

UNIVERSIDADE FEDERAL DE MINAS GERAIS
Faculdade de Odontologia
Colegiado de Pós-Graduação em Odontologia

Ana Carolina Marques Medeiros

**EXPOSIÇÕES OCUPACIONAIS A HIV E HBV EM AMBIENTES
ODONTOLÓGICOS: *REVISÃO SISTEMÁTICA, AVALIAÇÃO DA
QUALIDADE DOS REGISTROS DE ACIDENTES BIOLÓGICOS E
ANÁLISE DESCRITIVA COM MODELAGEM POR CLUSTERS***

Belo Horizonte
2025

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Orientador: Prof. Dr. Mauro Henrique Nogueira
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ANA CAROLINA MARQUES MEDEIROS

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RESUMO

Acidentes ocupacionais com exposição a materiais biológicos constituem importante problema de saúde pública, especialmente na prática odontológica, onde o uso intensivo de instrumentos perfurocortantes, a proximidade com a cavidade bucal e a dinâmica dos procedimentos elevam o risco de contato com fluidos potencialmente infectantes. Entre os agravos de maior relevância, destacam-se o vírus da imunodeficiência humana (HIV) e o vírus da hepatite B (HBV), cujo potencial de soroconversão reforça a necessidade de vigilância contínua e de estratégias de prevenção baseadas em evidências. Esta tese foi estruturada em três vertentes metodológicas complementares, que originaram produtos científicos independentes e articulados. A primeira consistiu em uma revisão sistemática global com metanálise, destinada a estimar a incidência de soroconversão ocupacional por HIV entre profissionais de saúde expostos a materiais biológicos. A busca foi realizada em seis bases bibliográficas internacionais e literatura cinzenta, com protocolo registrado na plataforma PROSPERO. Foram incluídos estudos observacionais, com sínteses quantitativas por modelos de efeitos aleatórios, estratificadas conforme tipo de exposição, uso de profilaxia pós-exposição (PEP) e completude do seguimento clínico, além de avaliação do risco de viés e da certeza da evidência. Os resultados indicaram baixa incidência de soroconversão ocupacional por HIV, com eventos raros mesmo em exposições percutâneas, elevada consistência entre os estudos e ausência de soroconversão entre indivíduos que utilizaram PEP, em contraste com taxas mais elevadas, embora ainda raras, entre aqueles com indicação, mas sem uso de PEP. A segunda vertente correspondeu à avaliação da qualidade da informação registrada nas fichas de notificação de acidentes com material biológico do Sistema de Informação de Agravos de Notificação (Sinan), relativas a ambientes odontológicos no município de Belo Horizonte entre 2006 e 2019. Foram analisados os atributos de completitude, consistência interna e duplicidade segundo diretrizes do Ministério da Saúde. Observou-se ausência de duplicidades e elevada completitude das variáveis obrigatórias; entretanto, variáveis essenciais de natureza clínica e assistencial, como exames laboratoriais, conduta adotada e evolução do caso, apresentaram completitude predominantemente ruim ou muito ruim, além de inconsistências relevantes, especialmente no campo “Evolução do caso”, indicando limitações do sistema para a avaliação do risco de infecção e o acompanhamento dos trabalhadores expostos. A terceira vertente envolveu um estudo observacional descritivo, baseado no mesmo banco de dados, com caracterização das exposições notificadas e aplicação do método TwoStep Cluster para identificação de perfis de risco. As exposições ocorreram predominantemente por via percutânea durante procedimentos clínicos, com uso incompleto de equipamentos de proteção e lacunas frequentes na documentação de exames laboratoriais e do seguimento pós-exposição. A análise de clusters identificou dois perfis distintos, um de menor risco biológico e outro associado a exposições mucosas e em pele não íntegra, maior proporção de fontes positivas ou desconhecidas e menor adequação das barreiras de proteção, sem registro de soroconversões para HIV, HBV ou HCV. A pesquisa foi aprovada pelos Comitês de Ética em Pesquisa da Universidade Federal de Minas Gerais (parecer nº 6.097.439) e da Secretaria Municipal de Saúde de Belo Horizonte (parecer nº 6.161.565).

Palavras-chave: exposição ocupacional; soroconversão; HIV; HBV; odontologia; sistema de informação em saúde.

ABSTRACT

Occupational seroconversion to HIV and HBV in dental setting: a systematic review, retrospective cohort study, and evaluation of SINAN data quality

Occupational accidents involving exposure to biological materials constitute an important public health problem, particularly in dental practice, where the intensive use of sharp instruments, close proximity to the oral cavity, and the dynamics of clinical procedures increase the risk of contact with potentially infectious fluids. Among the most relevant hazards are the human immunodeficiency virus (HIV) and the hepatitis B virus (HBV), whose potential for seroconversion underscores the need for continuous surveillance and evidence-based prevention strategies. This doctoral thesis was structured around three complementary methodological approaches, which resulted in independent and interconnected scientific products. The first approach consisted of a global systematic review with meta-analysis aimed at estimating the incidence of occupational HIV seroconversion among healthcare workers exposed to biological materials. The search was conducted in six international bibliographic databases and grey literature, with the protocol registered on the PROSPERO platform. Observational studies were included, and quantitative syntheses were performed using random-effects models, stratified according to type of exposure, use of post-exposure prophylaxis (PEP), and completeness of clinical follow-up, in addition to assessments of risk of bias and certainty of evidence. The results indicated a low incidence of occupational HIV seroconversion, with rare events even following percutaneous exposures, high consistency across studies, and no seroconversion among individuals who used PEP, in contrast to higher, although still rare, rates among those with indication but without PEP use. The second approach corresponded to an evaluation of the quality of information recorded in notification forms for accidents involving exposure to biological material in the Sistema de Informação de Agravos de Notificação (Sinan), referring to dental settings in the municipality of Belo Horizonte between 2006 and 2019. The attributes of completeness, internal consistency, and duplicity were analyzed according to guidelines of the Ministério da Saúde. The analysis showed no duplicate records and high completeness of mandatory variables. However, essential clinical and care-related variables, such as laboratory testing, post-exposure management, and case evolution, exhibited predominantly poor or very poor completeness, as well as relevant inconsistencies, particularly in the “Evolução do caso” field, indicating limitations of the system for infection risk assessment and adequate follow-up of exposed workers. The third approach involved a descriptive observational study based on the same dataset, with characterization of reported exposures and application of the TwoStep Cluster method to identify risk profiles. Exposures occurred predominantly via the percutaneous route during clinical procedures, with incomplete use of personal protective equipment and frequent gaps in the documentation of laboratory tests and post-exposure follow-up. Cluster analysis identified two distinct profiles, one characterized by lower biological risk and another associated with mucosal and non-intact skin exposures, a higher proportion of positive or unknown sources, and less adequate protective barriers, with no recorded seroconversions to HIV, HBV, or HCV. The study was approved by the Comitês de Ética em Pesquisa da Universidade Federal de Minas Gerais (approval no. 6.097.439) and the Secretaria Municipal de Saúde de Belo Horizonte (approval no. 6.161.565).

Keywords: occupational exposure; seroconversion; HIV; HBV; dentistry; health information systems.

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LISTA DE ABREVIATURAS E SIGLAS

Aids – Síndrome da Imunodeficiência Adquirida

Anti-HIV – Anticorpos contra o vírus da imunodeficiência humana

CAT – Comunicação de Acidente de Trabalho

CBO – Classificação Brasileira de Ocupações

CD – Cirurgiões-Dentistas

CDC – Centers for Disease Control and Prevention

CEP – Comitês de Ética em Pesquisa

CNAE – Classificação Nacional de Atividades Econômicas

Datasus – Departamento de Informática do SUS

EPI – Equipamentos de Proteção Individual

GRADE – *Grading of Recommendations Assessment, Development and Evaluation*

HBeAg – Antígeno e

HBsAg – Antígeno de Superfície do Vírus da Hepatite B

HBV – Vírus da Hepatite B

HCV – Vírus da Hepatite C

HIV – Vírus da Imunodeficiência Humana

HIV-1 – Vírus da Imunodeficiência Humana tipo 1

IGHAHB – Imunoglobulina Humana anti-Hepatite B

JBI – *Joanna Briggs Institute*

NHI – *National Institutes of Health*

OR – *Odds Ratio*

PAS – Profissionais da Área da Saúde

PNI – Programa Nacional de Imunização

PPE – Profilaxia Pós-Exposição

PU – Precauções Universais

SDNC – Sistema de Doenças de Notificação Compulsória

Sinan – Sistema de Informação de Agravos de Notificação

SIS – Sistemas de Informação em Saúde

SMS-BH – Secretaria Municipal de Saúde de Belo Horizonte

SUS – Sistema Único de Saúde

TCLE – Termo de Consentimento Livre e Esclarecido

TPD – Técnico em Prótese Dentária

TSB – Técnico em Saúde Bucal

UFMG – Universidade Federal de Minas Gerais

UNAIDS – Programa Conjunto das Nações Unidas sobre HIV/AIDS

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1 INTRODUÇÃO

A Saúde do Trabalhador constitui uma área essencial da saúde pública, direcionada à proteção dos indivíduos durante o exercício de suas atividades profissionais (Brasil, 1995). Preservar a saúde dos trabalhadores implica reconhecer, analisar e controlar os riscos ocupacionais, entre os quais se incluem agentes físicos, químicos e biológicos capazes de produzir agravos significativos à saúde (Brasil, 1995). No caso dos profissionais da saúde, as exposições acidentais a materiais biológicos potencialmente contaminados ainda representam eventos frequentes e de elevado risco, especialmente em serviços que lidam diretamente com fluidos corporais e procedimentos invasivos (Brasil, 2011). A preocupação é ampliada pela elevada prevalência de infecções transmissíveis, como HIV, HBV e HCV, na população mundial, que torna esses acidentes um problema persistente e relevante (Orestes-Cardoso, 2009).

Material biológico de risco compreende sangue e fluidos orgânicos potencialmente infectantes, capazes de transmitir agentes patogênicos quando ocorre contato com barreiras cutâneo-mucosas lesadas (Brasil, 2011). As exposições incluem acidentes percutâneos por instrumentos cortantes ou perfurantes, contato com mucosas oral, nasal e ocular, contato com pele não íntegra e mordeduras com sangue (Brasil, 2011; Lages *et al.*, 2015). O risco de infecção varia conforme a natureza da exposição, o tipo e a quantidade de fluido envolvido e o estado sorológico do paciente-fonte, aspectos amplamente descritos em diretrizes nacionais e internacionais (CDC, 1998; Brasil, 2011; Kuhar *et al.*, 2013; Santos, 2014).

Essas exposições configuram, ao mesmo tempo, uma urgência clínica e um desafio contínuo para as práticas de biossegurança e para a vigilância em saúde (Brasil, 2011; Kuhar *et al.*, 2013). Elas ocorrem em um contexto marcado por rotinas intensas, sobrecarga laboral, alta demanda assistencial, execução sucessiva de procedimentos, manipulação constante de perfurocortantes e contato direto com fluidos corporais. A literatura mostra que fatores como pressa, fadiga, acúmulo de tarefas e condições assistenciais adversas aumentam a vulnerabilidade dos trabalhadores e contribuem para a persistência dos riscos, mesmo em ambientes tecnicamente preparados (Maamor *et al.*, 2022; Lages *et al.*, 2015; Wicker *et al.*, 2008).

No contexto odontológico, essa vulnerabilidade assume contornos particulares. A prática clínica é realizada em um campo operatório reduzido, com visibilidade limitada e necessidade permanente de precisão manual. Instrumentos perfurocortantes são utilizados de forma intensiva e em proximidade direta com o paciente, frequentemente em situações que geram respingos, aerossóis e contato simultâneo com sangue e saliva. Tais condições aumentam o potencial de ocorrência de acidentes, especialmente entre estudantes e profissionais em formação, que ainda desenvolvem habilidades motoras finas e experiência clínica (Dantas Filho *et al.*, 2017; Machado-Carvalhais *et al.*, 2007; Sasamoto *et al.*, 2010). Mesmo com a adoção de precauções padrão, a literatura evidencia que os acidentes permanecem frequentes e muitas vezes subnotificados, o que limita a compreensão real da magnitude do problema (Machado-Carvalhais *et al.*, 2007; Sasamoto *et al.*, 2010).

Diante desse conjunto de fatores, torna-se evidente a importância de aprofundar o entendimento sobre as exposições ocupacionais em odontologia, considerando sua frequência, suas características e os riscos associados. Reconhecer a complexidade desses eventos e compreender suas implicações é essencial para fundamentar estratégias de prevenção, apoiar a formulação de políticas públicas baseadas em evidências e fortalecer a proteção dos trabalhadores da saúde.

2 REVISÃO DE LITERATURA

2.1 Antecedentes científicos: HIV, HBV e as respectivas quimioprofilaxias

Com o surgimento dos primeiros casos de infecção pelo HIV na década de 1980, os profissionais de saúde passaram a manifestar grande preocupação com a nova doença, até então pouco conhecida, mas inicialmente comparada ao perfil epidemiológico do HBV, que já era reconhecido como importante risco ocupacional (Henderson *et al.*, 1990). À época, já se reconhecia que o risco de transmissão acidental do HBV era significativamente superior ao do HIV (Hu *et al.*, 1991). A epidemia de HIV/Aids levou à normatização de medidas de segurança para os profissionais da saúde, que até então não eram considerados grupo de risco para acidentes laborais (Magagnini; Ayres, 2009).

Em 1983, o Centers for Disease Control and Prevention (CDC), órgão de referência nos Estados Unidos da América para controle de doenças, publicou recomendações específicas para precauções nos atendimentos a pacientes sabidamente infectados com patógenos de transmissão parenteral (CDC, 1987). A preocupação aumentou em 1987, com a publicação de novo relatório que alertava para o risco de transmissão ocupacional do HIV-1 também em exposições não parenterais (Henderson *et al.*, 1990). A partir dessas evidências, o CDC emitiu orientações que passaram a considerar todos os pacientes como potencialmente infectados, instituindo as chamadas Precauções Universais (PU), aplicáveis a qualquer atendimento. Essas medidas incluíam o uso de barreiras protetoras, como luvas, além da recomendação de vacinação contra a hepatite B. Em 1988, um documento do CDC já recomendava a aplicação das PU também em atendimentos odontológicos, considerando que a saliva poderia conter sangue e que havia alto risco de lesões manuais nos profissionais (CDC, 1988; Conitec, 2017). Em 1996, o CDC atualizou esse sistema de precauções, estruturando-o em duas etapas: as Precauções Padrão (ou Básicas), aplicáveis a todos os pacientes; e as precauções específicas para pacientes com infecção suspeita ou confirmada, subdivididas em precauções por aerossóis, gotículas e contato (Garner, 1996). Este modelo permanece em uso até hoje como base das medidas de biossegurança ocupacional.

Paralelamente à implantação das PU, foi conduzido um estudo prospectivo no Warren G. Magnuson Clinical Center do National Institutes of Health (NIH), iniciado no início da década de 1980, com 1.344 profissionais acompanhados por seis anos, com o objetivo de estimar o risco de transmissão ocupacional do HIV-1, inicialmente em exposições percutâneas. Após o relatório do CDC de 1987, a investigação passou a incluir exposições não parenterais, tornando-se o primeiro estudo com essa abrangência (Henderson et al., 1990). Trata-se de referência central para a estimativa do risco de transmissão ocupacional do HIV-1, com base em dados de soroconversão.

Nesse estudo, houve apenas uma soroconversão registrada, após corte profundo por material contaminado com sangue de paciente em estágio terminal de Aids, com viremia documentada três dias antes. O risco de transmissão por exposição percutânea foi estimado em 0,3 por cento (IC 95%: 0,13–0,70), ou seja, uma soroconversão a cada 333 exposições documentadas. O estudo também destacou fatores associados ao risco de infecção, incluindo o tipo de acidente, o estado imunológico do indivíduo exposto, a presença de receptores CD4 nos linfócitos T auxiliares, a carga viral do paciente-fonte, a realização adequada de primeiros socorros e as medidas de higiene adotadas pelo profissional acidentado. Ressalta-se que o estudo não avaliou a eficácia da profilaxia pós-exposição (PPE), e que, durante o período de observação, ainda não estavam estabelecidas as Precauções Universais como medida padrão de prevenção (Henderson et al., 1990).

Estudos posteriores, como o de Ippolito et al. (1993), também avaliaram o risco de soroconversão. Nesse estudo multicêntrico italiano, realizado no final da década de 1980, duas soroconversões foram documentadas entre profissionais da saúde expostos percutaneamente, totalizando taxa de infecção de 0,10 por cento. Nenhum dos casos relatou uso de profilaxia pós-exposição. Em um dos episódios, o profissional apresentou soroconversão após 43 dias do acidente e faleceu de Aids quatro anos depois.

A PPE, portanto, é reconhecida como um coadjuvante essencial na redução do risco de transmissão ocupacional. No Brasil, o Sistema Único de Saúde (SUS) passou a distribuir antirretrovirais gratuitamente em 1996 (Brasil, 2018). No entanto, ainda existem lacunas na literatura quanto à eficácia da PPE em diferentes cenários, e sua indicação nem sempre é realizada (Rouveix et al., 2014). Um estudo francês (2000–

2003) mostrou taxas de prescrição de PPE de apenas 35% para exposições ocupacionais, em contraste com 78% para exposições sexuais, explicadas pela maior facilidade em determinar o status da fonte no contexto ocupacional (Rouveix *et al.*, 2014). Apesar dessas limitações, evidências recentes apontam para uma redução de até 81% no risco de infecção por HIV com o uso adequado da PPE em ambientes ocupacionais (Mawbe *et al.*, 2017). Ainda assim, muitos Profissionais de Área da Saúde (PAS) relatam desconhecimento sobre os fluxos institucionais, protocolos e acesso à PPE (Garcia; Blank, 2008; Mawbe *et al.*, 2017).

Dada a prevalência global do HIV, a análise do risco ocupacional permanece relevante. Em 2024, aproximadamente 1,3 milhão de pessoas foram recém-infectadas pelo VIH, totalizando cerca de 40,8 milhões de pessoas vivendo com o vírus, e cerca de 630 mil mortes relacionadas à Aids foram registradas (Unaid, 2024). O desconhecimento do status sorológico por parte dos pacientes, especialmente nos atendimentos de urgência e emergência, aumenta a necessidade de se conhecer o risco real de soroconversão entre PAS (Almeida; Benatti, 2007). No Brasil, entre 2007 e junho de 2024, o Sistema de Informação de Agravos de Notificação (Sinan) registrou 541.759 casos de infecção pelo HIV (Brasil, 2024). No entanto, a notificação compulsória só foi implementada em 2004, o que limita a completude e profundidade da análise epidemiológica sobre o tema (Brasil, 2019).

Em paralelo, a situação epidemiológica do HBV também é preocupante. O vírus da hepatite B é altamente resistente e infeccioso, podendo sobreviver por até uma semana em superfícies secas e causar infecção com volumes mínimos de sangue contaminado (Fernandez *et al.*, 2013; Santos, 2014). Sua taxa de soroconversão em acidentes ocupacionais é alta, o que eleva o risco para PAS (Garbin *et al.*, 2017). Mesmo com vacinação, muitos infectados permanecem assintomáticos, e a subnotificação ainda é relevante (Garbin *et al.*, 2017). Embora o Brasil apresente baixa prevalência em âmbito mundial, regiões da África Subsaariana e Sudeste Asiático concentram as maiores taxas (Maamor *et al.*, 2022; Santos, 2014).

Tal como no HIV, o risco de infecção pelo HBV depende do tipo de exposição e do status imunológico do acidentado. A PPE com Imunoglobulina Hiperimune contra Hepatite B (IGHAHB), quando indicada, deve ser administrada até uma semana após a exposição, e o acompanhamento clínico deve durar seis meses (CDC, 2001; Santos,

2014). Em casos em que o sangue da fonte é positivo para antígeno de superfície da hepatite B (HBsAg) e para antígeno “e” da hepatite B (HBeAg), o risco de desenvolver a doença varia entre 22% e 31%, e a taxa de soroconversão entre 37% e 62%. Quando apenas o antígeno de superfície do vírus da hepatite B (HBsAg) está presente, sem detecção do antígeno “e” (HBeAg), o risco de infecção clínica cai para 1% a 6%, e a taxa de soroconversão varia entre 23% e 37% (CDC, 2001; Santos, 2014).

O risco ocupacional não se limita à exposição percutânea. Estudos de surtos hospitalares mostraram que muitos profissionais infectados não relataram acidentes com perfurocortantes, o que pode ser explicado pela resistência do vírus em superfícies contaminadas (CDC, 2001; Santos, 2014). Exposições em mucosas e pele não íntegra também são relevantes e não devem ser subestimadas (CDC, 2001; Santos, 2014).

A vacinação contra o HBV é composta por três doses (0, 30 e 180 dias), seguidas de teste para verificação da titulação de anticorpos. Estima-se que 10% dos vacinados não desenvolvem imunidade satisfatória, mesmo após revacinação (Garbin *et al.*, 2017). Um estudo realizado em Gana mostrou que três doses são imprescindíveis para níveis adequados de anticorpos (Obiri-Yeboah *et al.*, 2019). No Brasil, apesar de as vacinas existirem desde a década de 1980, sua incorporação no Programa Nacional de Imunização (PNI) só ocorreu em 1998, sendo estendida à população geral apenas em 2015 (Brasil, 2015). Esses antecedentes reforçam a importância de compreender, de forma integrada, os riscos de soroconversão ocupacional por HIV e HBV, especialmente em ambientes de alta exposição como os serviços odontológicos.

2.2 A odontologia e o acidente com material biológico

O ambiente odontológico passou por diversas transformações impulsionadas por avanços tecnológicos e por mudanças socioeconômicas em nível local e global. Em paralelo a essa evolução, surgiram novos riscos ocupacionais inerentes à prática profissional (Soaita, 2014). O desenvolvimento da odontologia favoreceu a

conformação de equipes multiprofissionais, compostas por cirurgiões-dentistas (CD), técnicos em saúde bucal (TSB), auxiliares em saúde bucal (ASB) e técnicos em prótese dentária (TPD), todos expostos potencialmente a sangue e fluidos contaminados (Brasil, 2006).

Além dos profissionais diretamente envolvidos no atendimento clínico, outros trabalhadores atuantes no ambiente odontológico, como funcionários da higienização, manutenção, setor administrativo e até profissionais de outras áreas da saúde, também estão sujeitos a acidentes com material biológico, em virtude da manipulação ou descarte inadequado de instrumentos e resíduos contaminados. Assim, a prática odontológica configura-se como um espaço de risco ampliado, com possibilidade de exposição ocupacional mesmo entre aqueles que não realizam procedimentos clínicos diretos (Dantas Filho *et al.*, 2017).

Dentre todos os integrantes das equipes de saúde bucal, os estudantes de odontologia se destacam como grupo de maior vulnerabilidade. Nas instituições de ensino, os acadêmicos geralmente são responsáveis pelo preparo e lavagem dos instrumentos utilizados nas aulas práticas, tarefa predominantemente manual que eleva o risco de acidentes. Fatores adicionais, como o uso incorreto de Equipamentos de Proteção Individual (EPI), a inexperiência técnica, o desconhecimento quanto à própria condição sorológica relacionada à imunização contra o HBV e a ausência de conhecimento sobre o fluxo de atendimento em casos de acidentes, ampliam ainda mais esse risco (Ramos Lages *et al.*, 2015).

Durante os procedimentos clínicos, são frequentes os ferimentos faciais decorrentes da projeção de materiais ou respingos de fluidos contaminados, sobretudo pelo uso de peças de alta rotação. Além disso, há risco constante de perfurações e cortes nas mãos dos profissionais com objetos perfurocortantes. Esse ambiente de exposição contínua pode gerar ansiedade nos trabalhadores diante da possibilidade de infecção (Fasunloro; Owotade, 2004). Entretanto, mesmo diante desse cenário, ainda é comum que acadêmicos e profissionais negligenciem o uso de máscaras e óculos de proteção durante o atendimento (Miglena Balcheva *et al.*, 2015).

2.3 Sistemas de Informação em Saúde e a qualidade dos dados

Os Sistemas de Informação em Saúde (SIS) desempenham papel fundamental na captação, processamento e disseminação de dados sobre as condições de saúde da população e o desempenho dos serviços (Correia *et al.*, 2014). No Brasil, sua estruturação teve início na década de 1970, por meio do Ministério da Saúde, sendo progressivamente ampliada com a criação de diversos sistemas ao longo das décadas seguintes. Embora sejam de base nacional, sua alimentação é obrigatoriamente realizada em nível estadual e municipal, configurando uma lógica de gestão compartilhada. O Departamento de Informática do SUS (Datasus) é o responsável pelo armazenamento e pela difusão desses dados aos usuários do sistema (Ferreira *et al.*, 2020). Com o avanço da informatização, a responsabilidade pelo processamento passou a ser atribuída às Secretarias Municipais de Saúde (SMS) (Correia *et al.*, 2014).

Entre os SIS existentes, destaca-se o Sistema de Informação de Agravos de Notificação (Sinan), voltado ao suporte das ações de vigilância epidemiológica (Barbosa; Barbosa, 2013). Desenvolvido na década de 1990, o Sinan tem como objetivo central a consolidação de uma base de dados secundária sobre agravos de notificação compulsória, permitindo estimar a magnitude desses eventos em âmbito nacional (Ministério da Saúde, 2019).

Em 2004, a Portaria nº 777 do Ministério da Saúde tornou obrigatória a notificação de doenças relacionadas ao trabalho, incluindo o acidente com material biológico. Inicialmente, essa notificação era realizada por meio do Sistema de Doenças de Notificação Compulsória (SDNC) (Teixeira *et al.*, 1998). Com a Portaria nº 104/2011, e com o avanço da informatização dos sistemas, passou a ser exigido que tais notificações fossem feitas exclusivamente via Sinan. Três anos depois, a Portaria nº 1.271/2014 estabeleceu a periodicidade semanal para as notificações, inclusive em instituições privadas, e instituiu uma ficha específica para o registro de acidentes de trabalho com material biológico (Brasil, 2004; Brasil, 2011; Brasil, 2014).

Embora os SIS representem fontes valiosas de dados secundários, sua qualidade pode variar significativamente, comprometendo a fidedignidade das

análises epidemiológicas. A função primordial dessas bases é permitir o monitoramento das condições de saúde da população e subsidiar o planejamento das ações em saúde. Para tanto, é indispensável assegurar a confiabilidade das informações (Correia *et al.*, 2014).

Segundo Paim *et al.* (1996), a qualidade da informação pode ser analisada a partir de uma perspectiva multidimensional. Três dimensões são propostas pelos autores: transcendente, intrínseca e contingencial. A dimensão transcendente está associada a uma ideia abstrata e atemporal de excelência, vinculada a valores filosóficos e subjetivos. Já a dimensão contingencial refere-se à percepção do usuário sobre a utilidade da informação e a adequação do seu formato. Por fim, a dimensão intrínseca contempla os atributos objetivos dos dados, como a completitude e a consistência, sendo particularmente relevantes para a avaliação técnica dos SIS. No estudo dos sistemas de informação em saúde, o termo "completeza" é frequentemente substituído por "completitude" (Correia *et al.*, 2014).

Essas duas últimas dimensões, completitude e consistência, são adotadas pelo Ministério da Saúde como parâmetros para avaliação e monitoramento da qualidade do acervo do Sinan. Conforme definido nos documentos técnicos:

Entende-se por completitude dos registros o grau de preenchimento dos campos existentes nas fichas de notificação e de investigação dos agravos notificados no Sinan. (Brasil, 2018, p. 5).

Consistência é a coerência entre as categorias assinaladas em dois campos relacionados. Deve ser avaliada, prioritariamente, a coerência entre dados de campos relacionados em que pelo menos um deles é necessário ao cálculo dos indicadores básicos (Brasil, 2019, p. 34).

O monitoramento dessas dimensões permite identificar as potencialidades e fragilidades dos dados registrados nos sistemas, qualificando o produto-informação gerado. No contexto do presente estudo, que utilizará os registros do Sinan para estimar taxas de soroconversão ocupacional por HIV e HBV em acidentes com material biológico, torna-se imprescindível acompanhar também a qualidade dos dados analisados, a fim de assegurar validade e confiabilidade às inferências produzidas.

2.4 Justificativa

A exposição ocupacional a material biológico permanece como um importante problema de saúde pública, especialmente em ambientes odontológicos, onde a combinação entre campo operatório restrito, visibilidade limitada, uso intensivo de instrumentos perfurocortantes e contato direto com fluidos corporais potencialmente infectantes aumenta de maneira significativa a suscetibilidade a acidentes, como já destacado (Dantas Filho *et al.*, 2017; Fasunloro; Owotade, 2004; Machado-Carvalho *et al.*, 2007). Mesmo com a adoção de precauções padrão, diferentes estudos mostram que acidentes continuam a ocorrer e, em muitos cenários, permanecem subnotificados, o que compromete a compreensão real da magnitude desse agravo entre profissionais e estudantes de odontologia (Gomes; Caldas, 2017; Sasamoto *et al.*, 2010).

A relevância epidemiológica das infecções por HIV e HBV reforça a necessidade de estudos que abordem a exposição ocupacional. Entretanto, há diferenças importantes na disponibilidade e qualidade das evidências para esses dois agravos. Em relação ao HBV, embora existam revisões recentes sobre infecção ocupacional em profissionais de saúde, como a de Senoo-Dogbey *et al.* (2024), os estudos primários que documentam soroconversão ocupacional são escassos, metodologicamente heterogêneos e, em grande parte, anteriores à ampla implementação da vacinação. Esse cenário limita a possibilidade de conduzir uma revisão sistemática com o mesmo rigor metodológico aplicável ao HIV, cujo corpo de evidências é mais robusto, diversificado e contemporâneo. Por essa razão, a síntese sistemática desta tese concentrou-se no HIV, enquanto o HBV foi mantido como desfecho nas análises observacionais.

Outro elemento essencial para compreender os acidentes ocupacionais no Brasil é a qualidade dos sistemas de informação. O Sistema de Informação de Agravos de Notificação (Sinan) constitui a principal ferramenta nacional para monitoramento desses eventos, dependendo diretamente da completude e consistência dos dados registrados. Contudo, diferentes estudos apontam inconsistências, campos incompletos ou preenchimentos inadequados que podem distorcer estimativas epidemiológicas e comprometer a vigilância (Barbosa; Barbosa,

2013; Gomes; Caldas, 2017; Maia *et al.*, 2014). Assim, qualquer análise baseada em dados secundários requer avaliação prévia de sua qualidade, de modo a assegurar que as conclusões reflitam adequadamente a realidade epidemiológica.

Diante dessas lacunas, o presente estudo foi estruturado para integrar três frentes complementares. A primeira, uma revisão sistemática sobre soroconversão ocupacional ao HIV, possibilita atualizar as estimativas globais de risco e identificar fatores associados à infecção em profissionais de saúde. A segunda vertente, voltada especificamente para a avaliação da qualidade dos registros de acidentes com material biológico em ambientes odontológicos no município de Belo Horizonte, examina completitude, duplicidade e consistência interna do banco, assegurando a validade das análises subsequentes. A terceira vertente, desenvolvida após a avaliação do banco, consiste em um estudo descritivo aprofundado, com aplicação de técnicas de agrupamento para identificar padrões de exposição, características das fontes, uso de equipamentos de proteção e demais variáveis relacionadas ao contexto assistencial.

A articulação dessas três abordagens permite compreender, simultaneamente, o risco epidemiológico, a confiabilidade dos registros utilizados para monitorar esses eventos e os perfis de exposição mais frequentes na prática odontológica. Com isso, esta tese contribui para o aprimoramento das práticas de biossegurança, para o fortalecimento da vigilância epidemiológica e para o desenvolvimento de políticas públicas mais efetivas na proteção dos trabalhadores da saúde expostos a material biológico no Brasil..

3 OBJETIVOS

3.1 Objetivo geral

Quantificar e analisar a ocorrência de soroconversão ocupacional ao HIV entre profissionais de saúde, por meio de uma revisão sistemática da literatura internacional e nacional, e caracterizar os acidentes com material biológico envolvendo risco para HIV e HBV em ambientes odontológicos no município de Belo Horizonte, no período de 2006 a 2019, incluindo a avaliação da qualidade das notificações e dos padrões de risco observados.

3.2 Objetivos específicos

- Estimar a incidência de soroconversão ocupacional ao HIV entre profissionais de saúde, por meio de uma revisão sistemática da literatura internacional e nacional;
- Avaliar a completitude, duplicidade e a consistência das fichas de notificação de acidentes com material biológico em ambientes odontológicos registrados no município de Belo Horizonte, no período de 2006 a 2019, no Sistema de Informação de Agravos de Notificação;
- Descrever as características dos acidentes com material biológico envolvendo profissionais e estudantes em ambientes odontológicos em Belo Horizonte, no período de 2006 a 2019, incluindo tipo de exposição, status da fonte, adequação de equipamentos de proteção e circunstâncias do evento;
- Identificar padrões de exposição e de risco associados aos acidentes com material biológico nesses ambientes por meio de análise de cluster baseada em variáveis relacionadas ao tipo de acidente, status da fonte, risco contextual para hepatite B e adequação dos equipamentos de proteção utilizados no momento da exposição.

4 HIPÓTESE

Hipótese nula (H_0): Não há diferença na probabilidade de soroconversão ocupacional ao HIV entre profissionais de saúde descrita nos estudos primários incluídos na revisão sistemática, independentemente do tipo de exposição, das características da fonte ou do uso de quimioprofilaxia pós-exposição.

Hipótese alternativa (H_a): A probabilidade de soroconversão ocupacional ao HIV varia de acordo com fatores relacionados ao tipo de exposição, às características da fonte e ao uso de quimioprofilaxia pós-exposição, conforme observado nos estudos primários incluídos na revisão sistemática.

Hipótese para a análise da qualidade das notificações do Sinan: As fichas de notificação e investigação de acidentes com material biológico em ambientes odontológicos registrados no município de Belo Horizonte entre 2006 e 2019 apresentam padrões de completude, duplicidade e consistência variáveis, com possível comprometimento da qualidade da informação para estimativas epidemiológicas.

Hipótese para a análise dos acidentes em odontologia (descrição + cluster): Os acidentes com material biológico envolvendo profissionais e estudantes em ambientes odontológicos em Belo Horizonte apresentam padrões específicos de risco, caracterizados pela combinação de tipo de exposição, status da fonte, risco contextual para hepatite B e adequação de equipamentos de proteção, agrupando-se em perfis distintos identificáveis pela análise de cluster.

5 METODOLOGIA EXPANDIDA

5.1 Delineamento dos estudos

Esta tese está estruturada em três vertentes metodológicas complementares, articuladas de forma integrada:

1. Uma revisão sistemática da literatura voltada à estimativa global da taxa de soroconversão ocupacional ao HIV entre profissionais de saúde.
2. Uma avaliação da qualidade da informação, conduzida por meio dos atributos de completitude, duplicidade e consistência das fichas de notificação referentes aos acidentes com material biológico registrados no Sistema de Informação de Agravos de Notificação (Sinan) para o município de Belo Horizonte, no período de 2006 a 2019, em ambientes odontológicos.
3. Um estudo observacional descritivo, baseado nos registros de acidentes com material biológico em ambientes odontológicos no município de Belo Horizonte, referente ao período de 2006 a 2019, incluindo identificação da ocorrência de soroconversão por HIV e HBV e identificação de padrões de risco por meio de técnicas de agrupamento.

5.2 Revisão Sistemática

A primeira vertente desta tese corresponde a uma revisão sistemática com metanálise, voltada à estimativa da incidência de soroconversão ocupacional para o vírus da imunodeficiência humana (HIV) entre profissionais de saúde expostos a sangue e fluidos corporais potencialmente contaminados. Foram considerados estudos publicados em nível internacional, sem restrição geográfica, no período compreendido entre 1985 e 2023, intervalo que abrange desde os primeiros relatos de transmissão ocupacional até o contexto contemporâneo de ampla disponibilidade da profilaxia pós-exposição.

Trata-se de um estudo secundário de síntese de evidências, com protocolo previamente registrado na base PROSPERO (CRD42023406192) e conduzido de

acordo com as diretrizes do PRISMA 2020. A formulação da pergunta de pesquisa seguiu o acrônimo CoCoPop, conforme recomendado pelo Joanna Briggs Institute (JBI) para revisões de prevalência e incidência, considerando como condição a soroconversão para o HIV, como contexto a exposição ocupacional a material biológico de risco e como população profissionais de saúde em âmbito internacional.

A revisão seguiu o referencial metodológico do Joanna Briggs Institute para revisões de prevalência/incidência. Foram incluídos estudos observacionais (coortes prospectivas, coortes retrospectivas e estudos transversais retrospectivos) que reportaram dados de soroconversão ao HIV após exposição ocupacional, com seguimento sorológico mínimo compatível com a janela imunológica da infecção, de modo a evitar subestimação do desfecho. Não foram aplicadas restrições quanto ao idioma de publicação.

A estratégia de busca foi conduzida de forma sistematizada em seis bases bibliográficas internacionais (MEDLINE/PubMed, Embase, Scopus, Web of Science, CINAHL e LILACS), sendo complementada por literatura cinzenta, incluindo buscas no Google Scholar, repositórios de teses e dissertações e análise das listas de referências dos estudos elegíveis. As estratégias de busca foram adaptadas às especificidades de cada base, mantendo equivalência conceitual entre os descritores e termos livres utilizados.

A seleção dos estudos foi realizada em duas etapas (triagem de títulos e resumos e leitura do texto completo), por dois revisores independentes, utilizando a plataforma Rayyan, com cegamento das decisões na fase inicial. Antes do início da seleção definitiva, os revisores passaram por processo de calibração, sendo considerado adequado nível de concordância superior a 80%. Divergências em qualquer etapa do processo foram resolvidas por discussão e consenso e, quando necessário, por consulta a um terceiro revisor sênior, especialista na temática, que atuou como referência metodológica para dirimir dúvidas relacionadas à elegibilidade, extração de dados ou interpretação dos critérios.

A avaliação do risco de viés dos estudos incluídos foi realizada por dois revisores independentes, utilizando o checklist do Joanna Briggs Institute para estudos de prevalência e incidência, com classificação do risco de viés conforme a

proporção de critérios atendidos. A extração dos dados foi conduzida de forma padronizada, contemplando informações sobre desenho do estudo, contexto, características da população, tipo de exposição, indicação e adesão à profilaxia pós-exposição (PEP), tempo de seguimento sorológico e ocorrência de soroconversão.

A síntese quantitativa foi realizada por meio de metanálises de proporções, com aplicação de transformações apropriadas para eventos raros, utilizando modelos de efeitos aleatórios. As análises foram estratificadas conforme tipo de exposição, uso ou não de PEP e completude do seguimento clínico. A heterogeneidade foi avaliada por meio das estatísticas I^2 e τ^2 , e a possibilidade de viés de publicação foi explorada com cautela, considerando as limitações inerentes a desfechos raros. Quando a síntese quantitativa não foi considerada apropriada, os resultados foram apresentados de forma narrativa.

A certeza da evidência foi avaliada por meio do método GRADE, considerando os domínios de risco de viés, inconsistência, imprecisão, indireção e viés de publicação, com classificação final da certeza da evidência para as estimativas de incidência. O protocolo da revisão sistemática e o manuscrito da revisão completa constituem os dois primeiros produtos científicos desta tese.

5.3 Estudos observacionais: avaliação da qualidade dos dados e estudo descritivo com técnicas de agrupamento

Esta pesquisa observacional compreende duas vertentes metodológicas articuladas:

1. uma avaliação da qualidade da informação, por meio da análise de completitude, duplicidade e consistência das fichas de notificação de acidentes com material biológico em ambientes odontológicos no município de Belo Horizonte, referente ao período de 2006 a 2019, registrados no sistema nacional de vigilância;

2. um estudo observacional descritivo dessa mesma base de dados, incluindo a identificação de padrões de risco por meio de técnicas de agrupamento (TwoStep Cluster).

5.3.1 População de estudo

Ambos os estudos observacionais desta tese utilizaram como base o mesmo banco de dados, composto pelas fichas de notificação/investigação de acidentes com material biológico registradas no Sistema de Informação de Agravos de Notificação (SINAN) entre os anos de 2006 e 2019, referentes ao município de Belo Horizonte. Essa base foi obtida junto à Secretaria Municipal de Saúde e inclui acidentes ocorridos em ambientes odontológicos, abrangendo pessoal remunerado ou não que atuava direta ou indiretamente nesses serviços, como cirurgiões-dentistas, técnicos e auxiliares em saúde bucal, estagiários, alunos, profissionais de higienização, manutenção, administrativo, entre outros.

Ao utilizar o banco completo de 2006 a 2019 disponível no banco e anterior à pandemia por Covid-19, busca-se assegurar uma visão abrangente dos acidentes ocorridos em ambientes odontológicos e permitir análises robustas sobre qualidade dos dados, incidência de soroconversão e adesão às medidas preventivas.

5.3.2 Critérios de inclusão e exclusão

Para assegurar a abrangência e qualidade da análise dos acidentes com exposição a material biológico em ambientes odontológicos, foram incluídos todos os registros constantes no Sistema de Informação de Agravos de Notificação (SINAN) do município de Belo Horizonte entre os anos de 2006 a 2019, com identificação do ambiente odontológico conforme pelo menos um dos critérios a seguir:

- Ocupação relacionada à odontologia, segundo os códigos da Classificação Brasileira de Ocupações (CBO) 2232 (cirurgiões-dentistas) e 3224 (técnicos de odontologia);
- Classificação Nacional de Atividades Econômicas (CNAE) compatível com estabelecimentos odontológicos, como 8630-5/04 (consultórios odontológicos) e 8650-0/03 (atividades de profissionais da área da saúde);
- Circunstância do acidente classificada com o código 13 (procedimento odontológico);
- Presença de palavras-chave como “odont*” no campo livre de observações, analisado por dois revisores independentes com validação pela Coordenação de Saúde do Trabalhador da Secretaria Municipal de Saúde de Belo Horizonte.

Foram excluídos os registros:

- Com data de acidente a partir de 2020, para evitar interferências da pandemia de Covid-19 na rotina de notificações;
- Com preenchimento incompleto ou inconsistente de variáveis-chave, conforme regras estabelecidas no manual técnico do Ministério da Saúde;
- Considerados duplicados após verificação determinística e probabilística com revisão manual, para o estudo de coorte;
- Com incompatibilidade entre a identificação do paciente-fonte e a realização de testes laboratoriais, conforme regras de consistência internas do banco.

Esses critérios foram para o banco de dados final utilizado nas duas vertentes desse eixo metodológico.

5.3.3 Estudo sobre avaliação da qualidade de dados

Os estudos descritivos fazem parte do grupo dos estudos observacionais nos quais não há comparação entre grupos, sendo utilizados para caracterizar padrões, frequências e distribuição de eventos ou agravos na população estudada (GORDIS, 2017). No presente estudo descritivo, foi utilizado todo o banco de dados Sinan,

incluindo as notificações de acidentes com material biológico em ambientes odontológicos no município de Belo Horizonte, entre os anos de 2006 e 2019, independentemente de haver ou não acompanhamento sorológico.

- A completitude foi avaliada conforme orientações do Ministério da Saúde (2019), considerando como incompletos tanto os campos deixados em branco quanto aqueles registrados como “ignorado”. A classificação seguiu a escala de Romero e Cunha (2007), adaptada pelo Ministério da Saúde, com os seguintes pontos de corte:
- Excelente: $\geq 95\%$;
- Bom: 90–94,9%;
- Regular: 70–89,9%;
- Ruim: 50–69,9%;
- Muito ruim: $< 50\%$.

A avaliação considerou variáveis obrigatórias e essenciais, conforme classificação operacional do Sinan (CEARÁ, 2017). No caso da variável “Gestante”, a categoria não se aplica foi considerada preenchimento válido para registros masculinos.

A consistência interna foi definida como a coerência lógica entre pares de variáveis que, segundo os fundamentos técnico-epidemiológicos do agravo (Ministério da Saúde, 2011; 2019), devem apresentar relação compatível. Foram avaliadas as combinações especificadas no protocolo, incluindo:

- Sexo $\times$ Gravidez;
- Idade $\times$ Tempo na Ocupação;
- Paciente-fonte conhecido $\times$ Resultados laboratoriais da fonte;
- Tipo de exposição $\times$ Agente causador;
- Tipo de exposição $\times$ Circunstância do acidente;
- Terceirização $\times$ Nome da empresa contratante;
- Evolução do caso $\times$ Desfecho esperado.

A consistência foi classificada como:

- Excelente: $\geq 90\%$ de registros consistentes;

- Regular: 70–89%;
- Baixa: <70%.

Foram examinadas também incompatibilidades conceituais, valores fora de intervalos plausíveis e temporalidades inviáveis.

A duplicidade foi definida como registros referentes ao mesmo acidente notificados mais de uma vez. A verificação foi realizada em duas etapas complementares:

- Determinística: cruzamento direto de nome, sexo, data de nascimento e data do acidente;
- Probabilística: uso de algoritmos de similaridade (Soundex e fonética) para identificar variações ortográficas.

Complementarmente, adotou-se uma janela temporal de até sete dias entre notificações de um mesmo indivíduo para identificar possíveis duplicações típicas de eventos agudos, considerando que o manual do sistema utiliza a semana epidemiológica (sete dias) como unidade de referência (BRASIL, 2007).

Registros identificados como potenciais duplicidades foram revisados manualmente. Após essa etapa, todos os identificadores foram codificados, assegurando sigilo e integridade ética dos dados.

5.3.4 Estudo observacional descritivo e análise de clusters

A terceira vertente metodológica corresponde a um estudo observacional descritivo, de abordagem quantitativa, conduzido com base nos registros de acidentes com material biológico em ambientes odontológicos do município de Belo Horizonte entre 2006 e 2019. Essa vertente utilizou o mesmo banco de dados estruturado para a avaliação da qualidade da informação, empregando todas as notificações elegíveis após os filtros ocupacionais e de local de ocorrência.

O estudo teve como objetivos:

1. caracterizar o perfil dos acidentes notificados, incluindo tipos de exposição, circunstâncias, materiais biológicos envolvidos e status sorológico das fontes;
2. verificar a ocorrência documentada de soroconversão ocupacional para HIV e HBV no período;
3. identificar possíveis padrões de risco entre as exposições por meio da aplicação do método TwoStep Cluster.

A análise descritiva compreendeu frequências absolutas e relativas das variáveis sociodemográficas, ocupacionais e relacionadas ao acidente. A identificação de soroconversão foi baseada nos registros de evolução e acompanhamento sorológico presentes nas fichas do Sinan.

Para explorar possíveis agrupamentos de risco, foi conduzida uma análise de *clusters TwoStep*, adequada para grandes bancos de dados e variáveis categóricas. O modelo incluiu variáveis como tipo de exposição, status sorológico da fonte, adequação do uso de EPI, material biológico envolvido e risco contextual para HBV. Categorias “sem informação” foram mantidas como válidas, conforme a lógica do manuscrito correspondente. O algoritmo identificou padrões diferenciados de acidentes, permitindo caracterizar perfis de exposição mais frequentes e potenciais combinações de risco em ambientes odontológicos.

A descrição detalhada do processamento dos dados, critérios de inclusão das variáveis, desempenho do modelo (coeficiente de silhueta, ΔBIC) e interpretação dos clusters está apresentada no manuscrito específico derivado desta vertente, correspondendo ao quarto produto científico desta tese.

5.3.5 Coleta de dados dos estudos

Conforme já apresentado, todos os acidentes com material biológico devem ser notificados, e a vigilância desses eventos é operacionalizada por meio da Ficha de Investigação do Sinan, registrada pelas instâncias de gestão municipal e estadual. O acesso ao banco de dados utilizado neste estudo foi viabilizado pela Secretaria

Municipal de Saúde de Belo Horizonte, mediante autorização formal da Prefeitura (Apêndices B e C), contemplando todas as notificações de acidentes de trabalho com material biológico ocorridas entre 2006 e 2019. O banco foi extraído sem aplicação do filtro “Não contar”, permitindo a identificação e posterior tratamento das duplicidades.

A mesma base de dados subsidiou as duas vertentes observacionais concluídas: a avaliação da qualidade da informação e o estudo descritivo com análise de clusters. Após a obtenção do banco bruto, foram aplicados os critérios de inclusão e exclusão previamente definidos, seguidos pelos procedimentos de padronização, limpeza, verificação de duplicidade, avaliação de consistência interna e categorização das variáveis. A etapa subsequente envolveu a preparação dos dados para as análises descritivas e para o modelo *TwoStep Cluster*, conforme descrito em suas respectivas seções metodológicas.

Para assegurar a integridade do processamento, a codificação dos campos de identificação dos acidentados foi realizada pela própria equipe de pesquisa, garantindo rastreabilidade durante a checagem de duplicidades. Todas as informações foram utilizadas exclusivamente para o desenvolvimento desta tese e dos manuscritos associados. Após a finalização das análises, os dados permanecerão armazenados pelo período regulamentar de cinco anos, sendo posteriormente eliminados, em conformidade com os princípios éticos e de sigilo estabelecidos para pesquisas com dados secundários.

5.3.6 Análise de dados

As análises foram conduzidas em duas etapas principais, correspondentes às vertentes observacionais deste estudo.

Na primeira etapa, referente à avaliação da qualidade da informação, foram realizadas análises específicas do banco de dados obtido do Sistema de Informação de Agravos de Notificação. Essa etapa incluiu:

1. análise de completitude, segundo a classificação adaptada de Romero e Cunha pelo Ministério da Saúde;

2. verificação da consistência interna, com base em regras operacionais definidas nos manuais técnicos; e
3. identificação de duplicidades por meio de métodos determinísticos e probabilísticos, complementados por revisão manual.

Todas essas análises foram automatizadas por meio de scripts desenvolvidos em *Python*, utilizando bibliotecas específicas para manipulação de dados, rotinas de verificação lógica e geração de métricas, assegurando reprodutibilidade, precisão e rastreabilidade dos procedimentos empregados. A descrição detalhada dos algoritmos, critérios e indicadores encontra-se apresentada no manuscrito específico referente à avaliação de qualidade.

Na segunda etapa, correspondente ao estudo observacional descritivo com análise de *clusters*, os dados validados foram convertidos para formato compatível com o *software IBM SPSS Statistics*, versão 26.0. Foram conduzidas análises descritivas das variáveis sociodemográficas, ocupacionais e relacionadas ao acidente, além da verificação de registros de acompanhamento sorológico. Com base nesses dados, foi aplicado o método *TwoStep Cluster* para identificar agrupamentos de exposições com padrões semelhantes. O modelo utilizou variáveis categóricas relacionadas ao tipo de exposição, status da fonte, adequação de Equipamentos de Proteção Individual (EPIs) e outros fatores contextuais, mantendo categorias “sem informação” como válidas, conforme descrito no manuscrito associado. Informações detalhadas sobre desempenho do modelo, coeficiente de silhueta e critérios de seleção estão apresentadas na seção de Resultados da vertente específica.

6 RESULTADOS E DISCUSSÃO

Os resultados e a discussão deste trabalho serão apresentados em formato de três produtos científicos.

6.1 Primeiro produto científico

O primeiro produto científico refere-se ao manuscrito “*Incidence of occupational HIV seroconversion among healthcare workers: a systematic review protocol*”, elaborado a partir da vertente metodológica da revisão sistemática com metanálise. O artigo foi aceito pelo periódico Revista de Enfermagem UFPE on line (REUOL), conforme e-mail do editor (Apêndice D). O periódico possui classificação B2 na área de Odontologia e na área de Saúde Coletiva, segundo o Qualis/CAPES mais recente.

Incidence of occupational HIV seroconversion among healthcare workers: a systematic review protocol

Incidência de soroconversão ocupacional para HIV entre profissionais de saúde: um protocolo de revisão sistemática

Incidencia de soroconversión ocupacional al VIH en profesionales sanitarios: protocolo de revisión sistemática

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ABSTRACT

Objective: to conduct a systematic review aimed at estimating the global incidence of HIV seroconversion among healthcare workers following occupational exposure to blood or potentially contaminated body fluids. **Method:** prospective and retrospective cohort studies, as well as retrospective cross-sectional studies, will be included. The search terms will include the following concepts: (1) HIV; (2) seroconversion; (3) occupational exposure to blood or potentially contaminated body fluids; and (4) healthcare workers. Searches will be conducted in seven electronic databases: MEDLINE (via PubMed), Embase, Scopus, Web of Science, Cochrane Database of Systematic Reviews, CINAHL (via Ovid), and Latin American and Caribbean Health Sciences Literature (*Literatura Latino-Americana e do Caribe em Ciências da Saúde* - LILACS via BVS). Gray literature will be consulted through Open Gray, Google Scholar, and manual searches of academic theses and dissertations. All retrieved studies will be assessed by two independent reviewers for eligibility, data extraction, methodological quality, risk of bias, and certainty of evidence. This protocol will be developed in accordance with the Joanna Briggs Institute methodology for systematic reviews of observational epidemiological studies. A narrative synthesis will be performed for all included studies, and a meta-analysis will be conducted if sufficient and homogeneous data are available. The systematic review report will follow the PRISMA guidelines.

Systematic review registration number: PROSPERO CRD42023406192.

Keywords: Healthcare workers; HIV; Occupational exposure; Blood; Seroconversion.

RESUMO

Objetivo: realizar uma revisão sistemática com o objetivo de estimar a incidência global de soroconversão ao HIV entre profissionais de saúde após a exposição ocupacional ao sangue ou fluidos corporais potencialmente contaminados. **Método:** serão incluídos estudos de coorte, prospectivos e retrospectivos, bem como estudos transversais retrospectivos. Os termos de busca incluirão os seguintes conceitos: (1) HIV; (2) soroconversão; (3) exposição ocupacional ao sangue ou fluidos corporais potencialmente contaminados; e (4) profissionais de saúde. As buscas serão realizadas em sete bases de dados eletrônicas: MEDLINE (via PubMed), Embase, Scopus, Web of Science, Cochrane Database of Systematic Reviews, CINAHL (via Ovid) e Literatura Latino-Americana e do Caribe em Ciências da Saúde (LILACS via BVS). A literatura cinzenta será consultada por meio do Open Gray, Google Acadêmico e buscas manuais em teses e dissertações acadêmicas. Os estudos recuperados serão avaliados por dois revisores independentes, quanto à elegibilidade, extração de dados, qualidade metodológica, risco de viés e certeza da evidência. Este protocolo será desenvolvido de acordo com a metodologia do Instituto Joanna Briggs para revisões sistemáticas de estudos epidemiológicos observacionais. Será realizada uma síntese narrativa de todos os estudos incluídos, e uma metanálise será conduzida caso haja dados suficientes e homogêneos. O relatório da revisão sistemática seguirá as diretrizes PRISMA.

Número de registro da revisão sistemática: PROSPERO CRD42023406192.

Descritores: Profissionais de saúde; HIV; Exposição ocupacional; Sangue; Soroconversão.

RESUMEN

Objetivo: realizar una revisión sistemática para estimar la incidencia global de soroconversión al VIH en profesionales sanitarios tras la exposición ocupacional a sangre o fluidos corporales potencialmente contaminados. **Método:** se incluirán estudios de cohorte prospectivos y retrospectivos, así como estudios transversales retrospectivos. Los términos de búsqueda incluirán los siguientes conceptos: (1) VIH; (2) seroconversión; (3) exposición ocupacional a sangre o fluidos corporales potencialmente contaminados; y (4) profesionales sanitarios. Las búsquedas se realizarán en siete bases de datos electrónicas: MEDLINE (via PubMed), Embase, Scopus, Web of Science, Base de Datos Cochrane de Revisiones Sistemáticas, CINAHL (via Ovid) y Literatura Latinoamericana y del Caribe en Ciencias de la Salud (LILACS via BVS). Se consultará la literatura gris a través de Open Gray, Google Scholar y búsquedas manuales de tesis y disertaciones académicas. Todos los estudios recuperados serán evaluados por dos revisores independientes en cuanto a elegibilidad, extracción de datos, calidad metodológica, riesgo de sesgo y certeza de la evidencia. Este protocolo se desarrollará de acuerdo con la metodología del Instituto Joanna Briggs para revisiones sistemáticas de estudios epidemiológicos observacionales. Se realizará una síntesis narrativa de todos los estudios incluidos y, si se dispone de datos suficientes y homogéneos, se realizará un metaanálisis. El informe de la revisión sistemática seguirá las directrices PRISMA.

Número de registro de la revisión sistemática: PROSPERO CRD42023406192.

Descriptores: Personal de salud; VIH; Exposición profesional; Sangre; Seroconversión.

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Introduction

Although the fight against HIV began in the 1980s, the virus's prevalence remains high worldwide, with approximately 39 million people infected.¹⁻² A recent report emphasized that global progress in combating the virus has slowed.³ Despite the decline in incidence on a worldwide scale over the past decade, new cases have been increasing in several regions, including Latin America, Eastern Europe, Asia, the Pacific, the Middle East, and North Africa. If current projections are maintained, the goal of reducing new infections to 370,000 by 2025 will not be achieved, with over 1 million new infections projected for that year.

A recent report highlights that, given the current high global prevalence of HIV and the potential health implications for infected patients, health care workers are expected to provide increasing care to this population.⁴ According to this report, about 2.5% of HIV infections among health care workers worldwide result from Occupational Exposure to Blood (OEB). OEB is defined as contact of healthcare workers with blood, tissues, or other potentially contaminated body fluids through percutaneous injuries, mucous membranes, and non-intact skin.⁵

A systematic review identified a high combined global prevalence of occupational exposure to blood and body fluids among healthcare workers during their careers, estimated at 56.6% (95% CI 47.3-65.4).⁶ In a subgroup analysis, the African region had the highest prevalence among the World Health Organization (WHO) regions, at 68.4% (95% CI 56.1-78.6). A report documented 58 confirmed cases of occupational HIV transmission in healthcare workers and 150 reported possible occupational transmissions in the United States.⁷ Early studies estimated the risk of occupational HIV seroconversion at a time when there were limited guidelines for managing occupational accidents, and Post-Exposure Prophylaxis (PEP) was neither recommended nor readily available during that period.⁸

And it should be noted that the biological risk is not the same for all exposures, varying with the type of exposure, the body fluid and tissue involved, and the serological status of both the source patient and the healthcare worker.⁹

A widely cited study estimated that the risk of HIV-1 transmission associated with a percutaneous exposure to blood from an infected patient is approximately 0.3% per exposure (95% CI 0.13–0.70), without evaluating the use of PEP.¹⁰ Subsequent studies have reported different estimates according to the characteristics of occupational exposure and the measures adopted in its management, such as adherence to PEP.¹¹⁻¹²

Another review estimated that approximately 64% of healthcare workers experienced needlestick injuries at some point during their career, a type of event that increases the risk of HIV infection among healthcare workers.^{5,13}

Thus, estimating a global seroconversion rate based on up-to-date scientific evidence is essential to clarify the magnitude of occupational HIV infection risk among health care workers exposed to blood and body fluids.^{8,14} To this end, it is necessary to provide accurate information on the measures of a disease occurrence, which can be assessed through prevalence, defined as the proportion or percentage of individuals who have a certain condition at a specific point in time, and incidence, which corresponds to the frequency of new cases over a defined period.¹⁵

A preliminary search conducted in the International Prospective Register of Systematic Reviews (PROSPERO), MEDLINE/PUBMED, Virtual Health Library (VHL), Centre for Reviews and Dissemination (CRD), the Cochrane Database of Systematic Reviews, JBI Evidence Synthesis, and the Information System of the Brazilian Health Technology Assessment Network (*Sistema de Informação da Rede Brasileira de Avaliação de Tecnologias em Saúde - SISREBRATS*) did not identify any current or ongoing systematic reviews on this topic. Only regional or national reviews and other reviews published nearly two decades ago were found, which do not allow for an updated global analysis.

Therefore, this systematic review aims to assess the global incidence rate of HIV seroconversion among healthcare workers reporting OBE.

Review question

As this is a systematic review focused on estimating the incidence of an outcome, the CoCoPop mnemonic will be used, in accordance with the Joanna Briggs Institute recommendations for this type of study. The acronym stands for: Co (Condition), Co (Context), and Pop (Population).¹⁵

The guiding research question is: What is the incidence rate of HIV seroconversion among healthcare workers following exposure to blood and/or potentially contaminated body fluids?

Seroconversion is the stage of infection after HIV acquisition, characterized by the development of specific antibodies.¹⁶ The interval between infection and the production of detectable antibodies corresponds to the window period, which ranges from six to eight weeks, during which seroconversion can be observed.¹⁷

Inclusion criteria**Condition**

This review will consider studies that evaluate HIV seroconversion.

Context

Studies investigating Occupational Exposure to Blood (OEB) among health care workers will be included. Exposures via different routes — percutaneous, mucocutaneous, and non-intact skin — will be accepted based on the definitions adopted by the original studies, provided they are associated with a risk of HIV infection.¹⁸

The WHO classifies risk factors for HIV infection, beyond occupational exposure, behaviors, into personal behaviors and conditions, such as: unprotected sexual intercourse; previous infection with other sexually transmitted disease, such as herpes, syphilis, gonorrhea, chlamydia, and bacterial vaginosis; sharing of sharp devices for drug and medication injection; alcohol or other psychoactive substance use associated with sexual activity; and receipt of unsafe injections, organ transplants, blood transfusions, and medical procedures performed with non-sterilized critical materials.¹⁹

Population

Studies including healthcare workers from any region of the world will be considered. The selected studies should provide the following data: study design, country and study setting, language and year of publication; sample size, individual characteristics of the studied population (professional category, age, and gender of participants); characteristics of occupational exposure (location of the accident, type of sharp material, type of injury, contaminated biological material); indication and adherence to Post-Exposure Prophylaxis, type of PEP used, and time interval between exposure to biological material and initiation of prophylaxis; rate of participants who seroconverted to HIV, comparison of seroconversion rates according to adherence or non-adherence to PEP, follow-up period; and outcome measures (methods used to assess seroconversion, prevalence and incidence measures - proportion/rate/indices), dropouts rates, missing data, presence of bias, and controlling for confounding factors such as socioeconomic conditions, previous health status, comorbidities, access to health services, and type of care assistance.

Types of studies

This review will include only observational studies that estimate the incidence or prevalence of HIV seroconversion among healthcare workers following Occupational

Exposure to Blood (OEB), including prospective and retrospective cohort studies, as well as retrospective cross-sectional studies. No restrictions will be applied regarding language or publication date. Studies will be eligible if they report a minimum follow-up period of four weeks between exposure and HIV serological testing, considering the immunological window period of infection.

After exposure, specific antibodies against HIV generally become detectable from the third or fourth week onward, with the peak of seroconversion occurring between the fourth and eighth week. Therefore, studies with shorter follow-up periods may underestimate the true occurrence of seroconversion, failing to capture all relevant cases.¹⁶

Case-control studies and clinical trials, literature review papers, case reports or series, opinion articles, conference and editorial abstracts, and studies with insufficient methodological quality to answer the research question will be excluded. Studies will also be excluded if the population does not belong to the category of health care workers, if they do not report data on the seroconversion rates, if they evaluate diseases other than HIV, or if they use duplicate samples from studies already included in the review.

Exposure

The exposure will be defined as reported occupational exposure to blood and body fluids among healthcare workers, including subgroups of those who adhered to Post-Exposure Prophylaxis (PEP) and those who did not.

Outcome

The primary outcome of this systematic review will be the incidence rate of HIV seroconversion among healthcare workers following OEB, defined as the proportion of individuals who seroconverted in relation to the total number of individuals exposed. Whenever possible, subgroup analyses will be conducted according to the use or non-use of PEP, the type of exposure (percutaneous, mucocutaneous, or contact with non-intact skin), and whether or not post-exposure serological follow-up was performed.

Method

The protocol for this systematic review is registered in PROSPERO (CRD42023406192) and follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.²⁰ This review adopts the methodological framework of the Joanna Briggs Institute (JBI) for systematic reviews of prevalence and incidence. The

process includes the following steps: formulation of the research question; definition of eligibility criteria; development of the search strategy; screening of titles and abstracts; selection of full texts; data extraction; synthesis of the extracted data; assessment of Risk of Bias (RoB) of the included studies; evaluation of the certainty of evidence; and manuscript writing.

Search strategy

The search strategy was based on descriptors selected from MeSH (available on the PubMed platform), Emtree (available on the Embase platform), and DeCS (available on the VHL platform), combined with Boolean operators. The search terms covered the following main concepts: (1) HIV; (2) seroconversion; (3) occupational exposure to blood and/or potentially contaminated body fluids; and (4) healthcare workers. The strategies were conceptually aligned across databases but adapted to the structure and indexing systems of each, using controlled vocabularies when applicable and free-text terms where necessary. While terminology and syntax may vary among platforms, efforts were made to maintain conceptual equivalence in all queries. The complete search strings for each database are presented in Appendix A.

The search will be conducted in seven databases: MEDLINE (via PubMed), Embase, Scopus, Web of Science, Cochrane Database of Systematic Reviews, CINAHL (via Ovid), and Latin American and Caribbean Health Sciences Literature (LILACS, via BVS). Gray literature will be consulted through OpenGrey – the European system for gray literature – and Google Scholar. Theses and dissertations will also be included. In Google Scholar, the first 200 retrieved references will be evaluated, following methodological recommendations for systematic searches.²¹ Finally, the reference lists of the selected studies will be reviewed to identify additional studies not captured through electronic search.

Study selection

Studies retrieved during the electronic search will be exported to EndNote v. 20.0 (Clarivate Analytics, PA, USA), and all duplicate references will be removed. Rayyan v. 2023 (Rayyan Systems Inc., MA, USA) will be used to facilitate the screening process. Two reviewers will independently and blindly screen the titles and abstracts according to the eligibility criteria. The Rayyan platform ensures that each reviewer's decisions remain masked during the initial screening phase. If a study does not provide sufficient information in the title or abstract, the full text will be obtained for further evaluation. When necessary, corresponding authors will be contacted via email to clarify study eligibility or provide missing

data. If no response is received or if critical data for synthesis remain unavailable, the study may be excluded, with the reason for exclusion clearly documented.

Studies selected by title/abstract will have their full texts analyzed for final inclusion by the reviewers. Disagreements at all stages will be solved through discussion and consensus. Before study selection, the reviewers will undergo training and calibration, with a third reviewer – either a senior researcher or principal investigator – serving as the gold standard, using a 10% sample of the retrieved studies. Intra- and inter-examiner agreement levels above 80% will be considered adequate. The search results, as well as the process of study selection and inclusion, will be fully reported in the final systematic review and presented in a PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) flow diagram.²²

Assessment of Risk of Bias

The assessment of risk of bias is a critical step, even in systematic reviews of prevalence and incidence, as it enhances the rigor of interpretation regarding the reliability of the estimates and helps identify methodological limitations that may affect the validity of the results. Therefore, this review will include a critical appraisal of all studies, following the Joanna Briggs Institute (JBI) recommendations for prevalence and incidence reviews.^{15,22} The risk of bias of the included studies will be assessed by two independent reviewers, and disagreements will be resolved through discussion and consensus. Reviewers will undergo training and calibration with the support of a senior researcher.

The JBI Critical Appraisal Tool for prevalence and incidence studies will be applied according to the design and characteristics of each study.¹⁵ This instrument includes nine domains, *classified* as “yes”, “no”, “not applicable”, or “unclear”. Each “yes” response will correspond to one point, and the proportion of positive responses will be used to classify the risk of bias. For quantitative analysis, studies will be classified as having low risk of bias ($\geq 70\%$ of criteria met), moderate risk (50–69%), or high risk ($< 50\%$). All studies, regardless of classification, will be included for data extraction and, where appropriate, data synthesis.

The interpretation of the appraisal domains will be contextualized to the specific nature of occupational exposures to blood and/or potentially contaminated body fluids, considering variations in institutional or national follow-up protocols. In addition to the overall risk classification, the proportion of studies that met each domain will be reported to enhance transparency and to identify potential patterns of bias among the included studies.

Data extraction

Data will be independently extracted by two reviewers who have been previously trained by a senior researcher. Disagreements will be resolved through discussion and consensus. A standardized data extraction tool adapted from the Joanna Briggs Institute (JBI) for prevalence and incidence studies will be used, considering the longitudinal nature of the outcome of interest - HIV seroconversion following occupational exposure.

The following information will be extracted from each included study: study design, country and study setting, language and year of publication; sample size and population characteristics (professional category, age, sex); characteristics of the occupational exposure (location of the accident, type of sharp object, nature of injury, type of biological material); indication, adherence, and type of PEP, as well as time elapsed between exposure and initiation of PEP; HIV seroconversion rate; comparison of seroconversion rates according to PEP adherence; follow-up period; outcome measures (testing methods, and measures of incidence or prevalence); drop-outs rate, missing data, presence of bias, and control of confounding factors (e.g., socioeconomic status, previous health status, comorbidities, access to healthcare services, and type of care provided).

In case of missing data, the corresponding authors will be contacted whenever possible. Inclusion in the meta-analysis will depend on the availability of data for different subgroups, such as the number of individuals who completed or did not complete serological follow-up, adherence or non-adherence to PEP, and the type of exposure. Heterogeneity resulting from variations in follow-up protocols will be considered in the assessment of the certainty of evidence and explored through subgroup and sensitivity analyses.

Data synthesis

The synthesis in this type of review aims to collect and summarize data from the selected studies and may be conducted through both quantitative and qualitative approaches. Statistical techniques, such as meta-analysis, will be applied when methodological homogeneity is identified.²³ Statistical analyses will be performed in RStudio (RStudio, Boston, MA, USA) using the meta package, specifically designed for proportion meta-analyses, when applicable.

The primary outcome will be standardized as the proportion of HIV seroconversion (cumulative incidence), calculated as the number of seroconverted healthcare workers divided by the total number of exposed individuals, regardless of whether serological follow-up was completed, depending on the type of analysis. The Freeman-Tukey double arcsine

transformation will be used, as it is considered appropriate for rare outcomes, providing variance stabilization and the inclusion of studies with zero events without continuity correction.²⁴

Fixed-effect models will be employed, considering the low expected variability of the outcome and the robustness of this transformation under very low incidence contexts.²⁵ Heterogeneity will be assessed using the I^2 statistic with 95% confidence intervals, along with the tau-squared (τ^2), which estimates between-study variance.²¹ Studies with disproportionate weights or near-zero variances may be excluded to prevent distortion in the pooled estimates.²⁴

Publication bias will be assessed using funnel plots²⁶ and Egger's test²⁷, and with interpretation conducted cautiously due to their known limitations in meta-analyses of rare events.²⁴ Stratified meta-analyses will be performed according to the type of exposure (percutaneous or mucocutaneous), adherence to Post-Exposure Prophylaxis (PEP), and the presence or absence of serological follow-up.²⁸

When applicable, sensitivity analyses will be conducted, including only studies classified as low risk of bias according to the JBI critical appraisal tool. When statistical pooling is not feasible, the findings will be presented narratively, supported by summary tables and figures to facilitate interpretation.²⁹ Limitations arising from regional and temporal heterogeneity in populations and protocols will be acknowledged, which may restrict the feasibility or interpretability of pooled estimates.

Concluding Remarks

Assessing certainty in the findings

The certainty of evidence will be independently assessed by two reviewers using the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) approach.³⁰ The certainty of evidence will be classified as high, moderate, low, or very low, based on five domains: risk of bias, inconsistency, imprecision, indirectness, and publication bias. Observational studies start at "low" certainty level and may be downgraded due to methodological limitations or upgraded based on the magnitude of the effect, evidence of a dose-response gradient, or plausible residual confounding that would reduce the observed effect.³⁰

Although GRADE was originally developed for systematic reviews of interventions (such as randomized controlled trials), its application has been extended to reviews of

observational studies reporting frequency outcomes, such as prevalence and incidence, particularly with methodological support from the Joanna Briggs Institute.¹⁵

Thus, the certainty of cumulative incidence estimates of HIV seroconversion will be assessed across all included observational studies, with results synthesized in a summary of findings table.

Authors Contributions

Study design: Ana Carolina Marques-Medeiros, Lívia Guimarães Zina, Suellen da Rocha Mendes, Mauro Henrique Nogueira Guimarães de Abreu.

Data collection: Ana Carolina Marques-Medeiros, Lívia Guimarães Zina, Suellen da Rocha Mendes, Mauro Henrique Nogueira Guimarães de Abreu.

Data analysis and interpretation: Ana Carolina Marques-Medeiros, Lívia Guimarães Zina, Suellen da Rocha Mendes, Mauro Henrique Nogueira Guimarães de Abreu.

Manuscript writing: Ana Carolina Marques-Medeiros, Lívia Guimarães Zina, Suellen da Rocha Mendes, Mauro Henrique Nogueira Guimarães de Abreu.

Critical review of the manuscript: Ana Carolina Marques-Medeiros, Lívia Guimarães Zina, Suellen da Rocha Mendes, Mauro Henrique Nogueira Guimarães de Abreu, Brune de Sousa Faria Costa; Rafaela da Silveira Pinto.

Approval of the final version of the text: Lívia Guimarães Zina, Mauro Henrique Nogueira Guimarães de Abreu.

Conflict of interest

No ethical approval is required for the conduct of this systematic review, as only secondary data will be used for the analyses.

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Excluir essa seção, em caso contrário.

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References

1. Joint United Nations Programme on HIV/AIDS (UNAIDS). The path that ends AIDS: UNAIDS Global AIDS Update 2023 [Internet]. Geneva: UNAIDS; 2023 [cited 2025 Feb 12]. Available from: <https://www.unaids.org/en/resources/documents/2023/global-aids-update-2023>
2. Lee JB, Choi JS. Epidemiology of occupational exposure to blood-borne viruses, postexposure prophylaxis and seroconversion over 10 years among healthcare workers. *J Hosp Infect* [Internet]. 2023;135:18-27 [cited 2025 Jan 23]. Available from: <https://www.sciencedirect.com/science/article/pii/S0195670123000476?via%3Dihub>. DOI: <https://doi.org/10.1016/j.jhin.2023.02.010>
3. Joint United Nations Programme on HIV/AIDS (UNAIDS). In danger: UNAIDS global AIDS update 2022 [Internet]. Geneva: UNAIDS; 2022 [cited 2025 Mar 02]. Available from: https://www.unaids.org/sites/default/files/media_asset/2022-global-aids-update-summary_en.pdf
4. World Health Organization (WHO). The world health report 2002: reducing risks, promoting healthy life [Internet]. Geneva: World Health Organization; 2002 [cited 2025 Feb 06]. Available from: <https://www.who.int/publications/i/item/9241562072>
5. Tsega D, Gintamo B, Mekuria ZN, Demissie NG, Gizaw Z. Occupational exposure to HIV and utilization of post-exposure prophylaxis among healthcare workers at St. Peter's specialized hospital in Addis Ababa, Ethiopia. *Sci Rep* [Internet]. 2023;13(1) [cited 2025 Feb 04]. Available from: <https://www.nature.com/articles/s41598-023-34250-4>. DOI: <https://doi.org/10.1038/s41598-023-34250-4>
6. Mengistu DA, Dirirsa G, Mati E, Ayele DM, Bayu K, Deriba W, Alemu FK, Demmu YM, Asefa YA, Geremew A. Global occupational exposure to blood and body fluids among healthcare workers: systematic review and meta-analysis. *Can J Infect Dis Med Microbiol* [Internet]. 2022[cited 2025 Feb 04];2022:5732046. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC9187485/>. DOI: <https://doi.org/10.1155/2022/5732046>
7. Centers for Disease Control and Prevention (CDC). HIV occupational transmission [Internet]. Atlanta: Centers for Disease Control and Prevention; 2019 [cited 2025 Mar 20]. Available from: <https://www.cdc.gov/hiv/causes/occupational-transmission.html>
8. Beekmann SE, Henderson DK. Prevention of human immunodeficiency virus and AIDS postexposure prophylaxis (including health care workers). *Infect Dis Clin North Am* [Internet]. 2014[cited 2025 Feb 11];28(4):601-+. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4253549/>. DOI: <https://doi.org/10.1016/j.idc.2014.08.003>
9. Centers for Disease Control and Prevention (CDC). Perspectives in disease prevention and health promotion update: universal precautions for prevention of transmission of human immunodeficiency virus, hepatitis B virus, and other bloodborne pathogens in health-care settings [Internet]. Atlanta: Centers for Disease Control and Prevention; 1988[cited 2025 Mar 05]. Available from: <https://www.cdc.gov/mmwr/preview/mmwrhtml/00000039.htm>
10. Henderson DK, Fahey BJ, Willy M, Schmitt JM, Carey K, Koziol DE, Lane HC, Fedio J, Saah AJ. Risk for occupational transmission of human immunodeficiency virus type 1 (HIV-1) associated with clinical exposures: a prospective evaluation. *Ann Intern Med* [Internet]. 1990[cited 2025 Feb 21];113(10):740-6. Available from: <https://www.acpjournals.org/doi/10.7326/0003-4819-113-10-740>. DOI: <https://doi.org/10.7326/0003-4819-113-10-740>
11. Baggaley RF, Boily MC, White RG, Alary M. Risk of HIV-1 transmission for parenteral exposure and blood transfusion: a systematic review and meta-analysis. *AIDS* [Internet]. 2006[cited 2025 Jan 29];20(6):805-12. Available from: https://journals.lww.com/aidsonline/fulltext/2006/04040/risk_of_hiv_1_transmission_

- for_parenteral_exposure.3.aspx.
DOI:<https://doi.org/10.1097/01.aids.0000218543.46963.6d>
12. Tokars JI, Marcus R, Culver DH, Schable CA, McKibben PS, Bandea CI, Bell DM. Surveillance of HIV infection and zidovudine use among health care workers after occupational exposure to HIV-infected blood. *Ann Intern Med* [Internet]. 1993[cited 2025 Mar 01];118(12):913-9. Available from: <https://www.acpjournals.org/doi/10.7326/0003-4819-118-12-199306150-00001>. DOI:<https://doi.org/10.7326/0003-4819-118-12-199306150-00001>
 13. Mengistu DA, Tolera ST, Demmu YM. Worldwide prevalence of occupational exposure to needle stick injury among healthcare workers: a systematic review and meta-analysis. *Can J Infect Dis Med Microbiol* [Internet]. 2021[cited 2025 Feb 22];2021:1-9. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7864758/>. DOI:<https://doi.org/10.1155/2021/9019534>
 14. Cardo DM, Culver DH, Ciesielski CA, Srivastava PU, Marcus R, Abiteboul D, Heptonstall J, Ippolito G, Lot F, McKibben PS, Bell DM, Centers for Disease Control and Prevention Needlestick Surveillance Group. A case-control study of HIV seroconversion in health care workers after percutaneous exposure. *N Engl J Med* [Internet]. 1997[cited 2025 Feb 17];337(21):1485-90. Available from: <https://www.nejm.org/doi/10.1056/NEJM199711203372101>. DOI:<https://doi.org/10.1056/NEJM199711203372101>
 15. Munn Z, McInnes SM, Lisy K, Riitano D, Tufanaru C. Methodological guidance for systematic reviews of observational epidemiological studies reporting prevalence and cumulative incidence data. *Int J Evid Based Healthc* [Internet]. 2015[cited 2025 Feb 15];13(3):147-53. Available from: https://journals.lww.com/ijebh/fulltext/2015/09000/methodological_guidance_for_systematic_reviews_of.6.aspx. DOI:<https://doi.org/10.1097/XEB.0000000000000054>
 16. Mindel A, Tenant-Flowers M. ABC of AIDS: natural history and management of early HIV infection. *BMJ* [Internet]. 2001[cited 2025 Feb 10];322(7297):1290-3. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1120386/>. DOI:<https://doi.org/10.1136/bmj.322.7297.1290>
 17. Hashida S, Hashinaka K, Nishikata I, Oka S, Shimada K, Saito A, Takamizawa A, Shinagawa H, Ishikawa E. Shortening of the window period in diagnosis of HIV-1 infection by simultaneous detection of p24 antigen and antibody IgG to p17 and reverse transcriptase in serum with ultrasensitive enzyme immunoassay. *J Virol Methods* [Internet]. 1996[cited 2025 Feb 01];62(1):43-53. Available from: <https://www.sciencedirect.com/science/article/pii/0166093496020873?via%3Dihub>. DOI:[https://doi.org/10.1016/0166-0934\(96\)02087-3](https://doi.org/10.1016/0166-0934(96)02087-3)
 18. Petersen JM, Barrett M, Ahrens KA, Murray EJ, Bryant AS, Hogue CJ, Mumford SL, Gadupudi S, Fox MP, Trinquart L. The confounder matrix: a tool to assess confounding bias in systematic reviews of observational studies of etiology. *Res Synth Methods* [Internet]. 2022[cited 2025 Feb 13];13(2):242-54. Available from: <https://onlinelibrary.wiley.com/doi/full/10.1002/jrsm.1544>. DOI:<https://doi.org/10.1002/jrsm.1544>
 19. World Health Organization (WHO). HIV and AIDS [Internet]. Geneva: World Health Organization; 2024[cited 2025 Mar 03]. Available from: <https://www.who.int/news-room/fact-sheets/detail/hiv-aids>
 20. Shamseer L, Moher D, Clarke M, Gherzi D, Liberati A, Petticrew M, Shekelle P, Stewart LA. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. *BMJ* [Internet]. 2015[cited 2025 Jan 27];349:g7647. Available from: <https://www.bmj.com/content/349/bmj.g7647>. DOI:<https://doi.org/10.1136/bmj.g7647>

21. Haddaway NR, Collins AM, Coughlin D, Kirk S. The role of Google Scholar in evidence reviews and its applicability to grey literature searching. PLoS One [Internet]. 2015[cited 2025 Feb 18];10(9):e0138237. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4574933/>. DOI:<https://doi.org/10.1371/journal.pone.0138237>
22. Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart LA. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. Syst Rev [Internet]. 2015[cited 2025 Jan 27];4(1):1. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4320440/>. DOI:<https://doi.org/10.1186/2046-4053-4-1>
23. Higgins JPT, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta-analyses. BMJ [Internet]. 2003[cited 2025 Jan 30];327(7414):557-60. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC192859/>. DOI:<https://doi.org/10.1136/bmj.327.7414.557>
24. Chen Y, Chen D, Wang Y, Han Y. Using Freeman-Tukey double arcsine transformation in meta-analysis of single proportions. Aesthetic Plast Surg [Internet]. 2023[cited 2025 Feb 08];47(Suppl 1):83-4. Available from: <https://link.springer.com/article/10.1007/s00266-022-02977-6>. DOI:<https://doi.org/10.1007/s00266-022-02977-6>
25. Borenstein M, Hedges LV, Higgins JP, Rothstein HR. A basic introduction to fixed-effect and random-effects models for meta-analysis. Res Synth Methods [Internet]. 2010[cited 2025 Feb 19];1(2):97-111. Available from: <https://onlinelibrary.wiley.com/doi/10.1002/jrsm.12>. DOI:<https://doi.org/10.1002/jrsm.12>
26. Biljana M, Jelena M, Branislav J, Milorad R. Bias in meta-analysis and funnel plot asymmetry. Stud Health Technol Inform [Internet]. 1999[cited 2025 Jan 28];68:323-8. Available from: <https://ebooks.iospress.nl/publication/17906>. DOI:<https://doi.org/10.3233/978-1-60750-915-8-323>
27. Egger M, Smith GD, Schneider M, Minder C. Bias in meta-analysis detected by a simple, graphical test measures of funnel plot asymmetry. BMJ [Internet]. 1997[cited 2025 Feb 02];315:629-34. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2127453/>. DOI:<https://doi.org/10.1136/bmj.315.7109.629>
28. Berkey CS, Hoaglin DC, Mosteller F, Colditz GA. A random-effects regression model for meta-analysis. Stat Med [Internet]. 1995[cited 2025 Feb 05];14(4):395-411. Available from: <https://pubmed.ncbi.nlm.nih.gov/7746979/>. DOI:<https://doi.org/10.1002/sim.4780140406>
29. Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA. Cochrane handbook for systematic reviews of interventions [Internet]. London: Cochrane; 2019[cited 2025 Feb 20]. Available from: <https://training.cochrane.org/handbook>. DOI:<https://doi.org/10.1002/9781119536604>
30. Zhang Y, Akl EA, Schünemann HJ. Using systematic reviews in guideline development: the GRADE approach. Res Synth Methods [Internet]. 2019[cited 2025 Feb 09];10(3):312-29. Available from: <https://onlinelibrary.wiley.com/doi/10.1002/jrsm.1313>. DOI:<https://doi.org/10.1002/jrsm.1313>

Label 1 - Appendix I: Search strategy - Description of Boolean search string for each database on April 21th, 2023 and updated on April 1st, 2024.

Database	Query	Record retrieved

MEDLINE/PUBMED	("HIV"[MeSH Terms] OR "HIV" OR "human immunodeficiency virus" OR "Human-T-Cell-Lymphotropic Virus-Type-III" OR Human-T-Cell Leukemia-Virus-Type-III OR "LAV-HTLV-III" OR "LAV" OR Lymphadenopathy-Associated-Virus OR "AIDS" OR "Acquired Immunodeficiency Syndrome"[Mesh Terms] OR acquired-immune-deficiency-syndrome OR "HTLV-III" OR lymphadenopathy-associated-retrovirus OR "HIV Infections"[Mesh:NoExp]) AND ("Seroconversion"[MeSH Terms] OR "seroconversion" OR Seropositiv* OR Anti-HIV-Positivit* OR HIV-Antibody-Positivit*) AND ("Occupational Exposure"[MeSH Terms] OR "occupational exposure*" OR "accidents, occupational"[MeSH Terms] OR "Occupational Accident*" OR "Exposure" OR occupational-risk* OR "job related accident*" OR "job related injur*" OR "occupation-related-injur*" OR "work-related accident*" OR "work-related injur*" OR needle-stick* OR percutaneous* OR needle* OR "needles"[MeSH Terms] OR sharps-injur* OR sharps-accident*) AND ("Health Personnel"[MeSH Terms] OR "health care worker" OR health-care-worker* OR "health care personnel" OR health-care-personnel OR employee* OR "occupational groups"[MeSH Terms] OR "health personnel" OR "health care practitioner*" OR "Health practitioner*" OR "health care provider*" OR health-care-professional* OR healthcare-professional* OR "Health Care Professional" OR health-professional* OR "health professional" OR health-worker* OR "health worker" OR "medical staff" OR "dental staff" OR medical-professional* OR medical-practitioner* OR "medical personnel" OR dentist* OR nurs*)	633
EMBASE	('human immunodeficiency virus'/exp OR 'human immunodeficiency virus' OR HIV OR 'human immunodeficiency virus 1' OR 'human immunodeficiency virus 2' OR AIDS OR 'acquired immune deficiency syndrome'/exp OR 'human immunodeficiency virus infection'/exp) AND ('seroconversion'/exp OR 'seropositivity' OR 'anti hiv positivit*' OR 'hiv antibody positivit*') AND ('occupational exposure'/exp OR 'occupational accident'/exp OR exposure OR 'occupational hazard' OR 'needlestick injury' OR 'needle'/exp OR 'sharps injury') AND ('health care personnel'/exp OR 'health care worker*' OR 'employee' OR 'health practitioner' OR 'health care professional' OR 'medical staff' OR 'dental staff' OR 'medical professional*' OR 'medical practitioner*' OR 'medical personnel' OR 'dentist*' OR nurs*)	351
COCHRANE	("HIV"[MeSH Terms] OR "HIV" OR "human immunodeficiency virus" OR "Human-T-Cell-Lymphotropic Virus-Type-III" OR Human-T-Cell Leukemia-Virus-Type-III OR "LAV-HTLV-III" OR "LAV" OR Lymphadenopathy-Associated-Virus OR "AIDS" OR "Acquired Immunodeficiency Syndrome"[Mesh Terms] OR acquired-immune-deficiency-syndrome OR "HTLV-III" OR lymphadenopathy-associated-retrovirus OR "HIV Infections"[Mesh:NoExp]) AND ("Seroconversion"[MeSH Terms] OR "seroconversion" OR Seropositiv* OR Anti-HIV-Positivit* OR HIV-Antibody-Positivit*) AND ("Occupational Exposure"[MeSH Terms] OR "occupational exposure*" OR "accidents, occupational"[MeSH Terms] OR "Occupational Accident*" OR "Exposure" OR occupational-risk* OR "job related accident*" OR "job related injur*" OR "occupation-related-injur*" OR "work-related accident*" OR "work-related injur*" OR needle-stick* OR percutaneous* OR needle* OR "needles"[MeSH Terms] OR sharps-injur* OR sharps-accident*) AND ("Health Personnel"[MeSH Terms] OR "health care worker" OR health-care-worker* OR "health care personnel" OR health-care-personnel OR employee* OR "occupational groups"[MeSH Terms] OR "health personnel" OR "health care practitioner*" OR "Health practitioner*" OR "health care provider*" OR health-care-professional* OR healthcare-professional* OR "Health Care Professional" OR health-professional* OR "health professional" OR health-worker* OR "health worker" OR "medical staff" OR "dental staff" OR medical-	54

	professional* OR medical-practitioner* OR "medical personnel" OR dentist* OR nurs*)	
WEB OF SCIENCE	(“HIV” OR “human immunodeficiency virus” OR “Human-T-Cell-Lymphotropic Virus-Type-III” OR Human-T-Cell Leukemia-Virus-Type-III OR “LAV-HTLV-III” OR “LAV” OR Lymphadenopathy-Associated-Virus OR “AIDS” OR “Acquired Immunodeficiency Syndrome” OR acquired-immune-deficiency-syndrome OR “HTLV-III” OR lymphadenopathy-associated-retrovirus OR “HIV Infections”) AND (“Seroconversion” OR Seropositiv* OR Anti-HIV-Positiv* OR HIV-Antibody-Positiv*) AND (“occupational exposure*” OR “Occupational Accident*” OR “Exposure” OR occupational-risk* OR “job related accident*” OR “job related injur*” OR “occupation-related-injur*” OR “work-related accident*” OR “work-related injur*” OR needle-stick* OR percutaneous* or needle* OR sharps-injur* OR sharps-accident*) AND (“Health Personnel” OR “health care worker” OR health-care-worker* OR “health care personnel” OR health-care-personnel OR employee* OR “occupational groups” OR “health care practitioner*” OR “Health practitioner*” OR “health care provider*” OR health-care-professional* OR healthcare-professional* OR “Health Care Professional” OR health-professional* OR “health professional” OR health-worker* OR “health worker” OR “medical staff” OR “dental staff” OR medical-professional* OR medical-practitioner* OR “medical personnel” OR dentist* OR nurs*)	226
SCOPUS	TITLE-ABS-KEY (HIV) AND TITLE-ABS-KEY (seroconversion) AND TITLE-ABS-KEY (“health care worker”*) TITLE-ABS-KEY (hiv) AND TITLE-ABS-KEY (seroconversion) AND TITLE-ABS-KEY (“health care worker”*)	148
LILACS	(HIV) AND (seroconversion) AND (exposure) AND (“health care professional”)	7

6.2 Segundo produto científico

O segundo produto científico corresponde ao manuscrito elaborado a partir da revisão sistemática e metanálise desenvolvida na primeira vertente metodológica da pesquisa. Intitulado "*Incidence of occupational HIV seroconversion among healthcare workers: a systematic review and meta-analysis*", o artigo foi submetido ao periódico *BMC Health Services Research* (Apêndice E). O periódico possui classificação A1 na área de Saúde Coletiva e B2 na área de Odontologia, de acordo com o Qualis/CAPES mais recente. O manuscrito encontra-se atualmente em etapa de revisão editorial, após a realização do *technical check* pela equipe da Springer Nature. Os apontamentos foram recebidos em 14 de novembro de 2025 e a versão revisada já foi reenviada conforme solicitado pela equipe editorial.

Incidence of occupational HIV seroconversion among healthcare workers: a systematic review and meta-analysis

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Abstract

Background

Healthcare workers (HCWs) may be at elevated risk of HIV infection due to the global HIV burden and frequent occupational exposure to blood and body fluids (BBF). This

systematic review aimed to estimate the global incidence of occupational HIV seroconversion among HCWs by synthesizing evidence from observational studies.

Methods

This review followed PRISMA guidelines and was registered in PROSPERO. Systematic searches were conducted in six major databases and gray literature to identify observational studies reporting HIV seroconversion following occupational exposure. Studies were included regardless of whether the source patient's HIV serostatus was confirmed, in line with real-world reporting practices. Data were extracted on seroconversion, PEP adherence, exposure type, and follow-up. Meta-analyses of proportions were performed using fixed-effect models with arcsine and Freeman-Tukey double arcsine transformations to account for the rarity of events. Heterogeneity was assessed using I^2 and τ^2 statistics.

Results

A total of 132 studies were included. The pooled probability of occupational HIV seroconversion across all reported exposures was 0.0000125 (95% CI: 0.0000030–0.0000425). Among individuals who completed follow-up, the incidence was 0.0001 (95% CI: 0.0000–0.0003). For percutaneous exposures, the pooled incidence was 0.0006 (95% CI: 0.0002–0.0012), and for mucocutaneous exposures, 0.0018 (95% CI: 0.0008–0.0032). Among PEP users, the pooled incidence was 0.0000 (95% CI: 0.0000–0.0004), compared to 0.0017 (95% CI: 0.0003–0.0045) among non-adherent individuals.

Conclusion

Occupational HIV seroconversion among HCWs is rare. Adherence to PEP is associated with reduced transmission risk, reinforcing the importance of timely follow-up and strategies in occupational settings.

Systematic review registration number: PROSPERO CRD42023406192

Descriptors: Health Personnel; HIV; Occupational Exposure; Blood; Seroconversion.

1 Background

Healthcare workers (HCWs) may face an increased risk of HIV infection due to frequent occupational exposure to blood and body fluids (BBF) and the high global burden of HIV¹. The 2024 UNAIDS report estimated that, in 2023, 39.9 million people were living with HIV worldwide, with an adult prevalence rate of 0.8%². Studies conducted between 2015 and 2020 reported that 39.0% to 60.6% of HCWs experienced occupational exposure to BBF³. The risk of HIV transmission depends on the type of exposure and the use of protective measures, such as post-exposure prophylaxis (PEP)⁴.

More recent findings reinforce these concerns: in Eritrea, Negash *et al.*⁵ observed a 12-month prevalence of needlestick injuries of 37.1%, but only 10.4% of those exposed initiated PEP. Similarly, in a scoping review, Auerbach *et al.*⁶ reported consistently low PEP uptake across low- and middle-income countries, citing barriers such as stigma, limited access, inadequate training, and incomplete adherence.

Despite increasing awareness, estimates of actual transmission risk remain limited, with few comprehensive syntheses available. Henderson *et al.*⁷ estimated a 0.3% transmission risk following percutaneous exposure to HIV-positive blood, a figure widely cited in the literature^{8–11}. Baggaley *et al.*¹² conducted the only prior global systematic review, using modeled data to estimate transmission probabilities of 0.32% for percutaneous exposures, 0.09% for mucosal exposures, and 0.003% for exposures involving non-intact skin. Although important at the time, their synthesis included only 21 studies on accidental exposures and did not address follow-up procedures, post-exposure prophylaxis (PEP), or regional variability. Systematic reviews are particularly valuable when primary data are fragmented or inconsistently reported, as was the case in the early 2000s. The present review builds upon that effort by incorporating a broader range of countries and healthcare contexts, and by evaluating observed seroconversion outcomes stratified by exposure type, PEP adherence, and follow-up completion. Our methods follow the current PRISMA guidelines¹³ and apply the Joanna Briggs Institute (JBI) approach¹⁴ for risk of bias assessment. Some primary studies included in Baggaley's review were also retrieved in our search and incorporated into this synthesis when they met the updated eligibility criteria. Although seroconversion is a longitudinal outcome, we included cross-sectional studies when they reported documented exposure to HIV-positive blood or body fluids and provided post-exposure serological status. This systematic review aims to estimate the global incidence of occupational HIV

seroconversion among healthcare workers following exposure to blood or body fluids considered potentially contaminated, based on follow-up procedures established by institutional or national post-exposure protocols. By synthesizing observational studies reporting real-world exposures and outcomes, this review seeks to fill an important evidence gap and to support the development of prevention strategies and improvements in occupational HIV surveillance.

2 Materials and Methods

This review is registered in PROSPERO (CRD42023406192) and follows the Preferred Reporting Items for Systematic Reviews and Meta-Analysis¹³ guidelines (see PRISMA checklist in Supplementary Table 1 (Additional file 1)). The Joanna Briggs Institute framework for prevalence and incidence studies was adopted as a methodological approach. The review was conducted in the following steps: systematic database search and removal of duplicate studies; peer-reviewed screening of titles and abstracts; peer-reviewed full-text selection of studies; data extraction from the selected articles; synthesis of extracted data; methodological quality assessment of the studies; evaluation of evidence certainty; and meta-analysis of the findings.

2.1 Eligibility criteria

Studies on occupational exposure to blood and body fluids (BBF) that reported on HIV seroconversion among healthcare workers (HCWs) were selected. Confounding factors, such as behaviors and personal conditions that affect the risk of HIV infection, were considered¹⁵. Occupational exposures to blood and body fluids (BBF) were included regardless of the HIV serostatus of the source patient. Although some studies adopted institutional or national protocols that recommended follow-up primarily for individuals exposed to sources confirmed positive or of unknown status, all reported

exposures were considered to minimize selection bias. Additionally, even in cases without extended serological follow-up, exposed individuals without seroconversion were reported as part of the study population and contributed to the incidence denominator. This approach is supported by clinical guidelines from major health authorities^{16–18}, which state that follow-up testing is not required when the source patient is confirmed HIV-negative and the exposed individual has a baseline negative test. In such cases, the absence of monitoring does not indicate incomplete data but reflects a protocol-based decision consistent with low-risk exposure management. To ensure methodological clarity, we conducted separate meta-analyses: one including all reported exposure cases and another restricted to exposures with confirmed serological follow-up, thereby balancing real-world surveillance diversity with methodological rigor. This allowed us to reflect both the broader occupational surveillance context and the set of higher-risk exposures more consistently followed in clinical practice.

