

SUELLEN DA ROCHA MENDES

**PERFIL DOS CIRURGIÕES-DENTISTAS E SUA INFLUÊNCIA SOBRE
O DESEMPENHO DAS EQUIPES DE SAÚDE BUCAL ATUANTES NO
SISTEMA ÚNICO DE SAÚDE BRASILEIRO**

**Faculdade de Odontologia
Universidade Federal de Minas Gerais
Belo Horizonte
2019**

Suellen da Rocha Mendes

**PERFIL DOS CIRURGIÕES-DENTISTAS E SUA INFLUÊNCIA SOBRE
O DESEMPENHO DAS EQUIPES DE SAÚDE BUCAL ATUANTES NO
SISTEMA ÚNICO DE SAÚDE BRASILEIRO**

Tese apresentada ao Colegiado do Programa de Pós-Graduação da Faculdade de Odontologia da Universidade Federal de Minas Gerais, como requisito parcial para obtenção do título de Doutora em Odontologia – área de concentração em Saúde Coletiva.

Orientador: Prof. Dr. Mauro Henrique Nogueira Guimarães de Abreu.

Coorientadora: Profa. Dra. Renata de Castro Martins.

Belo Horizonte
2019

Ficha Catalográfica

M538p Mendes, Suellen da Rocha.
2019 Perfil dos cirurgiões-dentistas e sua influência sobre o
T desempenho das equipes de saúde bucal atuantes no sistema
único de saúde brasileiro / Suellen da Rocha Mendes. --
2019.

128 f. : il.

Orientador: Mauro Henrique Nogueira Guimarães de Abreu.
Coorientadora: Renata de Castro Martins.

Tese (Doutorado) -- Universidade Federal de Minas
Gerais, Faculdade de Odontologia.

1. Atenção primária à saúde. 2. Serviços de saúde bucal.
3. Odontólogos. 4. Inquéritos e questionários. 5. Cirurgia
bucal. I. Abreu, Mauro Henrique Nogueira Guimarães de . II.
Martins, Renata de Castro. III. Universidade Federal de
Minas Gerais. Faculdade de Odontologia. IV. Título.

BLACK - D047



UNIVERSIDADE FEDERAL DE MINAS GERAIS

PROGRAMA DE PÓS-GRADUAÇÃO EM ODONTOLOGIA



FOLHA DE APROVAÇÃO

PERFIL DOS CIRURGIÕES-DENTISTAS E SUA INFLUÊNCIA SOBRE O DESEMPENHO DAS EQUIPES DE SAÚDE BUCAL ATUANTES NO SISTEMA ÚNICO DE SAÚDE BRASILEIRO

SUELLEN DA ROCHA MENDES

Tese submetida à Banca Examinadora designada pelo Colegiado do Programa de Pós-Graduação em Odontologia, como requisito para obtenção do grau de Doutor, área de concentração Saúde Coletiva.

Aprovada em 21 de outubro de 2019, pela banca constituída pelos membros:

Prof(a). Mauro Henrique Nogueira Guimaraes de Abreu - Orientador
FO/UFMG

Prof(a). Renata de Castro Martins
FO/UFMG

Prof(a). Fabiana Vargas Ferreira
FO/UFMG

Prof(a). Saul Martins de Paiva
FO/UFMG

Prof(a). Maria Aparecida Gonçalves de Melo Cunha
Centro Universitário Newton Paiva

Prof(a). Maria Gabriela Haye Biazevic
USP

Belo Horizonte, 21 de outubro de 2019.

AGRADECIMENTOS

À Deus, o meu maior e melhor agradecimento, por sempre colocar em minha vida pessoas especiais e oportunidades únicas, que acrescentam de maneira significativa no meu crescimento pessoal e profissional. À minha mãe, Anair, pelo apoio incondicional e sem questionamentos, pelo carinho e companheirismo (e por sempre embarcar comigo nas minhas loucuras). À vó Gercina, que mesmo em outro plano continua me influenciando a ser uma pessoa melhor.

Aos professores da Faculdade de Odontologia da UFMG, em especial Professor Mauro Henrique Abreu, por acreditar no meu potencial para a pesquisa e docência quando eu me sentia sem rumo e por me ensinar tanto ao longo desses vários anos (de IC, Mestrado e Doutorado). À professora Renata Martins por todas as palavras carinhosas e olhar atento, ao Professor Saul Paiva por sempre me encorajar, à Professora Isabela Pordeus por comandar o PPGO-UFMG com mãos firmes e ao mesmo tempo carinhosas, à professora Ana Cristina Oliveira, por sempre escutar minhas angústias e dizer que ‘tudo vai ficar bem’.

À professora Jennifer E Gallagher, por me receber com carinho e dedicação na King’s College London, à Grazi (e Phil) pelo suporte familiar em Londres e aos amigos que encontrei nessa experiência incrível. Aos amigos da Pós-Graduação (Ivana, Matheus, Álex, Sâmila, Aline, Angélica, Jack e todos os demais) pela parceria diária e por compartilhar angústias e experiências.

À família Rocha e família CP/Coltec, por serem meu porto seguro de sempre e para sempre. Agradeço ao Programa de Pós-Graduação da Faculdade de Odontologia da UFMG, pelo grande empenho para com a pesquisa e pela formação de excelência que oferece aos seus discentes, em especial aos que fazem tudo isso funcionar (Laís, Luciene, Valéria, Letícia e Victor, obrigada pelo apoio diário).

Por fim, mas não menos importante, às agências de fomento “Coordenação de Aperfeiçoamento de Pessoal de Nível Superior” (CAPES), “Conselho Nacional de Desenvolvimento Científico e Tecnológico” (CNPq) e “Fundação de Amparo à Pesquisa do Estado de Minas Gerais” (FAPEMIG) pelo suporte à pesquisa brasileira,

mesmo em tempos de dificuldades. Espero que, em breve, consigamos enxergar uma luz no fim do túnel e que a pesquisa no nosso país volte a prosperar.

RESUMO

O objetivo deste estudo foi avaliar a influência do perfil dos cirurgiões-dentistas e da organização e planejamento dos serviços de saúde bucal no desempenho das Equipes de Saúde Bucal (ESB) atuantes na Atenção Primária em Saúde (APS) brasileira. Trata-se de um estudo transversal, utilizando dados secundários do segundo ciclo do 'Programa Nacional de Melhoria do Acesso e da Qualidade da Atenção Básica' (PMAQ-AB), ocorrido entre 2013 e 2014. Foram utilizados dados obtidos na fase de avaliação externa do PMAQ-AB, que envolveu entrevista com 18.114 dentistas sobre o processo de trabalho das equipes e verificação de documentos na Unidade Básica de Saúde. O questionário foi desenvolvido por meio de uma parceria do Ministério da Saúde com seis instituições de ensino e pesquisa, sendo aplicado por equipe treinada. A variável dependente, 'desempenho das ESB', foi um escore atribuído a cada ESB, estimado por Teoria de Resposta ao Item, através da análise psicométrica de 20 procedimentos odontológicos da APS. As variáveis independentes incluíram características de formação, vínculo de trabalho e plano de carreira dos cirurgiões dentistas, bem como dados referentes à gestão e organização dos serviços de saúde bucal. Análises de Regressão Linear foram realizadas para estimativa dos valores de Beta brutos e ajustados, bem como respectivos intervalos de confiança no modelo ajustado (IC95%). Foram consideradas estatisticamente significativas as variáveis com $p \leq 0,05$. Os resultados indicaram que os procedimentos com maiores níveis de dificuldade (e menos frequentemente realizados) foram aqueles relacionados à provisão de próteses dentárias e monitoramento do câncer de boca; os procedimentos com maior capacidade de discriminação foram restauração e exodontia de dentes decíduos. O desempenho das ESB variou de -3,66 a +1,87 (média -0,06; DP 0,82). As variáveis 'pós-graduação *Lato Sensu*', 'atividades de educação permanente', 'monitoramento e análise dos indicadores e informações de saúde bucal' e 'agenda de atendimentos flexível (usuários agendados e de demanda espontânea)' influenciaram de forma positiva o desempenho de ESB em todas as macrorregiões brasileiras. Variações na realização de procedimentos odontológicos da APS, nos escores de desempenho das ESB e nas variáveis que influenciaram tais desempenhos puderam ser observadas entre as cinco macrorregiões brasileiras. Os achados indicam que a formação complementar do cirurgião-dentista, no formato de educação permanente e pós-graduação *Lato Sensu*, a avaliação de indicadores de saúde bucal da população adscrita e a oferta de agenda de atendimentos flexível, garantindo atendimento às demandas espontâneas e programadas dos usuários, foram de grande importância para um bom desempenho das equipes de saúde bucal brasileiras atuantes no SUS.

Palavras-chave: atenção primária à saúde. Saúde bucal. Inquéritos e questionários. Qualidade da assistência à saúde.

ABSTRACT

Dentists profile and its influence in the performance of dental teams of the Brazilian National Health System

This study aimed to evaluate the influence of dentists' profile and work management in the performance of primary care dental teams of the Brazilian National Health System. Cross-sectional analysis of secondary data from the 'National Programme for Improving the Access and Quality of Primary Care' (PMAQ-AB), that evaluated 18,114 Brazilian dental teams between 2013 and 2014. Data were obtained from the external evaluation phase of the PMAQ-AB, which comprised the interview with the dentist regarding the dental team's work process and verification of documents in the primary health care units. The questionnaire was developed through a partnership between the Ministry of Health and six teaching and research institutions and was applied by trained professionals. The dependent variable, 'performance of dental teams', was a score of dental teams obtained from the Item Response Theory, estimated through the psychometric analysis of 20 dental procedures executed in the PHC. Independent variables included complementary training, employment relationship and career plan of dentists and data referring to the management and organization of oral health services. Linear Regressions were performed to estimate the raw and adjusted Beta values, as well as their confidence intervals (CI 95%); in the adjusted model, variables with $p \leq 0.05$ were considered statistically significant. The results showed that the procedures with the highest difficulty levels (and less frequently performed) were those related to the provision of dental prostheses and oral cancer monitoring; the most discriminating procedures were restoration and extraction of primary teeth. The dental teams' performance ranged from -3.66 to +1.87 (mean -0.06; SD 0.82). The variables 'graduate studies', 'continuing education activities', 'monitoring oral health indicators' and 'flexible dental appointment list (scheduled and walk in patients)' influenced the dental teams' performance in all Brazilian Geographical Regions. Variations in the execution of PHC dental procedures, dental teams' performance scores, and the variables that influenced such performances could be observed among the five Brazilian Geographical Regions. The findings suggest that the complementary training of the dentist, including continuing education training and graduate studies, the evaluation of oral health indicators of the enrolled population and the offer of a flexible appointment list, ensuring care to scheduled and walk in patients, had a positive impact in the performance of Brazilian dental teams.

Keywords: primary health care. Oral health. Quality of health care. Surveys and questionnaires.

LISTA DE ILUSTRAÇÕES
FIGURAS, GRÁFICOS E QUADROS

METODOLOGIA EXPANDIDA

Quadro 1 - Procedimentos odontológicos de APS utilizados para estimar o desempenho das ESB.....	20
Quadro 2 - Variáveis independentes do estudo.....	21
Quadro 3 - Covariáveis (ou variáveis de confusão) do estudo.....	23
Gráfico 1 - Exemplo de Curva Característica do Item.....	25

ARTIGO 2

Figura 1 - Questões realizadas em entrevista presencial com dentistas relativas à execução de procedimentos odontológicos da APS. Brasil, 2013-2014.....	40
Figura 2 - Curva de Informação do Teste, mostrando o intervalo de escore mais bem elucidado pelo conjunto de itens.....	44

ARTIGO 3

Figura 1 - Variáveis independentes relativas ao perfil do dentista e gestão dos serviços de saúde das ESB e possíveis respostas.....	55
--	----

APÊNDICE A

Figura 1 - Curvas Características dos Itens – Ações de vigilância em saúde bucal realizadas pelas equipes de saúde bucal. Brasil. 2013-2014.....	81
Figura 2 - Curvas Características dos Itens – Procedimentos preventivos e restauradores realizados pelas equipes de saúde bucal. Brasil. 2013-2014.....	82

Figura 3 -	Curvas Características dos Itens – Procedimentos cirúrgicos e endodônticos realizados pelas equipes de saúde bucal. Brasil. 2013-2014.....	83
------------	--	----

LISTA DE TABELAS

ARTIGO 1

Tabela 1 - Procedimentos odontológicos de atenção primária realizados pelas equipes de saúde bucal, Brasil, 2013-2014.....	31
Tabela 2 - Número médio de procedimentos odontológicos realizados pelas equipes de saúde bucal nas macrorregiões brasileiras, 2013-2014.....	32

ARTIGO 2

Tabela 1 - Frequência de execução de procedimentos odontológicos da APS, total e dividido em tercis - ESB com os menores escores, escores intermediários e maiores escores; variação da frequência de execução entre os grupos; (a) parâmetro de discriminação; (b) nível de dificuldade auto referida. Brasil, 2013-2014.....	42
Tabela 2 - Frequência de execução de procedimentos odontológicos da APS de acordo com as macrorregiões do Brasil – Norte, Nordeste, Centro-Oeste, Sudeste e Sul. Brasil, 2013, 2014.....	43
Tabela 3 - Número absoluto e percentual de ESB classificadas com menores, intermediários e maiores escores, de acordo com as macrorregiões do Brasil – Norte, Nordeste, Centro-Oeste, Sudeste e Sul. Brasil, 2013, 2014.....	43

ARTIGO 3

Tabela 1a - Frequência das variáveis categóricas independentes referentes ao perfil dos dentistas e organização dos serviços das ESB da APS, Brasil e macrorregiões brasileiras.....	68
--	----

Tabela 1b - Médias, medianas, valores mínimos e máximos das variáveis independentes quantitativas referentes ao perfil dos dentistas e organização dos serviços das ESB da APS, Brasil e macrorregiões brasileiras.....	69
Tabela 2 - Regressão Linear Simples e modelo ajustado utilizando o desempenho das equipes de saúde bucal como variável dependente e o perfil do cirurgião dentista e organização dos serviços de saúde bucal como variáveis independentes. Brasil, 2013-2014.....	70
Tabela 3 - Valores de Beta e respectivos intervalos de confiança das variáveis que mostraram significância estatística ($p \leq 0,05$) nos modelos ajustados para cada macrorregião brasileira, 2013-2014	72
Tabela 4 - Resumo dos modelos de regressão linear múltipla. Brasil e macrorregiões brasileiras, 2013-2014.....	74

APÊNDICE B

Tabela 1 - Regressão Linear Simples e modelo ajustado utilizando o desempenho das equipes de saúde bucal como variável dependente e o perfil do cirurgião dentista e organização dos serviços de saúde bucal como variáveis independentes. Região Norte, Brasil, 2013-2014.....	84
Tabela 2 - Regressão Linear Simples e modelo ajustado utilizando o desempenho das equipes de saúde bucal como variável dependente e o perfil do cirurgião dentista e organização dos serviços de saúde bucal como variáveis independentes. Região Nordeste, Brasil, 2013-2014.....	87
Tabela 3 - Regressão Linear Simples e modelo ajustado utilizando o desempenho das equipes de saúde bucal como variável dependente e o perfil do cirurgião dentista e organização dos serviços de saúde bucal como variáveis independentes. Região Centro-Oeste, Brasil, 2013-2014.....	90

Tabela 4 -	Regressão Linear Simples e modelo ajustado utilizando o desempenho das equipes de saúde bucal como variável dependente e o perfil do cirurgião dentista e organização dos serviços de saúde bucal como variáveis independentes. Região Sudeste, Brasil, 2013-2014.....	93
Tabela 5 -	Regressão Linear Simples e modelo ajustado utilizando o desempenho das equipes de saúde bucal como variável dependente e o perfil do cirurgião dentista e organização dos serviços de saúde bucal como variáveis independentes. Região Sul, Brasil, 2013-2014.....	96

LISTA DE ABREVIATURAS E SIGLAS

ABS	Equipe de Atenção Básica
APS	Equipe de Atenção Primária
CCI	Curva Característica do Item
CEO	Centro de Especialidades Odontológicas
EAP	Equipe de Atenção Primária
ESB	Equipe de Saúde Bucal
ESF	Estratégia Saúde da Família
MS	Ministério da Saúde
PMAQ-AB	Programa Nacional de Melhoria do Acesso e da Qualidade da Atenção Básica
PNSB	Política Nacional de Saúde Bucal
SUS	Sistema Único de Saúde
TCM	Teoria Clássica de Medidas
TRI	Teoria de Resposta ao Item
UBS	Unidade Básica de Saúde
ICC	Item Characteristic Curve
IRT	Item Response Theory
MofH	Ministry of Health
NOHP	National Oral Health Policy
OHT	Oral Health Team
PHC	Primary Health Care
PMAQ-AB	National Programme for Improving Access and Quality of Primary Care
SUS	Brazilian National Health System
VIF	Variance Inflation Factor

SUMÁRIO

1	CONSIDERAÇÕES INICIAIS.....	14
2	OBJETIVOS.....	17
2.1	Objetivo geral.....	17
2.2	Objetivos específicos.....	17
3	METODOLOGIA EXPANDIDA.....	19
3.1	Considerações éticas.....	19
3.2	Desenho de estudo e amostra.....	19
3.3	Coleta de dados.....	19
3.4	Variáveis avaliadas.....	20
3.4.1	Variáveis dependentes.....	20
3.4.2	Variáveis independentes.....	21
3.4.3	Covariáveis.....	23
3.5	Teoria de Resposta ao Item (TRI).....	24
3.6	Análise estatística dos dados.....	26
4	ARTIGOS.....	28
4.1	Artigo 1.....	28
4.2	Artigo 2.....	35
4.3	Artigo 3.....	50
5	CONSIDERAÇÕES FINAIS.....	75
	REFERÊNCIAS.....	78
	APÊNDICE A.....	81
	APÊNDICE B.....	84
	ANEXO A.....	99
	ANEXO B.....	105
	ATIVIDADES ACADÊMICAS E PRODUÇÃO INTELECTUAL.....	123

1 CONSIDERAÇÕES INICIAIS

A Estratégia Saúde da Família (ESF), implantada no Sistema Único de Saúde brasileiro (SUS) em 1994, surgiu como uma forma de reordenar o modelo de assistência à saúde vigente, até então baseado na prática centrada na doença. Com isso, buscou desenvolver uma atenção integral que impactasse na situação de saúde e autonomia das pessoas e nos determinantes e condicionantes de saúde das coletividades. Desse momento em diante, o termo “Atenção Básica em Saúde” (ABS) passou a ser conhecido e fortemente empregado no SUS, uma vez que o termo “Atenção Primária em Saúde” (APS) remetia à assistência limitada e pouco resolutiva existente até então (GIL, 2006). Uma vez que o termo ABS é reconhecido apenas no contexto brasileiro, para efeitos de padronização será empregado, no presente documento, o termo APS porém, já considerando o modelo assistencial do SUS após a implantação da ESF (GIL, 2006; NASCIMENTO; MOYSÉS; WERNECK; MOYSÉS, 2013; PAIM; TRAVASSOS; ALMEIDA; BAHIA; MACINKO, 2011; PUCCA-JUNIOR; COSTA; CHAGAS; SILVESTRE, 2009).

No que diz respeito às ações de saúde bucal na APS, desde o ano 2000 as Equipes de Saúde Bucal (ESB) fazem parte da ESF e toda a população brasileira tem direito ao cuidado odontológico. Porém, após a criação da Política Nacional de Saúde Bucal (PNSB), em 2004, houve a ampliação e a qualificação dos serviços de saúde bucal, aumentando a resolutividade das ações, disponibilizando prótese dentária na rede de assistência primária e implantando os Centros de Especialidades Odontológicas (CEO). A inserção da ESB na ESF é apontada como a responsável pela ampliação do acesso, maior satisfação do usuário e maior abrangência das ações de promoção e prevenção em saúde bucal. Porém se observa, dentre outros problemas, que o serviço não é capaz de absorver toda a demanda, fazendo com que a maior parte dos procedimentos realizados ainda seja no âmbito curativo (BRASIL, 2004; NASCIMENTO; MOYSÉS; WERNECK; MOYSÉS, 2013; SCHERER; SCHERER, 2015).

Os recursos humanos em saúde são vistos, na APS brasileira, como a essência da capacidade produtiva, uma vez que representam a maior densidade tecnológica disponível para a prestação do cuidado em saúde para a população. No SUS, são considerados a base e, portanto, protagonistas do desenvolvimento e

melhoria do sistema. De fato, as equipes atuantes na ESF possuem um processo de trabalho descrito como bastante complexo, uma vez que os profissionais devem possuir habilidades técnicas e de relações interpessoais, além do compromisso de entender e atuar no processo saúde-doença das coletividades (MAEDA; MOLEIRO; EGRY; CIOSAK, 2011; TOMASI; FACCHINI; PICCINI; THUMÉ; SILVEIRA; SIQUEIRA; RODRIGUES; PANIZ; TEIXEIRA, 2008).

Muito se discute na literatura a importância da qualificação profissional e da educação continuada para adequação dos profissionais às necessidades epidemiológicas da população assistida e aos modelos assistenciais vigentes no país (COTTA; SCHOTT; AZEREDO; FRANCESCHINI; PRIORE; DIAS, 2006; GALLAGHER; MANICKAM; WILSON, 2015; GONÇALVES; CRUZ; OLIVEIRA; MORAIS; MOREIRA; RODRIGUES; LEITE, 2014). Loch-Neckel *et al.* (2009) destacaram que os cursos de capacitação em saúde da família, seja na forma de especialização ou residência, fornecem experiências importantes para o desenvolvimento de uma prática interdisciplinar, que geralmente não recebe a ênfase necessária nos cursos de graduação.

Tendo em vista o grande crescimento da APS brasileira nas duas últimas décadas, fazendo com que mais da metade da população brasileira fosse potencialmente assistida pela ESF, fez-se necessário que os gestores do SUS se atentassem à qualidade da gestão dos serviços e das práticas realizadas pelas equipes de atenção primária (EAP). Assim, após importante processo de negociação entre as três esferas de gestão do SUS, em 19 de julho de 2011 foi instituído, pelo Ministério da Saúde (MS), o 'Programa Nacional de Melhoria do Acesso e da Qualidade da Atenção Básica' (PMAQ-AB) através da Portaria nº 1.654 GM/MS (BRASIL, 2013; 2015).

O PMAQ-AB foi desenhado para permitir a ampliação do acesso e a melhoria da qualidade da APS em todo o Brasil, por meio de um processo composto por quatro fases que se complementam e formam um ciclo contínuo de avaliação: (1) adesão e contratualização, (2) desenvolvimento, (3) avaliação externa e (4) recontratualização. A adesão ao programa é voluntária por parte das EAP. As equipes aderentes, após a contratualização, passam por processo auto avaliativo, planejamento de ações, melhoria do serviço e avaliação externa por parte da equipe do PMAQ-AB. Parte do incentivo financeiro é repassado inicialmente na fase de contratualização e parte após a avaliação externa, caso a equipe prove melhoria do

serviço através dos itens e dos indicadores de saúde pactuados (BRASIL, 2013; 2015).

No âmbito da saúde bucal, o PMAQ-AB se propôs a avaliar sete indicadores, sendo quatro de desempenho e três de monitoramento. Ainda na fase de avaliação externa, são verificadas nas Unidades Básicas de Saúde (UBS) questões relativas à gestão municipal, estrutura e condições de funcionamento da UBS, acesso e qualidade da atenção e organização do processo de trabalho. Essas questões devem ser respondidas por um membro da ESB, preferencialmente pelo cirurgião-dentista. O primeiro ciclo de avaliações do PMAQ-AB ocorreu entre 2011 e 2012, sendo a adesão das ESB limitada à 50% das equipes existentes à época. No segundo ciclo, que aconteceu entre 2013 e 2014, não houve limite para adesão e o instrumento de avaliação externa das ESB foi separado das demais EAP (BRASIL, 2013; 2015).

Além do seu objetivo principal de melhorar o acesso e a qualidade dos serviços prestados na APS brasileira, o PMAQ-AB gerou, até o momento, um importante banco de dados com informações de grande parte das ESB brasileiras. Considerando o papel central que os recursos humanos em saúde possuem para uma adequada prestação de serviços, sobretudo na APS, o presente estudo apresenta grande relevância por avaliar se características de formação profissional e características laborais de cirurgiões-dentistas estariam influenciando o desempenho das ESB brasileiras. Os achados do presente estudo são importantes para que se busque uma maior adequação dos recursos humanos ao SUS e às demandas populacionais, além de condições adequadas de trabalho para os mesmos.