Only observational studies on HIV seroconversion following occupational exposure were included, with no language or date restrictions. Cross-sectional studies were eligible only if they retrospectively reported exposures and follow-up with documented seroconversion outcomes. These were conceptually treated as retrospective cohorts based on the temporality of data collection, regardless of the authors' original classification. Prospective cohort studies were defined as those in which participants were followed from exposure onward, while retrospective cohorts analyzed data after both exposure and outcome had occurred, in line with Gordis' criteria¹⁹. Studies included in the Baggaley *et al.*¹² review were re-screened according to the updated eligibility criteria of the present review and were included only if they met the predefined methodological standards. Case-control studies, clinical trials, literature reviews, case reports, editorials, and studies with insufficient data regarding methodology were

excluded. Since the PICO question structure is not suited for questions related to prevalence and incidence studies, the CoCoPop acronym (Condition, Context, and Population) was chosen to guide the inclusion criteria for the studies reviewed, in accordance with methodological guidance for prevalence and incidence systematic reviews¹⁴. Our review evaluated HIV seroconversion rates (Condition) among healthcare professionals (Population) exposed to BBF (Context).

For this review, healthcare workers (HCWs) were defined by the framework proposed by the World Health Organization and the Global Health Workforce Alliance²⁰ as individuals whose primary intent is to improve health and who are either directly involved in patient care or occupationally exposed to blood or body fluids. This definition aligns with the International Standard Classification of Occupations 2008 (ISCO-08) and commonly includes physicians, nurses, midwives, dentists, and laboratory professionals. Support staff, such as cleaning personnel, were considered only when explicitly mentioned in the original studies and directly linked to occupational exposure to biological material.

2.2 Search strategy

The search strategy was designed using descriptors from MeSH (available on PUBMED), Emtree (available on Embase), and DeCS (available on BVS), combined with Boolean operators. The search terms included: 1) HIV; 2) seroconversion; 3) occupational blood exposure; and 4) healthcare professionals. This strategy was validated by two experts in systematic reviews and tailored for each search tool used in the databases. The full search strategy, including synonyms and alternative terms for all key concepts, is detailed in Supplementary Table 2 (Additional file 2).

The search was conducted across six databases: MEDLINE (via PUBMED), Embase, Scopus, Web of Science, the Cochrane Database of Systematic Reviews, and LILACS (via BVS). Additionally, gray literature was explored through Open Gray – the European information system for gray literature –, Google Scholar, and by reviewing theses and dissertations. In Google Scholar, the first 200 references retrieved were assessed according to methodological guidelines for systematic reviews²¹. Finally, the reference lists of the selected studies were examined to identify any additional studies not captured in the electronic search.

2.3 Selection process

Studies identified in the electronic search were exported to EndNote v. 20.0 (Clarivate Analytics, PA, USA), and duplicate references were removed. Study screening was performed using Rayyan v. 2023 (Rayyan Systems Inc., MA, USA). Two researchers independently evaluated titles and abstracts based on the eligibility criteria. For studies with insufficient information in the titles and abstracts, full texts were retrieved for further assessment, and authors were contacted if additional data were needed. The reviewers reviewed the full texts of selected studies for final inclusion, and a summary of the reasons for inclusion and exclusion for the selected studies is provided in Figure 1. Discrepancies at any stage were resolved through discussion and consensus. Researchers underwent training and calibration before the selection process - using a 10% sample of the retrieved studies - with a third reviewer (either a senior researcher) serving as the gold standard. Intra- and inter-rater agreement levels above 80% were deemed satisfactory.

2.4 Data collection process, data items, and effect measures

The data extraction process included the following information: study design, country and location of the research, language and publication date; sample size, individual characteristics of the population studied (professional category, age, and sex of participants); details of occupational exposure (site of the accident, type of sharp material, type of injury, contaminated biological material); indication and adherence to post-exposure prophylaxis (PEP), type of PEP used, and the time elapsed between exposure to biological material and PEP adoption; HIV seroconversion rates among participants, comparison of seroconversion rates based on PEP adherence, and follow-up period; outcome measures (methods for assessing seroconversion, incidence measures such as proportions/rates/indices), as well as data on dropouts, missing data, presence of bias, and control of confounding factors such as socioeconomic conditions, prior health status, comorbidities, access to healthcare services, and type of care. For studies with missing data, researchers contacted the authors to obtain additional information, when possible.

Although this review followed the Joanna Briggs Institute (JBI) framework for reviews of prevalence and incidence data, the outcome analyzed (HIV seroconversion) is conceptually a measure of cumulative incidence, as it reflects the proportion of initially disease-free individuals who develop infection over time¹⁹. Therefore, despite the alignment with JBI methods, the terminology used in this manuscript was adapted to reflect the longitudinal nature of the outcome.

Regarding follow-up duration, studies were included in the meta-analysis if they reported the number of individuals who completed serological follow-up, and if the follow-up period, based on the study protocol, was sufficient to detect HIV seroconversion. Although follow-up intervals varied, often based on local or

institutional post-exposure protocols, all included studies ensured a temporal window appropriate for identifying new infections. We recognize that these variations may introduce heterogeneity, which was considered in the certainty of evidence assessment and explored through group and sensitivity analyses.

2.5 Synthesis methods

Data pooling was conducted using the Rstudio software (Rstudio, Boston, Massachusetts, USA) with R programming language, employing the meta package²². Data of studies were pooled into meta-analyses of proportion. Given that the incidence rate of individuals exhibiting seroconversion was very low and often zero within studies, which leads to minimal variance and may overweight studies with no events, fixed-effect models were applied. Arcsine and Freeman–Tukey double arcsine transformations were used to stabilize variance estimates^{23,24}. Although this transformation does not intrinsically address the shortcomings of zero-event studies, it allows one to incorporate the data of those studies into the analysis without the need for arbitrary continuity corrections, such as adding 0.5 to empty cells, thus precluding the artificial inflation of variance^{23,24}. Following the recommendations of the Cochrane Handbook for Systematic Reviews, a complementary sensitivity analysis excluding studies with zero seroconversion events was also conducted. The summary measures were reported in terms of the pooled proportion and 95% confidence interval (CI). To assess heterogeneity, the I^2 method was used to evaluate the variability of the effect size, and tau-square (τ^2) was employed to assess between-study variance. For I^2 , a 95% CI was calculated²⁵. The Maximum-Likelihood method was deployed.

Publication bias was assessed using funnel plots²⁶ and the Egger test²⁷. Given the known limitations of these tools in rare-event meta-analyses or when the number of studies is small, findings were interpreted with caution. Funnel plot asymmetry may

reflect small-study effects, zero-event prevalence, or methodological differences rather than true publication bias. Therefore, these assessments were treated as exploratory and contextualized within the broader limitations of the dataset^{26,27}.

Although included studies reported seroconversion using diverse epidemiological metrics, all effect measures were standardized as cumulative incidence proportions. These proportions were computed as the number of seroconversions divided by the most appropriate denominator for each analysis — including total reported exposures, exposures with follow-up, exposure type (e.g., percutaneous or mucocutaneous), and PEP indication and use.

Following guidance from the Cochrane Handbook²⁸ and Borenstein *et al.*²⁹, we performed separate meta-analyses for each clinically distinct exposure context, instead of conducting subgroup analysis within a single model. This approach was warranted due to the biological, clinical, and methodological differences among the exposure types. For example, mucocutaneous and percutaneous exposures differ in transmission risk and reporting practices, while PEP adherence may biologically reduce the risk of seroconversion^{17,30}.

Whenever needed, raw data were recalculated from reported rates or indices to ensure standardization and comparability of effect measures. In meta-analyses stratified by exposure type, certain studies with very large sample sizes and no events were excluded when their inclusion led to extremely small variances, thereby distorting pooled estimates and impairing graphical interpretability. In the analysis of mucocutaneous exposures, for example, Fahey *et al.*³¹, (n = 7,956; 0 events) was excluded based on its disproportionate influence on the variance structure. This decision followed established methodological guidance for rare-event meta-analyses.

Although data were extracted on healthcare setting, geographic region, and professional category, variations in terminology and incomplete reporting across studies limited the feasibility of subgroup meta-analyses for these variables. These contextual elements were instead incorporated into the descriptive synthesis and are further addressed in the Discussion.

In addition to stratified analyses by exposure type, follow-up status, and PEP use, a sensitivity analysis was conducted to assess the robustness of the findings. All six meta-analyses were repeated after excluding studies classified as high risk of bias based on the JBI Critical Appraisal Tool. The same analytical procedures, including fixed-effect models and Freeman–Tukey transformations, were applied to this restricted subset. This approach aimed to identify whether any specific results would change after excluding lower-quality studies, by repeating the same analytical steps using a restricted dataset. The results of the sensitivity analysis are presented in the Results section and illustrated in Supplementary Figures.

Additionally, subgroup analyses were conducted to examine whether HIV prevalence in the countries where the studies had been conducted influenced the observed seroconversion rates. For each included study, national estimates of adult HIV prevalence (aged 15–49 years or general population, depending on data availability) corresponding to the study year were retrieved primarily from UNAIDS and World Bank databases. When data for specific years or countries were unavailable, estimates were complemented with information from official national surveillance reports and additional published research. All extracted prevalence data and their corresponding sources are detailed in Supplementary Table 3 (Additional file 3).

Studies were then grouped according to national HIV prevalence: those conducted in countries with HIV prevalence below 1% (representing 92.4% of all included studies) and those conducted in countries with HIV prevalence above 1%. Among studies with lower-prevalence settings, two additional subgroups were generated: one including all studies, and another restricted to studies reporting cases of seroconversion, to allow targeted sensitivity testing of observed events. In high-prevalence settings, a separate dataset was prepared; however, none of the studies in this subgroup reported seroconversion; thus, no additional stratified analysis was applicable.

2.6 Risk of Bias Assessment

Two independent reviewers assessed the risk of bias (RoB) using the Joanna Briggs Institute (JBI) Critical Appraisal Tool for prevalence and incidence studies¹⁴, which comprises nine domains rated as “yes,” “no,” “not applicable,” or “unclear” Discrepancies were resolved through discussion and consensus, and the reviewers were previously trained and calibrated with the support of a senior researcher. All studies, regardless of their assessed risk of bias, were included in data extraction and, when appropriate, in the meta-analysis. The RoB domains were interpreted considering the context of occupational exposures to blood and body fluids (BBF), which often follow institutional or national protocols with variability in follow-up. Each checklist item scored “yes” received 1 point, and the proportion of positive responses was used to classify the study's overall risk of bias. Greater weight was assigned to domains 5, 6, 7, and 9, which assess the representativeness of the sample, the reliability of outcome measures (i.e., HIV seroconversion), and the completeness of follow-up. Studies that met $\geq 70\%$ of the checklist items were classified as low RoB, those that met 50–69% as moderate RoB, and those below 50% as high RoB. Additionally, we reported the

proportion of studies that met each individual domain to improve transparency and identify patterns of potential bias across studies. Although percentage thresholds were used for classification, domain-level judgments were also qualitatively reviewed to ensure that critical sources of bias were not masked by high overall scores. This approach allowed us to consider not only the quantity but also the relevance of the domains met when judging each study's contribution to the evidence base

2.7 Certainty assessment

The certainty of evidence was assessed using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) framework³². Evidence was classified into four levels — high, moderate, low, and very low — based on evaluation across five domains: risk of bias (e.g., serious methodological limitations), inconsistency (e.g., substantial variability in study results), indirectness (evidence not directly applicable to the CoCoPop question), imprecision (e.g., wide confidence intervals or small sample sizes), and publication bias (e.g., suspected selective reporting). Observational studies were initially considered low-certainty evidence and could be downgraded further based on these domains. Although the GRADE approach was originally developed for systematic reviews of interventions (e.g., randomized controlled trials), it has been increasingly adapted to assess certainty in observational studies reporting prevalence and incidence outcomes. This broader application is supported by guidance from the Joanna Briggs Institute, which recognizes the appropriateness of applying GRADE to evidence derived from observational studies estimating measures of frequency such as incidence and prevalence³³. Following this adaptation, we assessed the certainty of cumulative incidence estimates across the included observational studies.

3 Results

3.1 Studies selection and characteristics

A total of 1,056 articles were retrieved from the databases, and 369 were identified through article references. Out of these, 132 articles were selected by the two reviewers. The flowchart of the selection process is shown in Figure 1, with detailed reasons for inclusion and exclusion provided in Table 1. In the descriptive synthesis (Table 2), most studies were in English (n=100, 75.8%); 49 (37.1%) were prospective cohort studies, 82 (62.1%) were retrospective and one was a study with both designs. The geographical distribution of studies was classified according to the United Nations geoscheme³⁴. The majority were conducted in the European region (n=39; 29.5%), followed by the Americas (n=31; 23.5%), South Asia (n=16; 12.1%), and West Asia (n=16; 12.1%). Fewer studies were identified from regions such as Western Africa (n=4; 3.0%), Southeast Asia (n=2; 1.5%), and Latin America and the Caribbean (n=11; 8.3%).

The number of reported BBF exposures ranged from 5 to 43,464 with 1 to 7,956 completing follow-up. The age of exposed individuals varied from 17 to 74 years, with women being the most affected (n=125, 94.7%). Percutaneous injuries accounted for 96.8% (n=128) of studies. PEP use was reported in 80 studies (60.6%). The incidence of seroconversion among all exposures ranged from 0% to 1.14%. Among individuals who completed follow-up, the incidence ranged from 0% to 2.17%. For percutaneous exposures, it ranged from 0% to 1.89%, and for mucocutaneous exposures, from 0% to 0.63%. In studies with reports of PEP use, the incidence ranged from 0% to 0.70%. For those who were indicated for PEP but did not adhere, the incidence ranged from 0% to 2.86%.

Regarding the HIV serostatus of the source patients, among the 132 included studies, 36 (27.3%) followed only exposures to confirmed HIV-positive sources, 15

(11.4%) included exposures to HIV-positive and/or unknown-status sources, and 8 (6.1%) included exposures to HIV-negative sources. However, in 73 studies (55.3%), the status of the source was either not reported or incompletely described Supplementary Table 4; see Additional file 4).

Figure 1 - PRISMA Flow Diagram

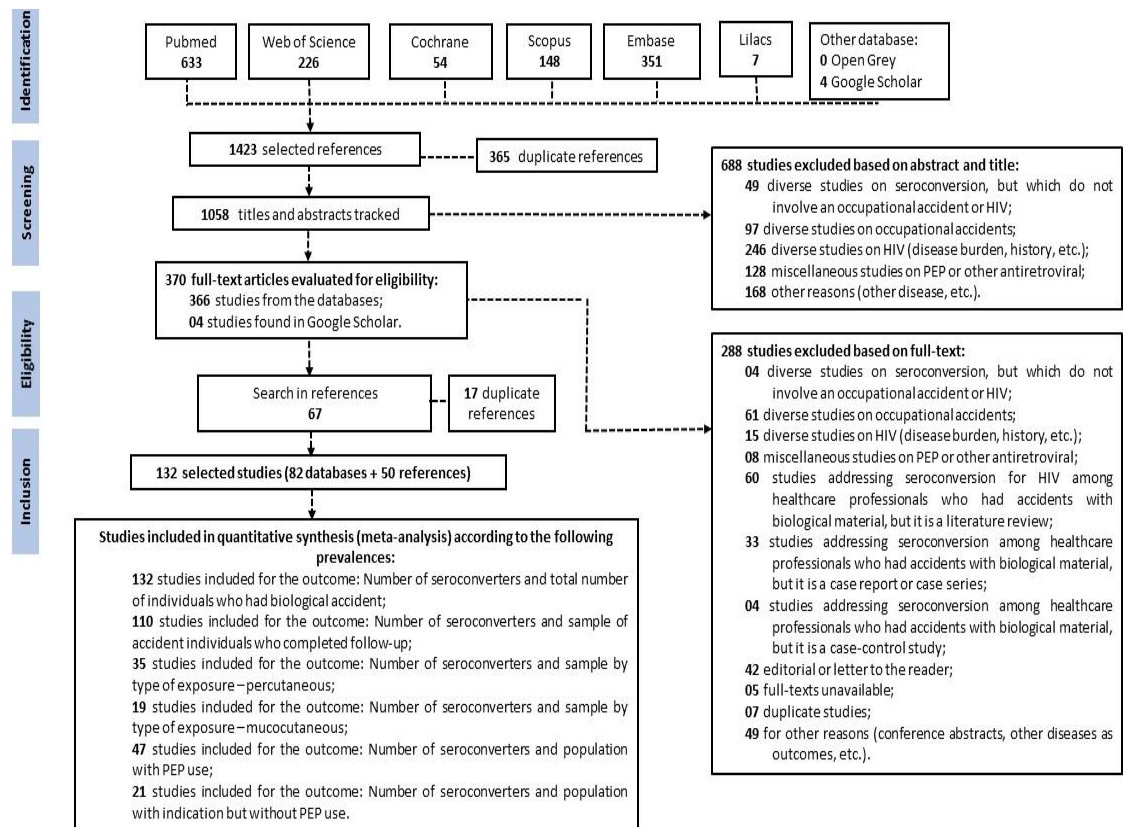


Table 1 - Summary of Inclusion and Exclusion Reasons for Studies Selected for Full-Text Assessment (see in Additional file 5).

Table 2 - Characteristics of Included Studies on Occupational HIV Exposure and Seroconversion (see in Additional file 6).

3.2 Risk of Bias (RoB) Assessment Findings by Type of Incidence

Table 3 presents a detailed summary of the risk of bias (RoB) assessment for the individual studies included in this review. It evaluates each study across nine methodological domains, highlighting strengths and potential limitations. Additionally,

the table identifies the studies included for specific outcomes analyzed in the meta-analysis. In addition to Table 3, supplementary tables provide detailed risk of bias (RoB) assessments for each specific outcome analyzed in the meta-analysis, including follow-up completion, type of exposure (percutaneous or mucocutaneous), and PEP use (or non-use).

Table 3 - Summary of risk of bias (RoB) assessment for each study and across domains using the Joanna Briggs Institute Critical Appraisal Tool checklist for prevalence studies (see Additional file 7).

1. Seroconversion among all reported occupational exposures:

Among the included studies, 55.30% were classified as high quality, 38.64% as moderate, and 6.06% as low. High quality was observed in Domain 1 (sample frame – 100%) and Domain 8 (statistical analysis – 100%), ensuring representativeness and appropriate statistical methods. Domain 4 (setting description – 46.21%) and Domain 6 (valid methods – 45.45%) showed lower quality, suggesting a potential risk of bias due to incomplete contextual and methodological clarity.

2. Seroconversion among exposed individuals who completed follow-up:

The methodological quality of the included studies showed that 63.64% were classified as high quality, 33.64% as moderate, and 2.73% as low. High quality was observed in Domain 1 (sample frame - 100%), Domain 2 (sampling - 98.18%), Domain 5 (sample coverage - 93.64%), Domain 8 (statistical analysis - 100%), and Domain 9 (response rate - 95.45%). Domain 4 (setting description - 46.36%) and Domain 6 (valid methods - 48.18%) may indicate moderate risk due to limitations in setting details and methodological rigor. Further details are available in Supplementary Table 5 (see Additional file 8).

3. Seroconversion by type of exposure – percutaneous:

Among studies that assessed seroconversion by percutaneous exposure, 62.86% were classified as high quality, 34.29% as moderate, and 2.73% as low. High quality was demonstrated in Domain 1 (sample frame - 100%), Domain 2 (sampling - 100%), Domain 5 (sample coverage - 91.43%), Domain 8 (statistical analysis - 100%), and Domain 9 (response rate - 94.29%), providing a solid methodological foundation. Domain 4 (setting description - 42.86%) and moderate scores in Domain 6 (valid methods - 51.43%) and Domain 7 (standardized measurements - 51.43%) suggest some moderate risk of bias. Further details are available in Supplementary Table 6 (see Additional file 9).

4. Seroconversion by type of exposure – mucocutaneous:

Among studies assessing seroconversion by mucocutaneous exposure, 63.16% were classified as high quality, 31.58% as moderate, and 5.26% as low. High quality was found in Domain 1 (sample frame - 100%), Domain 2 (sampling - 100%), Domain 5 (sample coverage - 89.47%), Domain 8 (statistical analysis - 100%), and Domain 9 (response rate - 94.74%), ensuring a robust methodological base. Moderate scores in Domain 4 (setting description - 47.37%), Domain 6 (valid methods - 47.37%), and Domain 7 (standardized measurements - 47.37%) indicate a moderate risk of bias. Further details are available in Supplementary Table 7 (see Additional file 10).

5. Seroconversion among a population with PEP use:

Among studies evaluating seroconversion in the population using PEP, 57.45% were classified as high quality, 38.30% as moderate, and 4.26% as low. High quality was observed in Domain 1 (sample frame - 100%), Domain 2 (sampling - 100%), Domain 5

(sample coverage - 91.49%), Domain 8 (statistical analysis - 100%), and Domain 9 (response rate - 93.62%), providing a reliable methodological base. Moderate scores in Domain 4 (setting description - 40.43%) and Domains 6 and 7 (valid methods and standardized measurements - both 74.07%) suggest a moderate risk of bias. Further details are available in Supplementary Table 8 (see Additional file 11).

6. Seroconversion among a population with indication but without PEP use:

Among studies assessing seroconversion in the population with indication but without PEP use, 57.14% were classified as high quality, 38.10% as moderate, and 4.76% as low. High quality was observed in Domain 1 (sample frame - 100%), Domain 2 (sampling - 100%), Domain 5 (sample coverage - 85.71%), Domain 8 (statistical analysis - 100%), and Domain 9 (response rate - 95.24%), ensuring a strong evidence base. Although Moderate scores in Domain 4 (setting description - 42.86%) and Domains 6 and 7 (valid methods and standardized measurements - both 47.62%) indicate a moderate risk of bias. Further details are available in Supplementary Table 9 (see Additional file 12).

3. 3 Certainty assessment

Table 4 summarizes the GRADE evidence profile and corresponding justifications. For all studies, no concerning inconsistencies, indirectness, or imprecision were observed. For the overall incidence rate of seroconversion among the total population of occupationally exposed individuals, the risk of bias was assessed as very serious. This assessment was largely due to the outcome being based on the entire population of exposed individuals, rather than only those who completed the recommended period for serological status verification. Consequently, the overall

certainty of the evidence was classified as very low. In contrast, for the group of individuals who completed the recommended follow-up, as well as for those exposed to percutaneous and mucocutaneous accidents, and those who used the indicated PEP, the risk of bias was deemed serious. However, this bias was considered plausible but unlikely to significantly alter the results, resulting in a classification of evidence as low.

Table 4 - Certainty Assessment and Effect of Observational Studies on HIV Seroconversion Risk

Certainty assessment							№ of patients	Effect	Certainty
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Publication bias		Relative (95% CI)	
132	observational studies ^a	very serious ^b	not serious ^c	not serious ^d	not serious ^e	not serious ^f	107819	0.0000 [0.0000; 0.0000]	⊕○○○ very low
110	observational studies ^g	serious ^h	not serious ^c	not serious ^d	not serious ^e	not serious ^f	29607	0.0001 [0.0000; 0.0003]	⊕⊕○○ low
35	observational studies ⁱ	serious ^j	not serious ^c	not serious ^d	not serious ^e	not serious ^f	8307	0.0006 [0.0002; 0.0012]	⊕⊕○○ low
19	observational studies ^k	serious ^l	not serious ^c	not serious ^d	not serious ^e	very serious ^o	4439	0.0018 [0.0008; 0.0032]	⊕○○○ very low
47	observational studies ^m	serious ⁿ	not serious ^c	not serious ^d	not serious ^e	not serious ^o	3828	0.0000 [0.0000; 0.0004]	⊕⊕○○ low
21	observational studies ^p	serious ^q	not serious ^c	not serious ^d	not serious ^e	very serious ^o	1519	0.0017 [0.0003; 0.0045]	⊕○○○ very low

Table adapted from Zhang, Y., Akl, E. A., & Schünemann, H. J.³².
Relative measure presented as pooled incidence; CI: confidence interval.

Explanations:

- a. Outcome:** Number of individuals who presented seroconversion and total number of occupational exposures to biological material.
- b. Study Quality:** 55.30% high, 38.64% moderate, 60.06% low. Domains 1 (100%) and 8 (100%) ensured reliability. Smaller sample sizes (35.61%) and incomplete setting descriptions (46.21%) suggest moderate bias.
- c. Heterogeneity:** Minimal variation, consistent effects, overlapping CIs, and no heterogeneity ($I^2 = 0\%$; $p \geq 0.6$).
- d. Direct Evidence:** Relevant to HIV seroconversion, occupational exposure, and health professionals worldwide.
- e. Sample Size:** Most studies exceeded 384 participants, supporting robust estimates.
- f. Publication Bias:** Egger test ($p > 0.05$) showed no evidence of bias.
- g. Outcome:** Number of seroconverters and sample of occupational biological exposures who completed follow-up.
- h. Study Quality:** 63.64% high, 33.64% moderate, 2.73% low. Strong sampling (98.18%) and analysis (100%) were strengths. Moderate bias from setting description (46.36%) and methods (48.18%).
- i. Outcome:** Number of seroconverters and sample by type of exposure – percutaneous.
- j. Study Quality:** 62.86% high; strong methods overall, moderate bias from incomplete setting descriptions.
- k. Outcome:** Number of seroconverters and sample by type of exposure – mucocutaneous.
- l. Study Quality:** 63.16% high; robust sampling and methods, moderate bias in setting descriptions.
- m. Outcome:** Number of seroconverters and population with the PEP use.
- n. Study Quality:** 57.45% high; reliable evidence, moderate risks in settings.
- o. Publication Bias:** Egger test revealed asymmetry ($p < 0.005$).
- p. Outcome:** Number of seroconverters and population with indication but without the PEP use.
- q. Study Quality:** 57.14% high; robust sampling, moderate bias in methods.

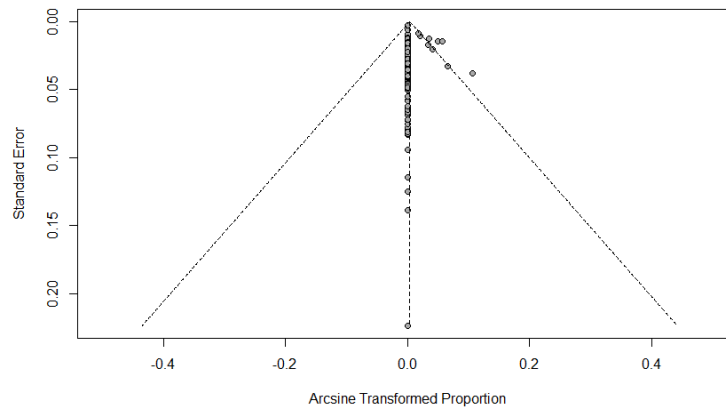
3.4 Synthesis of results by outcome

1. Number of individuals who presented seroconversion and total number of occupational exposures to biological material

The result of the meta-analysis demonstrated that the pooled incidence of seroconversion was 0.0000125 (95% CI: [0.0000030–0.0000425]). Heterogeneity was $I^2 = 0.0\%$ [0.0%; 21.6%] and $\tau^2 < 0.0001$ (Figure 2). The funnel plot is shown in Figure 3. The Egger test result confirmed the funnel plot's symmetry ($p=0.416$).

Figure 2 – Meta-Analysis of HIV Seroconversion Among Healthcare Workers Exposed to BBF (see Additional file 13).

Figure 3 - Funnel Plot for HIV Seroconversion Among Healthcare Workers Exposed to BBF

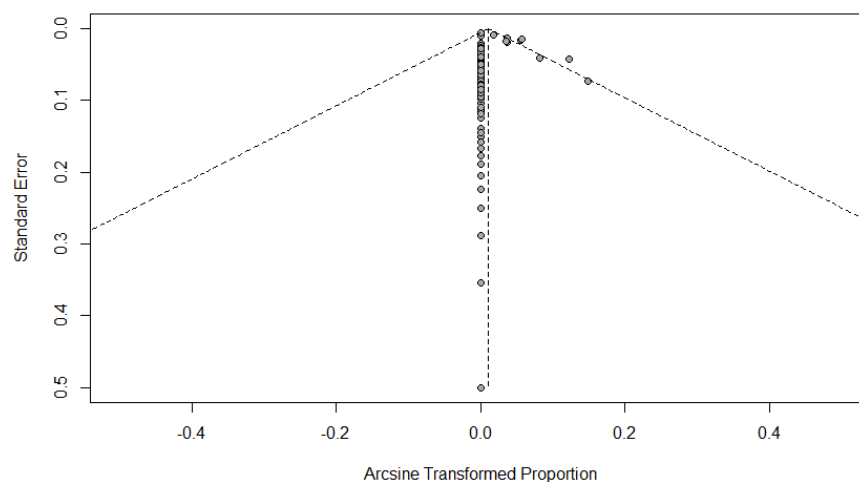


2. Number of seroconverters and a sample of occupational biological exposures who completed follow-up

The result of the meta-analysis demonstrated that the pooled incidence of seroconversion was 0.0001 (95% CI = [0.0000; 0.0003]. Heterogeneity was $I^2 = 0.0\%$ [0.0%; 23.4%] and $\tau^2 = 0.0001$ (Figure 4). The funnel plot is shown in Figure 5. The Egger test result confirmed the funnel plot's symmetry ($p=0.356$).

Figure 4 – Meta-Analysis of HIV Seroconversion Among Occupational Exposed Individuals Completing Follow-Up (see Additional file 14).

Figure 5 - Funnel Plot for HIV Seroconversion Among Occupational Exposed Individuals Completing Follow-Up



3. Number of seroconverters and sample by type of exposure – percutaneous

The result of the meta-analysis demonstrated that the pooled incidence of seroconversion was 0.0006 (95% CI = [0.0002; 0.0012]. Heterogeneity was $I^2 = 0.0\%$ [0.0%; 38.3%] and $\tau^2 = 0.0003$ (Figure 6). The funnel plot is shown in Figure 7. The Egger test result confirmed the funnel plot's symmetry ($p=0.251$).

Figure 6 - Meta-Analysis of HIV Seroconversion Following Percutaneous Exposure Among Healthcare Workers

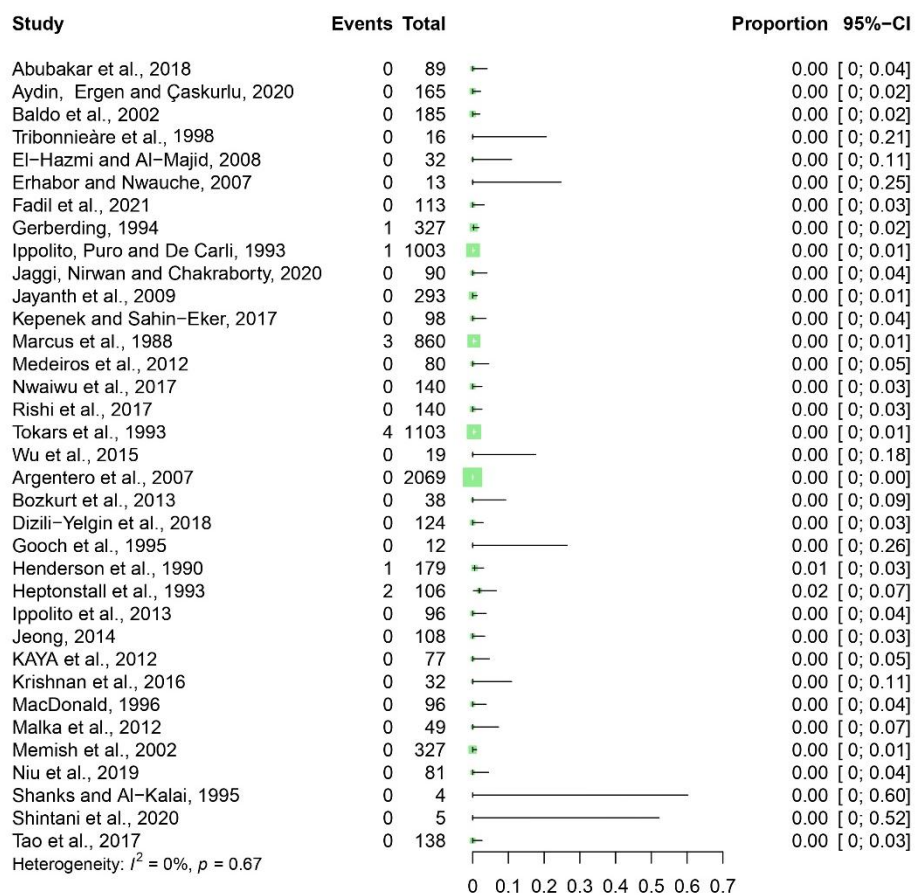
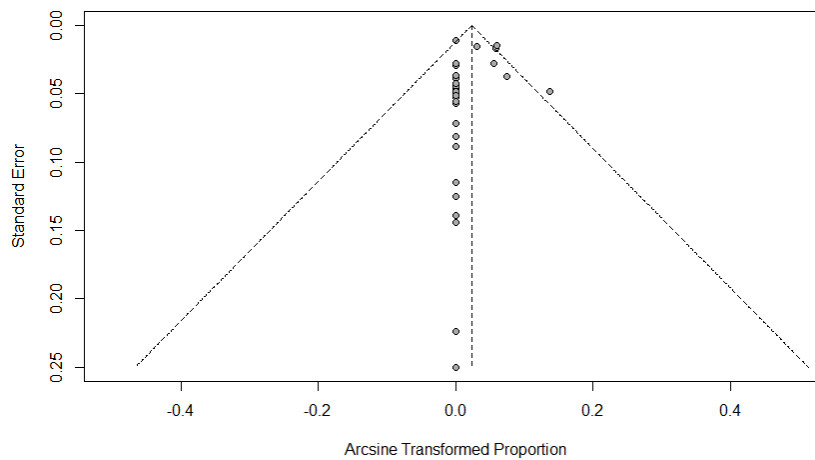


Figure 7 - Funnel Plot for HIV Seroconversion Following Percutaneous Exposure Among Healthcare Workers



4. Number of seroconverters and sample by type of exposure - mucocutaneous

The result of the meta-analysis demonstrated that the pooled incidence of seroconversion was 0.0018 (95% CI = [0.0008; 0.0032]. Heterogeneity was $I^2 = 0.0\%$ [0.0%; 48.9%] and $\tau^2 = 0.0005$ (Figure 8). The funnel plot is shown in Figure 9. The Egger test result confirmed the funnel plot's asymmetry ($p=0.002$).

Figure 8 - Meta-Analysis of HIV Seroconversion Following Mucocutaneous Exposure Among Healthcare Workers

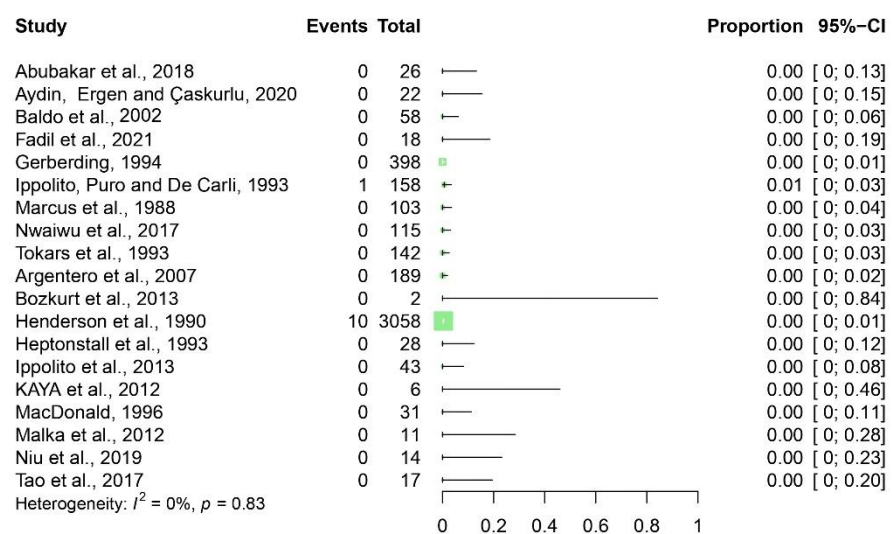
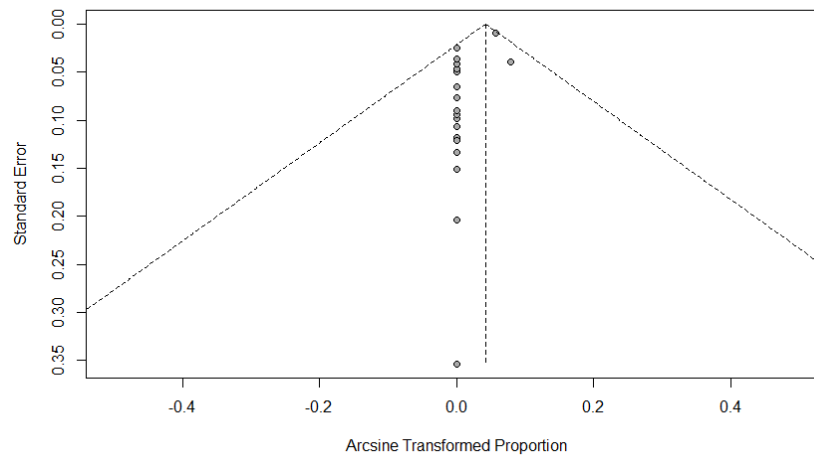


Figure 9 - Funnel Plot for HIV Seroconversion Following Mucocutaneous Exposure Among Healthcare Workers



5. Number of seroconverters and population with PEP use

The result of the meta-analysis demonstrated that the pooled incidence of seroconversion was 0.0000 (95% CI = [0.0000; 0.0004]. Heterogeneity was $I^2 = 0.0\%$ [0.0%; 33.8%] and $\tau^2 = 0$ (Figure 10). The funnel plot is shown in Figure 11. The Egger test result confirmed the funnel plot's symmetry ($p=0.798$).

Figure 10 - Meta-Analysis of HIV Seroconversion Among Healthcare Workers Using PEP

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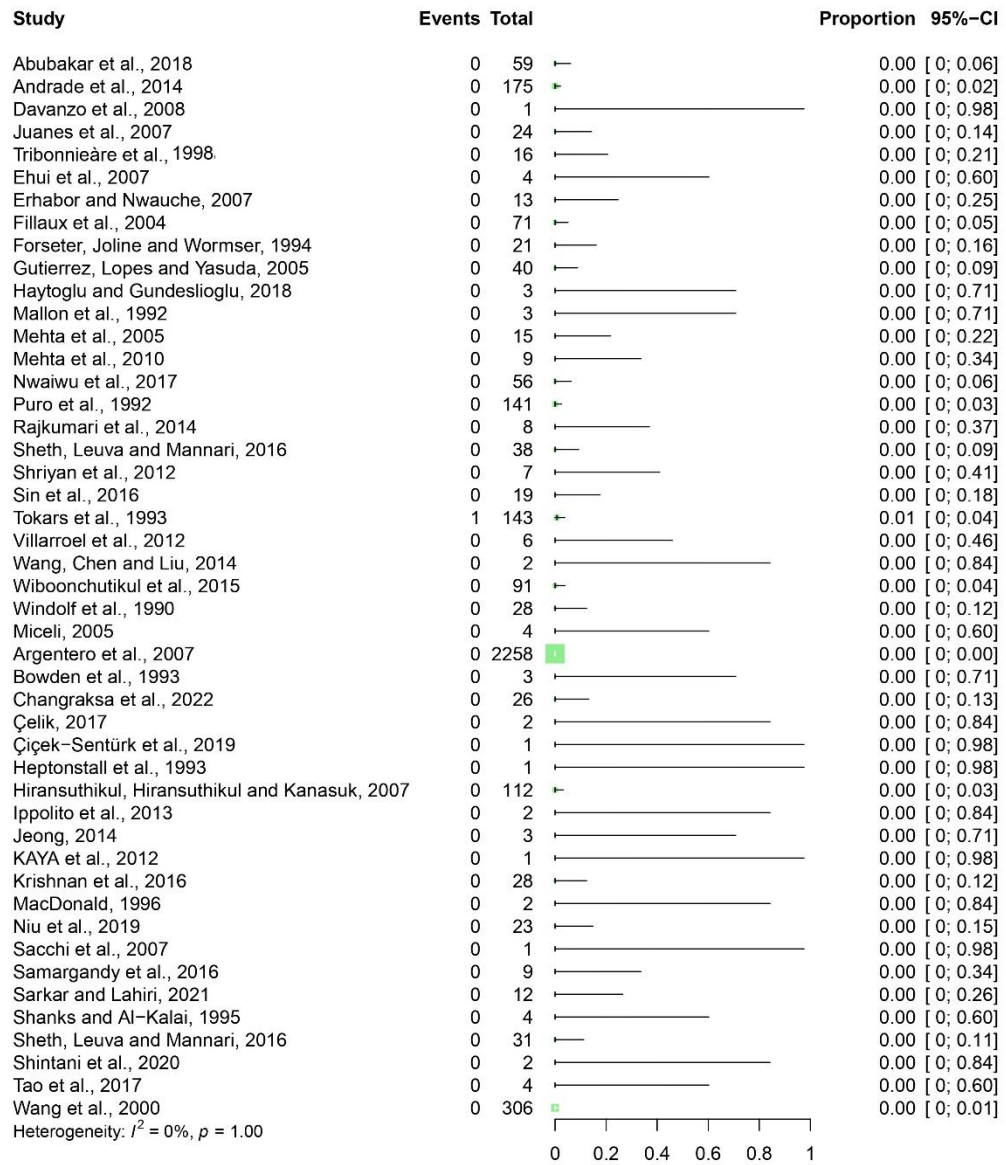
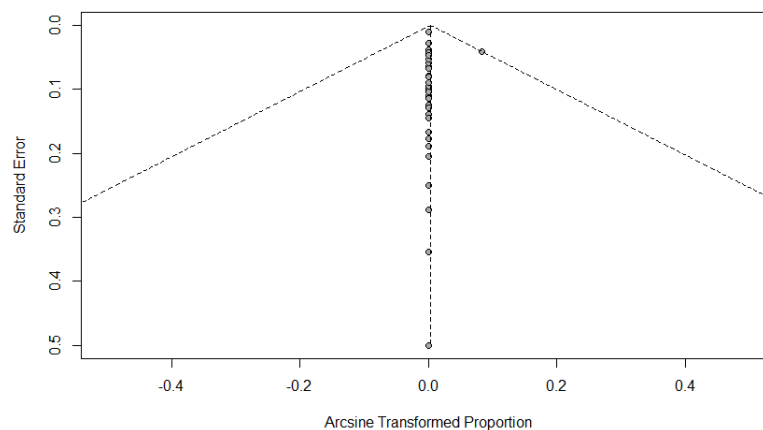


Figure 11 - Funnel Plot for HIV Seroconversion Among Healthcare Workers Using PEP



6. Number of seroconverters and population with indication but without PEP use

The result of the meta-analysis demonstrated that the pooled incidence of seroconversion was 0.0017 (95% CI = [0.0003; 0.0045]. Heterogeneity was $I^2 = 0.0\%$ [0.0%; 47.0%] and $\tau^2 = 0.0002$ (Figure 12). The funnel plot is shown in Figure 13. The result of the Egger test confirmed the asymmetry of the funnel plot ($p < 0.001$).

Figure 12 -Meta-Analysis of HIV Seroconversion Among Healthcare Workers Indicated for PEP but Without PEP Use

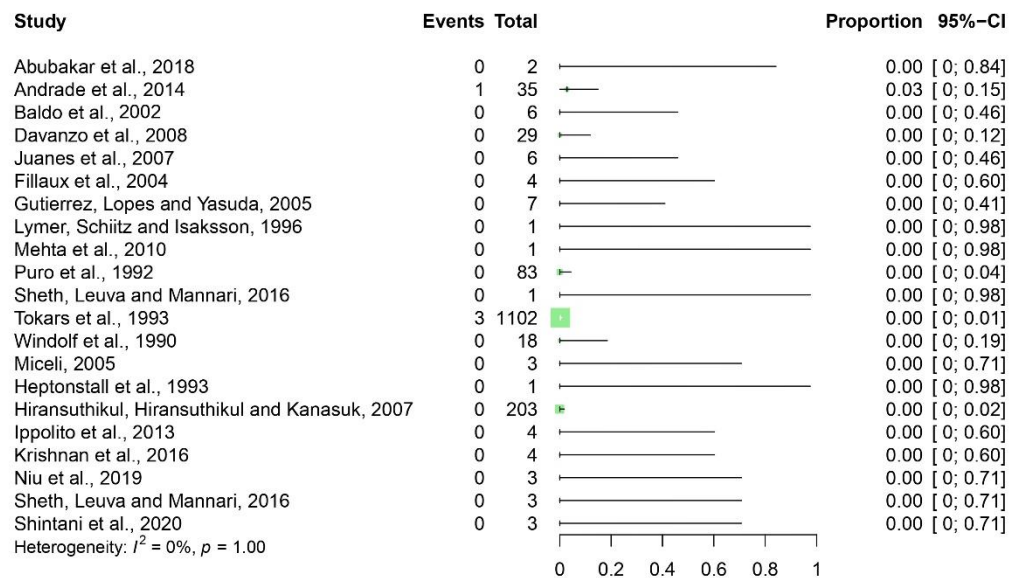
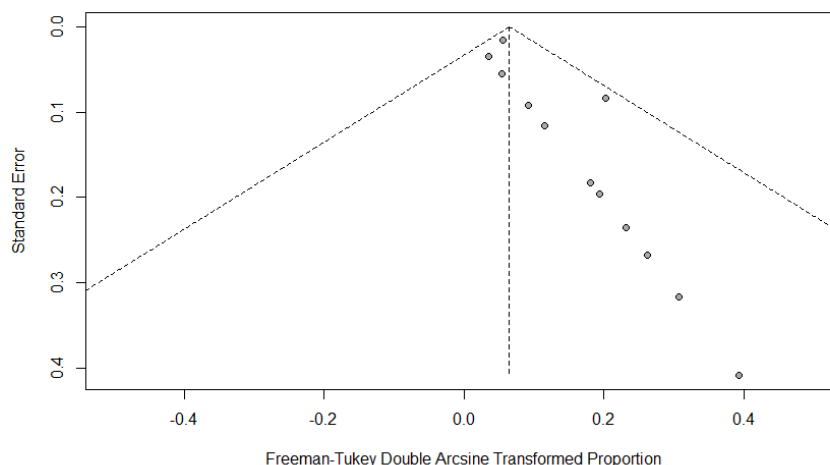


Figure 13 - Funnel Plot for HIV Seroconversion Among Healthcare Workers Indicated for PEP but Without PEP Use



3.4.1 Sensitivity Analyses Excluding High-Risk of Bias Studies

1. Number of individuals who exhibited seroconversion and total number of occupational exposures to biological material

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0000 (95% CI = [0.0000; 0.0000]). Heterogeneity was $I^2 = 0.0\%$ [0.0%; 22.2%] and $\tau^2 < 0.0001$ (Supplementary Figure 1 – see Additional file 15). The funnel plot is shown in Supplementary Figure 2 – see Additional file 16. The result of the Egger test confirmed the symmetry of the funnel plot ($p = 0.369$).

2. Number of seroconverters and sample of accident victims who completed follow-up

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0001 (95% CI = [0.0000; 0.0003]). Heterogeneity was $I^2 = 0.0\%$ [0.0%; 23.8%] and $\tau^2 = 0.0001$ (Supplementary Figure 3 – see Additional file 17). The funnel plot is shown in Supplementary Figure 4 – see Additional file 18. The result of the Egger test confirmed the symmetry of the funnel plot ($p = 0.377$).

3. Number of seroconverters and sample by type of exposure – percutaneous

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0006 (95% CI = [0.0002; 0.0012]). Heterogeneity was $I^2 = 0.0\%$ [0.0%; 38.7%] and $\tau^2 = 0.0003$ (Supplementary Figure 5 – see Additional file 19). The funnel plot is shown in Supplementary Figure 6 – see Additional file 20. The result of the Egger test confirmed the symmetry of the funnel plot ($p = 0.282$).

4. Number of seroconverters and sample by type of exposure – mucocutaneous

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0018 (95% CI = [0.0008; 0.0033]). Heterogeneity was $I^2 = 0.0\%$ [0.0%; 50.0%] and $\tau^2 = 0.0005$ (Supplementary Figure 7 – see Additional file 21). The funnel plot is shown in Supplementary Figure 8 – see Additional file 22. The result of the Egger test confirmed the asymmetry of the funnel plot ($p = 0.003$).

5. Number of seroconverters and population with PEP use

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0000 (95% CI = [0.0000; 0.0004]). Heterogeneity was $I^2 = 0.0\%$ [0.0%; 34.5%] and $\tau^2 = 0$ (Supplementary Figure 9 – see Additional file 23). The funnel plot is shown in Supplementary Figure 10 – see Additional file 24. The result of the Egger test confirmed the symmetry of the funnel plot ($p = 0.786$).

6. Number of seroconverters and population with indication but without PEP use

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0000 (95% CI = [0.0000; 0.0000]). Heterogeneity was $I^2 = 0.0\%$ [0.0%; 47.0%] and $\tau^2 = 0$ (Supplementary Figure 11 – see Additional file 25). The funnel plot is shown in Supplementary Figure 12 – see Additional file 26. The result of the Egger test confirmed the asymmetry of the funnel plot ($p < 0.001$).

3.4.2 Meta-analyses pooling data of studies conducted in countries with low HIV prevalence

1. Number of individuals who exhibited seroconversion and total number of occupational exposures to biological material

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0000 (95% CI = [0.0000; 0.0002]). Heterogeneity was $I^2 = 0.0\%$ [0.0%; 22.4%] and $\tau^2 < 0.0001$ (Supplementary Figure 13 – see Additional file 27). The funnel plot is shown in Supplementary Figure 14 – see Additional file 28. The result of the Egger test confirmed the symmetry of the funnel plot ($p = 0.347$).

2. Number of seroconverters and sample of accident victims who completed follow-up

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0001 (95% CI = [0.0000; 0.0003]). Heterogeneity was $I^2 = 0.0\%$ [0.0%; 24.2%] and $\tau^2 = 0.0001$ (Supplementary Figure 15 – see Additional file 29). The funnel plot is shown in Supplementary Figure 16 – see Additional file 30. The result of the Egger test confirmed the symmetry of the funnel plot ($p = 0.592$).

3. Number of seroconverters and sample by type of exposure – percutaneous

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0003 (95% CI = [0.0001; 0.0007]). Heterogeneity was $I^2 = 0.0\%$ [0.0%; 35.5%] and $\tau^2 = 0.0003$ (Supplementary Figure 17– see Additional file 31). The funnel plot is shown in Supplementary Figure 18 – see Additional file 32. The result of the Egger test confirmed the symmetry of the funnel plot ($p = 0.726$).

4. Number of seroconverters and sample by type of exposure – mucocutaneous

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0000 (95% CI = [0.0000; 0.0001]). Heterogeneity was $I^2 = 0.0\%$ [0.0%; 44.6%] and $\tau^2 = 0$ (Supplementary Figure 19 – see Additional file 33). The funnel

plot is shown in Supplementary Figure 20 – see Additional file 34. The result of the Egger test confirmed the symmetry of the funnel plot ($p = 0.434$).

5. Number of seroconverters and population with PEP use

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0000 (95% CI = [0.0000; 0.0004]). Heterogeneity was $I^2 = 0.0\%$ [0.0%; 35.1%] and $\tau^2 = 0$ (Supplementary Figure 21 – see Additional file 35). The funnel plot is shown in Supplementary Figure 22 – see Additional file 36. The result of the Egger test confirmed the symmetry of the funnel plot ($p = 0.770$).

6. Number of seroconverters and population with indication but without PEP use

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0000 (95% CI = [0.0000; 0.0002]). Heterogeneity was $I^2 = 0.0\%$ [0.0%; 43.9%] and $\tau^2 = 0$ (Supplementary Figure 23 – see Additional file 37). The funnel plot is shown in Supplementary Figure 24 – see Additional file 38. The result of the Egger test confirmed the asymmetry of the funnel plot ($p < 0.001$).

3.4.3 Meta-analyses pooling data of studies conducted in low-prevalence countries reporting seroconversion

1. Number of individuals who exhibited seroconversion and total number of occupational exposures to biological material

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0011 (95% CI = [0.0006; 0.0018]). Heterogeneity was $I^2 = 50.7\%$

[0.0%; 77.0%] and $\tau^2 = 0.0002$ (Supplementary Figure 25 – see Additional file 39). The funnel plot is shown in Supplementary Figure 26 – see Additional file 40.

2. Number of seroconverters and sample of accident victims who completed follow-up

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0014 (95% CI = [0.0007; 0.0023]). Heterogeneity was $I^2 = 53.6\%$ [1.5%; 78.1%] and $\tau^2 = 0.0002$ (Supplementary Figure 27 – see Additional file 41). The funnel plot is shown in Supplementary Figure 28 – see Additional file 42.

3. Number of seroconverters and sample by type of exposure – percutaneous

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0029 (95% CI = [0.0015; 0.0048]). Heterogeneity was $I^2 = 10.1\%$ [0.0%; 73.8%] and $\tau^2 < 0.0001$ (Supplementary Figure 29 – see Additional file 43). The funnel plot is shown in Supplementary Figure 30 – see Additional file 44. The result of the Egger test confirmed the symmetry of the funnel plot ($p = 0.282$).

4. Number of seroconverters and sample by type of exposure – mucocutaneous

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0000 (95% CI = [0.0000; 0.0004]). Heterogeneity was $I^2 = 0.0\%$ [0.0%; 70.8%] and $\tau^2 = 0$ (Supplementary Figure 31 – see Additional file 45). The funnel plot is shown in Supplementary Figure 32 – see Additional file 46.

5. Number of seroconverters and population with PEP use

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0048 (95% CI = [0.0000; 0.0207]). Heterogeneity was $I^2 = 0.0\%$ [0.0%; 89.6%] and $\tau^2 = 0$ (Supplementary Figure 33 – see Additional file 47). The funnel plot is shown in Supplementary Figure 34 – see Additional file 48.

6. Number of seroconverters and population with indication but without PEP use

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0000 (95% CI = [0.0000; 0.0002]). Heterogeneity was $I^2 = 45.0\%$ [0.0%; 81.7%] and $\tau^2 = 0.0156$ (Supplementary Figure 35 – see Additional file 49). The funnel plot is shown in Supplementary Figure 36 – see Additional file 50. The result of the Egger test confirmed the asymmetry of the funnel plot ($p < 0.001$).

3.4.4 Meta-analyses pooling data of studies conducted in countries with high HIV prevalence

1. Number of individuals who exhibited seroconversion and total number of occupational exposures to biological material

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0000 (95% CI = [0.0000; 0.0002]). Heterogeneity was $I^2 = 0.0\%$ [0.0%; 62.4%] and $\tau^2 = 0$ (Supplementary Figure 37 – see Additional file 51). The funnel plot is shown in Supplementary Figure 38 – see Additional file 52.

2. Number of seroconverters and sample of accident victims who completed follow-up

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0000 (95% CI = [0.0000; 0.0009]). Heterogeneity was $I^2 = 0.0\%$ [0.0%; 62.4%] and $\tau^2 = 0$ (Supplementary Figure 39 – see Additional file 53). The funnel plot is shown in Supplementary Figure 40 – see Additional file 54.

3. Number of seroconverters and sample by type of exposure – percutaneous

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0000 (95% CI = [0.0000; 0.0094]). Heterogeneity was $I^2 = 0.0\%$ [0.0%; 0.2%] and $\tau^2 = 0$ (Supplementary Figure 41 – see Additional file 55). The funnel plot is shown in Supplementary Figure 42 – see Additional file 56.

4. Number of seroconverters and sample by type of exposure – mucocutaneous

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0018 (95% CI = [0.0000; 0.0365]) (Supplementary Figure 43 – see Additional file 57). The funnel plot is shown in Supplementary Figure 44 – see Additional file 58.

5. Number of seroconverters and population with PEP use

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0000 (95% CI = [0.0000; 0.0014]). Heterogeneity was $I^2 = 0.0\%$ [0.0%; 67.6%] and $\tau^2 = 0$ (Supplementary Figure 45 – see Additional file 59). The funnel plot is shown in Supplementary Figure 46 – see Additional file 60.

6. Number of seroconverters and population with indication but without PEP use

The result of the meta-analysis demonstrated that the pooled prevalence of seroconversion was 0.0000 (95% CI = [0.0000; 0.0002]). Heterogeneity was $I^2 = 0.0\%$ [0.0%; 84.7%] and $\tau^2 = 0$ (Supplementary Figure 47 – see Additional file 61). The funnel plot is shown in Supplementary Figure 48 – see Additional file 62.

4 Discussion

This systematic review and meta-analysis provide a comprehensive synthesis of HIV seroconversion incidence among healthcare professionals worldwide following occupational exposure. The pooled incidence of seroconversion across all occupational exposures was 0.0000 (95% CI: 0.0000–0.0000). Among individuals who completed serological follow-up, the pooled incidence was 0.0001 (95% CI: 0.0000–0.0003). For percutaneous exposures, the pooled incidence was 0.0006 (95% CI: 0.0002–0.0012), while for mucocutaneous exposures it was 0.0018 (95% CI: 0.0008–0.0032). Among individuals who adhered to Post-Exposure Prophylaxis (PEP), the pooled seroconversion incidence was 0.0000 (95% CI: 0.0000–0.0004), whereas among those indicated for PEP but who did not adhere, the pooled incidence was 0.0017 (95% CI: 0.0003–0.0045). Despite the low incidence rates, the occurrence of seroconversion is a real concern.

HIV seroconversion following occupational exposure among healthcare professionals is rare; however, documented cases reveal that specific risk factors substantially increase the likelihood of transmission. Critical factors include the type of exposure, particularly deep percutaneous injuries involving hollow-bore needles, and the advanced infection stage in the source patient^{35–37}. These findings are supported by occupational safety guidelines¹⁶ and prior studies, highlighting the necessity of preventive measures and PEP in high-risk exposure^{36,38,39}.

Despite the extremely low incidence of occupational HIV seroconversion observed in this review, its clinical and personal impact remains substantial. A single case may lead to chronic infection, lifelong antiretroviral therapy, enduring psychosocial consequences, and considerable healthcare costs^{40–42}. Although advances in experimental therapies, such as gene editing and immunotherapeutic strategies, offer hope, no definitive, accessible, and effective cure currently exists⁴⁰. The burden associated with lifelong treatment and diminished quality of life underscores the need to maintain rigorous biosafety protocols and to offer post-exposure prophylaxis even in cases of low-risk exposure⁴¹. Such measures are not only supported from a preventive standpoint, but also represent a strong ethical consideration, given the potential severity of the outcome⁴³. Documented cases of seroconversion after occupational exposures emphasize the critical role of immediate PEP in reducing transmission risk^{35,37,44}.

The robustness of the findings was further examined through subgroup analyses exploring whether national HIV prevalence could influence the observed seroconversion rates. Restricting the analysis to studies conducted in low-prevalence settings (below 1%) yielded pooled estimates virtually identical to the main analysis, confirming that background prevalence did not alter the overall pattern of results. When restricting to studies conducted in low-prevalence countries that reported at least one seroconversion, the pooled estimates increased slightly, but remained far below the biological probability of transmission per exposure (0.3%)⁷. This stability across subgroups reinforces that background prevalence acts as a contextual amplifier—affecting only the probability of encountering an infected source, not the biological likelihood of infection once exposure occurs. Conversely, in high-prevalence settings, no additional seroconversions were detected, suggesting that occupational HIV infection has become largely theoretical, even where community transmission persists. Together, these findings indicate that the

biological probability of seroconversion per exposure remains stable across epidemiological contexts and that global prevention and PEP programs have effectively minimized residual occupational risk.

Most of the studies included in this systematic review were conducted in countries classified as high- and upper-middle-income, particularly in Western Europe, North America, and parts of Asia and Latin America. Sub-Saharan Africa, despite bearing the highest burden of HIV globally, was underrepresented in the included studies². This imbalance in the distribution of studies may reflect disparities in research funding, surveillance systems and access to publication channels between regions of the world⁴⁵. Notably, all studies that reported cases of occupational HIV seroconversion were conducted in high- and upper-middle-income countries. This concentration may be associated with stronger occupational health systems, more consistent access to post-exposure testing and prophylaxis, and better infrastructure for reporting and follow-up^{46,47}. The absence of reported cases in low-resource settings may not reflect lower risk, but rather the lack of systematic surveillance, underreporting, or absence of confirmatory testing⁴⁵. These contextual disparities should be taken into account when interpreting pooled seroconversion estimates across regions. Beyond the geographic imbalance in study representation, it is important to highlight that many of the few studies originating from low-resource settings exhibited methodological fragilities. Several received low scores in our risk of bias assessment, particularly in domains related to setting description, sample size, and follow-up clarity. These weaknesses suggest potential selection bias, underpowered estimates, and limited external validity. This interpretation is consistent with Habibi *et al.*⁴⁸, who emphasize that limited infrastructure, insufficient funding, and poorly adapted health policies in low-resource settings hinder the implementation of recommended clinical practices and robust research. Similarly, Boyd

*et al.*⁴⁹ note that the use of electronic health records in such contexts may exacerbate data gaps by excluding vulnerable populations. Together, these findings underscore the urgent need to strengthen health research capacity and occupational surveillance systems in under-resourced regions to produce more representative and actionable evidence.

In addition to geographic disparities, most of the studies included in this review were conducted in hospital environments, with fewer studies conducted in dental clinics, laboratories, or home care settings. Notably, all reports of occupational HIV seroconversion originated from hospital-based studies. This concentration may reflect true differences in exposure risk across settings, but it could also be influenced by underreporting or by limitations in surveillance and follow-up infrastructure in non-hospital environments^{2,45}. The marked heterogeneity in the description of settings and exposure scenarios, combined with the scarcity of studies outside hospital contexts, precluded stratified meta-analyses by healthcare setting. This limitation should be considered when interpreting the pooled seroconversion rates, as the findings may not be fully generalizable to all occupational contexts, particularly those characterized by resource constraints or different clinical practices.

The analysis of seroconversion rates among occupational exposures to HIV from studies included in this review highlights the inherent complexity of the data, driven by methodological variability across studies. While findings from a large dataset suggest an extremely low incidence of seroconversion, inconsistencies in study design and scenario descriptions introduce potential biases that warrant careful consideration. Moreover, the inclusion of exposures without standardized serological follow-up complicates the reliability of reported rates. The estimation of incidence from exposure incidents rather than exclusively from those with completed follow-up, as noted by Pérez-Díaz *et al.*⁵⁰,

presents challenges. Studies that include all reported exposures without adherence to standardized follow-up protocols, such as those recommended by the Centers for Disease Control and Prevention (CDC)⁴, risk sacrificing data reliability, making it difficult to ascertain true incidence. When contrasted with the only previous global systematic review on this topic found in the literature, conducted by Baggaley *et al.*¹², the findings of the present review appear to suggest a lower observed risk of occupational HIV seroconversion. Baggaley's review concentrated on deriving theoretical transmission probabilities using modeling approaches, particularly in contexts where observational data were scarce, although empirical data were incorporated when available. Their synthesis focused on calculating theoretical transmission probabilities by exposure type, without incorporating data on follow-up procedures, PEP, or differences across healthcare settings. In contrast, the present review compiles a broader and more recent body of observational studies reporting documented seroconversion outcomes following real-world occupational exposures. By stratifying the data by exposure type, PEP use, and follow-up completion, and applying statistical techniques suitable for rare events, this review may offer a more detailed and clinically relevant risk profile. These differences could reflect not only methodological approaches, but also temporal shifts in occupational safety practices, access to PEP, infection control awareness, and surveillance systems. This reinforces the value of regularly updating evidence syntheses to reflect current clinical realities and inform occupational health strategies.

Examining the seroconversion rates for percutaneous versus mucocutaneous exposures reveals key insights into the risk profiles in occupational settings. The higher rate of mucocutaneous exposures suggests a need for continued attention to these incidents, although publication bias and methodological quality issues may affect data reliability. Studies with limited sample sizes and insufficient scenario descriptions,

particularly in percutaneous cases^{9,38,51–72}, may not fully represent the realities of occupational exposure¹⁴. Under-reporting of occupational exposures further complicates the assessment of seroconversion risks. Facchin *et al.*⁷³ highlighted that 23.76% of accidents involving biological material were not officially reported by nursing professionals in a Brazilian emergency hospital. Among these, 53.47% were percutaneous exposures, and 67.33% involved blood. The primary reason for under-reporting was the perception that the incidents were "low risk," particularly for percutaneous and mucocutaneous exposures. This aligns with findings that healthcare workers often underestimate the risk of bloodborne pathogen transmission, leading to gaps in post-exposure management and prevention efforts⁷³.

In this review, meta-analyses were conducted separately for each type of exposure (percutaneous and mucocutaneous) rather than in a combined model with subgroup comparisons. This approach was chosen due to the biological and clinical differences in transmission risk across exposure types^{4,17,18}, as well as incomplete reporting, with several studies presenting data exclusively for one type of exposure. Combining these data into a single model would have required assumptions incompatible with the available dataset, potentially introducing structural heterogeneity and undermining the interpretability of subgroup comparisons. Furthermore, the small number of events and studies in some subgroups would limit the statistical power for detecting meaningful differences. Stratified analyses, therefore, allowed for a clearer and more accurate interpretation of seroconversion risk by exposure category. It is important to note that even high-risk exposures, such as deep percutaneous injuries or those involving visible blood, were frequently under-reported, which may have delayed or prevented the timely implementation of prophylactic measures⁷³. Interestingly, the present meta-analysis observed a higher pooled incidence of seroconversion following

mucocutaneous exposures compared to percutaneous exposures, a finding that contrasts with most of the existing literature, which typically reports a higher risk associated with percutaneous injuries. This unexpected result can be explained by several important factors, including the smaller number of patients in the mucocutaneous exposure group. This may have contributed to greater variability in the results and a wider confidence interval. In addition, publication bias was classified as "very serious" for studies on mucocutaneous exposure, indicating the possibility of overestimating the risk due to the absence of publications that did not report seroconversion^{26,27}. Despite the smaller number of studies, the higher seroconversion rate observed in mucocutaneous exposures raises the possibility that positive results are overrepresented, potentially distorting the understanding of the actual risk associated with these types of exposure⁷⁶. Given these limitations, the findings regarding mucocutaneous exposures should be interpreted with caution, and future research with larger samples and standardized follow-up is warranted to clarify the true magnitude of this risk.

Another point to consider is the methodological differences among the included studies, which may have used distinct definitions of exposure, different participant inclusion criteria, and variations in follow-up duration. These methodological differences may have influenced the reported seroconversion rates. Furthermore, the imprecision found in the mucocutaneous exposure group results, reflected by a wider confidence interval, also suggests greater uncertainty regarding the estimated risk for this type of exposure. Differentiating between types of exposure is crucial for guiding preventive interventions^{4,36}. Deep percutaneous exposures, involving a larger volume of blood and viral load, require prioritization in prophylactic strategies, while grouping mucosal and cutaneous (non-intact skin) exposures offers a practical approach for comparative analysis^{4,36}. In this study, we combined mucosal and cutaneous exposures

as mucocutaneous to improve comparability, following studies such as Gerberding⁷⁴, Marcus *et al.*⁷⁵, and Heptonstall *et al.*⁶⁴, which treat these exposures as a unified category. Therefore, it is important to consider these factors when interpreting the results of the meta-analysis, recognizing that despite the findings, the existing literature consistently points to a higher risk of seroconversion related to percutaneous exposure. This highlights the need for more studies that rigorously evaluate the different types of exposure, with greater control over confounding factors and a more representative sample, to provide more accurate and consistent estimates of the risk of occupational seroconversion. In addition to methodological limitations, systemic challenges such as under-reporting of occupational exposures represent a critical barrier to accurately estimating seroconversion risk and designing effective preventive strategies. In addition, under-reporting of occupational exposures represents a critical challenge for occupational health, hindering efforts to design effective preventive strategies and safety policies⁷³. Investments in a safety culture, including training and clear reporting protocols, have been associated with reduced under-reporting rates, highlighting the importance of an institution-focused approach to workplace safety⁷³.

The notable difference in seroconversion rates between workers who used PEP and those who did not, despite the indication, may suggest a potential protective effect of this intervention. However, this observation should be interpreted with caution, as the observational nature of the included studies, the absence of randomization, the lack of adjustment for potential confounding variables, such as exposure severity or timing of PEP initiation, adherence rates, and follow-up protocols varied limit the ability to infer a causal relationship between PEP use and seroconversion risk. Furthermore, publication bias, where studies reporting negative outcomes are less likely to be published, may obscure a true assessment of PEP's effectiveness in preventing occupational HIV

transmission^{26,27} Despite this, it is worth highlighting studies such as those by Cardo *et al.*³⁶ and Bell⁸ indicate that zidovudine as PEP can substantially reduce the risk of seroconversion among healthcare workers, although this protection is not absolute. Cases of PEP failure, often due to viral resistance or poor adherence, have also been documented^{64,76,77}. Adherence to the 28-day antiretroviral drug regimen is essential for the efficacy of HIV PEP⁴. Despite its importance, studies indicate that acceptance and adherence to PEP are often inadequate, with less than 60% of individuals who initiate the treatment completing the full course, thereby compromising its effectiveness³⁹. This is particularly concerning in healthcare settings where occupational exposure risk is significant. For instance, Cleveland *et al.*⁷⁸ emphasized the importance of ensuring proper PEP protocols among dental healthcare personnel, highlighting the need for continuous education and updated recommendations to improve adherence and ensure appropriate use of PEP.

Despite the extremely low incidence of occupational HIV seroconversion observed in this review, its clinical and personal impact remains substantial. Although advances in experimental therapies, such as gene editing and immunotherapeutic strategies, offer hope, no definitive, accessible, and effective cure currently exists⁴⁰. The burden associated with lifelong treatment and diminished quality of life underscores the need to maintain rigorous biosafety protocols and to offer post-exposure prophylaxis even in cases of low-risk exposure⁴¹. Such measures are not only supported from a preventive standpoint, but also represent a strong ethical consideration, given the potential severity of the outcome⁴³. Documented cases of seroconversion after percutaneous and mucocutaneous exposures emphasize the critical role of immediate PEP in reducing transmission risk^{35,37,44}.

Moreover, there are concerns regarding the inappropriate use of PEP, including its use in situations of low or negligible exposure risk. The U.S. Public Health Service (USPHS) guidelines specifically address these issues, cautioning against the use of expanded PEP regimens for low-risk exposures¹⁶. Some studies have shown that some healthcare workers have completed a full course of PEP even when the source patient was HIV-negative^{30,39,53,78}. One of the reasons for this might be concerns that the source patient is in the "window period" of HIV infection. However, USPHS guidelines clearly state that if the source is confirmed as HIV-negative and shows no clinical evidence of AIDS or HIV-related symptoms, the probability of being in the "window period" is extremely low, and thus PEP should be discontinued¹⁶. These instances of misuse and overuse may lead to unnecessary adverse effects, increased healthcare costs, and a potential overestimation of PEP's limitations. Addressing such misuse is critical to ensure PEP is used appropriately and effectively. Taken together, while the pooled estimates indicate a lower seroconversion rate among individuals who used PEP, these findings should be considered hypothesis-generating rather than confirmatory. Further prospective studies with controlled confounding are needed to more accurately assess the real-world effectiveness of PEP in occupational exposures. These limitations underscore the importance of interpreting PEP-related findings within the constraints of observational data and avoiding overgeneralization in the absence of randomized evidence.

The robustness of the findings was further supported by sensitivity analyses restricted to studies with low or moderate risk of bias. These analyses yielded results consistent with the primary estimates across most exposure categories, suggesting that the inclusion of studies with higher methodological limitations did not substantially distort the overall conclusions. Notably, the group of individuals for whom PEP was

indicated but not used appeared more sensitive to study quality, with observed seroconversions limited to studies at high risk of bias. This finding reinforces the importance of methodological rigor in accurately estimating seroconversion risk and underscores the need for cautious interpretation of results derived from lower-quality evidence.

Beyond pharmacological interventions, structural and behavioral preventive strategies also play a crucial role in minimizing occupational risk. The prevention of occupational HIV seroconversion relies on the consistent implementation of biosafety strategies. Correctly using this equipment remains a key barrier to preventing contact with contaminated biological materials. However, adherence to PPE protocols is still limited in many healthcare settings. Studies have linked noncompliance to factors such as informal employment, needle recapping, medication administration, improper disposal of sharps, insufficient biosafety training, and work overload^{79–81}. Even when protective equipment is available, gaps in risk perception, low adherence to standard precautions, and the lack of formal reporting systems reflect persistent weaknesses in institutional safety culture⁸¹. Tejada-Pérez *et al.*⁸² emphasize the importance of strengthening this culture by implementing effective surveillance and notification systems, such as EPINETAC — the Spanish adaptation of the international EPINet (Exposure Prevention Information Network), which facilitates monitoring and prevention of biological exposures in clinical environments.

In parallel with the clinical interpretation of pooled outcomes, it is also essential to consider the methodological quality of the evidence base. The overall risk of bias (RoB) varied across the different outcomes analyzed in this review, influencing the interpretation of pooled estimates. Risk of bias is a critical determinant of the reliability

of effect estimates and must be systematically assessed in evidence syntheses^{83,84}, especially when dealing with rare outcomes like occupational HIV seroconversion. The overall RoB across studies included methodological limitations such as incomplete reporting and unclear follow-up protocols, factors that are recognized as critical sources of bias that can downgrade the certainty of evidence even in narrative syntheses⁸⁵. Concerns regarding small sample sizes and the lack of detailed setting descriptions also remained, which could affect external validity and limit the generalizability of the findings⁸⁶. For percutaneous exposures, the risk of bias was generally low across most domains, particularly in sample frame and outcome ascertainment. Nevertheless, moderate concerns were observed regarding setting description and standardized measurement methods. This underscores the ongoing challenge of ensuring consistent methodological reporting in observational studies, a factor known to hinder the accurate appraisal and comparability of bias across studies⁸⁴. In contrast, studies assessing mucocutaneous exposures demonstrated a higher risk of bias. Limitations such as small sample sizes, inconsistent exposure definitions, and publication bias were more frequent, potentially inflating the estimated seroconversion rates. These findings are consistent with broader evidence-based principles, which caution that high risk of bias in studies addressing rare outcomes may lead to exaggerated effect estimates and reduce the overall certainty in evidence^{85,87}. Regarding PEP-related outcomes, analyses restricted to individuals who adhered to PEP showed low to moderate RoB, although some studies lacked detailed documentation of PEP initiation timing, adherence rates, and follow-up protocols^{36,78}. Among individuals indicated for PEP but who did not adhere, similar concerns regarding exposure classification and follow-up completeness persisted, introducing additional risk of bias. This interpretation is reinforced by the sensitivity analyses, which revealed that the pooled estimates remained stable after excluding high-

risk studies for most outcomes, except in the group without PEP use, where the incidence dropped to zero. This suggests that the few observed events in that group were largely concentrated in studies with methodological limitations. Overall, the heterogeneity in study methodologies and domain-specific risks of bias contributed to downgrading the certainty of evidence in the GRADE evaluation. According to GRADE guidance, serious or very serious risk of bias warrants downgrading when critical domains are affected. In this review, such concerns led to a very low certainty rating for the outcome based on all reported exposures, and to low certainty for most other outcomes involving stratified analyses.

Beyond the statistical patterns and the outcome-specific risk of bias assessments, it is equally important to consider the broader methodological limitations and historical variability observed across the included studies. One key challenge was the lack of standardization in post-exposure protocols, including inconsistencies in exposure definitions, follow-up procedures, and HIV testing strategies, which likely influenced the comparability and robustness of reported outcomes. These discrepancies directly influenced our risk of bias assessment, especially in domains related to exposure classification, outcome ascertainment, follow-up completeness, and statistical modeling. Given that the included studies span several decades, changes in clinical practices, such as the introduction and evolution of PEP, variations in follow-up duration, and advances in HIV diagnostic technologies, likely contributed to this heterogeneity. Another methodological nuance relates to the inclusion of exposures without extended serological follow-up. According to internationally recognized guidelines^{4,17,18}, when the source is confirmed HIV-negative and the exposed individual has a negative baseline test, further serological monitoring is not recommended. In such cases, discharge from follow-up reflects a clinical decision, not a loss to follow-up, and these individuals are typically

classified as not having seroconverted. To accommodate the variability in follow-up duration and ensure methodological transparency, we performed two separate meta-analyses: one including all exposures reported in the studies, and another restricted to those with confirmed follow-up. This stratification allowed us to distinguish between robust outcome ascertainment and cases with abbreviated or unclear monitoring protocols, without conflating this with the HIV status of the source patient, which was inconsistently reported across studies and therefore unsuitable for stratified analysis in this review.

In addition to addressing challenges related to stratification and data heterogeneity, this review presents several methodological strengths. It was prospectively registered in PROSPERO, conducted in accordance with PRISMA and JBI guidelines, and included a comprehensive search of six major databases and gray literature sources. Dual independent screening, calibration of reviewers, and the application of standardized extraction and risk of bias tools enhanced the transparency and reliability of the review process. Furthermore, the use of stratified meta-analyses, appropriate transformations for rare events, and adherence to current guidance on GRADE framework adapted for prevalence and incidence outcomes added rigor to the synthesis of evidence.

Nonetheless, some weaknesses of the review process and the included studies should be acknowledged. Variability in study designs, exposure classification, follow-up duration, and reporting clarity may have introduced heterogeneity and affected the precision of pooled estimates. Incomplete contextual descriptions, underreporting of occupational incidents, and inconsistent follow-up protocols, particularly regarding PEP use, limited the comparability of data and hindered the feasibility of subgroup analyses

by region, profession, or healthcare setting. Additionally, some studies lacked methodological transparency, which limited the assessment of key quality domains and contributed to downgrading of certainty in the GRADE evaluation. It is also important to emphasize that, according to the GRADE framework, the certainty of evidence for most pooled estimates was rated as low or very low, reflecting serious concerns about study quality, completeness of follow-up, and potential publication bias. These limitations collectively highlight the need for cautious interpretation of the pooled estimates and careful consideration of the certainty of evidence. The rarity of the outcome and the predominance of zero-event studies further constrained the analytical scope.

From a statistical standpoint, this review applied the Freeman–Tukey double arcsine transformation, a long-established and widely validated method for variance stabilization in meta-analyses of proportions and rare events. Although recent reports, such as the study of Lin and Xu²³, have discussed potential interpretability and numerical challenges when event rates are extremely low, these limitations do not invalidate its utility in ensuring comparability with previous syntheses and in handling datasets dominated by zero-event studies. To verify the robustness of this approach, a complementary sensitivity analysis was conducted, excluding studies with zero seroconversion events. The exclusion of these studies, which contribute with limited direct information to the estimation of event probability, did not substantially alter the pooled estimates. These findings confirm that the main conclusions are statistically consistent and methodologically sound. Future research should consider the adoption of more flexible one-step models, such as generalized linear mixed or Bayesian hierarchical frameworks.

Although the direction of findings remained consistent across analyses, these weaknesses underscore the need for more rigorous and standardized study protocols aligned with current international recommendations. Despite these challenges, we believe this review offers a robust and up-to-date synthesis of occupational HIV seroconversion risk and can support future research and policy efforts to strengthen clinical surveillance and healthcare worker protection.

5 Conclusion

This comprehensive review consolidates evidence on occupational HIV seroconversion, showing that the overall risk is extremely low. Slightly higher pooled estimates were observed for mucocutaneous exposures and for individuals who did not use PEP when it was indicated. However, sensitivity analyses revealed that the latter finding was concentrated in studies with high risk of bias, underscoring the importance of study quality in interpreting specific outcomes. Overall, while methodological limitations, small event numbers, and potential publication bias warrant caution, the robustness of most estimates across analytical approaches supports their reliability. These findings reinforce the need for consistent exposure reporting, effective post-exposure management, and strict adherence to prevention protocols. Future research and policy should also address global disparities by strengthening surveillance systems and implementing context-specific strategies in under-resourced settings to ensure equitable protection of healthcare workers.

6 List of abbreviations

BBF - Blood and Body Fluids;

CDC - Centers for Disease Control and Prevention;

PEP - Post-Exposure Prophylaxis.

7 Declarations

7.1 Ethics approval and consent to participate

This systematic review did not involve direct research on human participants. All data were obtained from previously published studies that had their own ethics approvals. Therefore, no additional ethics approval or consent was required for this study.

7.2 Consent for publication

Not applicable.

7.3 Availability of data and materials

All data generated or analyzed during this study are included in this published article and its supplementary information files.

7.4 Competing interests

The authors declare that they have no competing interests.

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7.6 Authors' contributions

ACMM, LGZ, LGA, SRM, MHNGA: The authors contributed to the study's conception, planning, analysis, interpretation of data, writing, and critical review.

CMP, RSP: The authors contributed to the critical review of the study.

7.7 Acknowledgements

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8 References

1. World Health Organization. The World Health Report 2002: Reducing risks, promoting healthy life [Internet]. Geneva: World Health Organization; 2002 [cited 2025 Apr 12]. Available from: <https://www.who.int/publications/i/item/9241562072>
2. UNAIDS. 2024 Global AIDS Report — The Urgency of Now: AIDS at a Crossroads [Internet]. Geneva: Joint United Nations Programme on HIV/AIDS (UNAIDS); 2024 [cited 2025 Apr 7]. Available from: <https://www.unaids.org/en/resources/documents/2024/global-aids-update-2024>
3. Mengistu DA, Dirirsa G, Mati E, Ayele DM, Bayu K, Deriba W, et al. Global Occupational Exposure to Blood and Body Fluids among Healthcare Workers: Systematic Review and Meta-Analysis. *Can J Infect Dis Med Microbiol*. 2022;2022:5732046.
4. Centers for Disease Control and Prevention. US Public Health Service Guidelines for the Management of Occupational Exposures to Human Immunodeficiency Virus and Recommendations for Postexposure Prophylaxis: Draft Update [Internet]. 2023 [cited 2025 Apr 15]. Available from: <https://stacks.cdc.gov/view/cdc/133952>
5. Negash FB, Hailemichael A, Hailelassie E, Hawaz E, Zerai S, Tesfamariam Z, et al. Prevalence, response and associated factors of needlestick injury among health care workers in Orotta National Referral Hospital, Eritrea. *BMC Health Serv Res*. 2024;24(1):853.
6. Auerbach JD, Malone S, Forsyth AD, Corresponding §. Occupational post-exposure prophylaxis among healthcare workers: a scoping review of factors affecting optimal utilization. *J Int AIDS Soc*. 2024;27:26341.
7. Henderson DK, Fahey BJ, Willy M, Schmitt JM, Carey K, Koziol DE, et al. Risk for occupational transmission of human immunodeficiency virus type 1 (HIV-1) associated with clinical exposures: A prospective evaluation. *Ann Intern Med*. 1990;113(10):740-746.
8. Bell DM. Occupational risk of human immunodeficiency virus infection in healthcare workers: An overview. *Am J Med*. 1997;102(5B):9-15.

9. Aydın Ö, Ergen P, Çaşkurulu H. An Evaluation of Health Personnel Exposed to Occupational Injuries in Terms of HBV, HCV, and HIV Infections. *Viral Hepatitis Journal*. 2020;26(3):158-162.
10. Goel V, Kumar D, Lingaiah R, Singh S. Occurrence of Needlestick and Injuries among Health-care Workers of a Tertiary Care Teaching Hospital in North India. *J Lab Physicians*. 2017;9(1):20-25.
11. Razzakh SS, Qureshi MF. Needlestick injuries among healthcare personnel in Qatar: A retrospective study. *Qatar Med J*. 2021;2021(2):35.
12. Baggaley RF, Boily MC, White RG, Alary M. Risk of HIV-1 transmission for parenteral exposure and blood transfusion: A systematic review and meta-analysis. *AIDS*. 2006;20(6):805-812.
13. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*. 2021;372:n71.
14. Munn Z, MCLinSc SM, Lisy K, Riitano D, Tufanaru C. Methodological guidance for systematic reviews of observational epidemiological studies reporting prevalence and cumulative incidence data. *Int J Evid Based Healthc*. 2015;13(3).
15. World Health Organization. HIV/AIDS Fact Sheet [Internet]. Geneva: World Health Organization; 2024 [cited 2025 Apr 12]. Available from: https://unaids.org.br/wp-content/uploads/2024/11/2024_11_20-Factsheet_PT-Complete.pdf
16. Kuhar DT, Henderson DK, Struble KA, Heneine W, Thomas V, Cheever LW, et al. Updated U.S. Public Health Service guidelines for the management of occupational exposures to HIV and recommendations for postexposure prophylaxis [Internet]. Atlanta: U.S. Public Health Service; 2013 [cited 2025 Apr 21]. Available from: <https://stacks.cdc.gov/view/cdc/20711>
17. Brasil. Ministério da Saúde. Protocolo clínico e diretrizes terapêuticas para profilaxia pós-exposição (PEP) de risco à infecção pelo HIV, IST e hepatites virais [Internet]. Brasília; 2024 [cited 2025 Apr 21]. Available from: http://bvsms.saude.gov.br/bvs/publicacoes/pcdt_pep_hiv_ist_hepatites.pdf
18. European AIDS Clinical Society (EACS). EACS Guidelines Version 12.0. [Internet]. Brussels; 2023 [cited 2025 Apr 21]. Available from: https://www.eacsociety.org/media/final2023eacsguidelinesv12.0_oct2023.pdf
19. Gordis, Leon. *Epidemiology*. 5th ed. Philadelphia: Saunders; 2014. 1–412 p.
20. Campbell J, Dussault G, Buchan J, Pozo-Martin F, Guerra Arias M, Leone C, et al. A universal truth: No health without a workforce [Internet]. Geneva: World Health Organization; 2013 [cited 2025 Apr 22]. Available from: https://www.who.int/publications/m/item/hrh_universal_truth
21. Haddaway NR, Collins AM, Coughlin D, Kirk S. The role of google scholar in evidence reviews and its applicability to grey literature searching. *PLoS One*. 2015;10(9): e0138237.

22. Balduzzi S, Rücker G, Schwarzer G. How to perform a meta-analysis with R: A practical tutorial. *Evid Based Ment Health*. 2019;22(4):153-160.
23. Lin L, Xu C. Arcsine-based transformations for meta-analysis of proportions: Pros, cons, and alternatives. *Health Sci Rep*. 2020;3(3):e178.
24. Zhou S, Shen C. Statistical concerns for meta-analysis of rare events and small sample sizes. *Lancet Infect Dis*. 2022 Aug;22(8):1111-1112.
25. Higgins JPT, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta-analyses. *BMJ*. 2003;327(7414):557-560.
26. Biljana M, Jelena M, Branislav J, Milorad R. Bias in meta-analysis and funnel plot asymmetry. *Stud Health Technol Inform*. 1999;68:323–8.
27. Egger M, Smith GD, Schneider M, Minder C. Bias in meta-analysis detected by a simple, graphical test. *Br Med J*. 1997;315(7109).
28. Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, et al. *Cochrane Handbook for Systematic Reviews of Interventions* [Internet]. 2nd ed. Chichester (UK): John Wiley & Sons; 2019 [cited 2025 Apr 23]. Available from: <https://www.cochrane.org/handbook>
29. Borenstein M, Hedges L V., Higgins JPT, Rothstein HR. *Introduction to meta-analysis*. Introduction to Meta-Analysis. 2009.
30. Borba Brum MC, Dantas Filho FF, Yates ZB, Verçoza Viana MC, Martin Chaves EB, Trindade DME. HIV seroconversion in a health care worker who underwent postexposure prophylaxis following needlestick injury. *Am J Infect Control*. 2013;41(5):471-472.
31. Fahey BJ, Koziol DE, Banks SM, Henderson DK. Frequency of nonparenteral occupational exposures to blood and body fluids before and after universal precautions training. *Am J Med*. 1991;90(2):145-153.
32. Zhang Y, Akl EA, Schünemann HJ. Using systematic reviews in guideline development: The GRADE approach. *Res Synth Methods*. 2019;10(3).
33. The Joanna Briggs Institute. Supporting document for the Joanna Briggs Institute levels of evidence and grades of recommendation [Internet]. Adelaide: The Joanna Briggs Institute; 2014 [cited 2025 Apr 25]. Available from: <https://jbi.global/sites/default/files/2019-05/JBI%20Levels%20of%20Evidence%20Supporting%20Documents-v2.pdf>
34. United Nations Statistics Division. Standard country or area codes for statistical use (M49) [Internet]. New York: United Nations; 2025 [cited 2025 Apr 27]. Available from: <https://unstats.un.org/unsd/classifications/Family/Detail/12>
35. Louise Gerberding J, Bryant-Leblanc CE, Nelson K, Moss AR, Osmond D, Chambers HF, et al. Risk of Transmitting the Human Immunodeficiency Virus, Cytomegalovirus, and Hepatitis b Virus to Health Care Workers Exposed to Patients with Aids and Aids-Related Conditions. *J Infect Dis*. 1987;156(1):1-8.

36. Cardo DM, Culver DH, Ciesielski CA, Srivastava PU, Marcus R, Abiteboul D, et al. A Case–Control Study of HIV Seroconversion in Health Care Workers after Percutaneous Exposure. *N Engl J Med*. 1997;337(21):1485-1490.
37. Ippolito G, Puro V, De Carli G. The Risk of Occupational Human Immunodeficiency Virus Infection in Health Care Workers: Italian Multicenter Study. *Arch Intern Med*. 1993;153(12):1451-1458.
38. Erhabor O, Ejele OA, Nwauche CA. Epidemiology and management of occupational exposure to blood borne viral infections in a resource poor setting: the case for availability of post exposure prophylaxis. *Niger J Clin Pract*. 2007;10(2):100-104.
39. Ford N, Irvine C, Shubber Z, Baggaley R, Beanland R, Vitoria M, et al. Adherence to HIV postexposure prophylaxis: A systematic review and meta-analysis. *AIDS*. 2014;28(18):2721-2727.
40. Sankaranantham M. HIV - Is a cure possible?. *Indian J Sex Transm Dis AIDS*. 2019;40(1):1-5.
41. Portilla-Tamarit I, Rubio-Aparicio M, Fuster-Ruiz de Apodaca MJ, Portilla-Tamarit J, Reus S, Portilla J. Health-Related Quality of Life in People with Advanced HIV Disease, from 1996 to 2021: Systematic Review and Meta-analysis. *AIDS Behav*. 2024;28(6):1978-1998.
42. Bingham A, Shrestha RK, Khurana N, Jacobson EU, Farnham PG. Estimated Lifetime HIV-Related Medical Costs in the United States. *Sex Transm Dis*. 2021;48(4):299-304.
43. UNAIDS, World Health Organization (WHO). Ethical considerations in HIV prevention trials: UNAIDS and WHO guidance document [Internet]. Geneva; 2021 [cited 2025 Apr 9]. Available from: https://www.unaids.org/sites/default/files/media_asset/ethical-considerations-hiv-prevention-trials_en.pdf
44. Tokars JI, Marcus R, Culver DH, Schable CA, McKibben PS, Bandea CI, et al. Surveillance of HIV infection and zidovudine use among health care workers after occupational exposure to HIV-infected blood. *Ann Intern Med*. 1993;118(12).
45. Adam T, Ralaidovy AH, Ross AL, Reeder JC, Swaminathan S. Tracking global resources and capacity for health research: time to reassess strategies and investment decisions. *Health Res Policy Syst*. 2023;21:93.
46. Al-Rahamneh MJ, Khader Y, Aqel AJ, Abaza H, Satyanarayana S, Al-Shaikh AF, et al. Evaluation of the national AIDS program and HIV/AIDS surveillance system in Jordan. *SAGE Open Med*. 2024;12:20503121241263694.
47. European Centre for Disease Prevention and Control. Review of the HIV surveillance system in France [Internet]. Stockholm: ECDC; 2024 [cited 2025 Apr 24]. 1–41 p. Available from: <https://www.ecdc.europa.eu/en/publications-data/review-hiv-surveillance-system-france>
48. Habibi J, Bosch J, Bidulka P, Belson S, DePaul V, Gandhi D, et al. Strategies for specialty training of healthcare professionals in low-resource settings: a systematic review on evidence from stroke care. *BMC Med Educ*. 2023;23(1):442.

49. Boyd AD, Gonzalez-Guarda R, Lawrence K, Patil CL, Ezenwa MO, O'Brien EC, et al. Potential bias and lack of generalizability in electronic health record data: Reflections on health equity from the National Institutes of Health Pragmatic Trials Collaboratory. *J Am Med Inform Assoc.* 2023;30(9):1561-66.
50. Pérez-Díaz C, Calixto OJ, Faccini-Martínez ÁA, Bravo-Ojeda JS, Botero-García CA, Uribe-Pardo E, et al. Occupational exposure to blood borne pathogens among healthcare workers: A cross-sectional study of a registry in Colombia. *J Occup Med Toxicol.* 2015;10:45.
51. Abubakar S, Iliyasu G, Dayyab FM, Inuwa S, Tudun Wada RA, Sadiq NM, et al. Post-exposure prophylaxis following occupational exposure to HIV and hepatitis B: An analysis of a 12-year record in a Nigerian tertiary hospital. *J Infect Prev.* 2018;19(4):184-189.
52. Baldo V, Floreani A, Vecchio LD, Cristoforetti M, Carletti M, Majori S, et al. Occupational Risk of Blood-Borne Viruses in Healthcare Workers: A 5-Year Surveillance Program. *Infect Control Hosp Epidemiol.* 2002;23(6):325-327.
53. De La Tribonnière X, Dufresne MD, Alfandari S, Fontier C, Sobazek A, Valette M, et al. Tolerance, compliance and psychological consequences of post-exposure prophylaxis in health-care workers. *Int J STD AIDS.* 1998;9(10):591-594.
54. El-Hazmi MM, Al-Majid FM. Needle stick and sharps injuries among health care workers: A 5-year surveillance in a teaching center in Saudi Arabia. *Biomedical Research.* 2008;19(2):133-140.
55. Fadil RA, Abdelmutalab NA, Abdelhafeez SA, Mazi W, Algamdi S, Shelwy MM, et al. Pattern and risk factors of sharp object injuries among health care workers in two tertiary hospitals, Al Taif-Kingdom of Saudi Arabia 2016–2018. *Saudi J Biol Sci.* 2021;28(11):6582-6585.
56. Jaggi N, Nirwan P, Chakraborty M. Process improvement to effectively manage and reduce sharps injuries in a Tertiary Hospital in Northern India. *J Healthc Qual Res.* 2020;35(3):141-148.
57. Jayanth S, Kirupakaran H, Brahmadathan K, Gnanaraj L, Kang G. Needle stick injuries in a tertiary care hospital. *Indian J Med Microbiol.* 2009;27(1):44-47.
58. Kepenek E, Sahin Eker HB. An Assessment of Sharp Injuries to Workers in a State Hospital. *Klimik Dergisi/Klimik Journal.* 2017;30(2):78-82.
59. Nwaiwu CA, Egro FM, Smith S, Harper JD, Spiess AM. Seroconversion rate among health care workers exposed to HIV-contaminated body fluids: The University of Pittsburgh 13-year experience. *Am J Infect Control.* 2017;45(8):896-900.
60. Rishi E, Shantha B, Dhami A, Rishi P, Rajapriya H. Needle stick injuries in a tertiary eye-care hospital: Incidence, management, outcomes, and recommendations. *Indian J Ophthalmol.* 2017;65(10):999-1003.
61. Bozkurt S. Needle sticks and injuries due to surgical instruments in health care providers. *Dicle Medical Journal/Dicle Tıp Dergisi.* 2013;40(3):449–52.

62. Dizili-Yelgin C, Çıkman A, Karakeçili F, Gülhan B, Aydın M. Evaluation of sharps injuries in a training and research hospital. *KLIMIK Derg.* 2018;31(3).
63. Gooch BF, Cardo DM, Marcus R, McKibben PS, Cleveland JL, Srivastava PU, et al. Percutaneous exposures to HIV-infected blood. Among dental workers enrolled in the CDC Needlestick Study. *J Am Dent Assoc.* 1995;126(9):1237-1242.
64. Heptonstall J, Gill ON, Porter K, Black MB, Gilbert VL. Health care workers and HIV: surveillance of occupationally acquired infection in the United Kingdom. *Commun Dis Rep CDR Rev.* 1993;3(11):R147-R153.
65. Ippolito G, De Carli G, Angeletti C, Piselli P, Puro V; Italian Study Group on Occupational Risk of HIV Infection (SIROH). Professional risks of infection with HIV and other bloodborne pathogens for solid organ transplant surgeons: results from the SIROH program and review of the literature. *Organs, Tissues & Cells.* 2013;16:11–7.
66. Kaya Ş, Baysal B, Eşkazan AE, Çolak H. Evaluation of Sharp Objects Injuries in the Health Care Personnel Working in the Diyarbakır Training and Research Hospital. *Viral Hepatit Dergisi.* 2012 Dec 15;18(2):107–10.
67. Malka E, Streinu-Cerce A, Pițigoi D, Bacruban R. Management of accidental exposure to HCV, HBV and HIV in healthcare workers in Romania. *Germes.* 2012;2(4):137-141.
68. Memish ZA, Almuneef M, Dillon J. Epidemiology of needlestick and sharps injuries in a tertiary care center in Saudi Arabia. *Am J Infect Control.* 2002;30(4):234-241.
69. Niu X, Ren Z, Pan N, Lin D. Analysis and management of occupational infection exposure accidents at an infectious disease hospital in China. *Southeast Asian J Trop Med Public Health.* 2019;50(4).
70. Shanks NJ, Al-Kalai D. Occupation risk of needlestick injuries among health care personnel in Saudi Arabia. *J Hosp Infect.* 1995;29(3):221-226.
71. Shintani T, Iwata T, Okada M, Nakaoka M, Yamasaki N, Fujii T, et al. Clinical Outcomes of Post-exposure Prophylaxis following Occupational Exposure to Human Immunodeficiency Virus at Dental Departments of Hiroshima University Hospital. *Curr HIV Res.* 2020;18(6):475-479.
72. Tao X, Peng H, Qian L, Li Y, Wu Q, Ruan J, et al. Occupational Exposure to Positive Blood and Body Fluids among Health Care Workers in a Chinese University Hospital: A Three Years Retrospective Study. *Glob J Health Sci.* 2016;9(4).
73. Facchin LT, Gir E, Pazin-Filho A, Hayashida M, da Silva Canini SRM. Under-reporting of accidents involving biological material by nursing professionals at a Brazilian emergency hospital. *Int J Occup Saf Ergon.* 2013;19(4):623-629.
74. Gerberding J.L. Incidence and prevalence of human immunodeficiency virus, hepatitis B virus, hepatitis C virus, and cytomegalovirus among health care personnel at risk for blood exposure: final report from a longitudinal study. *J Infect Dis.* 1994 Dec;170(6):1410–7.