2 OBJETIVOS

2.1 Objetivo geral

Avaliar a associação do perfil dos cirurgiões-dentistas e da organização e planejamento dos serviços de saúde bucal com o desempenho das Equipes de Saúde Bucal atuantes na Atenção Primária em Saúde brasileira.

2.2 Objetivos específicos

- Avaliar a associação da qualificação profissional (pós-graduação *Lato Sensu*, pós-graduação *Stricto Sensu* e atividades de Educação Permanente) com o desempenho das Equipes de Saúde Bucal atuantes na Atenção Primária em Saúde brasileira.
- Avaliar a associação da atuação dos cirurgiões-dentistas em preceptoria/tutoria de alunos de graduação e pós-graduação com o desempenho das Equipes de Saúde Bucal atuantes na Atenção Primária em Saúde brasileira.
- Avaliar a associação da forma de ingresso do cirurgião-dentista na equipe com o desempenho das Equipes de Saúde Bucal atuantes na Atenção Primária em Saúde brasileira.
- Avaliar a associação do tipo de agente contratante do cirurgião-dentista com o desempenho das Equipes de Saúde Bucal atuantes na Atenção Primária em Saúde brasileira.
- Avaliar a associação do tipo de vínculo empregatício do cirurgião-dentista com o desempenho das Equipes de Saúde Bucal atuantes na Atenção Primária em Saúde brasileira.
- Avaliar a associação do tempo de atuação do cirurgião-dentista na APS brasileira com o desempenho das Equipes de Saúde Bucal atuantes na Atenção Primária em Saúde brasileira.

- Avaliar a associação da presença/ausência de plano de carreira, progressão e bonificação salarial para os cirurgiões-dentistas com o desempenho das Equipes de Saúde Bucal atuantes na Atenção Primária em Saúde brasileira.
- Avaliar a associação do perfil dos cirurgiões-dentistas, controlando pelo perfil da Gestão no planejamento e na organização dos serviços de saúde bucal, com o desempenho das Equipes de Saúde Bucal atuantes na Atenção Primária em Saúde brasileira.

3 METODOLOGIA EXPANDIDA

3.1 Considerações éticas

O presente estudo foi submetido e aprovado pela Comissão Nacional de Ética em Pesquisa e pelo Comitê de Ética em Pesquisa da Universidade Federal de Minas Gerais em 13 de outubro de 2015. Protocolo CAAE 02396512.8.0000.5149; número do parecer 1.275.911.

3.2 Desenho de estudo e amostra

Trata-se de um estudo transversal, que utilizou dados secundários relativos aos recursos humanos em saúde bucal (cirurgiões-dentistas) e procedimentos de atenção primária em saúde bucal realizados pelas ESB avaliadas no segundo ciclo do PMAQ-AB. Todos os dados que foram utilizados são públicos do MS e nenhum participante foi identificado em qualquer etapa da pesquisa, não sendo, portanto, necessária assinatura do Termo de Consentimento Livre e Esclarecido.

De um total de 23.150 ESB existentes no Brasil em 2013 (BRASIL, c2018), o segundo ciclo de avaliações do PMAQ-AB, que aconteceu entre 2013 e 2014, teve a adesão de 19.946 ESB. Segundo os critérios do programa, 1.832 equipes foram desclassificadas ou consideradas insatisfatórias, contabilizando, assim, um total de 18.114 ESB avaliadas (aproximadamente 76% das ESB brasileiras).

3.3 Coleta dos dados

O PMAQ-AB é composto por quatro fases que se complementam e formam um ciclo contínuo de avaliação, (1) adesão e contratualização, (2) desenvolvimento, (3) avaliação externa e (4) recontratualização. Foram utilizados, no presente estudo, dados obtidos na fase de avaliação externa do PMAQ-AB, especificamente do módulo VI, que envolveu a entrevista com o profissional de saúde bucal (preferencialmente o cirurgião-dentista) sobre o processo de trabalho da ESB e verificação de documentos na UBS (BRASIL, 2013).

O questionário aplicado foi desenvolvido por meio de uma parceria do MS com seis instituições de ensino e pesquisa. Foi construído com base nos princípios da APS e no modelo de avaliação da qualidade dos serviços de saúde proposto por

Donabedian (2005), que considera três dimensões do cuidado: estrutura, processo e resultado. O instrumento foi aplicado por uma equipe de 989 profissionais da saúde com formação universitária completa, após 40 horas de treinamento e avaliação. As perguntas eram, sobretudo, dicotômicas, com respostas do tipo sim/não. Foram registradas em *tablets* por meio de um programa elaborado especificamente para o PMAQ-AB, projetado para lançar e organizar os bancos *online* automaticamente. O MS inicialmente disponibilizou os bancos para as instituições de ensino e pesquisa participantes. Posteriormente, os dados foram liberados para domínio público por meio do *website* oficial (<http://aps.saude.gov.br/ape/pmaq>).

3.4 Variáveis avaliadas

3.4.1 Variável dependente

A variável dependente (desfecho do estudo) foi o desempenho das ESB, estimado a partir do relato de realização de procedimentos odontológicos de atenção primária. Ao todo foram 23 procedimentos de APS bucal incluídos (QUADRO 1).

Quadro 1 – Procedimentos odontológicos de APS utilizados para estimar o desempenho das ESB.

Procedimentos e ações de APS bucal
1. Agendamento de retorno para a continuidade de tratamento de um usuário que iniciou seu tratamento
2. Drenagem de abscesso
3. Sutura de ferimentos por trauma dentário/maxilofacial
4. Remoção de dentes impactados
5. Frenectomia
6. Remoção de cistos
7. Acesso à polpa dentária
8. Aplicação tópica de flúor
9. Exodontia de dente decíduo
10. Exodontia de dente permanente
11. Restauração de amálgama
12. Restauração de resina composta
13. Restauração em dente decíduo

-
14. Pulpotomia
 15. Raspagem, alisamento e polimento supragengival
 16. Tratamento de alveolite
 17. Ulotomia/ ulectomia
 18. Cimentação de prótese dentária
 19. Documentos que comprovem o registro dos casos suspeitos/confirmados de câncer de boca
 20. Referência para encaminhamento dos casos suspeitos/confirmados de câncer de boca
 21. Identificação de pessoas que necessitam de prótese dentária
 22. Moldagem anatômica e funcional para confecção de próteses
 23. Consulta retorno para avaliar a instalação de prótese dentária
-

Fonte: Elaborado pelo autor, 2019.

3.4.2 Variáveis Independentes

As variáveis independentes (exposição) envolveram, sobretudo, aspectos da qualificação profissional dos cirurgiões-dentistas, atividades de educação permanente, tipo de vínculo empregatício e plano de carreira que possuem. Ao todo, foram 13 itens compondo este grupo.

Quadro 2 – Variáveis independentes do estudo.

Variáveis
<p>1. Pós-graduação <i>Lato Sensu</i> Variável qualitativa: sim; não. Incluem: Especialização em Saúde da Família, Saúde Pública, Saúde Coletiva ou outros; Residência em Saúde da Família, Saúde Pública, Saúde Coletiva ou outros.</p>
<p>2. Pós-graduação <i>Stricto Sensu</i> Variável qualitativa: sim; não. Incluem: mestrado em Saúde da Família, Saúde Pública, Saúde Coletiva ou outros; doutorado em Saúde da Família, Saúde Pública, Saúde Coletiva ou outros.</p>

-
3. Atividades de educação permanente
Variável quantitativa: Escores variando de 0 a 8 de acordo com o número de respostas positivas para cada item incluído.
Incluem: Seminários, mostras, oficinas ou grupos de discussão; cursos presenciais; Telessaúde; Rede Universitária de Telemedicina (RUTE); UNASUS; curso de educação à distância; troca de experiência; outras atividades de educação permanente.
 4. Tutoria/preceptoria de alunos
Variável qualitativa: sim; não.
 5. Tempo de atuação na ESB
Qualitativa: Até dois anos; há mais de dois anos.
 6. Agente contratante do cirurgião-dentista
Qualitativa: Administração Direta; Outros (incluindo Consórcio Intermunicipal de Direito Público, Consórcio Intermunicipal de Direito Privado, Fundação Pública de Direito Público, Fundação Pública de Direito Privado, Organização Social, Organização da Sociedade Civil de Interesse Público, Entidade Filantrópica, Organização não Governamental, empresa, cooperativa, outros, não sabe/não respondeu).
 7. Vínculo empregatício do cirurgião-dentista
Qualitativa: Servidor Público Estatutário; Outros (incluindo cargo comissionado, contrato temporário pela administração pública regido por legislação especial - municipal/ estadual/ federal -, contrato temporário por prestação de serviço, empregado público CLT, contrato CLT, autônomo, outros, não sabe/não respondeu).
 8. Forma de ingresso do cirurgião-dentista na ESB
Qualitativa: Concurso público; Outros (incluindo seleção pública, indicação ou outras formas de ingresso)
 9. Plano de carreira
Qualitativa: sim; não.
 10. Plano de carreira com progressão por tempo de serviço
Qualitativa: sim; não.
 11. Plano de carreira com progressão por avaliação de desempenho e/ou desenvolvimento (mérito)
-

Qualitativa: sim; não.

12. Plano de carreira com progressão por titulação e formação profissional

Qualitativa: sim; não.

13. Incentivo, gratificação, prêmio financeiro por desempenho

Qualitativa: sim; não.

Fonte: Elaborado pelo autor, 2019.

3.4.3 Covariáveis

Considerando que diversos outros fatores, além do perfil dos cirurgiões-dentistas, podem influenciar no desempenho das equipes de saúde bucal (FISCHER; PERES; KUPEK, 2010), também foram analisadas variáveis relativas à gestão e organização da assistência odontológica na ESF.

Quadro 3 – Covariáveis (ou variáveis de confusão) do estudo.

Variáveis
1. Unidade básica como espaço de formação de ensino aprendizagem com alunos de graduação, especialização, residentes entre outros. Qualitativa: sim; não.
2. Apoio para o planejamento e organização do processo de trabalho. Qualitativa: sim; não.
3. Gestão disponibiliza para a ESF informações que auxiliam na análise de situação de saúde. Qualitativa: sim; não.
4. Monitoramento e análise dos Indicadores e informações de saúde bucal. Qualitativa: sim; não.
5. Documentos provando planejamento e programação de ações mensalmente. Qualitativa: sim; não.
6. Documentos provando processo de autoavaliação nos últimos seis meses. Qualitativa: sim; não.
7. ESF participa das reuniões da Equipe de Atenção Primária. Qualitativa: sim; não.
8. Oferta de atendimentos clínicos.

Qualitativa: Agenda de atendimentos flexível (consultas odontológicas agendadas e consultas de demanda espontânea); Agenda de atendimentos restrita (apenas consultas odontológicas agendadas ou consultas de demanda espontânea).

9. Forma de agendamento.

Qualitativa: Em qualquer dia da semana e qualquer horário; Dias e/ou horários específicos.

10. Oferta de consultas especializadas.

Qualitativa: sim; não.

11. Número de equipes da ESF cobertas pela ESB.

Quantitativa: Escores variando de 1 a 9 de acordo com o número de Equipes de Saúde da Família.

Fonte: Elaborado pelo autor, 2019.

3.5 Teoria de Resposta ao Item (TRI)

Os procedimentos odontológicos realizados pelas ESB na APS foram utilizados para estimar o desempenho das referidas equipes utilizando, para isso, a Teoria de Resposta ao Item (TRI). A TRI foi desenvolvida a partir da necessidade de se mensurar propriedades psicológicas, também conhecidas por traços (ou construtos) latentes, que são características individuais e que não podem ser mensuradas de forma direta, como atitude, satisfação e proficiência. Este modelo matemático surgiu, sobretudo, para suprir limitações que a Teoria Clássica de Medidas (TCM) apresentava, uma vez que a TRI permite, a partir de um conjunto de respostas apresentadas por um grupo de respondentes, a estimação dos parâmetros dos itens - nível de dificuldade (b) e parâmetro de discriminação (a) - e dos indivíduos (objeto do estudo) em uma escala de medida (ARAÚJO; ANDRADE; BORTOLOTTI, 2009; COUTO; PRIMI, 2011).

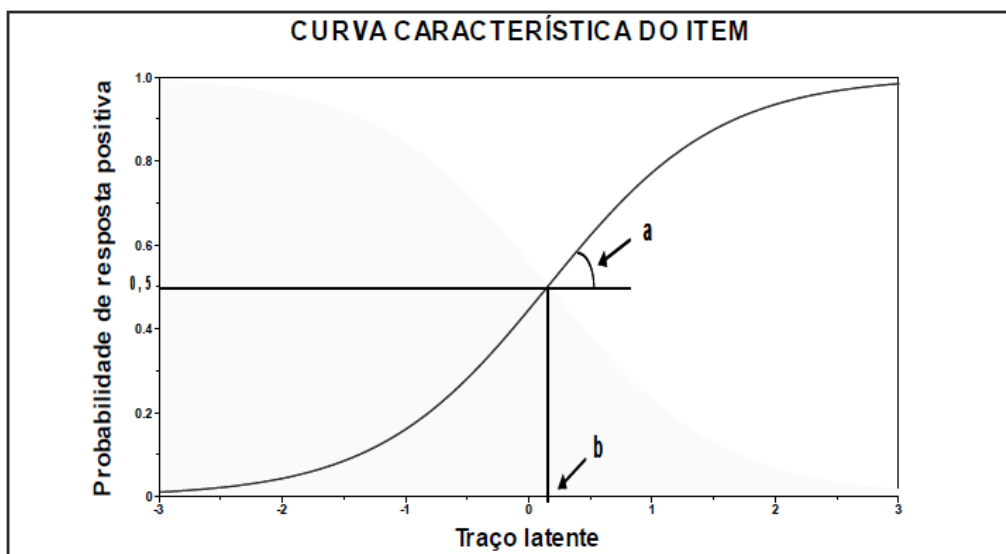
O modelo da TRI relaciona a probabilidade da resposta de um indivíduo a um item e seu traço latente, variável não observável, estimada com base nas respostas dadas a cada um dos itens considerados pelos respondentes participantes (BHAKTA; TENNANT; HORTON; LAWTON; ANDRICH, 2005; BOURION-BÉDÈS; SCHWAN; EPSTEIN; LAPREVOTE; BÉDÈS; BONNET; BAUMANN, 2015). No

presente estudo, o construto latente derivado da aplicação da TRI foi o ‘desempenho das ESB’ participantes do segundo ciclo do PMAQ, estimado a partir dos procedimentos odontológicos da APS realizados pelas ESB.

Dentre os diversos modelos de TRI existentes, foi utilizado o Modelo de Resposta Gradual de Samejima (1968). Este modelo pode ser aplicado para variáveis politômicas em questionários de respostas ordenadas, quando não existe opção de resposta certa ou errada. A aplicação desse modelo exigiu como pressuposto a unidimensionalidade, ou seja, a existência de um único construto latente a ser estimado pelo conjunto de itens que compuseram o questionário. Este pressuposto foi verificado através da decomposição da matriz de correlação policórica, a fim de identificar a dominância do primeiro autovalor, que indica o quanto o escore explica todas as variações dos itens. Além disso, a consistência interna da escala foi verificada pelo Alfa de Cronbach (BHAKTA; TENNANT; HORTON; LAWTON; ANDRICH, 2005; BOURION-BÉDÈS; SCHWAN; EPSTEIN; LAPREVOTE; BÉDÈS; BONNET; BAUMANN, 2015).

A partir da estimação dos parâmetros do modelo da TRI, obtivemos a função matemática que relacionou a probabilidade de resposta a um item e seu traço latente (θ), dando origem à Curva Característica do Item (CCI). A forma dessa curva descreveu como a mudança do θ relacionou-se com a mudança na probabilidade de resposta ao item. O gráfico 1 ilustra um exemplo de CCI.

Gráfico 1 – Exemplo de Curva Característica do Item



Fonte: Sartes e Souza-Formigoni , 2013, p. 246.

O exemplo de CCI, de Sartes e Souza-Formigoni (2013), mostra um modelo logístico de dois parâmetros, onde é possível observar o nível de dificuldade do item (*b*), dado pelo valor de θ correspondente à $P(\theta)=0,5$ e o parâmetro de discriminação do item (*a*), que corresponde à inclinação da curva no ponto *b*. Assim, itens com maiores valores de *a* fornecem melhores discriminações.

Ao final, além da análise individual de cada item que compôs a lista de procedimentos odontológicos da APS, quanto ao seu nível de dificuldade e parâmetro de discriminação, o modelo da TRI forneceu um escore, uma nota de classificação, para cada ESB de acordo com as respostas dadas ao conjunto de itens. Cabe ressaltar que cada item teve um peso diferente na estimativa desse escore, estimado em função dos parâmetros de dificuldade e discriminação. Esse escore foi, de fato, a variável dependente do presente estudo, sendo denominado 'desempenho das ESB'.

3.6 Análise estatística dos dados

Foi realizada análise descritiva dos procedimentos odontológicos de APS (utilizados para a estimativa do desempenho das ESB), por meio de cálculo de proporção, de medidas de tendência central e de variabilidade. Essas análises descritivas foram apresentadas para cada macrorregião brasileira (Norte, Nordeste, Centro-Oeste, Sul e Sudeste). O desempenho das ESB, calculado por meio da TRI, foi apresentado em formato de escore, bem como os níveis de dificuldade e parâmetros de discriminação de cada um dos itens avaliados.

Modelos de regressão linear foram desenvolvidos para o desfecho (escores das ESB estimados através da TRI) a fim de estimar os coeficientes Beta (B) brutos e ajustados e respectivos intervalos de confiança 95% (IC 95%), utilizando-se variáveis independentes e covariáveis. Para a estimativa de Beta brutos (IC 95%), cada variável independente e covariável foi incluída no modelo linear. Aquelas com valor *p* menor que 0,20 foram incluídas, conjuntamente, para a estimativa dos coeficientes Beta ajustados (IC 95%). A inclusão foi feita inicialmente pelo método "Enter", forçando a entrada de todas as variáveis de uma só vez no modelo e, posteriormente, pelo método "Stepwise Forward". Após ajuste manual, foram mantidas no modelo final as variáveis com $p < 0,05$. A multicolinearidade foi checada por meio do Método VIF (*Variance Inflation Factor*). Os resíduos foram checados por meio do método

“Studentizado” (resíduos padronizados e preditos) e os pressupostos de normalidade e homocedasticidade foram verificados por meio do histograma e do gráfico de dispersão (RAWLINGS; PENTULA; DICKEY, 1998).

4 ARTIGOS

4.1 Artigo 1

“Dental procedures in primary health care of the Brazilian National Health System”

Artigo publicado no periódico *International Journal of Environmental Research and Public Health* em dezembro de 2017.

Fator de Impacto 2.145 (2017), equivalente ao Qualis Capes B1 para Odontologia.



Article

Dental Procedures in Primary Health Care of the Brazilian National Health System

Suellen R. Mendes ¹, Renata C. Martins ², Antônio T. G. Matta-Machado ³,
Grazielle C. M. Mattos ⁴, Jennifer E. Gallagher ⁴ and Mauro H. N. G. Abreu ^{2,*}

¹ Graduate Programme in Dentistry, Faculty of Dentistry, Universidade Federal de Minas Gerais, Belo Horizonte 31270-901, Brazil; srmendesodonto@gmail.com

² Department of Community and Preventive Dentistry, Faculty of Dentistry, Universidade Federal de Minas Gerais, Belo Horizonte 31270-901, Brazil; r.c.martins@uol.com.br

³ Department of Preventive and Social Medicine, Faculty of Medicine, Universidade Federal de Minas Gerais, Belo Horizonte 30130-100, Brazil; thomaz@nescon.medicina.ufmg.br

⁴ Division of Population and Patient Health, Kings College London Dental Institute, Denmark Hill Campus, London SE5 9RS, UK; gueziabh@yahoo.com.br (G.C.M.M.); jenny.gallagher@kcl.ac.uk (J.E.G.)

* Correspondence: maurohenriqueabreu@gmail.com; Tel.: +55-(31)-3409-2470 Received:

24 October 2017; Accepted: 29 November 2017; Published: 1 December 2017

Abstract: The aim of this study was to examine the procedures of primary dental health care performed by oral health teams (OHTs) adhering to the second cycle of the ‘National Programme for Improving Access and Quality of Primary Care’ (PMAQ-AB) in Brazil. A cross-sectional descriptive analysis was performed, across 23 dental procedures comprising preventive, restorative/prosthetic, surgical, endodontic and oral cancer monitoring. Descriptive analysis shows that most of the oral health teams carry out basic dental procedures. However, most of the time, they do not keep adequate records of suspected cases of oral cancer, diagnosis tests or follow-ups, and do not perform dental prosthetic procedures. Data also showed disparities in the average number of procedures performed in each Brazilian geographical region in 2013–2014, ranging from 13.9 in the northern to 16.5 in the southern and south-eastern regions, reinforcing the great social disparities between them. Brazilian regions with the highest volume of dental need deliver the lowest number of dental procedures. The need to tackle inequalities and further shape the supply of appropriate primary health care (PHC) is evident.

Keywords: primary health care; dental care; health services

1. Introduction

The inclusion of oral health teams (OHTs) in the Brazilian National Health System (SUS in Portuguese) and subsequent creation of the National Oral Health Policy, represented the enhancement of primary health care (PHC) and the expansion of dental health-care access to the Brazilian population [1–3].

There are currently 24,053 OHTs throughout Brazil [4]. Moreover, there has been a structural improvement in the dental facilities in PHC units, better qualification of OHT professionals (each OHT is composed of one dentist and at least one dental assistant—an oral health auxiliary and/or oral

health technician), the provision of dental prostheses in PHC and the expansion of secondary dental health care [3].

This great expansion of access brought with it the need to evaluate the quality of service provided to the population. In this sense, in 2011 the Ministry of Health (MofH) launched the 'National Programme for Improving Access and Quality of Primary Care' (PMAQ-AB) to increase access to and improve the quality of services provided by PHC by technically and economically supporting PHC teams. Each team underwent an accreditation process based on the results of an external evaluation and on the analysis of health indicators.

The first cycle was conducted between 2011 and 2012 and evaluated 12,404 OHTs. It was determined that most OHTs performed preventive, restorative and surgical procedures; however, procedures concerning oral cancer and dental prosthetic procedures were performed less frequently [5,6]. The low frequency of performance of these procedures is worrying, especially considering that the Brazilian health system is universal and that adults and the elderly often require such procedures. The second cycle occurred between 2013 and 2014. In contrast to the first cycle, when only 50% of OHTs were able to adhere to the PMAQ; in this second cycle, all primary health-care teams, including OHTs, were included in the evaluation. In addition, the external evaluation instrument was improved in the quantity of variables related to structure, work process and outcomes [5,6]. Serial health assessments are important in verifying whether there have been changes in the performance of health services. However, the scientific literature is rather scarce on this topic.

Thus, the present study aims to describe the procedures of primary dental health care performed by oral health teams adhering to the second cycle of the 'National Programme for Improving Access and Quality of Primary Care' in Brazil.

2. Materials and Methods

This is a cross-sectional descriptive study using secondary data related to the primary dental care procedures performed by oral health team (OHT) adherents to the second cycle of 'Programme for Improving Access and Quality of Primary Care' (PMAQ-AB). This survey was based on the classical quality of care framework by Donabedian, in which quality is evaluated using structure, process, and outcome parameters [7]. In the present study, we used data obtained in the external evaluation phase, which involves an interview with the dentists about the work process of the OHTs and verification of documents in the primary health care (PHC) units.

The Brazilian National Health System is a universal health system that allows access to oral care for all age groups, from early childhood to seniors, without direct costs to the population. There is a national protocol that sets out a range of basic oral health-care procedures (preventive, restorative/prosthetic, surgical, endodontic, and monitoring of oral health conditions) considered necessary for the epidemiological need of the Brazilian population [1-3].

For this phase, an observational instrument was created through a Ministry of Health (MofH) partnership with six teaching and research institutions in Brazil. This instrument was applied by a trained team of health professionals, all of whom had completed university degrees. Questions (mostly of the dichotomous yes/no type) and observations were recorded on tablets using a computer programme specifically designed for PMAQ-AB [5]. After the evaluation cycle, MofH organized the database and made it available to the teaching and research institutions.

In this study we considered the performance reports of 23 basic dental health-care procedures, including preventive, restorative/prosthetic, surgical, endodontic, and cancer monitoring procedures.

Each OHT received one point for each dental procedure performed. As such, each OHT's score was the sum of the number of dental health procedures, ranging from zero to 23. Therefore, descriptive analysis was performed, showing the proportion of OHTs that performed each dental procedure at the time, in addition to the average number of procedures performed by the teams in the five Brazilian geographical regions (north, north-east, mid-west, south and south-east). Confidence intervals were not calculated because this was a census of OHTs that adhered to PMAQ-AB.

The study was submitted to and approved by the National Ethics Research Council and by the

Research Ethics Committee of the Federal University of Minas Gerais (protocol number 02396512.8.0000.5149). We analysed a public and anonymous database from the Brazilian MofH; therefore, it was not necessary to ask for individual informed consent.

3. Results

In the second cycle of PMAQ-AB, which occurred between 2013 and 2014, 19,946 OHTs were assessed. Of these, 1832 (9.2%) were disqualified by the PMAQ-AB evaluation criteria because they did not follow the programme recommendations, such as an adequate oral health surveillance system and the presence of the dentist and dental equipment in the PHC unit, resulting in a sample of 18,114 OHTs.

Table 1 shows the frequency of 23 primary dental care procedures performed by the OHTs, grouped by categories of procedures, including preventive, restorative/prosthetic, surgical, endodontic, and cancer monitoring procedures.

Table 1. Basic dental procedures performed by oral health teams, Brazil, 2013–2014.

Variables	Yes (%)
Preventive procedures	
Supragingival scaling, root planing and coronal polishing	17,551 (96.9)
Fluoride application	17,866 (98.6)
Does OHT guarantee an appointment scheduling for the continuity of treatment?	16,639 (91.9)
Restorative/Prosthetic procedures	
Anatomical and functional impression for prostheses	1478 (8.2)
Return visit to evaluate prostheses installation	2231 (12.3)
Prostheses cementation	5109 (28.2)
Does the OHTs promote actions in its territory to identify people who need dental prostheses?	9504 (52.5)
Amalgam filling	16,180 (89.3)
Composite filling	17,718 (97.8)
Deciduous tooth restoration	17,851 (98.5)
Surgical procedures	
Removal of cysts	3883 (21.4)
Frenectomy	4929 (27.2)
Removal of impacted teeth	5446 (30.1)
Ulotomy/ulectomy	11,915 (65.8)
Suture of trauma injuries	14,485 (80.0)
Drainage of oral abscesses	15,908 (87.8)
Alveolitis treatment	16,332 (90.2)
Permanent tooth extraction	17,746 (98.0)
Deciduous tooth extraction	17,842 (98.5)
Endodontic procedures	
Pulpotomy	15,093 (83.3)
Access to dental pulp	15,959 (88.1)
Cancer monitoring	
Does OHT have documents proving the registration of suspected/confirmed cases of oral cancer?	4128 (22.8)
Does OHT have reference to forwarding suspected/confirmed cases of oral cancer?	14,497(80.0)

Note. OHT = Oral Health Team.

Table 2 shows that OHTs performed, on average, 15.5 dental procedures (SD 2.8; range 1–23 procedures). When the average numbers of procedures performed by dentists in the five Brazilian geographical regions were evaluated, it was observed that OHTs from the south and south-east (the more developed regions, accordingly to Human Development Index - HDI) performed a higher number of primary dental procedures, whereas teams from the north (one of the two least developed region, accordingly to HDI) performed, on average, fewer procedures. Teams from the mid-west and north-east regions carried out an average of 15 procedures, which is closer to the Brazilian average.

Table 2. Average number of dental procedures performed by oral health teams in Brazilian geographical regions, 2013–2014.

Brazilian Geographical Regions (Human Development Index) *	Population Size	Number of OHTs	Dental Procedures			
			Mean	SD †	Min ‡	Max §
North (0.667)	15,864,454	1263	13.9	2.9	0	21
North-east (0.663)	53,081,950	7700	14.9	2.8	0	23
Mid-west (0.757)	14,058,094	1572	15.1	2.7	0	23
South-east (0.766)	80,364,410	5027	16.5	2.5	0	23
South (0.754)	27,386,891	2552	16.5	2.4	2	23
Brazil	190,755,799	18,114	15.5	2.8	0	23

Note. * In accordance with the United Nations Development Programme [8] the Human Development Index (HDI) summarizes the measure of life expectancy at birth, mean of years of schooling for adults aged 25 years and over, and gross income per capita. The scores varied from 0 to 1 (the higher the score the better the outcome);

† SD = Standard Deviation; ‡ Min = Minimum values; § Max = Maximum values.

4. Discussion

Descriptive analysis shows that the majority of OHTs carry out a range of basic dental procedures, including individual preventive, restorative, endodontic, and surgical procedures. Although many teams report referral of suspected/confirmed cases of oral cancer, few teams keep adequate records of these. Concerning dental prostheses, half of the teams identify the need, but few in fact perform impressions, cementation and consultation for dental prosthesis evaluation.

Although there have been numerous methodological changes and a large increase in the number of OHTs evaluated between the first and second cycle of PMAQ-AB, the findings agree with the study by Reis et al. [6], who evaluated data from the first cycle of the PMAQ-AB. In general, OHTs perform basic oral health procedures, but do not perform the more complex procedures incorporated in the PHC from the National Oral Health Policy of 2003. This may be due to the lack of preparation of professionals, or lack of technical/structural support for performing such procedures. In addition, it is important to highlight that, even in cases of great skill of the primary care dentists, some procedures require specialized attention, demanding referral of the patient to secondary care [9]. Bias in self-reported data is a limitation of this study and its impact in the information of dental procedures should be checked in future research.

Before the insertion of the OHTs into SUS, access to dental health care was restricted to defined population groups and based on basic preventive care and surgical intervention (oral surgery and restorative procedures) [1]. The creation of a National Oral Health Policy based on the PHC principles of the Alma-Ata Declaration increased the access, infrastructure and training of professionals [10]. However, few OHTs expanded the variety of dental procedures offered to the population, either due to lack of preparation of the dentists or, in some cases, to lack of technical support for performing such procedures, which goes against the needs of the population and against the universality precepts of the SUS.

Although a reduction of edentulism in the Brazilian population was identified by some researchers, tooth loss is still characterized as a relevant public health problem, especially amongst elderly people [11,12]. Dental prosthetic procedures, such as temporary removable prostheses, removable partial prostheses and dentures, are part of PHC, but OHTs are not obligated to conduct this procedure, even though it is encouraged by management and laboratory support is made available. An inadequate frequency of performance of such procedures is observed, given the great need presented by the population for both partial prostheses and crown and fixed bridges. Recently, dental implants were included in secondary dental care in the Brazilian National Health System [1–3,6]. It is interesting to observe that impression-taking frequency is lower than that of prosthesis cementation. It is probably that the dental prosthesis cementation procedure is also being performed for patients whose prostheses were not performed under the Brazilian National Health System. This procedure could also include

re-cementation of dental prostheses.

Although the majority of OHTs report having a place to which they can refer suspected/confirmed cases of oral cancer, few report maintaining a record of these oral cancer cases which could improve the relationship of PHC with specialized care. Early diagnosis of oral cancer increases the chances of treatment success. Thus, this situation has great ethical and legal implications, considering that late diagnosis and management results in a poor outcome, including a failure to follow-up diagnosed patients. The importance of such diagnoses in PHC has been discussed, as well as professionals' failure to identify lesions in the initial phase. Therefore, it is important to emphasize its importance to professionals and to encourage continued professional development for its management. In addition, as already occurs in some OHTs, campaigns for oral examination should be encouraged [6,9,13,14].

North and north-east regions are the less developed Brazilian regions [2,9]. Furthermore, data from the last Brazilian Dental Epidemiological Survey (SB Brazil 2010) show that the oral health status of Brazilians of the northern and north-eastern regions are the worst, especially regarding dental caries, periodontal diseases and the need for dental prostheses [15]. Moreover, it is possible to observe three Brazilian realities, in which the north-east and mid-west perform similarly, the southern and south-eastern regions have a higher rate of dental procedures, and the north lower. Furthermore, the north-eastern region has a higher number of OHTs, it performs, on average, a smaller number of procedures when compared with the southern and south-eastern regions. The difference in the rate of procedures performed in each Brazilian geographic region emphasizes the great differences in sociodemographic and health conditions of Brazil and is widening internal inequalities. The differences in the rate of dental procedures could be explained by the fact that the access of people in deprived regions is more difficult and also due to the differences in regulation of OHTs. Another explanation for the differences observed among the Brazilian regions could be that a high proportion of OHTs in the north and north-east have only recently been established. More empirical studies should be carried out for a better understanding of these differences.

Although the present study results are limited to the use of a secondary database, where the performance of dental procedures is based on the report of the dentist, there is evidence of the need to expand the supply of prostheses and the early diagnosis of oral cancer in PHC. The evaluation of the primary dental health-care service makes it possible to outline strategies for the strengthening of access to oral health care for the Brazilian population. Thus, considering that the SUS is a universal health system that aims to serve all individuals of all age groups, it is necessary to reorganize the service in order to increase the variety of procedures offered according to the needs of the population, with the aim of achieving integrated oral health care.

5. Conclusions

Brazilian regions with the highest volume of dental need deliver the lowest number of dental procedures. The need to tackle inequalities and further shape the supply of appropriate primary health care (PHC) is evident.

Acknowledgments: The authors thank the financial support of the Brazilian research agencies: Coordination of Superior Level Staff Improvement (CAPES, in Portuguese: Coordenação de Aperfeiçoamento de Pessoal de Nível Superior); The Brazilian National Council for Scientific and Technological Development (CNPq, in Portuguese: Conselho Nacional de Desenvolvimento Científico e Tecnológico); and Research Support Foundation of the State of Minas Gerais (FAPEMIG, in Portuguese: Fundação de Amparo à Pesquisa do Estado de Minas Gerais).

Author Contributions: Suellen R. Mendes contributed to the design of the work, analysis, interpretation of data, and drafted the work. Renata C. Martins contributed to the design of the work, analysis, interpretation of data, and revisited the work critically for important intellectual content. Antônio T. G. M. Matta-Machado contributed to the acquisition of the data. Grazielle C. M. Mattos contributed to the interpretation of data and revisited the work critically for important intellectual content. Jennifer E. Gallagher contributed to the interpretation of data and revisited the work critically for important intellectual content. Mauro H. N. G. Abreu contributed to the design of the work, analysis, interpretation of data, and revisited the work critically for important intellectual content. All authors approved the final version to be published and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Pucca-Junior, G.A.; Costa, J.F.R.; Silvestre, R.M. Oral health policies in Brazil. *Braz. Oral Res.* **2009**, *23*, 9–16. [[CrossRef](#)]
2. Paim, J.; Travassos, C.; Almeida, C.; Bahia, L.; Macinko, J. The Brazilian health system: History, advances, and challenges. *Lancet* **2011**, *377*, 1778–1797. [[CrossRef](#)]
3. Nascimento, A.C.; Moysés, S.T.; Werneck, R.I.; Moysés, S.J. Oral health in the context of primary care in Brazil. *Int. Dent. J.* **2013**, *63*, 237–243. [[CrossRef](#)] [[PubMed](#)]
4. SAGE. Sala de Apoio à Gestão Estratégica. Ministério da Saúde. Available online: <http://sage.saude.gov.br/#> (accessed on 23 October 2017).
5. Ministério da Saúde. *Programa Nacional de Melhoria do Acesso e da Qualidade da Atenção Básica (PMAQ-AB): Manual Instrutivo*; Ministério da Saúde: Brasília, Brasil, 2013. (In Portuguese)
6. Reis, C.M.R.; Matta-Machado, A.T.G.; Amaral, J.H.L.; Werneck, M.A.F.; Abreu, M.H.N.G. Describing the primary care actions of oral health teams in Brazil. *Int. J. Environ. Res. Public Health* **2015**, *12*, 667–678. [[CrossRef](#)] [[PubMed](#)]
7. Donabedian, A. Evaluating the quality of medical care. *Milbank Q.* **2005**, *83*, 691–729. [[CrossRef](#)] [[PubMed](#)]
8. United Nations Development Programme. *Desenvolvimento Humano Nas Macrorregiões Brasileiras*. Brasília: Ministério da Saúde. 2016. Available online: http://www.ipea.gov.br/portal/images/stories/PDFs/livros/livros/20160331_livro-idhm.pdf (accessed on 21 November 2017).
9. Martins, R.C.; Reis, C.M.R.; Matta-Machado, A.T.G.; Amaral, J.H.L.; Werneck, M.A.F.; Abreu, M.H.N.G. Relationship between primary and secondary dental care in public health services in Brazil. *PLoS ONE* **2016**, *11*, e0164986. [[CrossRef](#)] [[PubMed](#)]
10. Jatrana, S.; Crampton, P.; Filoche, S. The case for integrating oral health into primary health care. *N. Z. Med. J.* **2009**, *122*, 43–52. [[PubMed](#)]
11. Peres, M.A.; Barbato, P.R.; Reis, S.C.G.B.; Freitas, C.H.S.M.; Antunes, J.L.F. Tooth loss in Brazil: Analysis of the 2010 Brazilian oral health survey. *Rev. Saude Publica* **2013**, *47*, 78–89. [[CrossRef](#)] [[PubMed](#)]
12. Cunha, M.A.G.M.; Lino, P.A.; Santos, T.R.; Vasconcelos, M.; Lucas, S.D.; Abreu, M.H.N.G. A 15-year time-series study of tooth extraction in Brazil. *Medicine* **2015**, *94*, e1924. [[CrossRef](#)] [[PubMed](#)]
13. Hassona, Y.; Scully, C.; Shahin, A.; Maayta, W.F.; Sawair, F. Factors influencing early detection of oral cancer by primary health-care professionals. *J. Cancer Educ.* **2016**, *31*, 285–291. [[CrossRef](#)] [[PubMed](#)]
14. Van de Waal, I. Are we able to reduce the mortality and morbidity of oral cancer? Some considerations. *Med. Oral Patol. Oral Cir. Bucal* **2013**, *18*, 33–37. [[CrossRef](#)]
15. Ministério da Saúde. *SB Brasil 2010: Pesquisa Nacional de Saúde Bucal: Resultados Principais*; Ministério da Saúde: Brasília, Brasil, 2012. (In Portuguese)



© 2017 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).

4.2 Artigo 2

“Using Item Response Theory to evaluate the psychometric characteristics of questions in a Brazilian programme and the performance of dental teams in primary care”

Artigo publicado no periódico *Plos ONE* em maio de 2019.

Fator de Impacto 2.766 (2017), equivalente ao Qualis Capes A1 para Odontologia.

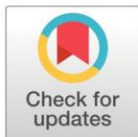
RESEARCH ARTICLE

Using Item Response Theory to evaluate the psychometric characteristics of questions in a Brazilian programme and the performance of dental teams in primary care

Suellen R. Mendes¹, Renata C. Martins², Juliana V. M. Mambrini³, Antônio Thomaz G. Matta-Machado⁴, Grazielle C. M. Mattos⁵, Jennifer E. Gallagher⁵, Mauro H. N. G. Abreu^{2*}

1 Graduate Program in Dentistry, Faculty of Dentistry, Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil, **2** Department of Community and Preventive Dentistry, Faculty of Dentistry, Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil, **3** René Rachou Institute, FIOCRUZ, Belo Horizonte, Minas Gerais, Brazil, **4** Department of Preventive and Social Medicine, Faculty of Medicine, Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil, **5** Kings College London, Faculty of Dentistry, Oral & Craniofacial Sciences, Centre for Host Microbiome Interactions, London, United Kingdom

* maurohenriqueabreu@gmail.com



OPEN ACCESS

Citation: Mendes SR, Martins RC, Mambrini JVM, Matta-Machado ATG, Mattos GCM, Gallagher JE, et al. (2019) Using Item Response Theory to evaluate the psychometric characteristics of questions in a Brazilian programme and the performance of dental teams in primary care. PLOS ONE 14(5): e0217249. <https://doi.org/10.1371/journal.pone.0217249>

Editor: Thiago Saads Carvalho, University of Bern, SWITZERLAND

Received: February 6, 2019

Accepted: May 7, 2019

Published: May 31, 2019

Copyright: © 2019 Mendes et al. This is an open access article distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Data Availability Statement: The data underlying the results presented in the study are available from http://dab.saude.gov.br/portaldab/ape_pmaq.php?conteudo=2_ciclo.

Funding: The authors would like to thank the financial support of the Brazilian research agencies: Coordination of Superior Level Staff Improvement (CAPES, in Portuguese: Coordenação de Aperfeiçoamento de Pessoal de Nível Superior),

Abstract

Objectives

First, to assess the psychometric properties of key questions included in a public sector evaluation of primary dental care in Brazil; and second, to evaluate the performance of dental teams in relation to these items.

Methods

Secondary analysis of a national primary care dataset monitoring quality and access to dental care. Data were collected through face-to-face interviews with representatives of dental teams participating in the 'National Programme for Improving Access and Quality of Primary Care'. Twenty-three mandatory questions about the dentists' reported delivery of dental procedures were included in the analysis. Item Response Theory (IRT) modelling was applied to measure the psychometric properties of the instrument—level of difficulty and discrimination parameter of each item—and then to estimate dental team performance scores based on these parameters. Based on IRT, possible scores ranged from -4 to +4.

Results

Three of the 23 mandatory items were removed due to poor internal consistency, resulting in a scale of 20 items for assessing dental team performance. The results showed variation in procedures delivered by the dental teams; whilst more than a half of the procedures were executed by at least 80% of the dental teams, those relating to dentures (partial/total) and frenectomy (lingual/labial) were performed by less than 30%. Amongst the 20 items included

The Brazilian National Council for Scientific and Technological Development (CNPq, in Portuguese: Conselho Nacional de Desenvolvimento Científico e Tecnológico), and Research Support Foundation of the State of Minas Gerais (FAPEMIG, in Portuguese: Fundação de Amparo à Pesquisa do Estado de Minas Gerais) and also Pró-reitoria de Pesquisa da Universidade Federal de Minas Gerais. All the funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Competing interests: The authors have declared that no competing interests exist.

in the model, those related to partial/total dentures and oral cancer follow-up presented higher levels of difficulty and were less frequently provided. The items relating to the treatment of deciduous teeth and access to the dental pulp of permanent teeth had the highest discrimination parameters and, consequently, greater weight in the performance's score estimation; therefore, dental teams that did not perform these items had the lowest performance scores. In the present study, dental team performance scores ranged from -3.66 to +1.87 with a mean/median of -0.06/+0.01.

Conclusion

The findings suggest that whilst the items within the instrument demonstrated some potential to discriminate between poor and very poor teams, they were ineffective in discriminating between poor and good teams. Whilst Brazilian dental teams perform many mandatory procedures, variation in the nature of their delivery of care requires further investigation to enhance service provision to the population.

Introduction

Brazil is a large country that covers approximately 47% of South American landmass, with a population estimate of 209 million inhabitants across five geographical regions (north, north-east, centre-west, southeast and south) and marked socioeconomic disparities [1]. Since 1988, the Brazilian population has been provided with access to all levels of health care through the Brazilian National Health System (known as Sistema Único de Saúde and abbreviated to 'SUS'), which is free at the point of delivery. It is therefore one of the biggest health care systems in the world, serving approximately 60% of the Brazilian population; none-the-less, whilst it is open to all, however, some people choose to seek private care [2,3].

Inclusion of dentistry in SUS only occurred in the year 2000 and this was followed by the creation of a National Oral Health Policy (NOHP) in 2003. A great increase in the number of dental facilities and enhanced qualification of the dental workforce was observed thereafter. SUS primary health care (PHC) dentistry, which is similar to routine care provided through the National Health Service (NHS) in England, includes preventive, restorative/prosthetic, endodontics and surgical procedures, with referral to specialists for more complex conditions such as impacted third molar extraction and serious conditions such as suspected oral cancer [4,5]. There are about 309,100 active dentists in Brazil, almost half of whom work in the public sector across primary, secondary and tertiary care [6,7]. Currently, there are 24,057 dental health teams (7.8% of the all active Brazilian dentists) working at PHC units delivering primary care in the public sector [8].

Oral health in Brazil appears to be improving. The most recent Brazilian oral health survey reported a decrease in dental caries amongst 12 years-old children and adolescents (aged 15–19 years) and increase uptake of dental care by adults. However, the same survey revealed that dental caries prevalence in the primary dentition remains high and suggested that 68.8% of adults and 92.7% of elderly people require rehabilitation which include total/partial dentures and crowns/bridges. Although construction of dentures and crown and bridgework are not mandatory in the Brazilian PHC, the delivery of dentures in particular is strongly recommended by the MoH, as there are about 17 million edentulous people nationally. Furthermore, there is a huge inequality within, and between, Brazilian geographical regions [3,9].

With the aim of monitoring health service to improve access and quality, the Brazilian Ministry of Health (MofH) launched the 'National Programme for Improving Access to and Quality of Primary Care' (PMAQ-AB). It involves a cross-sectional public sector survey, launched in 2011, through a partnership between the Brazilian MofH and six Brazilian education and research institutions. This voluntary programme, based on a 'Pay for Performance' system, may be followed by all PHC teams of SUS, including the dental teams. Teams participating in the programme, and demonstrating good outcomes, receive a financial incentive and can proceed to a new evaluation cycle. This national service evaluation has therefore generated a large dataset with information on the majority of Brazilian PHC teams [10–12], which is available for analysis.

To date, the PMAQ-AB has conducted two evaluation cycles, first in 2011/2012 and second in 2013/2014. Evaluating data from the first cycle, Reis et al. (2015; 2017), reported that a large variety of dental procedures were delivered by dental teams participating in the evaluation ($n = 12,404$), but items such as dental prostheses were not [13,14].

Given the importance of continuous assessment in health to the organisation and supply of services [15,16], data from the first and second evaluation cycles of PMAQ-AB have been analysed [13,14,17]. Provisional analysis reporting dentists' productivity across 23 standard primary dental care procedures suggested there is variation in dental team performance [17]. Now that this form of monitoring has been accepted, further research is required to evaluate the psychometric properties of the PMAQ-AB instrument, and its ability to discriminate between teams.

Therefore, the present study aimed first to assess the psychometric properties of key questions included in the public sector evaluation on primary dental care in Brazil; and second, to evaluate the reported performance of the dental teams in relation to these items.

Methodology

Study Design

This study was submitted to, and approved by, the National Ethics Research Council and by the Research Ethics Committee of the Federal University of Minas Gerais (Protocol No. 02396512.8.0000.5149; Approval No. 2004382) in order to gain access to the Brazilian MofH database.

The present study involved secondary analysis of data from the PMAQ-AB dataset (2nd cycle), conducted between 2013 and 2014. Participation was open to all 23,150 dental teams working at PHC at that time. Out of a total of 19,946 applicants, 1,832 were excluded by the PMAQ-AB evaluation criteria, as they did not have fully functioning dental team and equipment, resulting in the data from 18,114 dental teams being evaluated in the second cycle of the programme [8], and available for analysis in this study.

Data Collection

The PMAQ-AB programme comprises four phases—agreement, development, external evaluation, and re-contractualisation—which complement each other and form a continuous evaluation cycle of PHC teams [11]. The external evaluation phase is comprised of a questionnaire applied at the PHC units, together with verification. The questionnaires were constructed on the principles of PHC and Donabedian's model for health services evaluation, examining structure, process and outcomes [18]; and include questions concerning the dental facilities structure, dental instruments, dental procedures executed, dentists' profile, management and service organization. The questions primarily involved dichotomous responses (yes/no) and

were answered in a face-to-face interview with a representative dentist from each PHC unit [11,12].

The service evaluation involved a team of 989 interviewers, all senior health professionals, who underwent a 40-hour training programme regarding PHC in SUS, survey methods, and PMAQ-AB questionnaires to enable them to conduct this survey nationwide. All interviewers underwent formal evaluation to assess their abilities prior to commencing the study. The Brazilian MofH developed a mobile app with the relevant questions which sent responses to a central online database. Initially the MofH made these data available to the partner institutions; and, thereafter, publicly available online [11,12]. The PMAQ-AB questionnaire was constructed specifically to evaluate the Brazilian National Health System and face validity of the instrument was determined by experts in the field; with certain responses requiring supporting evidence for the purpose of validation, such as clinical records of suspected/confirmed oral cancer cases.