75. Marcus R, CDC CNSG. Surveillance of health care workers exposed to blood from patients infected with the human immunodeficiency virus. *NEJM*. 1988;319(17):1188–1123.
76. De Juanes JR, García De Codes A, Arrazola MP, González A. Occupational exposure to human immunodeficiency virus in hospital health care workers in Spain. *Vacunas*. 2007;8(1):4-8.
77. Sin WWY, Lin AWC, Chan KCW, Wong KH. Management of health care workers following occupational exposure to hepatitis B, hepatitis C, and human immunodeficiency virus. *Hong Kong Med J*. 2016;22(5):472-477.
78. Cleveland JL, Barker L, Gooch BF, Beltrami EM, Cardo D. Use of HIV postexposure prophylaxis by dental health care personnel: An overview and updated recommendations. *J Am Dent Assoc*. 2002;133(12):1619-1626.
79. Bertelli C, Martins BR, Reuter CP, Krug SBF. Accidents with biological material: factors associated with the non-use of personal protective equipment in Southern Brazil. *Cien Saude Colet*. 2023;28(3):789-801.
80. Hernández Murcia PM, Ordoñez Hernández CA, Saavedra Conde L, Ordoñez-Mora LT. Experiences of health professionals with biological accidents in an Intensive Care Unit. *Rev Esp Salud Publica*. 2023;97:e202301005.
81. Bertelli C, Martins BR, Krug SBF, Petry AR, De Souza Fagundes P. Occupational accidents involving biological material: Demographic and occupational profile of affected workers. *Rev Bras Med Trab*. 2021;18(4):415-424.
82. Tejada-Pérez JJ, Herrera-Burgos MR, Parrón-Carreño T, Alarcón-Rodríguez R. Biohazard Accidents, Harmful Elements to the Wellness of Healthcare Workers, and Their Risk Factors. *Int J Environ Res Public Health*. 2022;19(20):13214.
83. Page MJ, Moher D, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. PRISMA 2020 explanation and elaboration: Updated guidance and exemplars for reporting systematic reviews. *BMJ*. 2021;372:n160.
84. Sterne JAC, Savović J, Page MJ, Elbers RG, Blencowe NS, Boutron I, et al. RoB 2: A revised tool for assessing risk of bias in randomised trials. *BMJ*. 2019;366:l4898.
85. Murad MH, Mustafa RA, Schünemann HJ, Sultan S, Santesso N. Rating the certainty in evidence in the absence of a single estimate of effect. *Evid Based Med*. 2017 Jun;22(3):85-87.
86. Rothwell PM. External validity of randomised controlled trials: “to whom do the results of this trial apply?” *Lancet*. 2005;365(9453):82-93.
87. Guyatt GH, Oxman AD, Vist GE, Kunz R, Falck-Ytter Y, Alonso-Coello P, et al. GRADE: An emerging consensus on rating quality of evidence and strength of recommendations. *BMJ*. 2008;336:924.

Supplementary table 1 - PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	1 & 2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	2 & 3
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	3
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	4 & 6
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	6 & 7 and Appendix I
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	6 & 7 and Appendix I
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	6 & 8
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	6 & 8
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	7 - 9
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	7 - 9
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	12 & 13
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	7 & 12
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	7 & 12
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	7 & 12

Section and Topic	Item #	Checklist item	Location where item is reported
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	7 & 12
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	7 & 12
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	11 & 12
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	11 & 12
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	12 & 13
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	13
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	14 & 15 and Figure 1
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	14 & Table 1
Study characteristics	17	Cite each included study and present its characteristics.	14 & table 2
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	16 & 18 and Table 3
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	14 & table 2
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	16 & 18 and Table 3
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	20-27 and figures 2-13
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	20-27
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	20-27
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	16 & 18 and Table 3
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	18-20 & Table 4
DISCUSSION			

Section and Topic	Item #	Checklist item	Location where item is reported
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	27-38
	23b	Discuss any limitations of the evidence included in the review.	38-39
	23c	Discuss any limitations of the review processes used.	39-40
	23d	Discuss implications of the results for practice, policy, and future research.	40-41
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	2
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	2
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	NA
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	41 & 42
Competing interests	26	Declare any competing interests of review authors.	41
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	41

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

For more information, visit: <http://www.prisma-statement.org/>

Supplementary table 2 - Description of Boolean search string for each database on April 21th, 2023

Database	Query	Record retrieved
PUBMED	("HIV"[MeSH Terms] OR "HIV" OR "human immunodeficiency virus" OR "Human-T-Cell-Lymphotropic Virus-Type-III" OR Human-T-Cell Leukemia-Virus-Type-III OR "LAV-HTLV-III" OR "LAV" OR Lymphadenopathy-Associated-Virus OR "AIDS" OR "Acquired Immunodeficiency Syndrome"[Mesh Terms] OR acquired-immune-deficiency-syndrome OR "HTLV-III" OR lymphadenopathy-associated-retrovirus OR "HIV Infections"[Mesh:NoExp]) AND ("Seroconversion"[MeSH Terms] OR "seroconversion" OR Seropositiv* OR Anti-HIV-Positivit* OR HIV-Antibody-Positivit*) AND ("Occupational Exposure"[MeSH Terms] OR "occupational exposure*" OR "accidents, occupational"[MeSH Terms] OR "Occupational Accident*" OR "Exposure" OR occupational-risk* OR "job related accident*" OR "job related injur*" OR "occupation-related-injur*" OR "work-related accident*" OR "work-related injur*" OR needle-stick* OR percutaneous* or needle* OR "needles"[MeSH Terms] OR sharps-injur* OR sharps-accident*) AND ("Health Personnel"[MeSH Terms] OR "health care worker" OR health-care-worker* OR "health care personnel" OR health-care-personnel OR employee* OR "occupational groups"[MeSH Terms] OR "health personnel" OR "health care practitioner*" OR "Health practitioner*" OR "health care provider*" OR health-care-professional* OR healthcare-professional* OR "Health Care Professional" OR health-professional* OR "health professional" OR health-worker* OR "health worker" OR "medical staff" OR "dental staff" OR medical-professional* OR medical-practitioner* OR "medical personnel" OR dentist* OR nurs*)	616
EMBASE	('human immunodeficiency virus'/exp OR 'human immunodeficiency virus' OR HIV OR 'human immunodeficiency virus 1' OR 'human immunodeficiency virus 2' OR AIDS OR 'acquired immune deficiency syndrome'/exp OR 'human immunodeficiency virus infection'/exp) AND ('seroconversion'/exp OR 'seropositivity' OR 'anti hiv positivit*' OR 'hiv antibody positivit*') AND ('occupational exposure'/exp OR 'occupational accident'/exp OR exposure OR 'occupational hazard' OR 'needlestick injury' OR 'needle'/exp OR 'sharps injury') AND ('health care personnel'/exp OR 'health care worker*' OR 'employee' OR 'health practitioner' OR 'health care professional' OR 'medical staff' OR 'dental staff' OR 'medical professional*' OR 'medical practitioner*' OR 'medical personnel' OR 'dentist*' OR nurs*)	351
COCHRANE	("HIV"[MeSH Terms] OR "HIV" OR "human immunodeficiency virus" OR "Human-T-Cell-Lymphotropic Virus-Type-III" OR Human-T-Cell Leukemia-Virus-Type-III OR "LAV-HTLV-III" OR "LAV" OR Lymphadenopathy-Associated-Virus OR "AIDS" OR "Acquired Immunodeficiency Syndrome"[Mesh Terms] OR acquired-immune-deficiency-syndrome OR "HTLV-III" OR lymphadenopathy-associated-retrovirus OR "HIV Infections"[Mesh:NoExp]) AND ("Seroconversion"[MeSH Terms] OR "seroconversion" OR Seropositiv* OR Anti-HIV-Positivit* OR HIV-Antibody-Positivit*) AND ("Occupational Exposure"[MeSH Terms] OR "occupational exposure*" OR "accidents, occupational"[MeSH Terms] OR "Occupational Accident*" OR "Exposure" OR occupational-risk* OR "job related accident*" OR "job related injur*" OR "occupation-related-injur*" OR "work-related accident*" OR "work-related injur*" OR needle-stick* OR percutaneous* or needle* OR "needles"[MeSH Terms] OR sharps-injur* OR sharps-accident*) AND ("Health	54

	Personnel"[MeSH Terms] OR "health care worker" OR health-care-worker* OR "health care personnel" OR health-care-personnel OR employee* OR "occupational groups"[MeSH Terms] OR "health personnel" OR "health care practitioner*" OR "Health practitioner*" OR "health care provider*" OR health-care-professional* OR healthcare-professional* OR "Health Care Professional" OR health-professional* OR "health professional" OR health-worker* OR "health worker" OR "medical staff" OR "dental staff" OR medical-professional* OR medical-practitioner* OR "medical personnel" OR dentist* OR nurs*)	
WEB OF SCIENCE	("HIV" OR "human immunodeficiency virus" OR "Human-T-Cell-Lymphotropic Virus-Type-III" OR Human-T-Cell Leukemia-Virus-Type-III OR "LAV-HTLV-III" OR "LAV" OR Lymphadenopathy-Associated-Virus OR "AIDS" OR "Acquired Immunodeficiency Syndrome" OR acquired-immune-deficiency-syndrome OR "HTLV-III" OR lymphadenopathy-associated-retrovirus OR "HIV Infections") AND ("Seroconversion" OR Seropositiv* OR Anti-HIV-Positivit* OR HIV-Antibody-Positivit*) AND ("occupational exposure*" OR "Occupational Accident*" OR "Exposure" OR occupational-risk* OR "job related accident*" OR "job related injur*" OR "occupation-related-injur*" OR "work-related accident*" OR "work-related injur*" OR needle-stick* OR percutaneous* or needle* OR sharps-injur* OR sharps-accident*) AND ("Health Personnel" OR "health care worker" OR health-care-worker* OR "health care personnel" OR health-care-personnel OR employee* OR "occupational groups" OR "health care practitioner*" OR "Health practitioner*" OR "health care provider*" OR health-care-professional* OR healthcare-professional* OR "Health Care Professional" OR health-professional* OR "health professional" OR health-worker* OR "health worker" OR "medical staff" OR "dental staff" OR medical-professional* OR medical-practitioner* OR "medical personnel" OR dentist* OR nurs*)	226
SCOPUS	TITLE-ABS-KEY (HIV) AND TITLE-ABS-KEY (seroconversion) AND TITLE-ABS-KEY ("health care worker*") TITLE-ABS-KEY (hiv) AND TITLE-ABS-KEY (seroconversion) AND TITLE-ABS-KEY ("health care worker*")	148
LILACS	(HIV) AND (seroconversion) AND (exposure) AND ("health care professional")	7

Supplementary table 3 - National HIV prevalence (15–49 years) by study and data source

ID	Study	Country (WB)	Prevalence (%)	Data note
22	Abubakar et al., 2018	Nigeria	1,600	Value obtained from the indicator <i>Prevalence of HIV, total (% of population ages 15–49)</i> in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
24	Alavi and Sharifi, 2013	Iran, Islamic Rep.	0,100	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
26	Andrade et al., 2014	Colombia	0,500	Value obtained from the indicator <i>Prevalence of HIV, total (% of population ages 15–49)</i> in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
29	Aydın, Ergen and Çaşkurlu, 2020	Türkiye	0,200	Average estimate from the 0.1–0.3% range, according to Yaylalı et al., 2023 ^c
33	Baldo et al., 2014	Italy	0,300	Value obtained from the indicator <i>Prevalence of HIV, total (% of population ages 15–49)</i> in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
40	Beghdadli et al., 2009	Algeria	0,100	Value obtained from the indicator <i>Prevalence of HIV, total (% of population ages 15–49)</i> in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
44	Bi et al., 2008	Australia	0,100	Value obtained from the indicator <i>Prevalence of HIV, total (% of population ages 15–49)</i> in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
54	Çağlar-Özer, Altunal and Kadanalı, 2020	Türkiye	0,200	Average estimate from the 0.1–0.3% range, according to Yaylalı et al., 2023 ^c
64	Cleveland et al., 2002	United States	0,370	NHANES 1999–2006 (ages 18–49); stable prevalence — McQuillan et al., 2010 ^d
72	Davanzo et al., 2008	Italy	0,300	Value obtained from the indicator <i>Prevalence of HIV, total (% of population ages 15–49)</i> in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
73	Juanes et al., 2007	Spain	0,400	Value obtained from the indicator <i>Prevalence of HIV, total (% of population ages 15–49)</i> in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
74	Tribonnieàre et al., 2018	France	0,300	Value obtained from the indicator <i>Prevalence of HIV, total (% of population ages 15–49)</i> in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
84	Ehui et al., 2007	Côte d'Ivoire	4,300	Value obtained from the indicator <i>Prevalence of HIV, total (% of population ages 15–49)</i> in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a

85	El-Hazmi and Al-Majid, 2008	Saudi Arabia	<0,1	Value obtained from the indicator <i>Prevalence of HIV, total (% of population ages 15–49)</i> in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
88	Erhabor and Nwauche, 2007	Nigeria	2,000	Value obtained from the indicator <i>Prevalence of HIV, total (% of population ages 15–49)</i> in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
89	Escudero, Furtado and Medeiros, 2015	Brazil	0,500	Value obtained from the indicator <i>Prevalence of HIV, total (% of population ages 15–49)</i> in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
91	Fadil et al., 2021	Saudi Arabia	<0,1	Value obtained from the indicator <i>Prevalence of HIV, total (% of population ages 15–49)</i> in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
93	Fillaux et al., 2004	France	0,200	Value obtained from the indicator <i>Prevalence of HIV, total (% of population ages 15–49)</i> in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
98	Forseter, Joline and Wormser, 1994	United States	0,400	NHANES III (ages 18–49); no annual data available — McQuillan et al., 1997 ^e
103	Ilario et al., 2004	Spain	0,500	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
105	Gerberding, 1994	United States	0,390	NHANES III (ages 18–49); no annual data available — McQuillan et al., 1997 ^e
110	Goel et al., 2017	India	0,220	National estimate for adults (15–49 years) — NACO/Ministry of Health, <i>HIV Estimation 2017</i> ^f
112	Gupta et al., 2008	India	0,310	National adult estimate (15–49 years): 0.32% (95% CI 0.26–0.41) for 2008 — Pandey et al., 2012 ^g
113	Gutierrez, Lopes and Yasuda, 2005	Brazil	0,330	Value obtained from the indicator <i>Prevalence of HIV, total (% of population ages 15–49)</i> in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
117	Haytoglu and Gundeslioglu, 2018	Türkiye	0,200	Average estimate from the 0.1–0.3% range, according to Yaylalı et al., 2023 ^c
125	Ippolito, Puro and De Carli, 1993	Italy	0,200	Value obtained from the indicator <i>Prevalence of HIV, total (% of population ages 15–49)</i> in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
129	Jaggi, Nirwan and Chakraborty, 2020	India	0,220	National adult estimate (15–49 years) — NACO/ICMR-NIMS, India HIV Estimates 2020, 2021 ^h
131	Jayanth et al., 2009	India	0,310	National adult estimate (15–49 years): 0.32% (95% CI 0.26–0.41) for 2008 — Pandey et al., 2012 ^g

143	Kepenek and Şahin-Eker, 2017	Türkiye	0,200	Average estimate from the 0.1–0.3% range, according to Yaylalı et al., 2023 ^c
145	Kiertiburanakul et al., 2006	Thailand	1,900	Value obtained from the indicator Prevalence of HIV, total (% of population ages 15–49) in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
147	Ko et al., 2009	China	0,100	National estimate (15–49 years); cited in Lin TY et al., 2013 ⁱ
154	Lee and Choi, 2023	Korea, Rep.	< 0,1	UNAIDS/WHO estimate for adults aged 15–49 in South Korea; point estimate not published ^b
163	Lymer, Schütz and Isaksson, 1996	Sweden	0,100	Value obtained from the indicator Prevalence of HIV, total (% of population ages 15–49) in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
166	Mallon et al., 1992	Australia	0,100	Value obtained from the indicator Prevalence of HIV, total (% of population ages 15–49) in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
169	Marcus et al., 1988	United States	0,390	NHANES III (ages 18–49); no annual data available — McQuillan et al., 1997 ^c
175	Medeiros et al., 2012	Brazil	0,400	Value obtained from the indicator Prevalence of HIV, total (% of population ages 15–49) in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
176	Mehta et al., 2005	India	0,330	National estimate (15–49 years) for 2005 — NACO/ICMR-NIMS, *HIV Estimates 2006 (Technical Report, India)* ^j
177	Mehta et al., 2010	India	0,310	National adult estimate (15–49 years) — NACO/UNAIDS India Country Progress Report 2010; reference year 2008, used in official 2010 series ^k
189	Nwaiwu et al., 2017	United States	0,370	NHANES 1999–2018 (ages 18–59); stable trend — McQuillan et al., 2021 ^l
191	Oakley, Gooch and Cockcroft, 1992	United Kingdom	0,080	Absolute number (~23,400) converted based on the adult population (~29.9 million aged 15–49, ONS 1991); excludes Scotland and Northern Ireland; value preceding UNAIDS standardization; estimate derived from the Public Health Laboratory Service (PHLS) according to POST Note 46 – Heterosexual AIDS (1993) ^m
193	Oh, Yi and Choe, 2005	Korea, Rep.	0,014	Average hospital seroprevalence estimate between 2002–2008 (1.3–1.5 per 10,000 individuals $\approx$ 0.013–0.015%); not representative of the general population; model developed by KCDC for national hospital surveillance ⁿ
202	Pérez-Díaz et al., 2015	Colombia	0,500	Value obtained from the indicator Prevalence of HIV, total (% of population ages 15–49) in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
210	Puro et al., 1992	Italy	0,200	Value obtained from the indicator Prevalence of HIV, total (% of population ages 15–49) in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a

211	Puro, Ranchino and Profili, 1990	Italy	0,200	Value obtained from the indicator Prevalence of HIV, total (% of population ages 15–49) in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
214	Rajkumari et al., 2014	India	0,240	National estimate of HIV prevalence among adults (15–49 years); includes 2007–2015 modeled annual values via Spectrum 5.30; demographic base adjusted to the 2011 Census ^o
218	Rele, Mathur and Turbadkar, 2002	India	0,330	No annual estimate published; prevalence $\approx$ 0.33 % (0.26–0.41) in 2006, used for 2002–2005 — NACO/UNAIDS (historical series) ^j
219	Rice, Tomkins and Ncube, 2015	United Kingdom	0,160	1.6 per 1,000 population ($\approx$ 0.16 %) — HIV in the UK – 2016 report (Public Health England) ^p
221	Rishi et al., 2017	India	0,220	National adult HIV prevalence estimates (15–49 years) derived using the Spectrum 5.63 model, consistent with the UNAIDS Reference Group on Estimates, Modelling and Projections; demographic adjustments based on the 2011 Census and NFHS-3/NFHS-4 surveys; replaces all previous estimation rounds (1998–2015) ^q
228	Romea et al., 1995	Spain	0,500	Value obtained from the indicator Prevalence of HIV, total (% of population ages 15–49) in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
230	Safari et al., 2020	Germany	0,100	Value obtained from the indicator Prevalence of HIV, total (% of population ages 15–49) in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
234	Sheth, Leuva and Mannari, 2016	India	0,230	National adult HIV prevalence estimates (15–49 years) derived using the Spectrum 5.63 model, consistent with the UNAIDS Reference Group on Estimates, Modelling and Projections; demographic adjustments based on the 2011 Census and NFHS-3/NFHS-4; supersedes all previous rounds (1998–2015) ^q
239	Shriyan et al., 2012	India	0,280	National HIV prevalence estimate among adults (15–49 years); includes 2007–2015 annual values modeled via Spectrum 5.30; demographic base adjusted to the 2011 Census ^o
241	Sin et al., 2016	China	0,047	Calculated from 654,000 people living with HIV as of Sep 2016 (data from China CDC, reported by China Development Brief) divided by the 2016 total population (1,379,860,000; World Bank); approximate value for general population, not restricted to ages 15–49 ^r
242	Razzakh and Qureshi, 2021	Qatar	<0.1	Value obtained from the indicator Prevalence of HIV, total (% of population ages 15–49) in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
247	Tetteh et al., 2015	Ghana	1,800	Value obtained from the indicator Prevalence of HIV, total (% of population ages 15–49) in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
248	Tokars et al., 1993	United States	0,390	NHANES III (ages 18–49); no annual data available — McQuillan et al., 1997 ^e
254	Villarroel et al., 2012	Chile	0,400	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
259	Wang, Chen and Liu, 2014	China	0,037	National estimate: 501,000 people living with HIV/AIDS among 1.36782 billion inhabitants at the end of 2014; general population value, not restricted to ages 15–49 ^s

265	Wiboonchutikul et al., 2015	Thailand	1,400	Value obtained from the indicator Prevalence of HIV, total (% of population ages 15–49) in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
268	Windolf et al., 1990	Germany	< 0,1	Retrospective estimate based on historical RKI data and the UNAIDS/WHO Epidemiological Fact Sheet – Germany (2004 Update), which indicates <0.1% prevalence between 1993–1995 and stability since the early 1990s; value refers to adult population (15–49 years) ⁱ
271	Wnuk, 2003	Poland	0,100	National estimate for adults aged 15–49: ~14,000 people living with HIV/AIDS by the end of 2003; upper bound $\approx 0.2\%$ ^u
293	Elmsli, 1989	Canada	0,100	National estimate of ~28,000 people living with HIV (all ages) over a total population of 26.77 million (World Bank 1989); approximate value, not restricted to ages 15–49 ^w
318	Miceli, 2005	Argentina	0,300	Value obtained from the indicator Prevalence of HIV, total (% of population ages 15–49) in the World Development Indicators – The World Bank, derived from UNAIDS/WHO harmonized estimates for international comparability ^a
319	Miller and Farr, 1989	United States	0,390	NHANES III (ages 18–49); no annual data available — McQuillan et al., 1997 ^e
354	Wu et al., 2015	China	0,042	National estimate cited in UNAIDS report – “2015 national HIV prevalence ... 0.042% (577,423)” per technical visit report (2016); general population value ^y
371	Al Ghamdi S et al., 2003	Saudi Arabia	<0.1	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
372	Almeida and Benatti, 2007	Brazil	0,300	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
373	Argentero et al., 2007	Italy	0,300	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
374	Arva et al., 1990	Norway	<0.1	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
375	Barriga Ângulo, 1989	Mexico	<0.1	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
376	Blázquez et al., 2001	Spain	0,500	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
377	Bowden et al., 1993	Australia	<0.1	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
378	Bozkurt et al., 2013	Türkiye	0,200	Average estimate from the 0.1–0.3 % range, according to Yaylalı et al., 2023 ^e

379	Changraksa et al., 2022	Thailand	1,100	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
380	Chaiwarith et al., 2013	Thailand	1,500	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
381	Çelik, 2017	Türkiye	0,200	Average estimate from the 0.1–0.3 % range, according to Yaylalı et al., 2023 ^c
382	Çiçek-Şentürk et al., 2019	Türkiye	0,200	Average estimate from the 0.1–0.3 % range, according to Yaylalı et al., 2023 ^c
383	Daglio et al., 2006	Italy	0,300	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
384	Dizili-Yelgin et al., 2018	Türkiye	0,200	Average estimate from the 0.1–0.3 % range, according to Yaylalı et al., 2023 ^c
385	Elmslie and O'Shaughnessy, 1988	Canada	0,200	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
386	Fahey et al., 1991	United States	0,390	NHANES III (ages 18–49); no annual data available — McQuillan et al., 1997 ^c
387	Falagas et al., 2007	Greece	0,100	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
388	Frijstein, Hortensius and Zaaijer, 2011	Germany	0,100	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
389	Gerberding et al., 1987	United States	0,390	NHANES III (ages 18–49); no annual data available — McQuillan et al., 1997 ^c
390	Gooch et al., 1995	United States	0,390	NHANES III (ages 18–49); no annual data available — McQuillan et al., 1997 ^c
391	Guliz E, Meral U, Safak K, et al.	Türkiye	0,200	Average estimate from the 0.1–0.3 % range, according to Yaylalı et al., 2023 ^c
392	Henderson et al., 1986	United States	0,390	NHANES III (ages 18–49); no annual data available — McQuillan et al., 1997 ^c
393	Henderson et al., 1990	United States	0,390	NHANES III (ages 18–49); no annual data available — McQuillan et al., 1997 ^c

394	Heptonstall et al., 1993	United Kingdom	0,080	Absolute number (~23 400) converted based on adult population (~29.9 million aged 15–49, ONS 1991); excludes Scotland and Northern Ireland; pre-UNAIDS standardization; estimate derived from the Public Health Laboratory Service (PHLS) per POST Note 46 – Heterosexual AIDS (1993) ^m
395	Hiransuthikul, Hiransuthikul and Kanasuk, 2007	Thailand	1,800	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
396	Huertas et al., 1995	Mexico	0,100	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
397	Ippolito et al., 2013	Italy	0,300	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
398	Jeong, 2014	Korea, Rep.	<0,1	HIV prevalence <0.1 % among adults (15–49 years), according to historical trends and data from the National Health Insurance Service (NHIS) and Korea Disease Control and Prevention Agency (KDCA) ^z
399	Kaya et al., 2012	Türkiye	0,200	Average estimate from the 0.1–0.3 % range, according to Yaylalı et al., 2023 ^c
400	Khuri-Bulos et al., 1995	Jordan	<0.1	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
401	Krishnan et al., 2016	India	0,220	National adult HIV prevalence estimates (15–49 years) derived using the Spectrum 5.63 model, consistent with the UNAIDS Reference Group on Estimates, Modelling and Projections; demographic adjustments based on the 2011 Census and NFHS-3/NFHS-4 surveys; replaces all previous estimation rounds (1998–2015) ^q
402	Kuruüzüm et al., 2008	Türkiye	0,200	Average estimate from the 0.1–0.3 % range, according to Yaylalı et al., 2023 ^c
403	Kuruüzüm et al., 2008	Türkiye	0,200	Average estimate from the 0.1–0.3 % range, according to Yaylalı et al., 2023 ^c
404	Lee et al., 2017	Korea, Rep.	<0,1	HIV prevalence <0.1 % among adults (15–49 years), according to historical trends and data from the National Health Insurance Service (NHIS) and Korea Disease Control and Prevention Agency (KDCA) ^z
405	Loureiro et al., 2009	Brazil	0,400	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
406	MacDonald, 1996	Australia	<0.1	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
407	Machado et al., 1992	Brazil	0,200	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b

408	Madsen et al., 1999	Denmark	0,100	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
409	Malka et al., 2012	Romania	0,100	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
410	Marcuccio et al., 2003	Italy	0,200	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
411	McCormick et al., 1991	United States	0,390	NHANES III (ages 18–49); no annual data available — McQuillan et al., 1997 ^c
412	McEvoy et al., 1987	United Kingdom	0,100	Absolute number (~23 400) converted based on adult population (~29.9 million aged 15–49, ONS 1991); excludes Scotland and Northern Ireland; pre-UNAIDS standardization; estimate derived from the Public Health Laboratory Service (PHLS) per POST Note 46 – Heterosexual AIDS (1993) ^m
413	Memish et al., 2002	Saudi Arabia	<0.1	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
414	Murray et al., 2009	Iraq	<0.1	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
415	Niu et al., 2019	China	0,100	Estimate calculated from 958,280 people living with HIV in 2019 (China CDC Weekly 2023); <0.1% of total population ^{aa}
416	O’Connell T and Hayes, 2003	Ireland	0,100	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
417	Placidi et al., 2002	Italy	0,200	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
418	Pedersen, 1996	Denmark	0,100	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
419	Porter et al., 1990	United Kingdom	0,080	Absolute number (~23 400) converted based on adult population (~29.9 million aged 15–49, ONS 1991); excludes Scotland and Northern Ireland; pre-UNAIDS standardization; estimate derived from the Public Health Laboratory Service (PHLS) per POST Note 46 – Heterosexual AIDS (1993) ^m
420	Pournaras et al., 1999	Greece	<0.1	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
421	Pungpapong et al., 1999	Thailand	2,500	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
422	Ramos-Gomez et al., 1995	United States	0,390	NHANES III (ages 18–49); no annual data available — McQuillan et al., 1997 ^c

423	Ricketts et al., 1992	Canada	0,200	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
424	Roberts, Lincoff and Frankel, 1991	Brazil	0,200	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
425	Rogowska-Szadkowska et al., 1997	Poland	0,050	Estimate based on mean incidence 1999–2004 (Rosińska 2006) and regional UNAIDS 2004 trend ($\leq 0.1\%$) ^{ab}
426	Sacchi et al., 2007	Italy	0,300	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
427	Samargandy et al., 2016	Saudi Arabia	<0.1	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
428	Sarkar and Lahiri, 2021	India	0,220	National adult estimate (15–49 years) — NACO/ICMR-NIMS, India HIV Estimates 2020, 2021 ^h
429	Schmid, Schwager and Drexler, 2007	Germany	0,100	Estimate based on 59,000 people living with HIV (RKI, 2007) over a total population of 82.2 million, corresponding to $\sim 0.1\%$ among adults aged 15–49 ^{ac}
430	Shanks and Al-Kalai, 1995	Saudi Arabia	<0.1	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
431	Sheth, Leuva and Mannari, 2016	India	0,220	National adult HIV prevalence estimates (15–49 years) derived using the Spectrum 5.63 model, consistent with the UNAIDS Reference Group on Estimates, Modelling and Projections; demographic adjustments based on the 2011 Census and NFHS-3/NFHS-4; replaces all previous rounds (1998–2015) ^q
432	Shin and Jang, 2021	Korea, Rep.	<0,1	HIV prevalence <0.1 % among adults (15–49 years), according to historical trends and data from the National Health Insurance Service (NHIS) and Korea Disease Control and Prevention Agency (KDCA) ^z
433	Shintani et al., 2020	Japan	<0,1	HIV prevalence below 0.1% among adults aged 15–49; total of 31,385 PLWH in 2019; data from national surveillance (NIID, refs. 9–10 in Otani et al., 2023) ^{ad}
434	Shrestha et al., 2018	Nepal	0,200	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
435	Strickler, 1988	Canada	0,200	Modeled UNAIDS estimates for HIV prevalence among adults (15–49 years), with uncertainty intervals, 1990–2025 series ^b
436	Tao et al., 2017	China	0,100	Estimate based on 758,000 PLHIV reported by China CDC Weekly (2023); <0.1% of total population ^{aa}
437	Wang et al., 2000	United States	0,370	NHANES 1999–2018 (ages 18–59); stable trend — McQuillan et al., 2021 ⁱ

Notes

- a. World Bank. Prevalence of HIV, total (% of population ages 15–49) [SH.DYN.AIDS.ZS]. World Development Indicators. Washington (DC): The World Bank; [cited 2025 Nov 10]. Available from: <https://data.worldbank.org/indicator/SH.DYN.AIDS.ZS>
- b. Joint United Nations Programme on HIV/AIDS (UNAIDS). HIV estimates with uncertainty bounds, 1990–2025. Geneva: UNAIDS; 2025 Jul 10. Available from: https://www.unaids.org/en/resources/documents/2025/HIV_estimates_with_uncertainty_bounds_1990-present
- c. Yaylalı E, Erdoğan ZM, Calisir F, Gökengin D, Korten V, Tabak F, et al. Modeling the future of HIV in Turkey: Cost-effectiveness analysis of improving testing and diagnosis. PLoS One. 2023;18(7):e0286254. doi:10.1371/journal.pone.0286254. Available from: <https://pubmed.ncbi.nlm.nih.gov/37390076/>
- d. McQuillan GM, Kruszon-Moran D, Granade T, Feldman JW. Seroprevalence of HIV in the US household population aged 18–49 years: the National Health and Nutrition Examination Surveys, 1999–2006. J Acquir Immune Defic Syndr. 2010;53(1):117–23. doi:10.1097/QAI.0b013e3181b3a8e3. Available from: https://journals.lww.com/jaids/abstract/2010/01010/seroprevalence_of_hiv_in_the_us_household.18.aspx
- e. McQuillan GM, Khare M, Karon JM, Schable CA, Vlahov D, et al. Prevalence of HIV in the US household population aged 18–49 years: results from the Third National Health and Nutrition Examination Survey, 1988–1994. Am J Public Health. 1997;87(7):1072–8. PMID: 9224178. Available from: <https://pubmed.ncbi.nlm.nih.gov/9224178/>
- f. Ministry of Health & Family Welfare (IN). Findings from the 2017 HIV estimation round and trend analysis of key HIV indicators in India. Press Information Bureau; 2018 Sep 13. Available from: <https://pib.gov.in/Pressreleaseshare.aspx?PRID=1546133>
- g. Pandey A, Sahu D, Bakkali T, Kumar P, Reddy DCS, et al. Estimate of HIV prevalence and number of people living with HIV in India 2008–2009. Indian J Med Res. 2012;136(6):1040–7. PMID: 23028110. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3488742/>
- h. National AIDS Control Organisation (NACO); Indian Council of Medical Research–National Institute of Medical Statistics (ICMR-NIMS). India HIV Estimates 2020: Technical Brief. New Delhi: Government of India; 2021. Available from: <https://www.aidsdatahub.org/sites/default/files/resource/india-hiv-estimates-2020-0.pdf>
- i. Wang LWN, Wang L, Li D, Jia M, Gao X, Qu S, et al. The 2007 estimates for people at risk for and living with HIV in China: progress and challenges. J Acquir Immune Defic Syndr. 2009;50(4):414–8. Available from: <https://www.sciencedirect.com/science/article/pii/S1552881209000672>
- j. National AIDS Control Organisation (NACO); Indian Council of Medical Research–National Institute of Medical Statistics (ICMR-NIMS). HIV Estimates 2006: Technical Report. New Delhi: Government of India; 2007. Available from: https://naco.gov.in/sites/default/files/Technical%20Report%20on%20HIV%20Estimation%202006_0.pdf
- k. National AIDS Control Organisation (NACO); Joint United Nations Programme on HIV/AIDS (UNAIDS). India Country Progress Report 2010. New Delhi: Government of India; 2010 Mar. Available from: https://www.unaids.org/sites/default/files/country/documents/india_2010_country_progress_report_en.pdf

- l. McQuillan GM, Kruszon-Moran D, Masciotra S, Gu Q, Storandt R. Prevalence and trends in HIV infection and testing among adults in the United States: the National Health and Nutrition Examination Surveys, 1999–2018. *J Acquir Immune Defic Syndr*. 2021;86(5):523–9. doi:10.1097/QAI.0000000000002618
- m. Parliamentary Office of Science and Technology (POST). Heterosexual AIDS. London: UK Parliament; 1993 Oct. (POST Note No. 46). Available from: <https://researchbriefings.files.parliament.uk/documents/POST-PN-46/POST-PN-46.pdf>
- n. Lee JH, Hong KJ, Wang JS, Kim SS, Kee MK. Estimation of hospital-based HIV seroprevalence as a nationwide scale by novel method; 2002–2008 in Korea. *BMC Public Health*. 2010;10:739. doi:10.1186/1471-2458-10-739. Available from: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-10-739>
- o. National AIDS Control Organisation (NACO); Indian Council of Medical Research–National Institute of Medical Statistics (ICMR-NIMS). India HIV Estimations 2015: Technical Report. New Delhi: Ministry of Health and Family Welfare, Government of India; 2015. Available from: <https://naco.gov.in/sites/default/files/India%20HIV%20Estimations%202015%20Technical%20Report.pdf>
- p. Rice BD, Tomkins A, Ncube F. HIV in the UK: 2016 report. London: Public Health England; 2016. Available from: https://assets.publishing.service.gov.uk/media/5a74fbc540f0b6399b2afbd6/HIV_in_the_UK_report.pdf
- q. National AIDS Control Organisation (NACO); Indian Council of Medical Research–National Institute of Medical Statistics (ICMR-NIMS). HIV Estimations 2017: Technical Report. New Delhi: Ministry of Health and Family Welfare, Government of India; 2018. Available from: https://naco.gov.in/sites/default/files/HIV%20Estimations%202017%20Report_1.pdf
- r. China CDC; China Development Brief. Over 650,000 people living with HIV in China. 2016. Available from: <https://chinadevelopmentbrief.org/reports/over-650000-people-living-with-hiv-in-china/>
- s. National Health and Family Planning Commission of China. China AIDS Response Progress Report 2015. Beijing: NHFPC; 2015. Available from: https://www.unaids.org/sites/default/files/country/documents/CHN_narrative_report_2015.pdf
- t. UNAIDS; World Health Organization (WHO). Epidemiological Fact Sheet on HIV/AIDS and Sexually Transmitted Infections – Germany. 2004 Update. Geneva: UNAIDS/WHO; 2004. Available from: https://data.unaids.org/publications/fact-sheets01/germany_en.pdf
- u. UNAIDS; World Health Organization (WHO). Epidemiological Fact Sheet – Poland. Geneva: UNAIDS/WHO; 2004 Oct. Available from: https://data.unaids.org/publications/fact-sheets01/poland_en.pdf
- v. Centers for Disease Control and Prevention (US). Fast Facts: HIV in the United States. Atlanta (GA): CDC; [cited 2025 Nov 10]. Available from: <https://www.cdc.gov/hiv/data-research/facts-stats/index.html>

- w. Public Health Agency of Canada. Estimates of HIV Incidence, Prevalence and Proportion Undiagnosed in Canada. Ottawa: PHAC; 2014. Available from: <https://www.canada.ca/en/public-health/services/publications/diseases-conditions/summary-estimates-hiv-incidence-prevalence-canadas-progress-90-90-90.html>
- x. UNAIDS. Report of the PCB Field Visit to China – May 2016. Geneva: UNAIDS; 2016. Available from: https://www.unaids.org/sites/default/files/media_asset/Report_of_PCB_Field_Visit_China_May2016.pdf
- y. Oh TK, Song KH, Heo E, Song IA. Epidemiologic characteristics of people living with human immunodeficiency virus in South Korea: a nationwide cohort study. *Sci Rep.* 2024;14:24398. Available from: <https://www.nature.com/articles/s41598-024-76043-3>
- aa. China CDC Weekly. HIV/AIDS Surveillance — China, 2022. 2023;5(42):934–9. Available from: <https://weekly.chinacdc.cn/fileCCDCW/journal/article/ccdcw/2023/42/PDF/CCDCW230249.pdf>
- ab. Rosińska M. Current trends in HIV/AIDS epidemiology in Poland, 1999–2004. *Euro Surveill.* 2006;11(4–6):94–7. Available from: https://www.researchgate.net/publication/7136501_Current_trends_in_HIVAIDS_epidemiology_in_Poland_1999-2004#fullTextFileContent
- ac. Robert Koch-Institut. Schätzung der Zahl der Menschen mit HIV/AIDS Ende 2007 in Deutschland. *Epidemiologisches Bulletin.* 2007;(47):505–11. Available from: https://www.rki.de/DE/Aktuelles/Publikationen/Epidemiologisches-Bulletin/2007/47_07.pdf
- ad. Otani M, Shiino T, Hachiya A, Gatanaga H, Watanabe D, Minami R, et al. Association of demographics, HCV co-infection, HIV-1 subtypes and genetic clustering with late HIV diagnosis. *J Int AIDS Soc.* 2023;26:e26086. Available from: <https://onlinelibrary.wiley.com/doi/full/10.1002/jia2.26086>

Supplementary table 4 - HIV serostatus of source patients and follow-up protocol adopted in each included study

Author (year)	Title	Includes only HIV-positive sources?	Justification	Type of source followed	Follow-up protocol	Country	UN Region
Abubakar <i>et al.</i> (2018)	Post-exposure prophylaxis following occupational exposure to HIV and hepatitis B: an analysis of a 12-year record in a Nigerian tertiary hospital	No	Includes positive, unknown, or HIV-negative sources	Includes exposure to HIV-negative sources	Baseline testing and clinical monitoring for 6 months	Nigeria	Western Africa
Alavi & Sharifi (2013)	<i>Percutaneous Injuries and Transmission of HIV Among Cases Referred for Post Exposure</i>	No	Includes positive, unknown, or HIV-negative sources	Not clearly specified	Serological testing at 1.5, 3, and 6 months post-exposure	Iran	Southern Asia

Author (year)	Title	Includes only HIV-positive sources?	Justification	Type of source followed	Follow-up protocol	Country	UN Region
	<i>Prophylaxis to Razi Hospital in Ahvaz, Iran</i>						
Al-Ghamdi <i>et al.</i> (2003)	<i>Needlestick and sharps injuries at Asir Central Hospital, Abha, Saudi Arabia</i>	No	Includes HIV-negative and unknown sources	Negative and unknown sources	Baseline testing for exposed workers and sources when consented; follow-up testing up to 1 year in some cases	Saudi Arabia	Western Asia
Almeida & Benatti (2007)	<i>Exposições ocupacionais por fluidos corpóreos entre trabalhadores da saúde e sua adesão à quimioprofilaxia</i>	No	Includes positive, negative, or unknown sources	Not clearly specified	State Health Department protocol (São Paulo, Brazil); testing at baseline and 6 months	Brazil	South America
Andrade <i>et al.</i> (2014)	<i>Accidentes ocupacionales de riesgo biológico en Antioquia, Colombia. Enero de 2010 a diciembre de 2011</i>	No	Includes only positive and unknown sources	Positive and unknown sources were followed	National surveillance system protocol (Colombia)	Colombia	South America
Argentero <i>et al.</i> (2007)	<i>Sorveglianza regionale delle esposizioni professionali percutanee o mucocutanee a patogeni a trasmissione ematica negli operatori sanitari</i>	No	Includes positive, negative, or unknown sources	Only positive sources were followed	Regional institutional protocol based on SIROH; testing at baseline and 6 months	Italy	Southern Europe
Arva <i>et al.</i> (1991)	<i>Smitterisiko for hepatitt B og humant immunsivktvirus blant ansatte ved norske sykehus</i>	No	Includes positive, negative, or unknown sources	Not clearly specified	Hospital-based protocols; testing schedule not described	Norway	Western Europe
Aydın <i>et al.</i> (2020)	<i>An Evaluation of Health Personnel Exposed to Occupational Injuries in Terms of HBV, HCV, and HIV Infections</i>	No	Includes positive, negative, or unknown sources	Positive, negative, and unknown sources were followed	Institutional protocol: clinical and serological follow-up for 6 months	Turkey	Western Asia
Baldo <i>et al.</i> (2002)	<i>Occupational Risk of Blood-Borne Viruses in Healthcare Workers: A 5-Year Surveillance Program</i>	No	Includes positive, negative, or unknown sources	Positive, negative, and unknown sources were followed	Institutional protocol: serological testing at 3, 6, and 12 months post-exposure; annual testing if needed	Italy	Southern Europe
Barriga Angulo <i>et al.</i> (1989)	<i>Exposición ocupacional al virus de la inmunodeficiencia humana</i>	No	Includes positive, negative, or unknown sources	Not clearly specified	Institutional protocol: ELISA testing at baseline and 6 months	Mexico	Latin America and the Caribbean

Author (year)	Title	Includes only HIV-positive sources?	Justification	Type of source followed	Follow-up protocol	Country	UN Region
Beghdadli <i>et al.</i> (2009)	<i>Le personnel à risque d'accidents d'exposition au sang dans un CHU de l'Ouest algérien</i>	No	Includes positive, negative, or unknown sources	Positive, negative, and unknown sources were followed	Institutional protocol: serological testing at baseline, 3, and 6 months	Algeria	Northern Africa
Bi <i>et al.</i> (2008)	<i>Sharps Injury and Body Fluid Exposure Among Health Care Workers in an Australian Tertiary Hospital</i>	No	Includes positive, negative, or unknown sources	Positive, negative, and unknown sources were followed	Institutional protocol: serological testing at baseline and 6 months; PEP offered when source was HIV-positive	Australia	Oceania
Blázquez <i>et al.</i> (2001)	<i>Exposición a patógenos hemáticos en el personal sanitario</i>	No	Includes positive, negative, and unknown sources	Positive, negative, and unknown sources	Serological testing at baseline, 3, 6, and 12 months; PEP per CDC guidelines	Spain	Western Europe
Bowden <i>et al.</i> (1993)	<i>Occupational exposure to the human immunodeficiency virus and other blood-borne pathogens. A six-year prospective study</i>	Yes	Includes only HIV-positive sources	Only HIV-positive sources were followed	Zidovudine for 6 weeks; follow-up at 6 weeks, 3 months, and 12 months	Australia	Oceania
Bozkurt <i>et al.</i> (2013)	<i>Sağlık çalışanlarında iğne batması ve cerrahi aletlerle olan yaralanmalar</i>	No	Includes HIV-negative (n=25), positive (HBsAg=6; HCV=2), and unknown sources (n=15)	Positive, negative, and unknown sources	Institutional protocol: one-time testing for HBV, HCV, and HIV; no serial HIV or HCV testing performed	Turkey	Western Asia
Çağlar-Özer <i>et al.</i> (2020)	<i>Invisible Threat for Health Care Workers: Injuries Associated With Blood and Body Fluids</i>	No	Includes only HIV-positive and unknown sources	Positive and unknown sources were followed	Institutional protocol: baseline testing; PEP administered for confirmed and unknown-source HIV exposures	Turkey	Western Asia
Çelik <i>et al.</i> (2017)	<i>Evaluation of Four Years of Sharp Object Injuries</i>	No	Includes only HIV-positive and unknown sources	Only positive sources were followed	Institutional protocol: two workers exposed to HIV-positive sources received 1-month PEP and were followed; testing schedule not specified	Turkey	Western Asia

Author (year)	Title	Includes only HIV-positive sources?	Justification	Type of source followed	Follow-up protocol	Country	UN Region
Chaiwarith <i>et al.</i> (2013)	<i>Occupational Exposure to Blood and Body Fluids among Healthcare Workers in a Teaching Hospital: an Experience from Northern Thailand</i>	No	Includes HIV-positive (8.8%), negative (85.2%), and unknown (6.0%) sources	Positive, negative, and unknown sources	HIV follow-up at 6 weeks, 3 months, and 6 months; PEP per CDC; no seroconversions reported	Thailand	Eastern Asia
Changraksa <i>et al.</i> (2022)	<i>Occupational Post-exposure Prophylaxis after Blood and Body Fluids Exposure among Healthcare Workers in Siriraj Hospital</i>	No	Includes positive, negative, or unknown sources	Positive and unknown sources were followed	Institutional protocol: serological testing at baseline, 1 month, and 3 months; based on CDC and Thai guidelines	Thailand	South-Eastern Asia
Çiçek-Şentürk <i>et al.</i> (2019)	<i>Retrospective investigation of 9 years of data on needlestick and sharps injuries: Effect of a hospital infection control committee</i>	No	Includes positive, negative, or unknown sources	Positive sources were followed	Institutional protocol: follow-up up to 6 months; PEP administered in the only HIV exposure; no seroconversions reported	Turkey	Western Asia
Cleveland <i>et al.</i> (2002)	<i>Use of HIV Postexposure Prophylaxis by Dental Health Care Personnel: An Overview and Updated Recommendations</i>	No	Includes positive, negative, or unknown sources	Positive, negative, or unknown sources were followed	CDC NaSH protocol: serological follow-up after exposure; 23 workers started PEP; no seroconversions reported	United States	North America
Daglio <i>et al.</i> (2006)	<i>Accidents due to biological risk in health personnel: descriptive epidemiological analysis of the decade 1994–2003</i>	No	Includes positive, negative, or unknown sources	Not clearly specified	Follow-up after 1 and 2 months mentioned, but no specific protocol provided	Italy	Southern Europe
Davanzo <i>et al.</i> (2008)	<i>Occupational blood and body fluid exposure of university health care workers</i>	No	Includes positive, negative, or unknown sources	Positive, negative, or unknown sources were followed	Institutional protocol: testing at baseline, 3 and 6 months; PEP recommended for exposures to HIV-positive sources	Italy	Southern Europe
Dizili-Yelgin <i>et al.</i> (2018)	<i>Evaluation of Sharps Injuries in a Training and Research Hospital</i>	No	Includes positive, unknown, or non-positive sources	Includes exposure to HIV-negative sources	Institutional protocol: serological testing for HIV, HBV, HCV at baseline; follow-up up to 6 months	Turkey	Western Europe
Ehui <i>et al.</i> (2007)	<i>Prise en charge des accidents d'exposition au sang au CHU de</i>	No	Includes positive, negative, or unknown sources	Not clearly specified	Institutional protocol: testing at baseline, 1, 3, and 6 months; source status not	Ivory Coast	Western Africa

Author (year)	Title	Includes only HIV-positive sources?	Justification	Type of source followed	Follow-up protocol	Country	UN Region
El-Hazmi & Al-Majid (2008)	<i>Treichville, Abidjan (Côte-d'Ivoire) Needle stick and sharps injuries among health care workers: A 5-year surveillance in a teaching center in Saudi Arabia</i>	No	Includes positive, negative, or unknown sources	Positive and unknown sources were followed	specified for all follow-up cases Institutional protocol: testing at 6 and 12 weeks, and at 6 and 12 months for HIV-positive sources	Saudi Arabia	Western Asia
Elmslie <i>et al.</i> (1989)	<i>Occupational exposure to the human immunodeficiency virus among health care workers in Canada</i>	Yes	Includes only HIV-positive sources	Only HIV-positive sources were followed	Canadian national surveillance protocol: ELISA testing at baseline and at 6 weeks, 3, 6, and 12 months	Canada	North America
Erhabor <i>et al.</i> (2007)	<i>Epidemiology and Management of Occupational Exposure to Blood Borne Viral Infections in a Resource Poor Setting</i>	No	Includes only HIV-positive and negative sources	Positive and negative sources were followed	Institutional protocol: testing at baseline, 3 and 6 months; PEP offered for HIV-positive sources	Nigeria	Western Africa
Escudero <i>et al.</i> (2015)	<i>Healthcare Worker Adherence to Follow-up After Occupational Exposure to Blood and Body Fluids at a Teaching Hospital in Brazil</i>	No	Includes positive, negative, or unknown sources	Only positive and unknown sources were followed	Institutional protocol: testing at 3 and 6 months; 12 months in HIV/HCV coinfection; not for negatives	Brazil	South America
Evik <i>et al.</i> (2015)	<i>Evaluation of Sharp Object Injuries in Healthcare Personnel Working in Diyarbakır Gazi Yaşargil Training and Research Hospital</i>	No	Includes positive, unknown, or non-positive sources	Not clearly specified	Monitoring for HIV, HBV, HCV with PEP when indicated; testing schedule not clearly described	Turkey	Western Europe
Fadil <i>et al.</i> (2021)	<i>Pattern and risk factors of sharp object injuries among health care workers in two tertiary hospitals, Al Taif–KSA (2016–2018)</i>	No	Includes positive, negative, or unknown sources	Not clearly specified	No protocol clearly described; article states no HIV seroconversions were documented	Saudi Arabia	Western Asia
Fahey <i>et al.</i> (1991)	<i>Frequency of Nonparenteral Occupational Exposures to Blood and Body Fluids Before and After Universal Precautions Training</i>	No	Includes positive, negative, or unknown sources	Positive and unknown sources were followed	Institutional protocol: annual ELISA testing; ≥6 months after last exposure; source not always tested	United States	North America
Falagas <i>et al.</i> (2007)	<i>Percutaneous Exposure Incidents of the Health Care Personnel in a Newly Founded Tertiary Hospital: A Prospective Study</i>	No	Includes only negative and unknown sources	Negative and unknown sources were followed	Institutional protocol: ELISA and Western Blot for HIV; no HIV-positive sources identified	Greece	Southern Europe

Author (year)	Title	Includes only HIV-positive sources?	Justification	Type of source followed	Follow-up protocol	Country	UN Region
Fillaux <i>et al.</i> (2004)	<i>Prise en charge des accidents d'exposition au VIH... au centre hospitalo-universitaire de Toulouse</i>	No	Includes positive, negative, or unknown sources	Positive and unknown sources were followed	French institutional protocol: serological testing at baseline, 1 and 3 months	France	Western Europe
Forseter <i>et al.</i> (1994)	<i>Tolerability, Safety, and Acceptability of Zidovudine Prophylaxis in Health Care Workers</i>	Yes	Includes only HIV-positive sources	Only HIV-positive sources were followed	Institutional protocol: testing at baseline, 3, 6, 12 months and annually	United States	North America
Frijstein <i>et al.</i> (2011)	<i>Needlestick injuries and infectious patients in a major academic medical centre (2003–2010)</i>	No	Includes positive, unknown, or non-positive sources	Includes exposure to HIV-negative sources	Testing for HIV, HBV, HCV; PEP administered when indicated; clinical monitoring	Netherlands	Western Europe
Gerberding <i>et al.</i> (1987)	<i>Risk of Transmitting the Human Immunodeficiency Virus, Cytomegalovirus, and Hepatitis B Virus to Health Care Workers Exposed to Patients with AIDS and AIDS-Related Conditions</i>	No	Includes positive and unknown sources	Positive and unknown sources	Serological testing at enrollment and after a mean of 10.4 months; planned follow-up every 9–12 months	United States	North America
Gerberding, J. L. (1994)	<i>Incidence and prevalence of human immunodeficiency virus, hepatitis B virus, hepatitis C virus, and cytomegalovirus among health care personnel at risk for blood exposure</i>	No	Includes positive, negative, or unknown sources (not all specified)	Not clearly specified	Institutional protocol (SFGH); 725 followed for 6 months or more	United States	North America
Goel <i>et al.</i> (2017)	<i>Occurrence of Needlestick and Injuries among Health-care Workers of a Tertiary Care Teaching Hospital in North India</i>	No	Includes positive, negative, or unknown sources	Only positive sources were followed	National protocol (NACO/India): exposed to HIV-positive sources were referred to ART center for PEP and follow-up	India	Southern Asia
Gooch <i>et al.</i> (1995)	<i>Percutaneous Exposures to HIV-Infected Blood Among Dental Workers Enrolled in the CDC Needlestick Study</i>	Yes	Only positive sources were followed	Only HIV-positive sources	Serological testing at exposure and at 6 weeks, 3, 6, and 12 months	United States	North America
Gupta <i>et al.</i> (2008)	<i>High risk for occupational exposure to HIV and utilization of</i>	No	Includes positive, negative, or unknown sources	Positive and unknown	Institutional protocol based on CDC (2001): testing at	India	Southern Asia

Author (year)	Title	Includes only HIV-positive sources?	Justification	Type of source followed	Follow-up protocol	Country	UN Region
Gutierrez <i>et al.</i> (2005)	<i>post-exposure prophylaxis in a teaching hospital in Pune, India</i> <i>Accidental exposure to biological material in healthcare workers at a university hospital: Evaluation and follow-up of 404 cases</i>	No	Includes positive, negative, or unknown sources	sources were followed Positive, negative, or unknown sources were followed	baseline, 3 weeks, 3 and 6 months Institutional protocol: testing at exposure; follow-up at 1, 3, 6, and 12 months for infected or unknown sources	Brazil	South America
Haytoglu & Gundeslioglu (2018)	<i>Risk of sharp injuries and mucocutaneous exposures in healthcare workers: ongoing problem despite prevention programs</i>	No	Includes positive, negative, or unknown sources	Only positive sources were followed	Institutional protocol: 3 cases completed 28-day PEP; no post-exposure testing or follow-up for other sources reported	Turkey	Western Asia
Henderson <i>et al.</i> (1986)	<i>Risk of Nosocomial Infection with Human T-Cell Lymphotropic Virus Type III/Lymphadenopathy-Associated Virus in a Large Cohort of Intensively Exposed Health Care Workers</i>	Yes	Only positive sources were followed	Only HIV-positive sources	Institutional protocol: ELISA every 6 months, confirmed by Western Blot; follow-up ranged from 6 to 46 months	United States	North America
Henderson <i>et al.</i> (1990)	<i>Risk for Occupational Transmission of Human Immunodeficiency Virus Type 1 (HIV-1) Associated with Clinical Exposures</i>	No	Includes possible HIV-positive sources	Positive and unknown sources were followed	Serological testing at 6 weeks, 3, 6, and 12 months post-exposure	United States	North America
Heptonstall <i>et al.</i> (1993)	<i>Health care workers and HIV: surveillance of occupationally acquired infection in the United Kingdom</i>	Yes	Only positive sources were followed	Only HIV-positive sources	National protocol (PHLS, UK): testing at exposure, 6 weeks, 3 months, and minimum 6 months; 4 seroconversions documented	United Kingdom	Western Europe
Hiransuthikul <i>et al.</i> (2007)	<i>Human immunodeficiency virus postexposure prophylaxis for occupational exposure in a medical school hospital in Thailand</i>	No	Includes positive, unknown, or HIV-negative sources	Includes exposure to HIV-negative sources	Testing for HIV, HBV, and HCV; PEP when indicated; clinical monitoring	Thailand	Eastern Asia
Huertas <i>et al.</i> (1995)	<i>Accidentes laborales e incidencia de infección por VIH y hepatitis B y C en una institución mexicana</i>	No	Includes positive, negative, or unknown sources	Only HIV-positive or unknown	Baseline and quarterly testing for 1 year; no HIV	Mexico	Latin America and the Caribbean

Author (year)	Title	Includes only HIV-positive sources?	Justification	Type of source followed	Follow-up protocol	Country	UN Region
Ilario <i>et al.</i> (2004)	<i>Accidentes con exposición a material biológico contaminado por VIH en trabajadores de un hospital de tercer nivel de Madrid (1986–2001)</i>	Yes	Only HIV-positive sources were followed	sources were followed Only HIV-positive sources	seroconversions among 94 followed cases ELISA testing at exposure, 1, 3, 6, and 12 months; no seroconversions	Spain	Western Europe
Ippolito <i>et al.</i> (1993)	<i>The Risk of Occupational Human Immunodeficiency Virus Infection in Health Care Workers – Italian Multicenter Study</i>	Yes	Only HIV-positive sources were followed	Only HIV-positive sources	Standardized protocol: ELISA + Western Blot at 1, 3, 6, 12 months; 2 HIV seroconversions documented	Italy	Western Europe
Ippolito <i>et al.</i> (2013)	<i>Professional risks of infection with HIV and other bloodborne pathogens for solid organ transplant surgeons</i>	No	Includes positive, negative, or unknown sources	Positive, negative, or unknown sources followed	At least 6-month follow-up; 2 PEPs; no seroconversions; SIROH program in 14 hospitals	Italy	Southern Europe
Jaggi <i>et al.</i> (2020)	<i>Process improvement to effectively manage and reduce sharps injuries in a Tertiary Hospital in Northern India</i>	No	Includes positive, negative, or unknown sources	Positive, negative, or unknown sources followed	Testing at 6 and 12 weeks and 6 months; PEP by source status; no seroconversions	India	Southern Asia
Jayanth <i>et al.</i> (2009)	<i>Needle Stick Injuries in a Tertiary Care Hospital</i>	No	Includes positive, negative, or unknown sources	Positive, negative, or unknown sources followed	ELISA testing at 1, 3, and 6 months; PEP as needed; no seroconversions	India	Southern Asia
Jeong (2014)	<i>Post-exposure Treatment and Seroconversion to Blood-borne Viruses after Needlestick Injuries among Healthcare Personnel</i>	No	Includes positive, negative, or unknown sources	Positive, negative, or unknown sources followed	Testing at exposure, 3 and 6 months; 3 received PEP; no HIV seroconversions	South Korea	Eastern Asia
Juanes <i>et al.</i> (2007)	<i>Occupational exposure to human immunodeficiency virus in hospital health care workers in Spain</i>	Yes	Only HIV-positive sources were followed	Only HIV-positive sources	Testing at exposure and 1, 3, 6, 12 months; PEP recommended in 53 cases; no HIV seroconversions	Spain	Western Europe

Author (year)	Title	Includes only HIV-positive sources?	Justification	Type of source followed	Follow-up protocol	Country	UN Region
Kaya <i>et al.</i> (2012)	<i>Evaluation of Sharp Objects Injuries in the Health Care Personnel Working in the Diyarbakır Training and Research Hospital</i>	No	Includes positive, negative, or unknown sources	Positive, negative, or unknown sources followed	HIV, HCV, HBV testing at 6 weeks, 3 and 6 months; PEP given; no seroconversions	Turkey	Western Asia
Kepenek & Şahin-Eker (2017)	<i>Bir Devlet Hastanesinde... Yaralanmalarının Değerlendirilmesi</i>	No	Only HIV-negative and unknown sources	Negative and unknown sources followed	Testing at exposure and at 6 months (anti-HIV, anti-HCV, HBsAg); no seroconversions	Turkey	Western Asia
Khuri-Bulos <i>et al.</i> (1997)	<i>Epidemiology of needlestick and sharp injuries at a university hospital in a developing country... Use of HIV Postexposure Prophylaxis in Healthcare Workers after Occupational Exposure: A Thai University Hospital Setting</i>	No	Includes positive, unknown, or non-positive sources	Not clearly specified	Not clearly described	Jordan	Western Asia
Kiertiburanakul <i>et al.</i> (2006)	<i>Adherence to management after occupational exposure to bloodborne pathogen among health care workers in Taiwan</i>	No	Includes positive, negative, or unknown sources	Positive, negative, or unknown sources were followed	Testing at exposure, 6 weeks, 3 and 6 months; no HIV seroconversions	Thailand	South-Eastern Asia
Ko <i>et al.</i> (2009)	<i>Prevalence and Post-exposure Prophylaxis use for Needlestick Injuries... in Kochi, India</i>	No	Includes positive, negative, or unknown sources	Positive, negative, or unknown sources were followed	HIV testing at 3 and 6 months; PEP given in 37 cases; no HIV seroconversions	Taiwan	Eastern Asia
Krishnan <i>et al.</i> (2016)	<i>Risk of infection in health care workers following occupational exposure to a noninfectious or unknown source</i>	No	Includes only HIV-positive and unknown sources	Only HIV-positive sources were followed	ELISA at baseline, HIV-RNA PCR at 2 weeks, ELISA at 1 and 6 months; no HIV seroconversions	India	Southern Asia
Kuruuzum <i>et al.</i> (2008)	<i>Occupational exposures to blood and body fluids among health care workers: a questionnaire survey</i>	No	Includes only HIV-negative or unknown sources	Only HIV-negative or unknown sources were followed	HIV testing at exposure and at 3 months; no HIV seroconversions	Turkey	Western Asia
Kuruüzüm <i>et al.</i> (2008)		No	Includes positive, negative, or unknown sources	Positive, negative, or unknown sources were followed	Serological testing at baseline and 3 months; no HIV seroconversions	Turkey	Western Europe

Author (year)	Title	Includes only HIV-positive sources?	Justification	Type of source followed	Follow-up protocol	Country	UN Region
Lee & Choi (2023)	<i>Epidemiology of occupational exposure to blood-borne viruses... over 10 years among healthcare workers</i>	No	Includes positive, negative, or unknown sources	Positive, negative, or unknown sources were followed	Follow-up at 3 and 6 months; no HIV seroconversions	South Korea	Eastern Asia
Lee <i>et al.</i> (2017)	<i>Occupational blood exposures in health care workers... in South Korea</i>	No	Includes positive, unknown, or non-positive sources	Not clearly specified	Not clearly described	South Korea	Eastern Asia
Loureiro <i>et al.</i> (2009)	<i>Adesão de profissionais de enfermagem ao seguimento clínico após exposição ocupacional com material biológico</i>	No	Includes positive, unknown, or non-positive sources	Positive and unknown sources were followed	Not described	Brazil	South America
Lymer <i>et al.</i> (1997)	A descriptive study of blood exposure incidents among healthcare workers in a university hospital in Sweden	No	Included only HIV-negative and unknown sources	HIV-negative and unknown sources	Institutional protocol: serological testing at baseline and/or after 4 months	Sweden	Northern Europe
MacDonald (1996)	National surveillance for occupational exposure to blood borne viruses in health care workers	No	Included HIV-positive, HIV-negative, and unknown sources	Not clearly reported	National surveillance system protocol (Australia)	Australia	Oceania
Machado <i>et al.</i> (1992)	Risk of infection with the human immunodeficiency virus (HIV) among healthcare workers	No	Included HIV-positive, HIV-negative, and unknown sources	Not clearly reported	Institutional protocol: ELISA testing at baseline and after 1, 2, 6, and 12 months	Brazil	Latin America & Caribbean
Madsen <i>et al.</i> (1999)	Use of antiretroviral chemoprophylaxis following occupational HIV exposure	No	Included HIV-positive and unknown sources	Not clearly reported	Institutional protocol: clinical and serological follow-up; HIV testing for 18 workers receiving PEP	Denmark	Western Europe
Malka <i>et al.</i> (2012)	Management of accidental exposure to HCV, HBV and HIV in healthcare workers in Romania	No	Included HIV-positive, HIV-negative, and unknown sources	HIV-negative and unknown sources	Hospital-based protocols; testing schedule not specified	Romania	Eastern Europe
Mallon <i>et al.</i> (1992)	Exposure to blood borne infections in health care workers	No	Included HIV-positive, HIV-	Only HIV-positive sources	Institutional protocol: serological testing at 6 months post-exposure	Australia	Oceania

Author (year)	Title	Includes only HIV-positive sources?	Justification	Type of source followed	Follow-up protocol	Country	UN Region
Marcuccio <i>et al.</i> (2003)	Assessment of occupational bloodborne biological risk in a University Hospital in Bari	No	negative, and unknown sources Included HIV-positive, HIV-negative, and unknown sources	Not clearly reported	Not reported	Italy	Southern Europe
Marcus <i>et al.</i> (1988)	Surveillance of health care workers exposed to blood from patients infected with HIV	Yes	Included only HIV-positive sources	Only HIV-positive sources	Multicenter protocol: serological testing at baseline, 6 weeks, 12 weeks, 6 months, 12 months, and annually for 2 years	United States	North America
McCormick <i>et al.</i> (1991)	Epidemiology of hospital sharps injuries: a 14-year prospective study in the pre-AIDS and AIDS eras	No	Included HIV-positive, HIV-negative, and unknown sources	Only HIV-positive sources	Institutional protocol: clinical and serological follow-up; no seroconversions among 28 HIV-positive exposures	USA (Wisconsin)	North America
McEvoy <i>et al.</i> (1987)	Prospective study of clinical, laboratory, and ancillary staff exposed to HIV-positive blood or fluids	Yes	Included only HIV-positive sources	Only HIV-positive sources	Institutional protocol: serological testing at baseline, 3 months, and 12 months	United Kingdom	Western Europe
Medeiros <i>et al.</i> (2012)	Occupational hepatitis C seroconversions in a Brazilian hospital	No	Included HIV-positive, HIV-negative, and unknown sources	Not clearly reported	Not specified; study focus was HCV; HIV data cited without testing schedule	Brazil	Latin America & Caribbean
Mehta <i>et al.</i> (2005)	Needlestick injuries in a tertiary care centre in Mumbai, India	No	Included HIV-positive, HIV-negative, and unknown sources	HIV-positive, HIV-negative, and unknown sources	Institutional protocol: serological testing at baseline, 3, and 6 months	India	Southern Asia
Mehta <i>et al.</i> (2010)	Interventions to reduce needle stick injuries at a tertiary care centre	No	Only HIV-positive sources were followed	Only HIV-positive sources	Institutional protocol: serological testing at 3 and 6 months post-exposure	India	Southern Asia
Memish <i>et al.</i> (2002)	Epidemiology of needlestick and sharps injuries in a tertiary care center in Saudi Arabia	No	Included HIV-positive, HIV-negative, and unknown sources	HIV-positive, HIV-negative, and unknown sources	Institutional protocol: serological testing at 6 weeks, 3 months, and 6 months; PEP when indicated	Saudi Arabia	Western Asia
Miceli <i>et al.</i> (2005)	Adherence to an Occupational Blood Borne Pathogens Exposure	No	Included HIV-positive, HIV-	HIV-positive, HIV-negative,	Institutional protocol based on CDC guidelines; ELISA	Argentina	South America

Author (year)	Title	Includes only HIV-positive sources?	Justification	Type of source followed	Follow-up protocol	Country	UN Region
Miller & Farr (1989)	Management Program in Argentina Study of postexposure HIV testing in a hospital requiring informed consent	No	negative, and unknown sources Included HIV-positive, HIV-negative, and unknown sources	and unknown sources HIV-positive, HIV-negative, and unknown sources	testing after exposure; varied adherence to follow-up Not specified; partial follow-up reported (126 of 204 workers tested)	United States	North America
Murray <i>et al.</i> (2009)	Occupational exposure to blood and other body fluids at a military hospital in Iraq	No	Included HIV-positive, HIV-negative, and unknown sources	Not clearly reported	CDC/USPHS guidelines: source and exposed tested; follow-up up to 6 months when indicated	Iraq (US military)	Western Asia
Niu <i>et al.</i> (2019)	Management of occupational exposure incidents at an infectious disease hospital in China	No	Included HIV-positive, HIV-negative, and unknown sources	HIV-positive, HIV-negative, and unknown sources	Institutional protocol: serological testing at baseline, 6 months, 1 year, and 2 years	China	Eastern Asia
Nwaiwu <i>et al.</i> (2017)	Seroconversion rate among HCWs exposed to HIV-contaminated body fluids (13-year study)	Yes	Only HIV-positive sources were included	Only HIV-positive sources	Institutional protocol (University of Pittsburgh): serological testing at 0, 4, 12, 24, and 52 weeks	United States	North America
O'Connell & Hayes (2003)	Occupational sharps injuries in a Dublin teaching hospital	No	Included HIV-positive, HIV-negative, and unknown sources	Not clearly reported	Institutional protocol: follow-up up to 6 months when source was not known to be HIV-negative	Ireland	Western Europe
Oakley <i>et al.</i> (1992)	Review of management of incidents involving exposure to blood in a London teaching hospital, 1989–91	No	Only HIV-positive sources were followed	Only HIV-positive sources	Institutional protocol: source tested for HIV and HBsAg; follow-up conducted but testing schedule not reported	United Kingdom	Western Europe
Oh <i>et al.</i> (2005)	Epidemiological characteristics of occupational blood exposures in a South Korean hospital	No	Not clearly reported	Not clearly reported	Institutional protocol: serological testing at baseline, 6 weeks, 12 weeks, 6 and 12 months	South Korea	Eastern Asia
Pedersen (1996)	Potentially infectious blood exposure among hospital staff	No	HIV-positive and unknown sources were followed	HIV-positive and unknown sources	Institutional protocol: serological testing at 6 weeks, 3, 6, and 12 months post-exposure	Denmark	Western Europe

Author (year)	Title	Includes only HIV-positive sources?	Justification	Type of source followed	Follow-up protocol	Country	UN Region
Pérez-Díaz <i>et al.</i> (2015)	Occupational exposure to bloodborne pathogens among healthcare workers in Colombia	No	Not clearly reported	Not clearly reported	Institutional protocol: follow-up conducted in 33.1% of cases; no standardized testing schedule described	Colombia	Latin America & Caribbean
Placidi <i>et al.</i> (2002)	Biological risk injuries in a large hospital: case series analysis	No	HIV-positive, HIV-negative, and unknown sources included	HIV-positive, HIV-negative, and unknown sources	Institutional protocol: source testing and post-exposure serological follow-up; no HIV seroconversion observed	Italy	Southern Europe
Porter <i>et al.</i> (1990)	Occupational injuries to dental personnel	No	Not clearly reported	Not clearly reported	Not reported; only occasional reference to hepatitis B testing	United Kingdom	Western Europe
Pournaras <i>et al.</i> (1999)	Reported needlestick and sharps injuries in a Greek general hospital	No	Included exposure to HIV-negative source	HIV-negative sources	Institutional protocol: serological testing at 3, 6, and 12 months post-exposure	Greece	Southern Europe
Pungpapong <i>et al.</i> (1999)	Occupational HIV risk among Thai healthcare workers	No	HIV-negative and unknown sources were followed	HIV-negative and unknown sources	Institutional protocol based on CDC guidelines; testing for HIV, HBV, and HCV	Thailand	South-Eastern Asia
Puro <i>et al.</i> (1990)	Occupational blood exposures and HIV transmission risk in a general hospital (1986–88)	No	Only HIV-positive sources were followed	Only HIV-positive sources	Institutional protocol: ELISA at baseline and at 1, 2, 3, 6, 12, and 18 months; Western blot for confirmation	Italy	Western Europe
Puro <i>et al.</i> (1992)	Zidovudine prophylaxis after accidental HIV exposure: the Italian experience	Not clear	Unclear whether all sources were confirmed HIV-positive	Not clearly reported	National protocol (Italy): serological testing at 3, 6, and 12 months post-exposure; all received zidovudine as PEP	Italy	Western Europe
Rajkumari <i>et al.</i> (2014)	Prospective analysis of sharps and splash injuries among trauma healthcare workers	No	HIV-positive, HIV-negative, and unknown sources were followed	HIV-positive, HIV-negative, and unknown sources	Institutional protocol (India): clinical and serological follow-up for 6 months; PEP provided for HIV-positive exposures	India	Southern Asia
Ramos-Gomez <i>et al.</i> (1997)	Accidental exposures in dental teaching clinics: a prospective study	No	Only HIV-positive sources were followed	Only HIV-positive sources	Institutional protocol: serological testing at 6, 12, 24, and 52 weeks post-exposure	United States	North America
Razzakh <i>et al.</i> (2021)	Needlestick injuries among healthcare personnel in Qatar: A retrospective study	No	HIV-positive, HIV-negative, and unknown	HIV-positive, HIV-negative,	Institutional protocol: baseline and follow-up serological	Qatar	Western Asia

Author (year)	Title	Includes only HIV-positive sources?	Justification	Type of source followed	Follow-up protocol	Country	UN Region
Rele <i>et al.</i> (2002)	Risk of needle stick injuries in health care workers – a report	No	sources were followed HIV-positive and HIV-negative sources were followed	and unknown sources HIV-positive and HIV-negative sources	testing for HIV, HBV, and HCV for 6 months Institutional protocol (NACO - India): serological testing at baseline, 3, and 6 months using ELISA and rapid tests	India	Southern Asia
Rice <i>et al.</i> (2015)	Sharp truth: health care workers remain at risk of bloodborne infection	No	Not clearly reported	Not clearly reported	National surveillance system protocol (United Kingdom); follow-up schedule not specified	United Kingdom	Western Europe
Ricketts <i>et al.</i> (1992)	National surveillance of occupational exposure to HIV	No	Not clearly reported	Not clearly reported	National surveillance system protocol (Canada); 324 individuals followed for 6 months	Canada	North America
Rishi <i>et al.</i> (2017)	Needle stick injuries in a tertiary eye-care hospital	No	HIV-positive, HIV-negative, and unknown sources were followed	HIV-positive, HIV-negative, and unknown sources	Institutional protocol (NACO - India): serological testing at baseline and after 6 months	India	Southern Asia
Roberts <i>et al.</i> (1999)	Occupational exposure to HIV in an urban university hospital setting	No	Only HIV-positive and unknown sources were followed	Only HIV-positive and unknown sources	Institutional protocol (SFGH): serological testing at 6 to 12 months for exposures to HIV-positive or unknown sources	United States	North America
Rogowska-Szadkowska <i>et al.</i> (1997)	Chemoprophylaxis after occupational exposure to HIV	No	HIV-positive, HIV-negative, and unknown sources were followed	HIV-positive, HIV-negative, and unknown sources	Institutional protocol: serological testing at baseline, 6 weeks, 3, 6, 9, and 12 months	Poland	Eastern Europe
Romea <i>et al.</i> (1995)	Risk for occupational transmission of HIV among health care workers	No	Only HIV-positive sources were followed	Only HIV-positive sources	Institutional protocol: serological testing at baseline, 6 weeks, 3, 6, and 12 months; Western blot confirmation	Spain	Western Europe
Sacchi <i>et al.</i> (2007)	Occupational risk of bloodborne infections in obstetric personnel	No	Not clearly reported	Not clearly reported	Institutional protocol (Italy): serological testing at baseline, 6 weeks, 12 weeks, and 6 months	Italy	Southern Europe

Author (year)	Title	Includes only HIV-positive sources?	Justification	Type of source followed	Follow-up protocol	Country	UN Region
Safari <i>et al.</i> (2020)	High-risk needlestick injuries and viral transmission: a prospective study	No	Only HIV-positive and unknown sources were followed	Only HIV-positive and unknown sources	Institutional protocol (Germany/Austria): serological testing at 6, 12, and 24 weeks; early PCR for HCV (2–4 weeks)	Germany	Western Europe
Samargandy <i>et al.</i> (2016)	Epidemiology and outcomes of occupational exposures in a Saudi university hospital	No	Only HIV-positive sources were followed	Only HIV-positive sources	Institutional protocol (CDC-based): serological testing at baseline, 6 weeks, 3, and 6 months	Saudi Arabia	Western Asia
Sarkar <i>et al.</i> (2021)	Post-exposure prophylaxis for HIV among HCWs: a record-based study from Kolkata	No	HIV-positive and unknown sources were followed	HIV-positive and unknown sources	Institutional protocol (NACO and CDC): serological testing at baseline, 3, and 6 months	India	Southern Asia
Schmid <i>et al.</i> (2007)	Needlestick and fluid exposure among German healthcare workers and students	No	Included exposure to HIV-negative source	HIV-negative sources	Institutional protocol (Europe/CDC): serological testing at 6 weeks, 3, 6, and 12 months	Germany	Western Europe
Shanks <i>et al.</i> (1995)	Occupational risk of needlestick injuries among healthcare personnel in Saudi Arabia	No	Only HIV-positive and unknown sources were included	Only HIV-positive sources	Institutional protocol: serological testing at baseline, 3, 6, and 12 months; PEP with zidovudine offered	Saudi Arabia	Western Asia
Sheth <i>et al.</i> (2016)	PEP for occupational exposures to HIV and HBV: 13-year experience at rural tertiary hospital	Yes	Only HIV-positive sources	Only HIV-positive sources	Institutional protocol (NACO/CDC): serological testing at baseline, 6 weeks, 3, and 6 months	India	Southern Asia
Sheth, Leuva & Mannari (2016)	PEP for occupational exposures to HIV and HBV: 13-year experience at rural tertiary hospital	Yes	Only HIV-positive sources	Only HIV-positive sources	Institutional protocol (NACO/CDC): serological testing at baseline, 6 weeks, 3, and 6 months	India	Southern Asia
Shin & Jang (2021)	Characteristics of needlestick injuries in a Korean tertiary hospital	No	Not clearly reported	Not clearly reported	Institutional protocol; 71 workers completed follow-up for 6 months; testing schedule not described	South Korea	Eastern Asia
Shintani <i>et al.</i> (2020)	Clinical outcomes of PEP after HIV exposure at Hiroshima University Dental Hospital	Yes	Only HIV-positive sources	Only HIV-positive sources	Institutional protocol: serological testing at baseline, 4 weeks, and 12 weeks	Japan	Eastern Asia

Author (year)	Title	Includes only HIV-positive sources?	Justification	Type of source followed	Follow-up protocol	Country	UN Region
Shrestha <i>et al.</i> (2018)	PEP for occupational and non-occupational HIV exposure in Nepal	Yes	Only HIV-positive sources	Only HIV-positive sources	Institutional protocol (Nepal): ELISA testing at baseline, 3, and 6 months	Nepal	Southern Asia
Shriyan <i>et al.</i> (2012)	Incidence of occupational exposures in a tertiary care center	No	Only HIV-positive sources were followed	Only HIV-positive sources	Institutional protocol (CDC/NACO): serological testing at baseline, 3, and 6 months	India	Southern Asia
Sin <i>et al.</i> (2016)	Management of HCWs after exposure to HIV, HBV, HCV in Hong Kong	No	HIV-positive and unknown sources were followed	HIV-positive and unknown sources	Institutional protocol (Hong Kong Health Dept.): serological testing at baseline, 3, 6, and 12 months	Hong Kong (China)	Eastern Asia
Strickler <i>et al.</i> (1988)	Occupational HIV exposure at Toronto General Hospital	Yes	Only HIV-positive sources	Only HIV-positive sources	Institutional protocol (Canada): clinical and serological follow-up (schedule not fully specified)	Canada	North America
Tao <i>et al.</i> (2017)	Occupational exposure to blood and fluids among HCWs in a Chinese university hospital	No	Only HIV-positive sources were followed	Only HIV-positive sources	CDC guideline (USPHS 2001): clinical and serological follow-up for at least 1 year	China	Eastern Asia
Tetteh <i>et al.</i> (2015)	Outcomes of a PEP program at Korle-Bu Teaching Hospital in Ghana	No	HIV-positive, HIV-negative, and unknown sources were followed	HIV-positive, HIV-negative, and unknown sources	Institutional protocol (CDC/Ghana RAS): serological testing at 6 weeks, 3, and 6 months	Ghana	Western Africa
Tokars <i>et al.</i> (1993)	Surveillance of HIV infection and zidovudine use after occupational exposure	Yes	Only HIV-positive sources	Only HIV-positive sources	CDC surveillance protocol: serological testing at baseline, 6 weeks, 3, 6, and 12 months; ELISA + Western blot	United States	North America
Tribonnière <i>et al.</i> (1998)	PEP tolerance and psychological effects in HCWs	Yes	Only HIV-positive sources	Only HIV-positive sources	Institutional protocol: serological testing at 3 and 6 months post-exposure	France	Western Europe
Villarroel <i>et al.</i> (2012)	Occupational exposure to body fluids at Félix Bulnes Cerda Hospital (11-year study)	No	HIV-positive and HIV-negative sources were followed	HIV-positive and HIV-negative sources	Institutional protocol (MINSAL - Chile): serological testing at baseline, 3, and 6 months	Chile	South America

Author (year)	Title	Includes only HIV-positive sources?	Justification	Type of source followed	Follow-up protocol	Country	UN Region
Wang <i>et al.</i> (2000)	Experience of HCWs using PEP after HIV occupational exposure: HIV PEP Registry findings	No	HIV-positive, HIV-negative, and unknown sources were followed	HIV-positive, HIV-negative, and unknown sources	Institutional protocol (CDC-supported): serological testing at baseline, 6 weeks, and 6 months	United States	North America
Wang, Chen & Liu (2014)	Analysis of sharps injuries at a Taiwanese medical center	No	HIV-positive and unknown sources were followed	HIV-positive and unknown sources	Institutional protocol: 302 workers followed for 6 months; schedule not specified	Taiwan	Eastern Asia
Wiboonchutikul <i>et al.</i> (2016)	Efavirenz intolerance in HIV PEP among healthcare workers	No	HIV-positive, HIV-negative, and unknown sources were followed	HIV-positive, HIV-negative, and unknown sources	Institutional protocol (Thailand): serological testing at 6 weeks, 3, and 6 months	Thailand	South-Eastern Asia
Windolf <i>et al.</i> (1990)	Occupational accidents with potential HIV contamination	No	Only HIV-positive sources were followed	Only HIV-positive sources	Institutional protocol (Frankfurt University): serological testing at baseline and follow-up for up to 26 months	Germany	Western Europe
Wnuk (2003)	Occupational HIV exposure among healthcare workers	Yes	Only HIV-positive sources were followed	Only HIV-positive sources	Institutional protocol (Poland): serological testing at baseline, 6 weeks, 3, 6, and 12 months	Poland	Eastern Europe
Wu <i>et al.</i> (2015)	Incidence of percutaneous injury among Taiwanese healthcare workers	No	Not clearly reported	Not clearly reported	Retrospective analysis (EPINet Taiwan, 2011); 1,289 exposures; 19 HIV-positive sources; follow-up data not reported	Taiwan	Eastern Asia

Table 1 - Summary of Inclusion and Exclusion Reasons for Studies Selected for Full-Text Assessment

Study iD	Source	Reference	Full text classification
1	Databases	Needlestick transmission of HTLV-III from a patient infected in Africa. (1984). <i>Lancet (London, England)</i> , 2(8416), 1376–1377. https://pubmed.ncbi.nlm.nih.gov/6150372/	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but it is a case report or case series.
2	Databases	Centers for Disease Control (CDC). (1985). Update: prospective evaluation of health-care workers exposed via the parenteral or mucous-membrane route to blood or body fluids from patients with acquired immunodeficiency syndrome--United States. <i>MMWR. Morbidity and Mortality Weekly Report</i> , 34(7), 101–103. https://pubmed.ncbi.nlm.nih.gov/3918247/	Excluded: other reasons (conference abstracts, other diseases as outcomes, etc.)
3	Databases	Needlestick injuries and the risk of HIV infections. (1989). <i>California Nurse</i> , 85(3), 4.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
4	Databases	CDC. Surveillance for occupationally acquired HIV infection - United States, 1981-1992. (1992). <i>Journal of the American Medical Association</i> , 268(23).	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
5	Databases	(1993). "Health care worker infected with HIV." <i>Nurs Stand</i> 7(32): 6.	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with

			biological material, but is a case report or case series
6	Databases	(1993). "HIV seroconversion after occupational exposure despite early prophylactic zidovudine therapy." <i>Lancet</i> 341(8852): 1077-1078.	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
7	Databases	(1993). "Nurse sues after HIV accident infection." <i>Nurs Stand</i> 8(12): 6.	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
8	Databases	Surveillance study adds to database on seroconversion rates and zidovudine use after occupational exposures. (1993). <i>Clinical Pharmacy</i> , 12(9), 636–637.	Excluded: full text unavailable
9	Databases	Centers for Disease Control and Prevention (CDC). (1995). Case-control study of HIV seroconversion in health-care workers after percutaneous exposure to HIV-infected blood--France, United Kingdom, and United States, January 1988-August 1994. <i>MMWR. Morbidity and Mortality Weekly Report</i> , 44(50), 929–933.	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but it is a case-control study (same study: iD 9, 11, 12, 13, and 15)
10	Databases	Finding suggests AZT therapy may help prevent occupational HIV infection." <i>AIDS Alert</i> 10(4): 45-47.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)

11	Databases	Centers for Disease Control and Prevention (CDC). (1995). Case-control study of HIV seroconversion in health-care workers after percutaneous exposure to HIV-infected blood--France, United Kingdom, and United States, January 1988-August 1994. <i>MMWR. Morbidity and Mortality Weekly Report</i> , 44(50), 929–933. https://pubmed.ncbi.nlm.nih.gov/8531910/	Excluded: duplicate study (same as articles iD 9, 11, 12, 13, and 15)
12	Databases	Case-control study of HIV seroconversion in health-care workers after percutaneous exposure to HIV-infected blood — France, United Kingdom, and United States, January 1988–August 1994. (1997). <i>The American Journal of Medicine</i> , 102(5), 47–51. doi:10.1016/s0002-9343(97)00061-2	Excluded: duplicate study (same as articles iD 9, 11, 12, 13, and 15)
13	Databases	Case-control study of HIV seroconversion in healthcare workers after percutaneous exposure to HIV-infected blood - France, United Kingdom, and US. (1988). <i>Annals of Pharmacotherapy</i> , 30(2).	Excluded: duplicate study (same as articles iD 9, 11, 12, 13, and 15)
14	Databases	CDC wants more input before updating post-exposure guidelines. Centers for Disease Control and Prevention. (1996). <i>AIDS Alert</i> , 11(2), 13–15.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
15	Databases	From the Centers for Disease Control and Prevention. Case-control study of HIV seroconversion in health-care workers after percutaneous exposure to HIV-infected blood--France, United Kingdom, and United States, January 1988-August 1994. (1996). <i>JAMA: The Journal of the American Medical Association</i> , 275(4), 274–275. doi:10.1001/jama.275.4.274	Excluded: duplicate study (same as articles iD 9, 11, 12, 13, and 15)

16	Databases	Gross underestimation' of occupational HIV infection. (1996). <i>AIDS Alert</i> , 11(1), 5–8.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
17	Databases	Probation for biting. <i>AIDS Policy Law</i> 13(19): 16.	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
18	Databases	Rules for infected health care workers criticized. (1998). <i>AIDS Alert</i> , 13(2), 18–19.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
19	Databases	Surveillance of health care workers with occupational exposure to bloodborne viruses. (1998). <i>Communicable Disease Report. CDR Weekly</i> , 8(8), 65, 68.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
20	Databases	Needle stick injuries: nurses at risk. (2000). <i>The Michigan Nurse</i> , 73(3), 8–9. Retrieved from https://pubmed.ncbi.nlm.nih.gov/12040556/	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
21	Databases	Abgrall, J., Martin, J., & Granier, H. (1994). Traumatic emergencies and AIDS. <i>Cahiers d'anesthesiologie</i> , 42(4). Recuperado de https://pubmed.ncbi.nlm.nih.gov/7842315/	Excluded: diverse study on occupational accidents

22	Databases	Abubakar, S., Iliyasu, G., Dayyab, F. M., Inuwa, S., Tudun Wada, R. A., Sadiq, N. M., ... Habib, A. G. (2018). Post-exposure prophylaxis following occupational exposure to HIV and hepatitis B: an analysis of a 12-year record in a Nigerian tertiary hospital. <i>Journal of Infection Prevention, 19</i> (4), 184–189. doi:10.1177/1757177417746733	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
23	Databases	Aggarwal, V., Seth, A., Chandra, J., Gupta, R., Kumar, P., & Dutta, A. K. (2012). Occupational exposure to human immunodeficiency virus in health care providers: a retrospective analysis. <i>Indian Journal of Community Medicine: Official Publication of Indian Association of Preventive & Social Medicine, 37</i> (1), 45–49. doi:10.4103/0970-0218.94024	Excluded: diverse study on occupational accidents
24	Databases	Alavi, S. M., & Sharifi, M. (2013). Percutaneous injuries and transmission of HIV among cases referred for post exposure prophylaxis to Razi hospital in Ahvaz, a city in the southwest Iran. <i>Jundishapur journal of microbiology, 6</i> (10). doi:10.5812/jjm.8266	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
25	Databases	Allen, J. R. (1988). Health care workers and the risk of HIV transmission. <i>The Hastings Center Report, 18</i> (2), suppl 2-5. doi:10.2307/3562419	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but it is a literature review.
26	Databases	Andrade, F. E. M. (2010). Biohazard occupational exposure in Antioquia, Colombia. <i>Infectio, 18</i> (3), 79–85.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with

			occupational exposure to biological material
27	Databases	Argentero, P. A., Zotti, C. M., Abbona, F., Mamo, C., Castella, A., Vallino, A., ... De Carli, G. (2007). Regional surveillance of occupational percutaneous and mucocutaneous exposure to blood-borne pathogens in health care workers: strategies for prevention. <i>La Medicina del lavoro</i> , 98(2), 145–155.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
28	Databases	Arva, P., Dobloug, J. H., Vatn, S., Aarseth, S., & Lystad, A. (1990). The risk of exposure to hepatitis B and human immunodeficiency virus among employees at Norwegian hospitals. <i>Tidsskrift for den Norske laegeforening: tidsskrift for praktisk medicin, ny raekke</i> , 110(20), 2660–2662.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
29	Databases	Aydın, Ö., Ergen, P., & Çaşkurlu, H. (2020). An evaluation of health personnel exposed to occupational injuries in terms of HBV, HCV, and HIV infections. <i>Viral hepatit dergisi</i> , 26(3), 158–162. doi:10.4274/vhd.galenos.2020.2020.0024	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
30	Databases	Ba, P. S., Fall, B., Soumah-Mbaye, F. K., BA-Fall, K. M., & Mbaye, P. S. (2013). P310: The blood accidents exposure (aes) in principal hospital dakar (hpd): about 152 cases collected in 12 years. <i>Antimicrobial resistance and infection control</i> , 2(Suppl 1), P310. doi:10.1186/2047-2994-2-s1-p310	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
31	Databases	Baggaley, R. F., Boily, M.-C., White, R. G., & Alary, M. (2006). Risk of HIV-1 transmission for parenteral exposure and blood transfusion: a systematic	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had

		review and meta-analysis. <i>AIDS (London, England)</i> , 20(6), 805–812. doi:10.1097/01.aids.0000218543.46963.6d	accidents with biological material, but is a literature review
32	Databases	Baker, J. L. (1988). What is the occupational risk to emergency care providers from the human immunodeficiency virus? <i>Annals of Emergency Medicine</i> , 17(7), 700–703. doi:10.1016/s0196-0644(88)80615-2	Excluded: diverse study on occupational accidents
33	Databases	Baldo, V., Floreani, A., Dal Vecchio, L., Cristofolletti, M., Carletti, M., Majori, S., Trivello, R. (2002). Occupational risk of blood-borne viruses in healthcare workers: a 5-year surveillance program. <i>Infection Control and Hospital Epidemiology: The Official Journal of the Society of Hospital Epidemiologists of America</i> , 23(6), 325–327. doi:10.1086/502059	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
34	Databases	Barriga Angulo, G., Fajardo Ortiz, R., Díaz Saldaña, J., Peredo López Velarde, M. A., & Castillo Torrez, N. P. (1989). Exposición ocupacional al virus de la inmunodeficiencia humana. <i>Rev. Med. IMSS (Méx)</i> , 27, 379.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
35	Databases	Bastos, A. M. C. (2003). <i>Risco de infecção ocupacional por HIV</i> .	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
36	Databases	Baudin, C. (1991). Accidental inoculation by AIDS virus: trial of a preventive treatment. <i>Le Chirurgen-dentiste de France</i> , 61(579). Retrieved from https://pubmed.ncbi.nlm.nih.gov/1794240/	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)

37	Databases	Bauer, S. (1989). Testing source patient blood for HIV antibodies after accidental exposure of health care workers to blood and body fluids. <i>JAMA: the journal of the American Medical Association</i> , 262(11), 470–471. doi:10.1001/jama.262.11.470	Excluded: editorial or letter to the reader
38	Databases	Beekmann, S. E. (1997). Combination post-exposure prophylaxis (PEP): A prospective study of HIV-exposed health care workers (HCW). <i>Clinical Infectious Diseases</i> , 25(2).	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
39	Databases	Beekmann, S. E., & Henderson, D. K. (1994). Managing Occupational Risks in the Dental Office - Hiv and the Dental Professional. <i>Journal of the American Dental Association</i> , 125(7), 847–852.	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
40	Databases	Beghdadli, B., Ghomari, O., Taleb, M., Belhaj, Z., Belabed, A., Kandouci, D. A. K.-B., & Fanello, S. (2009). Personnel at risk for occupational blood exposure in a university hospital in West Algeria. <i>Sante publique (Vandoeuvre-les-Nancy, France)</i> , 21(3), 253–261.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
41	Databases	Belefquih, B. (2012). Epidemiological profile of occupational blood exposure accident in the mohamed 5th military teaching hospital. <i>Clinical Chemistry and Laboratory Medicine</i> , 50(4).	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
42	Databases	Benninger, M. S., Gupta, N., & Gilmore, K. (1991). Intraoperative infectious disease exposure to otolaryngology operating room personnel. <i>The Laryngoscope</i> , 101(12), 1276–1279. doi:10.1002/lary.5541011204	Excluded: diverse study on occupational accidents

43	Databases	Berger, A., Stürmer, M., & Doerr, H. W. (2012). Case report: risk of virus infection after accidental blood inoculation from a multi-infected AIDS patient. <i>Journal of Medical Virology</i> , 84(6), 897–900. doi:10.1002/jmv.23286	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
44	Databases	Bi, P. (2008). Sharps injury and body fluid exposure among health care workers in an Australian tertiary hospital. <i>Asia-Pacific Journal of Public Health</i> , 20(2), 139–147.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
45	Databases	Bilski, B. and J. Wysocki (2001). "[Human immunodeficiency virus in the work environment]." <i>Med Pr</i> 52(4): 277-283.	Excluded: full text unavailable
46	Databases	Bouvet, E. (1989). Risk of HIV transmission among health care workers. <i>Medecine Et Maladies Infectieuses</i> , 19, 215–218.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
47	Databases	Bouvet, E. (1993). Occupational Exposure to Hiv - Actual Knowledge and Trends in Prevention. <i>Medecine Et Maladies Infectieuses</i> , 23(1), 28–33.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review

48	Databases	Bouvet, E. (1995). Preventive measures for picking up injured persons on the road. <i>Reanimation Soins Intensifs Medecine d'Urgence</i> , 11(2), 87–92.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
49	Databases	Bredell, H., Crookes, R. L., du P Heynes, A., Schoub, B. D., & Morris, L. (2003). Molecular investigation of two possible cases of accidental HIV-1 transmission in South Africa. <i>AIDS Research and Human Retroviruses</i> , 19(7), 613–617. doi:10.1089/088922203322230987	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
50	Databases	Brent, N. J. (1990). Confidentiality and HIV status: accidental exposure to patient blood or bodily fluids. <i>Home Healthcare Nurse</i> , 8(4), 5–6. doi:10.1097/00004045-199008000-00002	Excluded: diverse study on occupational accidents
51	Databases	Brum, M. C. B. (2013). HIV seroconversion in a health care worker who underwent postexposure prophylaxis following needlestick injury. <i>American Journal of Infection Control</i> , 41(5), 471–472.	Excluded: editorial or letter to the reader
52	Databases	Burget, G. C. (1992). HIV-infected surgeons [1]. <i>Journal of the American Medical Association</i> , 267(6), 803–805.	Excluded: editorial or letter to the reader
53	Databases	Busch, M. P., & Satten, G. A. (1997). Time course of viremia and antibody seroconversion following human immunodeficiency virus exposure. <i>The American Journal of Medicine</i> , 102(5), 117–124. doi:10.1016/s0002-9343(97)00077-6	Excluded: diverse study on occupational accidents
54	Databases	Caglar-Ozer, M. (2020). Invisible Threat for Health Care Workers: Injuries Associated With Blood and Body Fluids. <i>Klimik Journal</i> , 33(1), 62–66.	Included: prevalence and incidence studies on the seroconversion rate for