In the present study, we assessed questions related to the delivery of 23 mandatory dental procedures in the PHC unit (Fig 1). All these questions were part of the external evaluation phase of PMAQ-AB, Module VI, involving data gained in face-to-face interview with the dentist at the PHC unit. Whilst the overall Module VI of PMAQ-AB had 108 questions, the 23 mandatory items were selected to be part of the study since they are primary health care procedures routinely executed and determined as essential in Brazil.

Statistical analysis

The psychometric characteristics of the instrument and dental team performance related to primary care services in dentistry were analyzed using Item Response Theory (IRT). IRT involves a set of mathematical models that relate the probability of an individual's response to an item and its latent trait (or unknown construct). The latent construct is a characteristic that cannot be measured directly, as attitude, satisfaction, and proficiency [19–21]. The unobservable variable, i.e. dental team performance, was estimated based on the dentists' report about the delivery of each dental procedure.

IRT modelling makes possible more detailed analysis of the items used to construct the measurement: level of difficulty and discrimination ability. Thus, when modelling, it is not the number of dental procedures performed by the dental teams that determine their performance, but the weighting for the level of difficulty (estimated based on the frequency of delivery) and the ability to discriminate between items. The scores attributed to each dental team theoretically can range from -4 to +4 [19–22].

Amongst existing IRT models, the graded response model proposed by Samejima (1969) was chosen. This model is usually applied in questionnaires of ordered responses, which reflect personal positioning, so there are no right or wrong answers, and it can be applied to dichotomous or polytomous variables [23].

Descriptive analyses of dental procedures were first undertaken to provide an overview of the data. Thereafter, to confirm the feasibility of applying the IRT, the first eigenvalue was calculated from the decomposition of the polychoric correlation matrix, verifying its domain. In addition, internal consistency of the scale was assessed using Cronbach's alpha [19,21,24].

The discrimination parameter (a); and, level of difficulty (b), of each procedure evaluated were calculated. Based on the findings, each dental team received a score based on the IRT modeling. For each dental procedure included in this performance estimation, the frequency of execution was calculated, total and according to groups of dental teams with 'high', 'medium' and 'low' scores. Besides that, a test information curve aggregating all items was

'Does the dental team execute (...)?'
• supragingival scaling, root scraping/smoothing and coronal polishing
• fluoride application
• appointment for the continuity of the treatment
• anatomical and functional impression for partial/total dentures
• crown/bridges cementation/recementation
• return visit to evaluate denture adjustment
• scanning to identify people who need partial/total dentures
• amalgam filling
• composite filling
• deciduous tooth restoration
• removal of cysts
• lingual/labial frenectomy
• removal of impacted teeth
• ulotomy
• suture of trauma injuries
• drainage of oral abscesses
• dry socket treatment
• permanent tooth extraction
• deciduous tooth extraction
• pulpotomy
• access to dental pulp
• record of suspected/confirmed oral cancer cases (with documents proving that)
• refer suspected/confirmed oral cancer cases

Fig 1. Questions related to the dental procedure's execution asked to the PHC dentist in a face-to-face interview.

<https://doi.org/10.1371/journal.pone.0217249.g001>

made to identify the score interval about which the present instrument provides information [22].

Data were entered and organised in Stata Software (StataCorp. 2015. Stata Statistical Software: Release 14. College Station, TX: StataCorp LP). R Software was used to analyse the data (descriptive analysis and correlation matrix to check the IRT assumptions); and latent trait model (LTM) package was used for the IRT model adjustment [25].

Results

The correlation of the 23 items from the original scale presented with a low Cronbach's alpha coefficient, and three items were therefore removed. The total Cronbach's alpha of the 20 remaining items was 0.66, which is considered acceptable internal consistency [24]. It is important to note that the dental procedures which were unreliable in the model were also less commonly provided: 'anatomical and functional impression for dentures/prostheses' (8.2%), 'removal of cysts' (21.4%), and 'removal of impacted teeth' (30.1%).

The correlation matrix for the 20 items ranged from 0.02 ('frenectomy' and 'reference to forward cases of oral cancer' items) to 0.92 ('deciduous tooth extraction' and 'permanent tooth extraction' items). The largest eigen value which indicates 36.8% of the total variance was substantially higher than the second largest (9.9%) indicating the uni-dimensionality of the instrument.

The findings suggest that more than half of the procedures (70%) were executed by 80% or more of the dental teams. Descriptive analysis showed the biggest floor effect for the item 'return visit to evaluate denture adjustment' (it was not performed by 87.7% of the dental

teams), whilst the biggest ceiling effect was for the item 'fluoride application' (it was performed by 98.6% of the dental teams).

Table 1 shows the 20 dental PHC procedures included in the evaluation of dental team performance through the IRT model. For each one, the frequency of accomplishment, the discrimination parameter (a), and level of difficulty (b), are presented. Dental procedures are arranged in descending order regarding the total frequency of accomplishment, according to each dental procedure's category: preventive procedures, restorative/prosthetic procedures, surgical procedures, endodontic procedures, and cancer monitoring.

Regarding the discrimination parameter (a), the dental procedures with the biggest scores and thus, with greater weight in the dental team performance estimation were 'deciduous tooth filling' (2.652), 'deciduous tooth extraction' (2.268), 'access to dental pulp' (1.925), 'permanent tooth extraction' (1.846), and 'supragingival scaling, root planning/debriment and coronal polishing' (1.779). Concerning the difficulty parameter (b), the dental procedures that showed the highest values (and less frequently performed) were 'return visit to evaluate denture adjustment' (2.594), 'record of suspected/confirmed cases of oral cancer' (1.794), 'lingual/labial frenectomy' (1.509), and 'crown/bridge cementation/re-cementation' (1.077).

Although the discriminatory potential is not necessarily related to the frequency of provision of the dental procedure, it is interesting to observe that the more discriminating procedures had high frequencies of delivery (>80%). It suggests that whether teams perform these procedures, or not, is an efficient way to discriminate between teams with low scores (which deliver these procedures somewhat more frequently than the very low scores) from teams with very low scores (which do not deliver them).

Table 2 shows the frequency of execution of the evaluated dental procedures according to each Brazilian Geographical Region and, altogether the dental procedures were more frequently executed in the South and Southeast regions whilst were less commonly performed in the North and Northeast regions.

The scores representing the performance of each dental team ($n = 18,114$) ranged from -3.66 to +1.87. The overall mean was -0.06 (SD = 0.82), and median was 0.01, showing left (negative) skewed. Although no cut off values were determined to these scores, in the present study they were divided by a mathematical appraisal, thus classifying the teams evaluated in 'low scores' (ranging from -3.66 to -0.34), 'medium' (ranging from -0.35 to +0.29) and 'high' (ranging from +0.30 to +1.87). They were composed by 6,044, 6,033 and 6,037 dental teams, respectively and, differences between teams with low, medium and high scores and procedures with the greatest range between groups, were those with the lowest total frequencies.

The findings presented in Table 3 show that more than a half of dental teams from the North region and almost half of dental teams from Northeast had lowest performance scores, whilst half of dental teams from South and Southeast regions had the highest performance.

The test information curve, presented in Fig 2, indicates that dental procedures included in the PMAQ-AB instrument and analysed in the present study provide more information about the dental teams in the negative end of scores spectrum, especially those between -2 and -3.

Discussion

The items included in the estimation of dental team performance are mandatory in the Brazilian PHC dentistry, although the dental teams are not forced to perform items which are beyond their competence. Whilst most of the dental procedures were reportedly executed by most dental teams; it has been possible to observe through the two PMAQ-AB cycles (2011/2012 and 2013/2014) that the additional procedures included after NOHP was introduced had the lowest individual performance frequencies, and so present higher levels of difficulty. Most

Table 1. Performance of each item provided in primary dental care: Total and categorized in groups of dental teams with the lowest, medium and highest scores; group's frequency range; (a) discrimination parameter; and (b) reported difficulty level, Brazil, 2013–2014.

Items	Frequency of accomplishment ^{1,2}					Discrimination ability (a)	Level of difficulty (b)
	Total (%)	Lowest scores (%)	Medium scores (%)	Highest scores (%)	Groups' range (%)		
Preventive Procedures							
Fluoride application	98.6	96.7	99.4	99.9	3.2	1.475	-3.615
Supragingival scaling, root scraping/smoothing and coronal polishing	96.9	91.5	99.3	99.9	8.4	1.779	-2.668
Appointment for the continuity of treatment	91.9	84.6	93.1	98.0	13.4	0.706	-3.716
Restorative/Prosthetic Procedures							
Deciduous tooth restoration	98.6	95.8	99.9	100.0	4.2	2.652	-2.679
Composite filling	97.8	94.3	99.4	99.8	5.5	1.611	-3.083
Amalgam filling	89.3	79.6	91.9	96.4	16.8	0.768	-3.050
Scanning to identify people who need partial/total dentures	52.5	36.8	51.0	69.7	32.9	0.605	-0.177
Crown/bridges cementation/recementation	28.2	8.4	18.3	57.9	49.5	1.029	1.097
Return visit to evaluate denture adjustment	12.3	4.5	6.6	25.9	21.4	0.855	2.594
Surgical Procedures							
Deciduous tooth extraction	98.5	95.7	99.8	100.0	4.3	2.268	-2.827
Permanent tooth extraction	98.0	94.6	99.4	100.0	5.4	1.846	-2.910
Dry socket treatment	90.2	73.0	97.7	99.9	26.9	1.742	-1.817
Drainage of oral abscesses	87.8	69.4	94.7	99.5	30.1	1.332	-1.902
Suture of trauma injuries	80.0	61.4	82.9	95.6	34.2	0.848	-1.858
Ulotomy	65.8	33.8	68.9	94.7	60.9	1.237	-0.683
Lingual/labial frenectomy	27.2	11.9	19.5	50.3	38.4	0.724	1.509
Endodontic procedures							
Access to dental pulp	88.1	66.9	97.7	99.8	32.9	1.925	-1.579
Pulpotomy	83.3	56.6	93.9	99.5	42.9	1.777	-1.338
Cancer Monitoring							
Refer suspected/confirmed oral cancer cases	80.0	63.2	82.6	94.4	31.2	0.756	-2.044
Record of suspected/confirmed oral cancer cases (with documents proving that)	22.8	8.1	15.8	44.5	36.4	0.782	1.749

¹ Dental procedures delivered at least once by the dental team;

²Lowest scores from -3.66 to -0.34; medium scores from -0.35 to 0.29; highest scores from 0.30 to 1.87.

<https://doi.org/10.1371/journal.pone.0217249.t001>

notably they related to the provision of partial/total dentures and oral cancer monitoring. Furthermore, it is of great concern that certain dental teams did not even meet the requirements to participate in the evaluation and they clearly need urgent investigation and support to ensure that they are fit for purpose of PHC.

In relation to the data which represents the majority of PHC nationally, it has been suggested that inadequate provision of dentures may be related to the unequal distribution of SUS regional prosthodontic laboratories throughout the country; even with the care almost restricted to partial/total dentures [26]. It is of concern that dental rehabilitation may not be adequately provided by the public sector, as the need for total/partial dentures and crown/bridges is still great among adults and the elderly [27], and our analysis suggests that these items are not available across SUS dental teams and supports the findings of Cunha et al. [26]. It suggests that the population may be forced to use the private sector, or remain on waiting lists for long time, in order to receive necessary dental prosthetic treatment, which increases

Table 2. Performance of each item provided in primary dental care according to the Brazilian Geographical Regions—North, Northeast, Centre-West, Southeast and South. Brazil, 2013–2014.

Items	North (n = 1,263) Yes (%)	Northeast (n = 7,700) Yes (%)	Centre-West (n = 1,572) Yes (%)	Southeast (n = 5,027) Yes (%)	South (n = 2,552) Yes (%)
Preventive Procedures					
Fluoride application	1,228 (97.2)	7,601 (98.7)	1,547 (98.4)	4,960 (98.7)	2,530 (99.1)
Supragingival scaling, root scraping/smoothing and coronal polishing	1,160 (91.8)	7,486 (97.2)	1,453 (92.4)	4,949 (98.4)	2,503 (98.1)
Appointment for the continuity of treatment	1,091 (86.4)	6,805 (88.4)	1,490 (94.8)	4,909 (97.7)	2,344 (91.8)
Restorative/Prosthetic Procedures					
Deciduous tooth restoration	1,213 (96.0)	7,564 (98.2)	1,550 (98.6)	4,984 (99.1)	2,540 (99.5)
Composite filling	1,214 (96.1)	7,488 (97.2)	1,545 (98.3)	4,948 (98.4)	2,523 (98.9)
Amalgam filling	747 (59.1)	7,115 (92.4)	1,380 (87.8)	4,698 (93.5)	2,240 (87.8)
Scanning to identify people who need partial/total dentures	470 (37.2)	4,102 (53.3)	704 (44.8)	2,935 (58.4)	1,292 (50.6)
Crown/bridges cementation/re cementation	146 (11.6)	1,434 (18.6)	343 (21.8)	2,250 (44.8)	936 (36.7)
Return visit to evaluate denture adjustment	48 (3.8)	813 (10.6)	137 (8.7)	851 (16.9)	382 (15.0)
Surgical Procedures					
Deciduous tooth extraction	1,228 (97.2)	7,574 (98.4)	1,539 (97.9)	4,972 (98.9)	2,529 (99.1)
Permanent tooth extraction	1,227 (97.1)	7,559 (98.2)	1,505 (95.7)	4,930 (98.1)	2,525 (98.9)
Dry socket treatment	1,091 (86.4)	6,712 (87.2)	1,346 (85.6)	4,748 (94.4)	2,435 (95.4)
Drainage of oral abscesses	1,117 (88.4)	6,234 (81.0)	1,411 (89.8)	4,716 (93.8)	2,430 (95.2)
Suture of trauma injuries	1,023 (81.0)	5,824 (75.6)	1,309 (83.3)	4,066 (80.9)	2,263 (88.7)
Ulotomy	698 (55.3)	4,642 (60.3)	970 (61.7)	3,675 (73.1)	1,930 (75.6)
Lingual/labial frenectomy	336 (26.6)	1,921 (24.9)	424 (27.0)	1,413 (28.1)	835 (32.7)
Endodontic procedures					
Access to dental pulp	964 (76.3)	6,326 (82.2)	1,415 (90.0)	4,797 (95.4)	2,457 (96.3)
Pulpotomy	873 (69.1)	5,858 (76.1)	1,340 (85.2)	4,705 (93.6)	2,317 (90.8)
Cancer Monitoring					
Refer suspected/confirmed oral cancer cases	841 (66.6)	5,924 (76.9)	1,157 (73.6)	4,332 (86.2)	2,243 (87.9)
Record of suspected/confirmed oral cancer cases (with documents proving that)	99 (7.8)	1,250 (16.2)	245 (15.6)	1,702 (33.9)	832 (32.6)

<https://doi.org/10.1371/journal.pone.0217249.t002>

inequalities. This is an area for urgent identification of the barriers to dental care for adults, together with the educational and training needs of the dental workforce so that service barriers can be overcome to ensure that the population has access to prosthodontics [26].

Considering that the oral cancer corresponds to 1–2% of the diagnosed cancers and only 50% of these cases are identified in the initial stages [28,29], it is of concern that less than 23% of the dental teams reported having records of suspected and confirmed oral cancer cases.

Although 80% of them reported having a specialized center to refer these patients, not having

Table 3. Frequency of dental teams with low, medium and high scores according to each Brazilian Geographical Region—North, Northeast, Centre-West, Southeast and South. Brazil, 2013–2014.

	Lowest Score Teams N (%)	Medium Score Teams N (%)	Highest Score Teams N (%)	Total
North	712 (56.4)	398 (31.5)	151 (12.0)	1,263
Northeast	3,383 (43.9)	2,576 (33.5)	1,741 (22.6)	7,700
Centre-West	589 (37.5)	536 (34.1)	447 (28.4)	1,572
Southeast	900 (17.9)	1,665 (33.1)	2,462 (49.0)	5,027
South	460 (18.0)	858 (33.6)	1,234 (48.4)	2,552
Total	6,044	6,033	6,037	18,114

<https://doi.org/10.1371/journal.pone.0217249.t003>

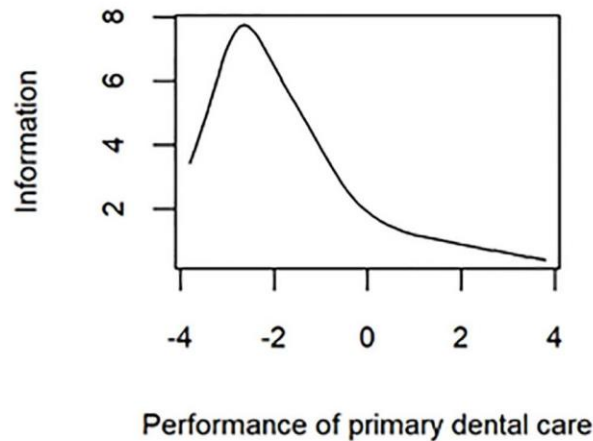


Fig 2. Test information curve, showing the score interval about which the present instrument provides more information.

<https://doi.org/10.1371/journal.pone.0217249.g002>

registers can indicate a weak bond between the primary and secondary care or a failure in the identification of initial cancer lesions. On the other hand, it can represent the low frequency of patients that are diagnosed with suspected/confirmed oral lesions in the working life of dentist [29]. It is important to ensure that primary care dentists have the appropriate education and training in relation to the identification and referral of patients with per-malignant and malignant lesions in a timely manner, which can increase the success of the treatment.

Although some dental procedures were included at the PHC dentistry of SUS after the NOHP, what is observed in practice is that the traditional dental care model, based on direct restorations and extractions, is still being prioritised. Whilst there is undoubtedly significant unmet need and requirement for routine procedures, it is important to provide a comprehensive dental treatment with more complex procedures. Also, this traditional model may reflect dental education and training which is still focused merely on resolution of the current dental problems of the majority of the population [26,29], rather than also extending to preventive care.

The dental care consequences of socioeconomic disparities throughout the country were evidenced by the differences in the delivery of dental procedures and in the performance scores of the dental teams between the Brazilian Geographical Regions, which suggest that additional resources should be allocated to the regions that presented with low performance scores, especially North and Northeast regions [13,26]. However, it is important to highlight that the access to health care is determined not only by the service availability and professional judgment about patient need of care, but also refers to the initiation by the patient into the process of utilising the service. "Gaining access" is also influenced by patient's perceived need for care, financial barriers and previous experience in the health service [30–32], which is influenced by social status [32].

It is interesting to note that the dental procedures with the highest discrimination parameters were frequently performed by dental teams; and, consequently, presented low levels of difficulty, especially those related to children's care. Since most dental teams reported delivering mandatory procedures considered to be in high need, the fact that some teams did not provide these procedures is vitally important in differentiating teams that performed the bare minimum of care from those well below expectations. In fact, if some dental teams do not provide

those commonplace procedures, we advocate that it is necessary to examine the reasons behind this. It may be due to lack of skills amongst the dentists or inadequate equipment and facilities at the dental surgery, which suggests that this should be addressed as a matter of urgency. In both cases, public policies are necessary to expand access to dental care for the Brazilian population, ensuring the equity and the quality of the offered care [33].

Given our findings, it is necessary to emphasise the importance of ensuring that the dental workforce matches Brazilian population oral health needs as closely as possible. Either through facilities development, expansion of the (number of) dental teams working in the PHC, distribution through the country, or, possibly further incentives to encourage them to take the necessary training to enable them to perform more needed dental procedures. This action could not only help to address the missing procedures amongst dental primary care, but also, and very importantly, results in improved population oral health [34,35].

The dental procedures included in the evaluation of dental team performance were not good in discriminating between dental teams with high and low scores. However, the dental procedures evaluated are those necessary to meet the needs and demands of the Brazilian population. In the view of the authors, all 20 dental procedures evaluated should be maintained at PHC, besides insurance of dental care access to all the Brazilian population. It is important to highlight that the PMAQ-AB instrument covers other aspects of PHC services besides dental procedures executed, but an improvement of the instrument may be necessary to future evaluation cycles.

A further avenue would be to evaluate patient oral health outcomes (using the FDI-ICHOM Standard Set of Adult Oral Health Measures, for example) [36] and also identify if they are receiving the proper dental treatment to meet their needs. Furthermore, questions should be included, to examine the why problems exist and how they can be addressed including team knowledge and skills, facilities/equipment and low demand by the local population and how secondary care can assist.

The present study was based on a secondary dataset of the second evaluation cycle of PMAQ-AB; and, municipal managers selected participating dental teams—probably those with the best structures and organisation—which can represent not only a limitation of the study, but a potential increase in the primary health care inequality. It may, therefore, be that the weakest teams did not or could not participate in the survey. Despite this fact, this work represents an important assessment of Brazilian PHC dentistry nationally. More studies on the dental teams that were not qualified for PMAQ evaluation should be also conducted.

Improvements in the PMAQ-AB instrument should be done for future evaluation cycles. Complementary open questions would be important to find out why some dental procedures were not delivered.

Conclusion

The findings suggest that items within the SUS evaluation instrument demonstrated some potential to discriminate between poor teams from the very poor ones and ineffective in discriminating the teams considered poor from the good ones. Whilst Brazilian dental teams perform many mandatory procedures, variation in the delivery of care requires further investigation to enhance service provision to the population.

Supporting information

S1 Dataset.
(SAV)

Acknowledgments

The authors thank Professor Manoharan Andiappan (Centre for Host Microbiome Interactions—Faculty of Dentistry, Oral & Craniofacial Sciences, Kings College London).

Author Contributions

Conceptualization: Suellen R. Mendes, Renata C. Martins, Juliana V. M. Mambrini, Jennifer E. Gallagher, Mauro H. N. G. Abreu.

Data curation: Juliana V. M. Mambrini, Antônio Thomaz G. Matta-Machado, Mauro H. N. G. Abreu.

Formal analysis: Suellen R. Mendes, Juliana V. M. Mambrini, Mauro H. N. G. Abreu.

Funding acquisition: Jennifer E. Gallagher, Mauro H. N. G. Abreu.

Investigation: Suellen R. Mendes, Renata C. Martins, Antônio Thomaz G. Matta-Machado, Grazielle C. M. Mattos, Jennifer E. Gallagher, Mauro H. N. G. Abreu.

Methodology: Suellen R. Mendes, Renata C. Martins, Antônio Thomaz G. Matta-Machado, Grazielle C. M. Mattos, Jennifer E. Gallagher, Mauro H. N. G. Abreu.

Project administration: Mauro H. N. G. Abreu.

Resources: Jennifer E. Gallagher.

Software: Juliana V. M. Mambrini.

Supervision: Renata C. Martins, Jennifer E. Gallagher, Mauro H. N. G. Abreu.

Writing – original draft: Suellen R. Mendes, Renata C. Martins, Juliana V. M. Mambrini, Antônio Thomaz G. Matta-Machado, Grazielle C. M. Mattos, Jennifer E. Gallagher, Mauro H. N. G. Abreu.

Writing – review & editing: Suellen R. Mendes, Renata C. Martins, Juliana V. M. Mambrini, Antônio Thomaz G. Matta-Machado, Grazielle C. M. Mattos, Jennifer E. Gallagher, Mauro H. N. G. Abreu.

References

1. [ibge.gov.br](https://www.ibge.gov.br/) [Internet]. Brazil: Brazilian Institute of Geography and Statistics; c2010 [cited 2018 August 31]. <https://www.ibge.gov.br/>.
2. Paim J, Travassos C, Almeida C, Bahia L, Macinko J. The Brazilian health system: history, advances, and challenges. *Lancet*. 2011; 377(9779):1778–97. [https://doi.org/10.1016/S0140-6736\(11\)60054-8](https://doi.org/10.1016/S0140-6736(11)60054-8) PMID: 21561655
3. Neves RG, Flores TR, Duro SMS, Nunes BP, Tomasi E. Time trend of Family Health Strategy coverage in Brazil, its Regions and Federative Units, 2006–2016. *Epidemiol Serv Saude*. 2018; 27(3):e2017170. <https://doi.org/10.5123/S1679-49742018000300008>
4. Pucca-Junior GA, Costa JFR, Silvestre RM. Oral Health Policies in Brazil. *Braz Oral Res*. 2009; 23(1 suppl):9–16.
5. Nascimento AC, Moysés ST, Werneck RI, Moysés SJ. Oral health in the context of primary care in Brazil. *Int Dent J*. 2013; 63(5):237–43. <https://doi.org/10.1111/ijdj.12039> PMID: 24074017
6. [cfo.org.br](http://cfo.org.br/website/estatisticas/) [Internet]. Brazil: Federal Council of Dentistry; c2018 [cited 2018 August 31]. <http://cfo.org.br/website/estatisticas/>.
7. Cascaes AM, Dotto L, Bomfim RA. Trends in the dental surgeon workforce in Brazil 2007–2014: a time series study using data from the National Registry of Health Services. *Epidemiol Serv Saude*. 2018 Mar 5; 27(1):e201723615. <https://doi.org/10.5123/S1679-49742018000100015>
8. [sage.saude.gov.br](http://sage.saude.gov.br/#) [Internet]. Brazil: Support Site for Strategic Management; c2018 [cited 2019 January 28]. <http://sage.saude.gov.br/#>.

9. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. SB Brasil 2010 –Pesquisa Nacional de Saúde Bucal: Resultados Principais. Brasília: Ministério da Saúde. 2012. Portuguese.
10. Eijkenaar F, Emmert M, Scheppachb M, Schöffski O. Effects of pay for performance in health care: A systematic review of systematic reviews. *Health Policy*. 2013; 110(2–3):115–30. <https://doi.org/10.1016/j.healthpol.2013.01.008> PMID: 23380190
11. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Programa Nacional de Melhoria do Acesso e da Qualidade da Atenção Básica (PMAQ-AB): manual instrutivo. Brasília: Ministério da Saúde, 2013. Portuguese.
12. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Versão Preliminar—Nota metodológica da certificação das equipes de saúde bucal participantes do Programa Nacional de Melhoria do Acesso e da Qualidade da Atenção Básica 2013–2014. Brasília: Ministério da Saúde. 2015. Portuguese.
13. Reis CMR, Matta-Machado ATG, Amaral JHL, Werneck MAF, Abreu MHNG. Describing the primary health care actions of oral health teams in Brazil. *Int. J. Environ. Res. Public Health*. 2015; 12(1):667–78. <https://doi.org/10.3390/ijerph120100667>
14. Reis CMR, Mambrini JVM, Matta-Machado ATG, Amaral JHL, Werneck MAF, Abreu MHNG. Primary dental care evaluation in Brazil: an item response theory approach. *J. Public Health Dent*. 2017; 77(4):317–24. <https://doi.org/10.1111/jphd.12210> PMID: 28295335
15. Shaw C. How can hospital performance be measured and monitored? Copenhagen, WHO Regional Office for Europe. Health Evidence Network report. 2003. 17p.
16. Reeve C, Humphreys J, Wakerman J. A comprehensive health service evaluation and monitoring framework. *Eval Program Plann*. 2015; 53:91–8. <https://doi.org/10.1016/j.evalprogplan.2015.08.006> PMID: 26343490
17. Mendes SR, Martins RC, Matta-Machado ATG, Mattos GCM, Gallagher JE, Abreu MHNG. Dental procedures in primary health care of the Brazilian National Health System. *Int J Environ Res Public Health*. 2017; 14(12):E1480. <https://doi.org/10.3390/ijerph14121480> PMID: 29194346
18. Donabedian A. Evaluating the quality of medical care. 1966. *Milbank Q*. 2005; 83(4):691–729.
19. Bhakta B, Tennant A, Horton M, Lawton G, Andrich D. Using item response theory to explore the psychometric properties of extended matching questions examination in undergraduate medical education. *BMC Med Educ*. 2005; 5(1):9. <https://doi.org/10.1186/1472-6920-5-9> PMID: 15752421
20. Yang FM, Kao ST. Item Response Theory for measurement validity. *Shanghai Arch Psychiatry*. 2014; 26(3):171–7. <https://doi.org/10.3969/j.issn.1002-0829.2014.03.010> PMID: 25114494
21. Bourion-Bédès S, Schwan R, Epstein J, Laprevote V, Bédès A, Bonnet J-L, et al. Combination of classical test theory (CTT) and item response theory (IRT) analysis to study the psychometric properties of the French version of the Quality of Life Enjoyment and Satisfaction Questionnaire-Short Form (Q-LES-Q-SF). *Qual Life Res*. 2015; 24(2):287–93. <https://doi.org/10.1007/s11136-014-0772-y> PMID: 25113237
22. Hays RD, Morales LS, Reise SP. Item response theory and health outcomes measurement in the 21st century. *Med Care*. 2000; 38(9 suppl):I128–42. PMID: 10982088
23. Samejima FA. Estimation of latent ability using a response pattern of graded scores. *Psychometric Monograph*. 1969;(17).
24. Gordon RA. Measuring constructs in Family Science: how can item response theory improve precision and validity? *J Marriage Fam*. 2015; 77(1):147–76. <https://doi.org/10.1111/jomf.12157> PMID: 25663714
25. Rizopoulos D. Irm: An R package for Latent Variable Modelling and Item Response Theory Analyses. *J Stat Softw*. 2006; 17(5):1–25.
26. Cunha MAGM, Matta-Machado ATG, Lucas SD, Abreu MHNG. Availability of dental prosthesis procedures in Brazilian primary health care. *Biomed Res Int*. 2018;4536707. <https://doi.org/10.1155/2018/4536707> PMID: 29607319
27. Peres MA, Barbato PR, Reis SCGB, Freitas CHSM, Antunes JLF. Tooth loss in Brazil: analysis of the 2010 Brazilian Oral Health Survey. *Rev Saúde Pública*. 2013; 47(3 suppl):1–11.
28. Van de Waal I. (2013) Are we able to reduce the mortality and morbidity of oral cancer; some considerations. *Med Oral Patol Oral Cir Bucal*. 18, 33–7.
29. Hassona Y, Scully C, Shahin A, Maayta W, Sawair F. Factors Influencing Early Detection of Oral Cancer by Primary Health-Care Professionals. *J Canc Educ*. 2016; 31(2):285–91. <https://doi.org/10.1007/s13187-015-0823-2> PMID: 25851202
30. Andersen RM. Revisiting the behavioral model and access to medical care: does it matter?. *J Health Soc Behav*. 1995; 1:1–0

31. Gulliford M, Figueroa-Munoz J, Morgan M, Hughes D, Gibson B, Beech R, Hudson M. What does 'ccess to health care' mean?. *J Health Serv Res Policy*. 2002; 7(3):186–8. <https://doi.org/10.1258/135581902760082517> PMID: 12171751
32. Saurman E. Improving access: modifying Penchansky and Thomas's theory of access. *J Health Serv Res Policy*. 2016; 21(1):36–9. <https://doi.org/10.1177/1355819615600001>
33. Scherer CI, Scherer MD. Advances and challenges in oral health after a decade of the "Smiling Brazil" Program. *Rev Saude Publica*. 2015; 49. <https://doi.org/10.1590/S0034-8910.2015049005961> PMID: 26815162
34. Gallagher JE, Manickam S, Wilson NHF. Sultanate of Oman: building a dental workforce. *Hum Resour Health*. 2015; 13:50. <https://doi.org/10.1186/s12960-015-0037-z> PMID: 26093908
35. Sun X, Bernabé E, Liu X, Zheng S, Gallagher JE. Meeting the oral health needs of 12-yearolds in China: human resources for oral health. *BMC Public Health*. 2017; 17(1):586. <https://doi.org/10.1186/s12889-017-4384-7>
36. World Dental Federation—FDI [Internet]. FDI and ICHOM present standard set of adult oral health measures. [cited 2019 February 5]. <https://www.fdiworldddental.org/news/20180908/fdi-and-ichom-present-standard-set-of-adult-oral-health-measures>.

4.3 Artigo 3

“The influence of dentists’ profile and work management in the performance of dental teams in the Brazilian primary care”

Artigo a ser submetido ao periódico *INTERNATIONAL JOURNAL OF PUBLIC HEALTH*

Fator de Impacto 2.373 (2016), equivalente ao Qualis Capes A2 para Saúde Coletiva.

RELATIONSHIP BETWEEN DENTISTS' PROFILE AND WORK MANAGEMENT
WITH THE PERFORMANCE OF PRIMARY DENTAL CARE TEAMS OF THE
BRAZILIAN HEALTH SYSTEM

Mendes SR¹, Martins RC², Mambrini JVM³, Matta-Machado ATG⁴, Savage GCM⁵,
Gallagher JE⁵, Abreu MHNG²

¹Graduate Program in Dentistry, Faculty of Dentistry, Federal University of Minas Gerais, Belo Horizonte, Minas Gerais, Brazil.

²Department of Community and Preventive Dentistry, Faculty of Dentistry, Federal University of Minas Gerais, Belo Horizonte, Minas Gerais, Brazil.

³René Rachou Institute, FIOCRUZ, Belo Horizonte, Minas Gerais, Brazil.

⁴Department of Preventive and Social Medicine, Faculty of Medicine, Federal University of Minas Gerais, Belo Horizonte, Minas Gerais, Brazil.

⁵Centre for Host Microbiome Interactions, Faculty of Dentistry, Oral & Craniofacial Sciences, Kings College London, London, United Kingdom

ABSTRACT

Objective: to evaluate the association between dentists' profile and work management with the performance of primary care dental teams of the Brazilian National Health System, both nationally and regionally.

Methods: analysis of secondary data from the 'National Programme for Improving the Access and Quality of Primary Care', that evaluated 18,114 Brazilian dental teams between 2013 and 2014. Linear regression was performed, using 24 independent variables of dentists' and dental teams' characteristics and the dependent variable 'dental team performance', a score previously estimated from 20 dental procedures of primary care through an Item Response Theory model. Simple linear regression was performed and those variables with $p \leq 0.20$ were included in the multiple linear model by the Stepwise Forward method, and variables with $p \leq 0.05$ were considered significant in the adjusted models of Brazil and according to each Brazilian Geographical Region.

Results: the dentists' profile variables: 'having graduate studies' ($\beta=0.151$) and 'performing continuing education activities' ($\beta=0.101$) enhanced the teams' performance in all the five Brazilian Regions; career plan with progression by performance ($\beta=0.128$) and involvement in educational activities ($\beta=0.108$) had a great influence in the Brazilian model, but not in all Regions. Having a flexible dental appointment list ($\beta=0.218$) and monitoring oral health indicators ($\beta=0.132$) also influenced the teams' performance in all the five Brazilian Geographical Regions, although all the management variables influenced in the Brazilian model.

Conclusion: The findings suggest that graduate studies and continuous training are important to enhance the Brazilian dental teams' performance, as the evaluation of oral health indicators and a flexible offer of dental services.

Keywords: primary health care, dental health services, health workforce, management service organizations.

BACKGROUND

The primary health care (PHC) is seen as the most important level of care of the Brazilian National Health System (known as Sistema Único de Saúde –“SUS”), where all the citizens can have access to promotion, prevention and recovery in health, integrally and free of charge at the point of delivery. The National Oral Health Policy (NOHP), published in 2004, defines the inclusion and organisation of the dental teams at the SUS, comprising strategies to expand and improve the health care provided to the population (Nascimento et al 2013; Paim et al. 2011; Brasil 2004).

The continuous education training assumption, and the adequacy of dental workforce availability according to the local demand are stated in the NOHP, as the epidemiological and territorial analysis to the proper planning of the oral health care provision. This adequacy is essential at SUS, due the great sociodemographic differences observed through the Brazilian Geographical Regions (Stopa et al. 2017). Also, a proper working condition, with reasonable dental facilities and complete supply of materials and instruments is consider essential for teams to work (Nascimento et al. 2013; Brasil 2004).

Although structural and organisational factors can influence the health care services provision, factors related to the workforce, like training and labour aspects, could also influence it (Cotta et al. 2006; Sanz et al. 2008). The growth of work precariousness, informal employment bond and salary deterioration resulted from the neoliberal logic of employment, that can also be observed in the SUS employment, could be some of these factors (Garrido-Pinzón and Bernardo 2017; Machado and Ximenes Neto 2018).

In 2011, the Brazilian Ministry of Health (MofH) launched the ‘National Programme for Improving the Access and Quality of Primary Care – PMAQ-AB’, with the purpose to improve the access and quality of services provided at SUS. The accession to the programme was voluntary, and those teams - including the dental teams - that showed good outcomes in the evaluation process received a financial incentive. The dental care services’ evaluation included issues about the primary health care unit/dental facilities structure, availability of dental instruments, dental procedures executed, the dentists’ profile and services organisation (Brasil 2013; 2015).

Preliminary analysis of data from the second evaluation cycle of PMAQ-AB (2013-2014) evidenced that most of the primary care procedures in dentistry were frequently performed. However, it is necessary to expand the provision of dentures/dental prostheses and the following of suspected/confirmed oral cancer cases (Mendes et al. 2017). The psychometric analyses of the questions related to the execution of the dental procedures attributed a score to the dental teams that was called 'dental team performance'; and showed that these items were better in discriminating the poor dental teams from the very poor ones (Mendes et al. 2019).

Considering the importance to identify factors that can influence the performance of PHC teams, the objective of the present study was to evaluate the influence of dentists' profile and work management in the performance of primary care dental teams of the Brazilian National Health System (1) in the national level and (2) according to each Brazilian Geographical Regions. The null hypothesis was that the dentists' profile and work management would not affect the performance of primary care dental teams in the national and regional level.

METHODS

Ethics Statement

This study was submitted and approved by the National Ethics Research Council and by the Research Ethics Committee of the Federal University of Minas Gerais (protocol number 02396512.8.0000.5149; approval number 2004382) to gain access to the Brazilian MofH database.

Study Design

It is a secondary analysis of data from the second evaluation cycle of PMAQ-AB, a cross sectional Brazilian evaluation on primary health care services, happened between 2013 and 2014. From the 23,150 dental teams working at SUS in 2013, a total of 18,114 dental teams (78.2%) were evaluated about the access and quality of services provided to the Brazilian population (Brasil 2013; 2015; c2018).

Data Collection and Variables

All the questions included in this study were obtained from the external evaluation phase of PMAQ-AB programme. This phase consisted in a face-to-face interview with the dentist at the PHC unit. The issues were based on the PHC principles and on the Donabedian's evaluation model for health services, based on structure, process and outcomes (Donabedian 2005). All the interviews were conducted by a graduated professional after 40-hours training and evaluation about the PMAQ-AB criteria.

The dependent variable was the dental team performance obtained through the dentist's report about the execution of 20 mandatory dental procedures of PHC dentistry and was presented in full in a previously paper (Mendes et al. 2019). The questions included performing supragingival scaling, root planing and coronal polishing; fluoride application; appointment for the continuity of the treatment; cementation/recementation of crown/bridges; return visit to evaluate denture adjustment; scanning to identify people who need partial/total dentures; amalgam filling; composite filling; deciduous tooth restoration; lingual /labial frenectomy; ulotomy; suture of trauma injuries; drainage of oral abscesses; dry socket treatment; permanent tooth extraction; deciduous tooth extraction; pulpotomy; access to dental

pulp; record of suspected/confirmed oral cancer cases (with documents proving that); referral of suspected/confirmed oral cancer cases.

These 20 procedures were evaluated by the Item Response Theory (IRT), a mathematical model that relates the probability of an individual's response to an item and its latent trait. The latent trait of this study was the dental team performance, given by a score that could range from -4 to +4. Through the IRT, the items' psychometric characteristics were estimated and then one performance score was attributed to each dental team evaluated in the second cycle of PMAQ-AB. In the present study, the dental team scores ranged from -3.66 to +1.87 (mean of -0.06; median of +0.01) (Bhakta et al. 2005; Mendes et al. 2019).

The independent variables were organised into two categories, with 13 questions about the dentists' profile and 11 questions about the work management of the dental teams (Figure 1). The questions included were mostly (22) categorical and were dichotomized for the statistical analysis. The variable 'continuity education training' is a quantitative variable that could range from 0 to 8, according to the number of activities the dentist/dental team participated; the variable "covered population" could vary from 1 to 9, according to the number of PHC teams the dental team assist (one PHC team cover about 3,500 patients).

Figure 1: Independent variables about dentists' profile and work management of the dental teams and the possible answers.

Dentists' Profile	
1. Does the dentist have Graduate Studies?	Yes; No.
2. Does the dentist have master's degree and/or Doctoral studies?	Yes; No.
3. Does the dentist tutor undergraduate students?	Yes; No.
4. What was the hiring process of the dentist?	Public tender test; Other.
5. Which employment bond does the dentist have?	Civil servant; Other.
6. Who is the dentist's employer?	Local government direct contract; Other.

7. **How long have the dentist been in the dental team?**
Two years or less;
More than three years.
8. **Does the dentist have career plan?**
Yes;
No/Do not know.
9. **Does the career plan have progression for time of service?**
Yes;
No/Do not know.
10. **Does the career plan have progression for professional performance?**
Yes;
No/Do not know.
11. **Does the career plan have progression for titles and professional improvement?**
Yes;
No/Do not know.
12. **Does the dentist receive financial incentive for good performance?**
Yes;
No.
13. **Does the dentist perform continuing education training?**
Score ranging from 0 to 8 according to the number of the listed activities performed.

Work Management of the Dental Team

1. **Is the PHC Unit a trainee field for undergraduate and graduate students?**
Yes;
No.
2. **Does the dental team have documents proving the monthly planning and scheduling of activities?**
Yes;
No.
3. **Does the dental team monitor and analyse population's oral health indicators?**
Yes;
No.
4. **Does the dental team receive support to plan and organise the labour process?**
Yes;
No.
5. **Does the dental team have access to data to analyse population's oral health status?**
Yes;
No.
6. **Does the dental team have documents proving self-evaluation in the past six months?**
Yes;
No.
7. **Does the dental team take part in the PHC team meetings?**
Always;
Sometimes or never.
8. **How is organised the dental appointment list?**
Flexible dental appointment list (scheduled and walk in patients);
Restricted dental appointment list (scheduled patients only or walk in patients only).
9. **When are the dental appointments scheduled?**
At any day and any time;
At fixed days and hours.
10. **Can the dental team refer the patients for secondary care?**
Yes;
No.
11. **How many PHC Teams the dental team assist? (one PHC team cover about 3,500 patients)**
Score ranging from 1 to 9 according to the number of PHC Teams.

Statistical Analysis

The items included in the dependent variable estimation – dental team performance - were descriptively analyzed in a previous paper (Mendes et al. 2017). For the independent variables, univariate analysis was conducted to estimate its frequencies according to the absolute and relative values.

The bivariate analysis was made by linear regression. Initially, each of the 24 independent variables were included in the simple linear regression with the dependent variable – dental team performance scores, estimated by IRT. Those with p values ≤ 0.20 were included together in the multiple linear model. Only remained in the adjusted model those variables that showed statistical significance ($p \leq 0.05$). The collinearity diagnosis was made by the 'Variance Inflation Factor – VIF' and values lower than 2 were considered acceptable.

Considering the great differences in the socioeconomic status and the access to dental healthcare among the Brazilian Geographical Regions, even in the public sector, the multiple linear regression model was also estimated according to each Region – North, Northeast, Midwest, Southeast and South. The Beta value and its confidence intervals are presented to those variables that showed statistical significance ($p \leq 0.05$) in the final model, according to each Region.

To evaluate the residues, the Standardized and Studentized deleted residuals were obtained, as the histogram and normal probability plot to evaluate its theoretical assumptions. The homoscedasticity assumption was verified, and the normality distribution of residuals was checked by the observation of the histogram. The final model summary of each linear regression model was estimated to verify how much the independent variables could explain the variation of the dental team performance.

Data were organised, dichotomized and analysed in the IBM SPSS Statistics software, version 25 (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.).

RESULTS

Table 1a shows the frequency of each categorical independent variable included in the present study, total and according to each Brazilian Geographical Region. It is possible to observe that dentists working at South Region presents higher frequencies of complementary training and involvement in academic activities. Also, higher frequencies of better labour relationship (hiring by public tender test and employment bond as a Civil Servant), career plan and financial incentives when comparing to Brazil, while the Northeast Region showed lower frequencies of these variables. The Southeast Region showed higher frequencies of monitoring and planning of activities, easier access to appointment scheduling and referral to secondary care, comparing to the Brazilian frequencies, while the North Region showed lower frequencies of these variables. The frequencies showed great variations between the Brazilian Geographical Regions.

Table 1b shows the mean, median, standard deviation, minimum and maximum values of the quantitative independent variables 'continuing education training' and 'number of PHC Teams the dental team assist'. On average, the Southeast and South Regions perform more continuing education training and the North less, comparing to the Brazilian mean. Otherwise, dental teams from Southeast and South Regions are, on average, responsible for greater population coverage, comparing to the Brazil and the other geographical Regions.

Once all independent variables showed $p < 0.001$ in the simple linear regression, all were included in the multiple model by the 'Stepwise Forward Method'. The variables 'master's degree/Doctoral studies', 'dentist's employer' and 'career plan with progression for titles and professional improvement' were automatically excluded of multiple linear regression. By this step, the collinearity diagnosis indicated that the variables 'employment bond' and 'career plan' showed with high variance inflation factor values ($VIF = 3.168$ and 5.265 , respectively) and requested the removal of them. After the removal of these two items, the collinearity diagnosis of the remained variables showed VIF values lower than 2, which is considered suitable.

Table 2 shows the simple linear regression and adjusted model using the performance of the dental teams as dependent variable and the above-mentioned independent variables. This table shows the complete analysis to Brazil, and it is possible to observe, by the adjusted model, that had positive impact in the dental

teams' performance: having graduate studies, performing continuing education activities, tutoring undergraduate students, have been hired by public tender test, having career plan with progression for time of service, with progression for professional performance, and financial reward for performance. Considering the variables related to work management, all the variables had a positive impact in the performance of the dental teams.

Considering the great differences among the five Brazilian Geographical Regions, the simple linear regression and adjusted model were estimated for each one of them. The Beta values of variables included in each adjusted model by the 'Stepwise Forward Method' and the confidence intervals are presented in the Table 3. On the other hand, dental teams from North Region were influenced only by having 'graduate studies', performing 'continuing education training' and being a 'Civil Servant'. The performance of dental teams from all the five Brazilian Geographical Regions was influenced by the variables 'graduate studies' and 'continuing education training'.

The Southeast Region showed the highest number of these variables influencing the dental teams' performance. The variables 'monitoring and analysis of health care indicators' and 'flexible dental appointment list' also influenced the performance of the dental teams in all the five Regions.

The Model Summary (Table 4) shows that the independent variables included in the analyses could explain about 22% the variation of the dental team performance. Some variations between the geographical Regions can be observed, however the Adjusted R^2 shows that such values are representative.

DISCUSSION

Given the importance of the dental workforce to the access of the Brazilian population to SUS primary care in dentistry, and the importance of monitoring and planning the health services to suit their needs in health care, the present study provides relevant information; especially for evaluating how these aspects influenced the performance of the dental teams. Although some differences could be observed among Brazilian Geographical Regions, having graduate studies and performing continuing education training had a positive impact in the performance of the dental teams from all the five Regions.

The healthcare workforce is considered the essence of the productive capacity at the PHC and an essential element of SUS, as they must develop technical and interpersonal skills, as well as the commitment to understand and operate in the patient and community's health-disease process (Maeda et al. 2011). However, one big challenge for SUS primary care is that professionals still have a training based on the curative biomedical model, what goes against the essence of the Brazilian health system (Bispo Junior and Moreira 2017).

The adequacy of the dental workforce has been highlighted in a variety of studies and by the World Health Organization. It includes the number of available professionals and the capacity to meet the needs of the current and future attached population, through the proper training of the dental workforce (Balasubramanian et al. 2018; Wanyonyi et al. 2014). In Brazil, the main institutional strategy for the qualification of SUS workforce is the National Policy of Permanent Health Education. The Policy highlight that the continuing education training for SUS must be based on a pedagogical process that provides greater capacity for analysis, intervention and autonomy for the development of transformative practices in health care (Bispo Junior and Moreira 2017).

The present study shows the positive impact of graduate studies (specialization and/or residency in any area of knowledge) in the dental teams' performance. In fact, Santos and Hugo (2018) showed that dentists having complementary training in Family Health, executed more activities in line with the proposals and principles of SUS primary care, like offer educational activities in oral health and conduct home visits. This reinforces the importance of professional

qualification, but also shows that the training directed for SUS labour indeed is efficient and should be encouraged.

The present study also showed that all the variables related to the planning and organisation of the dental care services influenced the dental teams' performance. The variables 'monitoring and analysis of population's oral health indicators by the dental team' and 'flexible dental appointment list', by providing assistance to scheduled and walk in patients, had a positive impact in all the five Regions. It reinforces the importance of the evaluation and local planning of services, once historically there has been an attempt to institutionalize it at SUS by improving and adapting different assessment methods (Vieira 2009).