			HIV in healthcare workers with occupational exposure to biological material
55	Databases	Capilouto, E. I. (1992). What Is the Dentists Occupational Risk of Becoming Infected with Hepatitis-B or the Human-Immunodeficiency-Virus. <i>American Journal of Public Health</i> , 82(4), 587–589.	Excluded: diverse study on occupational accidents
56	Databases	Cardo, D. M., Culver, D. H., Ciesielski, C. A., Srivastava, P. U., Marcus, R., Abiteboul, D., ... Bell, D. M. (1997). A case–control study of HIV seroconversion in health care workers after percutaneous exposure. <i>The New England journal of medicine</i> , 337(21), 1485–1490. doi:10.1056/nejm199711203372101	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but it is a case-control study
57	Databases	Cavalleri, A., & Gobba, F. (1989). Identification of occupations with greater risk of accidents and micro-accidents. <i>Giornale italiano di medicina del lavoro</i> , 11(1–2), 39–46.	Excluded: diverse study on occupational accidents
58	Databases	Çelik, N. (2017). Evaluation of sharp object injuries of health workers in our hospital during last four years. <i>Hastanemizdeki sağlık çalışanlarında dört yıllık kesici delici alet yaralanmalarının değerlendirilmesi</i> , 37, 61–67.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
59	Databases	Ceron, I., & Acuña, G. (2016). Management of occupational exposures to biological fluids at the hospital del trabajador de Santiago, Chile: Prospective follow-up. <i>Open Forum Infectious Diseases</i> , 3(suppl_1). doi:10.1093/ofid/ofw172.1095	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)

60	Databases	Chalya, P. L. (2015). Needle-stick injuries and splash exposures among health-care workers at a tertiary care hospital in north-western Tanzania. <i>Tanzania Journal of Health Research</i> , 17(2).	Excluded: diverse study on occupational accidents
61	Databases	Chavapong, V., & Kositpantawong, N. (2016). Tolerability of tenofovir-lamivudine-rilpivirine as the human immunodeficiency virus (HIV) occupational post-exposure prophylaxis for HIV infection. <i>Open Forum Infectious Diseases</i> , 3(suppl_1). doi:10.1093/ofid/ofw172.374	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
62	Databases	Chou, L., Reynolds, M. R., & Esterhai, J. L., Jr. (1996). Hazards to the orthopaedic trauma surgeon: occupational exposure to HIV and viral hepatitis (a review article). <i>Journal of Orthopaedic Trauma</i> , 10(4), 289–296. doi:10.1097/00005131-199605000-00011	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
63	Databases	Ciesielski, C. A., & Metler, R. P. (1997). Duration of time between exposure and seroconversion in healthcare workers with occupationally acquired infection with human immunodeficiency virus. <i>The American Journal of Medicine</i> , 102(5), 115–116. doi:10.1016/s0002-9343(97)00076-4	Excluded: diverse study on occupational accidents
64	Databases	Cleveland, J. L., Barker, L., Gooch, B. F., Beltrami, E. M., Cardo, D., & National Surveillance System for Health Care Workers Group of the Centers for Disease Control and Prevention. (2002). Use of HIV postexposure prophylaxis by dental health care personnel: an overview and updated recommendations. <i>Journal of the American Dental Association</i> (1939), 133(12), 1619–1626. doi:10.14219/jada.archive.2002.0109	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material

65	Databases	Consten, E. C. J. (1995). A Prospective-Study on the Risk of Exposure to Hiv during Surgery in Zambia. <i>Aids</i> , 9(6), 585–588.	Excluded: diverse study on occupational accidents
66	Databases	Coukos, P. S. (1991). The Bergalis case: assessing the impact of documented provider to patient HIV transmission on the public health process. <i>Courts, Health Science & the Law</i> , 2(1), 18–27.	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
67	Databases	Critchley, S. E., & Castro, K. G. (1995). Management of occupational exposure to HIV. <i>Seminars in Dermatology</i> , 14(3), 235–239. doi:10.1016/s1085-5629(05)80024-0	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
68	Databases	Culver, J. (1997). Preventing transmission of blood borne pathogens: A compelling argument for effective device-selection strategies. <i>American Journal of Infection Control</i> , 25(5), 430–433.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
69	Databases	Daglio, M. (1994). Accidents due to biological risk in health personnel: descriptive epidemiological analysis of the decade. <i>edicina del Lavoro ed Ergonomia</i> , 28(4), 457–465.	Excluded: diverse study on occupational accidents
70	Databases	Daglio, M., Sacchi, M., Feletti, T., Lanave, M., Marena, C., Zambianchi, L., & Strosselli, M. (2006). Accidents due to biological risk in health personnel:	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with

		descriptive epidemiological analysis of the decade 1994-2003. <i>Giornale italiano di medicina del lavoro ed ergonomia</i> , 28(4), 457–465.	occupational exposure to biological material
71	Databases	Davanzo, E., Bruno, A., Beggio, M., Frasson, C., Morandin, M., Giraldo, M., ... Trevisan, A. (2007). Biologic risk due to accident in academic personnel. <i>Giornale italiano di medicina del lavoro ed ergonomia</i> , 29(3 Suppl), 761–762.	Excluded: full text unavailable
72	Databases	Davanzo, Elisabetta, Frasson, C., Morandin, M., & Trevisan, A. (2008). Occupational blood and body fluid exposure of university health care workers. <i>American Journal of Infection Control</i> , 36(10), 753–756. doi:10.1016/j.ajic.2008.04.254	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
73	Databases	de Juanes, J. R., García de Codes, A., Arrazola, M. P., & González Md, A. (2007). Occupational exposure to human immunodeficiency virus in hospital health care workers in Spain. <i>Vacunas</i> , 8(1), 4–8. doi:10.1016/s1576-9887(07)73964-x	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
74	Databases	de la Tribonnière, X., et al. (1998). "Tolerance, compliance and psychological consequences of post-exposure prophylaxis in health-care workers." <i>Int J STD AIDS</i> 9(10): 591-594.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material

75	Databases	De Lucena, N. O. (2011). HIV-1 infection after occupational accidents in the State of Amazonas: first reported case. <i>Revista Da Sociedade Brasileira De Medicina Tropical</i> , 44(5), 646–647.	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
76	Databases	De Oliveira, C. F. (2008). Passive transfer of HIV-1 antibodies and drug resistant virus during a health care worker accident: Implications for HCW post-exposure management. <i>American Journal of Infectious Diseases</i> , 4(4), 244–256.	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
77	Databases	Derevnuk, A., Santos-Cruz, E., Karam-Howlin, R., Reyes, M., De la Vega-Diaz, I., & Wallach, F. (2015). Evaluation of high risk blood and body fluid exposures at a large urban teaching hospital. <i>American journal of infection control</i> , 43(6), S10. doi:10.1016/j.ajic.2015.04.026	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
78	Databases	Desalegn, B., Beyene, H., & Yamada, R. (2012). Patients-to-healthcare workers HIV transmission risk from sharp injuries, Southern Ethiopia. <i>SAHARA J : Journal of Social Aspects of HIV/AIDS Research Alliance</i> , 9(1), 1–5. doi:10.1080/17290376.2012.665252	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
79	Databases	Nardo, D. (1995). Prevalence and incidence of hepatitis B virus, hepatitis C virus and human immunodeficiency virus among personnel and patients of a psychiatric hospital. <i>European Journal of Epidemiology</i> , 11(2), 239–242.	Excluded: diverse study on seroconversion, but which does not involve an occupational accident or HIV

80	Databases	Díaz, J. C., & Johnson, L. A. (2016). Health care worker follow-up compliance after occupational bloodborne pathogens exposure: A brief report. <i>American journal of infection control</i> , 44(12), 1738–1740. doi:10.1016/j.ajic.2016.04.243	Excluded: diverse study on occupational accidents
81	Databases	Do, A. N., Ciesielski, C. A., Metler, R. P., Hammett, T. A., Li, J., & Fleming, P. L. (2003). Occupationally acquired human immunodeficiency virus (HIV) infection: national case surveillance data during 20 years of the HIV epidemic in the United States. <i>Infection Control and Hospital Epidemiology: The Official Journal of the Society of Hospital Epidemiologists of America</i> , 24(2), 86–96. doi:10.1086/502178	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
82	Databases	Dulon, M., Wendeler, D., & Nienhaus, A. (2018). Seroconversion after needlestick injuries - analyses of statutory accident insurance claims in Germany. <i>GMS Hygiene and Infection Control</i> , 13, Doc05. doi:10.3205/dgkh000311	Excluded: diverse study on occupational accidents
83	Databases	Egro, F. M., Nwaiwu, C. A., Smith, S., Harper, J. D., & Spiess, A. M. (2017). Seroconversion rates among health care workers exposed to hepatitis C virus–contaminated body fluids: The University of Pittsburgh 13-year experience. <i>American Journal of Infection Control</i> , 45(9), 1001–1005. doi:10.1016/j.ajic.2017.03.011	Excluded: diverse study on occupational accidents
84	Databases	Ehui, E., et al. (2007). "[Management of accidental exposure to blood in the Treichville teaching hospital, Abidjan (Côte-d'Ivoire)]." <i>Med Mal Infect</i> 37: S251-256.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material

85	Databases	El-Hazmi, M. M., & Al-Majid, F. M. (2008). Needle stick and sharps injuries among health care workers: A 5-year surveillance in a teaching center in Saudi Arabia. <i>Biomedical Research</i> , 19(2), 133–140.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
86	Databases	Epstein, J. B., Scully, C., & Porter, S. R. (1992). The risk of transmission of human immunodeficiency virus in dental practice. <i>Oral Health</i> , 82(5), 33–34, 37–38.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
87	Databases	Ercam, B. (1999). Prophylaxis for occupational exposure to (HIV) human immunodeficiency virus. <i>Louvain Medical</i> , 118(3), 229–239.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
88	Databases	Erhabor, O., Ejele, O. A., & Nwauche, C. A. (2007). Epidemiology and management of occupational exposure to blood borne viral infections in a resource poor setting: the case for availability of post exposure prophylaxis. <i>Nigerian Journal of Clinical Practice</i> , 10(2), 100–104.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
89	Databases	Escudero, D. V. S., Furtado, G. H. C., & Medeiros, E. A. (2015). Healthcare worker adherence to follow-up after occupational exposure to blood and body fluids at a teaching hospital in Brazil. <i>The Annals of Occupational Hygiene</i> , 59(5), 566–571. doi:10.1093/annhyg/meu117	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with

			occupational exposure to biological material
90	Databases	Evrard, S. (1993). Occupational Risk to Surgeons of Unrecognized Hiv-Infection in a Low-Prevalence Area. <i>World Journal of Surgery</i> , 17(2), 232–236.	Excluded: diverse study on occupational accidents
91	Databases	Fadil, R. A., Abdelmutalab, N. A., Abdelhafeez, S. A., Mazi, W., Algamdi, S., Shelwy, M. M., ... Alzahrani, S. E. (2021). Pattern and risk factors of sharp object injuries among health care workers in two tertiary hospitals, Al Taif-Kingdom of Saudi Arabia 2016-2018. <i>Saudi Journal of Biological Sciences</i> , 28(11), 6582–6585. doi:10.1016/j.sjbs.2021.07.031	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
92	Databases	Fahrner, R. (2000). Risk of human immunodeficiency virus infection in health care workers. <i>AIDS Clinical Review</i> , 85–99.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
93	Databases	Fillaux, J., Delpierre, C., Alvarez, M., Miédougé, M., Massip, P., & Cuzin, L. (2004). Management of occupational and sexual exposure to HIV in the Toulouse teaching hospital. <i>Medecine et maladies infectieuses</i> , 34(4), 159–165. doi:10.1016/j.medmal.2004.02.002	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
94	Databases	Fitch, K. M. (1995). Occupational transmission of HIV in health care workers: A review. <i>European Journal of Public Health</i> , 5(3), 175–186.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review

95	Databases	Flexner, C. (1998). Post-exposure prophylaxis revisited: new CDC guidelines. Centers for Disease Control and Prevention. <i>The Hopkins HIV Report</i> , 10(1), 2–3.	Excluded: miscellaneous study on PEP or other antiretroviral
96	Databases	Flum, D. R., & Wallack, M. K. (1997). The surgeon's database for AIDS: a collective review. <i>Journal of the American College of Surgeons</i> , 184(4), 403–412.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
97	Databases	Fokin, A. A., Robicsek, F., & Masters, T. N. (2000). Accidental injuries by HIV-contaminated instruments in health provider or research environments: can seroconversion be prevented? <i>The American Surgeon</i> , 66(1), 14–21.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
98	Databases	Forseter, G. (1994). Tolerability, Safety, and Acceptability of Zidovudine Prophylaxis in Health-Care Workers. <i>Archives of Internal Medicine</i> , 154(23), 2745–2749.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
99	Databases	Francois, A. (2013). Needlestick injuries among professionals in a safe injecting facility. <i>Suchtmedizin in Forschung und Praxis</i> , 15(4).	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
100	Databases	Fuchs, D., Hausen, A., Reibnegger, G., Werner, E. R., Dierich, M. P., & Wachter, H. (1987). HIV seroconversion in health care workers. <i>JAMA: The Journal of the American Medical Association</i> , 258(18), 2525–2526. doi:10.1001/jama.1987.03400180059011	Excluded: editorial or letter to the reader

101	Databases	Ganczak, M., Topczewska, K., Biesiada, D., & Korzeń, M. (2020). Frequency of occupational bloodborne infections and sharps injuries among polish paramedics from selected ambulance stations. <i>International Journal of Environmental Research and Public Health</i> , 18(1), 60. doi:10.3390/ijerph18010060	Excluded: diverse study on HIV (disease burden, history, etc.)
102	Databases	Garcés, J. M., Yazbeck, H., Pi-Sunyer, T., Gutiérrez-Cebollada, J., & López-Colomés, J. L. (1996). Simultaneous human immunodeficiency virus and Hepatitis C infection following a needlestick injury. <i>European Journal of Clinical Microbiology & Infectious Diseases: Official Publication of the European Society of Clinical Microbiology</i> , 15(1), 92–94. doi:10.1007/bf01586195	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
103	Databases	García de Codes Ilario, A., de Juanes Pardo, J. R., Arrazola Martínez, M. del P., Jaén Herreros, F., Sanz Gallardo, M. I., & Lago López, E. (2004). Accidents with exposure to biological material contaminated with HIV in workers at a third level hospital in Madrid. <i>Revista espanola de salud publica</i> , 78(1), 41–51. doi:10.1590/s1135-57272004000100005	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
104	Databases	García De Codes Ilario, A. (1986). Accidents Involving Exposure to HIV-Contaminated Biological Material among Workers at a Third-Level Hospital in Madrid (1986-2001). <i>Revista Espanola de Salud Publica</i> , 78(1), 41–51.	Excluded: duplicate study (same as article iD 103)
105	Databases	Gerberding, J. L. (1994). Incidence and prevalence of human immunodeficiency virus, hepatitis B virus, hepatitis C virus, and cytomegalovirus among health care personnel at risk for blood exposure: final report from a	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with

		longitudinal study. <i>The Journal of Infectious Diseases</i> , 170(6), 1410–1417. doi:10.1093/infdis/170.6.1410	occupational exposure to biological material
106	Databases	Ghafur, A. (2013). Increasing needle stick injuries amongst the radiology teamneeds attention! <i>Antimicrobial Resistance and Infection Control</i> , 2.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
107	Databases	Gilks, C. F., & Wilkinson, D. (1998). Reducing the risk of nosocomial HIV infection in British health workers working overseas: role of post-exposure prophylaxis. <i>BMJ (Clinical Research Ed.)</i> , 316(7138), 1158–1160. doi:10.1136/bmj.316.7138.1158	Excluded: miscellaneous study on PEP or other antiretrovirals
108	Databases	Gisselquist, D., Upham, G., & Potterat, J. J. (2006). Efficiency of human immunodeficiency virus transmission through injections and other medical procedures: evidence, estimates, and unfinished business. <i>Infection Control and Hospital Epidemiology: The Official Journal of the Society of Hospital Epidemiologists of America</i> , 27(9), 944–952. doi:10.1086/506408	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
109	Databases	Giulieri, S. (2007). The trap - Professional exposure to human immunodeficiency virus antibody - Negative blood with high viral load. <i>Archives of Internal Medicine</i> , 167(22), 2524–2526.	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
110	Databases	Goel, V., Kumar, D., Lingaiah, R., & Singh, S. (2017). Occurrence of needlestick and injuries among health-care workers of a tertiary care teaching	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with

		hospital in North India. <i>Journal of Laboratory Physicians</i> , 9(1), 20–25. doi:10.4103/0974-2727.187917	occupational exposure to biological material
111	Databases	Grande Gimenez Marino, C., El-Far, F., Barsanti Wey, S., Servolo Medeiros, E. A., & Hospital Epidemiology Committee, Federal University at Sao Paulo, SP, Brazil. (2001). Cut and puncture accidents involving health care workers exposed to biological materials. <i>The Brazilian Journal of Infectious Diseases: An Official Publication of the Brazilian Society of Infectious Diseases</i> , 5(5), 235–242. doi:10.1590/s1413-86702001000500001	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
112	Databases	Gupta, A., Anand, S., Sastry, J., Krisagar, A., Basavaraj, A., Bhat, S. M., ... Kakrani, A. L. (2008). High risk for occupational exposure to HIV and utilization of post-exposure prophylaxis in a teaching hospital in Pune, India. <i>BMC Infectious Diseases</i> , 8(1), 142. doi:10.1186/1471-2334-8-142	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
113	Databases	Gutierrez, E. B., Lopes, M. H., & Yasuda, M. A. S. (2005). Accidental exposure to biological material in healthcare workers at a university hospital: Evaluation and follow-up of 404 cases. <i>Scandinavian Journal of Infectious Diseases</i> , 37(4), 295–300. doi:10.1080/00365540410026103	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
114	Databases	Ha, E. (2017). Seroconversion of occupational exposure to blood and body fluid among healthcare personnel over 6 years at a teaching hospital in Korea. <i>Antimicrobial Resistance and Infection Control</i> , 6.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)

115	Databases	Habimana, P., et al. (1994). "A survey of occupational blood contact and HIV infection among traditional birth attendants in Rwanda." <i>Aids</i> 8(5): 701-704.	Excluded: diverse study on occupational accidents
116	Databases	Hawkins, D., Asboe, D., Barlow, K., & Evans, B. (2001). Seroconversion to HIV-1 following a needlestick injury despite combination post-exposure prophylaxis. <i>The Journal of Infection</i> , 43(1), 12–15. doi:10.1016/s0163-4453(01)90811-4	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
117	Databases	Haytoglu, Z. (2018). Risk of sharp injuries and mucocutaneous exposures in healthcare workers: ongoing problem despite prevention programs. <i>Annals of Clinical and Analytical Medicine</i> , 09(03). doi:10.4328/jcam.5648	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
118	Databases	Henderson, D. K., Saah, A. J., Zak, B. J., Kaslow, R. A., Lane, H. C., Folks, T., ... Masur, H. (1986). Risk of nosocomial infection with human T-cell lymphotropic virus type III/lymphadenopathy-associated virus in a large cohort of intensively exposed health care workers. <i>Annals of Internal Medicine</i> , 104(5), 644–647. doi:10.7326/0003-4819-104-5-644	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
119	Databases	Henry, K., Campbell, S., Jackson, B., Balfour, H., Jr, Rhame, F., Sannerud, K., ... Kwok, S. (1990). Long-term follow-up of health care workers with work-site exposure to human immunodeficiency virus. <i>JAMA: The Journal of the American Medical Association</i> , 263(13), 1765–1766. doi:10.1001/jama.1990.03440130045016	Excluded: editorial or letter to the reader

120	Databases	Heptonstall, J., Gill, O. N., Porter, K., Black, M. B., & Gilbert, V. L. (1993). Health care workers and HIV: surveillance of occupationally acquired infection in the United Kingdom. <i>Communicable Disease Report. CDR Review</i> , 3(11), R147-53.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
121	Databases	Hitzler, W. and C. Krier (1988). "[AIDS and anesthesia]." <i>Anasth Intensivther Notfallmed</i> 23(4): 175-182.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
122	Databases	Huertas, M. A., Rivera-Morales, I. M., Romero, C., & Ponce-de-León, S. (1995). Occupational accidents and incidence of HIV infection and hepatitis B and C at a Mexican institution. <i>Revista de investigacion clinica; organo del Hospital de Enfermedades de la Nutricion</i> , 47(3), 181–187.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
123	Databases	Huertas, M. A. (1995). Occupational Injuries and Incidence of Hepatitis and Hiv in Health-Care Workers of a Mexican Hospital. <i>Revista De Investigacion Clinica-Clinical and Translational Investigation</i> , 47(3), 181–187.	Excluded: duplicate, same article iD 122
124	Databases	Ippolito, G., Cadrobbi, P., Carosi, G., Episcopo, P., Finzi, G., Ranchino, M., ... Puro, V. (1990). Risk of HIV transmission among health care workers: a multicentre study. The Italian Collaborative Study Group on HIV Occupational Risk. <i>Scandinavian Journal of Infectious Diseases</i> , 22(2), 245–246. doi:10.3109/00365549009037912	Excluded: editorial or letter to the reader

125	Databases	Ippolito, G. (1993). The Risk of Occupational Human Immunodeficiency Virus Infection in Health Care Workers: Italian Multicenter Study. <i>Archives of Internal Medicine</i> , 153(12), 1451–1458.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
126	Databases	Ippolito, G., Puro, V., Heptonstall, J., Jagger, J., De Carli, G., & Petrosillo, N. (1999). Occupational human immunodeficiency virus infection in health care workers: worldwide cases through September 1997. <i>Clinical Infectious Diseases: An Official Publication of the Infectious Diseases Society of America</i> , 28(2), 365–383. doi:10.1086/515101	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
127	Databases	Baraketi, E., Hsinet, J., Ismail, S., Khouja, N., Chemingui, S., Dallagi, A., ... Jemaa, A. B. (2021). P-443 Management of blood exposure accidents victims exposed to HIV by the occupational health department of Rabta hospital. <i>Poster Presentations</i> . BMJ Publishing Group Ltd.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
128	Databases	Ives, C. M. (2011). The incidence of blood and body fluid exposure in our trainees. <i>Journal of Investigative Medicine</i> , 59(1), 163–164.	Excluded: diverse study on occupational accidents
129	Databases	Jaggi, N., Nirwan, P., & Chakraborty, M. (2020). Process improvement to effectively manage and reduce sharps injuries in a Tertiary Hospital in Northern India. <i>Journal of Healthcare Quality Research</i> , 35(3), 141–148. doi:10.1016/j.jhqr.2020.03.007	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
130	Databases	Jalow, A. (1997). The AIDS patient in anaesthesia. <i>Anesthesiologie Intensivmedizin Notfallmedizin Schmerztherapie</i> , 32(2), 87–97.	Excluded: diverse study on occupational accidents

131	Databases	Jayanth, S. T., Kirupakaran, H., Brahmadathan, K. N., Gnanaraj, L., & Kang, G. (2009). Needle stick injuries in a tertiary care hospital. <i>Indian Journal of Medical Microbiology</i> , 27(1), 44–47. doi:10.1016/s0255-0857(21)01752-7	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
132	Databases	Jepsen, O. B. (1989). Risk of occupationally acquired HIV infection among health manpower. A review of known cases]. <i>Ugeskr Laeger</i> , 151(45), 2955–2958.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
133	Databases	Jochimsen, E. M., Luo, C. C., Beltrami, J. F., Respass, R. A., Schable, C. A., & Cardo, D. M. (1999). Investigations of possible failures of postexposure prophylaxis following occupational exposures to human immunodeficiency virus. <i>Archives of Internal Medicine</i> , 159(19), 2361–2363. doi:10.1001/archinte.159.19.2361	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
134	Databases	Johnson, C. D., Evans, R., Shanson, D. C., & Wastell, C. (1989). Attitudes of operating theatre staff to inoculation-risk cases. <i>The British Journal of Surgery</i> , 76(2), 195–197. doi:10.1002/bjs.1800760229	Excluded: full text unavailable
135	Databases	Johnson, M. D., Schaffner, W., Atkinson, J., & Pierce, M. A. (1997). Autopsy risk and acquisition of human immunodeficiency virus infection: a case report and reappraisal. <i>Archives of Pathology & Laboratory Medicine</i> , 121(1), 64–66.	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series

136	Databases	Johnston, J. J. E., & O'Connor, E. (2005). Needlestick injuries, management and education: a role for emergency medicine? <i>European Journal of Emergency Medicine: Official Journal of the European Society for Emergency Medicine</i> , 12(1), 10–12. doi:10.1097/00063110-200502000-00004	Excluded: diverse study on occupational accidents
137	Databases	Jörbeck, H., & Burman, L. G. (1988). Health personnel and HIV infection. 14 cases were reported in the world. Injuries caused by injection needles are the most frequent cause. <i>Lakartidningen</i> , 85(38), 3041–3042.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
138	Databases	Joyce, M. P., Kuhar, D., & Brooks, J. T. (2015). Notes from the field: occupationally acquired HIV infection among health care workers - United States, 1985-2013. <i>MMWR. Morbidity and Mortality Weekly Report</i> , 63(53), 1245–1246.	Excluded: editorial or letter to the reader
139	Databases	Joyce, M. P. (1985). Occupationally acquired HIV infection by healthcare personnel-United States, 1985-2013. <i>Topics in Antiviral Medicine</i> , 23.	Excluded: editorial or letter to the reader
140	Databases	Kato-Maeda, M., et al. (2000). Bloodborne viral infections in patients attending an emergency room in Mexico City: estimate of seroconversion probability in healthcare workers after an occupational exposure. <i>Infection Control and Hospital Epidemiology: The Official Journal of the Society of Hospital Epidemiologists of America</i> , 21(9), 600–602. doi:10.1086/501811	Excluded: diverse study on occupational accidents

141	Databases	Kelen, G. D. (1990). Human immunodeficiency virus and the emergency department: risks and risk protection for health care providers. <i>Annals of Emergency Medicine</i> , 19(3), 242–248. doi:10.1016/s0196-0644(05)82037-2	Excluded: diverse study on occupational accidents
142	Databases	Kennedy, I., & Williams, S. (2000). Occupational exposure to HIV and post-exposure prophylaxis in healthcare workers. <i>Occupational Medicine (Oxford, England)</i> , 50(6), 387–391. doi:10.1093/occmed/50.6.387	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
143	Databases	Kepenek, E., & Sahin Eker, H. B. (2017). An assessment of sharp injuries to workers in a state hospital. <i>KLIMIK dergisi</i> , 30(2), 78–82. doi:10.5152/kd.2017.19	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
144	Databases	Kessler, H. A., et al. (1992). "AIDS: Part I." <i>Dis Mon</i> 38(9): 633-690.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
145	Databases	Kiertiburanakul, S., Wannaying, B., Tonsuttakul, S., Kehachindawat, P., Apivanich, S., Somsakul, S., & Malathum, K. (2006). Use of HIV Postexposure Prophylaxis in healthcare workers after occupational exposure: a Thai university hospital setting. <i>Chotmaihet Thangphaet [Journal of the Medical Association of Thailand]</i> , 89(7), 974–978.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material

146	Databases	Kiprov, D., Simpson, D., Romanick-Schmiedl, S., Lippert, R., Spira, T., & Busch, D. (1987). Risk of AIDS-related virus (human immunodeficiency virus) transmission through apheresis procedures. <i>Journal of Clinical Apheresis</i> , 3(3), 143–146. doi:10.1002/jca.2920030302	Excluded: diverse study on seroconversion, but which does not involve an occupational accident or HIV
147	Databases	Ko, N.-Y., Yeh, S.-H., Tsay, S.-L., Pan, S.-M., Feng, M.-C., Chiang, M.-C., Jang, J.-F. (2009). Adherence to management after occupational exposure to bloodborne pathogen among health care workers in Taiwan. <i>American Journal of Infection Control</i> , 37(7), 609–611. doi:10.1016/j.ajic.2008.11.008	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
148	Databases	Koll, B. (1997). HIV post-exposure prophylaxis. <i>Clinical Infectious Diseases</i> , 25(2).	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
149	Databases	Kranendonk, D. H. (1994). The surgeon, needle-sticks, and HIV. <i>Wisconsin Medical Journal</i> , 93(3), 109–113.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
150	Databases	Krych, S. M. (1992). Treatment of patients with acquired immunodeficiency syndrome in a podiatric emergency situation. <i>Clinics in Podiatric Medicine and Surgery</i> , 9(4), 933–937.	Excluded: diverse study on HIV (disease burden, history, etc.)
151	Databases	Kuhls, T. L., Viker, S., Parris, N. B., Garakian, A., Sullivan-Bolyai, J., & Cherry, J. D. (1987). Occupational risk of HIV, HBV and HSV-2 infections in	Excluded: diverse study on occupational accidents

		health care personnel caring for AIDS patients. <i>American Journal of Public Health</i> , 77(10), 1306–1309. doi:10.2105/ajph.77.10.1306	
152	Databases	Kuo, Y. H., Fabiani, J. N., Mohamed, A. S., Couetil, J. P., Lévy, M., Gutmann, L., ... Bélec, L. (1999). Decreasing occupational risk related to blood-borne viruses in cardiovascular surgery in Paris, France. <i>The Annals of Thoracic Surgery</i> , 68(6), 2267–2272. doi:10.1016/s0003-4975(99)01051-6	Excluded: diverse study on occupational accidents
153	Databases	Kuruuzum, Z., et al. (2008). Risk of infection in health care workers following occupational exposure to a noninfectious or unknown source. <i>American Journal of Infection Control</i> , 36(10), e27–e31. https://doi.org/10.1016/j.ajic.2008.05.012	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
154	Databases	Lee, J. B., & Choi, J. S. (2023). Epidemiology of occupational exposure to blood-borne viruses, postexposure prophylaxis and seroconversion over 10 years among healthcare workers. <i>The Journal of Hospital Infection</i> , 135, 18–27. doi:10.1016/j.jhin.2023.02.003	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
155	Databases	Lee, S., & An, S. (2010). Occupational exposure to HIV and post exposure prophylaxis in a tertiary hospital in Korea. <i>Internal Medicine Journal</i> .	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
156	Databases	Leentvaar-Kuijpers, A., Keeman, J. N., Dekker, E., Dekker, M. M., Ansink-Schipper, M. C., & Coutinho, R. A. (1989). HIV occupational risk of surgical specialists and operating room personnel in the Saint Lucas	Excluded: diverse study on occupational accidents

		Hospital in Amsterdam. <i>Nederlands tijdschrift voor geneeskunde</i> , 133(48), 2388–2391.	
157	Databases	Legrand, J. C., Bastin, F., & Denachtergael, C. (1991). The risk of acquiring the human immunodeficiency virus for health care personnel. <i>Revue medicale de Bruxelles</i> , 12(4), 127–134.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
158	Databases	Lewandowski., et al. (2010). Health-Care Worker Exposure to Hiv-1 and Htlv-I-Ii in Critically Ill, Resuscitated Emergency Department Patients. (1992). <i>Annals of Emergency Medicine</i> , 21(11), 1353–1359.	Excluded: diverse study on occupational accidents
159	Databases	Li, H. (2010). Molecular identification of transmitted/founder viruses by single genome amplification following percutaneous occupational exposure to HIV-1. <i>AIDS Research and Human Retroviruses</i> , 26(10), A168–A169.	Excluded: diverse study on occupational accidents
160	Databases	Lin, E. Y., & Brunicardi, F. C. (1994). HIV infection and surgeons. <i>World Journal of Surgery</i> , 18(5), 753–757. doi:10.1007/bf00298922	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
161	Databases	Longfield, J. N., Brundage, J., Badger, G., Vire, D., Milazzo, M., Ray, K. & Roberts, C. (1994). Look-back investigation after human immunodeficiency virus seroconversion in a pediatric dentist. <i>The Journal of Infectious Diseases</i> , 169(1), 1–8. doi:10.1093/infdis/169.1.1	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with

			biological material, but is a case report or case series
162	Databases	Lot, F., et al. (2002). "[HIV and hepatitis C seroconversions in nurses]." <i>Soins</i> (671): 32-33.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
163	Databases	Lymer, U.-B., Schütz, A. A., & Isaksson, B. (1997). A descriptive study of blood exposure incidents among healthcare workers in a university hospital in Sweden. <i>The Journal of Hospital Infection</i> , 35(3), 223–235. doi:10.1016/s0195-6701(97)90210-3	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
164	Databases	Machado, A. A., et al. (1992). Risk of infections by the human immunodeficiency virus (HIV) among health professionals]. <i>Rev Saude Publica</i> 26(1): 54-56.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
165	Databases	Madsen, K. M., et al. (1999). Use of antiretroviral chemoprophylaxis after occupational HIV exposure. <i>Ugeskr Laeger</i> 161(48): 6619-6621.	Excluded: diverse study on seroconversion, but which does not involve an occupational accident or HIV
166	Databases	Mallon, D. F., Shearwood, W., Mallal, S. A., French, M. A., & Dawkins, R. L. (1992). Exposure to blood borne infections in health care workers. <i>The Medical Journal of Australia</i> , 157(9), 592–595. doi:10.5694/j.1326-5377.1992.tb137397.x	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with

			occupational exposure to biological material
167	Databases	Manikandan, S., Deepthi, R., Nag, B., Kumar, A., Kumar, P., Mathew, G., Ravichandran, B. (2023). O-95 Study on incidence and sequelae of needle stick injuries among healthcare workers. <i>Abstracts</i> . BMJ Publishing Group Ltd.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
168	Databases	Marcuccio, P., et al. (2003). Biological risk assessment among health workers of Bari polyclinic. <i>Giornale Italiano di Medicina del Lavoro ed Ergonomia</i> , 25, 165–166.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
169	Databases	Marcus, R., & The CDC Cooperative Needlestick Surveillance Group*. (1988). Surveillance of health care workers exposed to blood from patients infected with the human immunodeficiency virus. <i>The New England Journal of Medicine</i> , 319(17), 1118–1123. doi:10.1056/nejm198810273191703	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
170	Databases	Marcus, R., Kay, K. & Mann, J. M. (1989). Transmission of human immunodeficiency virus (HIV) in health-care settings worldwide. <i>Bulletin of the World Health Organization</i> , 67 (5), 577 - 582. World Health Organization. https://iris.who.int/handle/10665/264702	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review

171	Databases	Mazi, W. A., Abatayo, A. T., Kazem, N., & Senok, A. (2011). Pattern of occurrence of occupational exposure to blood-borne pathogens in a tertiary hospital in Saudi Arabia. <i>BMC Proceedings</i> , 5(S6), P218. doi:10.1186/1753-6561-5-s6-p218	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
172	Databases	McCarthy, G. M., Ssali, C. S., Bednarsh, H., Jorge, J., Wangrangsimaikul, K., & Page-Shafer, K. (2002). Transmission of HIV in the dental clinic and elsewhere. <i>Oral Diseases</i> , 8 Suppl 2, 126–135. doi:10.1034/j.1601-0825.8.s2.3.x	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
173	Databases	McCray, E. (1986). Occupational risk of the acquired immunodeficiency syndrome among health care workers. <i>The New England Journal of Medicine</i> , 314(17), 1127–1132. doi:10.1056/NEJM198604243141729	Excluded: full text unavailable
174	Databases	Mead, P. B. (1989). AIDS: risk to the health profession. <i>Clinical Obstetrics and Gynecology</i> , 32(3), 485–496. doi:10.1097/00003081-198909000-00011	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
175	Databases	Medeiros, W. P., Setúbal, S., Pinheiro, P. Y. M., Dalston, M. O., Bazin, A. R., & de Oliveira, S. A. (2012). Occupational hepatitis C seroconversions in a Brazilian hospital. <i>Occupational Medicine (Oxford, England)</i> , 62(8), 655–657. doi:10.1093/occmed/kqs105	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
176	Databases	Mehta, A., Rodrigues, C., Ghag, S., Bavi, P., Shenai, S., & Dastur, F. (2005). Needlestick injuries in a tertiary care centre in Mumbai, India. <i>The</i>	Included: prevalence and incidence studies on the seroconversion rate for

		<i>Journal of Hospital Infection</i> , 60(4), 368–373. doi:10.1016/j.jhin.2004.12.015	HIV in healthcare workers with occupational exposure to biological material
177	Databases	Mehta, A., Rodrigues, C., Singhal, T., Lopes, N., D’Souza, N., Sathe, K., & Dastur, F. D. (2010). Interventions to reduce needle stick injuries at a tertiary care centre. <i>Indian Journal of Medical Microbiology</i> , 28(1), 17–20. doi:10.4103/0255-0857.58722	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
178	Databases	Metters, J. S. (1998). Six months’ follow up after occupational exposure to HIV is usually long enough [13. <i>British Medical Journal</i> , 316(7149).	Excluded: editorial or letter to the reader
179	Databases	Meyohas, M. C., Morand-Joubert, L., Van de Wiel, P., Mariotti, M., & Lefrère, J. J. (1995). Time to HIV seroconversion after needlestick injury. <i>Lancet</i> , 345(8965), 1634–1635. doi:10.1016/s0140-6736(95)90139-6	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
180	Databases	Moffat, B. S., Inaba, K., Ives, C., Zuk, Z., Branco, B. C., Barmparas, G., & Demetriades, D. (2014). Reported blood and body fluid exposures in employees at a level I trauma center. <i>Journal of the American College of Surgeons</i> , 219(3), S110. doi:10.1016/j.jamcollsurg.2014.07.259	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
181	Databases	Montufar Andrade, F. E., Villa Franco, J. P., Madrid Muñoz, C. A., Díaz Correa, L. M., Vega Miranda, J., Vélez Rivera, J. D., & Zuleta, J. J. (2015). Infección por VIH posterior a exposición ocupacional de riesgo biológico	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with

		en trabajadores de la salud. <i>Infectio: revista de la Asociacion Colombiana de Infectologia</i> , 19(1), 31–34. doi:10.1016/j.infect.2014.04.003	biological material, but is a case report or case series
182	Databases	Moss, A., Osmond, D., Bacchetti, P., Gerberding, J., Levy, J., Carlson, J., & Casavant, C. (1986). Risk of seroconversion for acquired immunodeficiency syndrome (AIDS) in San Francisco health workers. <i>Journal of Occupational Medicine.: Official Publication of the Industrial Medical Association</i> , 28(9), 821–824. doi:10.1097/00043764-198609000-00013	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
183	Databases	Clinicaltrials.gov. ([s.d.]). Recovered from June, 7 of 2024, of Clinicaltrials.gov website: https://clinicaltrials.gov/show/NCT01234116 .	Excluded: miscellaneous study on PEP or other antiretroviral
184	Databases	Neisson-Vernant, C., Arfi, S., Mathez, D., Leibowitch, J., & Monplaisir, N. (1986). Needlestick HIV seroconversion in a nurse. <i>Lancet</i> , 328(8510), 814. doi:10.1016/s0140-6736(86)90338-7	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
185	Databases	Nelsing, S., Nielsen, T. L., & Nielsen, J. O. (1994). Occupational exposure to human immunodeficiency virus among health care workers in a Danish hospital. <i>The Journal of Infectious Diseases</i> , 169(2), 478. doi:10.1093/infdis/169.2.478	Excluded: editorial or letter to the reader
186	Databases	Newsom, D. H., & Kiwanuka, J. P. (2002). Needle-stick injuries in an Ugandan teaching hospital. <i>Annals of Tropical Medicine and Parasitology</i> , 96(5), 517–522. doi:10.1179/000349802125001186	Excluded: diverse study on occupational accidents

187	Databases	Niu, X. Y., et al. (2019). Analysis and Management of Occupational Infection Exposure Accidents at an Infectious Disease Hospital in China. <i>Southeast Asian Journal of Tropical Medicine and Public Health</i> , 50(4), 779–785.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
188	Databases	Nori, S., et al. (2005). Infectious occupational exposures in dermatology - A review of risks and prevention measures: I. For all dermatologists. <i>Journal of the American Academy of Dermatology</i> , 53(6), 1010–1019.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
189	Databases	Nwaiwu, C. A., Egro, F. M., Smith, S., Harper, J. D., & Spiess, A. M. (2017). Seroconversion rate among health care workers exposed to HIV-contaminated body fluids: The University of Pittsburgh 13-year experience. <i>American journal of infection control</i> , 45(8), 896–900. doi:10.1016/j.ajic.2017.03.012	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
190	Databases	O, D. (2005). Case-control study of HIV seroconversion in health care workers after percutaneous exposure to HIV-infected blood; implications for postexposure management. (1996). <i>Pediatric AIDS and HIV Infection</i> , 7(5).	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but it is a case-control study
191	Databases	Oakley, K., Gooch, C., & Cockcroft, A. (1992). Review of management of incidents involving exposure to blood in a London teaching hospital, 1989-91. <i>BMJ (Clinical Research Ed.)</i> , 304(6832), 949–951. doi:10.1136/bmj.304.6832.949	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with

			occupational exposure to biological material
192	Databases	Oh, H. M. L., & Meng, Q. S. (2019). 5 year survey on sharp injuries among healthcare workers in an acute care hospital in Singapore. <i>Antimicrobial Resistance and Infection Control</i> , 8.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
193	Databases	Oh, H. S., Yi, S. E., & Choe, K. W. (2005). Epidemiological characteristics of occupational blood exposures of healthcare workers in a university hospital in South Korea for 10 years. <i>The Journal of Hospital Infection</i> , 60(3), 269–275. doi:10.1016/j.jhin.2004.11.026	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
194	Databases	Oksenhendler, E., Harzic, M., Le Roux, J. M., Rabian, C., & Clauvel, J. P. (1986). HIV infection with seroconversion after a superficial needlestick injury to the finger. <i>The New England Journal of Medicine</i> , 315(9), 582. doi:10.1056/NEJM198608283150912	Excluded: editorial or letter to the reader
195	Databases	Olivares-Lopez, F., Terreros-Jimenez, J. S., & Juárez-Ortega, M. (1996). Risk of contamination with blood during obstetric-gynecologic surgery. <i>Ginecologia y obstetricia de Mexico</i> , 64, 223–226.	Excluded: diverse study on occupational accidents
196	Databases	Oneill, T. M. (1992). Risk of Needlesticks and Occupational Exposures among Residents and Medical-Students. <i>Archives of Internal Medicine</i> , 152(7), 1451–1456.	Excluded: diverse study on occupational accidents
197	Databases	Orenstein, R., Reynolds, L., Karabaic, M., Lamb, A., Markowitz, S. M., & Wong, E. S. (1995). Do protective devices prevent needlestick injuries among	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)

		health care workers? <i>American Journal of Infection Control</i> , 23(6), 344–351. doi:10.1016/0196-6553(95)90264-3	
198	Databases	Orient, J. M. (1990). Assessing the risk of occupational acquisition of the human immunodeficiency virus: implications for hospital policy. <i>Southern Medical Journal</i> , 83(10), 1121–1127. doi:10.1097/00007611-199010000-00003	Excluded: diverse study on occupational accidents
199	Databases	Owens, D. K., & Nease, R. F., Jr. (1992). Occupational exposure to human immunodeficiency virus and hepatitis B virus: a comparative analysis of risk. <i>The American Journal of Medicine</i> , 92(5), 503–512. doi:10.1016/0002-9343(92)90747-y	Excluded: diverse study on occupational accidents
200	Databases	Panlilio, A. L., et al. (1995). Serosurvey of Human-Immunodeficiency-Virus, Hepatitis-B Virus, and Hepatitis-C Virus-Infection among Hospital-Based Surgeons. <i>Journal of the American College of Surgeons</i> , 180(1), 16–24.	Excluded: diverse study on occupational accidents
201	Databases	Pedersen, C., & Nielsen, J. O. (1989). Risk of infection among medical personnel in the age of HIV. <i>Nordisk medicin</i> , 104(11), 283–284, 288. Recuperado de https://pubmed.ncbi.nlm.nih.gov/2813052/	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
202	Databases	Pérez-Díaz, C., Calixto, O.-J., Faccini-Martínez, Á. A., Bravo-Ojeda, J. S., Botero-García, C. A., Uribe-Pardo, E., ... Osorio, J. (2015). Occupational exposure to blood borne pathogens among healthcare workers: a cross-sectional study of a registry in Colombia. <i>Journal of Occupational</i>	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with

		<i>Medicine and Toxicology (London, England)</i> , 10(1), 45. doi:10.1186/s12995-015-0088-z	occupational exposure to biological material
203	Databases	Pinto, L. A., Landay, A. L., Berzofsky, J. A., Kessler, H. A., & Shearer, G. M. (1997). Immune response to human immunodeficiency virus (HIV) in healthcare workers occupationally exposed to HIV-contaminated blood. <i>The American Journal of Medicine</i> , 102(5), 21–24. doi:10.1016/s0002-9343(97)00056-9	Excluded: diverse study on HIV (disease burden, history, etc.)
204	Databases	Pinto, L. A., et al. (1995). Env-Specific Cytotoxic T-Lymphocyte Responses in Hiv Seronegative Health-Care Workers Occupationally Exposed to Hiv-Contaminated Body-Fluids. <i>Journal of Clinical Investigation</i> , 96(2), 867–876.	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but it is a case-control study
205	Databases	Placidi, D., Carta, A., Crotti, M. T., & Porru, S. (2002). Injuries with biological risk in a major hospital: analysis of a caseload. <i>Giornale italiano di medicina del lavoro ed ergonomia</i> , 24(4), 436–437. Recuperado de https://pubmed.ncbi.nlm.nih.gov/12528350/	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
206	Databases	Pratt, R. D., Shapiro, J. F., McKinney, N., Kwok, S., & Spector, S. A. (1995). Virologic characterization of primary human immunodeficiency virus type 1 infection in a health care worker following needlestick injury. <i>The Journal of Infectious Diseases</i> , 172(3), 851–854. doi:10.1093/infdis/172.3.851	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
207	Databases	Puro, V., et al. (2001). <i>Risk of HIV and other blood-borne infections in the cardiac setting: Patient-to-provider and provider-to-patient transmission.</i>	Excluded: a study addressing seroconversion for HIV among

		<i>Dipartimento di Epidemiologia, Istituto Nazionale per le Malattie Infettive Lazzaro Spallanzani, IRCCS, 00149 Rome, Italy Dipartimento di Epidemiologia, Istituto Nazionale per le Malattie Infettive Lazzaro Spallanzani, IRCCS, Via Portuense (Vol. 292). Rome, Italy.</i>	healthcare professionals who had accidents with biological material, but is a literature review
208	Databases	Puro, V. (2010). Theme updates on the epidemiology of occupational bloodborne infectious diseases. <i>Giornale Italiano di Medicina del Lavoro ed Ergonomia</i> , 32(3), 235–239.	Excluded: diverse study on occupational accidents
209	Databases	Puro, V., <i>et al.</i> (2010). Italiano Rischio Occupazionale da HIV. Update on the subject of epidemiology of blood-transmitted occupational infections. <i>Giornale italiano di medicina del lavoro ed ergonomia</i> , 32(3), 235–239.	Excluded: diverse study on occupational accidents
210	Databases	Puro, V., Ippolito, G., Guzzanti, E., Serafin, I., Pagano, G., Suter, F., ... Soscia, F. (1992). Zidovudine prophylaxis after accidental exposure to HIV: the Italian experience. The Italian Study Group on Occupational Risk of HIV Infection. <i>AIDS (London, England)</i> , 6(9), 963–969.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
211	Databases	Puro, V., Ranchino, M., & Profili, F. (1990). Occupational exposures to blood and risk of HIV transmission in a general hospital (1986-88). <i>European Journal of Epidemiology</i> , 6(1), 67–70. doi:10.1007/bf00155552	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material

212	Databases	Qureshi, A. U. (2009). Needle stick injury in high risk groups. <i>Pakistan Journal of Medical and Health Sciences</i> , 3(2), 168–170.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
213	Databases	Raahave, D., & Bremmelgaard, A. (1991). New operative technique to reduce surgeons' risk of HIV infection. <i>The Journal of Hospital Infection</i> , 18, 177–183. doi:10.1016/0195-6701(91)90021-y	Excluded: diverse study on occupational accidents
214	Databases	Rajkumari, N., Thanbuana, B. T., John, N. V., Gunjiyal, J., Mathur, P., & Misra, M. C. (2014). A prospective look at the burden of sharps injuries and splashes among trauma health care workers in developing countries: True picture or tip of iceberg. <i>Injury</i> , 45(9), 1470–1478. doi:10.1016/j.injury.2014.03.001	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
215	Databases	Rapparini, C. (2006). Occupational HIV infection among health care workers exposed to blood and body fluids in Brazil. <i>American Journal of Infection Control</i> , 34(4), 237–240. doi:10.1016/j.ajic.2005.08.016	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
216	Databases	Raucher, B. G. (1999). Infection control in pulmonary and critical care medicine. <i>Seminars in Respiratory Infections</i> , 14(4), 372–382.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
217	Databases	Reboulot, B. (1992). "[Transmission and prevention]." <i>Soins</i> (556): 16-20.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had

			accidents with biological material, but is a literature review
218	Databases	Rele, M., Mathur, M., & Turbadkar, D. (2002). Risk of needle stick injuries in health care workers - a report. <i>Indian Journal of Medical Microbiology</i> , 20(4), 206–207. doi:10.1016/s0255-0857(21)03190-x	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
219	Databases	Rice, B. D., Tomkins, S. E., & Ncube, F. M. (2015). Sharp truth: health care workers remain at risk of bloodborne infection. <i>Occupational Medicine (Oxford, England)</i> , 65(3), 210–214. doi:10.1093/occmed/kqu206	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
220	Databases	Ridzon, R., Gallagher, K., Ciesielski, C., Ginsberg, M. B., Robertson, B. J., Luo, C. C., & DeMaria, A., Jr. (1997). Simultaneous transmission of human immunodeficiency virus and hepatitis C virus from a needle-stick injury. <i>The New England Journal of Medicine</i> , 336(13), 919–922. doi:10.1056/NEJM199703273361304	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
221	Databases	Rishi, E., Shantha, B., Dhami, A., Rishi, P., & Rajapriya, H. (2017). Needle stick injuries in a tertiary eye-care hospital: Incidence, management, outcomes, and recommendations. <i>Indian Journal of Ophthalmology</i> , 65(10), 999. doi:10.4103/ijo.ijo_147_17	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material

222	Databases	Robbins, W. A. (2000). Duration of time between exposure and seroconversion in health care workers with occupationally acquired infection with HIV (Ciesielski, 1997). <i>AAOHN Journal</i> , 48(3), 149–151.	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
223	Databases	Roberts, R. B., Lincoff, A. S., & Frankel, R. E. (1999). Occupational exposure to HIV in an urban university hospital setting. <i>The Brazilian Journal of Infectious Diseases: An Official Publication of the Brazilian Society of Infectious Diseases</i> , 3(2), 50–62.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
224	Databases	Rodrigues, D. S. S., Brunialti, M. K. C., Medeiros, E. A. S., Diaz, R. S., Turcato, G., & Salomao, R. (2002). Induction of interleukin-10 by HIV antigens in peripheral mononuclear cells of health care workers after occupational exposure to HIV-1-positive blood. <i>Brazilian Journal of Medical and Biological Research</i> , 35(6), 697–701. doi:10.1590/s0100-879x2002000600010	Excluded: diverse study on occupational accidents
225	Databases	Rogowska-Szadkowska, D. (1997). Chemoprophylaxis after occupational exposure to human immunodeficiency virus (HIV). <i>Polskie Archiwum Medycyny Wewnętrznej</i> , 98(5), 431–440.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
226	Databases	Rogowska-Szadkowska, D., Borzuchowska, A., Wiercińska-Drapało, A., & Chlabicz, S. (1997). Prophylaxis after occupational exposure to human immunodeficiency virus (HIV). <i>Polskie Archiwum Medycyny</i>	

		Wewnetrznej, 98(11), 431–440. Recuperado de https://pubmed.ncbi.nlm.nih.gov/9594561/	Excluded: duplicate study (same as article iD 225)
227	Databases	Rojanawatsirivej, S. (1991). "[Dental practice and AIDS]." <i>J Dent Assoc Thai</i> 41(3): 141-146.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
228	Databases	Romea, S., M E Alkiza, J M Ramon, J Oromí. (1995). Risk for occupational transmission of HIV infection among health care workers - Study in a Spanish hospital. <i>European Journal of Epidemiology</i> , 11(2), 225–229.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
229	Databases	Sacchi, M., et al. (2007). Accidents with risk of blood-borne infections in obstetricians: analysis of a hospital case records]. <i>Med Lav</i> , 98(1), 64–72.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
230	Databases	Safari, N., Rabenau, H. F., Stephan, C., Wutzler, S., Marzi, I., & Wicker, S. (2020). Hochrisikonadelstichverletzungen und Virustransmission: Eine prospektive Beobachtungsstudie. <i>Der Unfallchirurg</i> , 123(1), 36–42. doi:10.1007/s00113-019-0655-3	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material

231	Databases	Santangelo, J. (2001). Acute seroconversion of HIV infection in the ambulatory care setting. <i>The Nurse Practitioner</i> , 26(4), 48, 51–54, 56. doi:10.1097/00006205-200104000-00006	Excluded: diverse study on HIV (disease burden, history, etc.)
232	Databases	Schaffner, W. (1989). AIDS: risk of HIV infection to health care workers. <i>Infection Control and Hospital Epidemiology: The Official Journal of the Society of Hospital Epidemiologists of America</i> , 10(6), 241–242. doi:10.1086/646013	Excluded: editorial or letter to the reader
233	Databases	Scully, C., & Porter, S. (1991). The Level of Risk of Transmission of Human-Immunodeficiency-Virus between Patients and Dental Staff. <i>British Dental Journal</i> , 170(3), 97–100.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
234	Databases	Sheth, S. P., Leuva, A. C., & Mannari, J. G. (2016). Post Exposure Prophylaxis for occupational exposures to HIV and Hepatitis B: Our experience of thirteen years at a rural based tertiary care teaching hospital of Western India. <i>Journal of Clinical and Diagnostic Research: JCDR</i> , 10(8), OC39-44. doi:10.7860/JCDR/2016/19876.8387	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
235	Databases	Shiao, J., Guo, L., & McLaws, M. L. (2002). Estimation of the risk of bloodborne pathogens to health care workers after a needlestick injury in Taiwan. <i>American Journal of Infection Control</i> , 30(1), 15–20. doi:10.1067/mic.2002.119928	Excluded: diverse study on occupational accidents
236	Databases	Shiao, J. S., Guo, Y. L., & McLaws, M.-L. (2011). Risk of seroconversion estimated from a percutaneous injury reporting system. <i>Occupational and</i>	Excluded: diverse study on occupational accidents

Environmental Medicine, 68(Suppl_1), A103–A103. doi:10.1136/oemed-2011-100382.341

237	Databases	Shokouhi, S., et al. (2011). Underreporting and non-adherence to post-exposure prophylaxis among healthcare workers in Iranian university hospitals. <i>Clinical Microbiology and Infection</i> , 17.	Excluded: diverse study on occupational accidents
238	Databases	Shokuhi, S., Gachkar, L., Alavi-Darazam, I., Yuhanaee, P., & Sajadi, M. (2012). Occupational exposure to blood and body fluids among health care workers in teaching hospitals in Tehran, Iran. <i>Iranian Red Crescent Medical Journal</i> , 14(7), 402–407.	Excluded: diverse study on occupational accidents
239	Databases	Shriyan, A., Roche, R., & Annamma. (2012). Incidence of occupational exposures in a tertiary health care center. <i>Indian Journal of Sexually Transmitted Diseases and AIDS</i> , 33(2), 91–97. doi:10.4103/0253-7184.102111	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
240	Databases	Sikka, R., Millham, F. H., & Feldman, J. A. (2004). Analysis of occupational exposures associated with emergency department thoracotomy. <i>The Journal of Trauma</i> , 56(4), 867–872. doi:10.1097/01.ta.0000082686.93669.10	Excluded: diverse study on occupational accidents
241	Databases	Sin, W. W., Lin, A. W., Chan, K. C., & Wong, K. H. (2016). Management of health care workers following occupational exposure to hepatitis B, hepatitis C, and human immunodeficiency virus. <i>Xianggang Yi Xue Za Zhi [Hong Kong Medical Journal]</i> , 22(5), 472–477. doi:10.12809/hkmj164897	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material

242	Databases	Razzakh, S., & Qureshi, M. (2021). Needlestick injuries among healthcare personnel in Qatar: A retrospective study. <i>Qatar Med J</i> , 2021(2).	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
243	Databases	Stock, S. R., Gafni, A., & Bloch, R. F. (1990). Universal precautions to prevent HIV transmission to health care workers: an economic analysis. <i>Journal de l'Association Medicale Canadienne [Canadian Medical Association Journal]</i> , 142(9), 937–946.	Excluded: diverse study on occupational accidents
244	Databases	Stricof, R. L., & Morse, D. L. (1986). HTLV-III/LAV seroconversion following a deep intramuscular needlestick injury. <i>The New England Journal of Medicine</i> , 314(17), 1115. doi:10.1056/NEJM198604243141711	Excluded: editorial or letter to the reader
245	Databases	Sureshkumar, D., Ramasubramanian, V., & Abdulghafur, K. (2011). Needle stick injuries among health care workers – a report from India. <i>BMC Proceedings</i> , 5(S6), P225. doi:10.1186/1753-6561-5-s6-p225	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
246	Databases	Tetteh, R. A., Nartey, E. T., Lartey, M., Mantel-Teeuwisse, A. K., Leufkens, H. G. M., Nortey, P. A., & Dodoo, A. N. O. (2015). Adverse events and adherence to HIV post-exposure prophylaxis: a cohort study at the Korle-Bu Teaching Hospital in Accra, Ghana. <i>BMC Public Health</i> , 15(1), 573. doi:10.1186/s12889-015-1928-6	Excluded: miscellaneous study on PEP or other antiretroviral
247	Databases	Tetteh, R. A., <i>et al.</i> (2015). "Outcomes of a postexposure prophylaxis program at the Korle-Bu Teaching Hospital in Ghana: A retrospective cohort study." <i>Journal of the International Association of Providers of AIDS Care</i> 14(6): 544-552.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with

			occupational exposure to biological material
248	Databases	Tokars, J. I., <i>et al.</i> (1993). Surveillance of HIV infection and zidovudine use among health care workers after occupational exposure to HIV-infected blood. <i>Annals of internal medicine</i> , 118(12), 913. doi:10.7326/0003-4819-118-12-199306150-00001	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
249	Databases	Tomkins, S., & Ncube, F. (2005). Occupationally acquired HIV: international reports to December 2002. <i>Weekly Releases (1997–2007)</i> , 10(10). doi:10.2807/esw.10.10.02660-en	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
250	Databases	Torbati, S. S., & Guss, D. A. (1999). Emergency department management of occupational exposures to HIV- infected fluids. <i>Journal of Emergency Medicine</i> , 17(2), 261–264.	Excluded: diverse study on occupational accidents
251	Databases	Traoré, A., Dembélé, M., Ouologuem, D. S., Minta, D. K., Kaya, A. S., Cissé, T., & Traoré, H. A. (2013). P296: Epidemiological profile and management of accidental blood exposure, Bamako. <i>Antimicrobial resistance and infection control</i> , 2(S1). doi:10.1186/2047-2994-2-s1-p296	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
252	Databases	Veeken, H., Verbeek, J., Houweling, H., & Cobelens, F. (1991). Occupational HIV infection and health care workers in the tropics. <i>Tropical Doctor</i> , 21(1), 28–31. doi:10.1177/004947559102100112	Excluded: diverse study on occupational accidents

253	Databases	Verrusio, A. C. (1989). Risk of transmission of the human immunodeficiency virus to health care workers exposed to HIV-infected patients: a review. <i>Journal of the American Dental Association (1939)</i> , 118(3), 339–342. doi:10.14219/jada.archive.1989.0108	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
254	Databases	Villarroel, J., Bustamante, M. C., Manríquez, I., Bertoglia, M. P., Mora, M., & Galarce, N. (2012). Occupational exposure risk to body fluids in the Felix Bulnes Hospital during eleven years. <i>Revista chilena de infectologia: organo oficial de la Sociedad Chilena de Infectologia</i> , 29(3), 255–262. doi:10.4067/S0716-10182012000300002	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
255	Databases	Wall, S. D., Howe, J. M., & Sawhney, R. (1997). Human immunodeficiency virus infection and hepatitis: biosafety in radiology. <i>Radiology</i> , 205(3), 619–628. doi:10.1148/radiology.205.3.9393512	Excluded: diverse study on occupational accidents
256	Databases	Wall, S. D., Olcott, E. W., & Gerberding, J. L. (1991). AIDS risk and risk reduction in the radiology department. <i>AJR. American Journal of Roentgenology</i> , 157(5), 911–917; discussion 919-21. doi:10.2214/ajr.157.5.1927808	Excluded: diverse study on occupational accidents
257	Databases	Wallace, M., & Harrison, W. (1988). Hiv seroconversion with progressive disease in health care worker after needlestick injury. <i>Lancet</i> , 331(8600), 1454. doi:10.1016/s0140-6736(88)92258-1	Excluded: editorial or letter to the reader
258	Databases	Wanchu, A., Singh, S., Bambery, P., & Varma, S. (2006). Possible occupationally acquired HIV infection in two Indian healthcare workers. <i>MedGenMed: Medscape General Medicine</i> , 8(2), 56.	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with

			biological material, but is a case report or case series
259	Databases	Wang, F. D., Chen, Y. Y., & Liu, C. Y. (2000). Analysis of sharp-edged medical-object injuries at a medical center in Taiwan. <i>Infection Control and Hospital Epidemiology: The Official Journal of the Society of Hospital Epidemiologists of America</i> , 21(10), 656–658. doi:10.1086/501710	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
260	Databases	Watters, D. A. (1994). Surgery, surgical pathology and HIV infection: lessons learned in Zambia. <i>Papua and New Guinea Medical Journal</i> , 37(1), 29–39. Recuperado de https://pubmed.ncbi.nlm.nih.gov/7863725/	Excluded: diverse study on occupational accidents
261	Databases	Weinmann, A., Chua, J., Spelman, D., McDonald, M., Spicer, W. J., & Sexton, D. (1989). Risk of infection of health-care workers by human immunodeficiency virus. <i>The Medical Journal of Australia</i> , 151(7), 422. doi:10.5694/j.1326-5377.1989.tb101242.x	Excluded: editorial or letter to the reader
262	Databases	Weiss, S. H. (1997). Risks and issues for the health care worker in the human immunodeficiency virus era. <i>The Medical Clinics of North America</i> , 81(2), 555–575. doi:10.1016/s0025-7125(05)70531-9	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
263	Databases	Weiss, S. H., Goedert, J. J., Gartner, S., Popovic, M., Waters, D., Markham, P., ... Gibbons, J. (1988). Risk of human immunodeficiency virus (HIV-1) infection among laboratory workers. <i>Science (New York, N.Y.)</i> , 239(4835), 68–71. doi:10.1126/science.3336776	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with

			biological material, but is a case report or case series
264	Databases	Weiss, S. H., Saxinger, W. C., Rechtman, D., Grieco, M. H., Nadler, J., Holman, S., ... Markham, P. D. (1985). HTLV-III infection among health care workers. Association with needle-stick injuries. <i>JAMA: The Journal of the American Medical Association</i> , 254(15), 2089–2093. doi:10.1001/jama.254.15.2089	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
265	Databases	Wiboonchutikul, S., Thientong, V., Suttha, P., Kowadisaiburana, B., & Manosuthi, W. (2016). Significant intolerability of efavirenz in HIV occupational postexposure prophylaxis. <i>The Journal of Hospital Infection</i> , 92(4), 372–377. doi:10.1016/j.jhin.2015.12.015	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
266	Databases	Wiboonchutikul, S., Thientong, V., Suttha, P., Kowadisaiburana, B., & Manosuthi, W. (2016). Significant intolerability of efavirenz in HIV occupational postexposure prophylaxis. <i>The Journal of Hospital Infection</i> , 92(4), 372–377. doi:10.1016/j.jhin.2015.12.015	Excluded: duplicate study (same as article iD 265)
267	Databases	Winceslaus, J. (1993). HIV seroconversion after occupational exposure despite early prophylactic zidovudine therapy. <i>The Lancet</i> , 341(8859), 1537. https://doi.org/10.1016/0140-6736(93)90675-7	Excluded: editorial or letter to the reader
268	Databases	Windolf, J., et al. (1990). Occupational accidents with possible HIV contamination. <i>Unfallchirurgie</i> 16(1): 35-40.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with

			occupational exposure to biological material
269	Databases	Winston, A., et al. (2005). The use of a triple nucleoside-nucleotide-regimen for occupational HIV post-exposure prophylaxis. <i>Hiv Medicine</i> , 6(3), 191–197.	Excluded: miscellaneous study on PEP or other antiretroviral
270	Databases	Wittmann, A., Hofmann, F., & Kralj, N. (2007). Needle stick injuries--risk from blood contact in dialysis. <i>Journal of Renal Care</i> , 33(2), 70–73. doi:10.1111/j.1755-6686.2007.tb00043.x	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
271	Databases	Wnuk, A. M. (2003). Occupational exposure to HIV infection in health care workers. <i>Medical Science Monitor: International Medical Journal of Experimental and Clinical Research</i> , 9(5), CR197-200.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
272	Databases	Wong, D. A., et al. (1998). Risk of blood contamination of health care workers in spine surgery - A study of 324 cases. <i>Spine</i> , 23(11), 1261–1266.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
273	Databases	Woodward, J. (1996). New recommendations on health care worker exposure to HIV. <i>STEP Perspective</i> , 8(3), 8–10.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review

274	Databases	Wormser, G. P., Rabkin, C. S., & Joline, C. (1988). Frequency of nosocomial transmission of HIV infection among health care workers. <i>The New England Journal of Medicine</i> , 319(5), 307–308. doi:10.1056/NEJM198808043190513	Excluded: editorial or letter to the reader
275	Databases	Wright, J. G., & McGeer, A. (1993). Human immunodeficiency virus transmission between surgeons and patients in orthopaedic surgery. <i>Clinical Orthopaedics and Related Research</i> , 297(297), 272–281. doi:10.1097/00003086-199312000-00045	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
276	Databases	Wyżgowski, P., Rosiek, A., Grzela, T., & Leksowski, K. (2016). Occupational HIV risk for health care workers: risk factor and the risk of infection in the course of professional activities. <i>Therapeutics and Clinical Risk Management</i> , 12, 989–994. doi:10.2147/TCRM.S104942	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
277	Databases	Young, T. N., Arens, F. J., Kennedy, G. E., Laurie, J. W., & Rutherford, G. w. (2007). Antiretroviral post-exposure prophylaxis (PEP) for occupational HIV exposure. <i>Cochrane Database of Systematic Reviews</i> , 2012(1), CD002835. doi:10.1002/14651858.CD002835.pub3	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
278	Databases	Zbeidy, R., Livingstone, J., Shatz, V., Raveh, Y., Gad, R., Nicolau-Raducu, R., & Souki, F. G. (2022). Occurrence and outcome of blood-contaminated percutaneous injuries among anesthesia practitioners: a cross-sectional study. <i>International Journal for Quality in Health Care</i> , 34(1). doi:10.1093/intqhc/mzac019	Excluded: diverse study on occupational accidents

279	Databases	Zogheib, C. T., Baraldi, M. M., Simonetti, M. M., & Santoro, C. M. (2011). Epidemiological study of accidents with biological material involving healthcare workers exposed to hepatitis B, C and HIV. <i>BMC Proceedings</i> , 5(S6), P224. doi:10.1186/1753-6561-5-s6-p224	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
280	Databases	Zuckerman, A. J. (1995). Occupational exposure to hepatitis B virus and human immunodeficiency virus: a comparative risk analysis. <i>American Journal of Infection Control</i> , 23(5), 286–289. doi:10.1016/0196-6553(95)90058-6	Excluded: diverse study on occupational accidents
281		Asanati, K., Majeed, A., Shemtob, L., & Cresswell, F. (2022). Healthcare workers potentially exposed to HIV: an update. <i>Journal of the Royal Society of Medicine</i> , 115(8), 286–288. doi:10.1177/01410768221107122	Excluded: editorial or letter to the reader
282		Badacsonyi, A. (2001). So unlikely, yet so terrifying: Correspondence. <i>Anaesthesia</i> , 56(4), 373–374. doi:10.1046/j.1365-2044.2001.01976-4.x	Excluded: editorial or letter to the reader
283		Baraniecki. (1993). Needlestick injuries--cause for concern! <i>AARN News Letter</i> , 49(4), 12.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
284		Boal, W. L., Hales, T., & Ross, C. S. (2005). Blood-borne pathogens among firefighters and emergency medical technicians. <i>Prehospital Emergency Care: Official Journal of the National Association of EMS Physicians and the National Association of State EMS Directors</i> , 9(2), 236–247. doi:10.1080/10903120590924915	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review

285	Discussion: Postexposure Follow-up-Duration and Counseling. (1997). <i>The American Journal of Medicine</i> 102(58).	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
286	Carlisle, D. (1993). Spelling it out. <i>Nursing Times</i> , 89(12), 18.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
287	Cavender, J. W. (1992). AIDS in the health care setting: the congressional response to the Kimberly Bergalis case. <i>Georgia Law Review (Athens, Ga.: 1966)</i> , 26(2), 539–599.	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
288	Chamberland, M. E., Petersen, L. R., Munn, V. P., White, C. R., Johnson, E. S., Busch, M. P., ... Zeger, G. (1994). Human immunodeficiency virus infection among health care workers who donate blood. <i>Annals of Internal Medicine</i> , 121(4), 269–273. doi:10.7326/0003-4819-121-4-199408150-00006	Excluded: diverse study on HIV (disease burden, history, etc.)
289	Clerici, M., Levin, J. M., Kessler, H. A., Harris, A., Berzofsky, J. A., Landay, A. L., & Shearer, G. M. (1994). HIV-specific T-helper activity in seronegative health care workers exposed to contaminated blood. <i>JAMA: The Journal of the American Medical Association</i> , 271(1), 42–46. doi:10.1001/jama.1994.03510250058035	Excluded: diverse study on HIV (disease burden, history, etc.)

290		Cooke, M. (1989). Ethics of the HIV epidemic, physician risk and responsibility. <i>Current Opinion in Infectious Diseases</i> , 2(1), 61–64. doi:10.1097/00001432-198902010-00013	Excluded: diverse study on HIV (disease burden, history, etc.)
291		Cotton, D. (1996). CDC study supports AZT use after occupational injury. Centers for Disease Control and Prevention. <i>AIDS Clinical Care</i> , 8(2), 18.	Excluded: editorial or letter to the reader
292		Duquette, A. M. (1993). Nothing to fear but fear itself. <i>RDH</i> , 13(6), 28–30, 32, 50.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
293	Databases	Occupational exposure to the human immunodeficiency virus among health care workers in Canada. (1989). <i>Journal de l'Association Médicale Canadienne [Canadian Medical Association Journal]</i> , 140(5), 503–505.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
294		Erridge, P. L. (1996). Needlestick injuries. <i>British Dental Journal</i> , 181(8), 284. doi:10.1038/sj.bdj.4809235	Excluded: editorial or letter to the reader
295		Ferreira, M. M. S. V., & Ferreira, C. M. M. (2002). Risks in ophthalmology: ocular AIDS. <i>Servir (Lisbon, Portugal)</i> , 50(5), 222–225.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
296		Füessl, H. S. (1989). Risiko und Prophylaxe einer Übertragung von HIV bei Angehörigen der Heil- und Heilhilfsberufe [Risk and prevention of	Excluded: a study addressing seroconversion for HIV among

	transmission of HIV in employees of health and nursing occupations. <i>Offentl Gesundheitswes</i> , 51(10), 621–625.	healthcare professionals who had accidents with biological material, but is a literature review
297	Gańczak, M., Boroń-Kaczmarek, A., Białecki, P., & Szych, Z. (2003). Narazenie lekarzy specjalności zabiegowych województwa zachodniopomorskiego na zakażenie HIV [Occupational exposure to HIV among Polish surgeons from the province of West Pomerania. <i>Pol Merkur Lekarski</i> , 15(85), 75–80.	Excluded: diverse study on occupational accidents
298	Galaio, L. M., Leite, E. S., Shapovalova, O., Rocha, R., Pereira, I., Matoso, T., & Consciencia, S. (2011). Accidents with confirmed biological risk in an university hospital. <i>Sho2011: International Symposium on Occupational Safety and Hygiene</i> , 0, 283–285.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
299	Gerner, H. M., Ivey, F. D., & Lane, T. W. (1989). Follow-up and education of employees exposed to a patient with HIV antibodies and massive bleeding. <i>American Journal of Infection Control</i> , 17(6), 349–352. doi:10.1016/0196-6553(89)90005-9	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
300	Gervich, D. H. (1988). Managing HIV exposure in the hospital setting. <i>Iowa Medicine: Journal of the Iowa Medical Society</i> , 78(3), 114–116.	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series

301	Greene, E. S., & Roizen, M. F. (1993). Risk of HIV infection. <i>Anesthesia and Analgesia</i> , 76, 913–914.	Excluded: editorial or letter to the reader
302	Grimes, R. M. (1997). Minimizing the risk. <i>Texas Medicine</i> , 93(6), 45–47.	Excluded: diverse study on occupational accidents
303	Hadaway, L. (2012). Needlestick injuries, short peripheral catheters, and health care worker risks. <i>Journal of Infusion Nursing: The Official Publication of the Infusion Nurses Society</i> , 35(3), 164–178. doi:10.1097/NAN.0b013e31824d276d	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
304	Hale, P. J. (1990). HIV infection and the nurse's duty to care: risk versus responsibility. <i>Virginia Nurse</i> , 58(2), 14–17.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
305	Hamlyn, E., & Easterbrook, P. (2007). Occupational exposure to HIV and the use of post-exposure prophylaxis. <i>Occupational Medicine (Oxford, England)</i> , 57(5), 329–336. doi:10.1093/occmed/kqm046	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
306	Lafeuillade, A., Thiebaut, C., Quilichini, R., & Profizi, N. (1995). HIV, occupational exposure, and medical responsibilities. <i>Lancet</i> , 346(8974), 579–580. doi:10.1016/s0140-6736(95)91418-8	Excluded: editorial or letter to the reader

307	Bell, D. M. (1991). Human immunodeficiency virus transmission in health care settings: Risk and risk reduction. <i>The American Journal of Medicine</i> , 91(3), S294–S300. doi:10.1016/0002-9343(91)90385-b	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
308	Howard, R. J. (1990). Human immunodeficiency virus testing and the risk to the surgeon of acquiring HIV. <i>Surgery, Gynecology & Obstetrics</i> , 171(1), 22–26.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
309	Hurwitz, J. J., Fine, N., & Rachlis, A. R. (1999). Needle-stick injuries and HIV infection: a surgeon's personal experience and review of postexposure prophylaxis. St. Paul's Ocular AIDS Group. <i>Canadian Journal of Ophthalmology. Journal Canadien d'ophtalmologie</i> , 34(4), 195–203.	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
310	Karpen, M. ([s.d.]). Post-exposure management: How one major medical center copes. <i>AIDS Patient Care</i> , 6(2), 56–58.	Excluded: editorial or letter to the reader
311	Kripke, C. (2007). Antiretroviral prophylaxis for occupational exposure to HIV. <i>American Family Physician</i> , 76(3), 375–376.	Excluded: editorial or letter to the reader
312	Kuzin, M. I., & Krylov, N. N. (1991). Khirurgicheskie problemy SPIDa (obzor inostrannoï literatury). <i>Klin Med (Mosk)</i> , 69(7), 9–15.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had

			accidents with biological material, but is a literature review
313		Lawyer, M. H. (1994). HIV and dentistry. <i>Valparaiso University Law Review</i> . <i>Valparaiso University. School of Law</i> , 29(1), 297–359.	Excluded: editorial or letter to the reader
314		Layon, A. J. (1997). HIV disease and anesthesiologists' risk: can old dogs learn new tricks? <i>Journal of Clinical Anesthesia</i> , 9(7), 525–526. doi:10.1016/s0952-8180(97)00139-6	Excluded: editorial or letter to the reader
315		Lemaire, R., & Masson, J. B. (2000). Risk of transmission of blood-borne viral infection in orthopaedic and trauma surgery. <i>The Journal of Bone and Joint Surgery. British Volume</i> , 82(3), 313–323. doi:10.1302/0301-620x.82b3.14194	Excluded: editorial or letter to the reader
316		Pont, L., Hatungimana, F., Guiguet, V., Ndayiragije, M., Nduricimpa, A., Niyongabo, J., & Larouzé, T. (2003). Assessment of Occupational Exposure to Human Immunodeficiency Virus and Hepatitis C Virus in a Referral Hospital in Burundi, Central Africa. <i>Central Africa. Infection Control and Hospital Epidemiology</i> , 24(10), 717–718.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
317		Marcus, R., Srivastava, P. U., Bell, D. M., McKibben, P. S., Culver, D. H., Mendelson, M. H., ... Kelen, G. D. (1995). Occupational blood contact among prehospital providers. <i>Annals of Emergency Medicine</i> , 25(6), 776–779. doi:10.1016/s0196-0644(95)70206-7	Excluded: diverse study on occupational accidents
318	Databases (maybe)	Miceli, M., Herrera, F., Temporiti, E., Li, D., Vila, A., & Bonvehí, P. (2005). Adherence to an occupational blood borne pathogens exposure management program among healthcare workers and other groups at risk	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with

		in Argentina. <i>The Brazilian Journal of Infectious Diseases: An Official Publication of the Brazilian Society of Infectious Diseases</i> , 9(6), 454–458. doi:10.1590/s1413-86702005000600002	occupational exposure to biological material
319	Databases (maybe)	Miller, P. J., & Farr, B. M. (1989). A study of the rate of postexposure human immunodeficiency virus testing in a hospital requiring written informed consent. <i>Journal of Occupational Medicine.: Official Publication of the Industrial Medical Association</i> , 31(6), 524–527.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
320	Databases (maybe)	Monafo, W. W., Chaplin, H., & Storch, G. (1989). HIV exposure in the emergency department. <i>Missouri Medicine</i> , 86(1), 11–12.	Excluded: editorial or letter to the reader
321	Databases (maybe)	Naccasha, Z. I. (1990). The permissibility of routine AIDS testing in the health care context. <i>Notre Dame Journal of Law, Ethics & Public Policy</i> , 5(1), 223–255.	Excluded: diverse study on HIV (disease burden, history, etc.)
322	Databases (maybe)	Nelsing, S., Nielsen, T. L., & Nielsen, J. O. (1993). Occupational blood exposure among health care workers: II. Exposure mechanisms and universal precautions. <i>Scandinavian Journal of Infectious Diseases</i> , 25(2), 199–205. doi:10.3109/00365549309008485	Excluded: diverse study on occupational accidents
323	Databases (maybe)	Newton, G. ([s.d.]). AIDS and the orthopaedic surgeon. <i>Journal of Bone and Joint Surgery - Series B. Journal of Bone and Joint Surgery - Series B</i> , 73(5), 707–708.	Excluded: editorial or letter to the reader
324	Databases (maybe)	N’Galy, B., Ryder, R. W., Bila, K., Mwandagaliirwa, K., Colebunders, R. L., Francis, H., ... Quinn, T. C. (1988). Human immunodeficiency virus infection among employees in an African hospital. <i>The New England</i>	Excluded: diverse study on seroconversion, but which does not

		<i>Journal of Medicine</i> , 319(17), 1123–1127. doi:10.1056/NEJM198810273191704	involve an occupational accident or HIV
325	Databases (maybe)	Onadeko, M. O., Balogun, M. O., Onigbogi, O. O., & Omokhodion, F. O. (2017). Occupational exposure, attitude to HIV-positive patients and uptake of HIV counselling and testing among health care workers in a tertiary hospital in Nigeria. <i>SAHARA J: Journal of Social Aspects of HIV/AIDS Research Alliance</i> , 14(1), 193–201. doi:10.1080/17290376.2017.1398104	Excluded: diverse study on occupational accidents
326	Databases (maybe)	Para, M. F., et al. (1992). Use of zidovudine following occupational exposure to human immunodeficiency virus. <i>Clinical Infectious Diseases: An Official Publication of the Infectious Diseases Society of America</i> , 15(5), 884–885. doi:10.1093/clind/15.5.884	Excluded: editorial or letter to the reader
327	Databases (maybe)	Paul, S. M., Jorden, V., Costa, S. J., & Ziskin, L. Z. (1999). Recommendations for occupational exposures to HIV. <i>New Jersey Medicine: The Journal of the Medical Society of New Jersey</i> , 96(1), 41–46. Recuperado de https://pubmed.ncbi.nlm.nih.gov/9949657/	Excluded: diverse study on occupational accidents
328	Databases (maybe)	Pence, G. (1992). Ethics and AIDS. <i>Newsletter on Philosophy and Medicine</i> , 91(2), 76–78.	Excluded: diverse study on HIV (disease burden, history, etc.)
329	Databases (maybe)	Pottenger, L. A., Ashby, H. U., & Thompson, C. R. (1992). Altruism in surgery of AIDS patients. <i>Journal of Religion and Health</i> , 31(1), 9–18. doi:10.1007/bf00986841	Excluded: diverse study on HIV (disease burden, history, etc.)
330	Databases (maybe)	Recker, N. (1992). AIDS is “real, personal and cruel”. <i>The South Dakota Nurse</i> , 34(3), 3.	Excluded: diverse study on HIV (disease burden, history, etc.)

331	Databases (maybe)	Resnic, F. S., & Noerdlinger, M. A. (1995). Occupational exposure among medical students and house staff at a New York City Medical Center. <i>Archives of Internal Medicine</i> , 155(1), 75–80. doi:10.1001/archinte.155.1.75	Excluded: diverse study on occupational accidents
332	Databases (maybe)	Rewri, P., Sharma, M., Lohan, A., Singh, D., Yadav, V., & Singhal, A. (2019). Practice pattern of cataract surgeons when operating on seropositive patients. <i>Indian Journal of Ophthalmology</i> , 67(3), 335–339. doi:10.4103/ijo.IJO_1437_18	Excluded: diverse study on HIV (disease burden, history, etc.)
333	Databases (maybe)	Risi, G. F., Jr, Gaumer, R. H., Weeks, S., Leete, J. K., & Sanders, C. V. (1989). Human immunodeficiency virus: risk of exposure among health care workers at a southern urban hospital. <i>Southern Medical Journal</i> , 82(9), 1079–1082.	Excluded: diverse study on HIV (disease burden, history, etc.)
334	Databases (maybe)	Rosenthal, E. (1990). Risk of contracting AIDS virus is changing practices in medicine. <i>The New York Times</i> , 1, 32.	Excluded: diverse study on HIV (disease burden, history, etc.)
335	Databases (maybe)	Rouveix, E., Bouvet, E., Vernat, F., Chansombat, M., Hamet, G., & Pellissier, G. (2014). Management of accidental exposure to HIV: the COREVIH 2011 activity report. <i>Medecine et Maladies Infectieuses</i> , 44(3), 112–116. doi:10.1016/j.medmal.2014.01.010	Excluded: miscellaneous study on PEP or other antiretroviral
336	Databases (maybe)	Scardino, P. T. (2007). A hazard surgeons need to address. <i>Nature Clinical Practice. Urology</i> , 4(7), 347. doi:10.1038/ncpuro0854	Excluded: editorial or letter to the reader

337	Databases (maybe)	Scasso, C. A., Berrettini, S., Sellari-Franceschini, S., Bruschini, P., Moretti, A., Scasso, A., & Piragine, F. (1990). HIV infection and nosocomial risk: experience at the ORL Clinic of Pisa. <i>Acta otorhinolaryngologica Italica: organo ufficiale della Societa italiana di otorinolaringologia e chirurgia cervico-facciale</i> , 10(3), 287–294.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
338	Databases (maybe)	Schweich, P. J., Fosarelli, P. D., Duggan, A. K., Quinn, T. C., & Baker, J. L. (1990). Prevalence of human immunodeficiency virus seropositivity in pediatric emergency room patients undergoing phlebotomy. <i>Pediatrics</i> , 86(5), 660–665. doi:10.1542/peds.86.5.660	Excluded: diverse study on HIV (disease burden, history, etc.)
339	Databases (maybe)	Serna-Ojeda, J. C., Navas, A., & Graue-Hernandez, E. O. (2017). Smaller needles, lower risks?: Occupational HIV risk for healthcare professionals. <i>HIV Medicine</i> , 18(8), 613–614. doi:10.1111/hiv.12496	Excluded: editorial or letter to the reader
340	Databases (maybe)	Stein, J. (2013). Playing the odds. <i>JAMA Pediatrics</i> , 167(6), 505–506. doi:10.1001/2013.jamapediatrics.17	Excluded: editorial or letter to the reader
341	Databases (maybe)	Tammelleo, A. D. (1994). Nurse exposed to AIDS pt.'s blood sues: peer privilege. Case in point: Willits v. Superior Court 24 CAL. Rptr. 2d 348--CA (1993). <i>The Regan Report on Nursing Law</i> , 34(8), 4.	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
342	Databases (maybe)	Tereskerz, P. M., Bentley, M., & Jagger, J. (1996). Risk of HIV-1 infection after human bites. <i>Lancet</i> , 348(9040), 1512. doi:10.1016/S0140-6736(05)65921-1	Excluded: editorial or letter to the reader

343	Databases (maybe)	Van Demark, R. E., Sr. (1989). Needlesticks and HIV infection. <i>South Dakota Journal of Medicine</i> , 42(3), 15.	Excluded: editorial or letter to the reader
344	Databases (maybe)	Verhagen, C. (1999). Management of occupational exposures to bloodborne viruses: HIV post-exposure prophylaxis. <i>The Journal of the Michigan Dental Association</i> , 81(7), 16, 44–46.	Excluded: diverse study on occupational accidents
345	Databases (maybe)	Von Der Crone, S. (1998). Post-exposure prevention of HIV infection with zidovudine. <i>Deutsche Apotheker Zeitung</i> , 138(7).	Excluded: miscellaneous study on PEP or other antiretroviral
346	Databases (maybe)	Walser, E. M., Dixon, R. G., Silberzweig, J. E., Bartal, G., Chao, C. P., Gross, K., ... Nikolic, B. (2014). Occupational Exposure to Bloodborne Pathogens in IR - Risks, Prevention, and Recommendations: A Joint Guideline of the Society of Interventional Radiology and Cardiovascular and Interventional Radiological Society of Europe. <i>Journal of Vascular and Interventional Radiology</i> , 25(3), 327–331.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
347	Databases (maybe)	Watson, S. B. (1991). The HIV infected health care worker -- ethics and common sense. <i>Clinical Ethics Report</i> , 5(4), 1–16.	Excluded: diverse study on occupational accidents
348	Databases (maybe)	Wicker, S., Rabenau, H. F., Haberl, A. E., Bühren, A., Bechstein, W. O., & Sarrazin, C. M. ([s.d.]). Blood-borne infections and the pregnant health care worker. Risks and preventive measures. <i>Chirurg</i> , 83(2), 136–2012.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
349	Databases (maybe)	Wicker, S., Rabenau, H. F., Haberl, A. E., Bühren, A., Bechstein, W. O., & Sarrazin, C. M. (2012). Blutübertragbare Infektionen und die schwangere	Excluded: a study addressing seroconversion for HIV among

		Mitarbeiterin im Gesundheitswesen: Risiko und Präventionsmaßnahmen. <i>Der Chirurg; Zeitschrift für alle Gebiete der operativen Medizen</i> , 83(2), 136–142. doi:10.1007/s00104-011-2166-9	healthcare professionals who had accidents with biological material, but is a literature review
350	Databases (maybe)	Wig, N. (2001). Occupational exposure to HIV: Are we sitting on a volcano? <i>Journal of Internal Medicine of India</i> , 4(2), 86–92.	Excluded: editorial or letter to the reader
351	Databases (maybe)	Wig, N. (2007). Work accidents in the HIV era. Solutions to a growing problem. <i>Salud(i)Ciencia</i> , 15(2), 540–544.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
352	Databases (maybe)	Withheld, N. (1990). Physicians in training and HIV (II). <i>New England Journal of Medicine</i> , 322(19).	Excluded: editorial or letter to the reader
353	Databases (maybe)	Wormser, G. P., Joline, C., Bittker, S., Forseter, G., Kwok, S., & Sninsky, J. J. (1989). Polymerase chain reaction for seronegative health care workers with parenteral exposure to HIV-infected patients. <i>The New England Journal of Medicine</i> , 321(24), 1681–1682. doi:10.1056/NEJM198912143212413	Excluded: editorial or letter to the reader
354	Databases (maybe)	Wu, H. C., Ho, J. J., Lin, M. H., Chen, C. J., Guo, Y. L., & Shiao, J. S. C. (2015). Incidence of percutaneous injury in Taiwan healthcare workers. <i>Epidemiology and Infection</i> , 143(15), 3308–3315. doi:10.1017/S0950268815000321	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material

355	Databases (maybe)	Wyld, D. C., & Cappel, S. D. (1990). The big easy? Legal and managerial perspectives on AIDS and health care delivery in the 1990s. <i>AIDS & Public Policy Journal</i> , 5(3), 99–106.	Excluded: diverse study on occupational accidents
356	Databases (maybe)	Post-exposure prophylaxis for HIV. Drug and Therapeutics Bulletin - Volume 49, Issue 3, pp. 30-33 - published 2011-01-01	Excluded: miscellaneous study on PEP or other antiretroviral
357	Databases (maybe)	Centers for Disease Control (CDC). (1985). Update: prospective evaluation of health-care workers exposed via the parenteral or mucous-membrane route to blood or body fluids from patients with acquired immunodeficiency syndrome--United States. <i>MMWR. Morbidity and Mortality Weekly Report</i> , 34(7), 101–103.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
358	Databases (maybe)	Rapid HIV testing for managing occupational exposures. (2006). <i>Healthcare Hazard Management Monitoring</i> , 20(1), 1–6.	Excluded: diverse study on occupational accidents
359	Databases (maybe)	IL: surgeon “drops scissors” in nurse’s hand: glove punctured--suit brought by nurse. (2002). <i>Nursing Law’s Regan Report</i> , 43(1), 3.	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series
360	Databases (maybe)	A nurse’s dream punctured with five words—‘Lynda, you are HIV-positive’. (1997). <i>The Pennsylvania Nurse</i> , 52(1), 4.	Excluded: a study addressing seroconversion among healthcare professionals who had accidents with biological material, but is a case report or case series

361	Databases (maybe)	Why anonymous?. (1993). <i>The Lancet</i> , 341(8852), 1059–1060. https://doi.org/10.1016/0140-6736(93)92415-P	Excluded: editorial or letter to the reader
362	Databases (maybe)	Occupational risk of HIV-associated TB. (1992). <i>Nursing Standard (Royal College of Nursing, Great Britain)</i> , 7(2), 17. https://doi.org/10.7748/ns.7.2.17.s37	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
363	Databases (maybe)	How risky is orthopedics?. ([s.d.]). <i>Today's OR Nurse</i> , 14(11), 40–1992.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
364	Databases (maybe)	HIV exposure demands immediate action. Position statement on post-exposure programs in the event of occupational exposure to HIV/HBV. (1991). <i>The American Nurse</i> , 23(10), 25.	Excluded: editorial or letter to the reader
365	Databases (maybe)	American Public Health Association. (1991). Bloodborne infections in health care providers. <i>American Journal of Public Health</i> , 81(2), 250–251.	Excluded: a study addressing seroconversion for HIV among healthcare professionals who had accidents with biological material, but is a literature review
366	Databases (maybe)	U.S. Department of Labor, Office of the Secretary. (1987). Joint advisory notice; Department of Labor/Department of Health and Human Services; HBV/HIV. <i>Federal Register</i> , 52(210), 41818–41824.	Excluded: editorial or letter to the reader

367	Google Scholar	Valim, M. D., & Marziale, M. H. P. (2012). Notification of work accidents with exposure to biological material: Cross study. <i>Online Brazilian Journal of Nursing</i> , 11(1), 51–64. https://doi.org/10.5935/1676-4285.20120006	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
368	Google Scholar	Kalman, E., Radulescu, A., Hanganut, A., & Borzan, C. (2001). Accidental exposure to blood and biological products in a tertiary teaching hospital in Romania. <i>Revista de Chimie</i> , 71(3), 312–319. https://doi.org/10.37358/rc.20.3.8003	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
369	Google Scholar	di C.M., Maida, L., Aprea, G., Calamusa, F., Campisi, D., Favaro, G., Russo Fiorino, A.M., Fodale, M.L., Maniglia, V., Marchese, M.M., Velardo, M.V., & Torregrossa, M.V. (2020). Blood and body fluids exposure of healthcare workers in a university hospital of Palermo, Italy: A fourteen years long surveillance. <i>Annali di Igiene</i> , 32(6), 819–826. https://doi.org/10.7416/ai.2020.2380	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
370	Google Scholar	Donatelli, L. J. P. (2007). Acidentes ocupacionais envolvendo exposição a material biológico em profissionais da área odontológica de Bauru-SP (Dissertação de mestrado, Universidade Estadual Paulista, Faculdade de Medicina de Botucatu). Repositório Institucional da UNESP.	Excluded: other reasons (conference abstracts, other diseases as outcome, etc.)
371	References	Al Ghamdi, S., Al-Azraqi, T., Bello, C., Gutierrez, H., Hyde, M., & Abdullah, M. (2003). Needlestick and sharps injuries at Asir Central Hospital, Abha, Saudi Arabia. <i>Annals of Saudi Medicine</i> , 23(6), 404–407. https://doi.org/10.5144/0256-4947.2003.404	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
372	References	Almeida, C. A. F., & Benatti, M. C. C. (2007). Exposições ocupacionais por fluidos corpóreos entre trabalhadores da saúde e sua adesão à quimioprofilaxia.	Included: prevalence and incidence studies on the seroconversion rate for

		<i>Revista da Escola de Enfermagem da USP</i> , 41(1), 120-126. https://doi.org/10.1590/S0080-62342007000100016	HIV in healthcare workers with occupational exposure to biological material
373	References	Argentero, P. A., Zotti, C. M., Abbona, F., Mamo, C., Castella, A., Vallino, A., De Carli, G. (2007). Regional surveillance of occupational percutaneous and mucocutaneous exposure to blood-borne pathogens in health care workers: Strategies for prevention. <i>La Medicina del Lavoro</i> , 98(2), 145–155.	Included: duplicate study (same a article iD 27)
374	References	Arva, P., Dobloug, J. H., Vatn, S., Aarseth, S., & Lystad, A. (1990). The risk of exposure to hepatitis B and human immunodeficiency virus among employees at Norwegian hospitals. <i>Tidsskrift for den Norske laegeforening: Tidsskrift for praktisk medicin, ny raekke</i> , 110(20), 2660–2662.	Included: duplicate study (same a article iD 28)
375	References	Barriga Angulo, G., Fajardo Ortiz, R., Díaz Saldaña, J., Peredo López Velarde, M. A., & Castillo Torrez, N. P. (1989). Exposición ocupacional al virus de la inmunodeficiencia humana. <i>Rev. Med. IMSS (Méx)</i> , 27, 379.	Included: duplicate study (same a article iD 34)
376	References	Blázquez, R. M., Moreno, S., Menasalvas, A., Guerrero, C., Novoa, A., & Segovia, M. (2001). Exposición a patógenos hemáticos en el personal sanitario. <i>Enfermedades Infecciosas y Microbiología Clínica</i> , 19(4), 156-160. https://doi.org/10.1016/S0213-005X(01)72595-5	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
377	References	Bowden, F. J., <i>et al.</i> (1993). Occupational exposure to the human immunodeficiency virus and other blood-borne pathogens. A six-year prospective study. <i>The Medical Journal of Australia</i> , 158(12), 810-812. https://doi.org/10.5694/j.1326-5377.1993.tb137667.x	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
378	References	Bozkurt, S., Kökoğlu, Ö. F., Yanıt, F., Kocahasanoğlu, U., Okumuş, M., Sucaklı, M. H., Güler, S., Kuzhan, N., Savrun, A., & Uçmak, H. (2013). Needle sticks and	Included: prevalence and incidence studies on the seroconversion rate for

		injuries due to surgical instruments in health care providers. <i>Dicle Medical Journal</i> , 40(3), 449-452. https://doi.org/10.5798/diclemedj.0921.2013.03.0308	HIV in healthcare workers with occupational exposure to biological material
379	References	Changraksa, N., Pannapoch, L., Phatharodom, P., Werarak, P., Ratanasuwan, W., & Navanukroh, O. (2022). Occupational post-exposure prophylaxis after blood and body fluids exposure among healthcare workers in Siriraj Hospital. <i>Siriraj Medical Journal</i> , 74(11), 787-791. https://doi.org/10.33192/Smj.2022.93	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
380	References	Chaiwarith, R., Ngamsrikam, T., Fupinwong, S., & Sirisanthana, T. (2013). Occupational exposure to blood and body fluids among healthcare workers in a teaching hospital: An experience from Northern Thailand. <i>Japanese Journal of Infectious Diseases</i> , 66(2), 121-125. https://doi.org/10.7883/yoken.66.121	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
381	References	Çelik, N. (2017). Evaluation of sharp object injuries of health workers in our hospital during last four years. <i>Hastanemizdeki sağlık çalışanlarında dört yıllık kesici delici alet yaralanmalarının değerlendirilmesi</i> , 37, 61–67.	Included: duplicate study (same a article iD 58)
382	References	Çiçek-Şentürk, G., et al. (2019). Retrospective investigation of 9 years of data on needlestick and sharps injuries: Effect of a hospital infection control committee. <i>American Journal of Infection Control</i> , 47(2), 186–190. https://doi.org/10.1016/j.ajic.2018.07.015	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
383	References	Daglio, M., Sacchi, M., Feletti, T., Lanave, M., Marena, C., Zambianchi, L., & Strosselli, M. (2006). Infortuni a rischio biologico nel personale sanitario: Analisi epidemiologica descrittiva nel decennio 1994-2003. <i>Giornale Italiano di Medicina del Lavoro ed Ergonomia</i> , 28(4), 457–465.	Included: duplicate study (same a article iD 70)

384	References	Dizili-Yelgin, C., Çıkman, A., Karakeçili, F., Gülhan, B., & Aydın, M. (2018). Evaluation of sharps injuries in a training and research hospital. <i>Klinik Dergisi</i> , 31(3), 200–204.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
385	References	Elmslie, K., & O'Shaughnessy, M. V. (1988). National surveillance program on occupational exposure to the human immunodeficiency virus among health care workers in Canada. <i>Canadian Medical Association Journal</i> , 138(1), 33-38.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
386	References	Fahey, B. J., et al. (1991). Frequency of nonparenteral occupational exposures to blood and body fluids before and after universal precautions training. <i>The American Journal of Medicine</i> , 90(2), 145-153.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
387	References	Falagas, M. E., et al. (2007). Percutaneous exposure incidents of the health care personnel in a newly founded tertiary hospital: A prospective study. <i>PLOS ONE</i> , 2(2), e194. https://doi.org/10.1371/journal.pone.0000194	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
388	References	Frijstein, G., Hortensius, J., & Zaaijer, H. L. (2011). Needle stick injuries and infectious patients in a major academic medical centre from 2003 to 2010. <i>Netherlands Journal of Medicine</i> , 69(10), 465–468.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with

			occupational exposure to biological material
389	References	Gerberding, J. L., et al. (1987). Risk of transmitting the human immunodeficiency virus, cytomegalovirus, and hepatitis B virus to health care workers exposed to patients with AIDS and AIDS-related conditions. <i>The Journal of Infectious Diseases</i> , 156(1), 1–8. https://doi.org/10.1093/infdis/156.1.1	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
390	References	Gooch, B. F., Cardo, D. M., Marcus, R., McKibben, P. S., Cleveland, J. L., Srivastava, P. U., Culver, D. H., Bell, D. M., & CDC Cooperative Needlestick Surveillance Group. (1995). Percutaneous exposures to HIV-infected blood among dental workers enrolled in the CDC Needlestick Study. <i>Journal of the American Dental Association (JADA)</i> , 126(9), 1237–1242.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
391	References	Guliz, E., Meral, U., Safak, K., et al. (2015). Evaluation of sharp object injuries in healthcare personnel working in Diyarbakir Gazi Yasargil Training and Research Hospital. <i>Mediterranean Journal of Infection Microbes and Antimicrobials</i> , 4, 9.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
392	References	Henderson, D. K., et al. (1986). Risk of nosocomial infection with human T-cell lymphotropic virus type III/lymphadenopathy-associated virus in a large cohort of intensively exposed health care workers. <i>Annals of Internal Medicine</i> , 104(5), 644–647. https://doi.org/10.7326/0003-4819-104-5-644	Included: duplicate study (same a article iD 118)
393	References	Henderson, D. K., Fahey, B. J., Willy, M., et al. (1990). Risk for occupational transmission of human immunodeficiency virus type 1 (HIV-1) associated with clinical exposure: A prospective evaluation. <i>Annals of Internal Medicine</i> , 113, 740–746.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with

			occupational exposure to biological material
394	References	Heptonstall, J., Gill, O. N., Porter, K., Black, M. B., & Gilbert, V. L. (1993). Health care workers and HIV: Surveillance of occupationally acquired infection in the United Kingdom. <i>Communicable Disease Report, CDR Review</i> , 3(11), R147–153.	Included: duplicate study (same a article iD 120)
395	References	Hiransuthikul, N., Hiransuthikul, P., & Kanasuk, Y. (2007). Human immunodeficiency virus postexposure prophylaxis for occupational exposure in a medical school hospital in Thailand. <i>Journal of Hospital Infection</i> , 67(4), 344–349.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
396	References	Huertas, M. A., Rivera-Morales, I. M., Romero, C., & Ponce-de-Leon, S. (1995). Occupational accidents and incidence of HIV infection and hepatitis B and C at a Mexican institution. <i>Revista de Investigación Clínica</i> , 47, 181–187.	Included: duplicate study (same a article iD 122)
397	References	Ippolito, G., et al. (2013). Professional risks of infection with HIV and other bloodborne pathogens for solid organ transplant surgeons: Results from the SIROH Program and review of the literature. <i>Organs, Tissues & Cells</i> , 16, 11–17.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
398	References	Jeong, J. S. (2014). Post-exposure treatment and seroconversion to blood-borne viruses after needlestick injuries among healthcare personnel. <i>Journal of Korean Biological Nursing Science</i> , 16(1), 26–32. https://doi.org/10.7586/jkbns.2014.16.1.26	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material

399	References	Kaya, Ş., Baysal, B., Eşkazan, A. E., & Çolak, H. (2012). Evaluation of sharp objects injuries in the health care personnel working in the Diyarbakır Training and Research Hospital. <i>Viral Hepatitis Journal</i> , 18(3), 107–110. https://doi.org/10.4274/Vhd.08370	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
400	References	Khuri-Bulos, N. A., Toukan, A., Mahafzah, A., et al. (1997). Epidemiology of needlestick and sharp injuries at a university hospital in a developing country: A 3-year prospective study at the Jordan University Hospital, 1993 through 1995. <i>American Journal of Infection Control</i> , 25, 322–329.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
401	References	Krishnan, A., KS, G., TS, S., Trikkur, S., Kumar, V., & Soman, S. (2016). Prevalence and post-exposure prophylaxis use for needlestick injuries among health care providers in a tertiary care hospital in Kochi, India. <i>Eurasian Journal of Emergency Medicine</i> , 15, 73–77. https://doi.org/10.5152/eajem.2016.47966	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
402	References	Kuruuzum, Z., et al. (2008). Risk of infection in health care workers following occupational exposure to a noninfectious or unknown source. <i>American Journal of Infection Control</i> , 36(10), e27–e31. https://doi.org/10.1016/j.ajic.2008.05.012	Included: duplicate study (same a article iD 153)
403	References	Kuruüzüm, Z., Elmalı, Z., Günay, S., Gündüz, Ş., & Yapan, Z. (2008). Occupational exposures to blood and body fluids among health care workers: A questionnaire survey. <i>Mikrobiyoloji Bülteni</i> , 42(1), 61–69.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material

404	References	Lee, J. H., Cho, J., Kim, Y. J., et al. (2017). Occupational blood exposures in health care workers: Incidence, characteristics, and transmission of bloodborne pathogens in South Korea. <i>BMC Public Health</i> , 17, 827–834.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
405	References	Loureiro, L. A., Gomes, A. C., Malaguti, S. E., et al. (2009). Adesão de profissionais de enfermagem ao follow-up clínico após exposição ocupacional com material biológico. <i>Revista Eletrônica de Enfermagem</i> , 11, 303–308. http://www.fen.ufg.br/revista/v11/n2/v11n2a10.htm	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
406	References	MacDonald, M. (1996). National surveillance for occupational exposure to blood-borne viruses in health care workers. <i>Australian HIV Surveillance Report</i> , 12(2), 3–5.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
407	References	Machado, A. A., et al. (1992). Risco de infecção pelo vírus da imunodeficiência humana (HIV) em profissionais da saúde. <i>Revista de Saúde Pública</i> , 26(1), 54–56. https://doi.org/10.1590/s0034-89101992000100010	Included: duplicate study (same a article iD 164)
408	References	Madsen, K. M., et al. (1999). Use of antiretroviral chemoprophylaxis after occupational HIV exposure. <i>Ugeskr Laeger</i> , 161(48), 6619–6621.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material

409	References	Malka, E., Streinu-Cercel, A., Pițigoi, D., & Bacruban, R. (2012). Management of accidental exposure to HCV, HBV, and HIV in healthcare workers in Romania. <i>GERMS</i> , 2(4), 137–141.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
410	References	Marcuccio, P., Maggi, P., Di Pierri, C., Paolino, E., Pranzo, S., & L'Abbate, N. (2003). Valutazione del rischio biologico a trasmissione ematica negli operatori di una Azienda Ospedaliera-Universitaria di Bari. <i>Giornale Italiano di Medicina del Lavoro ed Ergonomia</i> , 25(Suppl 3), 165.	Included: duplicate study (same a article iD 168)
411	References	McCormick, R. D., Meisch, M. G., Ircink, F. G., & Maki, D. G. (1991). Epidemiology of hospital sharps injuries: A 14-year prospective study in the pre-AIDS and AIDS eras. <i>American Journal of Medicine</i> , 91(suppl 3B), 301–307.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
412	References	McEvoy, M., et al. (1987). Prospective study of clinical, laboratory, and ancillary staff with accidental exposures to blood or body fluids from patients infected with HIV. <i>British Medical Journal (Clinical Research ed.)</i> , 294(6587), 1595–1597. https://doi.org/10.1136/bmj.294.6587.1595	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
413	References	Memish, Z. A., et al. (2002). Epidemiology of needlestick and sharps injuries in a tertiary care center in Saudi Arabia. <i>American Journal of Infection Control</i> , 30(4), 234–241. https://doi.org/10.1067/mic.2002.118841	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material

414	References	Murray, C. K., Johnson, E. N., Conger, N. G., & Marconi, V. C. (2009). Occupational exposure to blood and other bodily fluids at a military hospital in Iraq. <i>Journal of Trauma</i> , 66(4, Suppl), S62–S68.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
415	References	Niu, X., Ren, Z., Pan, N., & Lin, D. (2019). Analysis and management of occupational infection exposure accidents at an infectious disease hospital in China. <i>Southeast Asian Journal of Tropical Medicine and Public Health</i> , 50(4), 779–785.	Included: duplicate study (same a article iD 187)
416	References	O’Connell, T., & Hayes, B. (2003). Occupational sharps injuries in a Dublin teaching hospital. <i>Irish Medical Journal</i> , 96, 143–145.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
417	References	Placidi, D., Carta, A., Crotti, M. T., & Porru, S. (2002). Infortuni a rischio biologico in una grande azienda ospedaliera: Analisi di una casistica. <i>Giornale Italiano di Medicina del Lavoro ed Ergonomia</i> , 24(4), 436–437.	Included: duplicate study (same a article iD 205)
418	References	Pedersen, E. B. (1996). Potentielt smittefarlig blodeksposition blandt sygehuspersonale: En retrospektiv undersøgelse af systematisk registrerede ekspositioner i perioden 1990–1994. <i>Ugeskrift for Læger</i> , 158(13), 1807–1811.	Included: duplicate study (same a article iD 201)
419	References	Porter, K., Scully, C., Theyer, Y., & Porter, S. (1990). Occupational injuries to dental personnel. <i>Journal of Dentistry</i> , 18(5), 258–262. https://doi.org/10.1016/0300-5712(90)90025-A	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material

420	References	Pournaras, S., Tsakris, A., Mandraveli, K., Faitatzidou, A., Douboyas, J., et al. (1999). Reported needlestick and sharp injuries among health care workers in a Greek general hospital. <i>Occupational Medicine (London)</i> , 49, 423–426.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
421	References	Pungpapong, S., et al. (1999). The risk of occupational HIV exposure among Thai healthcare workers. <i>The Southeast Asian Journal of Tropical Medicine and Public Health</i> , 30(3), 496–503.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
422	References	Ramos-Gomez, F., Ellison, J., Greenspan, D., Bird, W., Lowe, S., & Gerberding, J. L. (1997). Accidental exposures to blood and body fluids among health care workers in dental teaching clinics: A prospective study. <i>Journal of the American Dental Association</i> , 128(9), 1253–1261. https://doi.org/10.14219/jada.archive.1997.0402 . PMID: 9297947	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
423	References	Ricketts, M., Deschamps, L., Elmslie, K., & O'Shaughnessy, M. (1992). National surveillance of occupational exposure to the human immunodeficiency virus. <i>The Canadian Journal of Infectious Diseases</i> , 3(6), 290–294. https://doi.org/10.1155/1992/269172	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
424	References	Roberts, R. B., Lincoff, A. S., & Frankel, R. E. (1999). Occupational exposure to HIV in an urban university hospital setting. <i>Brazilian Journal of Infectious Diseases</i> , 3, 50–62.	Included: duplicate study (same a article iD 223)

425	References	Rogowska-Szadkowska, D., Borzuchowska, A., Wiercińska-Drapało, A., & Chlabicz, S. (1997). Chemoprophylaxis after occupational exposure to human immunodeficiency virus (HIV). <i>Polish Archives of Internal Medicine</i> , 98, 431.	Included: duplicate study (same a article iD 225)
426	References	Sacchi, M., et al. (2007). Accidents with risk of blood-borne infections in obstetricians: Analysis of a hospital case records. <i>Medicina del Lavoro</i> , 98(1), 64–72.	Included: duplicate study (same a article iD 229)
427	References	Samargandy, S. A., Bukhari, L. M., Samargandy, S. A., Bahlas, R. S., Aldigs, E. K., Alawi, M. A., Al-Abdullah, N. A., & Madani, T. A. (2016). Epidemiology and clinical consequences of occupational exposure to blood and other body fluids in a university hospital in Saudi Arabia. <i>Saudi Medical Journal</i> , 37(7), 783–790.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
428	References	Sarkar, P., & Lahiri, S. K. (2021). Post exposure prophylaxis for HIV among healthcare workers due to occupational exposure: A record based study at a tertiary care teaching hospital of Kolkata. <i>International Journal of Community Medicine and Public Health</i> , 8(5), 2503–2507. https://doi.org/10.18203/2394-6040.ijcmph20211782	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
429	References	Schmid, K., Schwager, C., & Drexler, H. (2007). Needlestick injuries and other occupational exposures to body fluids amongst employees and medical students of a German university: Incidence and follow-up. <i>Journal of Hospital Infection</i> , 65, 124–130. https://doi.org/10.1016/j.jhin.2006.09.012	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
430	References	Shanks, N., & Al-Kalai, D. (1995). Occupational risk of needle stick injuries among health care personnel in Saudi Arabia. <i>Journal of Hospital Infection</i> , 29, 221–226. https://doi.org/10.1016/0195-6701(95)90145-9	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with

			occupational exposure to biological material
431	References	Sheth, S. P., Leuva, A. C., & Mannari, J. G. (2016). Post exposure prophylaxis for occupational exposures to HIV and hepatitis B: Our experience of thirteen years at a rural-based tertiary care teaching hospital of Western India. <i>Journal of Clinical and Diagnostic Research</i> , 10(8), OC39–OC44. https://doi.org/10.7860/JCDR/2016/19876.8387	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
432	References	Shin, H. Y., & Jang, K. S. (2021). Characteristics and trace status of needlestick injuries of health care workers in a tertiary hospital in Korea. <i>Nursing and Health Issues</i> , 26(2), 157–164. https://doi.org/10.33527/nhi2021.26.2.157	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
433	References	Shintani, T., et al. (2020). Clinical outcomes of post-exposure prophylaxis following occupational exposure to human immunodeficiency virus at dental departments of Hiroshima University Hospital. <i>Current HIV Research</i> , 18(6), 475–479. https://doi.org/10.2174/1570162X18666200804151118	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
434	References	Shrestha, R., Sharma, S., Khadga, P., Sayami, M., Chitrakar, U., & Dhungana, G. P. (2018). Post exposure prophylaxis for occupational and non-occupational exposure to HIV in a tertiary care hospital in central Nepal. <i>Journal of Advanced Internal Medicine</i> , 7(2), 34–37. Available at: https://nepjol.info/index.php/JAIM/article/view/23488	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material

435	References	Strickler, A. C. (1988). Occupational exposure to HIV infection among health care workers at the Toronto General Hospital. <i>Canadian Disease Weekly Report</i> , 32, 141–146.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
436	References	Tao, X., Peng, H., Qian, L., et al. (2017). Occupational exposure to positive blood and body fluids among healthcare workers in a Chinese university hospital: A three years retrospective study.	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material
437	References	Wang, S. A., et al. (2000). Experience of healthcare workers taking postexposure prophylaxis after occupational HIV exposures: Findings of the HIV Postexposure Prophylaxis Registry. <i>Infection Control and Hospital Epidemiology</i> , 21(12), 780–785. https://doi.org/10.1086/501736	Included: prevalence and incidence studies on the seroconversion rate for HIV in healthcare workers with occupational exposure to biological material

Table 2 - Characteristics of Included Studies on Occupational HIV Exposure and Seroconversion

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the statistical analysis)	Seroconversion rate per accident victim	Seroconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Abubakar <i>et al.</i> , 2018, Nigeria, RC*	Female - 52 (45.0); Male - 63 (55.0)	Average -35.1	Physicians - 40 (34.8); Nurses - 29 (25.2); Residents - 18 (15.7); Laboratory staff - 14 (12.2); Attendants - 8 (7.0); Students - 5 (4.3); Consultant - 1 (0.8)	Percutaneous - 89 (77.4); Mucocutaneous - 26 (22.6)	115	59	0	0	0	0	0	0
Alavi and Sharifi, 2013, Iran, PC†	Female - 232 (83.2); Male - 47 (16.8)	Not reported	Nurses - 191 (68.5); Physicians - 55 (19.7); Health Technicians - 27 (9.7); Others - 6 (2.1)	Not reported	279	92	0	0	-	-	-	-
Andrade <i>et al.</i> , 2014, Colombia, RC*	Female - 152 (65.8); Male - 79 (34.2)	Median - 30	Nursing assistants - 53 (22.9); Cleaning staff - 38 (16.5); Students - 33 (14.3); Public waste collection employees - 12 (5.2);	Percutaneous - 204 (88.4); Mucocutaneous - 21 (9.1); Non-intact skin - 1 (0.4)	231	148	0.43	0.67	-	-	0	2.85

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the statistical analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
			Physicians - 11 (4.8); Non-hospital cleaner - 10 (4.3); Nurses - 9 (3.9); Thanatologists - 9 (3.9); Dental assistants - 8 (3.5); Dentists - 5 (2.2); Waste incineration - 4 (1.7); Oral hygiene - 3 (1.3); Bacteriologists - 3 (1.3); Paramedical - 1 (0.4); Surgical Instrumentator - 1 (0.4); Others - 31 (13.4)									
Aydın, Ergen and Çaşkurlu, 2020, Türkiye, RC*	Female - 126 (67.38); Male - 61 (32.62)	Not reported	Nurses - 91 (48.66); Interns - 41 (21.92); Physicians - 23 (12.29); Cleaning staff -	Percutaneous - 165 (88.2); Mucocutaneous - 22 (11.8)	187	187	0	0	0	0	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the statistical analysis)	Seroconversion rate per accident victim	Seroconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Baldo <i>et al.</i> , 2014, Italy, PC†	Female - 156 (63.7); Male - 89 (36.3)	Average – 37.0	23 (12.29); Others - 9 (4.84) Nurses 191 (78.0); Physicians 46 (18.8); Laboratory staff 4 (1.6); Others 4 (1.6)	Percutaneous - 187 (76.3); Mucocutaneous - 58 (23.7)	245	6	0	0	0	0	-	0
Beghdadli <i>et al.</i> , 2009, Algeria, RC*	Female - 70 (64.8); Male - 38 (35.2)	Average - 38,3	Physicians - 5 (4.6); Nurses - 45 (41.7); Maintenance staff - 40 (37); Others - 18 (17.6)	Percutaneous - 104 (96.3); Mucocutaneous - 4 (3.7)	108	39	0	0	-	-	-	-
Bi <i>et al.</i> , 2008, Australia, RC*	Not reported	Not reported	Nurses - 356 (55.6); Physicians - 182 (28); Non-Medical staff - 29 (4.5); Non-hospital staff - 73 (11.4)	Percutaneous - 370 (58.0); Mucocutaneous - 270 (42.0)	640	595	0	0	-	-	-	-
Çağlar-Özer, Altunal and Kadanalı, 2020, Türkiye, RC*	Female - 77 (66.3); Male - 39 (33.7)	Average - 28.6	Nurses - 49 (42.2); Health Technicians - 38 (32.8); Interns - 21 (18.1);	Percutaneous - 110 (94.8); Mucocutaneous - 6 (5.2)	116	51	0	0	-	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the statistical analysis)	Seroconversion rate per accident victim	Seroconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Cleveland <i>et al.</i> , 2002, USA, RC*	Not reported	Not reported	Physicians - 8 (6.9) Dentists, oral surgeons, hygienists, assistants and dental students - 208 (100.0)	Percutaneous - 199 (95.7); Mucocutaneous - 6 (2.9); Skin exposures - 3 (1.4)	208	23	0	0	-	-	-	-
Davanzo <i>et al.</i> , 2008, Italy, RC*	Female - 293 (59.0); Male - 204 (41.0)	Average – 30.0	Not reported	Percutaneous - 380 (76.5); Mucocutaneous - 117 (23.5)	497	30	0	0	-	-	0	0
Juanes <i>et al.</i> , 2007, Spain, PC†	Female - 56 (74.7); Male - 19 (25.3)	Average - 35.8	Nursing assistants - 8 (10.6); Nurses - 32 (42.6); Physicians - 9 (12.0); Interns - 21 (28.0); Laboratory staff - 4 (5.3); Midwives - 1 (1.3)	Percutaneous - 56 (75.0); Mucocutaneous - 19 (25.0)	75	30	0	0	-	-	0	0
Tribonniear <i>et al.</i> , 2018, France, RC*	Female - 4 (25.0); Male - 12 (75.0)	Average – 33.0	Nurses - 10 (62.5); Physicians - 5 (31.2); Dental student - 1 (6.3)	Percutaneous - 16 (100.0);	16	16	0	0	0	-	0	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the statistical analysis)	Seroconversion rate per accident victim	Seroconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Ehui <i>et al.</i> , 2007, Ivory Coast, RC*	Female - 68 (48.4); Male - 94 (51.6)	Average -33.8	Physicians - 63 (34.6); Dentists - 3 (1.6); Nurses - 36 (19.8); Nursing assistant - 22 (12.1); Midwives - 2 (1.1); Laboratory staff - 9 (4.9); Students - 34 (18.6); Social workers - 9 (4.9); Maintenance staff - 4 (2.2)	Percutaneous - 81 (44.5); Mucocutaneous - 92 (50.5); Not reported - 9 (5.0)	182	4	0	0	-	-	0	-
El-Hazmi and Al-Majid, 2008, Saudi Arabia, RC*	Female - 80 (60.2); Male - 53 (39.8)	≥20-29 – 46; ≥30-39 – 36; ≥40-49 – 36; ≥50-59 - 15	Physicians - 35 (26.3); Nurses - 60 (45.1); Cleaning staff – 33 (24.8); Others - 5 (3.8)	Percutaneous - 133 (100.0)	133	32	0	0	0	-	-	-
Erhabor and Nwauche, 2007, Nigeria, RC*	Female - 8 (61.5); Male - 5 (38.5)	Average -34.1	Physicians - 3 (23.1); Scientists - 2 (15.4); Laboratory staff - 1 (7.7); Students - 6 (46.2);	Percutaneous - 13 (100.0)	13	13	0	0	0	-	0	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the statistical analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Escudero, Furtado and Medeiros, 2015, Brazil, RC*	Female - 478 (78.1); Male - 134 (21.9)	Not reported	Trainee Lab assistant - 1 (7.7) Not reported	Not reported	2012	62	0	0	-	-	-	-
Fadil <i>et al.</i> , 2021, Saudi Arabia, RC*	Female - 98 (74.8); Male - 33 (25.2)	Average -31.0	Nurses - 74 (56.5); Physicians - 23 (17.6); Cleaning staff - 18 (13.7); Health technicians - 8 (6.1); Yellow man - 4 (3.1); Paramedics - 2 (1.5); Trainee Lab assistant - 1 (0.8)	Percutaneous 119 (86.2); Others 18 (13.8)	131	-	0	-	0	0	-	-
Fillaux <i>et al.</i> , 2004, France, PC†	Female - 186 (78.8); Male - 50 (21.2)	Average – 37.5	Not reported	Percutaneous - 205 (86.7); Mucocutaneous - 26 (11.2); Bites - 5 (2.1)	236	75	0	0	-	-	0	0
Forseter, Joline and Wormser, 1994, USA, PC†	Female - 55 (48.7); Male - 58 (51.3)	Not reported	Nurses - 33 (29.0); Interns or Residents - 27 (24.0); Students - 25 (22.0); Physicians - 12	Not reported	113	42	0	0	-	-	0	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the statistical analysis)	Seroconversion rate per accident victim	Seroconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Ilario <i>et al.</i> , 2004, Spain, RC*	Female - 412 (74.9); Male - 138 (25.1)	Average -34.7	(11.0); Paramedics - 4 (4.0); Laboratory staff - 4 (4.0); Cleaning staff - 3 (3.0); Maintenance staff - 2 (2.0); Dentist - 1 (1.0)	Percutaneous - 441 (80.2); Mucocutaneous - 109 (19.8)	550	380	0	0	-	-	-	-
Gerberding, 1994, USA, PC†	Female - 505 (51.7); Male - 471 (48.3)	Average -34.7	Physicians - 369 (37.8); Nurses - 256 (26.2);	Percutaneous - 392 (40.2); Mucocutaneous - 488 (50.0);	880	725	0.11	0.13	0.30	0	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the estatistica l analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Goel <i>et al.</i> , 2017, India, PC†	Female - 191 (40.2); Male - 285 (59.8)	Average -28.4	Dentists - 155 (15.9); Laboratory staff - 82 (8.5); Health technicians - 35 (3.6); Paramedics - 30 (3.0); Others - 49 (5.0)	Not reported - 96 (9.8)	476	11	0	0	-	-	-	-
Gupta <i>et al.</i> , 2008, India, PC†	Female - 262 (46.8); Male - 295 (53.2)	Average -23.0	Physicians - 351 (73.7); Nurses - 91 (19.1); Hospital waste disposal staff - 15 (3.2); Attendants - 14 (2.9); Laboratory staff - 5 (1.1)	Percutaneous - 457 (96.0); Mucocutaneous - 19 (4.0)	557	-	0	-	-	-	-	-
Gutierrez, Lopes e	Female - 313 (77.5);	Average -38.0	Interns - 296 (53.1); Residents - 127 (22.8); Nurses - 42 (7.5); Students - 33 (5.9); Others - 59 (10.6)	Percutaneous - 452 (81.1); Mucocutaneous - 105 (18.9)	404	273	0	0	-	-	0	0

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the estatistica l analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Yasuda, 2005, Brazil, PC†	Male - 91 (22.5)		(47.8); Cleaning staff - 43 (10.6); Interns - 38 (9.4); Residents - 33 (8.2); Nurses - 25 (6.2); Physicians - 24 (5.9); Others - 48 (11.8)	Mucocutaneous - 68 (19.1); Others - 75 (16.1)								
Haytoglu and Gundeslioglu, 2018, Turkie, RC*	Not reported	Not reported	Nurses - 56 (30.0); Physicians - 8 (4.0); Cleaning staff - 44 (24.0); Medical students - 12 (7.0); Nurse students - 35 (19.0); Cleaning staff - 15 (8.0); Auxiliary staff - 15 (8.0)	Percutaneous - 161 (87.0); Mucocutaneous - 22 (11.9); Others - 2 (1.1)	185	3	0	0	-	-	0	-
Ippolito, Puro and De Carli, 1993, Italy, PC†	Female - 1019 (64.0); Male - 573 (36.0)	Average -28.0	Nurses - 1070 (67.2); Physicians - 150 (9.4); surgeons - 130 (8.1);	Percutaneous - 1052 (66.1); Mucocutaneous - 178 (11.2); Non-intact skin - 362 (22.7)	1592	1488	0.12	0.13	0.09	0.63	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the estatistica l analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Jaggi, Nirwan and Chakrabort, 2020, India, PC†	Not reported	Not reported	Cleaning staff - 81 (5.1); Laboratory staff - 57 (3.6); Midwives - 25 (1.6); Anesthesiologists - 17(1.1); Others - 62 (3.9)	Percutaneous - 211 (100.0)	211	90	0	0	0	-	-	-
Jayanth <i>et al.</i> , 2009, India, RC*	Not reported	Not reported	Nurses - 106 (50.24); Physicians - 33 (15.64); Cleaning staff - 35 (16.59); Assistants - 21 (9.95); Health technicians - 11 (5.21); Others - 5 (2.37)	Percutaneous - 296 (100.0)	296	293	0	0	0	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the estatistica l analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Kepenek and Şahin-Eker, 2017, Turkey, RC*	Female - 76 (77.6); Male - 22 (22.4)	Average -23.5	Interns - 66 (67.3); Nurses - 17 (17.3); Cleaning staff - 8 (8.2); Dentists - 3 (3.1); Health technicians - 3 (3.1); Data Entry Team - 1 (1.0)	Percutaneous - 98 (100.0)	98	98	0	0	0	-	-	-
Kiertiburana kul <i>et al.</i> , 2006, Thailand, RC*	Not reported	Not reported	Nurses - 221 (27.0); Medical students - 172 (21.0); Nurse aids -139 (17.0); Physicians - 82 (10.0); Cleaning staff - 66 (8.0); Laboratory staff - 57 (7.0); Nurse and Nurse aids students - 49 (6.0); Others - 33 (4.0)	Percutaneous - 676 (82.0); Mucocutaneous - 103 (13.0); Skin exposures - 41 (5.0)	820	-	0	-	-	-	-	-
Ko <i>et al.</i> , 2009,	Female - 621 (90.8);	Average -32.0	Nurses - 5549 (80.5);	Percutaneous - 439 (76.3);	685	203	0	0	-	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the estatistica l analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Taiwan, RC*	Male - 64 (9.2)		Others - 136 (19.5)	Others - 246 (23.7)								
Lee and Choi, 2023, South Korea, RC*	Female - 780 (71.8); Male - 306 (28.2)	Average -32.8	Nurses - 484 (44.6); Professors - 63 (5.8); Residents 127 (11.7); Interns 156 (14.4); Nursing assistants - 70 (6.4); Health technicians - 53 (4.9); Cleaning staff - 133 (12.2)	Percutaneous - 1020 (93.9); Mucocutaneous - 66 (6.1)	1086	444	0	0	-	-	-	-
Lymer, Schiitz and Isaksson, 1996, Sweden, PC [†]	Not reported	Average -38.0	Nurses - 198 (41.9); Physicians - 56 (11.8); Nursing Assistants - 135 (28.5); Laboratory staff - 50 (10.6); Students - 28 (5.9); Others - 6 (1.3)	Percutaneous - 398 (84.0); Mucocutaneous - 34 (7); Non-intact skin - 13 (3); Skin exposure - 28 (6)	473	1	0	0	-	-	-	0
Mallon <i>et al.</i> , 1992,	Not reported	Not reported	Nurses - 209 (63.0); Physicians - 61	Percutaneous - 316 (95.2); Mucocutaneous	332	8	0	0	-	-	0	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the estatistica l analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Australia, RC*			(18.4); Cleaning staff - 37 (11.1); Paramedicals - 25 (7.5)	- 28 (8.4); Not reported - 5 (1.5); Others - 11 (3.3)								
Marcus <i>et al.</i> , 1988, USA, PC†	Not reported	Not reported	Nurses - 751 (63.0); Physicians or Students - 164 (14.0); Laboratory staff - 134 (11.0); Phlebotomists - 90 (7.0); Respiratory Therapists - 36 (3.0); Cleaning or mainstenance staff - 26 (2.0)	Not reported	1201	963	0.24	0.31	0.34	0	-	-
Medeiros <i>et al.</i> , 2012, Brazil, RC*	Not reported	Not reported	Laboratory staff - 87 (6.0); Medical Students - 149 (10.2); Cleaning staff - 106 (7.3); Nursing aids - 504 (34.6) Physicians - 316 (21.7); Nurses - 92 (6.3); Nursing	Percutaneous - 1268 (87.0); Others - 189 (13.0)	1457	80	0	0	0	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the estatistica l analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Mehta <i>et al.</i> , 2005, India, RC*	Not reported	Not reported	students 47 (3.2); Others - 156 (10.7)	Percutaneous - 199 (52.3); Intact skin - 4 (1.1); Others – 177 (46.6)	380	368	0	0	-	-	0	-
Mehta <i>et al.</i> , 2010, India, RC*	Not reported	Not reported	Nurses - 171 (45.0); Attendants - 125 (33.0); Physicians - 42 (11.0); Health technicians - 42 (11.0)	Percutaneous - 308 (90.1); Others - 34 (9.9)	342	10	0	0	-	-	0	0
Nwaiwu <i>et al.</i> , 2017, USA, PC†	Not reported	Not reported	Not reported	Percutaneous - 140 (52.7); Mucocutaneous - 115 (43.2); Not reported - 11 (4.1)	266	266	0	0	0	0	0	-
Oakley, Gooch and Cockcroft, 1992, United	Not reported	Not reported	Nurses - 256 (57.3); Nurse students - 76 (17.0); Physician	Percutaneous - 337 (75.4); Mucocutaneous - 110 (24.6)	447	18	0	0	-	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the statistical analysis)	Seroconversion rate per accident victim	Seroconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Kingdom, PC†			students - 82 (18.3); Others - 109 (24.4)									
Oh, Yi and Choe, 2005, South Korea, PC†	Female - 522 (54.4); Male - 437 (45.6)	Average -28.8	Physicians - 463 (48.3); Interns - 346 (74.7); Nurses - 263 (27.4); Nurses aids - 99 (10.3); Cleaning staff - 54 (5.6); Health technicians 38 (4.0).	Percutaneous - 901 (94.0); Mucocutaneous - 49 (5.1); Others - 9 (0.9)	959	40	0	0	-	-	-	-
Pérez-Díaz <i>et al.</i> , 2015, Colombia, RC*	Female - 1980 (82.4); Male - 423 (17.6)	Average -29.5	Nurses - 1141 (47.5); Physicians - 334 (13.9); Students - 315 (13.1); Cleaning staff - 230 (9.6); Dentists - 175 (7.3); Bacteriology - 118 (4.9); Surgical instrumentation - 62 (2.6); Respiratory	Percutaneous - 2213 (92.1); Mucocutaneous - 190 (7.9)	2403	796	0.04	0.12	-	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accident n	Total sample size (number of participa nts in the estatistica l analysis)	Seroconversi on rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversi on rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconver sion rate per population using PEP	Seroconversi on rate by population with PEP indication and without PEP use
Puro <i>et al.</i> , 1992, Italy, RC and PC [‡]	Female - 139 (62.0); Male - 85 (38.0)	Average -34.0	therapy - 27 (1.1); Physicians - 61 (27.0); Dentists - 2 (1.0); Nurses - 120 (54.0); Midwives - 5 (3.0); Laboratory staff - 4 (1.0); Radiology Technician - 3 (1.0); Cleaning staff - 9 (4.0); Others - 20 (9.0)	Not reported	224	224	0	0	-	-	0	0
Puro, Ranchino and Profili, 1990, Italy, RC*	Not reported	Not reported	Nurses - 376 (68.6); Cleaning staff - 91 (16.6); Surgeons - 54 (9.85); Physicians - 14 (2.55); Laboratory staff - 13 (2.4)	Percutaneous - 507 (92.4); Mucocutaneous - 41 (7.5)	53	53	0	0	-	-	-	-
Rajkumari <i>et al.</i> , 2014, India, PC [†]	Female - 84 (23.6); Male - 272 (76.4)	Average -30.0	Physician - 129 (36.2); Nurses - 52 (14.6); Attendants - 17	Percutaneous - 303 (85.2); Mucocutaneous - 36 (10.0);	356	356	0	0	-	-	0	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accident n	Total sample size (number of participa nts in the estatistica l analysis)	Seroconversi on rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversi on rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconver sion rate per population using PEP	Seroconversi on rate by population with PEP indication and without PEP use
Rele, Mathur and Turbadkar, 2002, India, RC*	Not reported	Not reported	(4.8); Hospital waste disposal staff - 27 (7.6); Laboratory staff - 1 (0.3); Others - 130 (36.5)	Non-intact skin - 17 (4.8)	38	38	0	0	-	-	-	-
Rice, Tomkins and Ncube, 2015, United Kingdom, RC*	Not reported	Not reported	Residents - 29 (76.3); Interns - 2 (5.3); Nurses - 4 (10.5); Technician - 1 (2.6); Cleaning staff - 2 (5.3)	Percutaneous - 36 (94.8); Mucocutaneous - 1 (2.6); Bites - 1 (2.6)	2947		0	-	-	-	-	-
Rishi <i>et al.</i> , 2017, India, RC*	Not reported	Not reported	Physicians - 1110 (37.7); Nurses - 904 (30.7); Others - 933 (31.6)	Percutaneous - 2947 (100.0)	140	140	0	0	0	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the statistical analysis)	Seroconversion rate per accident victim	Seroconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Romea <i>et al.</i> , 1995, Spain, PC†	Female - 355 (83.9); Male - 68 (16.1)	Average -35.3	8 (6.0); Anesthesiologist - 2 (1.0); Secretary - 2 (1.0); Physicians - 59 (14.5); Nurses and Laboratory staff - 195 (48.2); Nursing assistant - 65 (16.0); Cleaning staff - 58 (14.4); Students - 28 (6.9); Others - 18 (4.2);	Percutaneous - 401 (94.8); Mucocutaneous - 17 (4.0); Skin exposure - 4 (0.9); Not reported - 1 (0.2)	423	47	0	0	-	-	-	-
Safari <i>et al.</i> , 2020, German, PC†	Female - 67 (58.3); Male - 48 (41.7)	Not reported	Physicians - 56 (48.7); Nursing assistant - 36 (31.3); Cleaning staff - 10 (8.7); Nurses - 13 (11.3)	Percutaneous - 80 (69.6); Mucocutaneous - 35 (30.4)	115	34	0	0	-	-	-	-
Sheth, Leuva and Mannari, 2016, India, RC*	Female - 57 (59.4); Male - 39 (40.6)	Not reported	Nurses - 37 (38.6); Residents - 23 (24.0); Consultants - 12	Percutaneous – 31 (32.3); Mucocutaneous – 13 (13.5);	48	39	0	0	-	-	0	0

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the estatistica l analysis)	Seroconversi on rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversi on rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconver sion rate per population using PEP	Seroconversi on rate by population with PEP indication and without PEP use
Shriyan <i>et al.</i> , 2012, India, RC*	Not reported	Not reported	(12.5); Interns - 10 (10.4); Attendants - 6 (6.2); Technicians - 5 (5.2); Students - 3 (3.1)	Intact skin - 4 (4.2)	61	7	0	0	-	-	0	-
Sin <i>et al.</i> , 2016, China, PC†	Female - 1174 (77.0); Male - 351 (23.0)	Average -33.0	Physicians - 2 (3.3); Surgical staff - 3 (5.0); Nursing staff - 40 (66.7); Cleaning staff - 4 (6.7); Laboratory staff - 7 (11.7); Students - 4 (6.7)	Percutaneous - 59 (98.3); Mucocutaneous - 2 (1.7)	1525	19	0	0	-	-	0	-
Razzakh and	Female - 72 (55.4);	Average -34.6	Dentists - 561 (36.8); Nurses - 509 (33.4); Ward staff - 177 (11.6); Physicians - 72 (4.7); Others - 206 (13.5)	Percutaneous - 1356 (88.9); Mucocutaneous - 50 (3.2); Non-intact skin - 30 (2.0); Bites - 59 (3.9); Others - 30 (2.0)	130	130	0	0	-	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accident n	Total sample size (number of participa nts in the estatistica l analysis)	Seroconversi on rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversi on rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconver sion rate per population using PEP	Seroconversi on rate by population with PEP indication and without PEP use
Qureshi, 2021, Qatar, RC*	Male - 58 (44.6)		Nurses - 79 (60.8); Others - 16 (12.3)	Others - 36 (27.7)								
Tetteh <i>et al.</i> , 2015, Ghana, RC*	Female - 175 (59.3); Male - 120 (40.7)	Average – 28.0	Students - 35 (11.9); Laboratory staff - 18 (6.1); Nurses - 116 (39.3); Physicians - 95 (32.2); Ward attendants - 31 (10.5)	Percutaneous - 271 (91.9); Mucocutaneous - 24 (8.1)	295	181	0	0	-	-	-	-
Tokars <i>et al.</i> , 1993, USA, PC†	Not reported	Not reported	Nurses - 797 (64.0); Physicians and Dentists - 149 (12.0); Phlebotomists - 100 (8.0); Laboratory staff - 75 (6.0); Medical students - 25 (2.0); Cleaning staff - 12 (1.0); Others - 100 (8.0)	Percutaneous - 1103 (89.0); Mucocutaneous - 67 (5.0); Non-intact skin - 75 (6.0)	1245	1245	0.32	0.32	0.36	0	0.69	0.27
Villarroel <i>et al.</i> , 2012, Chile, RC*	Not reported	Not reported	Paramedicals - 148 (36.0); Students - 87	Percutaneous - 384 (92.5); Mucocutaneous	415	6	0	0	-	-	0	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the statistical analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Wang, Chen and Liu, 2014, China, RC*	Not reported	Not reported	(21.0); auxiliaries - 58 (14.0); Others - 122 (29.0)	- 29 (7.0); Non-intact skin - 2 (0.1)	733	302	0	0	-	-	0	-
Wiboonchutikul <i>et al.</i> , 2015, Thailand, RC*	Female - 189 (84.0); Male - 36 (16.0)	Average -33.1	Nurses - 329 (44.9); Interns - 216 (29.5); Physicians - 86 (11.7); Technicians - 52 (7.1); Cleaning staff - 36 (4.9); Students - 14 (1.9)	Percutaneous - 733 (100.0)	225	91	0	0	-	-	0	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the statistical analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Windolf <i>et al.</i> , 1990, German, PC†	Female - 214 (36.5); Male - 372 (63.5)	Not reported	Physicians - 117 (20.0); Nurses - 275 (46.9); Students - 73 (12.4); Cleaning staff - 57 (9.7); Laboratory staff - 49 (8.4); Others - 12 (2.0)	Percutaneous - 532 (90.8); Mucocutaneous - 54 (8.2)	586	46	0.17	2.17	-	-	0	0
Wnuk, 2003, Poland, RC*	Female - 24 (85.7); Male - 4 (14.3)	Average -34.7	Nurses - 15 (53.6); Physicians - 9 (32.1); Nursing assistants - 2 (7.1); Morgue worker - 1 (3.6); Medical student - 1 (3.6)	Percutaneous - 22 (78.6); Mucocutaneous - 2 (7.1); Intact skin - 4 (14.3)	28		0	-	-	-	-	-
Elmsli, 1989, Canada, PC†	Female - 172 (84.0); Male - 33 (16.0)	Median – 31.0	Nurses - 146 (71.0); Laboratory staff - 22 (11.0); Health technician - 13 (6.0); Medical students - 11 (6.0); Physicians - 7	Percutaneous - 104 (50.8); Mucocutaneous - 64 (31.2); Not reported - 38 (18.0)	161	157	0	0	-	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accident n	Total sample size (number of participa nts in the estatistica l analysis)	Seroconversi on rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversi on rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconver sion rate per population using PEP	Seroconversi on rate by population with PEP indication and without PEP use
Miceli, 2005, Argentina, RC*	Not reported	Not reported	(3); Others - 6 (3.0) Nurses - 51 (39.0); Physicians - 22 (17.0); Health technicians - 8 (6.0); Phlebotomists - 6 (5.0); Nursing assistants - 8 (6.0); Medical students - 2 (2.0); Others - 33 (25.0)	Percutaneous - 115 (88.0); Mucocutaneous - 6 (5.0); Not reported - 9 (7.0)	130	61	0	0	-	-	0	0
Miller and Farr, 1989, EUA	Not reported	Not reported	Not reported	Percutaneous - 174 (85.3); Mucocutaneous - 30 (14.7)	204	126	0	0	-	-	-	-
Wu <i>et al.</i> , 2015, China, RC*	Not reported	Not reported	Nurses - 1019 (55.5); Physicians - 654 (36.6); Medical technologist - 108 (5.9); Paramedics - 56 (3.0)	Percutaneous - 1837 (100.0)	1837	19	0	0	0	-	-	-
Al Ghamdi S <i>et al.</i> ,	Not reported	Not reported	Nurses - 86 (58.2);	Percutaneous - 148 (100.0)	148		0	-	-	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the estatistica l analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
2003, Saudi Arabia, RC*			Cleaning staff: 30 (20.3); Physicians - 18 (12.2); Clerks - 5 (3.4); Health Technicians - 2 (1.4); Physiotherapists - 2 (1.4); Others - 5 (3,5)									
Almeida and Benatti, 2007, Brazil, RC*	Female - 299 (78,9); Male - 80 (21,1)	Not reported	Nurses - 271 (71.5); Cleaning staff - 50 (13.2); Laboratory staff - 16 (4.2); Dentists - 12 (3.2); Attendants - 11 (2.9); Physicians - 8 (2.1); Maintenance staff - 4 (1.1); Others - 7 (1.8);	Percutaneous - 341 (90.0); Mucocutaneous - 23 (6,1); Intact Skin - 11 (2,9); Non-Intact Skin - 3 (0,8); Not reported - 1 (0,2);	379	234	0	0	-	-	-	-
Argentero <i>et al.</i> , 2007, Italy, PC†	Not reported	Not reported	Not reported	Percutaneous - 5.174 (75.0); Mucocutaneous - 1.724 (25.0)	6898	2258	0	0	0	0	0	-
Arva <i>et al.</i> , 1990, Norway, PC†	Not reported	Not reported	Not reported	Percutaneous - 322 (77.78); Mucocutaneous - 66 (15.94);	414		0	-	-	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the estadística I analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Barriga Angulo <i>et al.</i> , 1989, Mexico, PC†	Not reported	Not reported	Nurses - 41 (64.0); Attendants - 12 (18.7); Physicians - 7 (11.0); Laboratory staff: 4 (6.3)	Others - 18 (4.35); Not reported - 8 (1.93) Percutaneous - 53 (82.8); Non-intact skin - 7 (11.0); Mucocutaneous - 4 (6.2)	64		0	-	-	-	-	-
Blázquez <i>et al.</i> , 2001, Spain, PC†	Female - 290 (71.2); Male - 117 (28.8)	Average -32,9	Nurses - 215 (52.8); Physicians - 67 (16.4); Nursing Assistants - 75 (18.4); Nurse Students - (5.1); Laboratory staff - (2.7); Cellars - (2.4); Cleaning staff - (2.2)	Percutaneous - 345 (84.8); Mucocutaneous - 62 (15.2)	407		0	-	-	-	-	-
Bowden <i>et al.</i> , 1993, Australia, PC†	Not reported	Not reported	Nurses - 149 (64.0); State enrolled nurses - 48 (21.0); Physicians - 11 (5.0); Scientists - 6	Percutaneous - 230 (100.0)	230	230	0	0	-	-	0	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the estatistica l analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Bozkurt <i>et al.</i> , 2013, Turkey, RC*	Female - 19 (47.5); Male - 21 (52.5)	Average - 28.5	(3.0); Nurse Students - 4 (2.0); Others - 12 (5.0); Nurses - 16 (40.0); Cleaning staff - 14 (35.0); Students - 6 (15.0); Physicians - 3 (7.5); Others - 1 (2.5)	Percutaneous - 38 (95.0); Mucocutaneous - 2 (5.0)	40	40	0	0	0	0	-	-
Changraksa <i>et al.</i> , 2022, Thailand, RC*	Female - 293 (75.3); Male - 96 (24.7)	Average - 27,8	Nurses - 112 (28.8); Residents - 101 (26.0); Medical Students - 91 (23.4); Nursing Assistants - 29 (7.5); Maintenance staff - 20 (5.1); Physicians - 17 (4.4); Laboratory staff - 16 (4.1); Nurse Students - 3 (0.8)	Percutaneous - 258 (66.3); Mucocutaneous - 102 (26.2); Non-intact skin - 17 (4.4); Intact skin - 12 (3.1)	389	26	0	0	-	-	0	-
Chaiwarith <i>et al.</i> , 2013,	Female - 1.086	Average -27.6	Physicians - 880 (54.6);	Percutaneous - 1125 (69.8);	1611	84	0	0	-	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accident n	Total sample size (number of participa nts in the estatistica l analysis)	Seroconversi on rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversi on rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconver sion rate per population using PEP	Seroconversi on rate by population with PEP indication and without PEP use
Thailand, RC*	(67.4); Male - 525 (32.6)		Nurses - 665 (41.4); Others - 66 (4.0)	Mucocutaneous - 418 (26.0); Non-intact skin - 50 (3.1)								
Çelik, 2017, Turkey, RC*	Female - 115 (65); Male - 62 (35)	< 30.0 – 121; > 30.0 - 56	Nurses - 78 (44.1); Nurse Students - 48 (27.1); Cleaning staff: 25 (14.1); Health Technicians - 11 (6.2); Physicians - 6 (3.4); Esterilization staff - 5 (2.8); Health officers - 3 (1.7); Midwives - 1 (0.6)	Percutaneous - 177 (100.0)	177	2	0	0	-	-	0	-
Çiçek- Şentürk <i>et</i> <i>al.</i> , 2019, , RC*	Female - 376 (68,9); Male - 170 (31.1)	Average – 27.0	Nurse Students - 243 (44.5); Nurses - 121 (22.2); Cleaning staff - 108 (19.8); Physicians - 49 (9.0); Others - 24 (4.4)	Percutaneous - 435 (79.7); Not reported - 111 (20.3)	546	1	0	0	-	-	0	-
Daglio <i>et</i> <i>al.</i> , 2006, Italy, RC*	Female- 1.200 (66.3);	Median – 30.0	Nurses - 778 (43.0); Physicians - 344 (19.0);	Percutaneous - 1429 (78.9); Mucocutaneous - 381 (21.1)	1810		0	-	-	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the statistical analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
	Male - 610 (33.7)		Bolsists - 308 (17.0); Nurse students - 145 (8.0); Laboratory staff - 127 (7.0); Nursing assistants - 54 (3.0); Non-laboratory staff - 18 (1.0); Midwives - 18 (1.0); Health Technicians - 18 (1.0); Others - 0 (0.0)									
Dizili-Yelgin C <i>et al.</i> , 2018, Turkey, RC*	Female - 90 (72,6); Male - 34 (27,4)	Average - 27.9	Students - 53 (42.7); Nurses and Health Technicians - 40 (32.3); Cleaning staff - 20 (16.1); Others - 11 (8.9);	Percutaneous - 124 (100.0)	124	124	0	0	0	-	-	-
Elmslie and O'Shaughnessy, 1988, Canada, PC†	Female - 102 (85.0); Male - 18 (15.0)	Female Median - 32.0; Male Median – 30.0	Nurses - 13 (69.0); Medical Students - 13 (11.0); Health Technicians - 8	Percutaneous - 57 (61.0); Mucocutaneous - 13 (13.0); Others - 50 (26.0)	120	116	0	0	-	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the statistical analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Fahey <i>et al.</i> , 1991, United States of America, PC†	Not reported	Not reported	(7.0); Physicians - 2 (2.0); Laboratory staff - 13 (11.0)	Percutaneous - 43464 (100.0)	43464	7956	0	0	-	0	-	-
Falagas <i>et al.</i> , 2007, Greece, PC†	Female - 69 (94.5); Male - 4 (5.5)	Not reported	Nurses - 71 (97.26); Cleaning staff - 2 (2.74)	Percutaneous - 71 (); Mucocutaneous - 2 ()	73		0	-	-	-	-	-
Frijstein, Hortensius and Zaaijer, 2011, Germany, RC*	Not reported	Not reported	Nurses - 427 (27.0); Medical Students - 285 (18.0); Residents - 243 (15.0); Physicians - 162 (10.0); Laboratory staff - 105 (7.0); Nursing Assistants - 95 (6.0); Physicians Assistents - 64 (4.0); Nurse Students - 33 (2.0); Radiology	Percutaneous - 1053 (66.0); Mucocutaneous - 198 (12.0); Cutânea (mordidas): 29 (2.0)	1601		0	-	-	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the estatistica l analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Gerberding <i>et al.</i> , 1987, United States of America, PC†	Female - 162 (60.0); Male - 108 (40.0)	Average: 33.0	Technicians - 18 (1.0); Anesthesiology Technicians - 18 (1.0); Others : 117 (7.0) Physicians - 77 (28.0); Nurses - 56 (21.0); Laboratory staff - 40 (15.0); Attendants - 26 (10.0); Assistents - 13 (5.0); Paramedics - 12 (4.0); Radiology Technicians - 11 (4.0); Physiotherapists - 11 (4.0); Surgeon Physicians - 11 (4.0); Dentists - 7 (3.0); Others - 6 (2.0)	Percutaneous - 129 (38.0); Mucocutaneous - 213 (62.0)	270	175	0	0	-	-	-	-
Gooch <i>et al.</i> , 1995, United States of	Not reported	Not reported	Dentists - 10 (52.6); Higienists - 3 (15.8);	Percutaneous - 19 (100.0);	19	12	0	0	0	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accident n	Total sample size (number of participa nts in the estatistica l analysis)	Seroconversi on rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversi on rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconver sion rate per population using PEP	Seroconversi on rate by population with PEP indication and without PEP use
America, PC†			Assistants - 6 (31.6)									
Guliz <i>et al.</i> , 2015, Turkey, RC*	Female - 40 (70.0); Male - 17 (30.0)	Average: 25.9	Nurses - 29 (58.0); Cleaning staff - 5 (10.0); Laboratory staff - 1 (2.0); Anesthesiology Technicians - 1 (2.0); Paramedics - 2 (4.0); Students - 11 (22.0); Others - 1 (2.0)	Percutaneous- 50 (88.0);	57		0	-	-	-	-	-
Henderson <i>et al.</i> , 1986, United States of America, PC†	Not reported	Not reported	Physicians, Nurses and assistants - 324 (61.6); Laboratory Staff (clinical) - 111 (21.0); Laboratory Staff - 75 (14.1)	Percutaneous - 37 (); Mucocutaneous - 84 (); Others - 29 ()	150	150	0	0	-	-	-	-
Henderson <i>et al.</i> , 1990, RC*	Not reported	Not reported	Nurses - 833 (62.0); Laboratory staff - 309 (23.0); Physicians - 121 (9.0)	Percutaneous - 179 (5.52); Mucocutaneous - 346 (10.7); Non-intact skin: 2.712 (83.8)	3237	3237	0.03	0.03	0.55	0	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the statistical analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Heptonstall <i>et al.</i> , 1993, United Kingdom, PC†	Not reported	Not reported	Physicians - 40 (29.9); Nurses - 66 (49.3); Surgeons: 9 (6.7); Dentists - 3 (2.2); Others - 13 (9.7); Not reported - 3 (2.2)	Percutaneous - 106 (); Mucocutaneous - 28 ()	176	134	1.13	1.49	1.88	0	0	0
Hiransuthikul, Hiransuthikul and Kanasuk, 2007, Thailand, RC*	Female - 252 (80.5); Male - 61 (19.5)	Average: 30.7	Nurses - 104 (34.0); Medical and nursing students - 71 (23.2); Nursing Assistants - 41 (13.4); Physicians - 38 (12.4); Cleaning Staff - 38 (12.4); Laboratory staff - 12 (3.9); Radiologists - 2 (0.7)	Percutaneous - 288 (91.4); Mucocutaneous - 19 (6.0); Non-intact skin - 4 (1.3); Bites - 4 (1.3)	315	315	0	0	-	-	0	0
Huertas <i>et al.</i> , 1995, Mexico, RC*	Female - 166 (64.0); Male - 80 (36.0)	Not reported	Cleaning staff - 82 (32.0); Nurses - 71 (27.0); Medical Students - 51	Percutaneous - 229 (88.0); Mucocutaneous - 21 (8.0); Non-intact skin - 10 (4.0)	260	94	0	0	-	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the statistical analysis)	Seroconversion rate per accident victim	Seroconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Ippolito <i>et al.</i> , 2013, Italy, RC*	Not reported	Not reported	(20.0); Residents - 18 (7.0); Laboratory Staff - 19 (7.0); Surgeons - 11 (4.0); Anesthesiologists - 5 (2.0); Gardeners - 3 (1.0)	Percutaneous - 161 (); Mucocutaneous - 34 (); Non-intact skin - 9 (); Intact skin - 13 ()	217	217	0	0	0	0	0	0
Jeong, 2014, South Korea, RC*	Not reported	Not reported	Physicians - 147 (27.1); Nurses - 218 (40.1); Nursing Assistants - 62 (11.4); Patologists - 33 (6.1); Paramedics - 20 (3.7); Cleaning staff - 35 (6.4); Others - 29 (5.2)	Percutaneous - 499 (100.0)	499	108	0	0	0	-	0	-
Kaya <i>et al.</i> , 2012,	Female - 61 (73.0);	Not reported	Nurses - 40 (48.0); Cleaning staff -	93 (77/83) dos ferimentos foram	83	83	0	0	0	0	0	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the estatistica l analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Turkey, RC*	Male - 22 (27.0)		18 (22.0); Laboratory staff - 12 (14.5); Health Technicians - 7 (8.5); Physicians - 6 (7.0);	Percutaneouss e 7 (6/83) foram por contato Mucocutaneous								
Khuri-Bulos <i>et al.</i> , 1995, Jordan, PC†	Not reported	Not reported	Nurses - 86 (34.7); Nursing assistants - 21 (8.5); Non-medical staff: 47 (19.0); Interns: 39 (15.7); Residents: 29 (11.7); Technicians: 15 (6.0); Others - 11 (4.4);	Percutaneous - 237 (); Others - 17 ()	248		0	-	-	-	-	-
Krishnan <i>et al.</i> , 2016, India, RC*	Female - 27 (84.4); Male - 5 (15.6)	Average -26.6	Nurses - 407 (42.9); Nursing assistants - 160 (16.9); Cleaning staff - 87 (9.2); Physicians - 47 (5.0); Others - 248 (26.0)	Percutaneous - 949 (100.0)	949	32	0	0	0	-	0	0

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the statistical analysis)	Seroconversion rate per accident victim	Seroconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Kuruüzüm <i>et al.</i> , 2008, Turkey, RC*	Male - 101 (49.8); Female - 102 (50.2)	Average -34.8	Physicians - 108 (53.2); Nurses - 53 (74.6); Medical Students - 26 (47.3); Cleaning staff - 26 (57.8); Professors - 24 (60.0); Nursing Assistants - 2 (16.7); Others - 1 (33.3);	Percutaneous - 197 (97.0); Mucocutaneous - 3 (1.5); Non-intact skin - 3 (1.5)	204		0	-	-	-	-	-
Kuruuzum <i>et al.</i> , 2008, Turkey, PC†	Female - 263 (70.3); Male - 111 (29.7)	Average -30.1	Cleaning staff - 180 (48.1); Nurses - 119 (31.8); Physicians - 28 (7.5); Students - 24 (6.4); Laboratory staff - 10 (2.7); Health Technicians - 7 (1.9); Others - 6 (1.6)	Percutaneous - 422 (94.0); Mucocutaneous - 17 (3.8); Non-intact skin: 10 (2.2)	449	320	0	0	-	-	-	-
Lee <i>et al.</i> , 2017, South Korea, RC*	Female - 851 (82.2); Male - 184 (17.8)	Average – 34.6	Physicians - 214 (19.9); Nursing assistants - 118	Percutaneous - 933 (86.7); Mucocutaneous - 143 (13.3)	1076		0	-	-	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of acidentes n	Total sample size (number of participa nts in the estatística I analysis)	Seroconversi on rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversi on rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconver sion rate per population using PEP	Seroconversi on rate by population with PEP indication and without PEP use
	Esses dados foram baseados nas informações disponíveis para 1.035 dos 1.076 incidentes relatados		(11.0); Cleaning staff - 131 (12.2); Health Technicians - 98 (8.9); Others - 4 (0.7)									
Loureiro <i>et al.</i> , 2009, Brazil, RC*	Female - 53 (94.6); Male - 3 (5.4)	20 -29 – 12; 30-39 – 19; 40-49 – 19; 50-60 – 6	Nursing assistants - 41 (73.2); Nurses - 15 (26.8)	Percutaneous - 48 (85.7); Mucocutaneous - 8 (14.3)	56	39	0	0	-	-	-	-
MacDonald, 1996, Australia, PC†	Not reported	Not reported	Not reported	Percutaneous - 432 (); Mucocutaneous - 98 ()	530	127	0	0	0	0	0	-
Machado <i>et al.</i> , 1992, Brazil, RC*	Female - 27 (75.0); Male - 9 (25.0)	Average -34.6	Nursing assistants - 19 (52.8); Nurses - 7 (19.4); Attendants - 5 (13.9); Health Technicians - 2 (5.5); Laboratory staff - 2 (2.8); Others - 2 (5.6)	Percutaneous - 17 (47.2); Others - 19 (52.8)	36	36	0	0	-	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the estatistica l analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Madsen <i>et al.</i> , 1999, Dinamarca, RC*	Female - 24 (51.0); Male - 23 (49.0)	Average -38.0	Nurses - 19 (40.4); Physicians - 10 (21.3); Laboratory staff - 3 (6.4); Social workers - 2 (4.3); Others - 13 (27.7)	Percutaneous - 32 (); Others - 16 ()	47	18	0	0	-	-	-	-
Malka <i>et al.</i> , 2012, Romania, RC*	Female - 54 (90) Male - 6 (10)	Average - 36.0	Nurses - 48 (80.0); Physicians - 12 (20.0)	Percutaneous - 49 (82.0) Mucocutaneous - 11 (18.0)	60	60	0	0	0	0	-	-
Marcuccio <i>et al.</i> , 2003, Italy, PC†	Female - 66 (58.0); Male - 48 (42.0)	Average -38.3	Nurses - 53 (46.5); Physicians - 31 (27.2); Health Technicians - 30 (26.3)	Percutaneous - 92 (); Mucocutaneous - 22 ()	114		0	-	-	-	-	-
McCormick <i>et al.</i> , 1991, United States of America, PC†	Not reported	Not reported	Nurses - 367 (58.2); House officers - 144 (22.8); Environmental services staff - 108 (10.5); Laboratory staff - 54 (8.6)	Percutaneous - 631 (100.0)	631	28	0	0	-	-	-	-
McEvoy <i>et al.</i> , 1987,	Female - 109 (73.0);	Male Median – 31.0;	Nurses - 91 (60.7);	Percutaneous - 76 ();	150	109	0	0	-	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the statistical analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
United Kingdom, PC†	Male - 41 (27.0);	Female Median – 28.0	Physicians - 32 (21.3); Laboratory staff - 8 (5.3); Others - 19 (12.7)	Mucocutaneous - 24 (); Others - 50 ()								
Memish <i>et al.</i> , 2002, Saudi Arabia, PC†	Not reported	Not reported	Nurses - 204 (56.0); Physicians - 47 (13.0); Cleaning staff - 24 (7.0); Phlebotomists - 12 (3.0); Health Technicians - 11 (3.0); Laboratory staff (clinic) - 13 (4.0); Paramedics - 7 (2.0); Others - 14 (4.0)	Percutaneous - 364 (100.0)	364	327	0	0	0	-	-	-
Murray <i>et al.</i> , 2009, Iraq, RC*	Not reported	Not reported	Not reported	Percutaneous - 47 (72.3); Mucocutaneous - 14 (21.5); Others - 4 (6.2)	65		0	-	-	-	-	-
Niu <i>et al.</i> , 2019, China, RC*	Female - 91 (81.3); Male - 21 (18.8)	Median - 38.0	Physicians - 37 (33.0); Nurses - 68 (60.7); Cleaning staff - 4 (3.6); Others - 1 (0.9); Maintenance	Percutaneous - 81 (72.3); Mucocutaneous - 14 (12.5)	112	112	0	0	0	0	0	0

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the statistical analysis)	Seroconversion rate per accident victim	Seroconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
O'Connell and Hayes, 2003, Ireland RC*	Female - 231 (76.2); Male - 72 (23.8)	Average: 29.8	staff - 1 (0.9); Laboratory staff - 1 (0.9) Nurses: 150 (49.5); Physicians - 86 (28.5); Cleaning staff - 41 (13.5); Others - 26 (8.5)	Percutaneous - 332 (100.0)	332		0	-	-	-	-	-
Placidi <i>et al.</i> , 2002, Italy RC*	Not reported	Average – 34.0	Not reported	Percutaneous - (75.0); Others - (25.0)	1000		0	-	-	-	-	-
Pedersen, 1996, Dinamarc, RC*	Not reported	Not reported	Nurses - 175 (41.0); Physicians - 107 (25.0); Laboratory staff - 34 (8.0); Nursing assistants - 10 (2.5); Midwives - 10 (2.5)	Percutaneous - 403 (93.0); Mucocutaneous - 29 (7.0)	430		0	-	-	-	-	-
Porter <i>et al.</i> , 1990, United Kingdom, RC*	Not reported	Not reported	Oral Health Assistants - 131 (43.4); Dentists e Students - 73 (24.2); Cleaning staff - 59 (19.5); Health Technicians - 16	Percutaneous - 167 (55.3); Mucocutaneous - 33 (10.9); Others - 100 (33.1)	200		0	-	-	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the estatistica l analysis)	Seroconversi on rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversi on rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconver sion rate per population using PEP	Seroconversi on rate by population with PEP indication and without PEP use
Pournaras <i>et al.</i> , 1999, Greece, RC*	Female - 200 (70.4); Male - 84 (29.6)	Average – 25.5	(5.3); Attendants - 12 (4.0); Hygienists - 3 (1.0)	Percutaneous - 258 (90.8) and Non-intact skin - 26 (9.2)	200	31	0	0	-	-	-	-
Pungpapong <i>et al.</i> , 1999, Thailand, RC*	Female - 165 (82.5); Male - 35 (17.5)	Not reported	Nurses - 150 (52.8); Physicians - 77 (27.1); Cleaning staff - 41 (14.4); Laboratory staff - 16 (5.6)	Percutaneous - 42 (21.0); Others - 158 (79.0)	200	110	0	0	-	-	-	-
Ramos-Gomez <i>et al.</i> , 1995, United States of	Not reported	Not reported	Nurses - 103 (51.5); Nursing assistants - 32 (16.0); Physicians - 20 (10.0); Medical Students and Laboratory staff - 11 (5.5); Cleaning Staff - 13 (6.5); Paramedics - 5 (2.5); Others - 5 (2.5)	Percutaneous - 412 (96.0); Mucocutaneous - 14 (3.0); Bites - 2 (0.5)	428	71	0	0	-	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accident n	Total sample size (number of participa nts in the estatistica l analysis)	Seroconversi on rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversi on rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconver sion rate per population using PEP	Seroconversi on rate by population with PEP indication and without PEP use
America, PC†			(58.3); Hygienists - 18 (4.4); Dental Assistants 83 (20.1); Staff Member - 10 (2.4); Others - 9 (2.2)									
Ricketts <i>et al.</i> , 1992, Canada, PC†	Not reported	Not reported	Nurses - 280 (67.0); Health technicians - 20 (5.0); Students - 20 (5.0); Laboratory staff - 43 (11.0); Physicians - 23 (6.0); Others - 26 (6.0)	Percutaneous - 259 (62.0); Mucocutaneous - 43 (10.0); Others - 44 (11.0); Intact Skin - 9 (2.0); Non-intact skin - 41 (10.0); Not reported - 41 (10.0)	414	334	0	0	-	-	-	-
Roberts, Lincoff and Frankel, 1991, Brazil, RC*	Female - 229 (73.1); Male - 84 (26.9)	Not reported	Not reported	Percutaneous - 229 (84.0); Mucocutaneous - 84 (16.0)	322	81	0	0	-	-	-	-
Rogowska- Szadkowska <i>et al.</i> , 1997, Poland, RC*	Female - 32 (78.0); Male - 9 (22.0)	Not reported	Nurses - 22 (53.7); Nurse Students - 1 (2.4); Midwives - 3 (7.3); Laboratory staff - 4 (9.8); Physicians - 7 (17.0)	Not reported	41	4	0	0	-	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the statistical analysis)	Seroconversion rate per accident victim	Seroconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Sacchi <i>et al.</i> , 2007, Italy, RC*	Not reported	Not reported	Students - 15 (34.1); Physicians - 29 (65.9)	Percutaneous - 25 (57.0); Mucocutaneous - 19 (43.0)	44		0	-	-	-	0	-
Samargandy <i>et al.</i> , 2016, Saudi Arabia, RC*	Female - 238 (73.5); Male - 86 (26.5)	Average – 30.0	Nurses and Nurse Students - 149 (45.7); Physicians - 57 (17.5); Dental Students: 39 (12.0); Laboratory staff: 26 (8.0); Cleaning staff - 23 (7.1); Dental staff - 18 (5.5); Others - 14 (4.2)	Percutaneous - 302 (92.6); Mucocutaneous - 21 (6.5); Bites - 3 (0.9)	326	9	0	0	-	-	0	-
Sarkar and Lahiri, 2021, India, RC*	Female - 51 (48.6); Male - 54 (51.4)	Not reported	Interns: 37 (35.2); Physicians - 22 (21.0); Nurses - 21 (20.0); Residents - 10 (9.5); Nurse Students - 4 (3.8); Laboratory staff - 3 (2.9); Others - 3 (2.9); Cleaning Staff - 3 (2.9); Nanny - 2 (1.9)	Percutaneous - 88 (83.8); Intact skin - 13 (12.4); Mucocutaneous - 3 (2.9); Others - 1 (1.0)	105	42	0	0	-	-	0	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the estatistica l analysis)	Seroconversi on rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversi on rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconver sion rate per population using PEP	Seroconversi on rate by population with PEP indication and without PEP use
Schmid, Schwager and Drexler, 2007, Germany, PC†	Not reported	Not reported	Nurses - 198 (33.2); Physicians - 81 (13.6); Health Technicians - 80 (13.4); Nurse Students - 68 (11.4); Scientists - 49 (8.2); Medical Students - 190 (24.1)	Percutaneous - 147 (72.4); Mucocutaneous and Non-intact skin - 14 (6.9); Others - 19 (9.4)	203	100	0	0	-	-	-	-
Shanks and Al-Kalai, 1995, Saudi Arabia, PC†	Not reported	Not reported	Nurses - 69 (64.5); Physicians - 16 (15.0); Health Technicians - 15 (14.0); Maintenance staff - 7 (6.5);	Percutaneous - 107 (100.0)	107	4	0	0	0	-	0	-
Sheth <i>et al.</i> , 2016, India, RC*	Female - 29 (60.4); Male - 19 (39.6)	Not reported	Nurses - 17 (35.4); Students - 12 (25.0); Physicians - 6 (12.5); Interns - 5 (10.4); Attendants - 4 (8.3); Health	Percutaneous - 33 (68.7); Mucocutaneous - 6 (12.5); Non-intact skin - 9 (18.7)	48	40	0	0	-	-	0	0

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the estatistica l analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Shin and Jang, 2021, South Korea, RC*	Female - 160 (59.9); Male - 107 (40.1)	Average – 30.7	Technicians - 3 (6.3); Nurse Students - 1 (2.1) Physicians - 114 (42.7); Nurses - 107 (40,1); Health Technicians - 22 (8.2); Nursing assistants - 16 (6.0); Others - 8 (3.0)	Percutaneous - 267 (100.0)	267	71	0	0	-	-	-	-
Shintani <i>et al.</i> , 2020, Japan, RC*	Not reported	Not reported	Dentists - 5 (100) Interns - 18 (48.0); Nurses - 7 (18.9); Students - 5 (13.0); Non-medical staff - 4 (10.0); Residents - 3 (8.0)	Percutaneous - 5 (100.0)	5	5	0	0	0	-	0	0
Shrestha <i>et al.</i> , 2018, Nepal, PC†	Female - 23 (88.5); Male - 14 (58,3)	21-40 – 90; 1-20 – 10	Nurses - 7 (18.9); Students - 5 (13.0); Non-medical staff - 4 (10.0); Residents - 3 (8.0)	Percutaneous - 26 (70.3); Mucocutaneous: 11 ()	37	35	0	0	-	-	-	-
Strickler, 1988, Canada, RC*	Not reported	Not reported	Nurses and Nursing assistants - 36 (59.0); Hospital	Percutaneous - 31 (); Intact Skin - 1 (); Non-intact skin	38	21	0	0	-	-	-	-

Author, year of publication, country, design	Sex n (%)	Age	Professional category n (%)	Type of exposure n (%)	Total sample of accidentes n	Total sample size (number of participants in the statistical analysis)	Seroconversion rate per accident victim	Soconversion rate per individual who completed follow up	Seroconversion rate by percutaneous accident	Seroconversion rate due to mucocutaneous accident	Seroconversion rate per population using PEP	Seroconversion rate by population with PEP indication and without PEP use
Tao <i>et al.</i> , 2017, China, RC*	Female - 118 (76,1); Male - 37 (23.9)	Average -24.3	Assistant - 3 (4.9); Cleaning staff - 1 (1.6); Laboratory staff - 3 (4.9); Radiology staff - 1 (1.6); Physioterapists - 3 (4.9); Residents - 8 (13.1); Interns - 1 (1.6); Clerk - 4 (6.5); Dental Assistant - 1 (1.6)	- 19 (); Mucocutaneous - 10 ()	155	155	0	0	0	0	0	-
Wang <i>et al.</i> , 2000, United States of America, PC†	Female - 349 (71.0); Male - 143 (29.0)	Median - 37.0	Not reported	Percutaneous - 413 (84.0); Mucocutaneous - (9.0); Intact skin - (8.0)	492	306	0	0	-	-	0	-

*Retrospective Cohort; †Prospective Cohort; ‡Retrospective and Prospective Cohort.

[illegible]

Jaggi, Nirwan and Chakraborty, 2020 ^{a, b, c}	+	+	-	-	+	?	?	+	+	Moderate
Jayanth <i>et al.</i> , 2009 ^{a, b, c}	+	+	-	-	+	+	+	+	+	High
Kepenek and Şahin-Eker, 2017 ^{a, b, c}	+	+	-	+	+	+	+	+	+	High
Kiertiburanakul <i>et al.</i> , 2006 ^a	+	+	+	-	+	+	+	+	+	High
Ko <i>et al.</i> , 2009 ^{a, b}	+	+	+	+	+	?	?	+	+	High
Lee and Choi, 2023 ^{a, b}	+	+	+	+	+	?	?	+	+	High
Lymer, Schiitz and Isaksson, 1996 ^{a, b, f}	+	+	+	-	-	?	?	+	?	Moderate
Mallon <i>et al.</i> , 1992 ^{a, b, e}	+	+	-	-	+	+	+	+	+	High
Marcus <i>et al.</i> , 1988 ^{a, b, c, d}	+	+	+	-	+	+	+	+	+	High
Medeiros <i>et al.</i> , 2012 ^{a, b, c}	+	+	+	-	-	?	?	+	?	Moderate
Mehta <i>et al.</i> , 2005 ^{a, b, e}	+	+	-	-	+	?	?	+	+	Moderate
Mehta <i>et al.</i> , 2010 ^{a, b, e, f}	+	+	-	-	-	?	?	+	+	Low
Nwaiwu <i>et al.</i> , 2017 ^{a, b, c, d, e}	+	+	-	-	+	+	+	+	+	High
Oakley, Gooch and Cockcroft, 1992 ^{a, b}	+	+	+	-	+	+	+	+	+	High
Oh, Yi and Choe, 2005 ^{a, b}	+	+	+	+	+	+	+	+	+	High
Pérez-Díaz <i>et al.</i> , 2015 ^{a, b}	+	+	+	+	+	?	?	+	+	High
Puro <i>et al.</i> , 1992 ^{a, b, e, f}	+	+	-	+	+	+	+	+	+	High
Puro, Ranchino and Profili, 1990 ^{a, b}	+	+	+	-	+	+	+	+	+	High
Rajkumari <i>et al.</i> , 2014 ^{a, b, e}	+	+	-	+	+	+	+	+	+	High
Rele, Mathur and Turbadkar, 2002 ^{a, b}	+	+	-	-	+	+	+	+	+	High
Rice, Tomkins and Ncube, 2015 ^a	+	+	+	-	-	?	?	+	?	Moderate
Rishi <i>et al.</i> , 2017 ^{a, b, c}	+	+	-	-	+	+	+	+	+	High
Romea <i>et al.</i> , 1995 ^{a, b}	+	+	+	+	+	+	+	+	+	High
Safari <i>et al.</i> , 2020 ^{a, b}	+	+	-	-	+	+	+	+	+	High
Sheth, Leuva and Mannari, 2016 ^{a, b, e, f}	+	+	-	-	+	?	?	+	+	Moderate
Shriyan <i>et al.</i> , 2012 ^{a, b, e}	+	+	-	-	+	+	+	+	+	High
Sin <i>et al.</i> , 2016 ^{a, b, e}	+	+	+	+	+	?	?	+	+	High
Razzakh and Qureshi, 2021 ^{a, b}	+	+	-	+	+	?	?	+	+	Moderate
Tetteh <i>et al.</i> , 2015 ^{a, b}	+	+	-	+	+	?	?	+	+	Moderate
Tokars <i>et al.</i> , 1993 ^{a, b, c, d, e, f}	+	+	+	-	+	+	+	+	+	High
Villarroel <i>et al.</i> , 2012 ^{a, b, e}	+	+	+	-	+	+	+	+	+	High
Wang, Chen and Liu, 2014 ^{a, b, e}	+	+	+	-	+	?	?	+	+	High
Wiboonchutikul <i>et al.</i> , 2015 ^{a, b, e}	+	+	-	+	+	?	?	+	+	Moderate

Windolf <i>et al.</i> , 1990 ^{a, b, e, f}	+	+	+	-	+	?	?	+	+	High
Wnuk, 2003 ^a	+	+	-	+	+	?	?	+	+	Moderate
Elmsli, 1989 ^{a, b}	+	+	-	+	+	+	+	+	+	High
Miceli, 2005 ^{a, b, e, f}	+	+	-	-	+	?	?	+	+	Moderate
Miller and Farr., 1989 ^{a, b}	+	?	-	-	+	+	+	+	+	Moderate
Wu <i>et al.</i> , 2015 ^{a, b, c}	+	+	+	-	+	?	?	+	+	Moderate
Al Ghamdi S <i>et al.</i> , 2003 ^a	+	+	-	-	+	+	+	+	+	High
Almeida and Benatti, 2007 ^{a, b}	+	+	-	-	+	?	?	+	+	Moderate
Argentero <i>et al.</i> , 2007 ^{a, b, c, d, e}	+	+	+	-	+	-	-	+	+	Moderate
Arva <i>et al.</i> , 1990 ^a	+	+	+	-	-	?	?	+	?	Moderate
Barriga Ângulo, 1989 ^a	+	+	-	-	-	+	+	+	?	Low
Blázquez <i>et al.</i> , 2001 ^a	+	+	+	+	-	+	+	+	?	High
Bowden <i>et al.</i> , 1993 ^{a, b, e}	+	+	-	-	+	?	?	+	+	Moderate
Bozkurt <i>et al.</i> , 2013 ^{a, b, c, d}	+	+	-	+	+	?	?	+	+	Moderate
Changraksa <i>et al.</i> , 2022 ^{a, b, e}	+	+	+	+	+	?	?	+	+	High
Chaiwarith <i>et al.</i> , 2013 ^{a, b}	+	+	+	+	+	+	+	+	+	High
Çelik, 2017 ^{a, b, e}	+	+	-	+	?	?	?	+	?	Moderate
Çiçek-Şentürk <i>et al.</i> , 2019 ^{a, b, e}	+	+	+	+	+	?	?	+	+	High
Daglio <i>et al.</i> , 2006 ^a	+	+	+	+	-	?	?	+	?	Moderate
Dizili-Yelgin <i>et al.</i> , 2018 ^{a, b, c}	+	+	-	+	+	+	+	+	+	High
Elmslie and O'Shaughnessy, 1988 ^{a, b}	+	+	-	+	+	+	+	+	+	High
Fahey <i>et al.</i> , 1991 ^{a, b}	+	+	+	-	+	+	+	+	+	High
Falagas <i>et al.</i> , 2007 ^a	+	+	-	-	-	+	+	+	?	Moderate
Frijstein, Hortensius and Zaaijer, 2011 ^a	+	+	+	-	-	?	?	+	?	Moderate
Gerberding <i>et al.</i> , 1987 ^{a, b}	+	+	-	+	+	+	+	+	+	High
Gooch <i>et al.</i> , 1995 ^{a, b, c}	+	+	-	-	+	?	?	+	+	Moderate
Guliz E, <i>et al.</i> , 2015 ^a	+	+	-	+	-	?	?	+	?	Low
Henderson <i>et al.</i> , 1986 ^{a, b}	+	+	-	-	+	+	+	+	+	High
Henderson <i>et al.</i> , 1990 ^{a, b, c, d}	+	+	+	-	+	+	+	+	+	High
Heptonstall <i>et al.</i> , 1993 ^{a, b, c, d, e, f}	+	+	-	-	+	+	+	+	+	High
Hiransuthikul N, Hiransuthikul P and	+	+	-	+	+	?	?	+	+	Moderate
Huertas <i>et al.</i> , 1995 ^{a, b}	+	+	-	-	+	+	+	+	+	High
Ippolito <i>et al.</i> , 2013 ^{a, b, c, d, e, f}	+	+	-	-	+	?	?	+	+	Moderate

Jeong, 2014 ^{a, b, c, e}	+	+	+	-	+	?	?	+	+	High
Kaya <i>et al.</i> , 2012 ^{a, b, c, d, e}	+	+	-	-	+	?	?	+	+	Moderate
Khuri-Bulos <i>et al.</i> , 1995 ^a	+	+	-	-	-	+	+	+	?	Moderate
Krishnan <i>et al.</i> , 2016 ^{a, b, c, e, f}	+	+	+	+	+	+	+	+	+	High
Kuruüzüm <i>et al.</i> , 2008 ^a	+	+	-	+	-	?	?	+	?	Moderate
Kuruüzüm <i>et al.</i> , 2008 ^{a, b}	+	+	+	+	+	+	+	+	+	High
Lee <i>et al.</i> , 2017 ^a	+	+	+	+	?	?	?	+	?	Moderate
Loureiro <i>et al.</i> , 2009 ^{a, b}	+	+	-	+	+	?	?	+	+	High
MacDonald, 1996 ^{a, b, c, d, e}	+	+	+	-	+	+	+	+	+	High
Machado <i>et al.</i> , 1992 ^{a, b}	+	+	-	+	+	+	+	+	+	High
Madsen <i>et al.</i> , 1999 ^{a, b}	+	+	-	+	+	?	?	+	+	High
Malka <i>et al.</i> , 2012 ^{a, b, c, d}	+	+	-	+	+	?	?	+	+	High
Marcuccio <i>et al.</i> , 2003 ^a	+	+	-	+	-	?	?	+	?	Moderate
McCormick <i>et al.</i> , 1991 ^{a, b}	+	+	+	-	+	?	?	+	+	High
McEvoy <i>et al.</i> , 1987 ^{a, b}	+	+	-	+	+	?	?	+	+	High
Memish <i>et al.</i> , 2002 ^{a, b, c}	+	+	-	-	+	+	+	+	+	High
Murray <i>et al.</i> , 2009 ^a	+	+	-	-	-	?	?	+	?	Low
Niu <i>et al.</i> , 2019 ^{a, b, c, d, e, f}	+	+	-	+	+	?	?	+	+	High
O'Connell T and Hayes, 2003 ^a	+	+	-	+	-	?	?	+	?	Moderate
Placidi <i>et al.</i> , 2002 ^a	+	+	+	+	-	?	?	+	?	Moderate
Pedersen, 1996 ^a	+	+	+	-	-	?	?	+	?	Moderate
Porter <i>et al.</i> , 1990 ^a	+	+	-	-	-	?	?	+	?	Low
Pournaras <i>et al.</i> , 1999 ^{a, b}	+	+	-	+	+	+	+	+	+	High
Pungpapong <i>et al.</i> , 1999 ^{a, b}	+	+	-	-	+	?	?	+	+	Moderate
Ramos-Gomez <i>et al.</i> , 1995 ^{a, b}	+	+	+	-	+	?	?	+	+	High
Ricketts <i>et al.</i> , 1992 ^{a, b}	+	+	+	-	+	+	+	+	+	High
Roberts, Lincoff and Frankel, 1991 ^{a, b}	+	+	-	-	+	?	?	+	+	Moderate
Rogowska-Szadkowska <i>et al.</i> , 1997 ^{a, b}	+	+	-	-	+	+	+	+	+	High
Sacchi <i>et al.</i> , 2007 ^{a, e}	+	+	-	-	-	+	+	+	?	Moderate
Samargandy <i>et al.</i> , 2016 ^{a, b, e}	+	+	-	+	+	?	?	+	+	Moderate
Sarkar and Lahiri, 2021 ^{a, b, e}	+	+	-	-	+	?	?	+	+	Moderate
Schmid, Schwager and Drexler, 2007 ^{a, b}	+	+	-	-	+	?	?	+	+	Moderate
Shanks and Al-Kalai, 1995 ^{a, b, c, e}	+	+	-	-	+	+	+	+	+	High

Sheth, Leuva and Mannari, 2016 ^{a, b, e, f}	+	+	-	-	+	?	?	+	+	Moderate
Shin and Jang, 2021 ^{a, b}	+	+	-	+	+	?	?	+	+	High
Shintani <i>et al.</i> , 2020 ^{a, b, c, e, f}	+	+	-	-	+	+	+	+	+	High
Shrestha <i>et al.</i> , 2018 ^{a, b}	+	+	-	+	+	+	+	+	+	High
Strickler, 1988 ^{a, b}	+	+	-	-	+	?	?	+	+	Moderate
Tao <i>et al.</i> , 2017 ^{a, b, c, d, e}	+	+	-	+	+	?	?	+	+	High
Wang <i>et al.</i> , 2000 ^{a, b, e}	+	+	+	-	+	+	+	+	+	High
Domains (D) results	100%	98.50%	35.61%	46.21%	80.30%	45.45%	45.45%	100%	81.82%	

Reference: D1. Was the sample frame appropriate to address the target population? D2. Were study participants sampled in an appropriate way? D3. Was the sample size adequate? D4. Were the study subjects and the setting described in detail? D5. Was the data analysis conducted with sufficient coverage of the identified sample? D6. Were valid methods used for the identification of the condition? D7. Was the condition measured in a standard, reliable way for all participants? D8. Was there appropriate statistical analysis? D9. Was the response rate adequate, and if not, was the low response rate managed appropriately?

+ Yes;
 - No;
 ? Unclear.

Source: adapted from Munn *et al.*

Supplementary table 5 - Risk of Bias (RoB) assessment for studies included in the outcome “Completed Follow-up”

Author	D1	D2	D3	D4	D5	D6	D7	D8	D9	Quality
Abubakar <i>et al.</i> , 2018	+	+	-	+	+	?	?	+	+	moderate
Alavi and Sharifi, 2013	+	-	-	-	+	?	?	+	+	low
Andrade <i>et al.</i> , 2014	+	+	-	+	+	+	+	+	+	high
Aydın, Ergen and Çaşkurlu, 2020	+	+	-	-	+	?	?	+	+	moderate
Baldo <i>et al.</i> , 2002	+	+	-	+	-	+	+	+	+	high
Beghdadli <i>et al.</i> , 2009	+	+	-	+	+	?	?	+	+	moderate
Bi <i>et al.</i> , 2008	+	+	+	-	+	?	?	+	+	moderate
Çağlar-Özer, Altunal and Kadanalı, 2020	+	+	-	+	+	?	?	+	+	moderate
Cleaveland <i>et al.</i> , 2002	+	+	-	-	+	+	+	+	+	high
Davanzo <i>et al.</i> , 2008	+	+	+	-	+	?	?	+	+	moderate
Juanes <i>et al.</i> , 2007	+	+	-	+	+	+	+	+	+	high

Tribonnieàre <i>et al.</i> , 1998	+	+	-	+	+	?	?	+	+	moderate
Ehui <i>et al.</i> , 2007	+	+	-	+	+	?	?	+	+	moderate
El-Hazmi and Al-Majid, 2008	+	+	-	+	+	?	?	+	+	moderate
Erhabor and Nwauche, 2007	+	+	-	+	+	+	+	+	+	high
Escudero, Furtado and Medeiros, 2015	+	+	+	-	+	?	?	+	+	moderate
Fillaux <i>et al.</i> , 2004	+	+	-	-	+	+	+	+	+	high
Forseter, Joline and Wormser, 1994	+	+	-	-	+	+	+	+	+	high
Ilario <i>et al.</i> , 2004	+	+	+	+	+	+	+	+	+	high
Gerberding, 1994	+	+	+	+	+	+	+	+	+	high
Goel <i>et al.</i> , 2017	+	+	-	+	+	+	+	+	+	high
Gupta <i>et al.</i> , 2008	+	+	+	+	-	+	+	+	?	high
Gutierrez, Lopes and Yasuda, 2005	+	+	+	+	+	+	+	+	+	high
Haytoglu and Gundeslioglu, 2018	+	+	-	-	-	?	?	+	?	low
Ippolito, Puro and De Carli, 1993	+	+	+	+	+	+	+	+	+	high
Jaggi, Nirwan and Chakraborty, 2020	+	+	-	-	+	?	?	+	+	moderate
Jayanth <i>et al.</i> , 2009	+	+	-	-	+	+	+	+	+	high
Kepenek and Şahin-Eker, 2017	+	+	-	+	+	+	+	+	+	high
Ko <i>et al.</i> , 2009	+	+	+	+	+	?	?	+	+	high
Lee and Choi, 2023	+	+	+	+	+	?	?	+	+	high
Lymer, Schiitz and Isaksson, 1996	+	+	+	-	-	?	?	+	?	moderate
Mallon <i>et al.</i> , 1992	+	+	-	-	+	+	+	+	+	high
Marcus <i>et al.</i> , 1988	+	+	+	-	+	+	+	+	+	high
Medeiros <i>et al.</i> , 2012	+	+	+	-	-	?	?	+	?	moderate
Mehta <i>et al.</i> , 2005	+	+	-	-	+	?	?	+	+	moderate
Mehta <i>et al.</i> , 2010	+	+	-	-	-	?	?	+	+	low
Nwaiwu <i>et al.</i> , 2017	+	+	-	-	+	+	+	+	+	high
Oakley, Gooch and Cockcroft, 1992	+	+	+	-	+	+	+	+	+	high
Oh, Yi and Choe, 2005	+	+	+	+	+	+	+	+	+	high
Pérez-Díaz <i>et al.</i> , 2015	+	+	+	+	+	?	?	+	+	high
Puro <i>et al.</i> , 1992	+	+	-	+	+	+	+	+	+	high
Puro, Ranchino and Profili, 1990	+	+	+	-	+	+	+	+	+	high
Rajkumari <i>et al.</i> , 2014	+	+	-	+	+	+	+	+	+	high
Rele, Mathur and Turbadkar, 2002	+	+	-	-	+	+	+	+	+	high

Rishi <i>et al.</i> , 2017	+	+	-	-	+	+	+	+	+	high
Romea <i>et al.</i> , 1995	+	+	+	+	+	+	+	+	+	high
Safari <i>et al.</i> , 2020	+	+	-	-	+	+	+	+	+	high
Sheth, Leuva and Mannari, 2016	+	+	-	-	+	?	?	+	+	moderate
Shriyan <i>et al.</i> , 2012	+	+	-	-	+	+	+	+	+	high
Sin <i>et al.</i> , 2016	+	+	+	+	+	?	?	+	+	high
Razzakh and Qureshi, 2021	+	+	-	+	+	?	?	+	+	moderate
Tetteh <i>et al.</i> , 2015	+	+	-	+	+	?	?	+	+	moderate
Tokars <i>et al.</i> , 1993	+	+	+	-	+	+	+	+	+	high
Villarroel <i>et al.</i> , 2012	+	+	+	-	+	+	+	+	+	high
Wang, Chen and Liu, 2014	+	+	+	-	+	?	?	+	+	high
Wiboonchutikul <i>et al.</i> , 2015	+	+	-	+	+	?	?	+	+	moderate
Windolf <i>et al.</i> , 1990	+	+	+	-	+	?	?	+	+	high
Elmsli, 1989	+	+	-	+	+	+	+	+	+	high
Miceli, 2005	+	+	-	-	+	?	?	+	+	moderate
Miller and Farr., 1989	+	?	-	-	+	+	+	+	+	moderate
Wu <i>et al.</i> , 2015	+	+	+	-	+	?	?	+	+	moderate
Almeida and Benatti, 2007	+	+	-	-	+	?	?	+	+	moderate
Argentero <i>et al.</i> , 2007	+	+	+	-	+	-	-	+	+	moderate
Bowden <i>et al.</i> , 1993	+	+	-	-	+	?	?	+	+	moderate
Bozkurt <i>et al.</i> , 2013	+	+	-	+	+	?	?	+	+	moderate
Changraksa <i>et al.</i> , 2022	+	+	+	+	+	?	?	+	+	high
Chaiwarith <i>et al.</i> , 2013	+	+	+	+	+	+	+	+	+	high
Çelik, 2017	+	+	-	+	?	?	?	+	?	moderate
Çiçek-Şentürk <i>et al.</i> , 2019	+	+	+	+	+	?	?	+	+	high
Dizili-Yelgin <i>et al.</i> , 2018	+	+	-	+	+	+	+	+	+	high
Elmslie and O'Shaughnessy, 1988	+	+	-	+	+	+	+	+	+	high
Fahey <i>et al.</i> , 1991	+	+	+	-	+	+	+	+	+	high
Gerberding <i>et al.</i> , 1987	+	+	-	+	+	+	+	+	+	high
Gooch <i>et al.</i> , 1995	+	+	-	-	+	?	?	+	+	moderate
Henderson <i>et al.</i> , 1986	+	+	-	-	+	+	+	+	+	high
Henderson <i>et al.</i> , 1990	+	+	+	-	+	+	+	+	+	high
Heptonstall <i>et al.</i> , 1993	+	+	-	-	+	+	+	+	+	high

Hiransuthikul N, Hiransuthikul P and Kanasuk,	+	+	-	+	+	?	?	+	+	moderate
Huertas <i>et al.</i> , 1995	+	+	-	-	+	+	+	+	+	high
Ippolito <i>et al.</i> , 2013	+	+	-	-	+	?	?	+	+	moderate
Jeong, 2014	+	+	+	-	+	?	?	+	+	high
Kaya <i>et al.</i> , 2012	+	+	-	-	+	?	?	+	+	moderate
Krishnan <i>et al.</i> , 2016	+	+	+	+	+	+	+	+	+	high
Kuruüzüm <i>et al.</i> , 2008	+	+	+	+	+	+	+	+	+	high
Loureiro <i>et al.</i> , 2009	+	+	-	+	+	?	?	+	+	high
MacDonald, 1996	+	+	+	-	+	+	+	+	+	high
Machado <i>et al.</i> , 1992	+	+	-	+	+	+	+	+	+	high
Madsen <i>et al.</i> , 1999	+	+	-	+	+	?	?	+	+	high
Malka <i>et al.</i> , 2012	+	+	-	+	+	?	?	+	+	high
McCormick <i>et al.</i> , 1991	+	+	+	-	+	?	?	+	+	high
McEvoy <i>et al.</i> , 1987	+	+	-	+	+	?	?	+	+	high
Memish <i>et al.</i> , 2002	+	+	-	-	+	+	+	+	+	high
Niu <i>et al.</i> , 2019	+	+	-	+	+	?	?	+	+	high
Pournaras <i>et al.</i> , 1999	+	+	-	+	+	+	+	+	+	high
Pungpapong <i>et al.</i> , 1999	+	+	-	-	+	?	?	+	+	moderate
Ramos-Gomez <i>et al.</i> , 1995	+	+	+	-	+	?	?	+	+	high
Ricketts <i>et al.</i> , 1992	+	+	+	-	+	+	+	+	+	high
Roberts, Lincoff and Frankel, 1991	+	+	-	-	+	?	?	+	+	moderate
Rogowska-Szadkowska <i>et al.</i> , 1997	+	+	-	-	+	+	+	+	+	high
Samargandy <i>et al.</i> , 2016	+	+	-	+	+	?	?	+	+	moderate
Sarkar and Lahiri, 2021	+	+	-	-	+	?	?	+	+	moderate
Schmid, Schwager and Drexler, 2007	+	+	-	-	+	?	?	+	+	moderate
Shanks and Al-Kalai, 1995	+	+	-	-	+	+	+	+	+	high
Sheth, Leuva and Mannari, 2016	+	+	-	-	+	?	?	+	+	moderate
Shin and Jang, 2021	+	+	-	+	+	?	?	+	+	high
Shintani <i>et al.</i> , 2020	+	+	-	-	+	+	+	+	+	high
Shrestha <i>et al.</i> , 2018	+	+	-	+	+	+	+	+	+	high
Strickler, 1988	+	+	-	-	+	?	?	+	+	moderate
Tao <i>et al.</i> , 2017	+	+	-	+	+	?	?	+	+	high
Wang <i>et al.</i> , 2000	+	+	+	-	+	+	+	+	+	high

Domains (D) results (%)	100	98.18	34.55	46.36	93.64	48.18	48.18	100	95.45	

Supplementary table 6 - Risk of Bias (RoB) assessment for studies included in the outcome “Percutaneous exposures”

Author	D1	D2	D3	D4	D5	D6	D7	D8	D9	Quality
Abubakar <i>et al.</i> , 2018	+	+	-	+	+	?	?	+	+	moderate
Aydın, Ergen and Çaşkurlu, 2020	+	+	-	-	+	?	?	+	+	moderate
Baldo <i>et al.</i> , 2002	+	+	-	+	-	+	+	+	+	high
Tribonnieàre <i>et al.</i> , 1998	+	+	-	+	+	?	?	+	+	moderate
El-Hazmi and Al-Majid, 2008	+	+	-	+	+	?	?	+	+	moderate
Erhabor and Nwauche, 2007	+	+	-	+	+	+	+	+	+	high
Fadil <i>et al.</i> , 2021	+	+	-	+	-	?	?	+	?	low
Gerberding, 1994	+	+	+	+	+	+	+	+	+	high
Ippolito, Puro and De Carli, 1993	+	+	+	+	+	+	+	+	+	high
Jaggi, Nirwan and Chakraborty, 2020	+	+	-	-	+	?	?	+	+	moderate
Jayanth <i>et al.</i> , 2009	+	+	-	-	+	+	+	+	+	high
Kepenek and Şahin-Eker, 2017	+	+	-	+	+	+	+	+	+	high
Marcus <i>et al.</i> , 1988	+	+	+	-	+	+	+	+	+	high
Medeiros <i>et al.</i> , 2012	+	+	+	-	-	?	?	+	?	moderate

Nwaiwu <i>et al.</i> , 2017	+	+	-	-	+	+	+	+	+	high
Rishi <i>et al.</i> , 2017	+	+	-	-	+	+	+	+	+	high
Tokars <i>et al.</i> , 1993	+	+	+	-	+	+	+	+	+	high
Wu <i>et al.</i> , 2015	+	+	+	-	+	?	?	+	+	moderate
Argentero <i>et al.</i> , 2007	+	+	+	-	+	-	-	+	+	moderate
Bozkurt <i>et al.</i> , 2013	+	+	-	+	+	?	?	+	+	moderate
Dizili-Yelgin <i>et al.</i> , 2018	+	+	-	+	+	+	+	+	+	high
Gooch <i>et al.</i> , 1995	+	+	-	-	+	?	?	+	+	moderate
Henderson <i>et al.</i> , 199	+	+	+	-	+	+	+	+	+	high
Heptonstall <i>et al.</i> , 1993	+	+	-	-	+	+	+	+	+	high
Ippolito <i>et al.</i> , 2013	+	+	-	-	+	?	?	+	+	moderate
Jeong, 2014	+	+	+	-	+	?	?	+	+	high
Kaya <i>et al.</i> , 2012	+	+	-	-	+	?	?	+	+	moderate
Krishnan <i>et al.</i> , 2016	+	+	+	+	+	+	+	+	+	high
MacDonald, 1996	+	+	+	-	+	+	+	+	+	high
Malka <i>et al.</i> , 2012	+	+	-	+	+	?	?	+	+	high
Memish <i>et al.</i> , 2002	+	+	-	-	+	+	+	+	+	high
Niu <i>et al.</i> , 2019	+	+	-	+	+	?	?	+	+	high
Shanks and Al-Kalai, 1995	+	+	-	-	+	+	+	+	+	high
Shintani <i>et al.</i> , 2020	+	+	-	-	+	+	+	+	+	high
Tao <i>et al.</i> , 2017 ^a	+	+	-	+	+	?	?	+	+	high
Domains (D) results (%)	100	100	31.43	42.86	91.43	51.43	51.43	100	94.29	

Reference: D1. Was the sample frame appropriate to address the target population? D2. Were study participants sampled in an appropriate way? D3. Was the sample size adequate? D4. Were the study subjects and the setting described in detail? D5. Was the data analysis conducted with sufficient coverage of the identified sample? D6. Were valid methods used for the identification of the condition? D7. Was the condition measured in a standard, reliable way for all participants? D8. Was there appropriate statistical analysis? D9. Was the response rate adequate, and if not, was the low response rate managed appropriately?