Although scheduled appointments represent a better organisation of health care services, the access of walk in patients to care represents that different demands are being met, especially considering urgent cases of pain. However, the urgency demands can be a result of the long waiting time for dental consultations or incompatible time for workers (Matsumoto et al. 2017; Reis et al. 2019). The referral to secondary care may indicate a good articulation of the health care network. In fact, the SUS network model, in which primary care coordinates the flow, is considered more effective in terms of internal organization, resource allocation, and clinical management, which may influence the performance of dental teams (Rodrigues et al. 2014).

There were different variables influencing the dental team performance according to each Brazilian Geographical Regions. It can reflect the differences in the need of dental care in different Brazilian Regions, which highlight the importance of understand each one to ensure equity in the dental health care. However, it also can suggest that some dentists are not able to ensure all the dental procedures required by the local demand.

The independent variables included in this study could explain about 22% of the dental teams' performance variation. In social sciences it is a relevant finding, but to understand a complex health care system and what can influence in the performance of the teams working on it is important to evaluate other aspects besides dentists' profile and work management. Also, the performance of the dental teams was estimated from the execution of 20 mandatory dental procedures of SUS primary care and could vary if other variables were considered. The cross-sectional design of this survey does not allow to achieve causal relationships, but rather associations.

Although the present study analysed secondary data, the PMAQ-AB evaluated almost 80% of the dental teams working at SUS in 2013-2014 and included all the five Brazilian Geographical Regions, which represents a relevant dataset concerning the dental teams working at SUS primary care in dentistry. To the date, it was not possible to identify assessments of such magnitude in health systems from other countries.

The findings suggest the importance of encourage dentists to perform continuing education training courses and graduate studies, especially those that can improve the capacity to assist the SUS, aiming the improvement of the services provided to the population. Also, it reinforces the importance of the proper evaluation and planning of the dental services, to achieve the local demand through the country.

CONCLUSION

The findings suggest that graduate studies and continuous training are important to enhance the Brazilian dental teams' performance, as the evaluation of oral health indicators and a flexible offer of dental services. Distinct variables influenced the dental team performance in the different Brazilian Geographical Regions.

Acknowledgements

The authors thank the financial support of the Brazilian research agencies: Coordination of Superior Level Staff Improvement (CAPES, in Portuguese: Coordenação de Aperfeiçoamento de Pessoal de Nível Superior), The Brazilian National Council for Scientific and Technological Development (CNPq, in Portuguese: Conselho Nacional de Desenvolvimento Científico e Tecnológico), and Research Support Foundation of the State of Minas Gerais (FAPEMIG, in Portuguese: Fundação de Amparo à Pesquisa do Estado de Minas Gerais). The authors declare no conflict of interest.

REFERENCES

Balasubramanian M, Davda L, Short SD, Gallagher JE (2018) Moving from advocacy to activism? The fourth WHO global forum on human resources for health and implications for dentistry. *Br Dent J* 225(2):119-22.

Bhakta B, Tennant A, Horton M, Lawton G, Andrich D (2005) Using item response theory to explore the psychometric properties of extended matching questions examination in undergraduate medical education. *BMC Med Educ* 5(1):9. doi: 10.1186/1472-6920-5-9.

Bispo Júnior JP, Moreira DC (2017) Continuing education and matrix support: training, experience, and practices of health professionals in the Centers for the Support of Family Health and the supported teams. *Cad Saude Publica* 33(9):e00108116. Portuguese.

Brasil. Ministério da Saúde (2004) Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Coordenação Nacional de Saúde Bucal. Diretrizes da Política Nacional de Saúde Bucal. Brasília: Ministério da Saúde. Portuguese.

Brasil. Ministério da Saúde (2013) Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Programa Nacional de Melhoria do Acesso e da Qualidade da Atenção Básica (PMAQ-AB): manual instrutivo. Brasília: Ministério da Saúde. Portuguese.

Brasil. Ministério da Saúde (2015) Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Versão Preliminar – Nota metodológica da certificação das equipes de saúde bucal participantes do Programa Nacional de Melhoria do Acesso e da Qualidade da Atenção Básica 2013-2014. Brasília: Ministério da Saúde. Portuguese.

Cotta RMM, Schott M, Azeredo CM, Castro Franceschini SDC, Priore S E, Dias G (2006) Work Organization and Professional Profile of the Family Health Program: a Challenge in the Health Basic Attention Restructuring. *Epidemiol Serv Saude* 15(3):7-18. doi: 10.5123/S1679-49742006000300002. Portuguese.

Donabedian A (2005) Evaluating the quality of medical care. 1966. *Milbank Q* 83(4):691-729.

Garrido-Pinzón J, Bernardo MH (2017) Health workers' experiences in dealing with the neoliberal logic: a study of primary care in Colombia and Brazil. *Cad Saude Publica* 33(9):e00050716. doi: 10.1590/0102-311X00050716. Portuguese.

Machado MH, Ximenes Neto FRG (2018) The Management of work and education in Brazil's Unified Health System: thirty years of progress and challenges. *Cien Saude Colet* 23(6):1971-9. doi: 10.1590/1413 81232018236.06682018.

Maeda ST, Moleiro PF, Eгры EY, Ciosak SI (2011) Human resources in primary health care: investments and the driving force of production. *Rev Esc Enferm USP* 45(2):1651-5.

Matsumoto MS, Gatti MA, Conti MH, Simeão SFA, Franzolin SOB, Marta SN (2017) Determinants of demand in the public dental emergency service. *J Contemp Dent Pract* 18(2):156-61.

Mendes SR, Martins RC, Matta-Machado ATG, Mattos GCM, Gallagher JE, Abreu MHNG (2017) Dental procedures in primary health care of the Brazilian Nacional Health System. *Int J Environ Res Public Health* 14(12):E1480. doi: 10.3390/ijerph14121480.

Mendes SR, Martins RC, Mambrini JVM, Matta-Machado ATG, Mattos GCM, Gallagher JE, Abreu MHNG (2019) Using Item Response Theory to evaluate the psychometric characteristics of questions in a Brazilian programme and the performance of dental teams in primary care. *PLoS One* 14(5):e0217249. doi:10.1371/journal.pone.0217249.

Nascimento AC, Moysés ST, Werneck RI, Moysés SJ (2013) Oral health in the context of primary care in Brazil. *Int Dent J* 63(5):237-43. doi: 10.1111/idj.12039.

Paim J, Travassos C, Almeida C, Bahia L, Macinko J (2011) The Brazilian health system: history, advances, and challenges. *Lancet* 377(9779):1778-97. doi: 10.1016/S0140-6736(11)60054-8.

Reis CMR, Matta-Machado ATG, Amaral JHL, Mambrini JVM, Werneck MAF, de Abreu MHNG (2019) Understanding oral health care team performance in primary care: A mixed-method study. *PLoS One* 14(5):e0217738.

Rodrigues LB, Silva PC, Peruhype RC, Palha PF, Popolin MP, Crispim JD, Pinto IC, Monroe AA, Arcêncio RA (2014) Primary Health Care in the coordination of health care networks: an integrative review. *Cien Saude Colet* 19(2):343-52. doi:10.1590/1413-81232014192.18032012.

sage.saude.gov.br [Internet]. Brazil: Support Site for Strategic Management; c2018 [cited 2018 October 18]. Available from: <http://sage.saude.gov.br/#>.

Santos NMLD, Hugo FN (2018) Training in Family Health and its association with workprocesses of Primary Care Dentistry Teams. *Cien Saude Colet* 23(12):4319-29. doi: 10.1590/1413-812320182312.12922016. Portuguese.

Sanz M, Treasure E, van Dijk W, Feldman C, Groeneveld H, Kellett M, Pazdera J, Rouse L, Sae-Lim V, Seth-Smith A, Yen E, Zarkowski P (2008) Profile of the dentist in the oral healthcare team in countries with developed economies. *Eur J Dent Educ* 12(1):101-10. doi: 10.1111/j.1600-0579.2007.00492.x.

Stopa SR, Malta DC, Monteiro CN, Szwarcwald CL, Goldbaum M, Cesar CLG (2017) Use of and access to health services in Brazil, 2013 National Health Survey. *Rev Saude Publica* 51(suppl 1):3s. doi: 10.1590/S1518-8787.2017051000074.

Vieira FS (2009) Advances and challenges of the Unified Health System planning. *Cien Saude Colet* 14 (Suppl 1):1565-77. Portuguese.

Wanyonyi KL, Radford DR, Gallagher JE (2014) Dental skill mix: a cross-sectional analysis of delegation practices between dental and dental hygiene-therapy students involved in team training in the South of England. *Hum Resour Health* 12:65.

Table 1a: Frequency of the categorical independent variables related to the dentists' profile and work management of PHC dental teams, Brazil and according to each Brazilian Geographical Region, 2013-2014.

Independent Variables	Brazil (%) N=18,114	North (%) N=1,263	Northeast (%) N=7,700	Midwest (%) N=1,572	Southeast (%) N=5,027	South (%) N=2,552
Dentists' Profile						
Graduate studies	52.8	43.9	48.3	52.2	57.4	62.4
Master's degree and/or Doctoral studies	6.6	6.5	5.7	6.1	7.5	7.6
Tutor undergraduate students	9.7	6.0	8.8	5.2	12.5	11.8
Hiring by public tender test	50.0	42.8	41.6	57.7	46.9	79.8
Civil servant	44.1	40.9	40.1	55.7	37.7	63.4
Local government direct contract	82.1	90.4	86.4	79.4	72.3	85.9
Two years or less at the dental team	57.3	62.3	61.0	48.9	53.2	56.7
Career plan	20.1	21.4	11.8	23.6	21.4	39.7
Career plan with progression for time of service	16.5	16.8	9.1	19.8	17.3	34.8
Career plan with progression for professional performance	10.5	10.1	5.2	8.5	13.6	21.8
Career plan with progression for titles and professional improvement	15.7	17.7	9.2	20.5	15.0	32.2
Financial incentive for good performance	22.9	15.9	23.9	20.1	22.5	26.1
Work Management						
PHC unit a trainee field for undergraduate students	16.2	11.4	16.3	11.3	17.3	19.3
Documents proving the monthly planning and scheduling of activities	51.0	41.2	52.4	44.9	52.0	53.2
Monitoring and analysis of population's oral health indicators	66.4	53.4	67.8	55.9	71.6	64.8
Dental team receive support to plan and organise the labour process	79.0	67.1	80.2	71.7	83.0	77.7
Dental team have access to data to analyse population's oral health status	73.4	58.9	75.1	64.0	77.4	73.6
Documents proving self-evaluation in the past six months	55.9	29.0	60.4	40.5	62.4	52.3
Dental team take part in the PHC team meetings	66.3	57.2	68.0	66.2	63.3	72.1

Flexible dental appointment list (schedule and walk in patients)	90.0	84.7	89.0	88.0	92.4	92.4
Scheduling of dental appointments at any day and time	47.6	36.9	35.9	54.8	63.1	53.1
Referral for secondary care	75.0	59.0	71.8	63.5	83.3	83.7

Table 1b: Mean, median, minimum and maximum values of the quantitative independent variables related to the dentists' profile and work management of PHC dental teams, Brazil and according to each Brazilian Geographical Region, 2013-2014.

Independent Variables		Brazil	North	Northeast	Midwest	Southeast	South
Continuing education training	Mean	2.2	1.5	2.0	1.9	2.6	2.8
	Median	2.0	1.0	2.0	2.0	3.0	3.0
	Std. Deviation	1.67	1.38	1.52	1.61	1.75	1.74
	Minimum	0	0	0	0	0	0
	Maximum	8	7	8	7	8	8
Number of PHC Teams the dental team assist	Mean	1.2	1.1	1.2	1.2	1.4	1.3
	Median	1.0	1.0	1.0	1.0	1.0	1.0
	Std. Deviation	0.67	0.40	0.57	0.59	0.82	0.75
	Minimum	1	1	1	1	1	1
	Maximum	9	8	9	5	9	9

Table 2: Simple linear regression and adjusted model using dental teams' performance as dependent variable and dentists' profile and work management issues as independent variables. Brazil, 2013-2014.

	Simple linear regression				Adjusted model					
	B	Std. Error	B Stand.	Sig.	B	Std. Error	B Stand.	Sig.	Confidence Interval (95%)	VIF
Graduate studies	0.287	0.012	0.175	<0.001	0.151	0.011	0.092	<0.001	0.129 – 0.173	1.082
Master's degree and/or Doctoral studies	0.142	0.024	0.043	<0.001						
Tutor undergraduate students	0.479	0.020	0.174	<0.001	0.108	0.020	0.039	<0.001	0.069 – 0.147	1.213
Hiring by public tender test	0.179	0.012	0.109	<0.001	0.077	0.012	0.047	<0.001	0.054 – 0.101	1.241
Civil servant	0.116	0.012	0.070	<0.001						
Local government direct contract	-0.071	0.016	-0.033	<0.001						
Two years or less at the dental team	0.035	0.012	0.021	0.004						
Career plan	0.331	0.015	0.162	<0.001						
Career plan with progression for time of service	0.378	0.016	0.172	<0.001	0.074	0.020	0.034	<0.001	0.035 – 0.113	1.899
Career plan with progression for professional performance	0.484	0.019	0.182	<0.001	0.128	0.024	0.048	<0.001	0.082 – 0.175	1.832
Career plan with progression for titles and professional improvement	0.356	0.016	0.159	<0.001						
Financial incentive for good performance	0.328	0.014	0.169	<0.001	0.067	0.014	0.034	<0.001	0.040 – 0.094	1.162
Continuing education training (1-8 activities)*	0.177	0.003	0.362	<0.001	0.101	0.004	0.206	<0.001	0.093 – 0.108	1.392

PHC unit a trainee field for undergraduate and graduate students	0.362	0.016	0.163	<0.001	0.058	0.016	0.026	<0.001	0.027 – 0.090	1.206
Documents proving the monthly planning and scheduling of activities	0.192	0.012	0.117	<0.001	0.044	0.011	0.027	<0.001	0.022 – 0.067	1.134
Monitoring and analysis of population's oral health indicators	0.392	0.013	0.227	<0.001	0.132	0.013	0.076	<0.001	0.106 – 0.158	1.336
Dental team receive support to plan and organise the labour process	0.376	0.015	0.188	<0.001	0.054	0.016	0.027	0.001	0.023 – 0.085	1.478
Dental team have access to data to analyse population's oral health status	0.391	0.013	0.211	<0.001	0.091	0.015	0.049	<0.001	0.061 – 0.120	1.568
Documents proving self-evaluation in the past six months	0.221	0.012	0.134	<0.001	0.070	0.012	0.042	<0.001	0.047 – 0.092	1.137
Dental team take part in the PHC team meetings	0.250	0.013	0.145	<0.001	0.040	0.012	0.023	0.001	0.017 – 0.063	1.100
Flexible dental appointment list (scheduled and walk in patients)	0.426	0.020	0.156	<0.001	0.281	0.018	0.103	<0.001	0.245 – 0.316	1.021
Scheduling of dental appointments at any day and time	0.190	0.012	0.116	<0.001	0.148	0.011	0.090	<0.001	0.126 – 0.169	1.011
Referral for secondary care	0.409	0.014	0.217	<0.001	0.174	0.013	0.092	<0.001	0.149 – 0.200	1.100
Number of PHC Teams the Dental team assist (1-9)*	0.064	0.009	0.053	<0.001	0.038	0.008	0.031	<0.001	0.023 – 0.054	1.005

*Quantitative variables.

Table 3: Beta values and CI 95% of the variables that showed statistical significance ($p \leq 0.05$) in the adjusted multiple linear regression for each Brazilian geographical Region. 2013-2014.

	Beta (CI 95%)				
	North (n=1,263)	Northeast (n=7,700)	Midwest (n=1,572)	Southeast (n=5,027)	South (n=2,552)
Graduate studies	0.107 (0.023 – 0.192)	0.133 (0.100 – 0.166)	0.146 (0.072 – 0.220)	0.140 (0.102 – 0.177)	0.124 (0.072 – 0.176)
Master's degree and/or Doctoral studies					
Tutor undergraduate students		0.162 (0.098 – 0.226)			0.108 (0.023 – 0.193)
Hiring by public tender test				0.134 (0.095 – 0.174)	
Civil servant	0.199 (0.114 – 0.284)		0.101 (0.026 – 0.176)		
Local government direct contract		0.050 (0.002 – 0.098)			0.087 (0.017 – 0.158)
Two years or less at the dental team					
Career plan					
Career plan with progression for time of service				0.075 (0.005 – 0.144)	0.155 (0.100 – 0.210)
Career plan with progression for professional performance				0.124 (0.048 – 0.199)	
Career plan with progression for titles and professional improvement					
Financial incentive for good performance		0.124 (0.084 – 0.164)	0.176 (0.082 – 0.270)		0.174 (0.113 – 0.235)
Continuing education training (1-8 activities)*	0.090 (0.059 – 0.122)	0.092 (0.080 – 0.105)	0.104 (0.080 – 0.128)	0.064 (0.052 – 0.076)	0.066 (0.050 – 0.083)

PHC unit a trainee field for undergraduate and graduate students		0.070 (0.022 – 0.119)		0.078 (0.027 – 0.129)	0.119 (0.048 – 0.190)
Documents proving the monthly planning and scheduling of activities				0.080 (0.041 – 0.118)	0.077 (0.027 – 0.127)
Monitoring and analysis of population's oral health indicators	0.195 (0.107 – 0.283)	0.127 (0.086 – 0.168)	0.145 (0.070 – 0.219)	0.164 (0.119 – 0.210)	0.097 (0.039 – 0.155)
Dental team receive support to plan and organise the labour process	0.165 (0.068 – 0.262)	0.059 (0.009 – 0.109)			
Dental team have access to data to analyse population's oral health status		0.118 (0.071 – 0.165)		0.106 (0.056 – 0.156)	0.150 (0.087 – 0.214)
Documents proving self-evaluation in the past six months	0.096 (0.05 – 0.187)	0.080 (0.046 – 0.114)	0.094 (0.020 – 0.167)	0.059 (0.020 – 0.099)	
Dental team take part in the PHC team meetings		0.063 (0.026 – 0.099)	0.108 (0.031 – 0.186)	0.050 (0.011 – 0.089)	0.102 (0.044 – 0.160)
Flexible dental appointment list (scheduled and walk in patients)	0.232 (0.118 – 0.347)	0.298 (0.245 – 0.351)	0.231 (0.122 – 0.340)	0.156 (0.088 – 0.224)	0.240 (0.147 – 0.333)
Scheduling of dental appointments at any day and time	0.100 (0.016 – 0.185)			0.091 (0.053 – 0.128)	0.106 (0.057 – 0.155)
Referral for secondary care		0.095 (0.057 – 0.133)	0.191 (0.115 – 0.268)	0.214 (0.163 – 0.246)	0.126 (0.058 - 0.194)
Number of PHC Teams the Dental team assist (1-9)*	0.117 (0.015 – 0.218)				

*Quantitative variables.

Table 4: Final model summary of each linear regression model, Brazil and according each Brazilian Geographical Region.

Final Model	R Squared	Adjusted R Squared
North	0.139	0.133
Northeast	0.159	0.157
Midwest	0.203	0.199
Southeast	0.188	0.186
South	0.238	0.234
Brazil	0.221	0.220

5 CONSIDERAÇÕES FINAIS

Os resultados obtidos e apresentados na forma dos artigos 1 e 2 mostram que a maioria dos procedimentos odontológicos da APS possuem altas frequências de realização, sendo executadas mesmo por equipes com menores escores de desempenho. Dos procedimentos com baixas frequências de realização, estão incluídos sobretudo os itens relacionados à confecção, instalação e avaliação de próteses dentárias, cirurgias de maior complexidade como remoção de cistos, frenectomia e remoção de dentes impactados e monitoramento de casos suspeitos/confirmados de câncer de boca. Quando se pensa em número médio de procedimentos realizados por macrorregião brasileira, tem-se que nas regiões Sul e Sudeste realiza-se uma média maior de procedimentos, enquanto a região Norte produz menor número médio dos mesmos.

Maiores níveis de dificuldade estão relacionados, não por acaso, aos procedimentos com menores frequências de realização. Por outro lado, quando se pensa em discriminação, vemos que os procedimentos que apresentam os maiores parâmetros de discriminação são considerados menos complexos, devido às altas frequências de realização observadas. Esse achado pode indicar que os itens incluídos na estimativa do desempenho das ESB foram bons em diferenciar equipes com escores mais baixos (sobretudo aqueles variando de -3 a -2) e pouco eficientes em diferenciar equipes com baixos escores daquelas que apresentaram os maiores escores.

O que se observa é que procedimentos incluídos mais recentemente na APS do SUS são realizados por menor número de equipes. Ainda há muito o que se avançar, sobretudo quando se pensa em confecção de instalação de próteses dentárias e monitoramento de casos de câncer de boca. Tais procedimentos possuem alta demanda por parte da população brasileira e são altamente incentivados por parte da gestão pelo impacto na qualidade de vida e mortalidade.

Com relação aos dados observados no artigo 3, a ser publicado, fica evidente que possuir cursos de pós-graduação *Lato Sensu* e cursos de educação continuada, que são atividades voltadas para o aperfeiçoamento das técnicas empregadas na clínica odontológica, podem influenciar de forma positiva o desempenho das ESB. Considerando que esse desempenho foi baseado na

realização, ou não, de procedimentos odontológicos da APS, a hipótese dessa relevância é reforçada. Além disso, outros aspectos dos cirurgiões-dentistas pareceram influenciar, não de forma homogênea, o desempenho das equipes nas diferentes macrorregiões brasileiras. Dentre elas cabe destacar o envolvimento em tutoria/preceptoria de alunos e plano de carreira com progressão por desempenho. Das variáveis relacionadas à estabilidade e vínculo empregatício, somente a forma de ingresso na ESB (através de concurso público) mostrou associação, o que mostra que, mesmo com a tendência de precarização do trabalho no SUS, o vínculo de trabalho parece não ser fator decisivo no desempenho das equipes. Mesmo assim, outros estudos nesta temática são importantes.

Com relação às variáveis relativas à gestão e organização dos serviços de saúde bucal, o fato de todas elas terem apresentado alguma influência no desempenho das equipes avaliadas, mostra que a análise de indicadores de saúde bucal, avaliação da condição de saúde bucal da população assistida e planejamento periódico das ações em conjunto com a equipe da ESF são, de fato, importantes para um bom funcionamento do sistema de saúde brasileiro. A possibilidade de uma agenda de atendimentos flexível garante a assistência às diferentes demandas da população, seja ela de urgência ou por demanda programada.

Cabe salientar que diferenças foram observadas entre as cinco macrorregiões brasileiras, na frequência de realização dos procedimentos de APS, na distribuição dos escores divididos em tercis (baixo, médio, alto) e com relação às variáveis que podem estar influenciando o desempenho das 18.114 equipes avaliadas. Isso reforça não somente o fato de o Brasil ser um país de extrema desigualdade de renda e acesso aos serviços de saúde, mas também reforça a importância da descentralização da gestão do SUS, visto que é essencial que os serviços atendam às demandas da população que lhes é referida.

Embora este estudo apresente limitações por utilizar dados secundários e por fazer um recorte específico para a estimativa do desempenho das ESB e para a inclusão de variáveis nos modelos de Regressão Linear Múltipla, traz a avaliação de um grande número de ESB atuantes no SUS e inclui aspectos relevantes para um bom funcionamento dos serviços de saúde. Além disso, destaca a importância de incentivar os dentistas atuantes na APS a buscarem aperfeiçoamento teórico e clínico, além de frisar a importância da avaliação e planejamento local. Mostra, também, a importância de se garantir assistência odontológica para diferentes demandas e a

importância da organização dos serviços em rede, onde exista possibilidade de referenciamento para a atenção secundária.