+ Yes;
 - No;
 ? Unclear.

Source: adapted from Munn *et al.*

Supplementary table 7 - Risk of Bias (RoB) assessment for studies included in the outcome “Mucocutaneous exposures”

Author	D1	D2	D3	D4	D5	D6	D7	D8	D9	Quality

Abubakar <i>et al.</i> , 2018	+	+	-	+	+	?	?	+	+	moderate
Aydın, Ergen and Çaşkurlu, 2020	+	+	-	-	+	?	?	+	+	moderate
Baldo <i>et al.</i> , 2002	+	+	-	+	-	+	+	+	+	high
Fadil <i>et al.</i> , 2021	+	+	-	+	-	?	?	+	?	low
Gerberding, 1994	+	+	+	+	+	+	+	+	+	high
Ippolito, Puro and De Carli, 1993	+	+	+	+	+	+	+	+	+	high
Marcus <i>et al.</i> , 1988	+	+	+	-	+	+	+	+	+	high
Nwaiwu <i>et al.</i> , 2017	+	+	-	-	+	+	+	+	+	high
Tokars <i>et al.</i> , 1993	+	+	+	-	+	+	+	+	+	high
Argentero <i>et al.</i> , 2007	+	+	+	-	+	-	-	+	+	moderate
Bozkurt <i>et al.</i> , 2013	+	+	-	+	+	?	?	+	+	moderate
Henderson <i>et al.</i> , 1990	+	+	+	-	+	+	+	+	+	high
Heptonstall <i>et al.</i> , 1993	+	+	-	-	+	+	+	+	+	high
Ippolito <i>et al.</i> , 2013	+	+	-	-	+	?	?	+	+	moderate
Kaya <i>et al.</i> , 2012	+	+	-	-	+	?	?	+	+	moderate
MacDonald, 1996	+	+	+	-	+	+	+	+	+	high
Malka <i>et al.</i> , 2012	+	+	-	+	+	?	?	+	+	high
Niu <i>et al.</i> , 2019	+	+	-	+	+	?	?	+	+	high
Tao <i>et al.</i> , 2017	+	+	-	+	+	?	?	+	+	high
Domains (D) results	100	100	36.84	47.37	89.47	47.37	47.37	100	94.74	

Reference: D1. Was the sample frame appropriate to address the target population? D2. Were study participants sampled in an appropriate way? D3. Was the sample size adequate? D4. Were the study subjects and the setting described in detail? D5. Was the data analysis conducted with sufficient coverage of the identified sample? D6. Were valid methods used for the identification of the condition? D7. Was the condition measured in a standard, reliable way for all participants? D8. Was there appropriate statistical analysis? D9. Was the response rate adequate, and if not, was the low response rate managed appropriately?

+ Yes;
 - No;
 ? Unclear.

Source: adapted from Munn *et al.*

Supplementary table 8 - Risk of Bias (RoB) assessment for studies included in the outcome “Mucocutaneous exposures”

Author	D1	D2	D3	D4	D5	D6	D7	D8	D9	Quality
Abubakar <i>et al.</i> , 2018	+	+	-	+	+	?	?	+	+	moderate

Aydın, Ergen and Çaşkurlu, 2020	+	+	-	-	+	?	?	+	+	moderate
Baldo <i>et al.</i> , 2002	+	+	-	+	-	+	+	+	+	high
Fadil <i>et al.</i> , 2021	+	+	-	+	-	?	?	+	?	low
Gerberding, 1994	+	+	+	+	+	+	+	+	+	high
Ippolito, Puro and De Carli, 1993	+	+	+	+	+	+	+	+	+	high
Marcus <i>et al.</i> , 1988	+	+	+	-	+	+	+	+	+	high
Nwaiwu <i>et al.</i> , 2017	+	+	-	-	+	+	+	+	+	high
Tokars <i>et al.</i> , 1993	+	+	+	-	+	+	+	+	+	high
Argentero <i>et al.</i> , 2007	+	+	+	-	+	-	-	+	+	moderate
Bozkurt <i>et al.</i> , 2013	+	+	-	+	+	?	?	+	+	moderate
Henderson <i>et al.</i> , 1990	+	+	+	-	+	+	+	+	+	high
Heptonstall <i>et al.</i> , 1993	+	+	-	-	+	+	+	+	+	high
Ippolito <i>et al.</i> , 2013	+	+	-	-	+	?	?	+	+	moderate
Kaya <i>et al.</i> , 2012	+	+	-	-	+	?	?	+	+	moderate
MacDonald, 1996	+	+	+	-	+	+	+	+	+	high
Malka <i>et al.</i> , 2012	+	+	-	+	+	?	?	+	+	high
Niu <i>et al.</i> , 2019	+	+	-	+	+	?	?	+	+	high
Tao <i>et al.</i> , 2017	+	+	-	+	+	?	?	+	+	high
Domains (D) results	100	100	36.84	47.37	89.47	47.37	47.37	100	94.74	

Reference: D1. Was the sample frame appropriate to address the target population? D2. Were study participants sampled in an appropriate way? D3. Was the sample size adequate? D4. Were the study subjects and the setting described in detail? D5. Was the data analysis conducted with sufficient coverage of the identified sample? D6. Were valid methods used for the identification of the condition? D7. Was the condition measured in a standard, reliable way for all participants? D8. Was there appropriate statistical analysis? D9. Was the response rate adequate, and if not, was the low response rate managed appropriately?

+ Yes;
 No;
 -
? Unclear.

Source: adapted from Munn *et al.*

Supplementary table 9 - Risk of Bias (RoB) assessment for studies included in the outcome “No use of Post-Exposure Prophylaxis (PEP)”

Author	D1	D2	D3	D4	D5	D6	D7	D8	D9	Quality
Abubakar <i>et al.</i> , 2018	+	+	-	+	+	?	?	+	+	moderate

Andrade <i>et al.</i> , 2014	+	+	-	+	+	+	+	+	+	high
Baldo <i>et al.</i> , 2002	+	+	-	+	-	+	+	+	+	high
Davanzo <i>et al.</i> , 2008	+	+	+	-	+	?	?	+	+	moderate
Juanes <i>et al.</i> , 2007	+	+	-	+	+	+	+	+	+	high
Fillaux <i>et al.</i> , 2004	+	+	-	-	+	+	+	+	+	high
Gutierrez, Lopes and Yasuda, 2005	+	+	+	+	+	+	+	+	+	high
Lymer, Schiitz and Isaksson, 1996	+	+	+	-	-	?	?	+	?	moderate
Mehta <i>et al.</i> , 2010	+	+	-	-	-	?	?	+	+	low
Puro <i>et al.</i> , 1992	+	+	-	+	+	+	+	+	+	high
Sheth, Leuva and Mannari, 2016	+	+	-	-	+	?	?	+	+	moderate
Tokars <i>et al.</i> , 1993	+	+	+	-	+	+	+	+	+	high
Windolf <i>et al.</i> , 1990	+	+	+	-	+	?	?	+	+	high
Miceli, 2005	+	+	-	-	+	?	?	+	+	moderate
Heptonstall <i>et al.</i> , 1993	+	+	-	-	+	+	+	+	+	high
Hiransuthikul N, Hiransuthikul P and Kanasuk,	+	+	-	+	+	?	?	+	+	moderate
Ippolito <i>et al.</i> , 2013	+	+	-	-	+	?	?	+	+	moderate
Krishnan <i>et al.</i> , 2016	+	+	+	+	+	+	+	+	+	high
Niu <i>et al.</i> , 2019	+	+	-	+	+	?	?	+	+	high
Sheth, Leuva and Mannari, 2016	+	+	-	-	+	?	?	+	+	moderate
Shintani <i>et al.</i> , 2020	+	+	-	-	+	+	+	+	+	high
Domains (D) results	100	100	28.57	42.86	85.71	47.62	47.62	100	95.24	

Reference: D1. Was the sample frame appropriate to address the target population? D2. Were study participants sampled in an appropriate way? D3. Was the sample size adequate? D4. Were the study subjects and the setting described in detail? D5. Was the data analysis conducted with sufficient coverage of the identified sample? D6. Were valid methods used for the identification of the condition? D7. Was the condition measured in a standard, reliable way for all participants? D8. Was there appropriate statistical analysis? D9. Was the response rate adequate, and if not, was the low response rate managed appropriately?

+ Yes;
 - No;
 ? Unclear.

Source: adapted from Munn *et al.*

Figure 2 - Meta-Analysis of HIV Seroconversion Among Healthcare Works Exposed to blood and body fluids BBF

Study	Events	Total		Proportion	95%-CI
Abubakar et al., 2018	0	115	┐	0.00	[0; 0.03]
Alavi and Sharifi, 2013	0	279	┐	0.00	[0; 0.01]
Andrade et al., 2014	1	231	┐	0.00	[0; 0.02]
Aydin, Ergen and Çaskurlu, 2020	0	187	┐	0.00	[0; 0.02]
Baldo et al., 2002	0	245	┐	0.00	[0; 0.01]
Beghdadli et al., 2009	0	108	┐	0.00	[0; 0.03]
Bi et al., 2008	0	640	+	0.00	[0; 0.01]
Çaglar-Özer, Altunal and Kadanali, 2020	0	116	┐	0.00	[0; 0.03]
Cleveland et al., 2002	0	208	┐	0.00	[0; 0.02]
Davanzo et al., 2008	0	497	+	0.00	[0; 0.01]
Juanes et al., 2007	0	75	┐	0.00	[0; 0.05]
Tribonnieare et al., 1998	0	16	┐	0.00	[0; 0.21]
Ehui et al., 2007	0	182	┐	0.00	[0; 0.02]
El-Hazmi and Al-Majid, 2008	0	133	┐	0.00	[0; 0.03]
Erhabor and Nwauche, 2007	0	13	┐	0.00	[0; 0.25]
Escudero, Furtado and Medeiros, 2015	0	2012	■	0.00	[0; 0.00]
Fadil et al., 2021	0	131	┐	0.00	[0; 0.03]
Fillaux et al., 2004	0	236	┐	0.00	[0; 0.02]
Forseter, Joline and Wormser, 1994	0	113	┐	0.00	[0; 0.03]
Ilario et al., 2004	0	550	+	0.00	[0; 0.01]
Gerberding, 1994	1	880	+	0.00	[0; 0.01]
Goel et al., 2017	0	476	+	0.00	[0; 0.01]
Gupta et al., 2008	0	557	+	0.00	[0; 0.01]
Gutierrez, Lopes and Yasuda, 2005	0	404	┐	0.00	[0; 0.01]
Haytoglu and Gundeslioglu, 2018	0	185	┐	0.00	[0; 0.02]
Ippolito, Puro and De Carli, 1993	2	1592	■	0.00	[0; 0.00]
Jaggi, Nirwan and Chakraborty, 2020	0	211	┐	0.00	[0; 0.02]
Jayanth et al., 2009	0	296	┐	0.00	[0; 0.01]
Kepenek and Sahin-Eker, 2017	0	98	┐	0.00	[0; 0.04]
Kiertiburanakul et al., 2006	0	820	+	0.00	[0; 0.00]
Ko et al., 2009	0	685	+	0.00	[0; 0.01]
Lee and Choi, 2023	0	1086	■	0.00	[0; 0.00]
Lymer, Schiitz and Isaksson, 1996	0	473	+	0.00	[0; 0.01]
Mallon et al., 1992	0	332	┐	0.00	[0; 0.01]
Marcus et al., 1988	3	1201	+	0.00	[0; 0.01]
Medeiros et al., 2012	0	1457	■	0.00	[0; 0.00]
Mehta et al., 2005	0	380	┐	0.00	[0; 0.01]
Mehta et al., 2010	0	342	┐	0.00	[0; 0.01]
Nwaiwu et al., 2017	0	266	┐	0.00	[0; 0.01]
Oakley, Gooch and Cockcroft, 1992	0	447	┐	0.00	[0; 0.01]
Oh, Yi and Choe, 2005	0	959	+	0.00	[0; 0.00]
Pérez-Díaz et al., 2015	1	2403	■	0.00	[0; 0.00]
Puro et al., 1992	0	224	┐	0.00	[0; 0.02]
Puro, Ranchino and Profili, 1990	0	53	┐	0.00	[0; 0.07]
Rajkumari et al., 2014	0	356	┐	0.00	[0; 0.01]
Rele, Mathur and Turbadkar, 2002	0	38	┐	0.00	[0; 0.09]
Rice, Tomkins and Ncube, 2015	0	2947	■	0.00	[0; 0.00]
Rishi et al., 2017	0	140	┐	0.00	[0; 0.03]
Romea et al., 1995	0	423	┐	0.00	[0; 0.01]
Safari et al., 2020	0	115	┐	0.00	[0; 0.03]
Sheth, Leuva and Mannari, 2016	0	48	┐	0.00	[0; 0.07]
Shriyan et al., 2012	0	61	┐	0.00	[0; 0.06]
Sin et al., 2016	0	1525	■	0.00	[0; 0.00]
Razzakh and Qureshi, 2021	0	130	┐	0.00	[0; 0.03]
Tetteh et al., 2015	0	295	┐	0.00	[0; 0.01]
Tokars et al., 1993	4	1245	+	0.00	[0; 0.01]
Villaruel et al., 2012	0	415	┐	0.00	[0; 0.01]
Wang, Chen and Liu, 2014	0	733	┐	0.00	[0; 0.01]
Wiboonchutikul et al., 2015	0	225	┐	0.00	[0; 0.02]
Windolf et al., 1990	1	586	┐	0.00	[0; 0.01]
Wnuk, 2003	0	28	┐	0.00	[0; 0.12]
Elmsli, 1989	0	161	┐	0.00	[0; 0.02]
Miceli, 2005	0	130	┐	0.00	[0; 0.03]
Miller and Farr, 1989	0	204	┐	0.00	[0; 0.02]
Wu et al., 2015	0	1837	■	0.00	[0; 0.00]
Al Ghamdi S et al., 2003	0	148	┐	0.00	[0; 0.02]

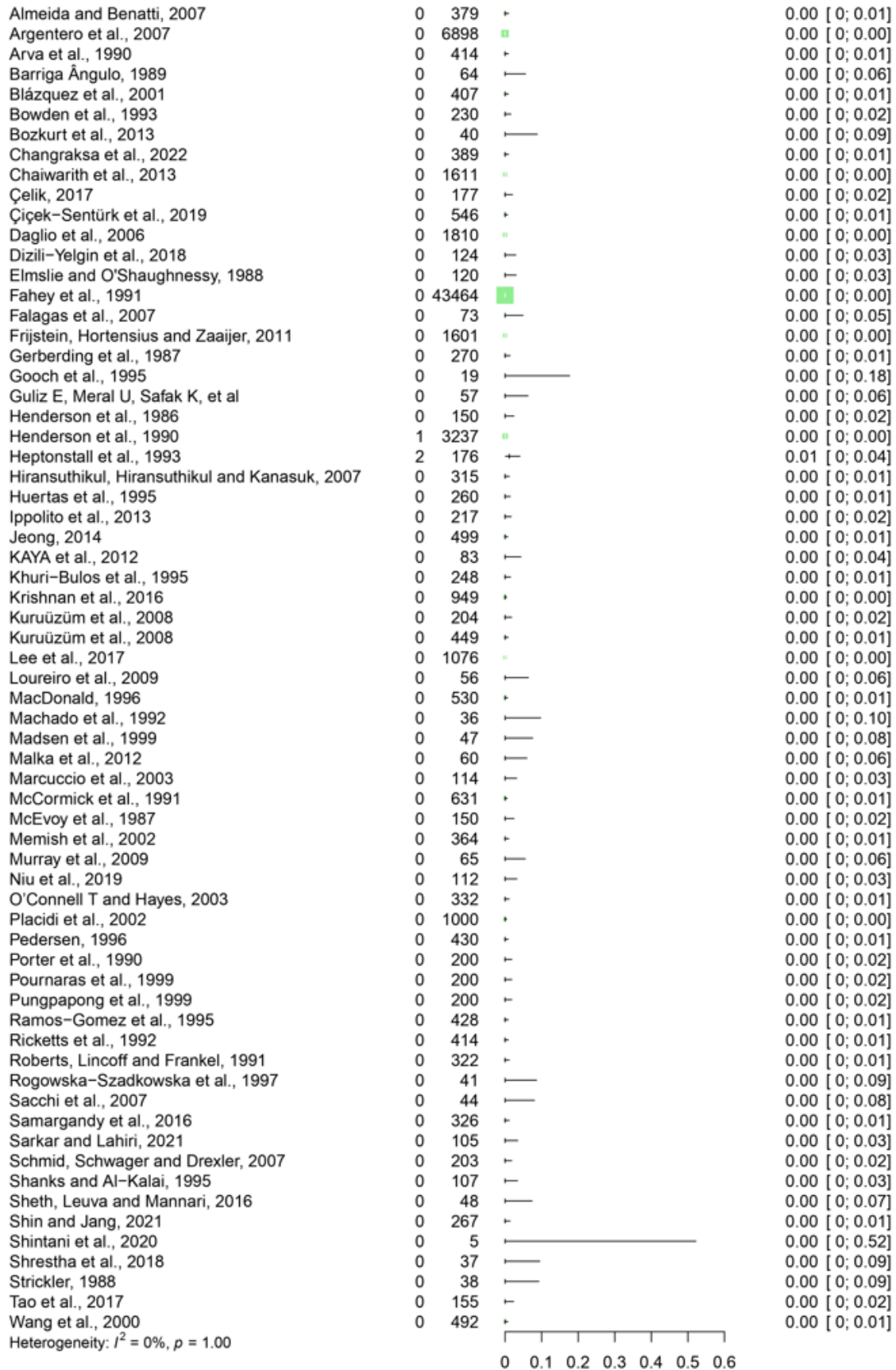
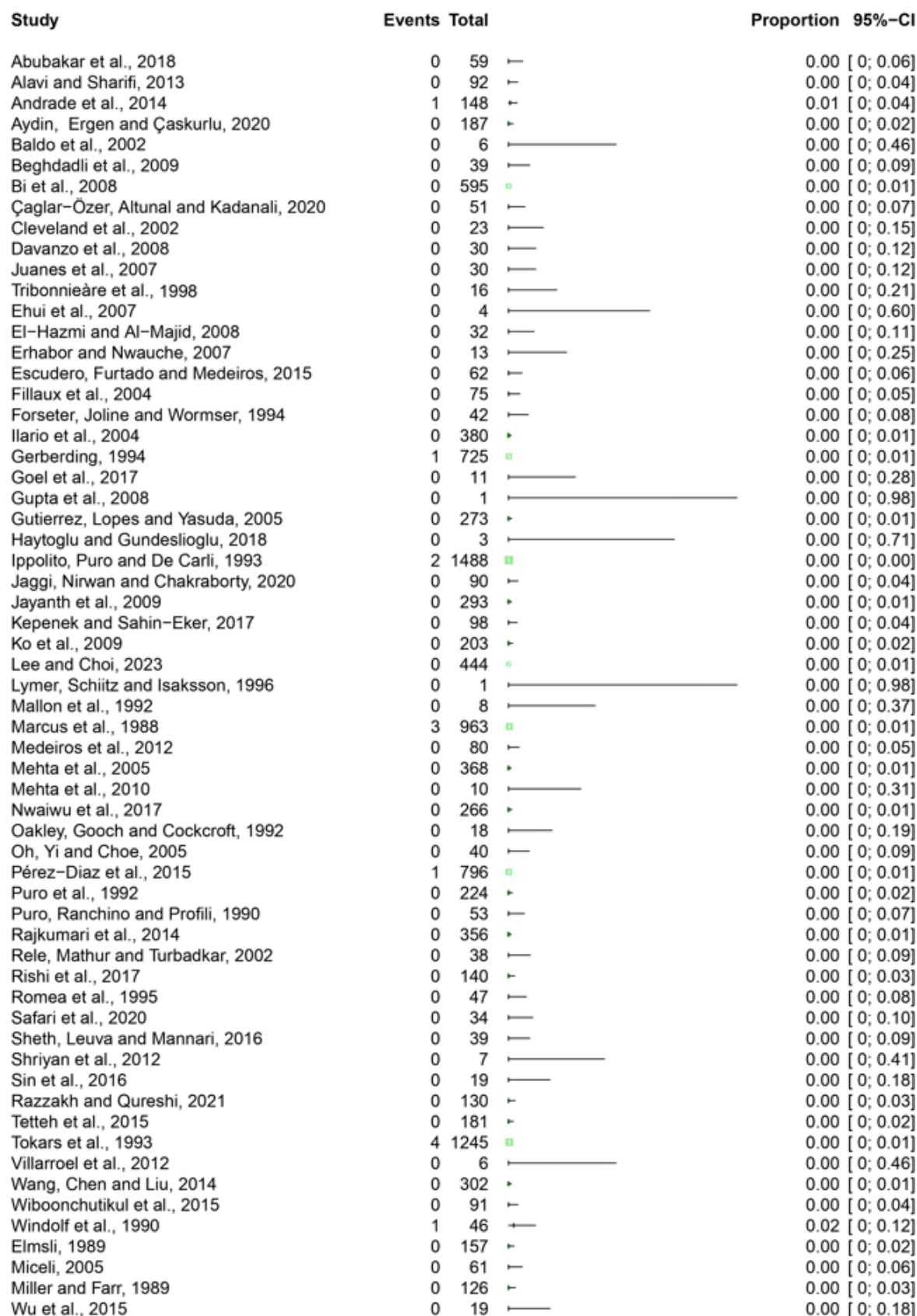
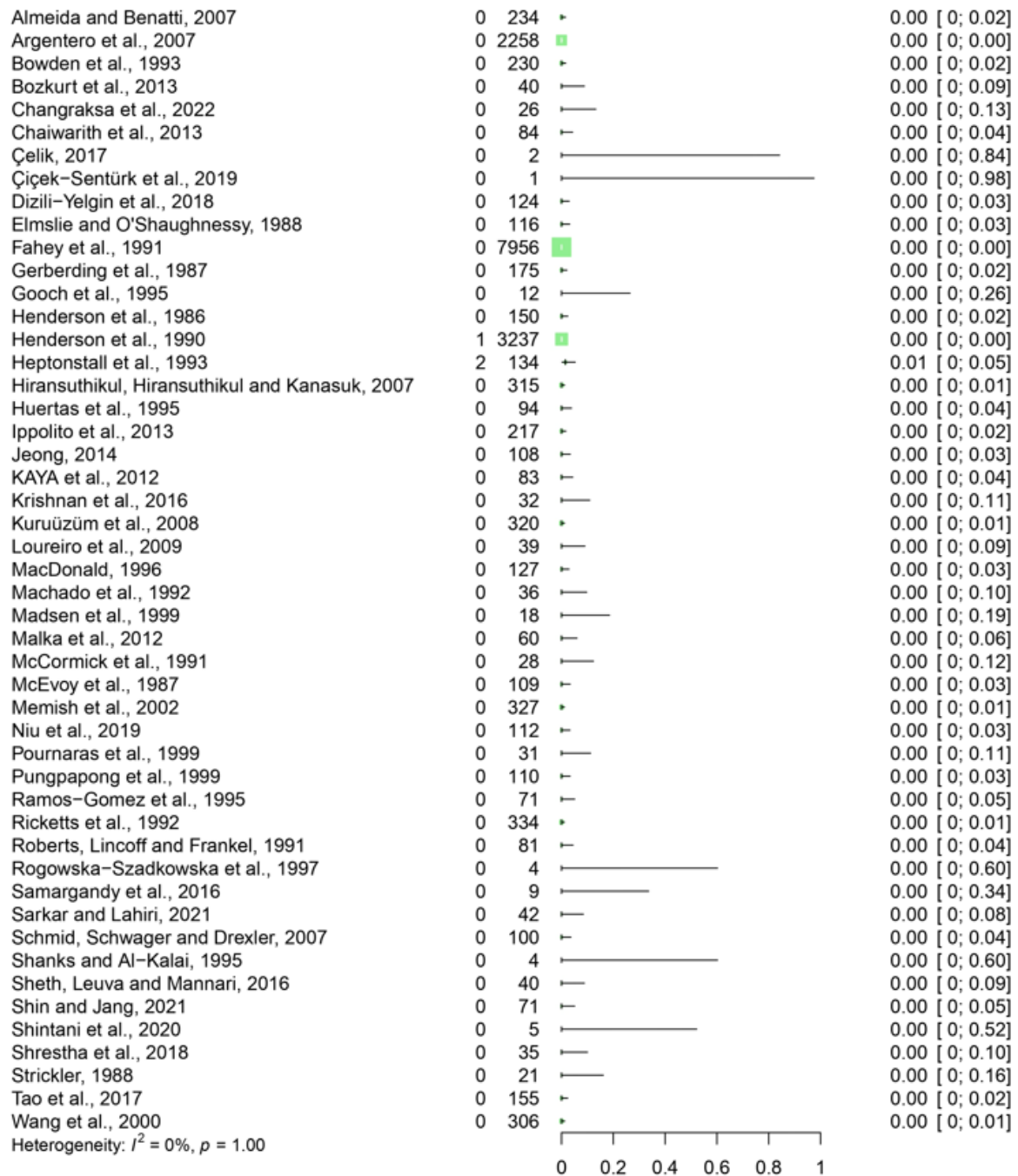


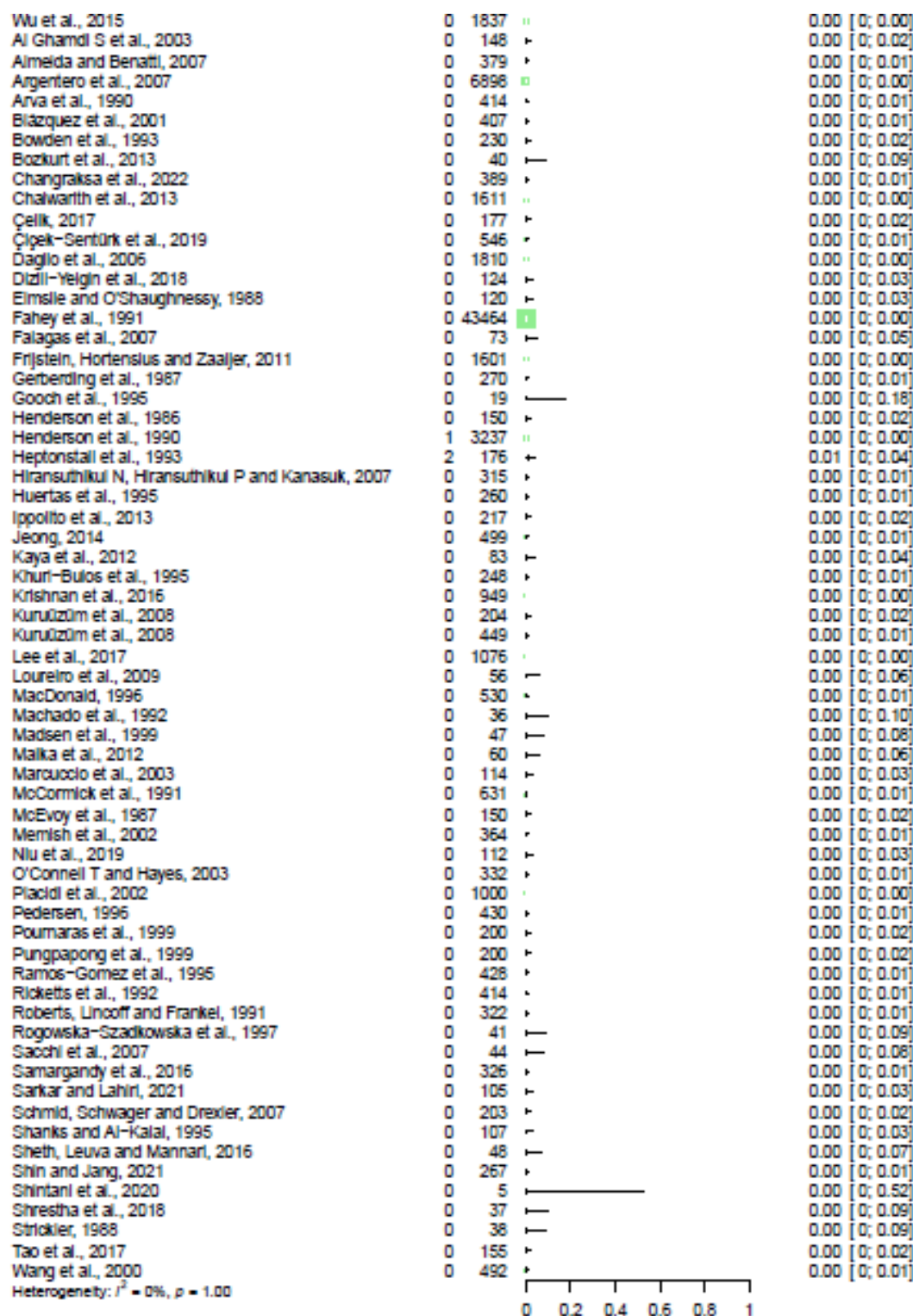
Figure 4 - Meta-Analysis of HIV Seroconversion Among Occupational Exposed Individuals Completing Follow-Up



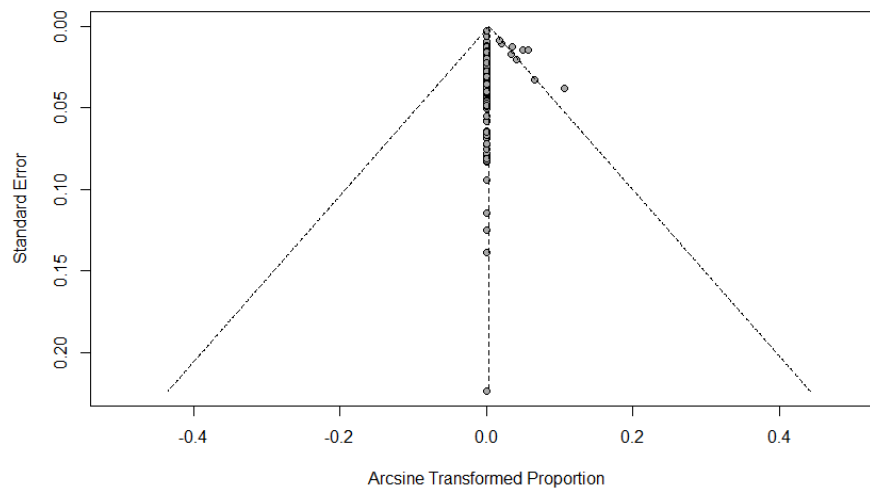


Supplementary Figure 1 - Meta-Analysis Sensitivity Plot of Total Occupational Exposures After Excluding High-Risk-of-Bias Studies

Study	Events	Total	Proportion	95%-CI
Abubakar et al., 2018	0	115	0.00	[0; 0.03]
Andrade et al., 2014	1	231	0.00	[0; 0.02]
Aydin, Ergen and Çaskurlu, 2020	0	187	0.00	[0; 0.02]
Baldo et al., 2014	0	245	0.00	[0; 0.01]
Beghdadli et al., 2009	0	108	0.00	[0; 0.03]
Bi et al., 2008	0	640	0.00	[0; 0.01]
Çaglar-Özer, Altunal and Kadanali, 2020	0	116	0.00	[0; 0.03]
Cleavel et al., 2002	0	208	0.00	[0; 0.02]
Davanzo et al., 2008	0	497	0.00	[0; 0.01]
Juanes et al., 2007	0	75	0.00	[0; 0.05]
Tribonnieare et al., 2018	0	16	0.00	[0; 0.21]
Ehui et al., 2007	0	182	0.00	[0; 0.02]
El-Hazmi and Al-Majid, 2008	0	133	0.00	[0; 0.03]
Erhabor and Nwauche, 2007	0	13	0.00	[0; 0.25]
Escudero, Furtado and Medeiros, 2015	0	2012	0.00	[0; 0.00]
Fillaux et al., 2004	0	236	0.00	[0; 0.02]
Forseter, Joline and Wormser, 1994	0	113	0.00	[0; 0.03]
Ilario et al., 2004	0	550	0.00	[0; 0.01]
Gerberding, 1994	1	880	0.00	[0; 0.01]
Goel et al., 2017	0	476	0.00	[0; 0.01]
Gupta et al., 2008	0	557	0.00	[0; 0.01]
Gutierrez, Lopes and Yasuda, 2005	0	404	0.00	[0; 0.01]
Ippolito, Puro and De Carli, 1993	2	1592	0.00	[0; 0.00]
Jaggi, Nirwan and Chakraborty, 2020	0	211	0.00	[0; 0.02]
Jayanth et al., 2009	0	296	0.00	[0; 0.01]
Kepenek and Sahin-Eker, 2017	0	98	0.00	[0; 0.04]
Kiertiburanakul et al., 2006	0	820	0.00	[0; 0.00]
Ko et al., 2009	0	685	0.00	[0; 0.01]
Lee and Choi, 2023	0	1086	0.00	[0; 0.00]
Lymer, Schiitz and Isaksson, 1996	0	473	0.00	[0; 0.01]
Mallon et al., 1992	0	332	0.00	[0; 0.01]
Marcus et al., 1988	3	1201	0.00	[0; 0.01]
Medeiros et al., 2012	0	1457	0.00	[0; 0.00]
Mehta et al., 2005	0	380	0.00	[0; 0.01]
Nwaiwu et al., 2017	0	266	0.00	[0; 0.01]
Oakley, Gooch and Cockcroft, 1992	0	447	0.00	[0; 0.01]
Oh, Yi and Choe, 2005	0	959	0.00	[0; 0.00]
Pérez-Díaz et al., 2015	1	2403	0.00	[0; 0.00]
Puro et al., 1992	0	224	0.00	[0; 0.02]
Puro, Ranchino and Profili, 1990	0	53	0.00	[0; 0.07]
Rajkumari et al., 2014	0	356	0.00	[0; 0.01]
Rele, Mathur and Turbadkar, 2002	0	38	0.00	[0; 0.09]
Rice, Tomkins and Ncube, 2015	0	2947	0.00	[0; 0.00]
Rishi et al., 2017	0	140	0.00	[0; 0.03]
Romea et al., 1995	0	423	0.00	[0; 0.01]
Safari et al., 2020	0	115	0.00	[0; 0.03]
Sheth, Leuva and Mannari, 2016	0	48	0.00	[0; 0.07]
Shriyan et al., 2012	0	61	0.00	[0; 0.06]
Sin et al., 2016	0	1525	0.00	[0; 0.00]
Razzakh and Qureshi, 2021	0	130	0.00	[0; 0.03]
Tetteh et al., 2015	0	295	0.00	[0; 0.01]
Tokars et al., 1993	4	1245	0.00	[0; 0.01]
Villarroel et al., 2012	0	415	0.00	[0; 0.01]
Wang, Chen and Liu, 2014	0	733	0.00	[0; 0.01]
Wiboonchutikul et al., 2015	0	225	0.00	[0; 0.02]
Windolf et al., 1990	1	586	0.00	[0; 0.01]
Wnuk, 2003	0	28	0.00	[0; 0.12]
Elmsli, 1989	0	161	0.00	[0; 0.02]
Miceli, 2005	0	130	0.00	[0; 0.03]
Miller and Farr, 1989	0	204	0.00	[0; 0.02]

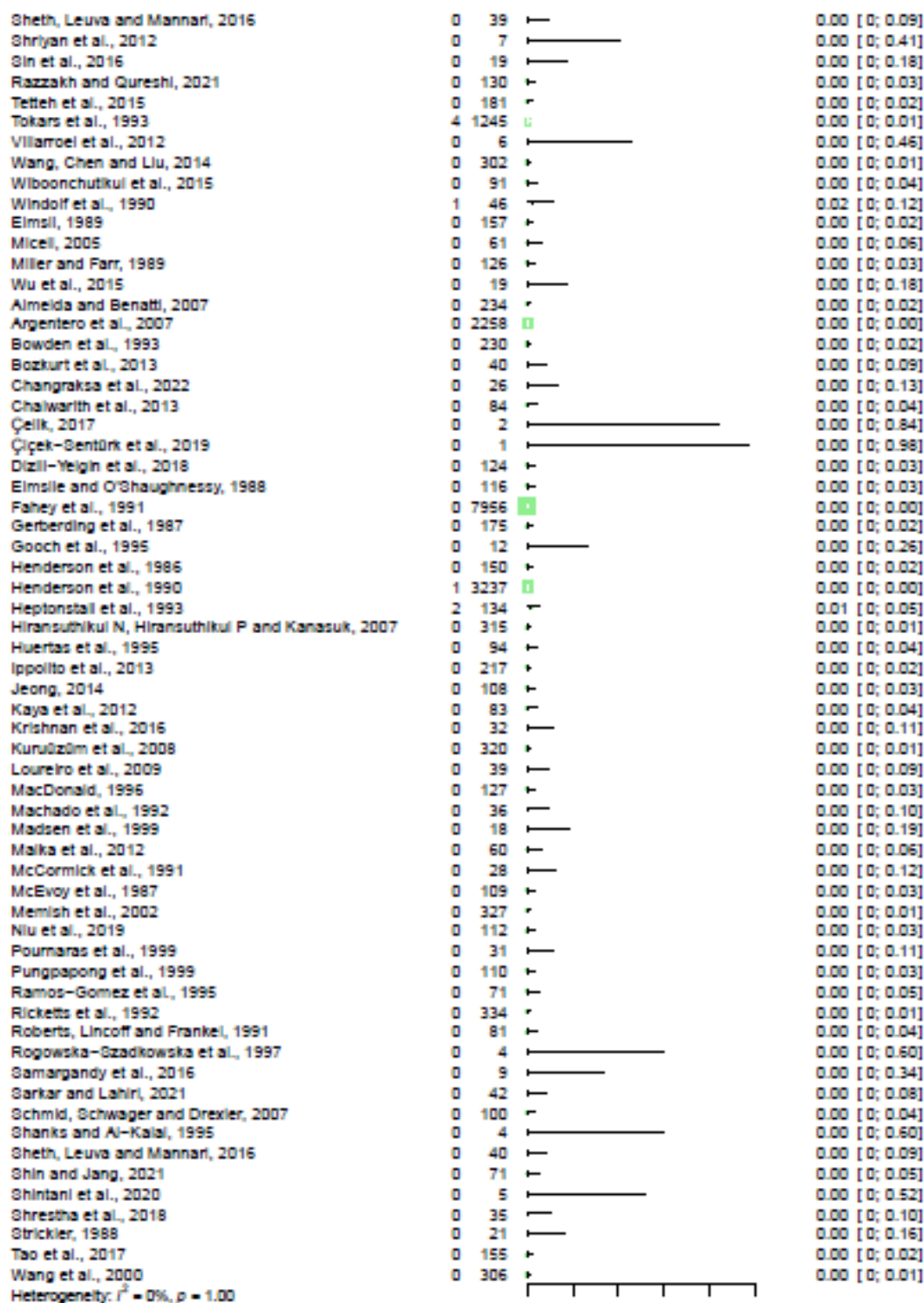


Supplementary Figure 2 - Funnel Ploto of Sensitivity Analysis of Total Occupational Exposures After Excluding High-Risk0of-Bias Studies

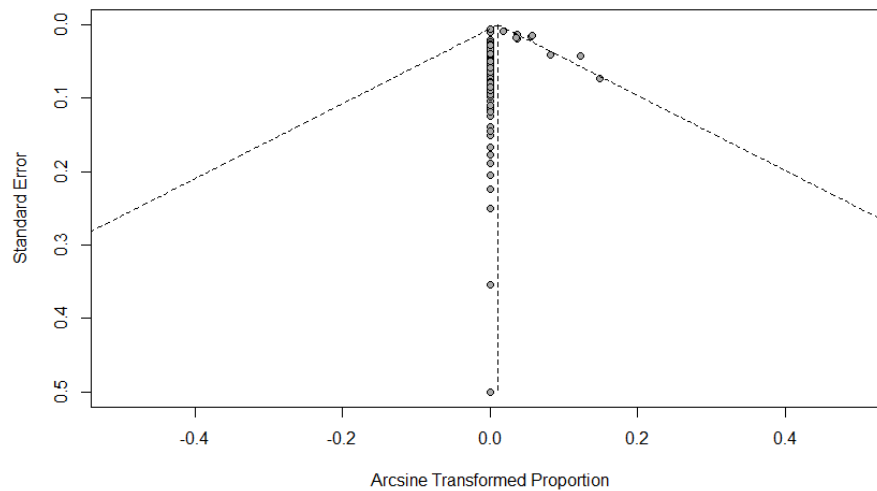


Supplementary Figure 3 - Meta-Analysis Sensitivity Plot of the Follow-Up Sample After Excluding High-Risk-of-Bias Studies

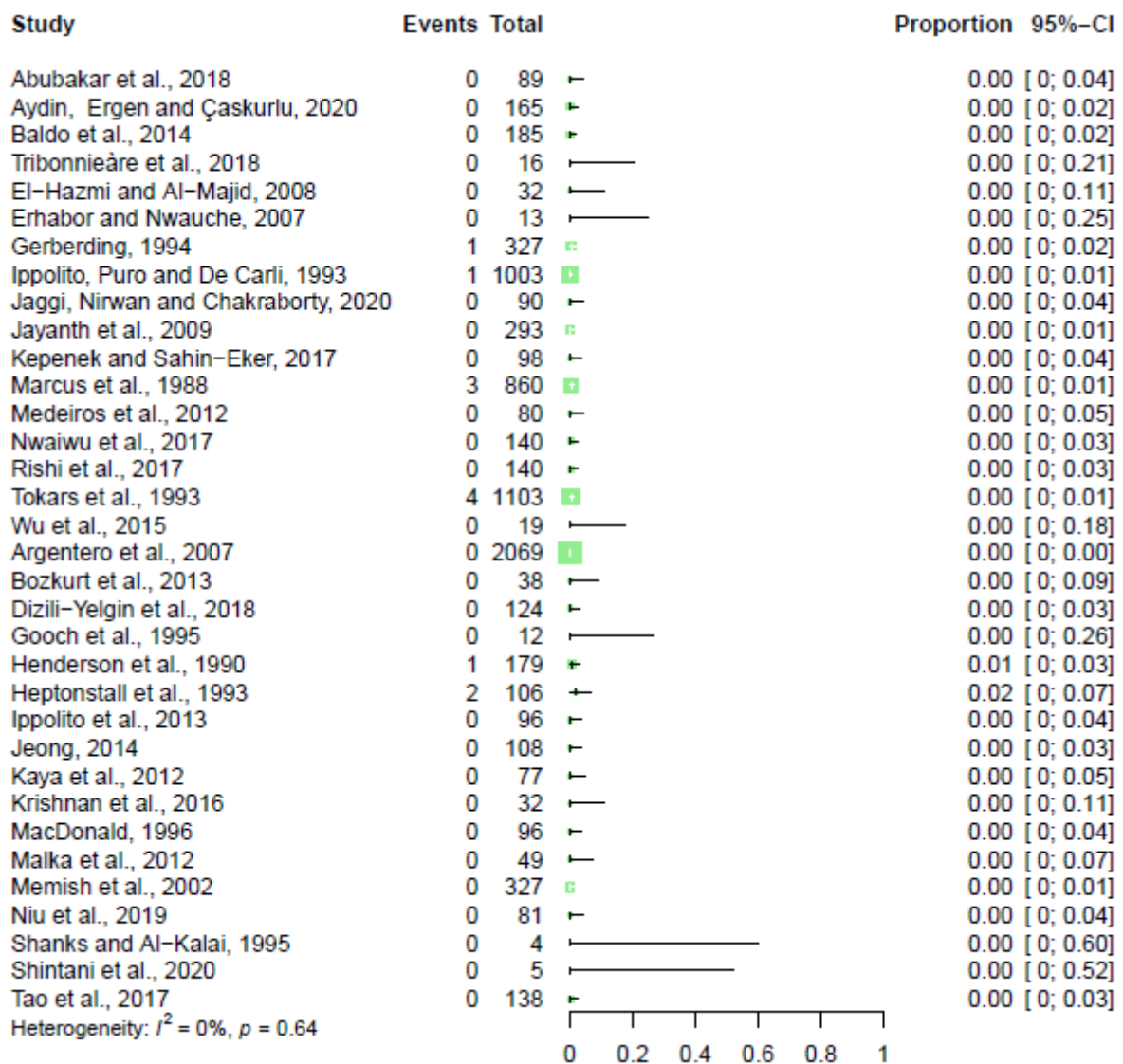
Study	Events	Total	Proportion	95%-CI
Abubakar et al., 2018	0	59	0.00	[0; 0.06]
Andrade et al., 2014	1	148	0.01	[0; 0.04]
Aydin, Ergen and Çaskurlu, 2020	0	187	0.00	[0; 0.02]
Baldo et al., 2014	0	6	0.00	[0; 0.46]
Beghdadi et al., 2009	0	39	0.00	[0; 0.09]
Bi et al., 2008	0	595	0.00	[0; 0.01]
Çaglar-Özer, Altunal and Kadanali, 2020	0	51	0.00	[0; 0.07]
Cleaveland et al., 2002	0	23	0.00	[0; 0.15]
Davanzo et al., 2008	0	30	0.00	[0; 0.12]
Juanes et al., 2007	0	30	0.00	[0; 0.12]
Tribonnet et al., 2018	0	16	0.00	[0; 0.21]
Ehul et al., 2007	0	4	0.00	[0; 0.60]
El-Hazmi and Al-Majid, 2008	0	32	0.00	[0; 0.11]
Erhabor and Nwauche, 2007	0	13	0.00	[0; 0.25]
Escudero, Furtado and Medeiros, 2015	0	62	0.00	[0; 0.06]
Fillaux et al., 2004	0	75	0.00	[0; 0.05]
Forster, Jolliffe and Wormser, 1994	0	42	0.00	[0; 0.08]
Ilario et al., 2004	0	380	0.00	[0; 0.01]
Gerberding, 1994	1	725	0.00	[0; 0.01]
Goel et al., 2017	0	11	0.00	[0; 0.28]
Gutierrez, Lopes and Yasuda, 2005	0	273	0.00	[0; 0.01]
Ippolito, Puro and De Carli, 1993	2	1488	0.00	[0; 0.00]
Jaggi, Nirwan and Chakraborty, 2020	0	90	0.00	[0; 0.04]
Jayanth et al., 2009	0	293	0.00	[0; 0.01]
Kepenek and Sahin-Eker, 2017	0	98	0.00	[0; 0.04]
Ko et al., 2009	0	203	0.00	[0; 0.02]
Lee and Choi, 2023	0	444	0.00	[0; 0.01]
Lymer, Schlitz and Isaksson, 1996	0	1	0.00	[0; 0.98]
Mallon et al., 1992	0	8	0.00	[0; 0.37]
Marcus et al., 1988	3	963	0.00	[0; 0.01]
Medeiros et al., 2012	0	80	0.00	[0; 0.05]
Mehta et al., 2005	0	368	0.00	[0; 0.01]
Nwalwu et al., 2017	0	266	0.00	[0; 0.01]
Oakley, Gooch and Cockcroft, 1992	0	18	0.00	[0; 0.19]
Oh, Yi and Choe, 2005	0	40	0.00	[0; 0.09]
Perez-Diaz et al., 2015	1	796	0.00	[0; 0.01]
Puro et al., 1992	0	224	0.00	[0; 0.02]
Puro, Ranchino and Profili, 1990	0	53	0.00	[0; 0.07]
Rajkumari et al., 2014	0	356	0.00	[0; 0.01]
Rele, Mathur and Turbadkar, 2002	0	38	0.00	[0; 0.09]
Rishi et al., 2017	0	140	0.00	[0; 0.03]
Romea et al., 1995	0	47	0.00	[0; 0.08]
Safari et al., 2020	0	34	0.00	[0; 0.10]



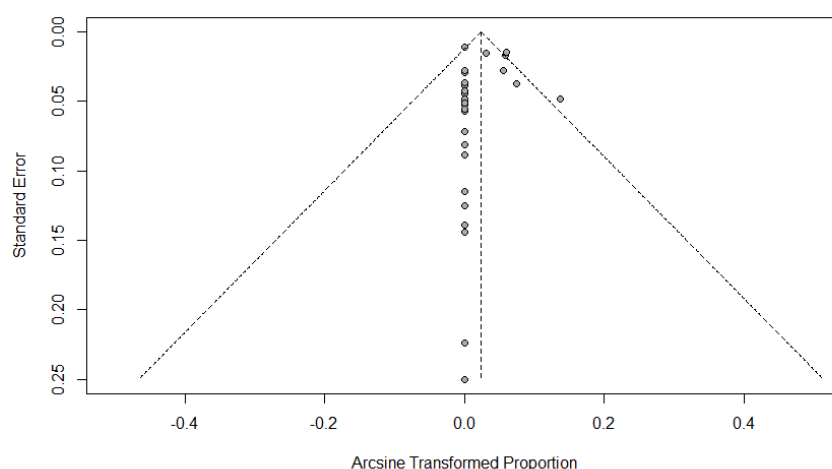
Supplementary Figure 4 - Funnel Plot of Sensitivity Analysis of the Follow-Up Sample After Excluding High-Risk-of-Bias Studies



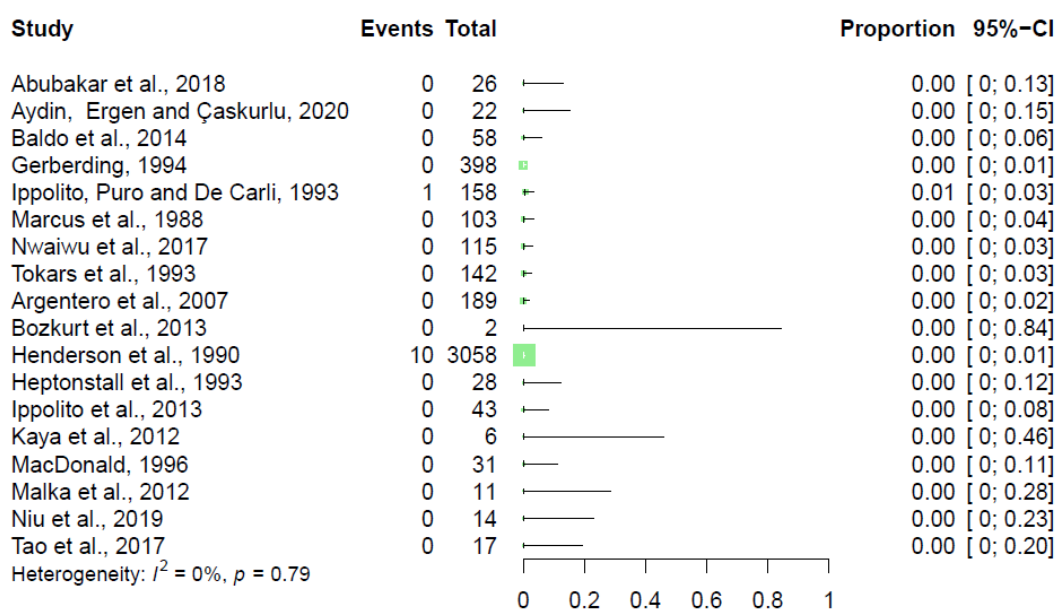
Supplementary Figure 5 - Meta-Analysis Sensitivity Plot of Percutaneous Exposures After Excluding High-Risk-of-Bias Studies



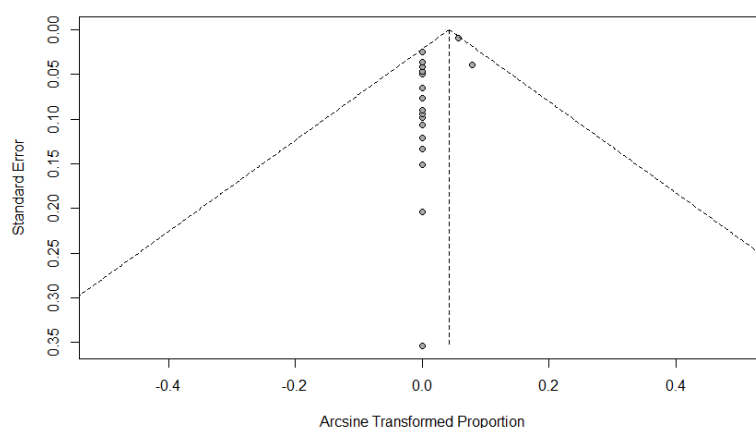
Supplementary Figure 6 - Funnel Plot of Sensitivity Analysis for Percutaneous Exposures After Excluding High-Risk-of-Bias Studies



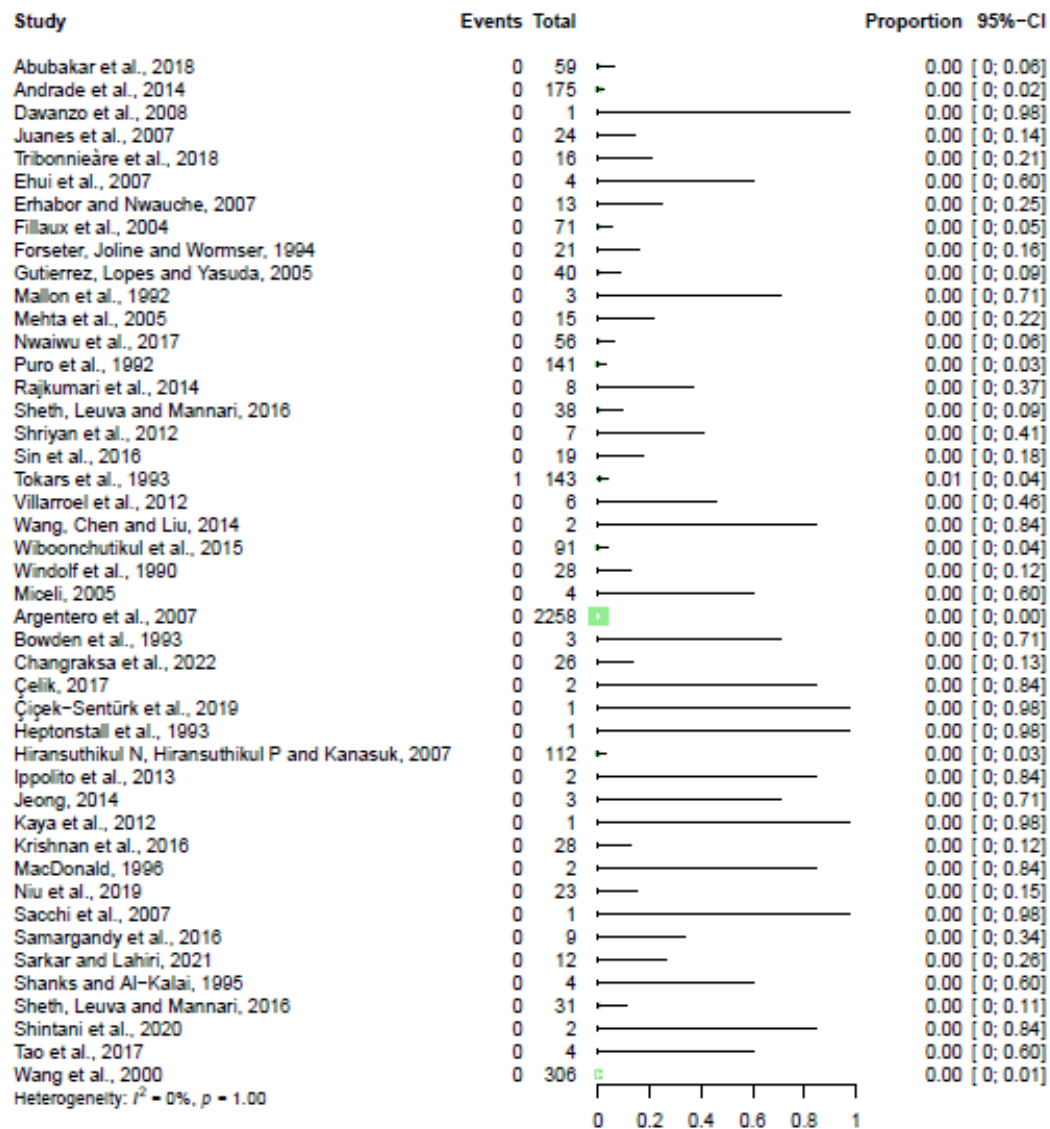
Supplementary Figure 7 - Meta-Analysis Sensitivity Plot of Mucocutaneous Exposures After Excluding High-Risk-of-Bias Studies



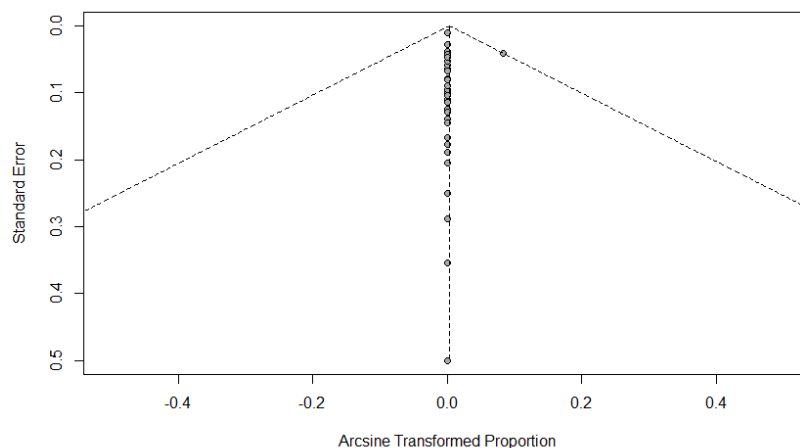
Supplementary Figure 8 - Funnel Plot of Sensitivity Analysis for Mucocutaneous Exposures After Excluding High-Risk-of-Bias Studies



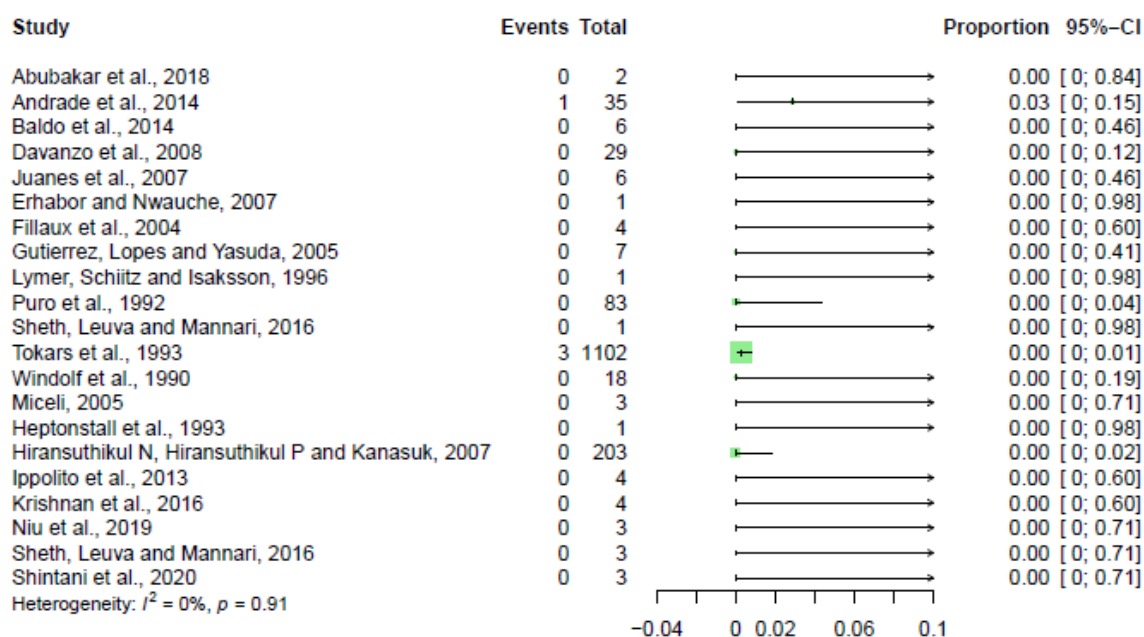
Supplementary Figure 9 - Meta-Analysis Sensitivity Plot of Seroconversion Among Individuals Using PEP After Excluding High-Risk-of-Bias Studies



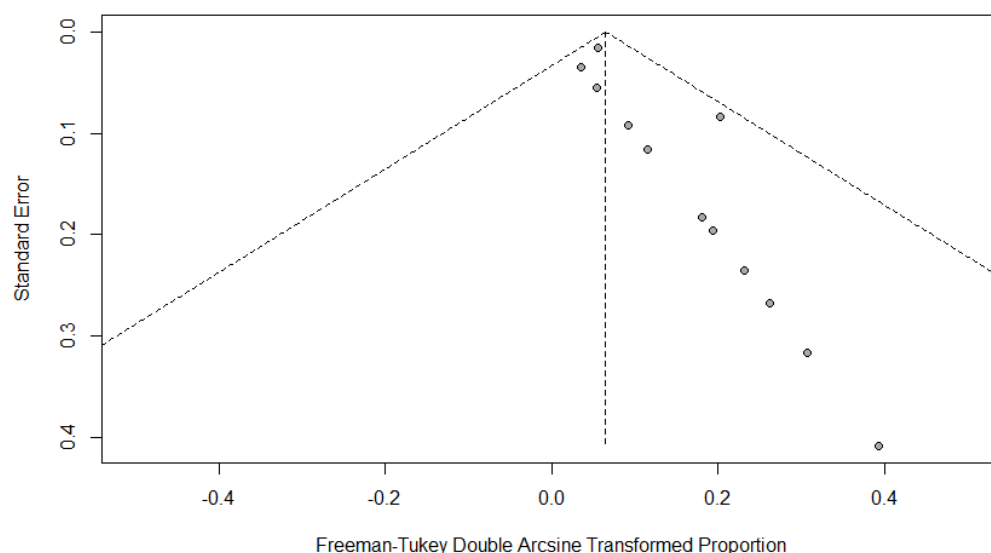
Supplementary Figure 10 - Funnel Plot of Sensitivity Analysis of Seroconversion Among Individuals Using PEP After Excluding High-Risk-of-Bias Studies



Supplementary Figure 11 - Meta-Analysis Sensitivity Plot of Individuals With PEP Indication but Without PEP Use After Excluding High-Risk-of-Bias Studies

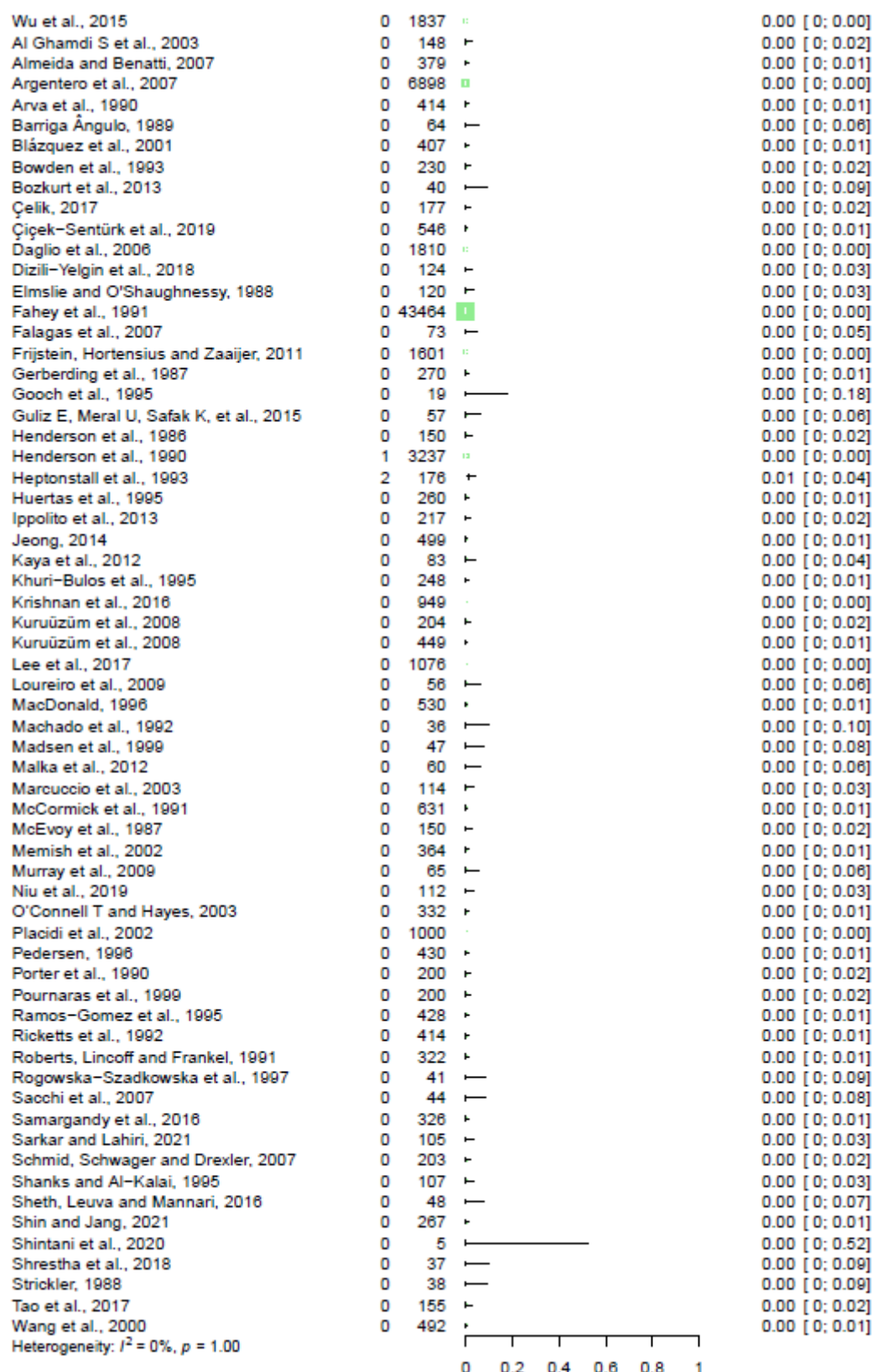


Supplementary Figure 12 - Funnel Plot of Sensitivity Analysis of Individuals With PEP Indication but Without PEP Use After Excluding High-Risk-of-Bias Studies

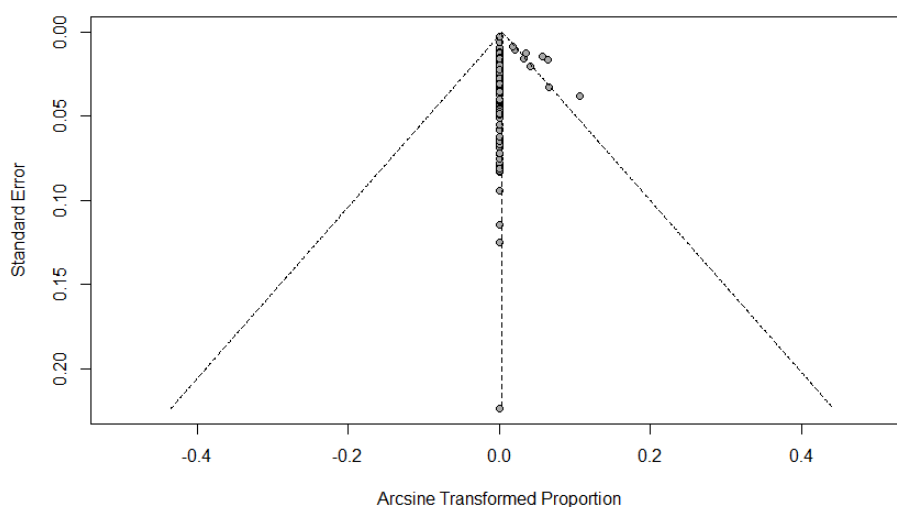


Supplementary Figure 13 - Meta-Analysis of HIV Seroconversion From Total Occupational Exposures in Low-Prevalence Countries

Study	Events	Total	Proportion	95%-CI
Alavi and Sharifi, 2013	0	279	0.00	[0; 0.01]
Andrade et al., 2014	1	231	0.00	[0; 0.02]
Aydin, Ergen and Çaskurlu., 2020	0	187	0.00	[0; 0.02]
Baldo et al., 2014	0	245	0.00	[0; 0.01]
Beghdadli et al., 2009	0	108	0.00	[0; 0.03]
Bi et al., 2008	0	640	0.00	[0; 0.01]
Çaglar-Özer, Altunal and Kadanali, 2020	0	116	0.00	[0; 0.03]
Cleveland et al., 2002	0	208	0.00	[0; 0.02]
Davanzo et al., 2008	0	497	0.00	[0; 0.01]
Juanes et al., 2007	0	75	0.00	[0; 0.05]
Tribonnieare et al., 2018	0	16	0.00	[0; 0.21]
El-Hazmi and Al-Majid, 2008	0	133	0.00	[0; 0.03]
Escudero, Furtado and Medeiros, 2015	0	2012	0.00	[0; 0.00]
Fadil et al., 2021	0	131	0.00	[0; 0.03]
Fillaux et al., 2004	0	236	0.00	[0; 0.02]
Forseter, Joline and Wormser, 1994	0	113	0.00	[0; 0.03]
Ilario et al., 2004	0	550	0.00	[0; 0.01]
Gerberding, 1994	1	976	0.00	[0; 0.01]
Goel et al., 2017	0	476	0.00	[0; 0.01]
Gupta et al., 2008	0	557	0.00	[0; 0.01]
Gutierrez, Lopes e Yasuda, 2005	0	404	0.00	[0; 0.01]
Haytoglu and Gundeslioglu, 2018	0	185	0.00	[0; 0.02]
Ippolito, Puro and De Carli, 1993	2	1592	0.00	[0; 0.00]
Jaggi, Nirwan and Chakraborty, 2020	0	211	0.00	[0; 0.02]
Jayanth et al., 2009	0	296	0.00	[0; 0.01]
Kepenek and Sahin-Eker, 2017	0	98	0.00	[0; 0.04]
Ko et al., 2009	0	685	0.00	[0; 0.01]
Lee and Choi, 2023	0	1086	0.00	[0; 0.00]
Lymer, Schiitz and Isaksson, 1996	0	473	0.00	[0; 0.01]
Mallon et al., 1992	0	332	0.00	[0; 0.01]
Marcus et al., 1988	4	963	0.00	[0; 0.01]
Medeiros et al., 2012	0	1457	0.00	[0; 0.00]
Mehta et al., 2005	0	380	0.00	[0; 0.01]
Mehta et al., 2010	0	342	0.00	[0; 0.01]
Nwaiwu et al., 2017	0	266	0.00	[0; 0.01]
Oakley, Gooch and Cockcroft, 1992	0	447	0.00	[0; 0.01]
Oh, Yi and Choe, 2005	0	959	0.00	[0; 0.00]
Pérez-Díaz et al., 2015	1	2403	0.00	[0; 0.00]
Puro et al., 1992	0	224	0.00	[0; 0.02]
Puro, Ranchino and Profili, 1990	0	53	0.00	[0; 0.07]
Rajkumari et al., 2014	0	356	0.00	[0; 0.01]
Rele, Mathur and Turbadkar, 2002	0	38	0.00	[0; 0.09]
Rice, Tomkins and Ncube, 2015	0	2947	0.00	[0; 0.00]
Rishi et al., 2017	0	140	0.00	[0; 0.03]
Romea et al., 1995	0	423	0.00	[0; 0.01]
Safari et al., 2020	0	115	0.00	[0; 0.03]
Sheth, Leuva and Mannari, 2016	0	96	0.00	[0; 0.04]
Shriyan et al., 2012	0	61	0.00	[0; 0.06]
Sin et al., 2016	0	1525	0.00	[0; 0.00]
Razzakh and Qureshi, 2021	0	130	0.00	[0; 0.03]
Tokars et al., 1993	4	1245	0.00	[0; 0.01]
Villarreal et al., 2012	0	415	0.00	[0; 0.01]
Wang, Chen and Liu, 2014	0	733	0.00	[0; 0.01]
Windolf et al., 1990	1	586	0.00	[0; 0.01]
Wnuk, 2003	0	28	0.00	[0; 0.12]
Elmsli, 1989	0	205	0.00	[0; 0.02]
Miceli, 2005	0	130	0.00	[0; 0.03]
Miller and Farr., 1989	0	204	0.00	[0; 0.02]

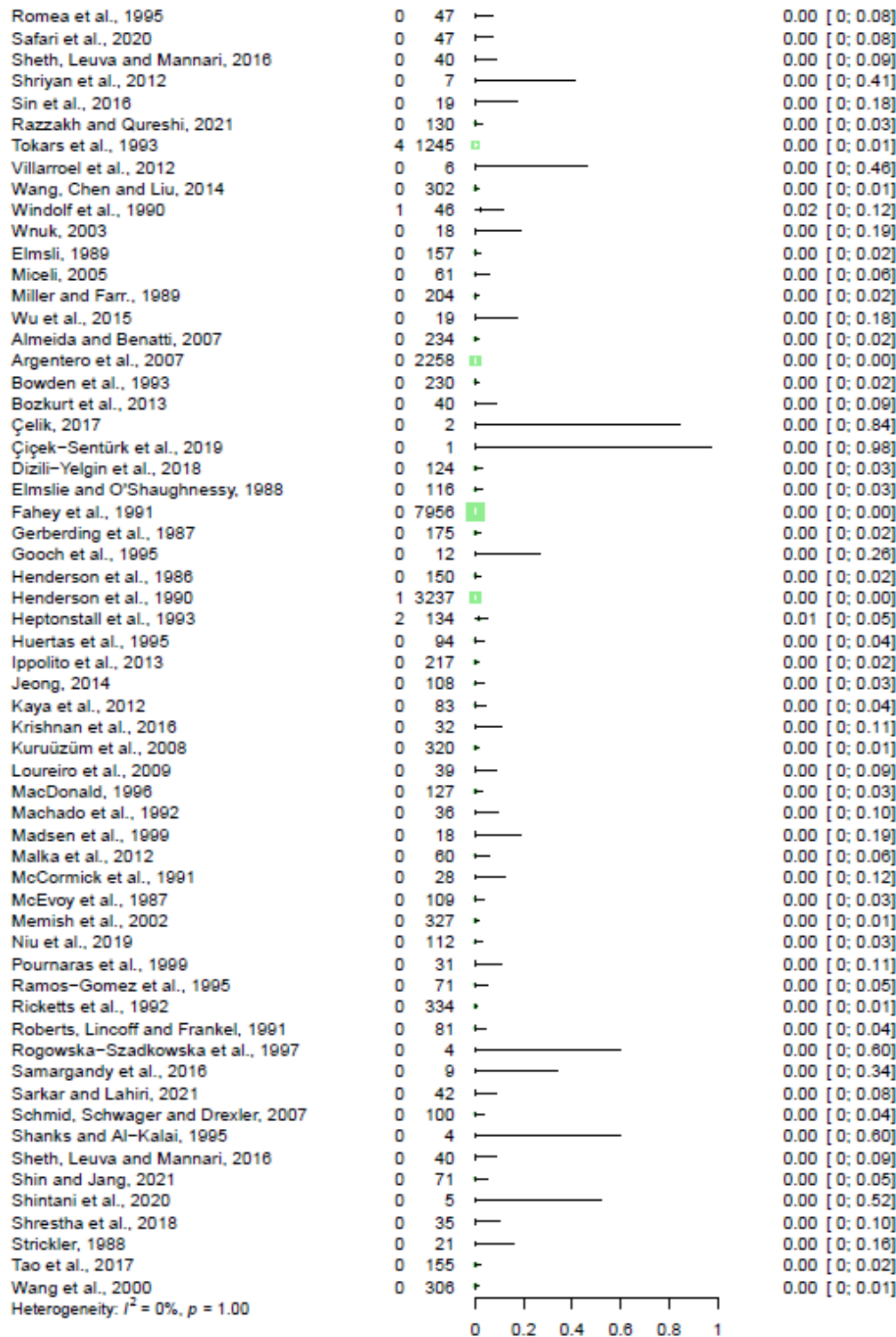


Supplementary Figure 14 - Funnel Plot of HIV Seroconversion From Total Occupational Exposures in Low-Prevalence Countries

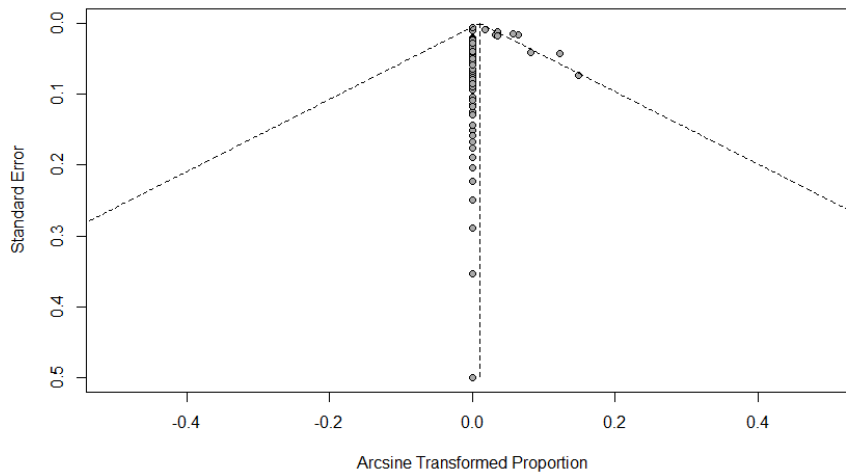


Supplementary Figure 15 - Meta-Analysis of HIV Seroconversion Among Individuals Completing Follow-Up in Low-Prevalence Countries

Study	Events	Total	Proportion	95%-CI
Alavi and Sharifi, 2013	0	92	0.00	[0; 0.04]
Andrade et al., 2014	1	148	0.01	[0; 0.04]
Aydin, Ergen and Çaskurlu., 2020	0	187	0.00	[0; 0.02]
Baldo et al., 2014	0	6	0.00	[0; 0.46]
Beghdadli et al., 2009	0	2	0.00	[0; 0.84]
Bi et al., 2008	0	595	0.00	[0; 0.01]
Çaglar-Özer, Altunal and Kadanali, 2020	0	51	0.00	[0; 0.07]
Cleveland et al., 2002	0	23	0.00	[0; 0.15]
Davanzo et al., 2008	0	150	0.00	[0; 0.02]
Juanes et al., 2007	0	40	0.00	[0; 0.09]
Tribonnieare et al., 2018	0	16	0.00	[0; 0.21]
El-Hazmi and Al-Majid, 2008	0	45	0.00	[0; 0.08]
Escudero, Furtado and Medeiros, 2015	0	484	0.00	[0; 0.01]
Fillaux et al., 2004	0	111	0.00	[0; 0.03]
Forseter, Joline and Wormser, 1994	0	113	0.00	[0; 0.03]
Ilario et al., 2004	0	295	0.00	[0; 0.01]
Gerberding, 1994	1	976	0.00	[0; 0.01]
Goel et al., 2017	0	11	0.00	[0; 0.28]
Gupta et al., 2008	0	217	0.00	[0; 0.02]
Gutierrez, Lopes e Yasuda, 2005	0	273	0.00	[0; 0.01]
Haytoglu and Gundeslioglu, 2018	0	3	0.00	[0; 0.71]
Ippolito, Puro and De Carli, 1993	2	1592	0.00	[0; 0.00]
Jaggi, Nirwan and Chakraborty, 2020	0	90	0.00	[0; 0.04]
Jayanth et al., 2009	0	293	0.00	[0; 0.01]
Kepenek and Sahin-Eker, 2017	0	98	0.00	[0; 0.04]
Ko et al., 2009	0	203	0.00	[0; 0.02]
Lee and Choi, 2023	0	444	0.00	[0; 0.01]
Lymer, Schiitz and Isaksson, 1996	0	108	0.00	[0; 0.03]
Mallon et al., 1992	0	8	0.00	[0; 0.37]
Marcus et al., 1988	4	963	0.00	[0; 0.01]
Mehta et al., 2005	0	15	0.00	[0; 0.22]
Mehta et al., 2010	0	10	0.00	[0; 0.31]
Nwaiwu et al., 2017	0	266	0.00	[0; 0.01]
Oakley, Gooch and Cockcroft, 1992	0	18	0.00	[0; 0.19]
Oh, Yi and Choe, 2005	0	40	0.00	[0; 0.09]
Pérez-Díaz et al., 2015	1	796	0.00	[0; 0.01]
Puro et al., 1992	0	224	0.00	[0; 0.02]
Puro, Ranchino and Profili, 1990	0	53	0.00	[0; 0.07]
Rajkumari et al., 2014	0	8	0.00	[0; 0.37]
Rele, Mathur and Turbadkar, 2002	0	10	0.00	[0; 0.31]
Rice, Tomkins and Ncube, 2015	0	2947	0.00	[0; 0.00]
Rishi et al., 2017	0	140	0.00	[0; 0.03]



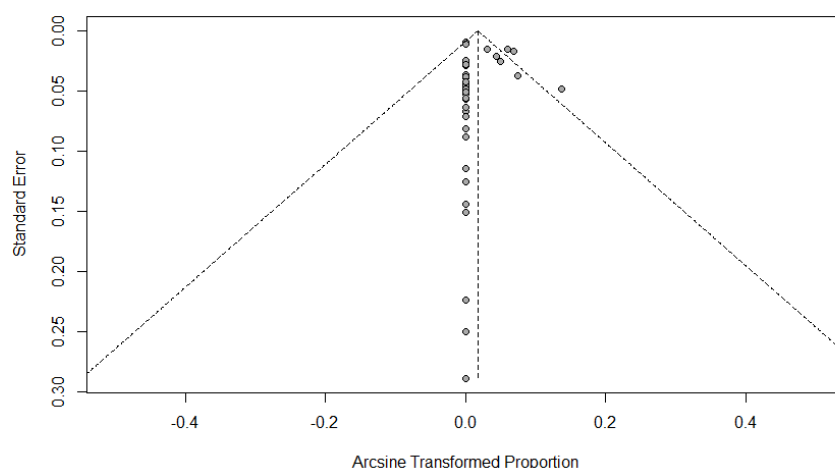
Supplementary Figure 16 - Funnel Plot of HIV Seroconversion Among Individuals Completing Follow-Up in Low-Prevalence Countries



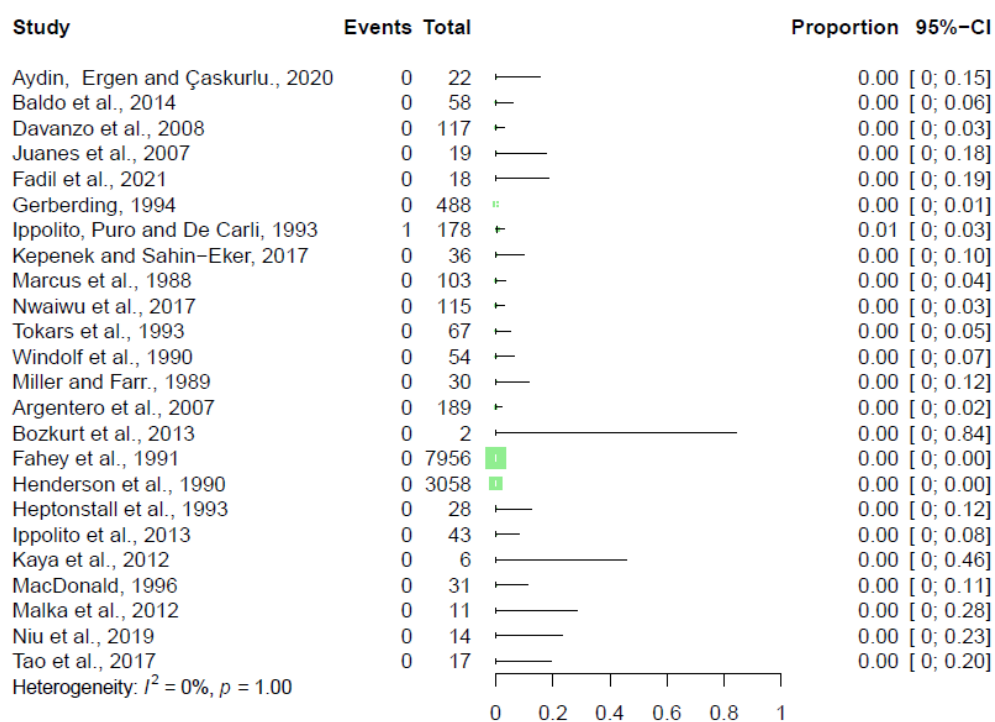
Supplementary Figure 17 - Meta-Analysis of HIV Seroconversion Following Percutaneous Exposures in Low-Prevalence Countries

Study	Events	Total	Proportion	95%-CI
Aydin, Ergen and Çaskurlu., 2020	0	165	0.00	[0; 0.02]
Baldo et al., 2014	0	187	0.00	[0; 0.02]
Davanzo et al., 2008	0	380	0.00	[0; 0.01]
Juanes et al., 2007	0	56	0.00	[0; 0.06]
Tribonnieare et al., 2018	0	16	0.00	[0; 0.21]
El-Hazmi and Al-Majid, 2008	0	133	0.00	[0; 0.03]
Fadil et al., 2021	0	113	0.00	[0; 0.03]
Fillaux et al., 2004	0	111	0.00	[0; 0.03]
Forseter, Joline and Wormser, 1994	0	113	0.00	[0; 0.03]
Gerberding, 1994	1	392	0.00	[0; 0.01]
Goel et al., 2017	0	11	0.00	[0; 0.28]
Gupta et al., 2008	0	401	0.00	[0; 0.01]
Haytoglu and Gundeslioglu, 2018	0	3	0.00	[0; 0.71]
Ippolito, Puro and De Carli, 1993	1	1052	0.00	[0; 0.01]
Jaggi, Nirwan and Chakraborty, 2020	0	90	0.00	[0; 0.04]
Jayanth et al., 2009	0	293	0.00	[0; 0.01]
Kepenek and Sahin-Eker, 2017	0	62	0.00	[0; 0.06]
Marcus et al., 1988	4	860	0.00	[0; 0.01]
Nwaiwu et al., 2017	0	140	0.00	[0; 0.03]
Rice, Tomkins and Ncube, 2015	0	2947	0.00	[0; 0.00]
Rishi et al., 2017	0	140	0.00	[0; 0.03]
Tokars et al., 1993	4	1103	0.00	[0; 0.01]
Windolf et al., 1990	1	532	0.00	[0; 0.01]
Miller and Farr., 1989	0	174	0.00	[0; 0.02]
Wu et al., 2015	0	19	0.00	[0; 0.18]
Argentero et al., 2007	0	2069	0.00	[0; 0.00]
Bozkurt et al., 2013	0	38	0.00	[0; 0.09]
Dizili-Yelgin et al., 2018	0	124	0.00	[0; 0.03]
Gooch et al., 1995	0	12	0.00	[0; 0.26]
Henderson et al., 1990	1	179	0.01	[0; 0.03]
Heptonstall et al., 1993	2	106	0.02	[0; 0.07]
Ippolito et al., 2013	0	96	0.00	[0; 0.04]
Jeong, 2014	0	108	0.00	[0; 0.03]
Kaya et al., 2012	0	77	0.00	[0; 0.05]
Krishnan et al., 2016	0	32	0.00	[0; 0.11]
MacDonald, 1996	0	96	0.00	[0; 0.04]
Malka et al., 2012	0	49	0.00	[0; 0.07]
Memish et al., 2002	0	327	0.00	[0; 0.01]
Niu et al., 2019	0	81	0.00	[0; 0.04]
Shanks and Al-Kalai, 1995	0	4	0.00	[0; 0.60]
Shintani et al., 2020	0	5	0.00	[0; 0.52]
Tao et al., 2017	0	138	0.00	[0; 0.03]
Heterogeneity: $I^2 = 0\%$, $p = 0.51$				

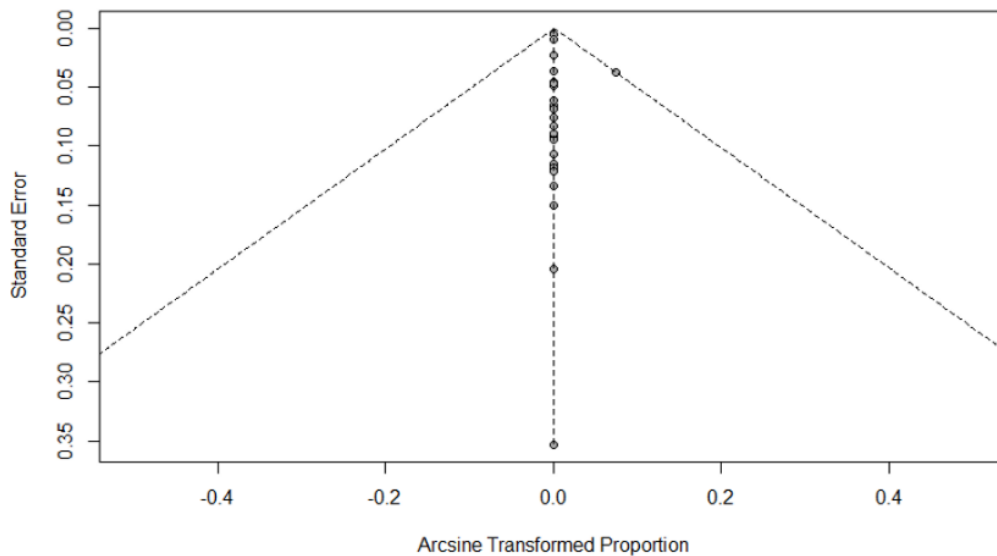
Supplementary Figure 18 - Funnel Plot of HIV Seroconversion Following Percutaneous Exposures in Low-Prevalence Countries



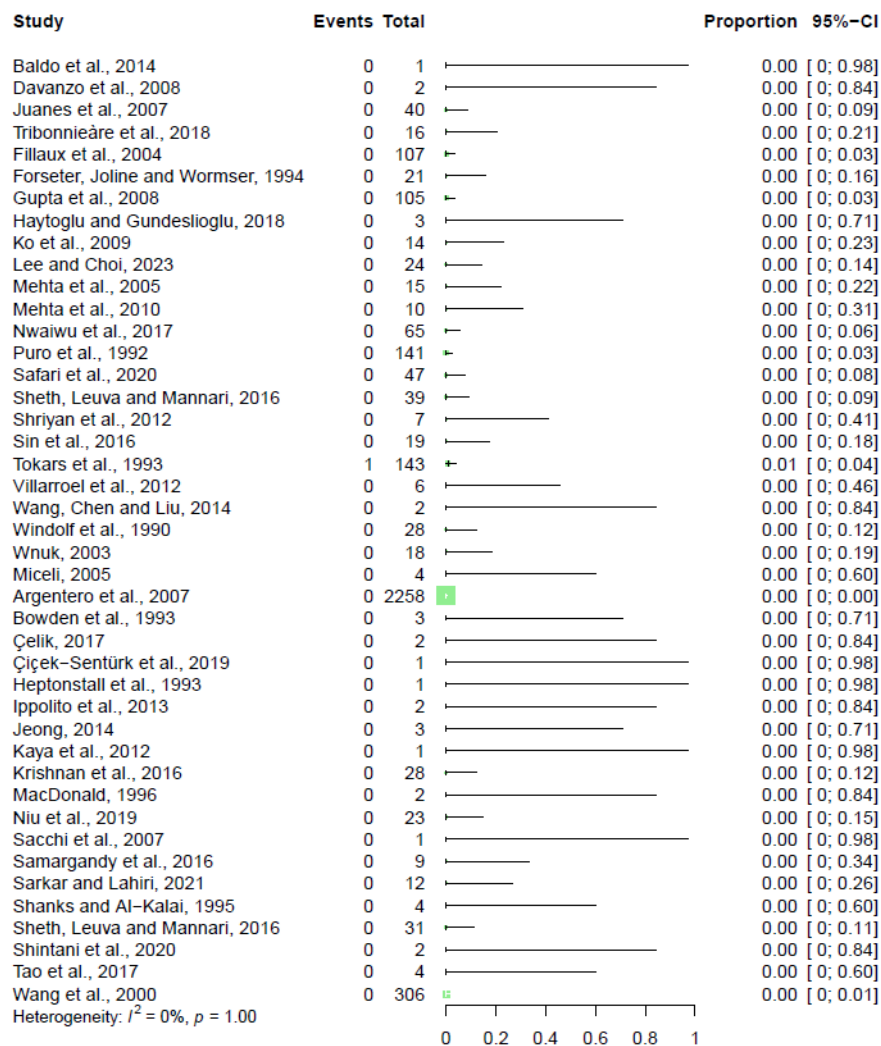
Supplementary Figure 19 - Meta-Analysis of HIV Seroconversion Following Mucocutaneous Exposures in Low-Prevalence Countries



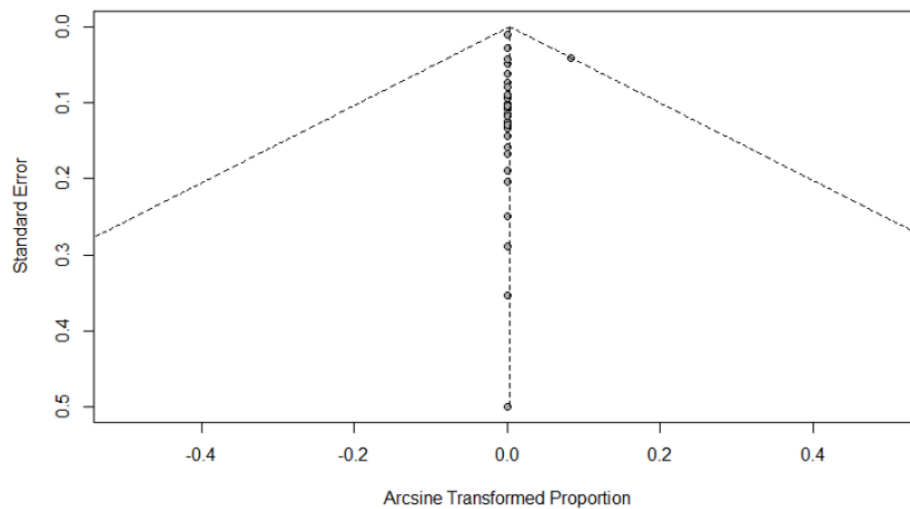
Supplementary Figure 20 - Funnel Plot of HIV Seroconversion Following Mucocutaneous Exposures in Low-Prevalence Countries



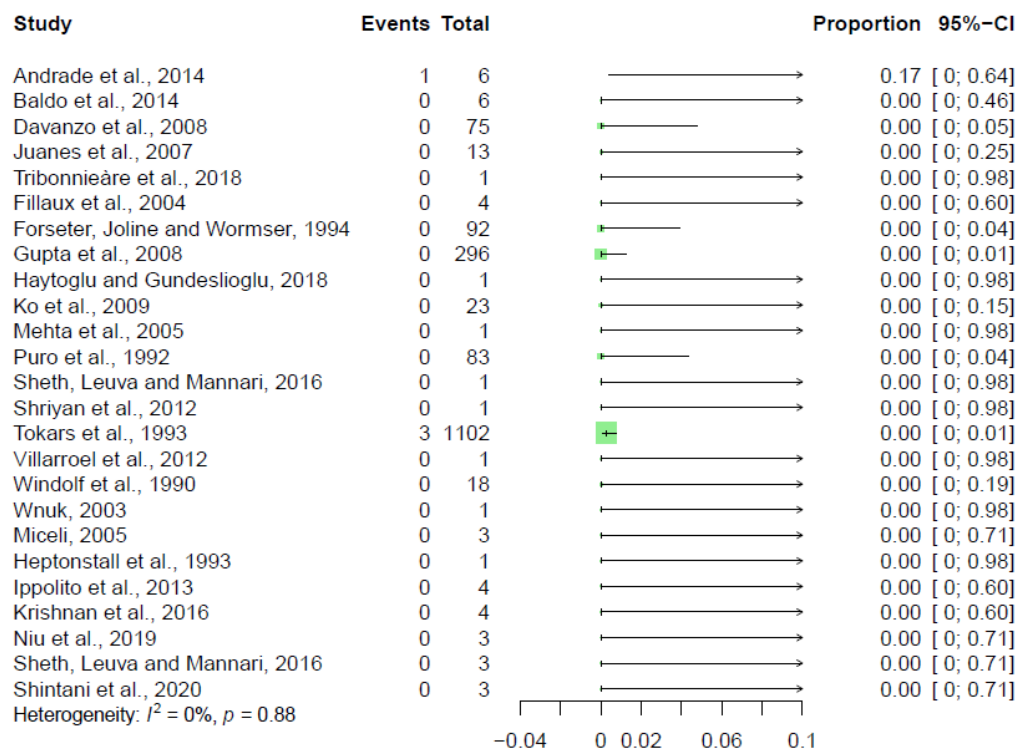
Supplementary Figure 21 - Meta-Analysis of HIV Seroconversion Among Individuals Using PEP in Low-Prevalence Countries



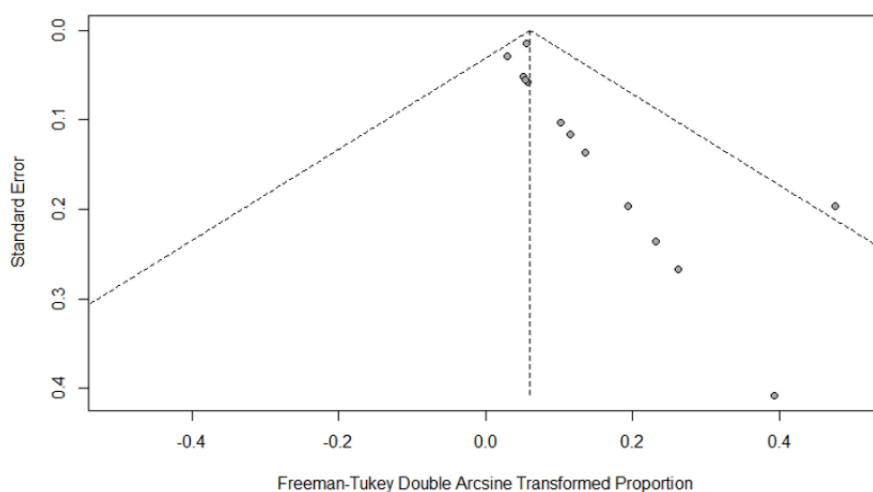
Supplementary Figure 22 - Funnel Plot of HIV Seroconversion Among Individuals Using PEP in Low-Prevalence Countries



Supplementary Figure 23 - Meta-Analysis of HIV Seroconversion Among Individuals With PEP Indication but Without PEP Use in Low-Prevalence Countries

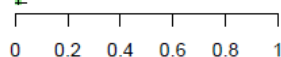


Supplementary Figure 24 - Funnel Plot of HIV Seroconversion Among Individuals With PEP Indication but Without PEP Use in Low-Prevalence Countries

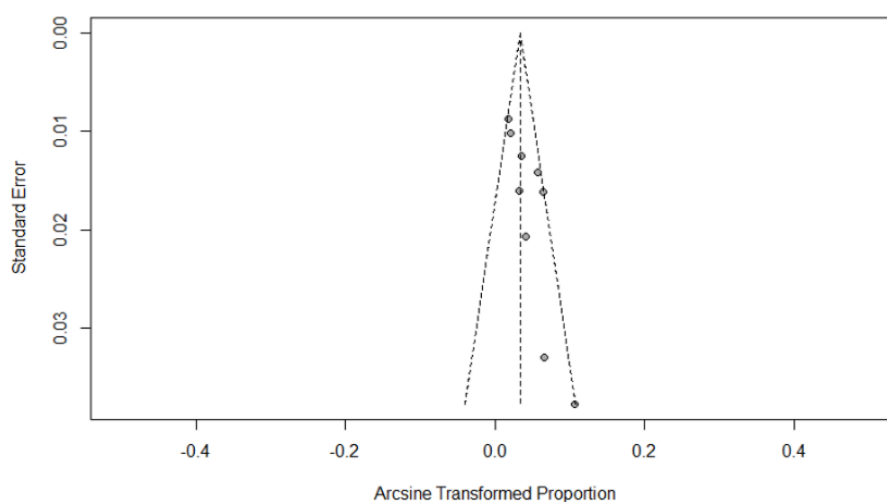


Supplementary Figure 25 - Meta-Analysis of HIV Seroconversion From Total Occupational Exposures in Low-Prevalence Countries Reporting Seroconversion

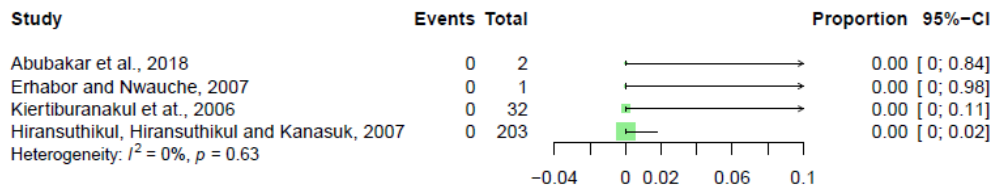
Study	Events	Total	Proportion	95%-CI
Andrade et al., 2014	1	231	0.00	[0; 0.02]
Gerberding, 1994	1	976	0.00	[0; 0.01]
Ippolito, Puro and De Carli, 1993	2	1592	0.00	[0; 0.00]
Marcus et al., 1988	4	963	0.00	[0; 0.01]
Pérez-Díaz et al., 2015	1	2403	0.00	[0; 0.00]
Tokars et al., 1993	4	1245	0.00	[0; 0.01]
Windolf et al., 1990	1	586	0.00	[0; 0.01]
Henderson et al., 1990	1	3237	0.00	[0; 0.00]
Heptonstall et al., 1993	2	176	0.01	[0; 0.04]
Heterogeneity: $I^2 = 51\%$, $p = 0.04$				



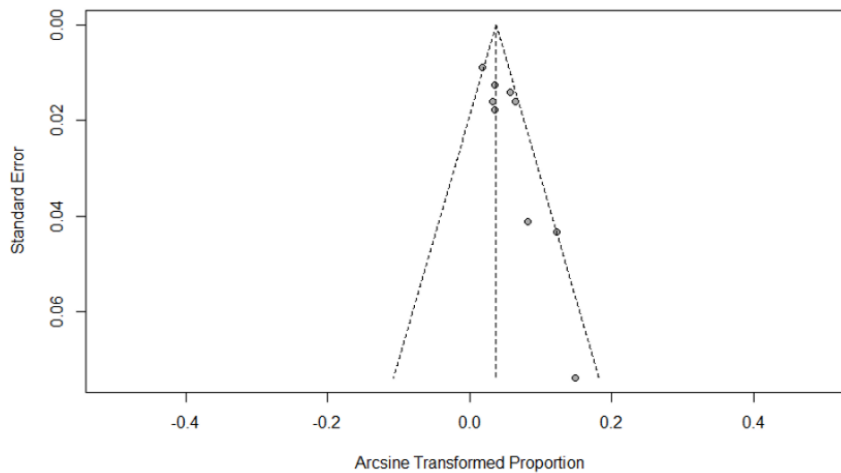
Supplementary Figure 26 - Funnel Plot of HIV Seroconversion From Total Occupational Exposures in Low-Prevalence Countries Reporting Seroconversion



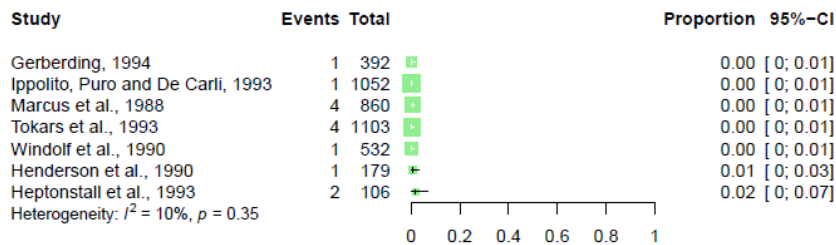
Supplementary Figure 27 - Meta-Analysis of HIV Seroconversion Among Individuals Completing Follow-Up in Low-Prevalence Countries Reporting Seroconversion



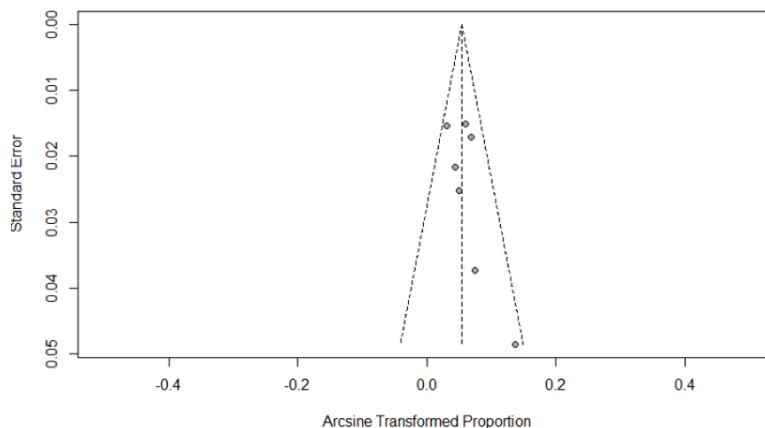
Supplementary Figure 28 - Funnel Plot of HIV Seroconversion Among Individuals Completing Follow-Up in Low-Prevalence Countries Reporting Seroconversion



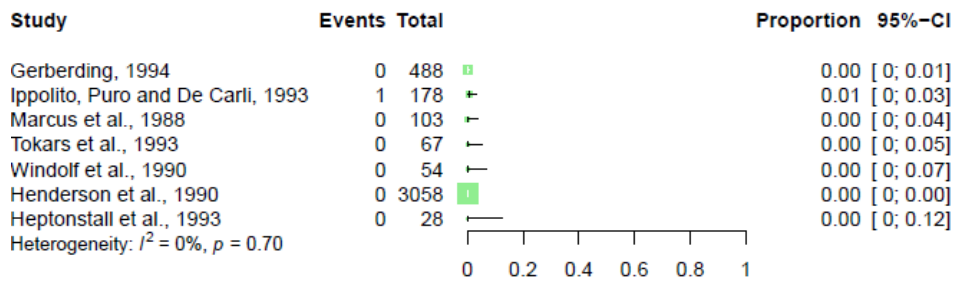
Supplementary Figure 29 - Meta-Analysis of HIV Seroconversion Following Percutaneous Exposures in Low-Prevalence Countries Reporting Seroconversion



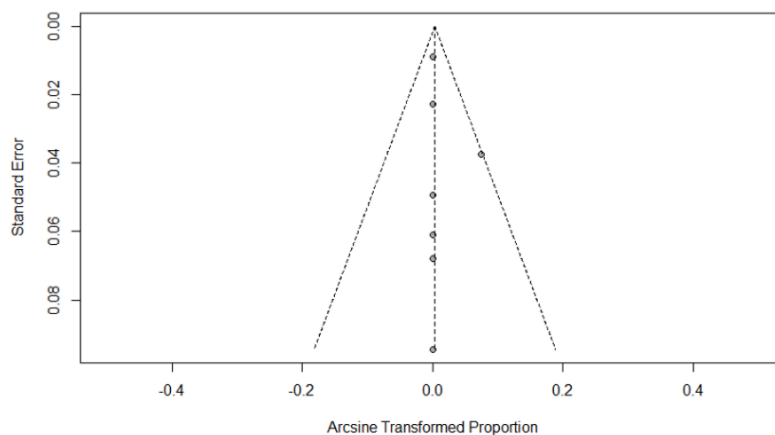
Supplementary Figure 30 - Funnel Plot of HIV Seroconversion Following Percutaneous Exposures in Low-Prevalence Countries Reporting Seroconversion



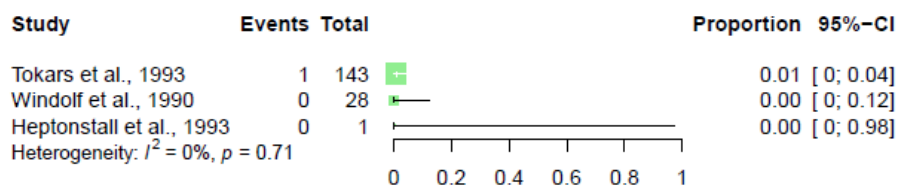
Supplementary Figure 31 - Meta-Analysis of HIV Seroconversion Following Mucocutaneous Exposures in Low-Prevalence Countries Reporting Seroconversion



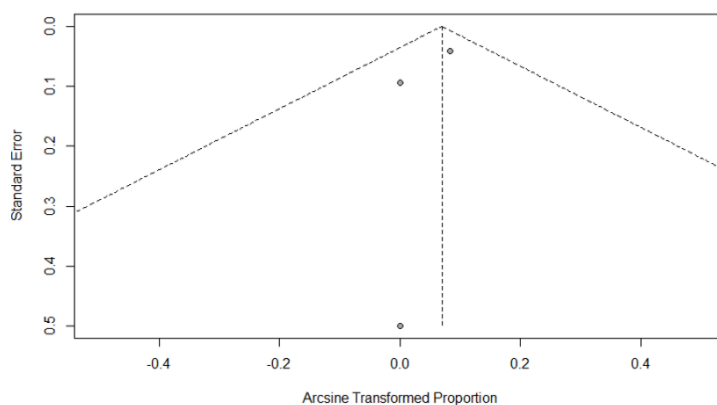
Supplementary Figure 32 - Funnel Plot of HIV Seroconversion Following Mucocutaneous Exposures in Low-Prevalence Countries Reporting Seroconversion



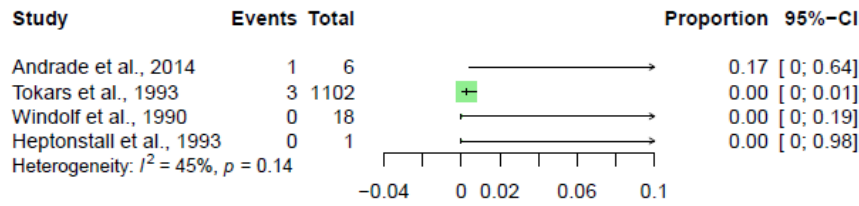
Supplementary Figure 33 - Meta-Analysis of HIV Seroconversion Among Individuals Using PEP in Low-Prevalence Countries Reporting Seroconversion



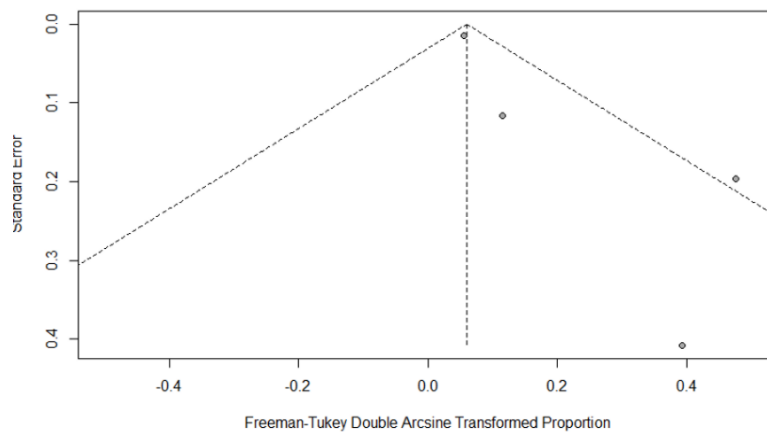
Supplementary Figure 34 - Funnel Plot of HIV Seroconversion Among Individuals Using PEP in Low-Prevalence Countries Reporting Seroconversion



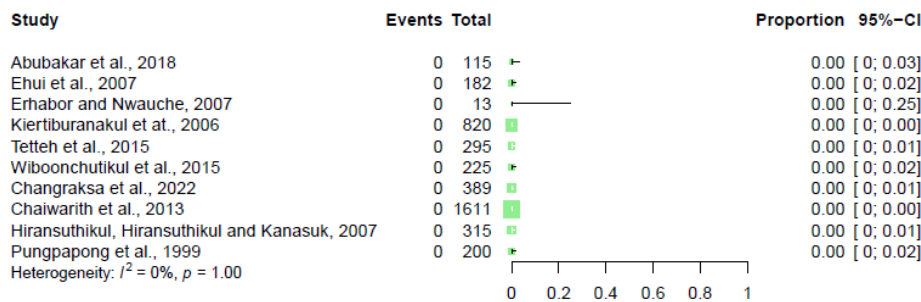
Supplementary Figure 35 - Meta-Analysis of HIV Seroconversion Among Individuals With PEP Indication but Without PEP Use in Low-Prevalence Countries Reporting Seroconversion



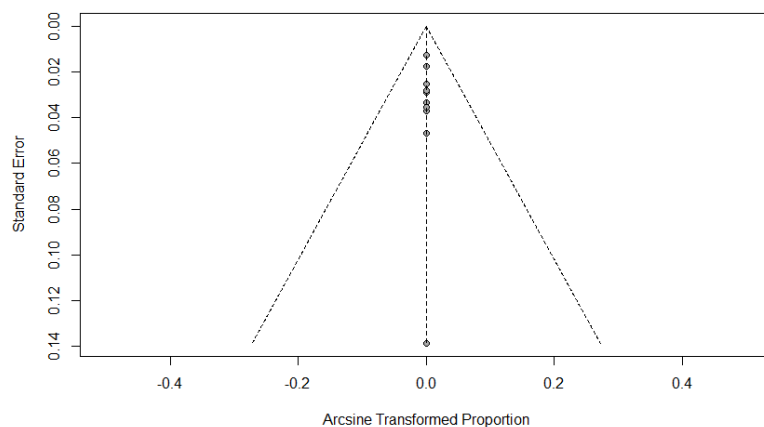
Supplementary Figure 36 - Funnel Plot of HIV Seroconversion Among Individuals With PEP Indication but Without PEP Use in Low-Prevalence Countries Reporting Seroconversion



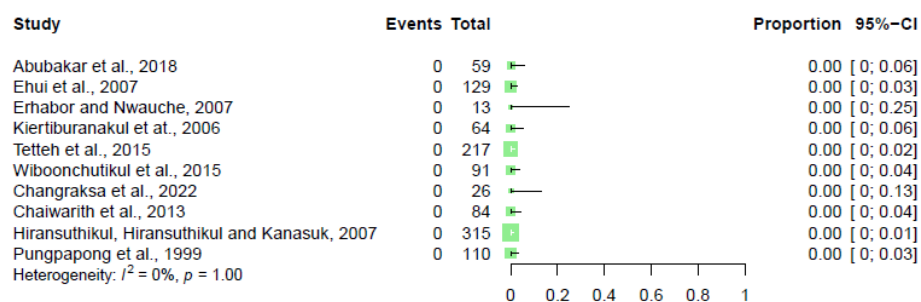
Supplementary Figure 37 - Meta-Analysis of Seroconversion Among Occupational Exposures in High-Prevalence Countries



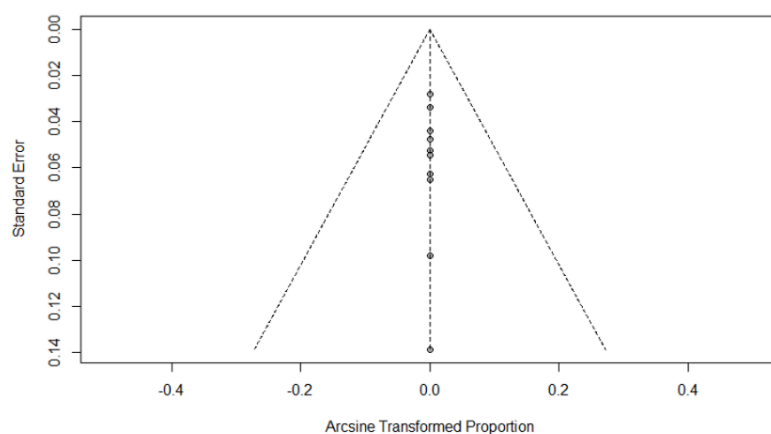
Supplementary Figure 38 - Funnel Plot of Meta-Analysis for Total Occupational Exposures in High-Prevalence Countries



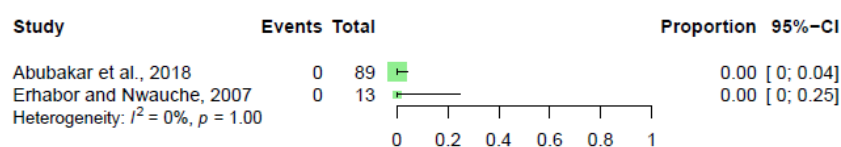
Supplementary Figure 39 - Meta-Analysis of Followed-Up Exposures in High-Prevalence Countries



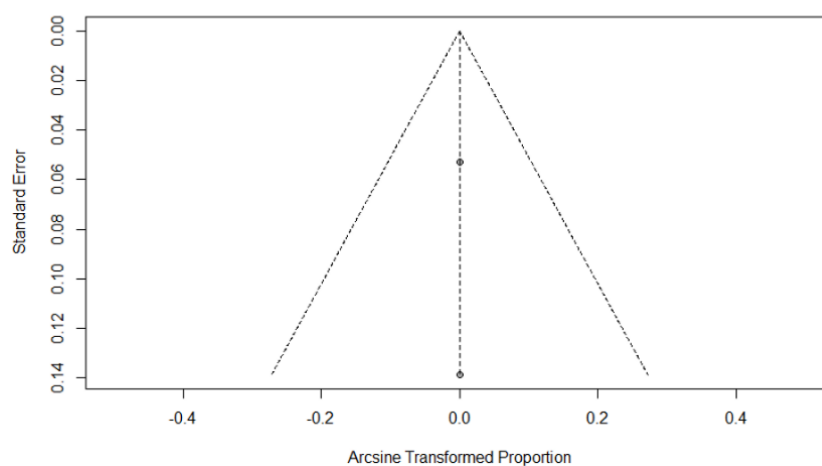
Supplementary Figure 40 - Funnel Plot of Follow-Up Exposure Meta-Analysis in High-Prevalence Countries



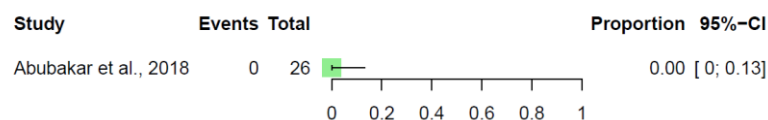
Supplementary Figure 41 - Meta-Analysis of Percutaneous Exposures in High-Prevalence Countries



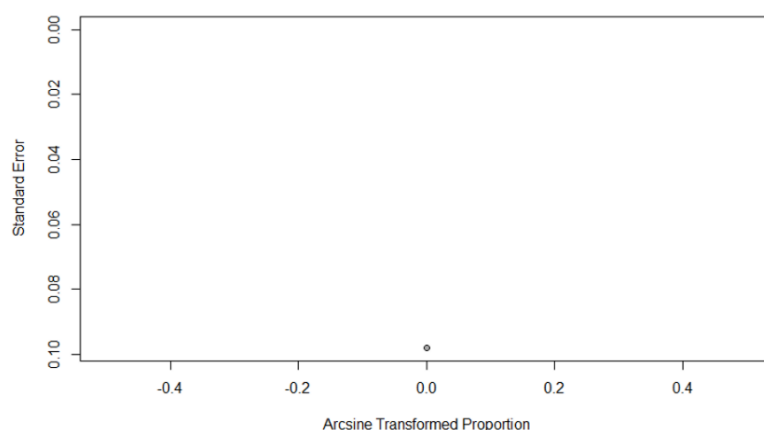
Supplementary Figure 42 - Funnel Plot of Percutaneous Exposure Meta-Analysis in High-Prevalence Countries



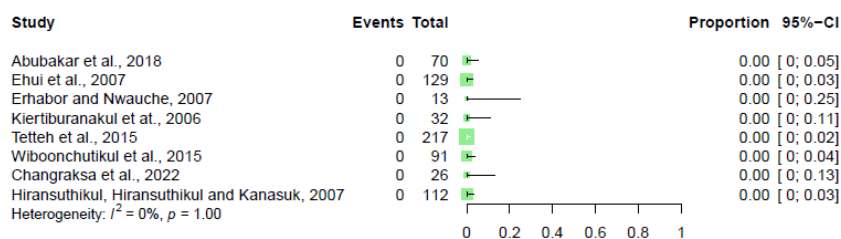
Supplementary Figure 43 - Meta-Analysis of Mucocutaneous Exposures in High-Prevalence Countries



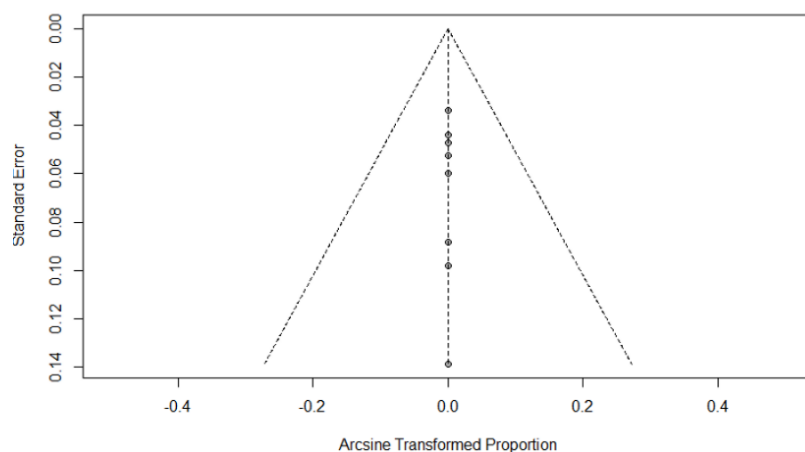
Supplementary Figure 44 - Funnel Plot of Mucocutaneous Exposure Meta-Analysis in High-Prevalence Countries



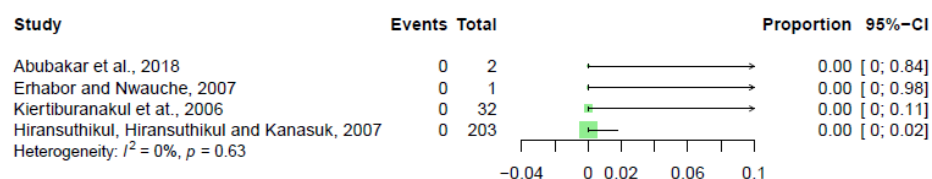
Supplementary Figure 45 - Meta-Analysis of Seroconversion Among Individuals Using PEP in High-Prevalence Countries



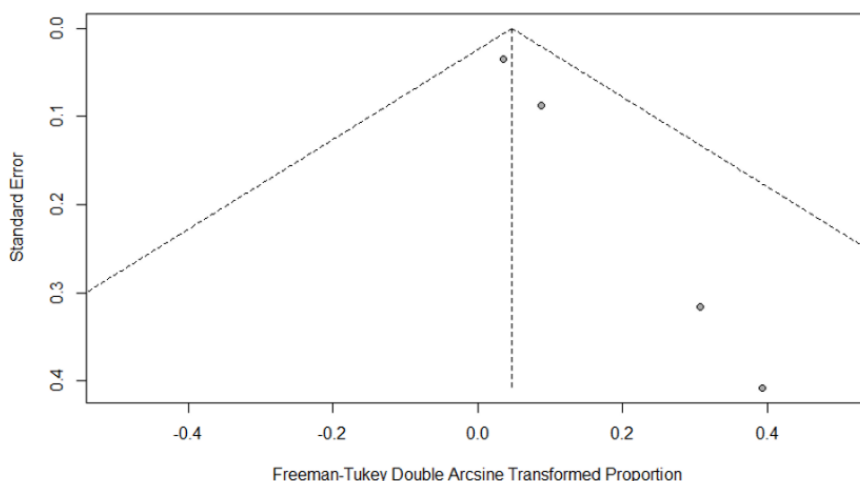
Supplementary Figure 46 - Funnel Plot of PEP-Use Meta-Analysis in High-Prevalence Countries



Supplementary Figure 47 - Meta-Analysis of Individuals With PEP Indication but Without Use in High-Prevalence Countries



Supplementary Figure 48 - Funnel Plot of Meta-Analysis for Individuals With PEP Indication but Without Use in High-Prevalence Countries



6.3 Terceiro produto científico

O terceiro produto científico corresponde ao manuscrito elaborado a partir do estudo descritivo sobre a qualidade dos registros de acidentes biológicos ocupacionais em ambientes odontológicos no município de Belo Horizonte, entre 2006 e 2019, desenvolvido na terceira vertente metodológica da pesquisa. Intitulado "*Completitude, consistência e duplicidade dos registros de acidentes com exposição a material biológico em ambientes odontológicos: estudo descritivo, Belo Horizonte, Minas Gerais, 2006–2019*", o artigo foi submetido ao periódico Epidemiologia e Serviços de Saúde (RESS) (Apêndice F). Possui classificação A3 na área de Saúde Coletiva, segundo o Qualis/CAPES mais recente. O manuscrito encontra-se atualmente em etapa de revisão editorial, após avaliação pelos revisores da revista. A decisão enviada pela RESS em 4 de novembro de 2025 já foi respondida pelos autores.

Completitude, consistência e duplicidade dos registros de acidentes com exposição a material biológico em ambientes odontológicos: estudo descritivo, Belo Horizonte, Minas Gerais, 2006–2019

Resumo

Objetivo: Avaliar a duplicidade, completitude e consistência interna dos registros de acidentes com exposição a material biológico em ambientes odontológicos, Belo Horizonte, Minas Gerais, 2006–2019. **Método:** Estudo descritivo com dados do Sistema de Informação de Agravos de Notificação, incluindo-se variáveis de identificação, dados sociodemográficos e laborais, circunstâncias do acidente, uso de equipamentos de proteção, exames laboratoriais, conduta e evolução. A duplicidade foi identificada por combinações determinísticas e probabilísticas. A completitude foi classificada como excelente ($\geq 95\%$), boa (90–94,9%), regular (70–89,9%), ruim (50–69,9%) e muito ruim ($< 50\%$). A consistência foi avaliada em pares de variáveis e classificada como excelente ($\geq 90\%$), regular (70–89%) e baixa ($< 70\%$). **Resultados:** Foram analisados 1.054 registros, sem duplicidades identificadas. Variáveis obrigatórias apresentaram completitude excelente, exceto “Gestante” (847; 80,4%) e “Emissão da Comunicação de Acidente de Trabalho” (796; 75,5%) que foram classificadas como regulares. A frequência de preenchimento para “Óculos” foi de 78,0% (n=822) e “Luvas”, 89,9% (n=947). Todos os exames laboratoriais do acidentado e do paciente-fonte, referentes à detecção de infecções por vírus da imunodeficiência humana e das hepatites B e C, apresentaram completitude $< 50\%$, classificados como muito ruins. “Conduta no momento do acidente” e “Evolução do caso” apresentaram completitude também $< 50\%$, ambas muito ruins. Na consistência, “Paciente-fonte conhecido” e “Resultados dos testes do paciente-fonte” (138; 13,1%) e “Tipo de exposição e Agente causador” (147; 13,5%) foram regulares, e “Evolução do caso” (581; 55,1%), baixa. **Conclusão:** Não houve duplicidades, e as variáveis clínicas e laborais apresentaram falhas de completitude e consistência.

Palavras-chaves: Exposição Ocupacional; Odontologia; Acidentes de Trabalho; Qualidade dos Dados; Estudos Descritivos.

Aspectos éticos		
Esta pesquisa respeitou os princípios éticos, obtendo os seguintes dados de aprovação:		
Comitê de ética em pesquisa	Número do parecer	Data de aprovação
Comitê de Ética em Pesquisa da Universidade Federal de Minas Gerais	6.097.439	02 de junho de 2023.
Comitê de Ética em Pesquisa da Secretaria Municipal de Saúde de Belo Horizonte	6.161.565	04 de julho de 2023.
Registro do consentimento livre e esclarecido	A pesquisa utilizou dados secundários e obteve dispensa do Termo de Consentimento Livre e Esclarecido, conforme aprovado pelos comitês de ética, considerando a natureza retrospectiva das informações e a impossibilidade de contato com os participantes. Por conter informações nominativas, campos abertos e variáveis internas de controle,	

	trata-se de base não publicizada, com acesso restrito e manutenção sob sigilo.

Introdução

A exposição a material biológico constitui um problema global entre profissionais da saúde, com prevalência ao longo da carreira de 56,6% (1). Esses acidentes implicam risco de soroconversão ao HIV, vírus da hepatite B e vírus da hepatite C, além de custos assistenciais, afastamento do trabalho e impacto psicológico (2). Entre as diversas áreas da saúde, a odontologia destaca-se pelo alto potencial de exposição. Revisões sistemáticas sobre acidentes percutâneos revelam uma prevalência global de 44% entre estudantes de Odontologia (3), 44% entre auxiliares, sendo que limpeza de instrumentais e manuseio de seringas de anestesia são procedimentos de elevado risco (4). Quando se comparam categorias de profissionais da saúde, cirurgiões-dentistas apresentam a maior prevalência anual, totalizando 59% (5). No Brasil, houve 36.171 (4,5%) casos notificados de acidentes de trabalho a partir da realização de procedimentos odontológicos, entre 2006 e 2022 (6). Em Belo Horizonte (2019–2024), a plataforma de tabulação do Departamento de Informática do Sistema Único de Saúde, com base nos registros do Sistema de Informação de Agravos de Notificação, aponta 8.607 acidentes no período, dos quais 366 ocorreram durante um procedimento odontológico (4,25%) (7).

Diante dessas consequências, torna-se essencial o monitoramento sistemático dos casos. No Brasil, o Sistema de Informação de Agravos de Notificação constitui a principal ferramenta para esse acompanhamento e para orientar ações de vigilância (8,9). A qualidade dos registros pode ser avaliada por completitude, consistência interna e duplicidade (10,11). Entre 2010 e 2015, a avaliação das notificações de acidentes com exposição a material biológico evidenciou variação expressiva na completitude das variáveis essenciais, que variou de excelente a muito ruim, sem que houvesse análise dos atributos de consistência ou duplicidade (12). Esses resultados indicam lacunas na verificação sistemática da qualidade dos registros, o que pode comprometer a comparabilidade e o uso dos dados para ações de vigilância. Situação semelhante é observada em outros agravos. No monitoramento de sarampo em Pernambuco, entre 2018 e 2022, foram identificadas notificações duplicadas, revelando fragilidades nas rotinas de depuração do sistema (11). Esses achados reforçam a importância de ampliar o escopo das avaliações de qualidade do sistema, incorporando a análise de duplicidade e consistência para fortalecer a confiabilidade das informações de vigilância.

Embora a qualidade dos sistemas de informação em saúde venha sendo cada vez mais estudada, não foram identificados estudos voltados especificamente para acidentes de trabalho com exposição a material biológico em ambientes odontológicos. A avaliação destes parâmetros permite identificar a possibilidade de geração de conhecimento destes Sistemas de Informação, contribuindo para políticas públicas que superem obstáculos para a existência de melhores informações em saúde pública. Diante desse cenário, este estudo objetiva avaliar a duplicidade, completitude e consistência interna dos registros de acidentes com exposição a material biológico em ambientes odontológicos de Belo Horizonte, Minas Gerais, 2006–2019.

Métodos

Este estudo observacional transversal descritivo foi reportado conforme a diretriz *Reporting of studies Conducted using Observational Routinely-collected health Data* (13). Foram utilizados dados de Belo Horizonte do Sistema de Informação de Agravos de Notificação, abrangendo notificações de 2006 a 2019, período correspondente à disponibilidade

do banco municipal informatizado e anterior às distorções provocadas pela pandemia de covid-19 (14). Registros posteriores foram excluídos em razão das distorções provocadas pela pandemia de Covid-19, que reduziram as notificações em ambientes odontológicos a níveis residuais, inviabilizando análises consistentes e comparáveis (14). O acesso ao banco de dados ocorreu em 01 de agosto de 2023.

A população do estudo foi composta por todas as notificações de acidentes com exposição a material biológico em ambientes odontológicos. Foram incluídos, assim, registros que apresentaram ao menos uma das seguintes características: a ocupação, segundo a Classificação Brasileira de Ocupação, de cirurgião-dentista (código 2.232), técnico de saúde bucal, auxiliar de saúde bucal, atendente ou auxiliar odontológico, (código 3.224); ou a Classificação Nacional de Atividades Econômicas na área odontológica (códigos 8630-5/04, 8650-0/03 e outros identificados por evidências complementares); ou circunstância do acidente (código 13); ou menções nos campos de observação por filtros textuais (“odont*” ou “dent*”). Notificações que não se enquadravam em pelo menos uma destas quatro características anteriores foram excluídas. O banco foi fornecido pela Secretaria Municipal de Saúde de Belo Horizonte, sem exclusão prévia de duplicidades, e a seleção final foi validada pela Coordenação de Saúde do Trabalhador.

As variáveis foram classificadas em obrigatórias (campos cujo preenchimento é indispensável para a validação da notificação) e essenciais (informações relevantes para análise epidemiológica, mas não impeditivas da digitação), conforme definições do sistema (8,9). A classificação e os códigos do sistema estão descritos na Tabela Suplementar 1. As variáveis seguiram as definições do manual técnico do agravo Acidente com Exposição a Material Biológico (9), elaborado pela Secretaria da Saúde do Estado do Ceará, adotado por tratar de forma específica esse agravo. As definições foram utilizadas em consonância com manuais do Ministério da Saúde (8,15), que apresentam orientações conceituais e metodológicas voltadas à vigilância de agravos e à avaliação da qualidade das informações em sistemas de saúde.

A qualidade dos dados foi analisada considerando três atributos: duplicidade (10,11), completitude (10,11) e consistência (10,11), conforme operacionalizado em estudos nacionais (10,11). A duplicidade foi definida como registros do mesmo acidente notificados mais de uma vez para o mesmo paciente em curto intervalo (8). A verificação ocorreu em duas etapas (8): determinística, pelo cruzamento direto de nome, data de nascimento, sexo e data do acidente; e probabilística, com uso de algoritmos Soundex e fonética para identificar registros semelhantes apesar de variações ortográficas. Adicionalmente, adotou-se uma janela temporal de até sete dias entre notificações de um mesmo indivíduo como critério complementar para detecção de repetições decorrentes de erros de digitação, sem confundir eventos distintos. Esse intervalo foi definido considerando que o manual próprio do sistema exemplifica duplicidades em agravos agudos quando notificações ocorrem na mesma semana epidemiológica, unidade temporal oficialmente equivalente a sete dias consecutivos (16). Como acidentes com material biológico são eventos agudos e de notificação imediata (16), a adoção desse intervalo é coerente com a natureza e o ciclo operacional do agravo. Registros fora desse período também foram verificados pelas etapas determinística e probabilística, garantindo a identificação de duplicidades não temporais.

A completitude foi avaliada pela proporção de preenchimento válido em cada variável, considerando incompletos tanto campos em branco quanto codificados como “ignorado” (8). Foram aplicados os pontos de corte de Romero e Cunha (17), adaptados pelo manual do Ministério da Saúde (8), que classifica cada variável avaliada pelo percentual de preenchimento completo: $\geq 95\%$ (excelente); 90–94,9% (bom); 70–89,9% (regular); 50–69,9% (ruim); $< 50\%$

(muito ruim). Para a variável gestante, a categoria “não se aplica”, atribuída a registros masculinos, foi considerada preenchimento válido (8).

A consistência interna foi definida como a coerência entre variáveis que devem apresentar relação lógica (8), com base em fundamentos técnico-epidemiológicos do manual de exposição a material biológico do Ministério da Saúde (15) e nos manuais de qualidade do sistema (8,9). Foram testadas as combinações: sexo e gravidez; tipo de exposição e circunstância do acidente; tipo de exposição e agente causador; paciente-fonte conhecido e resultados laboratoriais; idade e tempo de ocupação; terceirização e nome da empresa contratante; evolução do caso. Os critérios operacionais e exemplos de incompatibilidades estão descritos na Tabela Suplementar 2. A consistência foi classificada como excelente quando $\geq 90\%$ das combinações foram excelente, regular entre 70–89% e baixa quando $< 70\%$ (18).

Os dados foram disponibilizados em formato Excel (Microsoft Corp., Redmond, WA, USA) e processados no Python (versão 3.13.1; *Python Software Foundation*) com uso das bibliotecas Pandas (2.2.2) e NumPy (1.26.4). As etapas incluíram padronização de categorias e códigos de valores ignorados, uniformização de textos, remoção de espaços em branco, conversão de datas para formato adequado, cálculo de idade no momento do acidente e de tempo de ocupação em anos inteiros. Também foram criadas variáveis derivadas, como a chave composta para detecção de duplicidades. Quando a idade estava ausente, foi recalculada a partir da data de nascimento e da data do acidente. Valores impossíveis, como tempo de ocupação superior à idade, foram recodificados como inválidos. As etapas de validação, padronização e depuração do banco consolidado estão sintetizadas na Figura Suplementar 1.

Os resultados foram expressos em números absolutos e percentuais para duplicidade, completitude e consistência. Scripts e documentação do fluxo metodológico constam no material suplementar.

Resultados

Do total de 12.717 registros de acidentes com exposição a material biológico, 1.054 atenderam aos critérios de inclusão e compuseram a análise (figura suplementar 2). Não foram observadas duplicidades, e dois registros adicionais corresponderam a acidentes distintos em um mesmo trabalhador.

Entre as variáveis obrigatórias (Tabela 1), observou-se completitude excelente em 16 dos 18 dos campos, exceto “Gestante” (80,4%) e “Emissão da Comunicação de Acidente de Trabalho” (75,5%), classificadas como regulares. Das variáveis essenciais, o “Tipo de exposição” (Tabela 2) apresentou maior proporção de registros para acidentes percutâneos (90,8%). As variáveis clínicas (Tabela 2) apresentaram as menores proporções de preenchimento, sendo que todas foram classificadas como de completitude muito ruim ($< 50\%$). As demais proporções podem ser identificadas na Tabela 2.

Na avaliação de consistência (Tabela 3), a maioria das combinações foi classificada como excelente. As combinações “Paciente-fonte conhecido e Resultados laboratoriais” (13,1%) e “Tipo de exposição e Agente causador” (13,5%) apresentaram consistência regular, enquanto “Evolução do caso” apresentou consistência baixa (55,1%).

Discussão

A avaliação dos registros de acidentes com exposição a material biológico em ambientes odontológicos de Belo Horizonte no período analisado evidenciou ausência de duplicidades e

completitude excelente na maioria das variáveis obrigatórias. Para as variáveis essenciais, observou-se uma variabilidade no Sistema de Informação, de muito ruim a excelente. Importantes variáveis para o evento, tais como caracterização do acidente e desfechos clínicos em acidentes com material biológico em ambientes odontológicos tiveram, frequentemente, desempenho muito ruim e ruim. A consistência interna foi classificada como regular entre “Paciente-fonte conhecido e Resultados laboratoriais” e “Tipo de exposição e Agente causador”, além de baixa coerência para “Evolução do caso”. Esses achados são preocupantes para o seguimento e a vigilância epidemiológica dos profissionais de saúde bucal acidentados.

Ressalta-se que os resultados deste estudo devem ser interpretados considerando as limitações inerentes ao delineamento descritivo e ao uso de dados secundários, sujeitos a viés de classificação, incompletitude e subnotificação, especialmente em acidentes recorrentes ou não formalmente comunicados. Apesar dessas restrições, os achados oferecem subsídios consistentes para aprimorar o processo de notificação, fortalecer a vigilância e orientar estratégias de prevenção.

No que se refere à duplicidade, a ausência de casos indica controle efetivo do fluxo de notificações e adequada consolidação dos dados, aspectos fundamentais para a qualidade e a precisão dos sistemas de vigilância (19). Até onde foi possível revisar a literatura, não foram identificados estudos específicos sobre acidentes com material biológico que avaliem esse atributo; contudo, análises de outros agravos demonstram que a verificação de duplicidades é parte essencial da qualificação das bases de dados e da confiabilidade das estimativas. Nos últimos anos, evidenciou-se redução das duplicidades em sistemas nacionais: queda de 0,7% para 0,1% no sarampo em Pernambuco (2018–2022) (11); e 0,3% na hanseníase em João Pessoa (2001–2019) (10). Em notificações de violência sexual contra crianças e adolescentes registradas no Sistema de Informação de Agravos de Notificação de Santa Catarina, no período de 2009 a 2019, não foram identificados registros duplicados, o que reflete a consistência do sistema e a efetividade das rotinas de depuração adotadas (19). Esses resultados indicam o aprimoramento das rotinas de deduplicação e a importância da vigilância ativa. A identificação de dois acidentes distintos em um mesmo trabalhador reforça a necessidade de distinguir repetições indevidas de recorrências reais, que refletem risco ocupacional persistente e não erro de registro. Essa diferenciação depende da aplicação criteriosa de regras de vinculação e verificação temporal, conforme recomendado nos processos de qualificação de bases de dados (20). Mesmo assim, janelas curtas podem não captar todas as repetições, motivo pelo qual a vigilância deve manter auditorias e realimentação periódica no sistema (8,9,21).

Já a completitude das variáveis obrigatórias, a maioria foi classificada como excelente, achado também descrito em estudo nacional entre 2010–2015 para variáveis de identificação como sexo e idade, para acidentes com exposição a material biológico (12). Esses resultados indicam que a obrigatoriedade técnica favorece o preenchimento, embora não assegure qualidade ou precisão dos registros, que dependem do entendimento e do comprometimento dos notificadores (8,12,22). As variáveis “Gestante” e “Emissão da Comunicação de Acidente de Trabalho” apresentaram completitude regular, evidenciando que a exigência formal na ficha não garante registro efetivo. Em nível nacional (2010–2015), o campo “Comunicação de Acidente de Trabalho” apresentou completitude inferior a 70%, sendo classificado como ruim (12). Em um hospital universitário de Pernambuco (2009–2019), 97,7% das fichas careciam dessa informação, inviabilizando a análise de aspectos legais e trabalhistas (23). Esses resultados refletem a fragilidade administrativa e a falta de integração entre os sistemas de vigilância e o setor trabalhista, o que dificulta a rastreabilidade dos acidentes (23). A variável “Gestante” é igualmente crítica, pois o protocolo nacional prevê acompanhamento específico

com ajustes na profilaxia conforme a segurança materno-fetal (15). Em ambientes odontológicos, onde mulheres são maioria entre os profissionais expostos (24) e os acidentes percutâneos ocorrem com frequência durante a limpeza de instrumentais e o manuseio de seringas anestésicas (4), a ausência dessa informação limita a vigilância de riscos específicos desse grupo.

Entre as variáveis essenciais para a vigilância, exames laboratoriais do acidentado e do paciente-fonte, conduta e evolução foram classificadas como de preenchimento insuficiente, incluindo categorias ruins e muito ruins, padrão semelhante ao observado nacionalmente (12). Essas deficiências sugerem lacunas na articulação entre vigilância e assistência, já que o acompanhamento clínico nem sempre é reconhecido como parte do processo de notificação (8,23). O tipo de exposição, também registrado entre as variáveis essenciais, é determinante do risco de infecção (15,21). A completitude para acidentes percutâneos foi boa, enquanto as exposições mucosas e cutâneas foram ruins ou muito ruins. Esse padrão, com maior registro de acidentes percutâneos, repete-se em análise nacional (12) e revisões internacionais em odontologia (5,24). Por envolver maior risco de transmissão de HIV, HBV e HCV, esse tipo de acidente tende a ser mais prontamente notificado, refletindo maior percepção de risco entre os profissionais (12,23,24). A ausência de resultados laboratoriais e de evolução também compromete a vigilância e inviabiliza o acompanhamento da soroconversão, essencial para caracterizar o risco real de infecção (12,15,23). Essa lacuna pode decorrer de falhas de registro, quando exames e condutas são realizados, mas não informados, ou da ausência efetiva de testagem e seguimento. No primeiro caso, há perda de confiabilidade das estatísticas (8,12,22); no segundo, há falha assistencial, em desacordo com protocolos que preveem testagem da fonte e do acidentado e acompanhamento por até seis meses (15,21). Revisões internacionais sobre qualidade de dados em sistemas de informação em saúde associam a baixa completitude, especialmente em campos clínicos, à perda de utilidade secundária dos registros, como vigilância e pesquisa (25). Reforçam ainda que níveis reduzidos de completitude comprometem a usabilidade dos dados, recomendando o fortalecimento de rotinas de controle e o uso de interfaces adequadas à finalidade para aprimorar o preenchimento (25,26).

A variável “Conduta”, que registra as medidas adotadas após o acidente, é essencial para avaliar o manejo (9,15). Revisão recente relatou que cerca de um terço das fontes não é testado para hiv, hbv ou hcv, geralmente por recusa ou falta de consentimento (27). Outros estudos apontam subnotificação entre estudantes e auxiliares de odontologia, o que limita a avaliação pós-exposição (1,24). Esse padrão reforça a persistência de falhas estruturais na cultura de biossegurança, que permanecem mesmo em contextos com diretrizes consolidadas (15,22). A avaliação da “Evolução do caso” também é crítica, pois distingue se o trabalhador foi acompanhado para soroconversão ou houve abandono. Desta forma, a alta proporção de registros em branco sugere falhas de registro ou ausência de seguimento, contrariando protocolos nacionais e internacionais (9,15,22). A fragilidade dessa variável evidencia a desconexão entre o cuidado clínico e o processo de vigilância, comprometendo a utilidade da informação para avaliar a efetividade da profilaxia (22,23).

Já para as variáveis laborais, a maioria variou a completitude de regular a ruim, o que pode comprometer a identificação de ambientes de maior risco e o planejamento de medidas preventivas (28). Essa limitação é relevante entre profissionais de saúde, cujas condições de trabalho e adesão às medidas de biossegurança influenciam a ocorrência e o registro das exposições (1). Da mesma forma, a ausência de informações sobre uso de equipamentos de proteção individual restringe a análise da adesão às barreiras de proteção, fundamentais em procedimentos com risco de contato com sangue e saliva potencialmente contaminados (15,24).

Em consonância com esses achados, análises internacionais sobre a qualidade dos registros em sistemas nacionais de vigilância apontam variações na completude entre regiões e tipos de serviço, atribuídas à falta de padronização das variáveis, à indefinição conceitual dos campos e à capacitação insuficiente dos profissionais responsáveis pela notificação (29).

Na avaliação da consistência, evolução do caso foi classificada como baixa, o que pode comprometer sua função de sintetizar os desfechos do acompanhamento e reduzir a utilidade do sistema para avaliar a efetividade das medidas profiláticas (15,21). Na mesma direção, a consistência regular dos pares “Paciente-fonte conhecido e Resultados laboratoriais” e “Tipo de exposição e Agente causador” podem comprometer a avaliação do risco biológico e a definição das condutas pós-exposição (15,21), bem como o direcionamento das medidas preventivas nos serviços odontológicos (8,9). Do ponto de vista conceitual, a consistência é descrita como uma das dimensões mais influentes da qualidade dos dados, por afetar diretamente atributos como completude, acurácia, atualidade e acessibilidade (25). Inconsistências na captura, temporalidade e ausência de padronização minam a coerência entre campos, o que reflete o padrão observado nos pares com desempenho regular ou baixo (25).

O conhecimento desse cenário em ambientes odontológicos é fundamental para reconhecer limitações do sistema e orientar estratégias de vigilância mais efetivas (27). A persistência desses achados indica desalinhamento entre as exigências normativas e a prática cotidiana dos serviços, apontando a necessidade de estratégias permanentes de qualificação do registro (8,22). A vigilância pode ser fortalecida pela ampliação das ações ativas, assegurando seguimento adequado e monitoramento dos desfechos (23). Experiências internacionais demonstram que a melhoria da qualidade da informação depende de intervenções em todas as etapas do processo, como automatização das verificações de qualidade, padronização de campos e capacitação periódica das equipes que registram os dados (29). Portanto, recomenda-se a capacitação contínua dos profissionais, a simplificação dos formulários do sistema e a automação de rotinas de checagem, para ampliar a utilidade das informações na prevenção de acidentes ocupacionais, especialmente em contextos de maior risco, como o odontológico. Desta forma, avaliações periódicas do sistema permanecem indispensáveis para monitorar avanços e orientar ajustes contínuos (8,22).

O sistema demonstrou registrar adequadamente a ocorrência dos acidentes, evidenciado pela ausência de duplicidades e pela identificação de recorrências reais, contudo persistem fragilidades em variáveis clínicas e laborais que reduzem sua aplicabilidade para a vigilância em saúde. O preenchimento insuficiente e a inconsistência de campos como “Exames laboratoriais”, “Conduta” e “Evolução do caso” indicam limitações estruturais no processo de notificação, que comprometem a avaliação do risco real de infecção e o seguimento clínico dos trabalhadores expostos.

Disponibilidade dos dados

Os dados analisados são administrativos e sigilosos, provenientes do Sistema de Informação de Agravos de Notificação sob gestão da Secretaria Municipal de Saúde de Belo Horizonte. O acesso direto depende de autorização da autoridade competente. Os procedimentos de análise, incluindo arquivos gerados nas etapas de verificação e processamento, estão descritos no manuscrito e no material suplementar. Solicitações de acesso poderão ser avaliadas pelos autores, conforme critérios legais de sigilo e apreciação editorial.

Uso de inteligência artificial generativa

Declara-se que não foram usadas tecnologias de inteligência artificial generativa na redação, sendo o conteúdo baseado em pesquisa original e fontes científicas.

Referências

1. Mengistu DA, Dirirsa G, Mati E, Ayele DM, Bayu K, Deriba W, et al. Global occupational exposure to blood and body fluids among healthcare workers: systematic review and meta-analysis. *Can J Infect Dis Med Microbiol.* 2022;2022:1-12.
2. Mizoguti NN, Hirota MM, Ito FY, Gonçalves MR, Gonçalves MR, Hayashida MR, et al. Occupational accidents involving exposure to biological material reported at a worker's health sentinel unit: 11,645 cases. *Rev Bras Med Trab.* 2022;20(3):353-60.
3. Huang J, Li N, Xu H, Liu Y, An N, Cai Z. Global prevalence, risk factors, and reporting practice of needlestick and sharps injuries among dental students: a systematic review and meta-analysis. *J Hosp Infect.* 2022;129:89-101.
4. Zeng J, Li E, Xu Y, Lin Y, Xiao Y, Yu X. Prevalence of needlestick injuries in dental assistants: a systematic review and meta-analysis. *J Glob Health.* 2025;15:04030.
5. Bouya S, Balouchi A, Rafiemanesh H, Amirshahi M, Dastres M, Moghadam MP, et al. Global prevalence and device-related causes of needlestick injuries among health care workers: a systematic review and meta-analysis. *Ann Glob Health.* 2020;86(1):35.
6. Guedes BP, Moreira MR. Acidentes de trabalho com exposição a material biológico no âmbito nacional, estadual e de Governador Valadares. *HU Rev.* 2024;50:1-9. Portuguese.
7. Brasil. Ministério da Saúde. Departamento de Informática do SUS (DATASUS). Investigação de acidente de trabalho com exposição a material biológico – notificações registradas no SINAN Net: Belo Horizonte, Minas Gerais, 2019–2024 [Internet]. Brasília: Ministério da Saúde; 2025 [cited 2025 Oct 7]. Available from: <http://tabnet.datasus.gov.br/cgi/tabcgi.exe?sinannet/cnv/acbimg.def>
8. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Caderno de análise de dados: Sistema de Informação de Agravos de Notificação – SINAN [Internet]. Brasília: Ministério da Saúde; 2019 [cited 2025 Feb 10]. Available from: http://portalsinan.saude.gov.br/images/documentos/Agravos/Violencia/CADERNO_ANALISE_SINAN_Marco_2019_V1.pdf
9. Ceará. Secretaria da Saúde do Estado. Manual para uso do SINAN NET: Saúde do Trabalhador – análise da qualidade da base de dados e cálculos operacionais dos agravos e doenças relacionadas ao trabalho [Internet]. Fortaleza: Secretaria da Saúde do Estado do Ceará; 2017 [cited 2025 Nov 6]. Available from: https://www.saude.ce.gov.br/wp-content/uploads/sites/9/2018/06/manual_sinan_-15_02_17.pdf
10. Mendes M da S, Sá de Oliveira AL, Schindler HC. Evaluation of completeness, consistency and non-duplication of leprosy notification data on the Notifiable Health Conditions

- Information System, João Pessoa, Paraíba, Brazil: a descriptive study, 2001-2019. *Epidemiol Serv Saude*. 2023;32(2).
11. de Souza CRA, Vanderlei LC de M, de Frias PG. Measles epidemiological surveillance system before and during the COVID-19 pandemic in Pernambuco, Brazil, 2018-2022: a descriptive evaluation. *Epidemiol Serv Saude*. 2023;32(3).
 12. Gomes SCS, Caldas ADJM. Qualidade dos dados do sistema de informação sobre acidentes de trabalho com exposição a material biológico no Brasil, 2010 a 2015. *Rev Bras Med Trab*. 2017;15(3). Portuguese.
 13. Benchimol EI, Smeeth L, Guttman A, Harron K, Moher D, Peteresen I, et al. The REporting of studies Conducted using Observational Routinely-collected health Data (RECORD) Statement. *PLoS Med*. 2015;12(10).
 15. Morales LMP, Rodrigues SC, Garcia KKS. The impact of the Covid-19 pandemic on work accidents with exposure to biological material in Brazil: an interrupted time series analysis. *Rev Bras Epidemiol*. 2024;27.
 16. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Exposição a materiais biológicos [Internet]. In: Departamento de Vigilância em Saúde Ambiental e Saúde do Trabalhador. Série A: Normas e manuais técnicos. Brasília: Ministério da Saúde; 2011 [cited 2025 Nov 6]. p. 1-72. Available from: <http://www1.saude.rs.gov.br/dados/1332967170825PROTOCOLO%20EXPOSICAO%20A%20MATERIAL%20BIOLOGICO.pdf>
 17. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Manual de normas e rotinas do Sistema de Informação de Agravos de Notificação – SINAN [Internet]. Brasília: Ministério da Saúde; 2007 [cited 2025 Nov 4]. 70 p. Available from: https://portalsinan.saude.gov.br/images/documentos/Aplicativos/sinan_net/Manual_Normas_e_Rotinas_2_edicao.pdf
 17. Romero DE, Cunha CB da C. Avaliação da qualidade das variáveis epidemiológicas e demográficas do Sistema de Informações sobre Nascidos Vivos, 2002. *Cad Saude Publica*. 2007;23(3):701-14. Portuguese.
 18. Abath M de B, Lima MLLT de, Lima P de S, Silva MCM e, Lima MLC de. Avaliação da completitude, da consistência e da duplicidade de registros de violências do Sinan em Recife, Pernambuco, 2009-2012. *Epidemiol Serv Saude*. 2014;23(1):131-42. Portuguese.
 19. Platt VB, Coelho EBS, Bolsoni C, Höfelmann DA. Completitude, consistência e não duplicidade dos registros de violência sexual infantil no Sistema de Informação de Agravos de Notificação em Santa Catarina, 2009-2019. *Epidemiol Serv Saude*. 2022;31(2). Portuguese.
 20. Garcia KKS, Miranda CB de, Sousa FN e F de. Procedimentos para vinculação de dados da saúde: aplicações na vigilância em saúde. *Epidemiol Serv Saude*. 2022;31(3). Portuguese.

21. Centers for Disease Control and Prevention (US). Exposures to Human Immunodeficiency Virus and Recommendations for Postexposure Prophylaxis: Draft Update [Internet]. 2023. Available from: <https://stacks.cdc.gov/view/cdc/133952>
22. World Health Organization. Data quality assurance. Module 1: framework and metrics [Internet]. Geneva: World Health Organization; 2023 [cited 2025 Apr 17]. 40 p. Available from: <https://www.who.int/publications/i/item/9789240047365>
23. Monteiro EPG, Bezerra IMS, Bushatsky M, de Almeida AC, da Silva Fonseca RA, de Souza Andrade ES. Occupational accidents with exposure to biological material in a university hospital in Pernambuco. *Rev Bras Med Trab*. 2024;22(3).
24. Ravi A, Shetty PK, Singh P, Wakode D, Modica SF, Kodaganallur Pitchumani P, et al. Needlestick injuries in dentistry: time to revisit. *J Am Dent Assoc*. 2023;154:783-94.
25. Syed R, Eden R, Makasi T, Chukwudi I, Mamudu A, Kamalpour M, et al. Digital health data quality issues: systematic review. *J Med Internet Res*. 2023;25:e42615.
26. Ghalavand H, Shirshahi S, Rahimi A, Zarrinabadi Z, Amani F. Common data quality elements for health information systems: a systematic review. *BMC Med Inform Decis Mak*. 2024 Sep 2;24(1):243.
27. Săndulescu M, Nicolescu MI, Funieru C, Şahin GÖ, Săndulescu O. Exposure to biological fluids in dental practice—narrative review on appropriate risk assessment to guide post-exposure management. *Pathogens*. 2023;12:1-13.
28. Nogueira SA, Carvalho BKG, Medeiros A da R, Carneiro SE do R, Souza GC de A. Prevalência e notificações de acidentes de trabalho com exposição a material biológico na odontologia. *Rev Cienc Plural*. 2016;2(1):102-19. Portuguese.
29. Farnham A, Loss G, Lyatuu I, Cossa H, Kulinkina AV, Winkler MS. A roadmap for using DHIS2 data to track progress in key health indicators in the Global South: experience from sub-Saharan Africa. *BMC Public Health*. 2023 May 31;23(1):1030.

Tabelas

Tabela 1 - Completitude das variáveis de identificação, demográficas, de residência e laborais em registros de acidentes com exposição a material biológico em ambientes odontológicos. Belo Horizonte, Minas Gerais, 2006–2019 (n=1.054)

Variável	Classificação	n (%)	Categoria de completitudea
Variáveis de identificação da notificação e do evento:			
Número da Notificação	Obrigatória	1.054 (100,0)	Excelente
Nome do Agravado/Doença	Obrigatória	1.054 (100,0)	Excelente
Data da Notificação	Obrigatória	1.054 (100,0)	Excelente
Sigla da Unidade Federada	Obrigatória	1.054 (100,0)	Excelente
Município da Unidade Notificadora	Obrigatória	1.054 (100,0)	Excelente

Cadastro Nacional de Estabelecimentos de Saúde da Unidade Notificadora	Obrigatória	1.054 (100,0)	Excelente
Data do Acidente	Obrigatória	1.054 (100,0)	Excelente
Variáveis demográficas e de residência:	Obrigatória		
Nome Completo do Paciente	Obrigatória	1.054 (100,0)	Excelente
Data de Nascimento	Obrigatória	1.054 (100,0)	Excelente
Idade (anos, se data de nascimento desconhecida)	Obrigatória	1.054 (100,0)	Excelente
Sexo do Paciente	Obrigatória	1.054 (100,0)	Excelente
Gestante	Obrigatória	847 (80,4)	Regular
Unidade Federada da Residência do Paciente	Obrigatória	1.054 (100,0)	Excelente
Código do Município de Residência	Obrigatória	1.054 (100,0)	Excelente
País de Residência (se estrangeiro)	Obrigatória	1.054 (100,0)	Excelente
Identificação da Ocupação	Obrigatória	1.054 (100,0)	Excelente
Emissão da Comunicação de Acidente de Trabalho	Obrigatória	796 (75,5)	Regular
Raça/cor da pele	Essencial	909 (86,2)	Regular
Nível de Escolaridade	Essencial	1.040 (98,7)	Excelente
Nome Completo da Mãe	Essencial	1.054 (100,0)	Excelente
Nome do Distrito da Residência	Essencial	854 (81,0)	Regular
Nome do Bairro	Essencial	1.047 (99,2)	Excelente
Tipo de Logradouro da Residência	Essencial	1.046 (99,1)	Excelente
Número do Logradouro	Essencial	1.039 (98,6)	Excelente
Complemento do Logradouro	Essencial	556 (52,8)	Ruim
Ponto de Referência da Residência	Essencial	274 (26,0)	Muito ruim
Código de Endereçamento Postal	Essencial	649 (61,6)	Ruim
Código de Discagem Direta à Distância	Essencial	868 (82,3)	Regular
Telefone do Paciente	Essencial	866 (82,2)	Regular
Zona de Residência do Paciente	Essencial	881 (83,5)	Regular
Variáveis laborais:			
Situação no Mercado de Trabalho	Essencial	985 (93,5)	Bom
Tempo de Trabalho na Ocupação (anos)	Essencial	1.039 (98,6)	Excelente
Identificação da Empresa Contratante	Essencial	628 (59,6)	Ruim
Razão Social da Empresa Contratante	Essencial	1.054 (100,0)	Excelente
Classificação Nacional de Atividades Econômicas	Essencial	757 (71,8)	Regular
Unidade Federada da Localização da Empresa	Essencial	844 (80,1)	Regular
Município do Contratante	Essencial	808 (76,7)	Regular
Distrito do Município	Essencial	689 (65,4)	Ruim
Bairro do Município	Essencial	691 (65,6)	Ruim
Endereço da Empresa	Essencial	694 (65,8)	Ruim
Número das Instalações da Empresa	Essencial	689 (65,4)	Ruim
Empresa Terceirizada	Essencial	893 (84,7)	Regular

Nota: ^a Classificação da completitude: Excelente $\geq 95\%$; Bom 90–94,9%; Regular 70–89,9%; Ruim 50–69,9%; Muito ruim $< 50\%$.

Tabela 2 - Completitude das variáveis de exposição, caracterização do acidente e desfechos clínicos em acidentes com material biológico em ambientes odontológicos. Belo Horizonte, Minas Gerais, 2006–2019 (n=1.054)

Variável	Classificação	n (%)	Categoria de completitude ^a
Tipo de Exposição:			
Percutânea	Essencial	957 (90,8)	Bom
Mucosa	Essencial	552 (52,4)	Ruim
Pele Íntegra	Essencial	640 (60,7)	Ruim
Pele Não Íntegra	Essencial	524 (49,7)	Muito ruim
Outras	Essencial	347 (32,9)	Muito ruim

Caracterização do acidente:

Tipo de Material Orgânico	Essencial	954 (90,5)	Bom
Circunstância do Acidente	Essencial	1.038 (98,5)	Excelente
Agente Causador do Acidente	Essencial	997 (94,6)	Bom

Uso de Equipamento de Proteção Individual:

Luvas	Essencial	947 (89,9)	Regular
Avental	Essencial	840 (79,7)	Regular
Óculos	Essencial	822 (78,0)	Regular
Máscara	Essencial	836 (79,3)	Regular
Proteção Facial	Essencial	719 (68,2)	Ruim
Bota	Essencial	695 (65,9)	Ruim

Exames laboratoriais/situação vacinal:

Situação Vacinal contra Hepatite B	Essencial	873 (82,8)	Regular

Resultados de Exames do Acidentado (Data**Zero):**

Teste para detecção de anticorpos contra o Vírus da Imunodeficiência Humana	Essencial	517 (49,0)	Muito ruim

Antígeno de superfície do vírus da hepatite B	Essencial	484 (45,9)	Muito ruim

Teste para detecção de anticorpos contra o antígeno de superfície do vírus da hepatite B	Essencial	437 (41,4)	Muito ruim

Teste para detecção de anticorpos contra o vírus da hepatite C	Essencial	483 (45,8)	Muito ruim

Paciente-Fonte Conhecido	Essencial	922 (87,4)	Regular

Resultados de Exames do Paciente-Fonte:

Antígeno de Superfície do vírus da Hepatite B	Essencial	394 (37,4)	Muito ruim

Teste para detecção de anticorpos contra o Vírus da Imunodeficiência Humana	Essencial	454 (43,0)	Muito ruim

Teste para detecção de anticorpos contra o antígeno do núcleo (core) do Vírus da Hepatite B	Essencial	326 (30,9)	Muito ruim

Teste para detecção de anticorpos contra o vírus da hepatite C	Essencial	368 (34,9)	Muito ruim

Conduta no Momento do Acidente:

Sem indicação de quimioprofilaxia	Essencial	449 (42,6)	Muito ruim

Recusou quimioprofilaxia indicada	Essencial	103 (9,8)	Muito ruim

Zidovudina e Lamivudina	Essencial	199 (18,9)	Muito ruim

Zidovudina, Lamivudina e Indinavir	Essencial	133 (12,6)	Muito ruim

Zidovudina, Lamivudina e Nelfinavir	Essencial	107 (10,1)	Muito ruim

Imunoglobulina Humana contra Hepatite B	Essencial	107 (10,1)	Muito ruim

Vacina contra Hepatite B	Essencial	108 (10,2)	Muito ruim

Outro Esquema de Antirretrovirais	Essencial	335 (31,8)	Muito ruim

Especificação do Outro Esquema	Essencial	155 (14,7)	Muito ruim

Evolução do Caso	Essencial	473 (44,9)	Muito ruim

Nota: ^a Classificação da completude: Excelente $\geq 95\%$; Bom 90–94,9%; Regular 70–89,9%; Ruim 50–69,9%; Muito ruim $<50\%$.

Tabela 3 - Inconsistências entre variáveis em registros de acidentes com exposição a material biológico em ambientes odontológicos. Belo Horizonte, Minas Gerais, 2006–2019 (n=1.054)

Crítério de consistência	n^a (%^{a, b})	Classificação^c
Sexo e Gravidez	59 (5,6)	Excelente
Idade (anos) e Tempo na Ocupação (anos)	94 (9,0)	Excelente
Paciente-Fonte conhecido e Resultados dos Testes do Paciente-Fonte	138 (13,1)	Regular
Tipo de Exposição e Agente Causador	147 (13,5)	Regular
Tipo de Exposição e Circunstância do Acidente	38 (3,6)	Excelente
Terceirização e Nome da Empresa Contratante	8 (0,8)	Excelente
Evolução do Caso	581 (55,1)	Baixa

Nota: ^a Refere-se aos registros inconsistentes; ^b Percentuais calculados com base nos registros com ambas as variáveis preenchidas; ^c Classificação da consistência: Excelente $\geq 90\%$ de registros consistentes; Regular 70–89%; Baixa consistência $< 70\%$.

Tabela Suplementar 1 - Variáveis analisadas e respectivas categorias em registros de acidentes com exposição a material biológico em ambientes odontológicos. Belo Horizonte, 2006–2019

Nome da variável	Classificação	Categorias/valores (códigos) ^a
Variáveis de identificação da notificação e do evento:		
Número da Notificação	Obrigatória	Campo aberto (identificador do sistema)
Nome do Agravado/Doença	Obrigatória	Acidente de trabalho com exposição a material biológico (texto fixo)
Data da Notificação	Obrigatória	Data (DD/MM/AAAA)
Sigla da Unidade Federada ^b	Obrigatória	Sigla e/ou código Instituto Brasileiro de Geografia e Estatística
Município da Unidade Notificadora ^b	Obrigatória	Nome do município e código Instituto Brasileiro de Geografia e Estatística
Cadastro Nacional de Estabelecimentos de Saúde da Unidade Notificadora ^b	Obrigatória	Código específico
Data do Acidente	Obrigatória	Data (DD/MM/AAAA)
Variáveis demográficas e de residência:		
Nome Completo do Paciente	Obrigatória	Campo aberto
Data de Nascimento	Obrigatória	Data (DD/MM/AAAA)
Idade (se data de nascimento desconhecida)	Obrigatória	Número (anos)
Sexo do Paciente	Obrigatória	Masculino (M); Feminino (F); Ignorado (I)
Gestante	Obrigatória	1=1º trimestre; 2=2º trimestre; 3=3º trimestre; 4=Idade gestacional ignorada; 5=Não; 6=Não se aplica; 9=Ignorado
Unidade Federada da Residência do Paciente ^b	Obrigatória	UF (sigla) e/ou código Instituto Brasileiro de Geografia e Estatística
Código do Município de Residência	Obrigatória	Código Instituto Brasileiro de Geografia e Estatística do município
País de Residência (se estrangeiro) ^b	Obrigatória	Campo aberto (nome do país)
Identificação da Ocupação	Obrigatória	Campo aberto (descrição); se disponível, código CBO-2002
Emissão de Comunicação de Acidente de Trabalho (CAT)	Obrigatória	1=Sim; 2=Não; 3=Não se aplica; 9=Ignorado
Raça/cor da pele	Essencial	1=Branca; 2=Preta; 3=Amarela; 4=Parda; 5=Indígena; 9=Ignorado
Nível de escolaridade	Essencial	0=Analfabeto; 1=1ª–4ª série incompleta; 2=4ª série completa; 3=5ª–8ª série incompleta; 4=Fundamental completa; 5=Médio incompleto; 6=Médio comp.; 7=Superior incompleto; 8=Superior completo; 9=Ignorado; 10=Não se aplica
Nome Completo da Mãe ^b	Essencial	Campo aberto
Nome do Distrito da Residência ^b	Essencial	Campo aberto

Nome do Bairro ^b	Essencial	Campo aberto
Tipo de Logradouro da Residência ^b	Essencial	Campo aberto (rua, avenida, travessa etc.)
Número do Logradouro ^b	Essencial	Campo aberto (numérico/alfa-numérico)
Complemento do Logradouro ^b	Essencial	Campo aberto
Ponto de Referência da Residência ^b	Essencial	Campo aberto
Código de Endereçamento Postal (CEP)	Essencial	CEP (numérico)
Código de Discagem Direta à Distância (DDD)	Essencial	DDD (numérico)
Telefone do Paciente	Essencial	Número do telefone (numérico)
Zona de Residência do Paciente	Essencial	1=Urbana; 2=Rural; 3=Periurbana; 9=Ignorado
Variáveis laborais:		
Situação no Mercado de Trabalho	Essencial	01=Empregado registrado; 02=Empregado não registrado; 03=Autônomo/conta própria; 04=Servidor público estatutário; 05=Servidor público celetista; 06=Aposentado; 07=Desempregado; 08=Trabalho temporário; 09=Cooperativado; 10=Trabalhador avulso; 11=Empregador; 12=Outros
Tempo de Trabalho na Ocupação	Essencial	Número de anos (campo aberto)
Identificação da Empresa Contratante	Essencial	CNPJ/CPF (campo aberto)
Razão Social da Empresa Contratante ^b	Essencial	Campo aberto
Classificação Nacional de Atividades Econômicas ^b	Essencial	Código específico
Unidade Federada da Localização da Empresa ^b	Essencial	Sigla e/ou código Instituto Brasileiro de Geografia e Estatística
Município do Contratante ^b	Essencial	Nome do município e código Instituto Brasileiro de Geografia e Estatística
Distrito do Município ^b	Essencial	Campo aberto
Bairro do Município ^b	Essencial	Campo aberto
Endereço da Empresa ^b	Essencial	Campo aberto
Número das Instalações da Empresa ^b	Essencial	Campo aberto
Empresa Terceirizada?	Essencial	1=Sim; 2=Não; 3=Não se aplica; 9=Ignorado
Tipo de Exposição ^c:		
Percutânea/Mucosa/ Pele íntegra/ Pele íntegra/Outras	Essencial	Para cada subitem: 1=Sim; 2=Não; 9=Ignorado
Caracterização do acidente:		
Tipo de Material Orgânico	Essencial	1=Sangue; 2=Líquor; 3=Líquido pleural; 4=Líquido ascítico; 5=Líquido amniótico; 6=Fluido com sangue; 7=Soro/plasma; 8=Outros; 9=Ignorado
Circunstância do Acidente	Essencial	01=Administração endovenosa; 02=Intramuscular; 03=Subcutâneo; 04=Intradérmica; 05=Punção venosa/arterial (coleta); 06=Punção não especificada; 07=Descarte inadequado perfurocortante; 08=Descarte inadequado em bancada/cama/chão;

Agente Causador do Acidente	Essencial	09=Lavanderia; 10=Lavagem de material; 11=Manipulação de caixa com perfurocortante; 12=Procedimento cirúrgico; 13=Procedimento odontológico; 14=Procedimento laboratorial; 15=Dextro; 16=Reencape; 98=Outros; 99=Ignorado 1=Agulha com lúmen; 2=Agulha sem lúmen/maciça; 3=Intracath; 4=Vidros; 5=Lâmina/lanceta; 6=Outros; 9=Ignorado
Uso de Equipamento de Proteção Individual^c:		
Luvas/Avental/Óculos/Máscara/Proteção Facial/Bota	Essencial	Para cada subitem: 1=Sim; 2=Não; 9=Ignorado
Exames laboratoriais/situação vacinal:		
Situação Vacinal contra Hepatite B	Essencial	1=Vacinado; 2=Não vacinado; 9=Ignorado (esquema 3 doses)
Resultados de Exames do Acidentado^c (Data Zero):		
Anti-HIV/HBsAg/Anti-HBs/Anti-HCV	Essencial	Para cada subitem: 1=Positivo; 2=Negativo; 3=Inconclusivo; 4=Não realizado; 9=Ignorado
Paciente-fonte conhecido	Essencial	1=Sim; 2=Não; 9=Ignorado
Resultados de Exames do Paciente-Fonte^c:		
Anti-HIV/HBsAg/Anti-HBs/Anti-HCV	Essencial	Para cada subitem: 1=Positivo; 2=Negativo; 3=Inconclusivo; 4=Não realizado; 9=Ignorado
Conduta no Momento do Acidente^c:		
Sem indicação de quimioprofilaxia/Recusou quimioprofilaxia indicada/Zidovudina e Lamivudina/Zidovudina, Lamivudina e Indinavir/Zidovudina, Lamivudina e Nelfinavir/Outro Esquema de Antirretrovirais/Imunoglobulina Humana contra Hepatite B/Vacina contra Hepatite B	Essencial	Para cada subitem: 1=Sim; 2=Não; 9=Ignorado
Evolução do Caso		
	Essencial	1=Alta com conversão sorológica; 2=Alta sem conversão; 3=Alta paciente-fonte negativo; 4=Abandono; 5=Óbito por exposição a material biológico; 6=Óbito por outra causa; 9=Ignorado
Óbito (se aplicável)	Essencial	Capturado por 'Evolução do Caso' (5 ou 6); 'Data do óbito' é campo de data (DD/MM/AAAA)

Nota: ^a Categorias e códigos extraídos da ficha de investigação “Acidente de trabalho com exposição a material biológico” do Sistema de Informação de Agravos de Notificação; ^b Campos sem codificação oficial indicados como “campo aberto” ou como “identificador externo”, utilizando os seguintes sistemas: Instituto Brasileiro de Geografia e Estatística, Cadastro Nacional de Estabelecimentos de Saúde, Classificação Nacional de Atividades Econômicas e Classificação Brasileira de Ocupações; ^c Em grupos compostos por múltiplos itens, cada subitem é registrado como variável dicotômica independente.

Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Ficha de investigação: Acidente de trabalho com exposição a material biológico [Internet]. Brasília: Ministério da Saúde; 2019 Jun 21 [cited 2025 Sep 25]. Available from: https://portalsinan.saude.gov.br/images/DRT/DRT_Acidente_Trabalho_Biologico.pdf

Tabela Suplementar 2 - Critérios de consistência entre variáveis em registros de acidentes com exposição a material biológico em ambientes odontológicos. Belo Horizonte, 2006–2019

Par de variáveis	Descrição da relação esperada	Critério de consistência	Critério de inconsistência
Sexo do paciente × Gravidez	Consistência entre sexo e preenchimento da variável gravidez	Registros com sexo masculino e variável Gravidez preenchida como "Não aplicável" (código 6)	Registros com sexo feminino e variável Gravidez preenchida com código incompatível ("Não aplicável", código 6)
Tipo de exposição × Circunstância do acidente	Consistência entre tipo de exposição e circunstância do acidente informada	Para cada tipo de exposição registrada (Mucosa, Pele íntegra, Pele não íntegra ou Percutânea), circunstância do acidente compatível conforme os códigos padronizados do sistema	Tipo de exposição incompatível com a circunstância do acidente, ou registros classificados como "Ignorado" (códigos 9 ou 99) de forma inconsistente
Paciente-fonte conhecido × Testes laboratoriais do paciente-fonte	Consistência entre identificação de paciente-fonte e realização de exames laboratoriais	Para registros com paciente-fonte identificado como "Sim" (código 1), pelo menos um teste laboratorial informado com valor válido	Para registros com paciente-fonte identificado como "Sim" (código 1), todos os testes laboratoriais em branco, marcados como "Não realizado" (código 4) ou "Ignorado" (código 9)
Idade do paciente (anos) × Tempo de ocupação (anos)	Consistência entre idade do paciente e tempo de ocupação registrado	Tempo de ocupação informado igual ou inferior à idade atual do paciente e valor não negativo	Tempo de ocupação maior que a idade atual do paciente ou valor negativo
Terceirização × Nome da empresa contratante	Consistência entre informação sobre terceirização e preenchimento do campo Nome da Empresa Contratante	Para registros com Terceirização informada como "Sim" (código 1), campo Nome da Empresa Contratante preenchido; para Terceirização = "Ignorado" (código 9), campo Nome da Empresa Contratante em branco	Para registros com Terceirização = "Sim" (código 1), campo Nome da Empresa Contratante em branco; ou para Terceirização = "Ignorado" (código 9), campo Nome da Empresa Contratante preenchido.

Par de variáveis	Descrição da relação esperada	Critério de consistência	Critério de inconsistência
Evolução do caso	Consistência no preenchimento da variável Evolução do Caso	Campo preenchido com códigos válidos (1 a 6), conforme padronização oficial: 1 = Alta com conversão sorológica; 2 = Alta sem conversão; 3 = Alta fonte negativa; 4 = Abandono; 5 = Óbito por exposição; 6 = Óbito por outra causa	Campo em branco, preenchido com código inválido ou com código "Ignorado" (código 9)

Figura Suplementar 1 - Etapas de validação e preparo do banco consolidado (n = 1.054) utilizado para análise de duplicidade, completitude e consistência. Belo Horizonte, 2006–2019

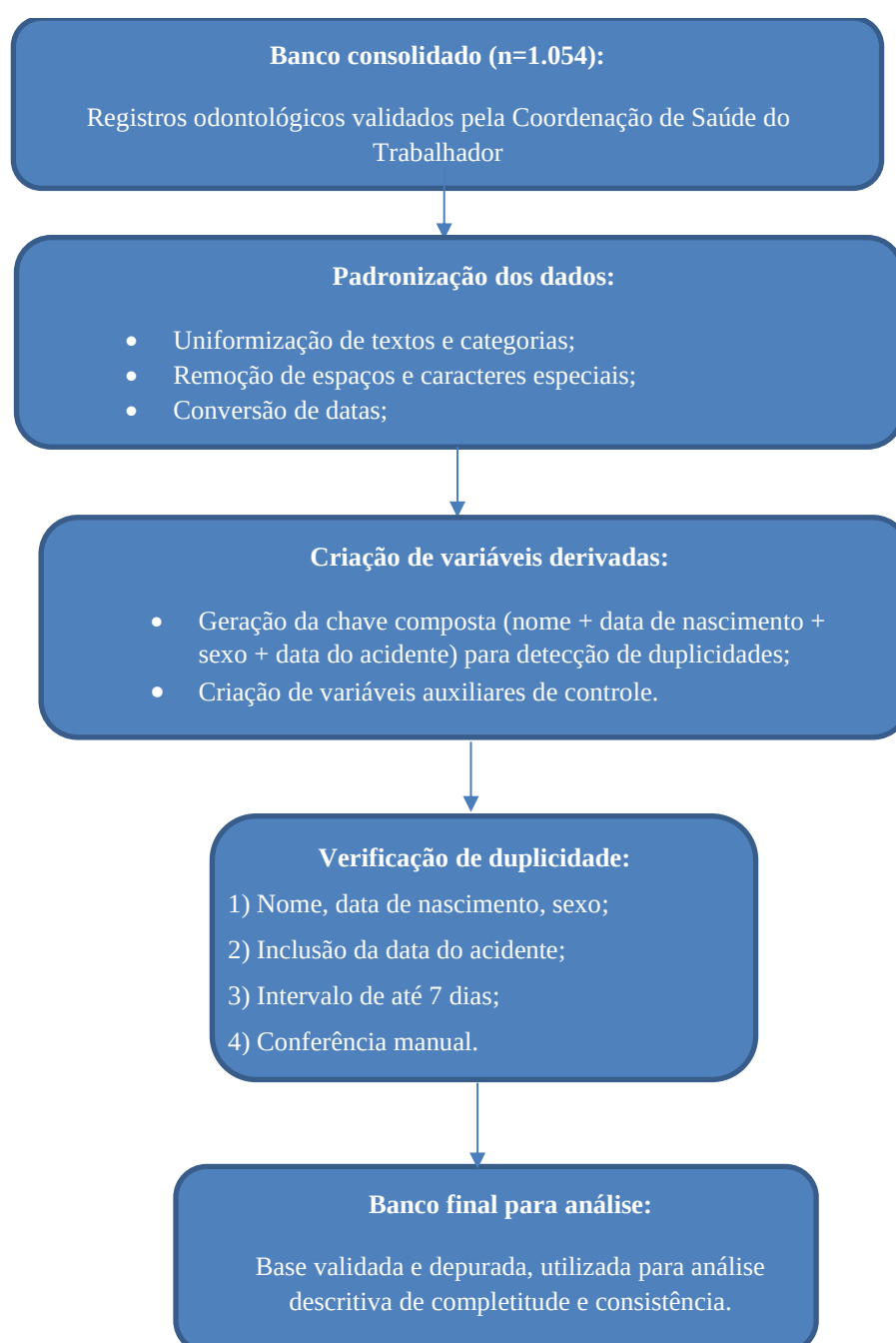
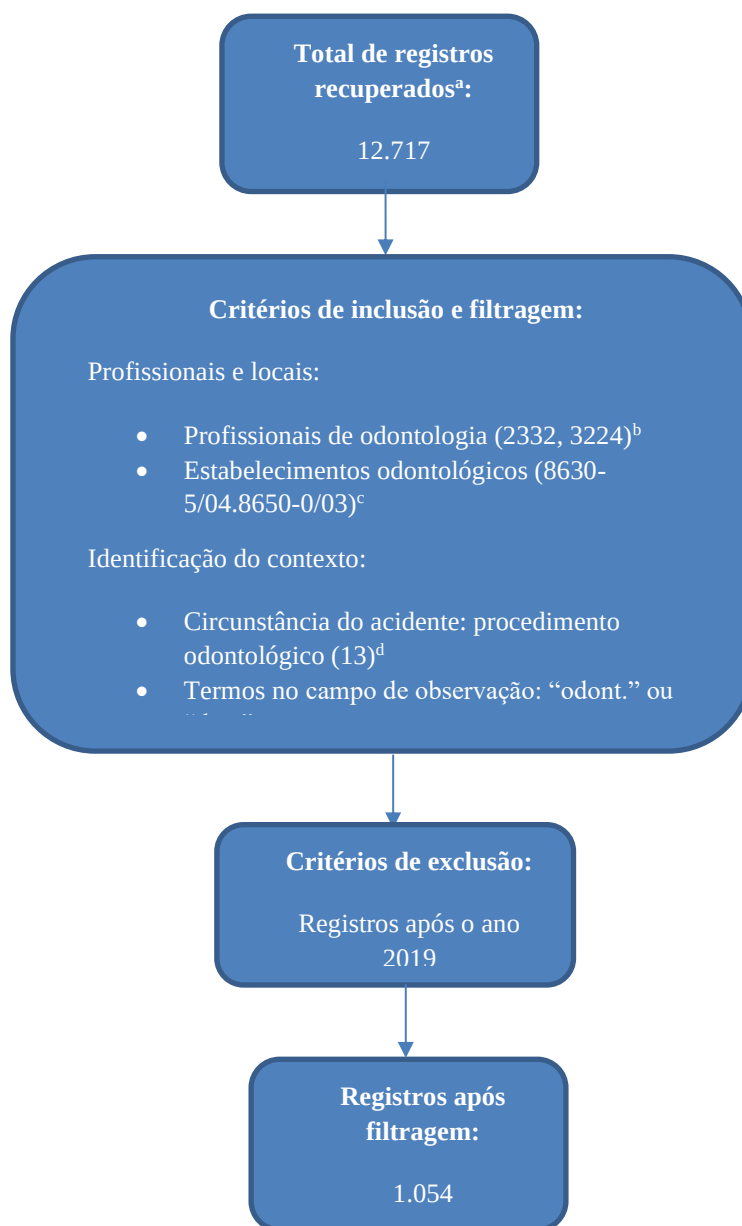


Figura Suplementar 3 - Critérios de inclusão, exclusão e filtragem de registros de acidentes com exposição a material biológico em ambientes odontológicos. Belo Horizonte, 2006–2019



Nota: ^a Total de registros recuperados corresponde ao banco bruto fornecido pela Secretaria Municipal de Saúde de Belo Horizonte, sem exclusão prévia de duplicidades ou filtros por ocupação; ^b códigos da Classificação Brasileira de Ocupações; ^c códigos da Classificação Nacional de Atividades Econômicas; ^d Código na ficha de notificação.

6.4 Quarto produto científico

O quarto produto científico desta tese corresponde ao manuscrito derivado da análise descritiva e da modelagem por *cluster analysis* aplicada às exposições ocupacionais a material biológico em ambientes odontológicos no município de Belo Horizonte entre 2006 e 2019, constituindo a terceira vertente metodológica da pesquisa. Intitulado “*Occupational exposures to blood and body fluids in dental care: A 14-year surveillance study using cluster analysis*”, o manuscrito será submetido ao periódico American Journal of Infection Control (AJIC), periódico de referência internacional em controle de infecções, com estrato A1 na área de Saúde Coletiva segundo o Qualis/CAPES mais recente.

Occupational exposures to blood and body fluids in dental care: A 14-year surveillance study using cluster analysis

Abstract

Background

Occupational exposure to blood and body fluids remains a relevant risk in dental care. This study characterizes such exposures and identifies risk profiles among oral-health workers in Belo Horizonte, Brazil.

Methods

We analyzed 1,054 surveillance notifications (2006–2019). Variables included worker characteristics, exposure type, PPE use, laboratory information, vaccination, and post-exposure management. Two-Step clustering was applied to identify exposure profiles.

Results

Most workers were female (85.1%) and had a university degree (64.7%). Dentists accounted for 39.3% of exposures, followed by assistants/technicians (22.5%) and students (22.4%). Percutaneous injuries predominated (86.5%), typically during procedures (70.0%) and involving sharp instruments (66.2%). Complete personal protective equipment (PPE) use was recorded in 50.6%. Hepatitis B vaccination was complete in 78.2%, but post-vaccination immunity and laboratory data were frequently missing. Among tested sources: 0.1% HIV-positive; 0.5% HBsAg-positive, and 0.1% anti-HCV-positive. No seroconversions occurred. Cluster analysis identified two profiles: a lower-risk pattern dominated by percutaneous exposures and high missing information, and a higher-risk pattern with mucosal and non-intact skin exposures, more positive or unknown sources, and less adequate PPE use.

Conclusions

Occupational exposures in dentistry occur mainly during routine procedures and persist amid gaps in protective practices and documentation. Improved biosafety adherence and follow-up may strengthen prevention.

Keywords: Occupational Exposure; Blood-Borne Pathogens; Dentistry; Health Personnel; Personal Protective Equipment; Cluster Analysis.

Highlights

- Long-term surveillance of 1,054 occupational exposures in dentistry
- High frequency of percutaneous injuries during routine clinical procedures
- Two distinct exposure profiles identified by Two-Step clustering
- Missing immunity and laboratory data highlight surveillance gaps
- No HIV, HBV, or HCV seroconversions detected in 14 years of monitoring

Introduction

Dental health-care personnel (DHCP) are continuously exposed to blood and saliva during clinical procedures, making them particularly vulnerable to occupational transmission of bloodborne pathogens such as HIV, HBV, and HCV¹. Despite advances in infection control, needlestick and mucocutaneous injuries remain frequent in dental settings, particularly during anesthetic administration, instrument cleaning, and sharps disposal^{2,3}. Institutional surveillance and systematic reviews indicate that dental students and assistants are among the most affected groups, with percutaneous injury prevalence ranging from 25% in institutional studies⁴ to 44% in global meta-analyses^{5,6}. These incidents are commonly associated with limited experience and inadequate supervision among early-career workers².

Although international frameworks such as the Occupational Safety and Health Administration's *Bloodborne Pathogens Standard*⁷ and the European Union Directive 2000/54/EC⁸ have established comprehensive preventive measures, adherence and implementation remain inconsistent in middle-income countries⁹. Global agencies such as the World Health Organization (WHO) and the International Labour Organization (ILO) emphasize that health-care workers in resource-limited settings face structural barriers including insufficient training, excessive workloads, and limited access to post-exposure prophylaxis, underscoring the need for robust surveillance and prevention systems^{9,10}.

In such contexts, surveillance systems are essential for monitoring trends, assessing biosafety compliance, and identifying priority groups for intervention¹¹. In Brazil, the Notifiable Diseases Information System (*Sistema de Informação de Agravos de Notificação*-SINAN in Portuguese) supports systematic monitoring of occupational exposures to biological material¹². However, few studies have longitudinally explored exposure trends and risk profiles in dental services, where complex procedures and high workforce turnover may amplify vulnerability. This study analyzed 14 years of occupational exposure notifications in dental settings and applied cluster analysis to identify distinct exposure profiles. The findings aim to inform targeted prevention strategies and strengthen biosafety policies in similar middle-income contexts.

Methods

This cross-sectional descriptive study used secondary surveillance data from the SINAN. Notifications of occupational accidents involving exposure to biological material were analyzed for dental settings in the municipality of Belo Horizonte, Brazil, from 2006 to 2019, corresponding to the period for which the consolidated municipal database was available. Records after 2019 were excluded because the COVID-19 pandemic markedly reduced reporting to residual levels, compromising comparability. The dataset was provided by the Municipal Health Secretariat in August 2023 under a confidentiality agreement, as it contained nominative fields and internal control variables.

Record selection included notifications compatible with dental practice, identified by at least one of the following criteria: occupation classified (Código Brasileiro de Ocupações – CBO in Portuguese) as dentist (CBO 2232) or dental assistant/technician (CBO 3224); National Classification of Economic Activities (*Classificação Nacional de Atividades Econômicas* - CNAE in Portuguese) codes related to dental services (8630-5/04, 8650-0/03, and similar); accident circumstance coded as “dental procedure” (code 13); or the presence of the text roots “odont*” or “dent*” in observation fields. The dataset was validated by the Occupational Health Coordination Unit and may differ from public databases due to local consolidation procedures.

Variables followed the definitions of the Technical Manual for Accidents Involving Exposure to Biological Material¹³, in accordance with national guidelines of the Brazilian Ministry of Health. Variables were classified as mandatory (required for notification validation) or essential (relevant for epidemiological analysis but not mandatory for entry), as defined by the SINAN taxonomy.

Data cleaning included standardization of categories and coding, correction of inconsistencies, calculation of age and length of employment, and harmonization of blank and “ignored” responses as “no information”. A total of 1,054 valid notifications were retained. Potential sources of bias inherent to surveillance data include underreporting of minor or mucosal exposures and missing laboratory records. No imputation was performed, and analyses were based on available data.

Four derived variables were created for epidemiological synthesis and clustering analysis:

1. **Source status:** categorical variable based on laboratory results for Anti-HIV, HBsAg, Anti-HBc, and Anti-HCV of the source patient. Classified as positive if any marker was reactive, negative if all were non-reactive, and no information if tests were not performed, pending, or absent.
2. **Contextual risk for hepatitis B (HBV):** ordinal variable combining worker vaccination status (complete, incomplete/absent, or no information) and the source status. Infection probability was categorized as very low, low, intermediate, or high. When source status was “no information”, risk was classified according to the worst plausible scenario given the worker’s immunity status.
3. **Adequacy of personal protective equipment (PPE) use:** nominal variable assessing logical correspondence between route of exposure and reported PPE. Classified as adequate, inadequate, or not applicable, following guidelines from the Technical Manual for Accidents Involving Exposure to Biological Material¹².
4. **Grouped exposure type:** consolidated into three mutually exclusive categories—percutaneous, mucosal, and non-intact skin. For events with multiple routes, the one with the highest biological risk was adopted, following the CDC hierarchy.

Cluster analysis was conducted using eight categorical variables: source status, contextual HBV risk, exposure type (percutaneous, mucosal, or non-intact skin), and adequacy of PPE use for each route. Missing data were not imputed. “No information” was treated as a valid analytical category across all variables to preserve data structure and allow the model to detect patterns of completeness, as recommended by the World Health Organization¹⁴. Clustering was performed with the TwoStep Cluster method in IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA), which integrates hierarchical and maximum-likelihood algorithms and is suitable for large categorical datasets. The optimal number of clusters was determined using the Bayesian Information Criterion (BIC) and the silhouette coefficient, selecting the solution that best balanced parsimony and cluster separation¹⁵.

This study was approved by the Research Ethics Committee of the Universidade Federal de Minas Gerais under protocol CAAE 6.097.439 and by the Research Ethics Committee of the Secretaria Municipal de Saúde de Belo Horizonte, Minas Gerais, Brazil, under protocol CAAE 6.161.565. Because the database contained nominative variables and consisted of retrospective secondary surveillance data, the requirement for informed consent was waived. The study adheres to the STROBE guideline for observational studies.

Results

A total of 1,054 notifications of occupational exposure to biological material were recorded in dental settings in Belo Horizonte, Brazil, from 2006 to 2019. Sociodemographic and occupational characteristics of exposed workers are presented in Table 1. Most exposed workers were female (n = 897; 85.1%) and had a university degree (n = 682; 64.7%). The median age was 30 years (range: 17–69). Dentists accounted for 39.3% (n = 414) of cases, followed by dental assistants/technicians (n = 237; 22.5%) and students (n = 236; 22.4%). Most exposures occurred in dental services (n = 888; 84.2%).