REFERÊNCIAS

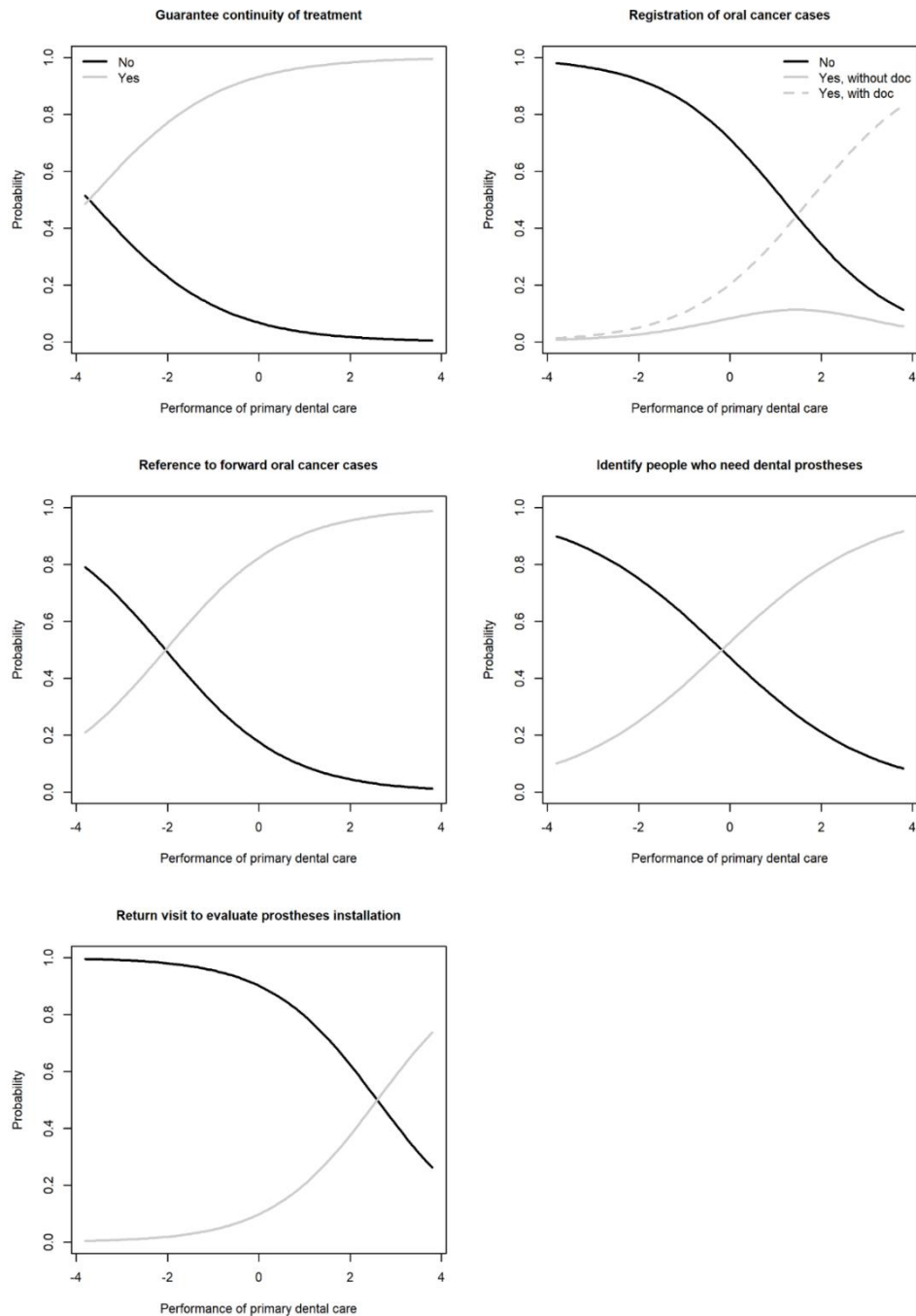
1. ARAÚJO, E.A.C.; ANDRADE, D.F.; BORTOLOTTI, S.L.V. Teoria de Resposta ao Item. **Rev Esc Enferm USP**, São Paulo, v. 43, v. esp, p. 1000-8, ago. 2009.
2. BHAKTA, B.; TENNANT, A.; HORTON, M.; *et. al.* Using item response theory to explore the psychometric properties of extended matching questions examination in undergraduate medical education. **BMC Med Educ**, London, v. 5, n. 9, p. 1-13, mar. 2005.
3. BOURION-BÉDÈS, S.; SCHWAN, R.; EPSTEIN, J.; LAPREVOTE, V.; *et. al.* Combination of classical test theory (CTT) and item response theory (IRT) analysis to study the psychometric properties of the French version of the Quality of Life Enjoyment and Satisfaction Questionnaire-Short Form (Q-LES-Q-SF). **Qual Life Res**, Dordrecht, v. 24, n. 2, p. 287–93, ago. 2015.
4. BRASIL. **Diretrizes da Política Nacional de Saúde Bucal**. Brasília: Ministério da Saúde, 2004, 15p.
5. BRASIL. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. **Programa Nacional de Melhoria do Acesso e da Qualidade da Atenção Básica (PMAQ-AB): manual instrutivo**. Brasília: Ministério da Saúde, 2013, 37p.
6. BRASIL. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. **Versão Preliminar – Nota metodológica da certificação das equipes de saúde bucal participantes do Programa Nacional de Melhoria do Acesso e da Qualidade da Atenção Básica 2013-2014**. Brasília: Ministério da Saúde, 2015, 110p.
7. COTTA, R.M.M.; SCHOTT, M.; AZEREDO, C.M.; *et. al.* Organização do trabalho e perfil dos profissionais do Programa Saúde da Família: um desafio na reestruturação da atenção básica em saúde. **Epidemiol Serv Saúde**, Brasília, v. 15, n. 3, p. 7-18, set. 2006.
8. COUTO, G.; PRIMI, R. Teoria de Resposta ao Item (TRI): Conceitos elementares dos modelos para itens dicotômicos. **Bol Psicol**, São Paulo, v. LXI, n. 134, p. 1-15, 2015.
9. DONABEDIAN, A. Evaluating the quality of medical care. 1966. **Milbank Q**, Nova York, v. 83, n. 4, p. 691-729, 2005.
10. FISCHER, T.K.; PERES, K.G.; KUPEK, E.; *et. al.* Indicadores de atenção básica em saúde bucal: associação com as condições socioeconômicas, provisão de serviços, fluoretação de águas e a estratégia de saúde da família

- no Sul do Brasil. **Rev Bras Epidemiol**, São Paulo, v. 13, n. 1, p. 126-38, fev. 2010.
11. GALLAGHER, J.E.; MANICKAM, S.; WILSON, N.H.F. Sultanate of Oman: building a dental workforce. **Hum Resour Health**, Londres, v. 13, n. 50, p. 1-10, jun. 2015.
 12. GONÇALVES, C.R.; CRUZ, M.T.; OLIVEIRA, M.P.; *et. al.* Recursos humanos: fator crítico para as redes de atenção à saúde. **Saúde Debate**, Rio de Janeiro v. 38, n. 100, p. 26-34, jan-mar. 2014.
 13. GIL, C.R.R. Atenção primária, atenção básica e saúde da família: sinergias e singularidades do contexto brasileiro. **Cad Saúde Pública**, Rio de Janeiro, v.22, n. 6, p. 1171-81, jun. 2006.
 14. LOCH-NECKEL, G.; SEEMANN, G.; EIDT, H.B.; *et. al.* Desafios para a ação interdisciplinar na atenção básica: implicações relativas à composição das equipes de saúde da família. **Cien Saude Colet**, Rio de Janeiro, v. 14, n. supl. 1, p. 463-72, out. 2009.
 15. MAEDA, S.T.; MOLEIRO, P.F.; EGRY, E.Y.; CIOSAK, S.I. Recursos humanos na atenção básica: investimento e força propulsora de produção. **Rev Esc Enferm USP**, São Paulo, v. 45, n. 2, p. 1651-5, dez. 2011.
 16. NASCIMENTO, A.C.; MOYSÉS, S.T.; WERNECK, R.I.; *et. al.* Oral health in the context of primary care in Brazil. **Int Dent J**, London, v. 63, n. 5, p. 237-43, abr. 2013.
 17. PAIM, J.; TRAVASSOS, C.; ALMEIDA, C.; *et. al.* The Brazilian health system: history, advances, and challenges. **Lancet**, London, v. 377, n. 9779, p. 1778-97, Mai. 2011.
 18. PUCCA JUNIOR, G.A.; COSTA, J.F.R.; SILVESTRE, R.M. Oral Health Policies in Brazil. **Braz Oral Res**, São Paulo, n. 23, v. spec iss 1, p. 9-16, abr. 2009.
 19. RAWLINGS, J.O., PENTULA, S.G.; DICKEY, D.A. Applied regression analysis: a research tool. *Regression Diagnostics*. In: *Applied regression analysis: a research tool*. 2 ed. Nova York: Springer, 1998. p. 341-96.
 20. sage.saude.gov.br [Internet]. Brasil: Sala de Apoio à Gestão Estratégica; c2018 [acesso em 18 de outubro de 2018]. Disponível em: <http://sage.saude.gov.br/#>.
 21. SAMEJIMA, F.A. Estimation of latent ability using a response pattern of graded scores. **Psychometric Monograph**, Princeton, n. 17, p. i-169, jan. 1968.

22. SARTES, L.M.A.; SOUZA-FORMIGONI, M.L.O. Avanços na Psicometria: Da Teoria Clássica dos Testes à Teoria de Resposta ao Item. **Psicologia: Reflexão e Crítica**, Porto Alegre, v. 26, n. 2, p. 241-50, mar. 2012.
23. SCHERER, C.I.; SCHERER, M.D.A. Avanços e desafios da saúde bucal após uma década de Programa Brasil Sorridente. **Rev Saúde Pública**, São Paulo, v. 49, n. 98, p. 1-12, mar. 2015.
24. TOMASI, E.; FACCHINI, L.A.; PICCINI, R.X.; *et. al.* Perfil sócio-demográfico e epidemiológico dos trabalhadores da atenção básica à saúde nas regiões Sul e Nordeste do Brasil. **Cad. Saúde Pública**, Rio de Janeiro, v. 24, n. 1, p. S191-S201, 2008.
25. YANG, F.M.; KAO, S.T. Item Response Theory for measurement validity. **Shanghai Arch Psychiatry**, Shanghai, v. 26, n. 3, p. 171-7, jul. 2014.

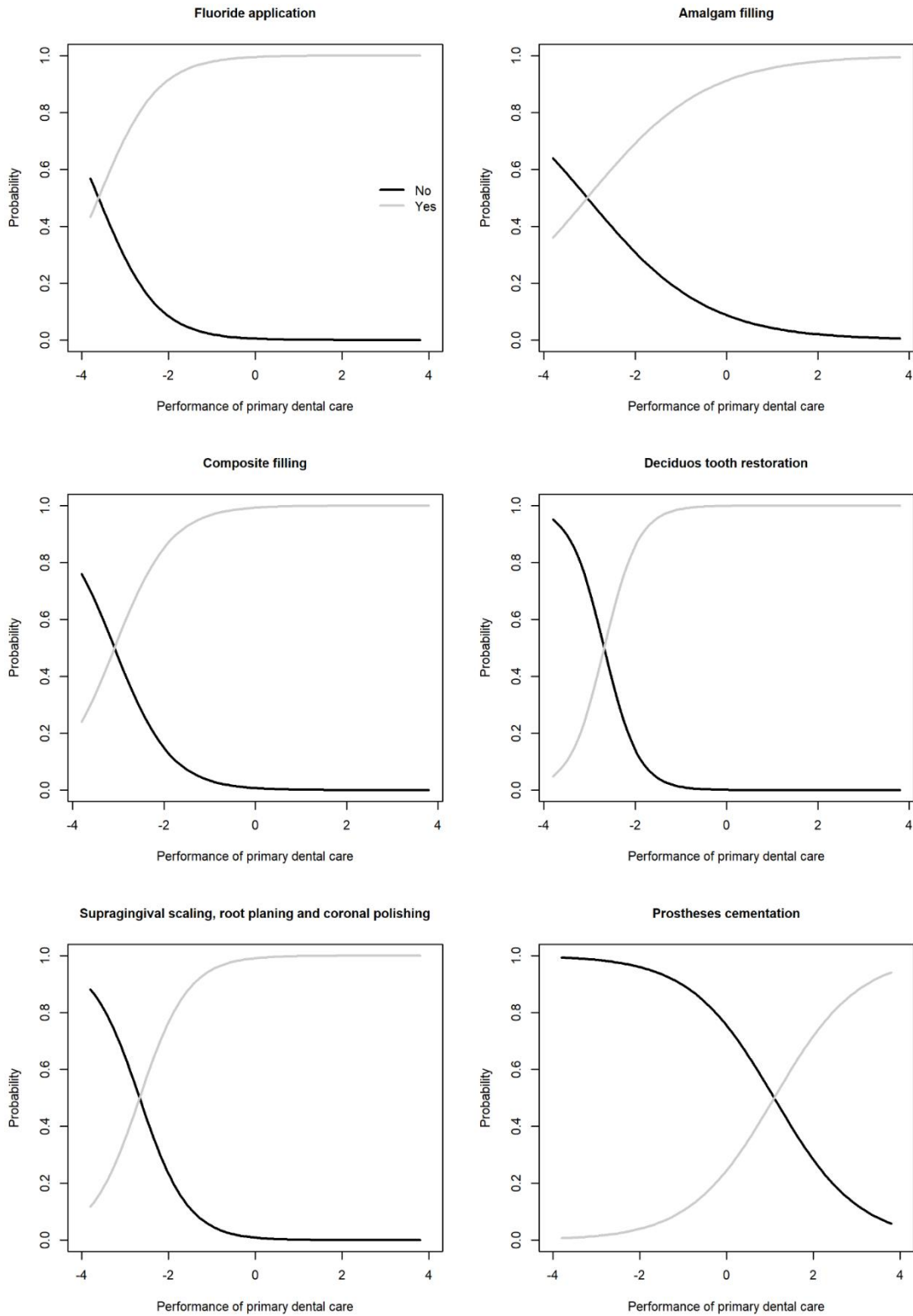
APÊNDICE A – Material suplementar

MATERIAL SUPLEMENTAR DO ARTIGO 2



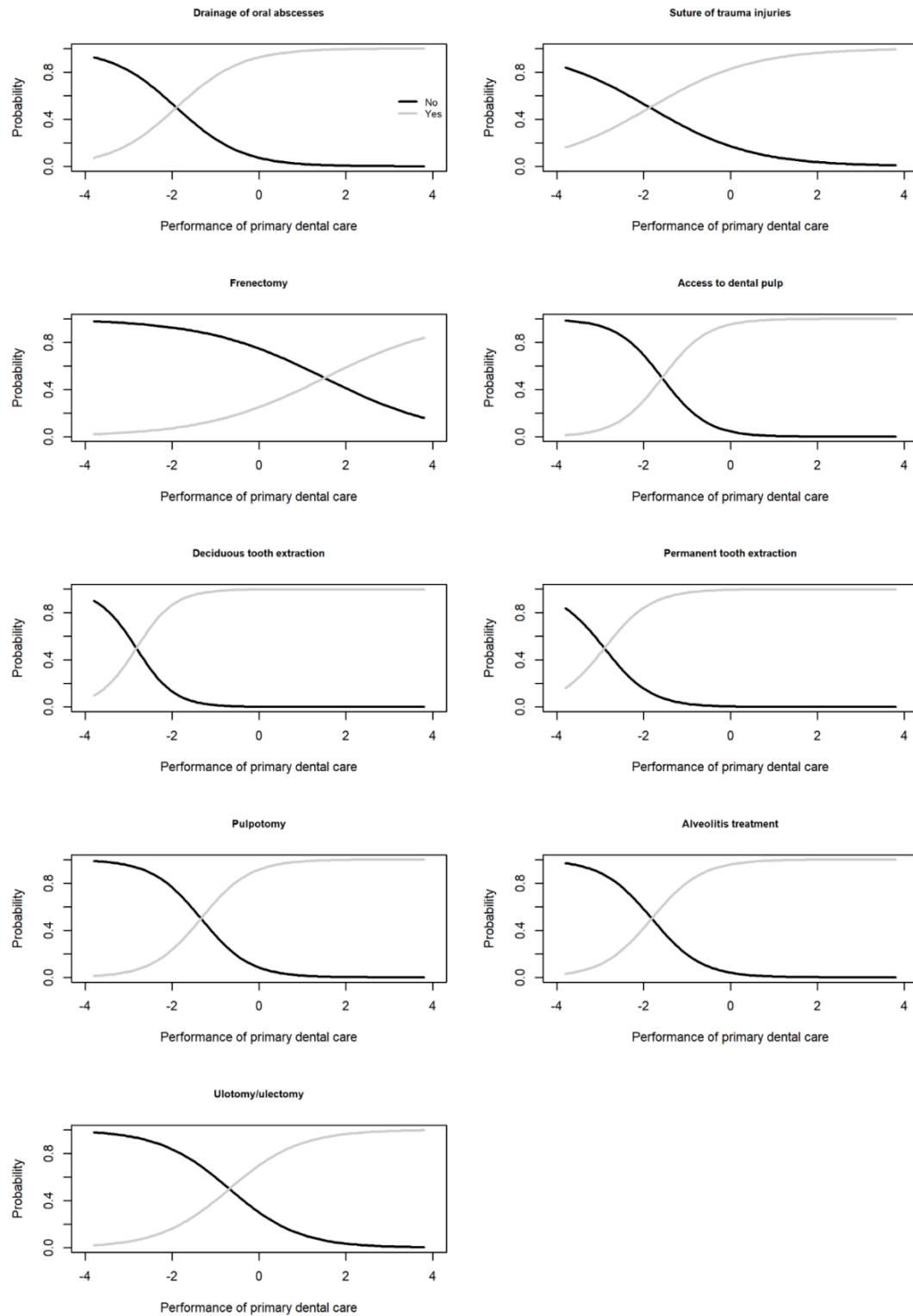
Fonte: Elaborado pelo autor, 2019.

Figura 1: Curvas Características dos Itens – Ações de vigilância em saúde bucal realizadas pelas ESB no Brasil, 2013-2014.



Fonte: Elaborado pelo autor, 2019.

Figura 2: Curvas Características dos Itens – Procedimentos preventivos e restauradores realizados pelas ESB. Brasil, 2013-2014.



Fonte: Elaborado pelo autor, 2019.

Figura 3: Curvas Características dos Itens – Procedimentos endodônticos e cirúrgicos realizados pelas ESB. Brasil, 2013-2014.

APÊNDICE B – Material suplementar

MATERIAL SUPLEMENTAR DO ARTIGO 3

Tabela 1 - Regressão Linear Simples e modelo ajustado utilizando o desempenho das equipes de saúde bucal como variável dependente e o perfil do cirurgião dentista e organização dos serviços de saúde bucal como variáveis independentes. Região Norte, Brasil, 2013-2014.

	Regressão Linear Simples				Regressão Linear Múltipla - modelo ajustado					
	B	Erro padrão	B Stand.	Sig.	B	Std. Error	B Stand.	Sig.	Intervalo de confiança (95%)	VIF
Pós-graduação <i>Lato Sensu</i> (Especialização e Residência)	0,179	0,04	0,113	<0,001	0,107	0,043	0,068	0,013	0,023 – 0,192	1,076
Pós-graduação <i>Stricto Sensu</i> (Mestrado e Doutorado)	0,004	0,90	0,001	0,963						
Preceptoria na formação superior	0,435	0,092	0,132	<0,001						
Forma de ingresso na ESB (concurso público)	0,181	0,045	0,114	<0,001						
Vínculo empregatício (Servidor público estatutário)	0,200	0,045	0,125	<0,001	0,199	0,043	0,124	<0,001	0,114 – 0,284	1,074
Agente contratante (Administração direta)	0,086	0,075	0,032	0,252						
Tempo na ESB (2 anos ou menos)	-0,050	0,046	-0,031	0,272						

Plano de carreira	0,233	0,054	0,121	<0,001						
Plano de carreira com progressão por tempo de serviço	0,296	0,059	0,141	<0,001						
Plano de carreira com progressão por desempenho e/ou mérito	0,332	0,073	0,127	<0,001						
Plano de carreira com progressão por titulação e formação profissional	0,288	0,058	0,140	<0,001						
Incentivo, gratificação e/ou prêmio financeiro por desempenho	0,220	0,060	0,102	<0,001						
Atividades de educação permanente (1-8)*	0,139	0,016	0,244	<0,001	0,090	0,016	0,159	<0,001	0,059 – 0,122	1,170
UBS como espaço de formação de ensino aprendizagem com os alunos de graduação, especialização, residentes e entre outros	0,270	0,069	0,109	<0,001						
Documentos provando que a ESB realiza planejamento e programação de suas ações mensalmente	0,151	0,045	0,095	0,001						
A ESB realiza monitoramento e análise dos indicadores e informações de saúde bucal	0,350	0,043	0,222	<0,001	0,195	0,045	0,123	<0,001	0,107 – 0,283	1,181

A ESB recebe apoio para o planejamento e organização do processo de trabalho	0,324	0,046	0,139	<0,001	0,165	0,049	0,098	0,001	0,068 – 0,262	1,265
A ESB tem disponível informações que auxiliam na análise de situação de saúde da população	0,333	0,044	0,208	<0,001						
Documentos comprovando processo de autoavaliação pela ESB nos últimos seis meses	0,197	0,049	0,113	<0,001						
A ESB participa das reuniões da equipe de atenção básica	0,233	0,019	0,136	<0,001						
A ESB oferece consultas odontológicas de demanda espontânea e agenda	0,339	0,061	0,155	<0,001	0,232	0,058	0,106	<0,001	0,118 – 0,347	1,035
AESB realiza agendamentos em qualquer dia da semana e em qualquer horário	0,137	0,046	0,084	0,003	0,100	0,043	0,062	0,020	0,016 – 0,185	1,012
A ESB tem disponível, por parte da rede de saúde, oferta de consultas especializadas	0,252	0,044	0,157	<0,001						
Número de ESF que a ESB cobre (1-9)*	0,100	0,055	0,051	0,071						

*Variáveis quantitativas.

Fonte: Elaborado pelo autor, 2019.

Tabela 2 - Regressão Linear Simples e modelo ajustado utilizando o desempenho das equipes de saúde bucal como variável dependente e o perfil do cirurgião dentista e organização dos serviços de saúde bucal como variáveis independentes. Região Nordeste, Brasil, 2013-2014.

	Regressão Linear Simples				Regressão Linear Múltipla - modelo ajustado					
	B	Erro padrão	B Stand.	Sig.	B	Std. Error	B Stand.	Sig.	Intervalo de confiança (95%)	VIF
Pós-graduação <i>Lato Sensu</i> (Especialização e Residência)	0,202	0,018	0,126	<0,001	0,133	0,017	0,083	<0,001	0,100 - 0,166	1,032
Pós-graduação <i>Stricto Sensu</i> (Mestrado e Doutorado)	0,111	0,039	0,032	0,005						
Preceptoria na formação superior	0,457	0,032	0,161	<0,001	0,162	0,032	0,057	<0,001	0,098 – 0,226	1,201
Forma de ingresso na ESB (concurso público)	-0,009	0,019	-0,005	0,632						
Vínculo empregatício (Servidor público estatutário)	-0,023	0,019	-0,014	0,212						
Agente contratante (Administração direta)	0,058	0,027	0,025	0,030	0,050	0,025	0,021	0,042	0,002 – 0,098	1,015
Tempo na ESB (2 anos ou menos)	-0,004	0,019	-0,003	0,824						
Plano de carreira	0,107	0,028	0,043	<0,001						
Plano de carreira com progressão por tempo de serviço	0,151	0,032	0,054	<0,001						

Plano de carreira com progressão por desempenho e/ou mérito	0,251	0,041	0,070	<0,001						
Plano de carreira com progressão por titulação e formação profissional	0,151	0,031	0,055	<0,001						
Incentivo, gratificação e/ou prêmio financeiro por desempenho	0,289	0,021	0,154	<0,001	0,124	0,020	0,066	<0,001	0,084 – 0,164	1,073
Atividades de educação permanente (1-8)*	0,159	0,006	0,301	<0,001	0,092	0,006	0,175	<0,001	0,080 – 0,105	1,299
UBS como espaço de formação de ensino aprendizagem com os alunos de graduação, especialização, residentes e entre outros	0,318	0,024	0,147	<0,001	0,070	0,025	0,032	0,005	0,022 – 0,119	1,197
Documentos provando que a ESB realiza planejamento e programação de suas ações mensalmente	0,154	0,018	0,096	<0,001						
A ESB realiza monitoramento e análise dos indicadores e informações de saúde bucal	0,366	0,019	0,213	<0,001	0,127	0,021	0,074	<0,001	0,086 – 0,168	1,339
A ESB recebe apoio para o planejamento e organização do processo de trabalho	0,348	0,023	0,173	<0,001	0,059	0,025	0,029	0,020	0,009 – 0,109	1,447

A ESB tem disponível informações que auxiliam na análise de situação de saúde da população	0,372	0,021	0,201	<0,001	0,118	0,024	0,064	<0,001	0,071 – 0,165	1,543
Documentos comprovando processo de autoavaliação pela ESB nos últimos seis meses	0,172	0,019	0,105	<0,001	0,080	0,017	0,049	<0,001	0,046 – 0,144	1,028
A ESB participa das reuniões da equipe de atenção básica	0,233	0,019	0,136	<0,001	0,063	0,019	0,037	0,001	0,026 – 0,099	1,093
A ESB oferece consultas odontológicas de demanda espontânea e agenda	0,422	0,029	0,165	<0,001	0,298	0,027	0,117	<0,001	0,245 – 0,351	1,025
AESB realiza agendamentos em qualquer dia da semana e em qualquer horário	0,044	0,019	0,026	0,022						
A ESB tem disponível, por parte da rede de saúde, oferta de consultas especializadas	0,255	0,020	0,143	<0,001	0,095	0,019	0,053	<0,001	0,057 – 0,133	1,074
Número de ESF que a ESB cobre (1-9)*	-0,027	0,016	-0,019	0,090						

*Variáveis quantitativas.