Table 1- Sociodemographic and occupational characteristics of workers with occupational exposure. Belo Horizonte, Brazil, 2006–2019 (N = 1,054)

Variable	Category	N	%
Age (years):	Median 30; range 17–69	—	—
Sex:	Female	897	85.1
	Male	157	14.9
Race/skin color:	Non-Black	632	60.0
	Black	277	26.3
	Ignored	145	13.8
Education:	Higher education	682	64.7
	(incomplete/complete)		
	High school	264	25.0
	Elementary school	19	1.8
	Ignored	75	7.1
Professional category:	Dentists	414	39.3
	Dental	237	22.5
	technicians/assistants		
	Students	236	22.4
	Nursing	58	5.5
	Other health	90	8.6
	professionals		

Clinical, laboratory, and exposure-related characteristics are summarized in Table 2. Percutaneous exposures predominated (n = 912; 86.5%), although multiple exposure routes could be recorded within the same notification, including mucosal (n = 455; 43.2%) and non-intact skin (n = 476; 45.2%) exposures. Most injuries occurred during dental procedures (n = 737; 70.0%). Complete use of personal protective equipment (PPE) was documented in 50.6% (n = 533) of notifications.

Table 2 - Exposure, clinical, and laboratory characteristics of workers with occupational exposure. Belo Horizonte, Brazil, 2006–2019 (N = 1,054)

Variable	Category	N	%
Type of exposure:	Percutaneous	912	86.5
	Mucosal	455	43.2
	Non-intact skin	476	45.2
	Intact skin	391	37.1
	Other	12	1.1
Accident circumstance:	Dental procedure (including surgical)	737	70.0
	Improper disposal/handling	169	16.0
	Others (puncture, recapping, etc.)	148	14.0
Causative agent:	Sharps	698	66.2
	Non-sharps	299	28.4
	Ignored	57	5.4
Complete PPE* use:	Yes	533	50.6
	Not complete	262	24.9
	Ignored	259	24.6
HBV vaccination (3 doses):	Complete	824	78.2
	Not vaccinated/incomplete	49	4.6
	Ignored	181	17.2
Anti-HIV (worker):	Negative	480	45.5
	Positive	1	0.1
	Inconclusive	12	1.1
	Not performed	24	2.3
	Ignored	537	51.0
HBsAg (worker):	Negative	433	41.1
	Positive	5	0.5
	Inconclusive	12	1.1
	Not performed	34	3.2
	Ignored	570	54.1
Anti-HBs (worker):	Positive	242	23.0
	Negative	86	8.2
	Inconclusive	14	1.3
	Not performed	95	9.0
	Ignored	617	58.6
Anti-HCV (worker):	Negative	434	41.2
	Positive	1	0.1
	Inconclusive	13	1.2
	Not performed	35	3.3
	Ignored	572	54.3
HBsAg (source):	Positive	9	0.9
	Negative	326	30.9
	Inconclusive	6	0.6
	Not performed	53	5.0

Variable	Category	N	%
Anti-HIV (source):	Ignored	491	46.6
	Positive	53	5.0
	Negative	362	34.3
	Inconclusive	3	0.3
	Not performed	36	3.4
Anti-HBc (source):	Ignored	600	56.9
	Positive	9	0.9
	Negative	135	12.8
	Inconclusive	7	0.7
	Not performed	175	16.6
Anti-HCV (source):	Ignored	728	69.1
	Positive	7	0.7
	Negative	292	27.7
	Inconclusive	7	0.7
	Not performed	62	5.9
PEP-ARV†:	Ignored	529	50.2
	Performed	404	38.3
	Not performed	65	6.2
	Ignored/missing data	585	55.5
HBV prophylaxis:	Performed	19	1.8
	Not performed	98	9.3
	Ignored/missing data	937	88.9
Outcome:	Discharge without seroconversion	178	16.9
	Discharge – source negative	154	14.6
	Loss to follow-up	141	13.4
	Ignored/no information	655	62.1

Note: * PPE = personal protective equipment; † PPE-ARV = antiretroviral post-exposure prophylaxis.

Vaccination against hepatitis B was complete for 78.2% (n = 824) of workers; however, serologic verification of immunity (anti-HBs) was frequently absent, with “ignored” responses exceeding 50.0%. Laboratory variables showed substantial incompleteness overall, particularly for source-person testing. Among tested sources, 5.0% (n = 53) were HIV-positive, 0.9% (n = 9) were HBsAg-positive, and 0.7% (n = 7) were anti-HCV-positive. No occupational seroconversions to HIV, HBV, or HCV were identified.

Post-exposure prophylaxis (PEP) for HIV was reported in 38.3% (n = 404) of cases, whereas hepatitis B prophylaxis was recorded in only 1.8% (n = 19). The main outcomes were discharge without serologic conversion (n = 178; 16.9%) and discharge after confirmation of a negative source (n = 154; 14.6%). A schematic comparison between Ministry of Health recommendations and real-world PEP practices is presented in Figure 1.

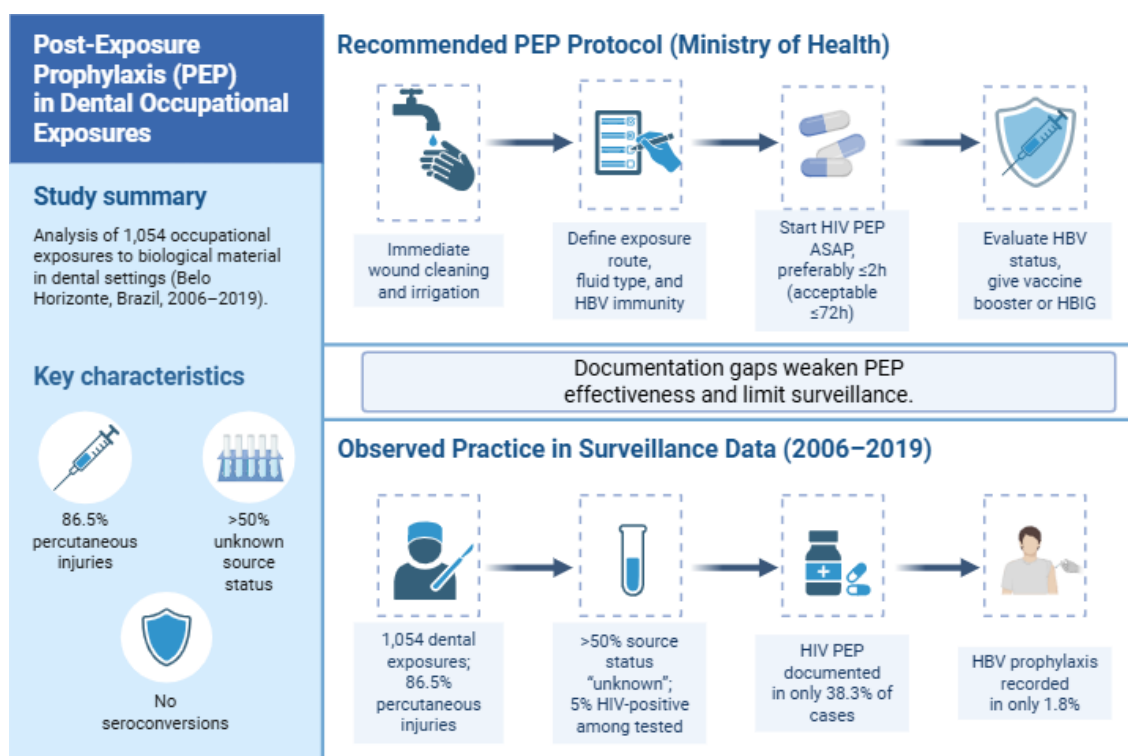


Figure 1 - Comparison between the recommended Ministry of Health post-exposure prophylaxis (PEP) protocol and observed practice in dental occupational exposures (Belo Horizonte, Brazil, 2006–2019)

A total of 1,054 valid notifications were included in the cluster analysis. The model identified two clusters, with a silhouette coefficient of 0.50 and a Δ BIC of 22.1, indicating a moderately well-differentiated structure. Categories coded as “no information” were retained as valid for all variables. The distribution of variables across clusters is shown in Table 3.

Table 3 - Distribution of variables included in the TwoStep Cluster model for occupational exposures in dental settings. Belo Horizonte, Brazil (2006–2019)

Variable	Category	Cluster 1 n (%)	Cluster 2 n (%)	Total n (%)
Source status	Positive	18 (3.6)	84 (15.0)	102 (9.7)
	Negative	252 (51.1)	169 (30.1)	421 (39.9)
	No information	223 (45.2)	308 (54.9)	531 (50.4)
Contextual HBV risk	Very low	258 (52.3)	93 (16.6)	351 (33.3)
	Low	202 (40.9)	152 (27.1)	354 (33.6)
	Intermediate	25 (5.1)	172 (30.7)	197 (18.7)
	High	8 (1.6)	127 (22.6)	135 (12.8)
Type of exposure	Percutaneous	433 (87.8)	479 (85.4)	912 (86.5)
	Mucosal	24 (4.9)	61 (10.9)	85 (8.1)
	Non-intact skin	21 (4.3)	54 (9.6)	75 (7.1)
PPE* adequacy – Percutaneous	Adequate	289 (58.6)	303 (54.0)	592 (56.2)
	Inadequate	59 (12.0)	91 (16.2)	150 (14.2)
	Not applicable	145 (29.4)	167 (29.8)	312 (29.6)
PPE* adequacy – Mucosal	Adequate	10 (2.0)	88 (15.7)	98 (9.3)

PPE* adequacy – Non-intact skin	Inadequate	2 (0.4)	52 (9.3)	54 (5.1)
	Not applicable	481 (97.6)	421 (75.0)	902 (85.6)
	Adequate	0 (0.0)	15 (2.7)	15 (1.4)
	Inadequate	0 (0.0)	11 (2.0)	11 (1.0)
	Not applicable	493 (100.0)	535 (95.4)	1 028 (97.5)

Note: * PPE = personal protective equipment.

Cluster 1 comprised 493 notifications (46.8%), characterized by a high frequency of “no information” in exposure and PPE variables, predominance of negative or unknown sources, and predominance of percutaneous exposures ($n = 433$; 87.8%), with mucosal and non-intact skin exposures below 5.0%. The contextual HBV risk was classified mainly as very low ($n = 258$; 52.3%) and low ($n = 202$; 40.9%). PPE use was recorded as adequate in 49.7% ($n = 245$) and not applicable in 43.8% ($n = 216$) of cases.

Cluster 2 included 561 notifications (53.2%), with a similar proportion of percutaneous exposures ($n = 479$; 85.4%), and concentrated almost all mucosal ($n = 61$; 10.9%) and non-intact skin ($n = 54$; 9.6%) exposures. This cluster presented a higher proportion of positive sources ($n = 84$; 15%) and of records with no information on source status ($n = 308$; 55%). Contextual HBV risk was intermediate or high in 53.3% ($n = 299$) of cases. PPE use was less frequently adequate, especially for mucosal and non-intact skin exposures. A graphical summary of the model structure and cluster characteristics is presented in Figure 2.

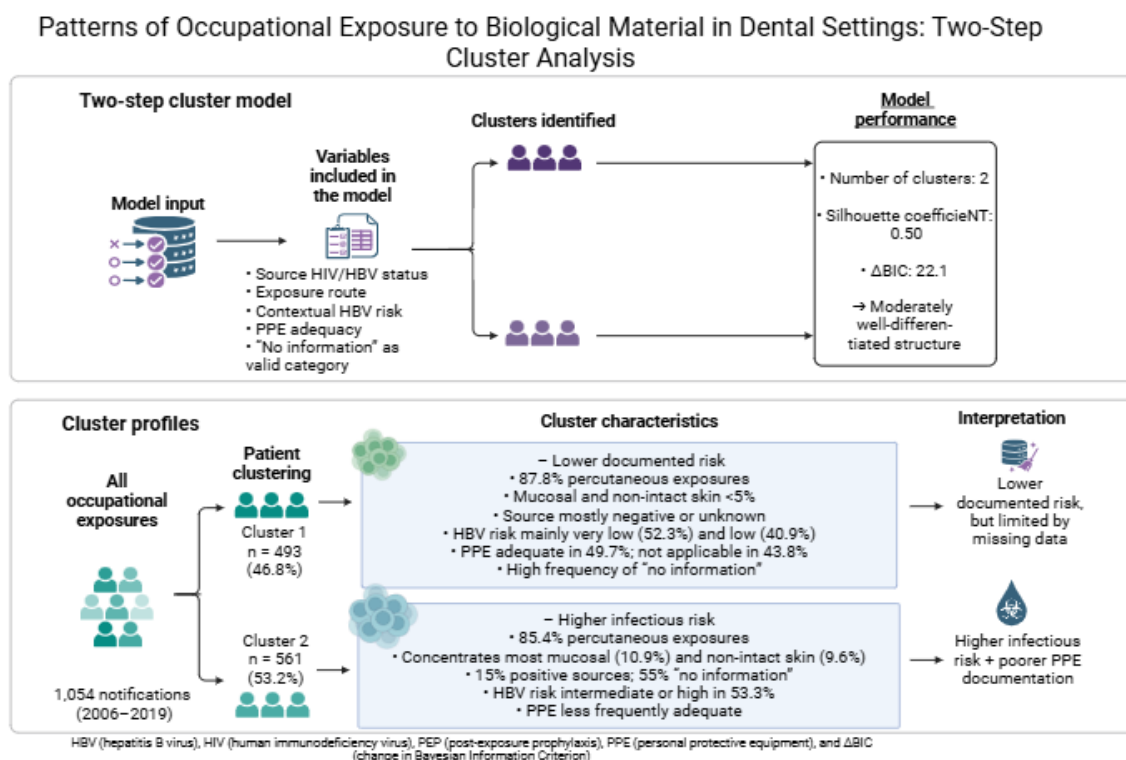


Figure 2 - Two-Step Cluster Analysis of Occupational Exposures to Biological Material in Dental Settings

Discussion

Most occupational exposures recorded in dental settings in Belo Horizonte occurred during routine clinical procedures and involved percutaneous injuries caused by sharp instruments. Mucosal and non-intact skin exposures were less frequent. The affected workers were predominantly women with higher education, including dentists, dental assistants, and students, and most exposures occurred during patient care. Hepatitis B vaccination coverage was high, and no cases of seroconversion to HIV, HBV, or HCV were identified. The cluster analysis identified two distinct exposure profiles based on biological risk, exposure route, and adequacy of protective measures.

The predominance of female participants in this sample may partly reflect broader demographic trends in the dental workforce. International evidence indicates that women constitute a substantial and growing proportion of practicing dentists, with estimates suggesting that female dentists represent between approximately 48% and 75% of the workforce across different regions worldwide¹⁶. In addition, workforce studies have documented increasing female participation in dentistry over recent decades, such as the rise from 24.5% to 29.8% of female dentists in the United States between 2010 and 2016¹⁷. These patterns of feminization of the dental profession, also described in global analyses of gender distribution and career trajectories in dentistry¹⁸, provide important contextual background and may help explain the gender distribution observed in the present study. Despite this numerical predominance in the workforce, women remain underrepresented in senior academic authorship and positions associated with greater academic prestige and leadership within dentistry¹⁹.

Institutional and multicenter investigations have reported similar distributions of injury type and clinical context among dental workers³⁻⁵, reinforcing that routine clinical activity remains the predominant setting for occupational exposure in oral health services. Needlestick injuries are consistently associated with local anesthesia administration and instrument cleaning^{3,5}, and evidence indicates that most exposures occur during direct patient care rather than post-procedural phases²⁰.

Although underreporting could not be directly assessed, prior research shows that mucosal exposures and minor percutaneous injuries are frequently unreported^{21,22}, particularly in contexts with limited surveillance feedback. This pattern contributes to compromised data completeness and may hinder accurate estimates of exposure frequency.

Partial adherence to personal protective equipment (PPE) in this dataset illustrates persistent challenges in integrating biosafety protocols into daily practice. Incomplete or inconsistent use of gloves, masks, and eye protection has been linked to workload demands and procedural barriers²³, as well as to perceived risk and organizational culture influencing adherence^{24,25}. Multicenter investigations similarly report deviations from post-exposure protocols driven by irregular PPE use and barriers such as visual obstruction, physical discomfort, and complex donning/doffing procedures²³, additional operational difficulties and visual-field interference affecting adherence²⁵, and fatigue or overload during extended work routines that hinder consistent compliance with biosafety measures²⁶.

Despite high hepatitis B vaccination coverage, more than half of the records lacked documentation of post-vaccination immunity, suggesting that anti-HBs testing is not routinely performed or recorded. This pattern is consistent with international findings showing that seroconversion verification is often incomplete or inconsistently documented, even in settings

with broad vaccination coverage^{27,28}. Prior studies note that antibody titers may decline and emphasize the importance of assessing anti-HBs 30 days after the third vaccine dose²⁷. Among dental professionals, incomplete vaccination records and missing immunity verification highlight the need for strengthened post-vaccination monitoring²⁸, especially in low and middle-income countries where documentation gaps remain common²⁹.

Weaknesses in immunity verification also affect post-exposure management. Limited recording of prophylactic measures after accidents contributes to incomplete surveillance, and global surveys indicate that many healthcare workers fail to initiate or complete recommended protocols, with delays and incomplete follow-up persisting across diverse settings^{30,31}.

Continuous education is essential to addressing these shortcomings. Structured training focusing on PPE use, vaccination monitoring, and standardized post-exposure management has been shown to reduce the frequency and severity of occupational injuries (Antoniadou et al., 2024). Integrating biosafety training into undergraduate curricula and offering periodic workplace refreshers may improve adherence and strengthen safety culture^{4,31}.

Clustering analysis offered additional explanatory value by identifying two distinct exposure profiles. One represented routine practice with more consistent protective measures and lower biological risk; the other concentrated exposures characterized by gaps in barriers, uncertain or potentially positive sources, and procedural vulnerability. Comparable patterns of differentiated vulnerability have been documented in studies examining risk factors for needle-stick injuries among dental personnel²⁵ and in investigations showing heterogeneous protective behaviors and variable adherence to post-exposure recommendations following sharp injuries⁶. Evidence from infection prevention shows that data-driven grouping can reveal meaningful subtypes overlooked by single-variable analyses^{32–34}, and comparable approaches in nursing have identified vulnerability patterns associated with workload and inconsistent protection³⁵.

These profiles have practical implications. Recurrent injuries are consistently associated with fatigue, constrained workspaces, and irregular protective practices, as documented in studies reporting repeated occupational exposures, heterogeneous protective behaviors, and vulnerability patterns among dental and nursing personnel^{6,25,35}. These findings reinforce the need for preventive actions that are tailored to specific worker groups and exposure contexts, rather than uniform measures applied broadly. By linking exposure contexts to specific worker groups, clustering supports the prioritization of preventive efforts and surveillance resources toward subgroups with the highest vulnerability, consistent with evidence showing that data-driven analyses identify clinically meaningful phenotypes and inform more targeted management strategies^{32–34}.

This is consistent with reports showing zero HIV seroconversions when post-exposure prophylaxis is initiated promptly and in alignment with recommended guidelines³⁶. Nonetheless, transmission cannot be definitively ruled out, given the documented underreporting and incomplete post-exposure practices described in an upper-middle-income setting³⁷. In addition, gaps in hepatitis B vaccination documentation and the frequent absence of recorded post-vaccination anti-HBs immunity among oral-health professionals further limit the ability to confirm transmission-free outcomes²⁷. Strengthening active follow-up, ensuring complete source-person testing, and enhancing surveillance systems remain essential components of occupational safety^{30,37,38}.

This study has limitations. Reliance on secondary surveillance data likely resulted in underreporting, particularly of minor or mucosal exposures. Substantial missing information on PPE use, laboratory testing, and post-exposure procedures may have affected descriptive estimates and the structure of the identified clusters. In addition, important contextual factors such as workload, supervision, and environmental conditions were not available for analysis. Finally, because the data reflect a single municipality, the generalizability of the findings is limited.

Despite these limitations, the results highlight the need for improved biosafety monitoring, reinforcement of post-exposure management, and incorporation of data-driven tools such as clustering to support more precise preventive actions in dental care.

Conclusion

In conclusion, while most exposures in dental services occurred during routine clinical procedures and no seroconversions were identified, this study highlights persistent gaps in biosafety adherence, immunity documentation, and post-exposure management. The two exposure profiles identified through clustering reveal distinct vulnerability patterns that are not captured by conventional surveillance. These findings can guide dental service managers and policymakers in strengthening vaccination monitoring, improving post-exposure follow-up, and implementing targeted interventions to reduce occupational risks and enhance biosafety performance.

Conflict of Interest

The authors declare that they have no conflicts of interest related to this study.

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References

1. Centers for Disease Control and Prevention (CDC). US Public Health Service Guidelines for the Management of Occupational Exposures to Human Immunodeficiency Virus and Recommendations for Postexposure Prophylaxis: Draft Update [Internet]. 2023 [cited 2025 Apr 15]. Available from: <https://stacks.cdc.gov/view/cdc/133952>
2. Săndulescu M, Nicolescu MI, Funieru C, Şahin GÖ, Săndulescu O. Exposure to biological fluids in dental practice—narrative review on appropriate risk assessment to guide post-exposure management. *Pathogens*. 2023;12:968.
3. Zeng J, Li E, Xu Y, Lin Y, Xiao Y, Yu X. Prevalence of needlestick injuries in dental assistants: a systematic review and meta-analysis. *J Glob Health*. 2025;15:04030.
4. Antoniadou M, Chanioti M, Pantelaki A, Parasiris A, Piperi E, Rahiotis C. The incidence of clinical injuries among undergraduate dental students: a prevention protocol. *Hygiene*. 2024;4(4):31.

5. Huang J, Li N, Xu H, Liu Y, An N, Cai Z. Global prevalence, risk factors, and reporting practice of needlestick and sharps injuries among dental students: a systematic review and meta-analysis. *J Hosp Infect.* 2022;129:89–101.
6. Kulik EM, Bornstein MM. Needlestick injuries and related occupational accidents with sharp objects in a dental school. *Swiss Dent J.* 2025;135(1):188–201.
7. Occupational Safety and Health Administration. Bloodborne pathogens and needlestick prevention (29 CFR 1910.1030). Washington (DC): Occupational Safety and Health Administration; 2024 [cited 2025 Oct 13]. Available from: <https://www.osha.gov/bloodborne-pathogens/general>
8. European Union (EU). Directive 2000/54/EC of the European Parliament and of the Council on the protection of workers from risks related to exposure to biological agents at work [Internet]. Brussels: European Union. 2025 [cited 2025 Oct 14]. Available from: <https://osha.europa.eu/en/legislation/directives/exposure-to-biological-agents/77>
9. International Labour Organization (ILO). Technical guidelines on biological hazards in the working environment [Internet]. Geneva; 2022 [cited 2025 Oct 12]. Available from: <https://www.ilo.org/media/254396/download>
10. World Health Organization (WHO). Guidelines for HIV post-exposure prophylaxis [Internet]. Geneva; 2024 [cited 2025 Oct 12]. Available from: <https://iris.who.int/server/api/core/bitstreams/fc3c8ce2-35d8-4b39-93b1-cb4d060767f0/content>
11. Centers for Disease Control and Prevention (CDC). Summary of infection prevention and control programs in dental settings: administrative considerations [Internet]. Atlanta (GA); 2024 [cited 2025 Oct 19]. Available from: <https://www.cdc.gov/dental-infection-control/hcp/summary/administrative-considerations.html>
12. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Exposição a materiais biológicos [Internet]. In: Departamento de Vigilância em Saúde Ambiental e Saúde do Trabalhador. Série A: Normas e manuais técnicos. Brasília: Ministério da Saúde; 2011 [cited 2025 Nov 6]. p. 1-72. Available from: <http://www1.saude.rs.gov.br/dados/1332967170825PROTOCOLO%20EXPOSICAO%20A%20MATERIAL%20BIOLOGICO.pdf>
13. Ceará. Secretaria da Saúde do Estado. Manual para uso do SINAN NET: Saúde do Trabalhador – análise da qualidade da base de dados e cálculos operacionais dos agravos e doenças relacionadas ao trabalho [Internet]. Fortaleza: Secretaria da Saúde do Estado do Ceará; 2017 [cited 2025 Nov 6]. Available from: https://www.saude.ce.gov.br/wp-content/uploads/sites/9/2018/06/manual_sinan_-15_02_17.pdf
14. World Health Organization (WHO). Data quality assurance: Module 3 – Site assessment of data quality: Data verification and system assessment [Internet]. Geneva; 2023 [cited 2025 Oct 16]. Available from: <https://iris.who.int/server/api/core/bitstreams/9b138841-fd8b-45fc-8b49-c40590751cf1/content>
15. Oyewole GJ, Thopil GA. Data clustering: application and trends. *Artif Intell Rev.* 2023;56(7):6439–6475.

16. Campus G, Maclellan A, von Hoyningen-Huene J, Wolf TG, Aerden M, Benyahya I, et al. The presence of women in the dental profession: a global survey. *Int Dent J*. 2024;74(1):110–118.
17. Surdu S, Mertz E, Langelier M, Moore J. Dental workforce trends: a national study of gender diversity and practice patterns. *Med Care Res Rev*. 2021;78(Suppl 1):30S–39S.
18. Tiwari T, Randall CL, Cohen L, Holtzmann J, Webster-Cyriaque J, Ajiboye S, et al. Gender inequalities in the dental workforce: global perspectives. *Adv Dent Res*. 2019;30(3):60–68.
19. Moreno LB, Franco MC, Karam SA, van de Sande FH, Montagner AF. Persistent gender disparity in leading dental publications across 4 decades: an observational study. *J Clin Epidemiol*. 2024;171:111386.
20. Zachar JJ, Reher P. Percutaneous exposure injuries amongst dental staff and students at a university dental clinic in Australia: a 6-year retrospective study. *Eur J Dent Educ*. 2022;26(2):288–295.
21. Pinelli C, Neri S do N, Loffredo L de CM. Dental students' reports of occupational exposures to potentially infectious biological material in a Brazilian school of dentistry. *Cad Saude Colet*. 2016;24(2):162–169.
22. Reis LA, Gómez La-Rotta EI, Diniz PB, Aoki FH, Jorge J. Occupational exposure to potentially infectious biological material among physicians, dentists, and nurses at a university. *Saf Health Work*. 2019;10(4):445–451.
23. Wan Q, Han L, Yang X, Yu S, Zheng X. Dental professionals' use of personal protective equipment during COVID-19: a cross-sectional study in China. *Front Public Health*. 2023;11:1183580.
24. Alkadi L, Farook FF, Binmoghaiseeb I, Alyousef Y, Alabdulwahab A, Aljohani R, et al. Knowledge and compliance with infection prevention and control practices in prosthodontic procedures among dental students and professionals. *Healthcare*. 2024;12(24):2536.
25. Xu J, Pan P, Song F, Gu Y, Xiong Q, Liu Z, et al. Analyzing the occupational exposure risks of dental healthcare workers from the perspective of repeated occupational exposure. *BMC Health Serv Res*. 2024;24(1):1377.
26. Silva MMS, Duarte LS, Nichiata LYI. Adherence to HIV post-exposure prophylaxis in a specialized service in São Paulo, Brazil. *J Infect Dev Ctries*. 2023;17(6):860–867.
27. Yared G, Al-Khatib A, El Manhal W, Yared N, Younes R. Dentists and hepatitis B vaccination: an “in vivo” national study. *Int Arab J Dent*. 2023;14(2):175–187.
28. Ravishankar S, Chowdhary A. Bringing hepatitis care closer to the dentists. *J Dent Res Rev*. 2023;10(2):110–116.
29. Senoo-Dogbey VE, Anto F, Quansah R, Danso-Appiah A. Completion of three-dose hepatitis B vaccination cycle and associated factors among health care workers in the Greater Accra Region of Ghana. *PLoS One*. 2024;19(4):e0298771.
30. Nakayoshi A, Gruta C, Lutes ER, Stupar L, Goldhammer B, Bositis C, et al. Experiences of the National Post-Exposure Prophylaxis Hotline (PEpline): occupational PEP consultation needs and trends, 2014 to 2022. *Am J Infect Control*. 2024;52(8):865–871.

31. da Silva GCB, Viani ACMM, Marinho AMCL, Pordeus IA, de Abreu MHNG. Factors associated with adherence to post-exposure prophylaxis among dental professionals in Brazil. *Braz Oral Res.* 2025;39:e20250047.
32. Ang SP, Chia JE, Lee E, Lorenzo-Capps MJ, Laezza M, Iglesias J. Unsupervised machine learning in identification of septic shock phenotypes and their in-hospital outcomes: a multicenter cohort study. *J Clin Med.* 2025;14(13):4450.
33. Teodoru M, Negrea MO, Cozgarea A, Cozma D, Boicean A. Enhancing pulmonary embolism mortality risk stratification using machine learning: the role of the neutrophil-to-lymphocyte ratio. *J Clin Med.* 2024;13(5):1191.
34. Barchitta M, Maugeri A, Favara G, Riela PM, La Mastra C, La Rosa MC, et al. Cluster analysis identifies patients at risk of catheter-associated urinary tract infections in intensive care units: findings from the SPIN-UTI Network. *J Hosp Infect.* 2021;107:57–63.
35. Deng X, Han J, Yin L, Pang Y, Han Q, Zhao L, et al. A machine learning-based approach for precision risk stratification and multifactorial analysis of needlestick injuries in oral and maxillofacial surgery nursing. *BMC Nurs.* 2025;24(1):698.
36. Pineda-Ramirez JL, Sierra-Diaz E, Zavala-Sánchez EV, Zarate-Leal G, Cisneros-García DL, Hernández-Muñoz EA, et al. The prevalence of HIV seroconversion in healthcare workers following sharp injuries and exposure to biofluids. *Cureus.* 2024;16(8):e66773.
37. Feng H, Mao X, Li M, Mao H. Analysis of characteristic and postexposure practices of occupational blood and body fluid exposures among health care workers in Chinese tertiary hospitals: a retrospective ten-year study. *BMC Infect Dis.* 2024;24(1):256.
38. Pierce A. Management of occupational exposure to blood and body fluids in primary care. *Aust Prescr.* 2024;47(4):113–118.

7 ASPECTOS ÉTICOS

Este estudo foi aprovado pelos Comitês de Ética em Pesquisa (CEP) da Universidade Federal de Minas Gerais (UFMG) e da Secretaria Municipal de Saúde de Belo Horizonte (SMS-BH), sob os Certificados de Apresentação de Apreciação Ética (CAAE) nº 68702123.9.0000.5149 (CEP/UFMG) e nº 68702123.9.3001.5140 (CEP/SMS-BH). Trata-se de pesquisa retrospectiva com uso de dados secundários extraídos do Sistema de Informação de Agravos de Notificação (SINAN), com dispensa do Termo de Consentimento Livre e Esclarecido (TCLE), em virtude da impossibilidade de identificação direta ou contato com os sujeitos da pesquisa, conforme as diretrizes da Resolução CNS nº 466/2012 e Resolução CNS nº 510/2016.

8 CONSIDERAÇÕES FINAIS

Os resultados obtidos nesta tese de doutorado ampliam a compreensão sobre acidentes ocupacionais com exposição a material biológico em ambientes odontológicos, especialmente no que se refere ao risco de soroconversão para HIV e hepatite B em contextos assistenciais reais. A revisão sistemática com metanálise fornece uma estimativa atualizada da probabilidade de soroconversão ocupacional por HIV, permitindo comparações internacionais, identificação de lacunas regionais e reflexão crítica sobre a efetividade das estratégias de prevenção utilizadas em diferentes cenários. Além disso, consolida uma base metodológica sólida para estudos futuros sobre eventos raros em saúde ocupacional.

A avaliação da qualidade das informações registradas no Sistema de Informação de Agravos de Notificação evidenciou fragilidades estruturais no processo de vigilância, especialmente no que diz respeito à completitude e à consistência das variáveis essenciais para o monitoramento adequado desses agravos. Esses achados reforçam a necessidade de aprimoramento contínuo dos instrumentos de notificação, da capacitação das equipes responsáveis pelo registro e da institucionalização de rotinas de checagem e qualificação dos dados. Melhorias nesse âmbito podem ampliar a sensibilidade do sistema e fortalecer a produção de indicadores confiáveis para subsidiar políticas públicas.

O estudo descritivo, associado à aplicação do método TwoStep Cluster, permitiu identificar padrões de risco e perfis de exposições com maior vulnerabilidade, oferecendo subsídios para ações educativas mais direcionadas, intervenções institucionais e revisões de fluxos assistenciais em ambientes odontológicos. A ausência de casos de soroconversão para HIV ou hepatite B no período analisado, embora deva ser interpretada com cautela devido às limitações próprias do uso de dados secundários, sugere que as medidas de prevenção e profilaxia adotadas podem estar desempenhando papel relevante na proteção dos trabalhadores.

A articulação das três vertentes metodológicas adotadas neste projeto aponta para a importância de estratégias integradas de prevenção, qualificação da informação e análise de risco em saúde ocupacional. Futuras pesquisas poderão explorar metodologias adicionais, como modelos preditivos, análises de rede, estudos

qualitativos com equipes notificadoras e investigações multicêntricas, para aprofundar a compreensão da dinâmica das exposições e fortalecer a cultura de segurança nos serviços de saúde. Espera-se que os achados aqui apresentados contribuam para o aprimoramento das práticas institucionais, para a consolidação de rotinas de vigilância mais sensíveis e para o desenvolvimento de políticas públicas orientadas pela melhor evidência disponível.

REFERÊNCIAS

ALMEIDA, A. I. S.; RIBEIRO, J. M.; BASTOS, F. I. Análise da política nacional de DST/Aids sob a perspectiva do modelo de coalizões de defesa. **Ciênc saúde coletiva**, 2022, v. 27, p. 837-848. Disponível em: <https://doi.org/10.1590/1413-81232022273.45862020>.

ALMEIDA, C. A. F.; BENATTI, M. C. C. Exposições ocupacionais por fluidos corpóreos entre trabalhadores da saúde e sua adesão à quimioprofilaxia. **Rev. esc. enferm. USP**, São Paulo, v. 41, n. 1, p. 120-126, mar. 2007. Disponível em: <http://www.scielo.br>

BARBOSA, D. A.; BARBOSA, A. M. F. Avaliação da completude e consistência do banco de dados das hepatites virais no estado de Pernambuco, Brasil, no período de 2007 a 2010. **Epidemiologia e Serviços de Saúde**, v. 22, n. 1, p. 49-58, 2013. Disponível em: http://scielo.iec.pa.gov.br/scielo.php?script=sci_arttext&pid=S1679-49742013000100005&lng=en&nrm=iso&tlng=en

BERKEY, C. S.; HOAGLIN, D. C.; MOSTELLER, F.; COLDITZ, G. A. A random-effects regression model for meta-analysis. **Stat Med.**, New York, v. 14, n. 4, p. 395-411, 1995.

BILJANA, M.; JELENA, M.; BRANISLAV, J.; MILORAD, R. Bias in meta-analysis and funnel plot asymmetry. **Stud Health Technol Inform**, Washington DC, n. 68, p. 323-328, 1999.

BRASIL. **Diretrizes metodológicas: Sistema GRADE – Manual de graduação da qualidade da evidência e força de recomendação para tomada de decisão em saúde**. Brasília: Ministério da Saúde, 2014. 72 p. Disponível em: https://bvsms.saude.gov.br/bvs/publicacoes/diretrizes_metodologicas_sistema_grad_e.pdf

BRASIL. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Ações Programáticas Estratégicas. **Exposição a materiais biológicos**. Brasília: Editora do Ministério da Saúde, 2011. Disponível em: https://bvsms.saude.gov.br/bvs/publicacoes/protocolo_expos_mat_biologicos.pdf

BRASIL. Ministério da Saúde. Agência Nacional de Vigilância Sanitária. **Serviços Odontológicos: Prevenção e Controle de Riscos**. Brasília: Ministério da Saúde, 2006. 156 p. (Série A. Normas e Manuais Técnicos). Disponível em: http://bvsms.saude.gov.br/bvs/publicacoes/manual_odonto_servicos.pdf

BRASIL. Ministério da Saúde. Secretaria de Vigilância em Saúde e Ambiente. **Boletim Epidemiológico: HIV e Aids 2024**. Brasília, DF: Ministério da Saúde, 2024. Disponível em: <https://www.gov.br/aids>

BRASIL. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Vigilância, Prevenção e Controle das Infecções Sexualmente Transmissíveis, do

HIV/Aids e das Hepatites Virais. **Boletim Epidemiológico HIV/Aids**. Brasília, DF, 2019. Disponível em:

<https://www.saude.gov.br/images/pdf/2019/novembro/29/Boletim-Ist-Aids-2019-especial-web.pdf>

BRASIL. Ministério da Saúde. Secretaria de Vigilância em Saúde. **Manual de normas e rotinas do Sistema de Informação de Agravos de Notificação – SINAN [Internet]**. Brasília: Ministério da Saúde, 2007. 70 p. Disponível em:

https://portalsinan.saude.gov.br/images/documentos/Aplicativos/sinan_net/Manual_Normas_e_Rotinas_2_edicao.pdf

BRASIL. Ministério da Saúde. Secretaria de Vigilância em Saúde. **Protocolo Clínico e Diretrizes para Manejo da Infecção pelo HIV em Adultos**. Brasília: Ministério da Saúde, 2018. Disponível em:

https://bvsms.saude.gov.br/bvs/publicacoes/protocolo_clinico_diretrizes_terapeuticas_profilaxia_exposicao_HIV_IST_hepatites_virais.pdf

BRASIL. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Vigilância das Doenças. **Nota Técnica Conjunta nº 02/2013/CGPNI/DEVEP e CGDHRV/DST-AIDS/SVS/MS**. 2013.

BRASIL. Ministério da Saúde. **Portaria nº 104, de 25 de janeiro de 2011**. Diário Oficial da União, 2011.

BRASIL. Ministério da Saúde. **Portaria nº 1.271, de 06 de junho de 2014**. Diário Oficial da União, 2014.

BRASIL. Ministério da Saúde. **Portaria nº 777, de 28 de abril de 2004**. Diário Oficial da União, 2004.

BRASIL. **Portaria nº 3.214, de 08 de junho de 1978**. Aprova as normas regulamentadoras que consolidam as leis do trabalho, relativas à segurança e medicina do trabalho. NR-9. Riscos Ambientais. In: SEGURANÇA E MEDICINA DO TRABALHO. 29. ed. São Paulo: Atlas, 1995. 489 p. (Manuais de legislação, 16). Disponível em: https://enit.trabalho.gov.br/portal/images/Arquivos_SST/SST_NR/NR-09-atualizada-2019.pdf

BRASIL. Ministério da Saúde. Conitec. **Protocolo Clínico e Diretrizes Terapêuticas para Profilaxia Pós-Exposição de Risco à Infecção pelo HIV, IST e Hepatites Virais**. Brasília, 2018. Disponível em:

http://conitec.gov.br/images/Consultas/Relatorios/2017/Relatorio_PCDT_ProfilaxiaPosExposicaoRiscoInfeccao_HIV_IST_HepatitesVirais_CP.pdf

CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC). Recommendations for prevention of HIV transmission in health-care settings. **MMWR**, 1987, v. 36 (suppl. no. 2S). Disponível em:

<https://www.cdc.gov/mmwr/preview/mmwrhtml/00023587.htm>

CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC). Guidelines for Infection Control in Dental Health-Care Settings. **MMWR Morb Wkly Rep**, 2003.

Disponível em: <https://www.cdc.gov/oralhealth/infectioncontrol/pdf/recommendations-excerpt.pdf>

CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC). Perspectives in Disease Prevention and Health Promotion Update: Universal Precautions for Prevention of Transmission of Human Immunodeficiency Virus, Hepatitis B Virus, and Other Bloodborne Pathogens in Health-Care Settings. **MMWR**, 1988, v. 37, n. 24, p. 377-388.

CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC). Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis. **MMWR Morb Mortal Wkly Rep**, 2001, jun. 29, v. 50 (RR-11), p. 1-52. Disponível em: <https://www.cdc.gov/mmwr/PDF/rr/rr5011.pdf>

CEARÁ. Secretaria da Saúde do Estado. **Manual para uso do SINAN NET, análise da qualidade da base de dados e cálculos operacionais dos agravos e doenças relacionados ao trabalho [recurso eletrônico]**. Fortaleza: Secretaria do Estado do Ceará, 2017.

COPPOLA, N. Hepatitis B virus and hepatitis C virus infection in healthcare workers. **World Journal of Hepatology**, v. 8, n. 5, p. 273, 2016. Disponível em: <http://www.wjgnet.com/1948-5182/full/v8/i5/273.htm>

CORREIA, L. O. S.; PADILHA, B. M.; VASCONCELOS, S. M. L. Métodos para avaliar a completude dos dados dos sistemas de informação em saúde do Brasil: uma revisão sistemática. **Ciência & Saúde Coletiva**, Rio de Janeiro, v. 19, n. 11, p. 4467-4478, nov. 2014. Disponível em: <http://www.cienciaesaudecoletiva.com.br/artigos/metodos-para-avaliar-a-completude-dos-dados-dos-sistemas-de-informacao-em-saude-do-brasil-uma-revisao-sistematica/12424?id=12424&id=12424&id=12424>

DANTAS FILHO, F. F. et al. Risk factors affecting occupational exposure to blood and body fluids among dental students: a cross-sectional study in a Brazilian federal university. **Clin Biomed Res**, 2017, v. 37, n. 1. Disponível em: <https://seer.ufrgs.br/hcpa/article/view/68843>

EGGER, M.; DAVEY, S. G.; SCHNEIDER, M.; MINDER, C. Bias in meta-analysis detected by a simple, graphical test. **BMJ**, Londres, v. 315, n. 7109, p. 629-634, 1997. Disponível em: <http://www.bmj.com/content/315/7109/629>

FASUNLORO, A.; OWOTADE, F. J. Occupational hazards among clinical dental staff. **J Contemp Dent Pract**, v. 5, p. 134-152, 2004. Disponível em: <https://www.thejcdp.com/doi/pdf/10.5005/jcdp-5-2-134>

FERNANDEZ, C. S.; MELLO, E. B. de; ALENCAR, M. J. S.; ALBRECHT, N. Conhecimento dos dentistas sobre contaminação das hepatites B e C na rotina odontológica. **Bras. Odontol. [online]**, 2013, v. 70, n. 2, p. 192-195. Disponível em: <http://revodonto.bvsalud.org/pdf/rbo/v70n2/a19v70n2.pdf>

FERREIRA, J. E. S. M. et al. Sistemas de Informação em Saúde no apoio à gestão da Atenção Primária à Saúde: revisão integrativa. **Revista Eletrônica de Comunicação, Informação e Inovação em Saúde**, v. 14, n. 4, 2020. Disponível em: <https://www.reciis.iciet.fiocruz.br/index.php/reciis/article/view/1923>

GARBIN, C. A. S. et al. Hepatite B e Exposição Ocupacional no Cenário Odontológico. A Valoração do Saber e das Atitudes dos Profissionais. **J Health Sci**, 2017, v. 19, n. 2, p. 209-213. Disponível em: <https://revista.pgsskroton.com/index.php/JHealthSci/article/download/5053/3683>

GARCIA, L. P.; BLANK, V. L. G. Condutas pós-exposição ocupacional a material biológico na odontologia. **Rev. Saúde Pública**, São Paulo, v. 42, n. 2, p. 279-286, abr. 2008. Disponível em: https://www.scielo.br/scielo.php?pid=S0034-89102008000200013&script=sci_abstract&tlng=pt

GARNER, J. S. Hospital Infection Control Practices Advisory Committee. Guideline for isolation precautions in hospitals. **Infect Control Hosp Epidemiol**, 1996, v. 17, n. 5, p. 53-80. Disponível em: <https://wonder.cdc.gov/wonder/prevguid/p0000419/p0000419.asp>

GOMES, S. C. S.; CALDAS, A. J. M. et al. Qualidade dos dados do sistema de informação sobre acidentes de trabalho com exposição a material biológico no Brasil, 2010 a 2015. **Revista Brasileira de Medicina do Trabalho**, v. 15, n. 3, p. 200-208, 2017. Disponível em: <http://www.rbmt.org.br/details/249/pt-BR/qualidade-dos-dados-do-sistema-de-informacao-sobre-acidentes-de-trabalho-com-exposicao-a-material-biologico-no-brasil-2010-a-2015>

GORDIS, L. **Epidemiologia**. 5. ed. Rio de Janeiro: Livraria e Editora Revinter Ltda, 2017.

HADDAWAY, N. R.; COLLINS, A. M.; COUGHLIN, D.; KIRK, S. The Role of Google Scholar in Evidence Reviews and Its Applicability to Grey Literature Searching. **PLoS One**, 2015, set. 17, v. 10, n. 9, e0138237. Disponível em: <https://pubmed.ncbi.nlm.nih.gov/26379270/>

HENDERSON, D. K.; FAHEY, B. J.; WILLY, M. et al. Risk for occupational transmission of human immunodeficiency virus type 1 (HIV-1) associated with clinical exposures: a prospective evaluation. **Ann Intern Med.**, 1990, v. 113, n. 10, p. 740-746.

HIGGINS, J. P. T. et al. Measuring inconsistency in meta-analyses. **British Medical Journal**, 2003, v. 327, n. 7414, p. 557-560.

HIGGINS, J. P. T. (ed.); GREEN, S. (ed.). **Cochrane handbook for systematic reviews of interventions**. Version 6 (updated September 2018). Disponível em: <http://handbook.cochrane.org>

HU, D. J.; KANE, M. A.; HEYMANN, D. L. Transmission of HIV, hepatitis B virus and other bloodborne pathogens in health care settings: a review of risk factors and

guidelines for prevention. **World Health Organization**, 1991, v. 69, n. 5, p. 623-630. Disponível em: <https://apps.who.int/iris/handle/10665/48170>

IBGE. Instituto Brasileiro de Geografia e Estatística. Comissão Nacional de Classificação: atividade odontológica. abr. 2020. Disponível em: <https://concla.ibge.gov.br/busca-online-cnae.html?subclasse=8630504&tipo=cnae&versao=9&view=subclasse>

IPPOLITO, G.; PURO, V.; DE CARLI, G. The Italian Study Group on Occupational Risk of HIV Infection. The risk of occupational human immunodeficiency virus infection in health care workers. **Arch Intern Med**, 1993, n. 12, p. 1451-1458. Disponível em: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.691.4704&rep=rep1&type=pdf>

KASHYAP, B.; TIWARI, U.; PRAKASH, A. Hepatitis B virus transmission and health care workers: Epidemiology, pathogenesis and diagnosis. **Indian Journal of Medical Specialities**, v. 9, n. 1, p. 30-35, 2018. Disponível em: <https://linkinghub.elsevier.com/retrieve/pii/S0976288418300079>

KUHAR, D.; HENDERSON, D.; STRUBLE, K.; HENEINE, W.; THOMAS, V.; CHEEVER, L.; PANLILIO, A. Updated US Public Health Service Guidelines for the Management of Occupational Exposures to Human Immunodeficiency Virus and Recommendations for Postexposure Prophylaxis. **Infection Control & Hospital Epidemiology**, 2013, v. 34, n. 9, p. 875-892. Disponível em: <https://www.cambridge.org/core/journals/infection-control-and-hospital-epidemiology/article/div-classtitleupdated-us-public-health-service-ylaxisdiv/FACD234C788E0D541E37BC3DEFB4C248>

MAAMOR, N. H.; MUHAMAD, N. A.; MOHD DALI, N. S. et al. Seroprevalence of Hepatitis B Among Healthcare Workers in Asia and Africa and Its Association With Their Knowledge and Awareness: A Systematic Review and Meta-Analysis. **Frontiers in Public Health**, v. 10, p. 859350, 2022. Disponível em: <https://www.frontiersin.org/articles/10.3389/fpubh.2022.859350/full>

MABWE, P.; KESSY, A. T.; SEMALI, I. Understanding the magnitude of occupational exposure to human immunodeficiency virus (HIV) and uptake of HIV post-exposure prophylaxis among healthcare workers in a rural district in Tanzania. **J Hosp Infect**, 2017, v. 96, n. 3, p. 276-280. Disponível em: [https://www.journalofhospitalinfection.com/article/S0195-6701\(17\)30019-1/abstract](https://www.journalofhospitalinfection.com/article/S0195-6701(17)30019-1/abstract)

MACHADO-CARVALHAIS, H. P.; RAMOS-JORGE, M. L.; AUAD, S. M.; MARTINS, L. H. P. M.; PAIVA, S. M.; PORDEUS, I. A. Occupational exposure to potentially infectious biological material in a dental teaching environment. **J Dent Educ.**, 2008, v. 72, n. 10, p. 1201-1208. Disponível em: <https://www.ncbi.nlm.nih.gov/pubmed/17923713>

MAGAGNINI, M. A. M.; AYRES, J. A. Acidentes com material biológico: a realidade de uma instituição hospitalar do interior paulista. **Rev. Min. Enferm.**, 2009, v. 13, n. 1, p. 115-122, jan./mar. Disponível em: <http://www.reme.org.br/artigo/detalhes/171>

MAIA, D. A. B.; FRIAS, P. G.; ASSUNÇÃO, R. S. et al. Avaliação da implantação do Sistema de Informação de Agravos de Notificação em Pernambuco, 2014.

Epidemiologia e Serviços de Saúde, v. 28, 2019. Disponível em: <http://www.scielo.br/j/ress/a/NxfrmzLp8xNBHDVd9sQ8Bxhb/?lang=pt>

MEDEIROS, A. J. **Representação Social sobre o acidente de trabalho na área de saúde**. 2005. Tese (Doutorado) – Universidade Federal do Rio Grande do Norte, Programa de Pós-Graduação em Ciências da Saúde, Natal, 2005. Disponível em: https://repositorio.ufrn.br/bitstream/123456789/13370/1/RepresentacoesSociaisAcidente_MedeirosJunior_2005.pdf

BALCHEVA, M. V. E. P. et al. Occupational infectious risk in dentistry – Awareness and Protection. **Journal of IMAS. Annual Proceeding (Scientific Papers)**, 2015, v. 21, n. 4. Disponível em: <https://www.journal-imab-bg.org/issues-2015/issue4/vol21issue4p995-999.html>

MINISTÉRIO DA SAÚDE. Secretaria de Vigilância em Saúde. **Roteiro para uso do SINAN Net, análise da qualidade da base de dados e cálculo de indicadores epidemiológicos e operacionais: Violência interpessoal/autoprovocada**. Brasília: Ministério da Saúde, 2019.

MUNN, Z.; MOOLA, S.; LISY, K.; RIITANO, D.; TUFANARU, C. Methodological guidance for systematic reviews of observational epidemiological studies reporting prevalence and incidence data. **Int J Evid Based Healthc.**, Sidney, v. 13, n. 3, p. 147-153, 2015.

MONTEIRO, S. S.; BRIGEIRO, M.; VILELLA, W. V.; MORA, C.; PARKER, R. Desafios do tratamento como prevenção do HIV no Brasil: uma análise a partir da literatura sobre testagem. **Ciênc saúde coletiva**, 2019, v. 24, p. 1793-1807. Disponível em: <https://doi.org/10.1590/1413-81232018245.16512017>

NASCIMENTO, L. S.; ASSUNÇÃO, L. R. S.; SILVA JÚNIOR, N. G.; PEDREIRA, E. N.; SILVA, R. L. C. Acidentes com perfurocortantes na Faculdade de Odontologia da UFPA: visualização de um cenário. **Rev Odontol Bras Central**, 2012, v. 21, n. 56, p. 463-467. Disponível em: <https://www.robrac.org.br/seer/index.php/ROBRAC/article/view/542>

NOGUEIRA, S. A.; MEDEIROS, A. R.; CARNEIRO, S. E. R.; SOUSA, G. C. A. Prevalência e notificações de acidentes de trabalho com exposição a material biológico na odontologia. **Revista Ciência Plural**, v. 2, n. 1, p. 102-119, jun. 2016. Disponível em: <https://pesquisa.bvsalud.org/porta1/resource/pt/biblio-855849>

NUNES, A. O.; ARAÚJO, T. M.; SANTOS, K. O. B. et al. Vacinação contra hepatite B em trabalhadores da saúde de um município da Bahia. **Revista de Saúde Coletiva da UEFS**, v. 5, n. 1, p. 9-16, 2016. Disponível em: <http://periodicos.uefs.br/index.php/saudecoletiva/article/view/1003>

OBIRI-YEBOAH, D.; AWUKU, Y. A.; ADJEI, G. et al. Post Hepatitis B vaccination sero-conversion among health care workers in the Cape Coast Metropolis of Ghana.

PLOS ONE, v. 14, n. 6, p. e0219148, 2019. Disponível em:

<https://dx.plos.org/10.1371/journal.pone.0219148>

ORESTES-CARDOSO, S. M.; FARIAS, A. L. F.; PEREIRA, M. R. M. G.; ORESTES-CARDOSO, A. J.; CUNHA JÚNIOR, I. F. Acidentes perfurocortantes: prevalência e medidas profiláticas em alunos de odontologia. **Rev Bras Saúde Ocup.**, 2009, v. 34, n. 119, p. 6-14. Disponível em: <http://dx.doi.org/10.1590/S0303-76572009000100002>

PAGE, M. J. et al. PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews. **BMJ**, 2021, mar. 29, v. 372, n160.

Disponível em: <https://www.bmj.com/content/372/bmj.n160>

PAIM, I.; NEHMY, R. M. Q.; GUIMARÃES, C. Problematização do conceito de "qualidade" da informação. **Perspectivas em Ciências da Informação**, 1996, v. 1, p. 113-122.

PAPPAS, S. C. Hepatitis B and Health Care Workers. **Clinics in Liver Disease**, v. 25, n. 4, p. 859-874, 2021. Disponível em:

<https://linkinghub.elsevier.com/retrieve/pii/S108932612100060X>

RAMOS LAGES, S. M. et al. Formação em odontologia: O papel das instituições de ensino na prevenção do acidente com exposição a material biológico. **Cienc Trab.**, Santiago, v. 17, n. 54, p. 182-187, dez. 2015. Disponível em:

<https://scielo.conicyt.cl/pdf/cyt/v17n54/art05.pdf>

ROMERO, D. E.; CUNHA, C. B. Avaliação da qualidade das variáveis epidemiológicas e demográficas do Sistema de Informação sobre Nascidos Vivos, 2002. **Cad Saude Pública**, 2007, v. 23, n. 2, p. 701-714.

ROUVEIX, E. et al. Management of accidental exposure to HIV: The COREVIH 2011 activity. **Médecine et maladies infectieuses**, 2014, v. 44, p. 112-116. Disponível em:

<https://www.sciencedirect.com/science/article/pii/S0399077X14000249?via%3Dihub>

WICKER, S.; CINATL, J.; BERGER, A.; DOERR, H. W.; GOTTSCHALK, R.; RABENAU, H. F. Determination of Risk of Infection with Blood-borne Pathogens Following a Needlestick Injury in Hospital Workers. **The Annals of Occupational Hygiene**, 2008. Disponível em:

<https://academic.oup.com/annweh/article/52/7/615/199261/Determination-of-Risk-of-Infection-with-Bloodborne>

SANTOS, K. F. **Análise dos aspectos epidemiológicos dos acidentes ocupacionais, práticas de biossegurança e impacto na rotina de trabalho de cirurgiões-dentistas, após exposição a material biológico**. 2014. Tese (Doutorado) – Programa de Pós-Graduação em Ciências da Coordenadoria de Controle de Doenças, Secretaria de Estado de São Paulo, São Paulo, 2014.

Disponível em: <https://ses.sp.bvs.br>

SASAMOTO, S. A. A.; TIPPLE, A. F. V.; LELES, C. R.; SILVA, É. T.; PAIVA, E. M. M.; LOPES-LIMA, L. K. O. Perfil de acidentes com material biológico em uma

instituição de ensino odontológico. **Acta Sci - Heal Sci.**, 2014, v. 36, n. 1, p. 43-49. Disponível em: <http://files.bvs.br/upload/S/0104-7914/2010/v19n50/a1558.pdf>

SOAITA, C. Identifying occupational risks in dentistry. **Procedia Technology**, v. 12, p. 558-565, 2014. Disponível em: www.sciencedirect.com

STROUP, D. F.; BERLIN, J. A.; MORTON, S. C.; OLKIN, I.; WILLIAMSON, G. D.; RENNIE, D. et al. Meta-analysis of observational studies in epidemiology: a proposal for reporting. Meta-analysis Of Observational Studies in Epidemiology (MOOSE) group. **JAMA**, Chicago, v. 283, n. 15, p. 2008-2012, 2000.

TEIXEIRA, M. G. et al. Seleção das doenças de notificação compulsória: critérios e recomendações para as três esferas de governo. **Inf. Epidemiol. Sus**, Brasília, v. 7, n. 1, p. 7-28, mar. 1998. Disponível em: http://scielo.iec.gov.br/scielo.php?script=sci_arttext&pid=S0104-16731998000100002&lng=pt&nrm=iso

THE JOANNA BRIGGS INSTITUTE. **Joanna Briggs Institute Reviewers' Manual: 2014 edition**. South Australia: The Joanna Briggs Institute, The University of Adelaide, 2014. 36 p.

UNAIDS. **2024 Global AIDS Report — The Urgency of Now: AIDS at a Crossroads [Internet]**. Geneva: Joint United Nations Programme on HIV/AIDS (UNAIDS), 2024 [cited 2025 Apr 7]. Disponível em: <https://www.unaids.org/en/resources/documents/2024/global-aids-update-2024>

UNAIDS. United Nations Programme on HIV/AIDS. **Global AIDS Report: The Urgency of Now – AIDS at a Crossroads**. Geneva: Joint United Nations Programme on HIV/AIDS, 2024. Disponível em: <https://www.unaids.org/en/resources/documents/2024/global-aids-update-2024>

YOUNG, T.; ARENS, F. J.; KENNEDY, G. E. et al. Antiretroviral post-exposure prophylaxis (PEP) for occupational HIV exposure. **Cochrane Database of Systematic Reviews**, 2007, v. 2012, n. 5. Disponível em: <http://doi.wiley.com/10.1002/14651858.CD002835.pub3>

ZHANG, Y.; AKL, E. A.; SCHÜNEMANN, H. J. Using systematic reviews in guideline development: the GRADE approach. **Res Synth Methods.**, 2018, p. 1-18. Disponível em: <https://pubmed.ncbi.nlm.nih.gov/30006970/>

ZINA, L. G.; MOIMAZ, S. A. S. Odontologia baseada em evidência: etapas e métodos de uma revisão sistemática. **Arq Odontol**, Belo Horizonte, v. 48, n. 3, p. 188-199, 2012. Disponível em: http://revodonto.bvsalud.org/scielo.php?script=sci_abstract&pid=S1516-09392012000300010&lng=pt&nrm=iso&tlng=pt

APÊNDICE A: Ficha de Investigação – Acidente de Trabalho com Exposição a Material Biológico” (SINAN)

República Federativa do Brasil
Ministério da Saúde

SINAN
SISTEMA DE INFORMAÇÃO DE AGRAVOS DE NOTIFICAÇÃO
FICHA DE INVESTIGAÇÃO ACIDENTE DE TRABALHO COM EXPOSIÇÃO À MATERIAL BIOLÓGICO

Nº

Definição de caso: Todo caso de acidente de trabalho ocorrido com quaisquer categorias profissionais, envolvendo exposição direta ou indireta do trabalhador a material biológico (orgânico) potencialmente contaminado por patógenos (vírus, bactérias, fungos, príons e protozoários), por meio de material perfuro-cortante ou não.

Dados Gerais	1 Tipo de Notificação 2 - Individual		2 Agravado/doença ACIDENTE DE TRABALHO COM EXPOSIÇÃO À MATERIAL BIOLÓGICO		Código (CID10) Z20.9	3 Data do Notificação
	4 UF	5 Município de Notificação		Código (IBGE)		
	6 Unidade de Saúde (ou outra fonte notificadora)		Código	7 Data do Acidente		
	8 Nome do Paciente					
Notificação Individual	10 (ou) Idade 1 - Hora 2 - Dia 3 - Mês 4 - Ano		11 Sexo M - Masculino F - Feminino I - Ignorado	12 Gestante 1-1º Trimestre 2-2º Trimestre 3-3º Trimestre 4- Idade gestacional Ignorada 5-Não 6- Não se aplica 9- Ignorado		13 Raça/Cor 1-Branca 2-Preta 3-Amarela 4-Parda 5-Indígena 9- Ignorado
	14 Escolaridade 0-Analfabeto 1-1ª a 4ª série incompleta do EF (antigo primário ou 1º grau) 2-4ª série completa do EF (antigo primário ou 1º grau) 3-5ª a 8ª série incompleta do EF (antigo ginásio ou 1º grau) 4-Ensino fundamental completo (antigo ginásio ou 1º grau) 5-Ensino médio incompleto (antigo colegial ou 2º grau) 6-Ensino médio completo (antigo colegial ou 2º grau) 7-Educação superior incompleta 8-Educação superior completa 9-Ignorado 10- Não se aplica					
	15 Número do Cartão SUS		16 Nome da mãe			
	17 UF		18 Município de Residência		Código (IBGE)	19 Distrito
Dados de Residência	20 Bairro		21 Logradouro (rua, avenida,...)		Código	
	22 Número	23 Complemento (apto., casa, ...)		24 Geo campo 1		
	25 Geo campo 2		26 Ponto de Referência		27 CEP	
	28 (DDD) Telefone		29 Zona 1 - Urbana 2 - Rural 3 - Periurbana 9 - Ignorado		30 País (se residente fora do Brasil)	
Dados Complementares do Caso						
Antecedentes Epidemiológicos	31 Ocupação					
	32 Situação no Mercado de Trabalho 01- Empregado registrado com carteira assinada 05- Servidor público celetista 09- Cooperativado 02- Empregado não registrado 06- Aposentado 10- Trabalhador avulso 03- Autônomo/ conta própria 07- Desempregado 11- Empregador 04- Servidor público estatutário 08- Trabalho temporário 12- Outros 99- Ignorado		33 Tempo de Trabalho na Ocupação 1 - Hora 2 - Dia 3 - Mês 4 - Ano			
	Dados da Empresa Contratante					
	34 Registro/ CNPJ ou CPF		35 Nome da Empresa ou Empregador			
36 Atividade Econômica (CNAE)		37 UF	38 Município		Código (IBGE)	
39 Distrito		40 Bairro		41 Endereço		
42 Número		43 Ponto de Referência		44 (DDD) Telefone		
45 O Empregador é Empresa Terceirizada 1- Sim 2- Não 3- Não se aplica 9- Ignorado						

Acidente de trabalho com exposição à material biológico

Sinan Net

SVS

21/06/2019

Acidente com material biológico	46 Tipo de Exposição 1- Sim 2- Não 9- Ignorado ☐ Percutânea ☐ Mucosa (oral/ ocular) ☐ Pele íntegra ☐ Pele não íntegra ☐ Outros _____			
	47 Material orgânico 1-Sangue 2-Líquor 3-Líquido pleural 4-Líquido ascítico 9-Ignorado 5-Líquido amniótico 6-Fluido com sangue 7-Soro/plasma 8-Outros: _____			
	48 Circunstância do Acidente 01 - Administ. de medicação endovenosa 02 - Administ. de medicação intramuscular 03 - Administ. de medicação subcutânea 04 - Administ. de medicação intradérmica 05 - Punção venosa/arterial para coleta de sangue 06 - Punção venosa/arterial não especificada 07 - Descarte inadequado de material perfurocortante em saco de lixo 08 - Descarte inadequado de material perfurocortante em bancada, cama, chão, etc... 09 - Lavanderia 10 - Lavagem de material 11 - Manipulação de caixa com material perfurocortante 12 - Procedimento cirúrgico 13 - Procedimento odontológico 14 - Procedimento laboratorial 15 - Dextro 16 - Reencape 98 - Outros 99 - Ignorado			
	49 Agente 1-Agulha com lúmen (luz) 2 - Agulha sem lúmen/maciça 3 - Intracath 4 - Vidros 5 - Lâmina/lanceta (qualquer tipo) 6 - Outros 9 - Ignorado			
	50 Uso de EPI (aceita mais de uma opção) 1- Sim 2 - Não 9 - Ignorado ☐ LUVA ☐ Avental ☐ Óculos ☐ Máscara ☐ Proteção facial ☐ Bota			
	51 Situação vacinal do acidentado em relação à hepatite B (3 doses) 1-Vacinado 2-Não vacinado 9-Ignorado		52 Resultados de exames do acidentado (no momento do acidente - data ZERO) 1-Positivo 2-Negativo 3-Inconclusivo 4-Não realizado 9-Ignorado ☐ Anti-HIV ☐ HbsAg ☐ Anti-HBs ☐ Anti-HCV	
	Dados do Paciente Fonte (no momento do acidente) 53 Paciente Fonte Conhecida? 1-Sim 2 - Não 9- Ignorado			
	54 Se sim, qual o resultado dos testes sorológicos? 1-Positivo 2-Negativo 3-Inconclusivo 4 - Não Realizado 9-Ignorado ☐ Hbs Ag ☐ Anti-HBc ☐ Anti-HIV ☐ Anti-HCV			
	55 Conduta no momento do acidente 1- Sim 2- Não 9- Ignorado ☐ Sem indicação de quimioprofilaxia ☐ Recusou quimioprofilaxia indicada ☐ AZT+3TC ☐ AZT+3TC+Indinavir ☐ AZT+3TC+Nelfinavir ☐ Imunoglobulina humana contra hepatite B (HBIG) ☐ Vacina contra hepatite B ☐ Outro Esquema de ARV Especifique _____			
	Conclusão	56 Evolução do Caso 1-Alta com conversão sorológica (Especificar vírus: _____) 2-Alta sem conversão sorológica 3-Alta paciente fonte negativo 4- Abandono 5- Óbito por acidente com exposição à material biológico 6- Óbito por Outra Causa 9- Ignorado		
57 Se Óbito, Data ____/____/____		58 Foi emitida a Comunicação de Acidente do Trabalho 1-Sim 2 - Não 3- Não se aplica 9- Ignorado		
Informações complementares e observações				
Investigador	Município/Unidade de Saúde		Cód. da Unid. de Saúde	
	Nome	Função	Assinatura	
Acidente de trabalho com exposição à material biológico		Sinan Net	SVS 21/06/2019	

APÊNDICE B: Termo de anuência institucional



TERMO DE ANUÊNCIA INSTITUCIONAL

Declaramos conhecer o projeto de pesquisa 'RISCO DE SOROCONVERSÃO PARA HIV E HBV EM EXPOSIÇÕES OCUPACIONAIS A MATERIAL BIOLÓGICO DE RISCO NOS AMBIENTES ODONTOLÓGICOS NO MUNICÍPIO DE BELO HORIZONTE E QUALIDADE DOS DADOS DO SINAN', sob a responsabilidade do pesquisador Mauro Henrique Nogueira Guimarães de Abreu, CPF 930.248.006-20, cujo objetivo é 'quantificar as frequências de soroconversão do HIV e do HBV em profissionais e estudantes que estejam expostos a risco de acidente com material biológico em ambientes odontológicos no município de Belo Horizonte e avaliar a qualidade do banco de dados das fichas de notificações/investigação disponíveis no SINAN para os agravos em estudo' e autorizamos que este estudo seja executado nas Unidades da Secretaria Municipal de Saúde de Belo Horizonte – SMSA-BH.

Esta autorização foi subsidiada por uma apreciação institucional das gerências responsáveis pela temática da pesquisa e está condicionada ao cumprimento pelos (a/o) pesquisadores (a/o) dos requisitos das Resoluções 466/12, 510/16 e suas complementares.

A SMSA-BH deverá constar como coparticipante da pesquisa.

Solicitamos que, ao término da pesquisa, a data da apresentação do trabalho seja informada à Assessoria de Educação em Saúde da Secretaria Municipal de Saúde de Belo Horizonte, assim como a referência do mesmo, em caso de publicação.

A utilização dos dados pessoais dos sujeitos da pesquisa se dará exclusivamente para os fins científicos propostos, mantendo o sigilo e garantindo a utilização das informações sem prejuízo das pessoas, grupos e ou comunidades.

O início do estudo dependerá de sua aprovação pelo Comitê de Ética em Pesquisa da SMSA de BH. Os documentos apresentados para fins de autorização deste TAI, deverão estar em coerência com os protocolos inseridos na Plataforma Brasil para submissão ao CEP da SMSA de BH.

Este Termo de Anuência terá validade de 24 (vinte e quatro) meses, a partir de sua assinatura.

Belo Horizonte, 30 de setembro de 2022

Janaína de Souza Aredes
BM 312.148-6
Assessoria de Educação em Saúde
ASEDS-SA/SMSA-BH

Paulo Roberto Lopes Corrêa

Paulo Roberto Lopes Corrêa
Diretoria de Promoção à Saúde e
Vigilância Epidemiológica
Paulo Roberto Lopes Corrêa
BM 39 493-2

Janaína de Souza Aredes

Janaína de Souza Aredes – BM 312.148-6
Assessoria de Educação em Saúde
Secretaria Municipal de Saúde/SMSA

Diretoria de Promoção à Saúde
e Vigilância Epidemiológica
DPCV/SMSA-BH

Assessoria de Educação em Saúde/ASEDS-SA

Secretaria Municipal de Saúde de Belo Horizonte – SMSA/BH
Rua Frederico Bracher Junior, nº103 - 3º andar - Padre Eustáquio - CEP 30 720-000 – Belo Horizonte/MG.
Telefone: (31) 3277 9281 / 8516 e Fax (31) 3277 8458 / e-mail: aseds@pbh.gov.br

APÊNDICE C: Parecer consubstanciado do CEP

UNIVERSIDADE FEDERAL DE
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PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: RISCO DE SOROCONVERSÃO PARA HIV E HBV EM EXPOSIÇÕES OCUPACIONAIS A MATERIAL BIOLÓGICO DE RISCO NOS AMBIENTES ODONTOLÓGICOS NO MUNICÍPIO DE BELO HORIZONTE E QUALIDADE DOS

Pesquisador: Mauro Henrique Nogueira Guimarães de Abreu

Área Temática:

Versão: 2

CAAE: 68702123.9.0000.5149

Instituição Proponente: PRO REITORIA DE PESQUISA

Patrocinador Principal: Financiamento Próprio

DADOS DO PARECER

Número do Parecer: 6.097.439

Apresentação do Projeto:

O projeto inclui uma revisão sistemática e um estudo epidemiológico de coorte retrospectivo, cuja população de estudo será composta por todo pessoal remunerado ou não remunerado no ambiente de assistência odontológica que sofreu acidentes com material biológico de risco devido exposição ocupacional no município de Belo Horizonte e seguiram as recomendações pós-exposição adotadas pelo município, a partir do ano 2011 até 2019, quando da obrigatoriedade da notificação de acidentes de trabalho (inclusive o biológico) pelo Sistema de Informação de Agravos de Notificação (SINAN) e anteriormente à pandemia por COVID-19.

Serão pesquisados no cadastro no SINAN de profissionais da área da saúde (PAS) da equipe odontológica acidentados que tiveram exame anti-HIV negativo ou teste rápido inválido, na data do acidente, ou exame antiHIV negativo durante fluxo laboratorial, após resultado discordante (teste rápido- TR1 positivo e TR2 negativo repetidos), que realizaram acompanhamento de, no mínimo, 3 meses pelo Centro de Referência em Saúde do Trabalhador (CEREST) ou pelas Unidades de Saúde do Trabalhador dos Estabelecimentos Assistenciais de Saúde, do município de Belo Horizonte. Serão analisados, também, no cadastro no SINAN, PAS da área odontológica que tiveram exame de teste rápido HBV (HbsAg) não reagente, na data do acidente.

Serão incluídos cadastros no SINAN de acordo com o período da notificação, já que em 2014 foi disponibilizada ficha específica para o agravo e anteriormente usava-se a de acidente de trabalho.

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Continuação do Parecer: 6.097.439

Para coleta dos dados das fichas de 2011 a 2013, serão incluídas notificação com código (CID10) Y96 (acidente de trabalho) e com, pelo menos, duas das descrições: descrição no item Diagnóstico da Lesão (CID10) Z20.9 (contato com exposição a doença transmissível); descrição no(s) item(ns) ocupação, dentro das atividades odontológicas e afins e/ou no item atividade econômica (Classificação Nacional de Atividades Econômicas - CNAE) com o código 8630-5/04 (clínicas odontológicas: pública ou particular, consultórios dentários, consultórios odontológicos, atividades de odontologia, pronto socorro odontológico, unidades móveis terrestres para consulta odontológica) (IBGE, 2020) ou (Classificação Brasileira de Ocupações – CBO) com os códigos 2232-76 (cirurgião-dentista – odontologia do trabalho), 2232-88 (cirurgia dentista – odontologia para pacientes com necessidades especiais), 2232-76 (odontologia ocupacional), 2344-50 (professor de odontologia) e 3224 (técnicos de odontologia) (CBO, 2022) + descrição no item circunstância do acidente com um dos seguintes subitens: descarte inadequado de material perfurocortante em saco de lixo; descarte inadequado de material perfurocortante em bancada; chão, etc.; lavagem de material; manipulação de caixa com material perfurocortante; outros; ignorado; descrição no campo Informações complementares e observações com dados sobre acidente biológico.

Para o período de 2014 até 2019 (quando se modificou o código (CID 10) na ficha SINAN de Y96 para Z20.9), será feita coleta nas fichas emitidas de pacientes de ambos os sexos que sofreram acidente com material biológico de risco, notificados com o código (CID10) Z20.9 e com, pelo menos, uma das descrições abaixo: descrição no item circunstância do acidente como procedimento odontológico; descrição no(s) item(ns) ocupação, dentro das atividades odontológicas e afins e/ou no item atividade econômica (Classificação Nacional de Atividades Econômicas - CNAE) com o código 8630-5/04 (clínicas odontológicas: pública ou particular, consultórios dentários, consultórios odontológicos, atividades de odontologia, pronto socorro odontológico, unidades móveis terrestres para consulta odontológica) (IBGE, 2020) + descrição no item circunstância do acidente com um dos seguintes subitens: descarte inadequado de material perfurocortante em saco de lixo; descarte inadequado de material perfurocortante em bancada; chão, etc.; lavagem de material; manipulação de caixa com material perfurocortante; outros; ignorado.

Serão excluídos os acidentados com cadastro no SINAN com dados incompletos por: recusa, entrada incorreta de dados, dúvida no preenchimento ou desistência no acompanhamento sorológico. Serão excluídos, também, acidentados com teste anti-HIV reativo na data zero da exposição ou exame anti-HIV positivo durante fluxo laboratorial, após resultado discordante (TR1 positivo e TR2 negativo repetidos), na data zero do acidente; ou acidentados com teste anti-HIV

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Continuação do Parecer: 6.097.439

negativo/não-reativo exposto a material biológico de paciente fonte com anti-HIV negativo ou não-reativo, porém com exposição de risco nos últimos 30 dias anteriores ao acidente ocupacional (uso de PPE sem acompanhamento sorológico). Serão excluídos, ainda, aqueles acidentados com resposta vacinal conhecida e adequada (anti-Hbs 10UI/mL) na data do acidente ou acidentados sem resposta vacinal após a segunda série (6 doses) expostos a material biológico de risco de paciente fonte HbsAg não-reativo ou acidentados com resposta vacinal desconhecida na data zero e, após exame laboratorial, apresentou resposta vacinal adequada, conforme fluxo descrito nos manuais de atendimento/acompanhamento do Ministério da Saúde. A amostra será dividida em quatro grupos, sendo dois grupos para o acompanhamento de exposição ou não à Profilaxia Pós-Exposição (PPE) em acidentados expostos a fluidos corporais de paciente com testagem anti-HIV positivo ou de fonte desconhecida para sorologia do HIV e que aderiram ao protocolo de profilaxia pós exposição, e outros dois grupos em que se acompanhará a exposição ou não de PPE em acidentados com risco aumentado de infecção pelo HBV.

As variáveis avaliadas serão: intervalo entre o acidente e o atendimento, sexo, faixa etária, escolaridade, tipo de exposição, tipo de material orgânico, circunstância do acidente, agente causador, uso de Equipamento de Proteção Individual (EPI), situação vacinal para Hepatite B, conduta, fonte conhecida, sorologia para HIV e HBV do paciente-fonte, evolução do caso para ambas as infecções e as respectivas taxas de soroconversão. O desfecho a ser analisado será a soroconversão ou não para HIV positivo e/ou HBV positivo na população de estudo.

A hipótese nula do estudo é a de que não há diferença na soroconversão para o HIV e HBV entre os profissionais e estudantes de odontologia expostos a acidente com material biológico de risco em ambientes odontológicos que utilizaram ou não a quimioprofilaxia pós-exposição.

Objetivo da Pesquisa:

Objetivo Primário:

Quantificar as frequências de soroconversão para HIV e HBV em profissionais de saúde que se acidentaram com material biológico, bem como entre profissionais e estudantes que se acidentaram com material biológico em ambientes odontológicos no município de Belo Horizonte com ou sem profilaxia pós-exposição, no período de 2011 a 2019.

Objetivo Secundário:

- Avaliar a prevalência e incidência da taxa de soroconversão para o HIV entre profissionais de saúde que se acidentaram com material biológico de risco, através de uma síntese de evidências;
- Determinar os fatores associados à soroconversão para o HIV e HBV entre profissionais da

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Continuação do Parecer: 6.097.439

odontologia;

- Comparar a efetividade do uso de quimioprofilaxia pós exposição accidental ao HIV e HBV entre os grupos expostos e não expostos;
- Avaliar a qualidade dos dados das fichas de notificações/investigação disponíveis no SINAN para HIV e HBV.

Avaliação dos Riscos e Benefícios:

Segundo os pesquisadores:

Riscos:

O estudo epidemiológico envolve riscos mínimos, haja vista que não serão realizadas nenhuma intervenção ou modificação intencional nas variáveis fisiológicas, psicológicas e/ou sociais dos sujeitos cujos dados estão registrados nas fichas do SINAN da Secretaria Municipal de Saúde de Belo Horizonte. Ademais, os nomes e identidades dos participantes do estudo não serão divulgados, mantendo-se assim a integridade da intimidade e anonimato dos mesmos. Não haverá qualquer contato direto dos pesquisadores com os sujeitos da pesquisa, uma vez que se utilizará bancos de dados da Prefeitura de Belo Horizonte. Os pesquisadores comprometem-se, ainda, a guardar o banco somente durante o período da pesquisa e eliminar quaisquer referências à identificação de sujeitos incluídos no banco de dados. Após o período da pesquisa, o banco será apagado.

Benefícios:

Acidentes profissionais com material biológico são um problema no contexto da atenção primária à saúde, seja na atenção odontológica ou nos cuidados à saúde do trabalhador. Apesar da frequência desta situação nos serviços de saúde, pouco se conhece na literatura sobre a taxa de soroconversão para HIV e HBV entre profissionais que atuam na atenção odontológica. O conhecimento desses fatores associados gerará um conhecimento novo sobre a temática, viabilizando organização mais efetiva de serviços de saúde, podendo-se identificar fatores associados aos acidentes e, por consequência, viabilizando medidas preventivas efetivas.

Comentários e Considerações sobre a Pesquisa:

O projeto foi aprovado pelo Departamento em 03/03/2023, está vinculado ao Programa de Pós-Graduação, e apresenta previsão de término para 31/12/2024. Apresenta a Secretaria Municipal de Saúde de Belo Horizonte/ SMSA-BH como instituição coparticipante. A estudante de doutorado foi incluída na Plataforma Brasil como membro da equipe de pesquisa.

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O cronograma apresentado na Plataforma Brasil é exequível, porém não corresponde ao cronograma apresentado no projeto. O orçamento financeiro apresentado na Plataforma Brasil (R\$ 2.000,00) é viável, porém não corresponde ao orçamento apresentado no projeto (R\$ 10.650,00), e será custeado pelos próprios pesquisadores.

Os pesquisadores propõem dispensa de TCLE, com a justificativa de que o projeto utilizará bases de dados públicos e de dados controlados pela Secretaria Municipal de Saúde de Belo Horizonte, com anuência da mesma. Destacam ainda a dificuldade em buscar contato com o grande número de participantes devido à ausência de contatos confiáveis nos bancos de dados e ao tempo decorrido desde o acidente até a presente data.

Os pesquisadores resolveram a inconsistência sobre o período de coleta de dados, alterando o período para 2011 a 2019 no objetivo do projeto detalhado e nos campos “desenho do estudo” e “resumo”, da Plataforma Brasil. Porém, no objetivo geral da Plataforma Brasil ainda consta o período de 2014 a 2019.

Os pesquisadores anexaram TCUD com assinatura dos pesquisadores que terão acesso ao banco de dados.

Considerações sobre os Termos de apresentação obrigatória:

Este parecer foi elaborado com base nos seguintes documentos, anexados à Plataforma Brasil:

- Informações básicas do projeto;
- Ofício com respostas ao parecer;
- Folha de Rosto, assinada;
- Parecer aprovado pelo Departamento, assinado de forma digital;
- Projeto Detalhado;
- Termo de anuência institucional emitido pela Secretaria Municipal de Saúde de Belo Horizonte, assinado e carimbado;
- TCUD, assinado.

Recomendações:

- Recomenda-se adequar o cronograma e o orçamento financeiro do projeto ao apresentado na Plataforma Brasil.
- Adequar o período de coleta de dados no objetivo primário, da Plataforma Brasil.

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Continuação do Parecer: 6.097.439

Conclusões ou Pendências e Lista de Inadequações:

Na condição de se atender as recomendações solicitadas, sou, S.M.J. favorável à aprovação do projeto.

Considerações Finais a critério do CEP:

Tendo em vista a legislação vigente (Resolução CNS 466/12), o CEP-UFMG recomenda aos Pesquisadores: comunicar toda e qualquer alteração do projeto e do termo de consentimento via emenda na Plataforma Brasil, informar imediatamente qualquer evento adverso ocorrido durante o desenvolvimento da pesquisa (via documental encaminhada em papel), apresentar na forma de notificação relatórios parciais do andamento do mesmo a cada 06 (seis) meses e ao término da pesquisa encaminhar a este Comitê um sumário dos resultados do projeto (relatório final).

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_2105853.pdf	26/05/2023 10:07:45		Aceito
Outros	oficiorespuestas_assinado.pdf	26/05/2023 10:07:34	Mauro Henrique Nogueira Guimarães de Abreu	Aceito
Projeto Detalhado / Brochura Investigador	Propostaprojeto.pdf	24/05/2023 16:32:55	Mauro Henrique Nogueira Guimarães de Abreu	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	TCUDnovo.pdf	24/05/2023 16:31:59	Mauro Henrique Nogueira Guimarães de Abreu	Aceito
Folha de Rosto	Folha.pdf	11/04/2023 19:22:16	Mauro Henrique Nogueira Guimarães de Abreu	Aceito
Parecer Anterior	parecerprojetoPBhufmg.pdf	17/03/2023 15:31:10	Mauro Henrique Nogueira Guimarães de Abreu	Aceito
Declaração de concordância	anuenciapbh.pdf	17/03/2023 15:24:53	Mauro Henrique Nogueira Guimarães de Abreu	Aceito

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Continuação do Parecer: 6.097.439

Situação do Parecer:

Aprovado

Necessita Apreciação da CONEP:

Não

BELO HORIZONTE, 02 de Junho de 2023

Assinado por:
Corinne Davis Rodrigues
(Coordenador(a))

Endereço: Av. Presidente Antonio Carlos, 6627 2º. Andar Sala 2005 Campus Pampulha
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APÊNDICE D: Decisão editorial - UFPE

18/11/2025, 19:39

Gmail - [REUOL] Decisão editorial



Ana Carolina Medeiros <carolmedeiros.cp.ufmg@gmail.com>

[REUOL] Decisão editorial

9 mensagens

Prof. Dra. Tatiane Gomes Guedes via Portal de Periódicos UFPE <conexao.revistas@ufpe.br>

7 de outubro de 2025 às 16:17

Responder a: "Prof. Dra. Tatiane Gomes Guedes" <tatiane.guedes@ufpe.br>

Para: Ana Carolina Marques-Medeiros <carolmedeiros.cp.ufmg@gmail.com>, Livia Guimarães Zina <liviazina@yahoo.com.br>, Suellen da Rocha Mendes <suellen_odonto13@hotmail.com>, Brune de Sousa Faria Costa <brune.faria@hotmail.com>, Rafaela da Silveira Pinto <rafaelasilveirapinto@gmail.com>, Mauro Henrique Nogueira Guimarães de Abreu <maurohenriqueabreu@gmail.com>

Prezados(as) Autores(as),

Ana Carolina Marques-Medeiros, Livia Guimarães Zina, Suellen da Rocha Mendes, Brune de Sousa Faria Costa, Rafaela da Silveira Pinto, Mauro Henrique Nogueira Guimarães de Abreu,

Pedimos desculpas pelo desencontro entre o envio da última versão do manuscrito e a comunicação da revista com os autores. O sistema vinculou a versão encaminhada à biblioteca da revista, o que impossibilitou a visualização dos arquivos por nossa parte.

Há uma decisão referente ao manuscrito "Global prevalence of HIV seroconversion in healthcare workers with occupational exposure: a systematic review protocol".

A decisão é: **aceitar para publicação**.

Para o seguimento do fluxo editorial de publicação, solicitamos atender as seguintes etapas:

- 1) Revisão minuciosa de todas as referências (verificar a ordem de citação no texto com a ordem apresentada na seção "Referências");
- 2) Encaminhamento do manuscrito aprovado (arquivo em anexo) para a tradução do português, revisão do inglês e tradução do título e resumo em espanhol;
- 3) Normalização do manuscrito nos templates português e inglês (arquivos em anexo);
- 4) Pagamento da Taxa de Editoração de R\$ 800,00 (oitocentos reais), efetuado por meio de transferência bancária para:

Fundação de Apoio ao Desenvolvimento da UFPE

Banco do Brasil - Agência 3234-4 - Conta corrente: 233.112-8 ou Chave PIX: e-mail: revista.reuol@ufpe.br

OBS: Caso seja necessária a emissão de recibo, enviar solicitação para o e-mail "revista.reuol@ufpe.br" com os seguintes dados do pesquisador principal: nome completo, CPF, data de nascimento e endereço postal.

Os manuscritos, na versão português e inglês, devem ser enviados em até 30 dias no sistema de submissão da revista. Também devem ser enviados as declarações (revisão de português e tradução) e o comprovante do pagamento da taxa de editoração.

Lista de Tradutores Credenciados:

<https://mail.google.com/mail/u/0/?ik=8bd696b95d&view=pt&search=all&permthid=thread-f:1845351822294349374&simpl=msg-f:1845351822294349374&simpl=msg-f:1845353492611752301&simpl=msg-a-r-424858...> 1/8

18/11/2025, 19:39

Gmail - [REUOL] Decisão editorial

- Andy Cumming (andyalastairc@yahoo.co.uk)
- Betânia Azevedo (betaniaazevedo@yahoo.com.br)
- Marcia Palhares (mmpalhares@gmail.com)
- Maria Amália Cunha (amaliacury@gmail.com)
- Vanessa Emille Sousa Freire (vanessaemille@gmail.com / <http://newhorizons.academy/>)
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Cordialmente,

Profa. Dra. Tatiane Gomes Guedes

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APÊNDICE E: Carta de submissão - BMC Health Services Research



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December 02, 2024.

Tillie Cryer, D.M.D., D.M.Sc.
 Editor-in-Chief
 BMC Health Services Research

Dear Editor,

On behalf of my co-authors, I am pleased to submit our manuscript entitled “**Prevalence of occupational HIV seroconversion among healthcare workers: a systematic review and meta-analysis**” for consideration in *BMC Health Services Research*. This work offers a comprehensive synthesis of global data on occupational HIV seroconversion rates, addressing a critical gap in the literature that has persisted for nearly two decades.

Healthcare workers are uniquely vulnerable to HIV infection due to their frequent exposure to blood and body fluids in occupational settings. Despite advancements in preventive measures, documented cases of occupational HIV seroconversion continue to highlight the persistent risks and the need for effective interventions. By systematically analyzing 132 studies from diverse regions and employing robust statistical methods, our review provides an updated, evidence-based global estimate of occupational HIV seroconversion prevalence. Key findings emphasize the rarity of seroconversion, the protective effect of post-exposure prophylaxis (PEP), and the need for adherence to preventive measures and follow-up protocols.

We believe this manuscript aligns closely with *BMC Health Services Research's* mission to advance evidence-based healthcare practices globally. The findings contribute valuable insights for policymakers and healthcare managers, highlighting the importance of targeted interventions to reduce occupational HIV risks and improve healthcare worker safety.

This manuscript is original, has not been published previously, and is not under consideration for publication elsewhere. All authors have reviewed and approved the final manuscript and declare no conflicts of interest.

Thank you for considering our submission. We look forward to the opportunity to share our work with the readership of *BMC Health Services Research* and are available to address any questions or provide additional information as needed.

Yours faithfully,

Mauro Henrique N. G. Abreu, Ph.D., M.Sc.
maurohenriqueabreu@gmail.com

APÊNDICE F: Carta de submissão - Epidemiologia e Serviços de Saúde

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31 de março de 2025.

Prof. Dr. Jorge Otávio Maia Barreto
Editor-Chefe
Epidemiologia e Serviços de Saúde – RESS

Prezado Editor,

É com grande satisfação que submetemos para apreciação da *Epidemiologia e Serviços de Saúde – RESS* o manuscrito intitulado "**Qualidade dos registros de acidentes biológicos ocupacionais no SINAN: análise em ambientes odontológicos de Belo Horizonte, 2006–2019**".

O estudo aborda um tema de grande relevância para a vigilância em saúde do trabalhador, ao avaliar a qualidade dos registros de Acidentes de Trabalho com Exposição a Material Biológico (Atemb) no Sistema de Informação de Agravos de Notificação (Sinan). A pesquisa analisa a completitude, consistência e duplicidade dos dados registrados entre 2006 e 2019, fornecendo um panorama detalhado sobre a fidedignidade dessas informações e os desafios enfrentados na notificação desses eventos.

Os achados indicam que, embora as variáveis obrigatórias apresentem alta completitude, há lacunas críticas em variáveis essenciais, especialmente aquelas relacionadas ao uso de Equipamentos de Proteção Individual (EPIs), exames laboratoriais do paciente-fonte e medidas pós-exposição. Esses aspectos comprometem a efetividade da vigilância epidemiológica e podem dificultar a implementação de estratégias preventivas eficazes para os profissionais expostos a material biológico. Além disso, a análise da consistência revelou discrepâncias importantes, reforçando a necessidade de aprimoramento na coleta e no gerenciamento desses dados.

Acreditamos que o tema do estudo dialoga diretamente com a missão da *RESS* de disseminar conhecimento qualificado para o fortalecimento da vigilância em saúde pública e a melhoria da qualidade dos sistemas de informação. Dessa forma, consideramos que os resultados apresentados podem contribuir significativamente para o aprimoramento das estratégias de notificação e para a formulação de políticas voltadas à proteção dos trabalhadores da saúde.

Declaramos que este manuscrito é original, não foi publicado anteriormente e não está sendo avaliado para publicação em outro periódico. Todos os autores participaram ativamente da concepção do estudo, da análise dos dados e da redação do manuscrito, e não há conflitos de interesse a declarar.

Agradecemos a oportunidade de submeter este trabalho à *RESS* e estamos à disposição para quaisquer esclarecimentos ou ajustes necessários.

Atenciosamente,



Ana Carolina Marques-Medeiros, Ph.D(c)., M.Sc.

APÊNDICE G: Atividades desenvolvidas durante o curso de doutorado

Artigos completos publicados ou aceitos para publicação:

- MARQUES-MEDEIROS, A. C.; MARTINS, R. C.; SOUZA, L. N.; GOMEZ, R. S.; SILVA, M. E. S.; MARTINS, M. A. P.; ABREU, M. H. N. G. *E-Learning as a strategy in Dentistry in the context of COVID-19: A path to follow? Brazilian Oral Research*. Disponível em: <https://pubmed.ncbi.nlm.nih.gov/37341233/>.
- MARQUES-MEDEIROS, A. C.; ZINA, L. G.; MENDES, S. R.; COSTA, B. S. F.; PINTO, R. S.; ABREU, M. H. N. G. *Incidence of occupational HIV seroconversion among healthcare workers: a systematic review protocol*. Revista de Enfermagem UFPE on line, Recife, no prelo, 2025.
- SILVA, G. C. B. da; VIANI, A. C. M. M.; MARINHO, A. M. C. L.; PORDEUS, I. A.; MARQUES-MEDEIROS, A. C.; ABREU, M. H. N. G. *Factors associated with adherence to post-exposure prophylaxis among dental professionals in Brazil*. Brazilian Oral Research [Internet]. 2025. Disponível em: <https://pubmed.ncbi.nlm.nih.gov/41092147/>

Manuscritos submetidos para publicação:

- MARQUES-MEDEIROS, A. C.; ZINA, L. G.; MENDES, S. R.; COSTA, B. S. F.; DE PÁDUA, C. A. M.; PINTO, R. S.; ABREU, M. H. N. G. *Incidence of occupational HIV seroconversion among healthcare workers: a systematic review and meta-analysis*. BMC Health Services Research (submetido).
- MARQUES-MEDEIROS, A. C.; BATISTA, V. S.; SILVA, L. O. P.; MAMBRINI, J. V. M.; PINTO, R. S.; ABREU, M. H. N. G. *Completeness, consistency and duplication of records of accidents with exposure to biological material in dental environments: descriptive study, Belo Horizonte, Minas Gerais, 2006–2019*. Revista Epidemiologia e Serviços de Saúde – RESS (submetido).
- MARQUES-MEDEIROS, A. C.; MAMBRINI, J. V. M.; PÁDUA, C. M.; PINTO, R. S.; ABREU, M. H. N. G. *Occupational exposures to blood and body fluids in dental care: a 14-year surveillance study using cluster analysis*. American Journal of Infection Control (a ser submetido), 2025.

Trabalhos apresentados em eventos científicos:

- **41ª Reunião Anual da Sociedade Brasileira de Pesquisa Odontológica (SBPqO), Ribeirão Preto, 2024**
 - Apresentação de painel na modalidade Revisão Sistemática: *“Prevalência de soroconversão para o HIV entre profissionais de saúde com exposição ocupacional: uma revisão sistemática”*.
 - Coautoria dos trabalhos:
 - *“Condição sorológica e vacinal dos profissionais de saúde bucal acidentados em Belo Horizonte e Contagem – Minas Gerais”*
 - *“Fatores associados ao uso de equipamento de proteção individual entre profissionais acidentados no ambiente odontológico, Belo Horizonte”*
- **39ª Reunião Anual da SBPqO, Campinas, 2022**
 - Apresentação de painel na modalidade Painel Aspirante: *“Impacto de um treinamento online sobre o conhecimento e atitudes às novas diretrizes sobre a COVID-19 em uma Faculdade de Odontologia”*.

Resumos publicados em anais de congressos:

- MARQUES-MEDEIROS, A. C.; ZINA, L. G.; MENDES, S. R.; COSTA, B. S. F.; DE PÁDUA, C. A. M.; PINTO, R. S.; ABREU, M. H. N. G. *Prevalência de soroconversão para o HIV entre profissionais de saúde com exposição ocupacional: uma revisão sistemática*. In: 41ª Reunião Anual da SBPqO, 2024. *Brazilian Oral Research*, 2024.
- SILVA, L. O. P.; BATISTA, V. S.; MARQUES-MEDEIROS, A. C.; HECKERT, C. A. L.; PINTO, R. S.; ABREU, M. H. N. G. *Condição sorológica e vacinal dos profissionais de saúde bucal acidentados em Belo Horizonte e Contagem – MG*. In: 41ª Reunião Anual da SBPqO, 2024. *Brazilian Oral Research*, 2024.
- BATISTA, V. S.; SILVA, L. O. P.; MARQUES-MEDEIROS, A. C.; GREGÓRIO, A. A. M.; SILVA, J. M.; MAMBRINI, J. V. M.; PINTO, R. S.; ABREU, M. H. N. G. *Fatores associados ao uso de equipamento de proteção individual entre profissionais acidentados no ambiente odontológico, Belo Horizonte*. In: 41ª Reunião Anual da SBPqO, 2024. *Brazilian Oral Research*, 2024.
- MARQUES-MEDEIROS, A. C.; MARTINS, R. C.; SOUZA, L. N.; GOMEZ, R. S.; SILVA, M. E. S.; MARTINS, M. A. P.; ABREU, M. H. N. G. *Impacto de um*

treinamento online sobre o conhecimento e atitudes às novas diretrizes sobre a COVID-19 em uma Faculdade de Odontologia. In: 39ª Reunião Anual da SBPqO, 2022. Brazilian Oral Research, 2022.

Outros trabalhos acadêmicos:

- **XVI Encontro Científico da Faculdade de Odontologia – UFMG, Belo Horizonte, 2024**
 - Atuação como avaliadora de pôsteres científicos: avaliação técnica dos trabalhos apresentados por discentes de graduação e iniciação científica nas áreas de Saúde Coletiva e Epidemiologia.
- **Comissão Científica da 59ª Reunião Anual da ABENO, 2024**
 - Avaliação dos resumos submetidos na modalidade online.
- **Revisora ad hoc – Campbell Systematic Reviews, 2025**
 - Avaliação por pares do manuscrito “Causal mechanisms linking education with fertility, HIV, and child mortality: A systematic review” (Manuscript ID: cl2.20250166), contribuindo para o processo editorial de periódico internacional na área de revisões sistemáticas.

Participação na Orientação de alunos de iniciação científica:

- **Victor Santos Batista** (Bolsista FAPEMIG): Participação na extração de dados do SINAN, revisão bibliográfica e coautoria de trabalhos apresentados em evento científico.
- **Luís Otávio Pereira da Silva** (Bolsista PRPq): Participação na extração de dados do Sinan, revisão bibliográfica e coautoria de trabalhos apresentados em evento científico.