Fonte: Elaborado pelo autor, 2019.

Tabela 3 - Regressão Linear Simples e modelo ajustado utilizando o desempenho das equipes de saúde bucal como variável dependente e o perfil do cirurgião dentista e organização dos serviços de saúde bucal como variáveis independentes. Região Centro-Oeste, Brasil, 2013-2014.

	Regressão Linear Simples				Regressão Linear Múltipla - modelo ajustado					
	B	Erro padrão	B Stand.	Sig.	B	Std. Error	B Stand.	Sig.	Intervalo de confiança (95%)	VIF
Pós-graduação <i>Lato Sensu</i> (Especialização e Residência)	0,296	0,039	0,188	<0,001	0,146	0,038	0,093	<0,001	0,072 – 0,220	1,116
Pós-graduação <i>Stricto Sensu</i> (Mestrado e Doutorado)	-0,019	0,083	-0,006	0,815						
Preceptoria na formação superior	0,525	0,088	0,148	<0,001						
Forma de ingresso na ESB (concurso público)	0,204	0,040	0,128	<0,001						
Vínculo empregatício (Servidor público estatutário)	0,209	0,040	0,132	<0,001	0,101	0,038	0,064	0,008	0,026 – 0,176	1,136
Agente contratante (Administração direta)	0,077	0,049	0,039	0,119						
Tempo na ESB (2 anos ou menos)	0,016	0,040	0,010	0,689						
Plano de carreira	0,133	0,047	0,072	0,004						
Plano de carreira com progressão por tempo de serviço	0,187	0,050	0,095	<0,001						

Plano de carreira com progressão por desempenho e/ou mérito	0,106	0,071	0,038	0,136						
Plano de carreira com progressão por titulação e formação profissional	0,154	0,049	0,079	0,002						
Incentivo, gratificação e/ou prêmio financeiro por desempenho	0,438	0,048	0,223	<0,001	0,176	0,048	0,090	<0,001	0,082 – 0,270	1,167
Atividades de educação permanente (1-8)*	0,168	0,012	0,343	<0,001	0,104	0,012	0,213	<0,001	0,080 – 0,128	1.235
UBS como espaço de formação de ensino aprendizagem com os alunos de graduação, especialização, residentes e entre outros	0,379	0,062	0,152	<0,001						
Documentos provando que a ESB realiza planejamento e programação de suas ações mensalmente	0,195	0,040	0,123	<0,001						
A ESB realiza monitoramento e análise dos indicadores e informações de saúde bucal	0,331	0,039	0,209	<0,001	0,145	0,038	0,091	<0,001	0,070 – 0,219	1,128
A ESB recebe apoio para o planejamento e organização do processo de trabalho	0,265	0,044	0,152	<0,001						

A ESB tem disponível informações que auxiliam na análise de situação de saúde da população	0,221	0,041	0,135	<0,001						
Documentos comprovando processo de autoavaliação pela ESB nos últimos seis meses	0,263	0,040	0,164	<0,001	0,094	0,038	0,058	0,013	0,020 – 0,167	1,073
A ESB participa das reuniões da equipe de atenção básica	0,306	0,041	0,184	<0,001	0,108	0,039	0,065	0,006	0,031 – 0,186	1,097
A ESB oferece consultas odontológicas de demanda espontânea e agenda	0,397	0,060	0,164	<0,001	0,231	0,056	0,096	<0,001	0,122 – 0,340	1,033
AESB realiza agendamentos em qualquer dia da semana e em qualquer horário	0,070	0,040	0,044	0,081						
A ESB tem disponível, por parte da rede de saúde, oferta de consultas especializadas	0,391	0,040	0,239	<0,001	0,191	0,039	0,117	<0,001	0,015 – 0,268	1,109
Número de ESF que a ESB cobre (1-9)*	0,008	0,034	0,006	0,811						

*Variáveis quantitativas.

Fonte: Elaborado pelo autor, 2019.

Tabela 4 - Regressão Linear Simples e modelo ajustado utilizando o desempenho das equipes de saúde bucal como variável dependente e o perfil do cirurgião dentista e organização dos serviços de saúde bucal como variáveis independentes. Região Sudeste, Brasil, 2013-2014.

	Regressão Linear Simples				Regressão Linear Múltipla - modelo ajustado					
	B	Erro padrão	B Stand.	Sig.	B	Std. Error	B Stand.	Sig.	Intervalo de confiança (95%)	VIF
Pós-graduação <i>Lato Sensu</i> (Especialização e Residência)	0,243	0,020	0,166	<0,001	0,140	0,019	0,096	<0,001	0,102 – 0,177	1,051
Pós-graduação <i>Stricto Sensu</i> (Mestrado e Doutorado)	0,188	0,039	0,069	<0,001						
Preceptoria na formação superior	0,342	0,030	0,157	<0,001						
Forma de ingresso na ESB (concurso público)	0,167	0,035	0,094	<0,001	0,134	0,020	0,093	<0,001	0,096 – 0,174	1,211
Vínculo empregatício (Servidor público estatutário)	0,182	0,021	0,122	<0,001						
Agente contratante (Administração direta)	-0,069	0,023	-0,043	0,002						
Tempo na ESB (2 anos ou menos)	0,014	0,020	0,010	0,481						
Plano de carreira	0,343	0,024	0,195	<0,001						
Plano de carreira com progressão por tempo de serviço	0,371	0,026	0,195	<0,001	0,075	0,035	0,039	0,035	0,005 – 0,144	2,127

Plano de carreira com progressão por desempenho e/ou mérito	0,435	0,029	0,207	<0,001	0,124	0,039	0,059	0,001	0,048 – 0,199	2,069
Plano de carreira com progressão por titulação e formação profissional	0,401	0,028	0,199	<0,001						
Incentivo, gratificação e/ou prêmio financeiro por desempenho	0,266	0,024	0,154	<0,001						
Atividades de educação permanente (1-8)*	0,123	0,006	0,298	<0,001	0,064	0,006	0,156	<0,001	0,052 – 0,076	1,321
UBS como espaço de formação de ensino aprendizagem com os alunos de graduação, especialização, residentes e entre outros	0,296	0,027	0,155	<0,001	0,078	0,026	0,041	0,002	0,027 – 0,129	1,129
Documentos provando que a ESB realiza planejamento e programação de suas ações mensalmente	0,201	0,020	0,139	<0,001	0,080	0,020	0,055	<0,001	0,041 – 0,118	1,130
A ESB realiza monitoramento e análise dos indicadores e informações de saúde bucal	0,374	0,022	0,234	<0,001	0,164	0,023	0,103	<0,001	0,119 – 0,210	1,313
A ESB recebe apoio para o planejamento e organização do processo de trabalho	0,350	0,027	0,182	<0,001						

A ESB tem disponível informações que auxiliam na análise de situação de saúde da população	0,361	0,024	0,210	<0,001	0,106	0,025	0,062	<0,001	0,056 – 0,156	1,337
Documentos comprovando processo de autoavaliação pela ESB nos últimos seis meses	0,185	0,021	0,124	<0,001	0,059	0,020	0,040	0,003	0,020 – 0,099	1,118
A ESB participa das reuniões da equipe de atenção básica	0,218	0,021	0,145	<0,001	0,050	0,020	0,033	0,012	0,011 – 0,089	1,095
A ESB oferece consultas odontológicas de demanda espontânea e agenda	0,214	0,038	0,079	<0,001	0,156	0,035	0,058	<0,001	0,088 – 0,224	1.006
AESB realiza agendamentos em qualquer dia da semana e em qualquer horário	0,099	0,021	0,066	<0,001	0,091	0,019	0,061	<0,001	0,053 – 0,128	1.012
A ESB tem disponível, por parte da rede de saúde, oferta de consultas especializadas	0,403	0,027	0,208	<0,001	0,214	0,026	0,110	<0,001	0,163 – 0,264	1,080
Número de ESF que a ESB cobre (1-9)*	0,018	0,012	0,020	0,148						

*Variáveis quantitativas.

Fonte: Elaborado pelo autor, 2019.

Tabela 5 - Regressão Linear Simples e modelo ajustado utilizando o desempenho das equipes de saúde bucal como variável dependente e o perfil do cirurgião dentista e organização dos serviços de saúde bucal como variáveis independentes. Região Sul, Brasil, 2013-2014.

	Regressão Linear Simples				Regressão Linear Múltipla - modelo ajustado					
	B	Erro padrão	B Stand.	Sig.	B	Std. Error	B Stand.	Sig.	Intervalo de confiança (95%)	VIF
Pós-graduação <i>Lato Sensu</i> (Especialização e Residência)	0,257	0,029	0,174	<0,001	0,124	0,026	0,084	<0,001	0,072 – 0,176	1,058
Pós-graduação <i>Stricto Sensu</i> (Mestrado e Doutorado)	0,054	0,054	0,020	0,311						
Preceptoria na formação superior	0,418	0,043	0,188	<0,001	0,108	0,043	0,049	0,012	0,023 – 0,193	1,262
Forma de ingresso na ESB (concurso público)	0,167	0,035	0,094	<0,001						
Vínculo empregatício (Servidor público estatutário)	0,155	0,029	0,104	<0,001						
Agente contratante (Administração direta)	0,155	0,041	0,075	<0,001	0,087	0,036	0,043	0,015	0,017 – 0,158	1,029
Tempo na ESB (2 anos ou menos)	0,010	0,029	0,007	0,738						
Plano de carreira	0,326	0,028	0,223	<0,001						
Plano de carreira com progressão por tempo de serviço	0,258	0,029	0,238	<0,001	0,155	0,028	0,103	<0,001	0,100 – 0,210	1,170
Plano de carreira com progressão por desempenho e/ou mérito	0,428	0,033	0,247	<0,001						

Plano de carreira com progressão por titulação e formação profissional	0,359	0,029	0,234	<0,001						
Incentivo, gratificação e/ou prêmio financeiro por desempenho	0,440	0,031	0,270	<0,001	0,174	0,031	0,107	<0,001	0,113 – 0,235	1,225
Atividades de educação permanente (1-8)*	0,146	0,008	0,354	<0,001	0,066	0,008	0,161	<0,001	0,050 – 0,083	1,414
UBS como espaço de formação de ensino aprendizagem com os alunos de graduação, especialização, residentes e entre outros	0,427	0,035	0,236	<0,001	0,119	0,036	0,066	0,001	0,048 – 0,190	1,323
Documentos provando que a ESB realiza planejamento e programação de suas ações mensalmente	0,183	0,028	0,128	<0,001	0,077	0,025	0,054	0,002	0,027 – 0,127	1,042
A ESB realiza monitoramento e análise dos indicadores e informações de saúde bucal	0,346	0,029	0,231	<0,001	0,097	0,030	0,065	0,001	0,039 – 0,155	1.311
A ESB recebe apoio para o planejamento e organização do processo de trabalho	0,358	0,033	0,208	<0,001						
A ESB tem disponível informações que auxiliam na análise de situação de saúde da população	0,403	0,031	0,248	<0,001	0,150	0,032	0,093	<0,001	0,087 – 0,214	1,314

Documentos comprovando processo de autoavaliação pela ESB nos últimos seis meses	0,162	0,028	0,113	<0,001						
A ESB participa das reuniões da equipe de atenção básica	0,333	,031	0,209	<0,001	0,102	0,030	0,064	0,001	0,044 – 0,160	1,142
A ESB oferece consultas odontológicas de demanda espontânea e agenda	0,368	0,053	0,137	<0,001	0,240	0,047	0,089	<0,001	0,147 – 0,333	1,030
AESB realiza agendamentos em qualquer dia da semana e em qualquer horário	0,083	0,028	0,058	0,004	0,106	0,025	0,074	<0,001	0,057 – 0,155	1,019
A ESB tem disponível, por parte da rede de saúde, oferta de consultas especializadas	0,320	0,038	0,165	<0,001	0,126	0,034	0,065	<0,001	0,058 – 0,194	1,058
Número de ESF que a ESB cobre (1-9)*	0,027	0,019	0,028	0,157						

*Variáveis quantitativas.

Fonte: Elaborado pelo autor, 2019.

ANEXO A – Comitê de ética

PARECER DO COMITÊ DE ÉTICA EM PESQUISA PARA O 2º CICLO DE AVALIAÇÕES DO PMAQ-AB

UNIVERSIDADE FEDERAL DE
MINAS GERAIS



PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: AVALIAÇÃO EXTERNA DAS EQUIPES DA ATENÇÃO BÁSICA NO ÂMBITO DO PROGRAMA NACIONAL DE MELHORIA DO ACESSO E DA QUALIDADE DA ATENÇÃO BÁSICA

Pesquisador: Antonio Thomaz Gonzaga da Matta Machado

Área Temática:

Versão: 3

CAAE: 02396512.8.0000.5149

Instituição Proponente: Universidade Federal de Minas Gerais

Patrocinador Principal: Secretaria de Atenção a Saúde

DADOS DO PARECER

Número do Parecer: 1.275.911

Apresentação do Projeto:

A principal estratégia de configuração da Atenção Básica em Saúde- ABS no Brasil é a Saúde da Família, que tem recebido importantes incentivos financeiros visando a ampliação da cobertura populacional, a reorganização da atenção e uma cobertura populacional por outros modelos de atenção básica, que pode variar entre 60% e 80%. (Ministério da Saúde, 2011) Entretanto, muitos desafios persistem e “indicam a necessidade de articulação de estratégias de acesso aos demais níveis de atenção à saúde, de forma a garantir o princípio da integralidade, assim como a necessidade permanente de ajuste das ações e serviços locais de saúde, visando à apreensão ampliada das necessidades de saúde da população e à superação das iniquidades entre as regiões do país”(Matta e Morosini, 2009). Avaliar o desempenho da ABS representa uma iniciativa relevante para o Sistema Único de Saúde-SUS e para a população brasileira. Trata-se de estudo com delineamento transversal, de abordagem qualitativa e quantitativa, com aplicação de questionário aos seguintes atores: responsável / coordenador da unidade de saúde; amostra de usuários presentes na unidade de saúde que atendam ao perfil de mães ou responsáveis por crianças menores de sete anos residentes e idosos com 65 anos ou mais residentes na área de abrangência da unidade de saúde. No que diz respeito ao processo de avaliação externa vinculado ao PMAQ, todas as Unidades de Saúde onde atuam as equipes

Endereço: Av. Presidente Antônio Carlos, 6627 2º Ad SI 2005

Bairro: Unidade Administrativa II **CEP:** 31.270-901

UF: MG **Município:** BELO HORIZONTE

Telefone: (31)3409-4592

E-mail: coep@prpq.ufmg.br

UNIVERSIDADE FEDERAL DE
MINAS GERAIS



Continuação do Parecer: 1.275.911

indicadas pela gestão municipal para o processo de avaliação serão incluídas no estudo. Essas unidades foram identificadas pelo gestor municipal por ocasião da adesão ao PMAQ-AB. As equipes de saúde e gestão da atenção serão certificadas quanto ao seu desempenho, por meio da verificação de evidências para um conjunto de padrões previamente determinados pelas instituições de ensino responsáveis pela realização da pesquisa. Também se realizará uma avaliação, cuja finalidade é apoiar a gestão local onde se contemplará avaliação da rede local de saúde pelas equipes de atenção básica, avaliação da satisfação do usuário e estudo de base populacional sobre aspectos de acesso, utilização e qualidade da atenção básica em Saúde. Quanto ao censo das condições de infraestrutura das UBS, todas as unidades dos estados do Acre, Rondônia e mesorregiões de Minas Gerais e de São Paulo deverão ser avaliadas em sua totalidade, tanto aquelas localizadas na zona urbana quanto na zona rural.

Objetivo da Pesquisa:

Objetivo Primário:

- Realizar a avaliação externa das equipes de atenção básica no âmbito do PMAQ-AB, de acordo com a Portaria 1.654/19/07/2011;
- Realizar um censo para avaliar as condições de infraestrutura de todas as UBS em funcionamento na totalidade dos municípios brasileiros.
- Induzir a ampliação do acesso e a melhoria da qualidade da atenção básica, com garantia de um padrão de qualidade comparável nacional, regional e localmente de maneira a permitir maior transparência e efetividade das ações governamentais direcionadas à Atenção Básica em Saúde.

Objetivo Secundário:

- I - Ampliar o impacto da AB sobre as condições de saúde da população e sobre a satisfação dos seus usuários, por meio de estratégias de facilitação do acesso e melhoria da qualidade dos serviços e ações da AB;
- II - Fornecer padrões de boas práticas e organização das UBS que norteiem a melhoria da qualidade da AB;
- III - Promover maior conformidade das UBS com os princípios da AB, aumentando a efetividade na melhoria das condições de saúde, na satisfação dos usuários, na qualidade das práticas de saúde e na eficiência e efetividade do sistema de saúde;
- IV - Promover a qualidade e inovação na gestão da AB, fortalecendo os processos de Autoavaliação, Monitoramento e Avaliação, Apoio Institucional e Educação Permanente nas três esferas de governo;

Endereço: Av. Presidente Antônio Carlos, 6627 2º Ad SI 2005

Bairro: Unidade Administrativa II **CEP:** 31.270-901

UF: MG **Município:** BELO HORIZONTE

Telefone: (31)3409-4592

E-mail: coep@prpq.ufmg.br

UNIVERSIDADE FEDERAL DE
MINAS GERAIS



Continuação do Parecer: 1.275.911

V - Melhorar a qualidade da alimentação e uso dos Sistemas de Informação como ferramenta de gestão da AB;

VI - Institucionalizar uma cultura de avaliação da AB no SUS e de gestão com base na indução e acompanhamento de processos e resultados;

VI - Estimular o foco da AB no usuário, promovendo a transparência dos processos de gestão, a participação e controle social e a responsabilidade sanitária dos profissionais e gestores de saúde com a melhoria das condições de saúde e satisfação dos usuários.

Avaliação dos Riscos e Benefícios:

Riscos: Na medida em que os sujeitos da pesquisa participam dando informações de natureza opinativa e não pessoal, sobre as condições de funcionamento da atenção básica, não existe risco previsível nem qualquer constrangimento de ordem pessoal para os participantes. Os participantes responderão às questões, apenas se o desejarem, podendo desistir de participar do estudo em qualquer momento. No relatório técnico da pesquisa, os entrevistados não serão identificados nominalmente.

Benefícios: Esta pesquisa, ao propor avaliar o desempenho da ABS representa uma iniciativa relevante para o Sistema Único de Saúde-SUS e para a população brasileira. Construir um sistema de monitoramento que contemple mecanismo de premiação ao melhor desempenho e apoio técnico-científico sistêmicos pode estimular a melhoria nas Unidades Básicas de Saúde-UBS/Saúde da Família-SF e criar um ciclo virtuoso de promoção de equidade e cobertura universal em saúde nos territórios dos serviços de saúde.

Comentários e Considerações sobre a Pesquisa:

Os resultados deste estudo poderão ser divulgados através de relatórios técnicos de pesquisa, artigos de revistas e eventos científicos, sem identificação nominal dos sujeitos da pesquisa. Os resultados serão entregues ao Ministério da Saúde para posterior utilização e para subsidiar a tomada de decisões pelos gestores dos três níveis de governo. Os dados serão armazenados eletronicamente, em bases de dados construídas especificamente para a pesquisa, com utilização de tecnologia de informação segura (senhas e demais recursos de informática) e inacessível a pessoas externas à equipe de trabalho.

Justificativa da Emenda: "Submetemos a apreciação do CEP o segundo Ciclo do PMAQ, com novo cronograma e inclusão de novos membros da equipe. Pelo registro apresentado na plataforma as notificações foram aceitas, mas gostaríamos de saber se o primeiro parecer vale para este segundo ciclo, uma vez que não houve alteração do projeto de pesquisa avaliativa".

Endereço: Av. Presidente Antônio Carlos, 6627 2º Ad SI 2005

Bairro: Unidade Administrativa II **CEP:** 31.270-901

UF: MG **Município:** BELO HORIZONTE

Telefone: (31)3409-4592

E-mail: coep@prpq.ufmg.br

UNIVERSIDADE FEDERAL DE
MINAS GERAIS



Continuação do Parecer: 1.275.911

Considerações sobre os Termos de apresentação obrigatória:

Presentes:

Folha de rosto

TCLE Representante da Equipe.

TCLE Usuário.

Inclusão de novos membros na equipe.

Instrumento de avaliação externa PMAQ - versão final maio 2012.

Termos de compromisso pesquisadores.

Parecer Câmara Departamental

Pareceres do Colegiado 28801 e 21421.

Pareceres Consubstanciados do CEP 28804 e 22913.

Cronograma Execução Identificação das Etapas.

Resposta parecer 22913.

Brochura Investigador PMAQ Projeto final.

Recomendações:

Recomenda-se acréscimo de campo de datas nos TCLEs, além da informação que o participante não terá nenhuma despesa e não receberá remuneração por sua participação na pesquisa. Este Comitê esclarece que o envio de um relatório parcial da pesquisa deverá ser realizado, pois o cronograma de execução relata a elaboração do relatório final em 30/06/2014. Este relatório parcial deverá conter em linhas gerais o que foi realizado até o presente momento. Inserir também na Plataforma o cronograma de execução do segundo Ciclo do PMAQ atualizado para a próxima etapa. Devido à importância do projeto a emenda será aprovada. Aguardamos as providências sugeridas ao pesquisador.

Gentileza, portanto inserir o cronograma atualizado e enviar, via notificação, os relatórios parciais e final (ao término da pesquisa) pela Plataforma Brasil.

Recomenda-se a aprovação da emenda ao projeto de pesquisa.

Conclusões ou Pendências e Lista de Inadequações:

Somos favoráveis à aprovação da emenda ao projeto "AVALIAÇÃO EXTERNA DAS EQUIPES DA ATENÇÃO BÁSICA NO ÂMBITO DO PROGRAMA NACIONAL DE MELHORIA DO ACESSO E DA QUALIDADE DA ATENÇÃO BÁSICA" do Pesquisador Responsável Prof. Dr. Antonio Thomaz Gonzaga da Matta Machado, com a extensão do prazo da pesquisa por dois anos a partir desta aprovação.

Endereço: Av. Presidente Antônio Carlos, 6627 2º Ad SI 2005

Bairro: Unidade Administrativa II

CEP: 31.270-901

UF: MG

Município: BELO HORIZONTE

Telefone: (31)3409-4592

E-mail: coep@prpq.ufmg.br

**UNIVERSIDADE FEDERAL DE
MINAS GERAIS**



Continuação do Parecer: 1.275.911

Considerações Finais a critério do CEP:

Diante do exposto, o Comitê de Ética em Pesquisa da UFMG/ COEP-UFMG, de acordo com as atribuições definidas na Resolução CNS nº 466 de 2012 e na Norma Operacional nº 001 de 2013 do CNS, manifesta-se pela aprovação da emenda proposta ao projeto de pesquisa.

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_414407_E1.pdf	30/09/2015 12:04:26		Aceito
Outros	Inclusão de novos membros na equipe.docx	18/03/2014 17:09:08		Aceito
Cronograma	Cronograma_Execução_Identificação das Etapas.pdf	24/09/2013 15:50:00		Aceito
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_23965.pdf	23/05/2012 11:19:42		Aceito
Recurso Anexado pelo Pesquisador	Resposta parecer 22913.pdf	23/05/2012 11:19:04		Aceito
Outros	Instrumento de avaliação externa PMAQ - versão final -maio_2012.pdf	23/05/2012 10:15:06		Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	TCLE_Final_Representante da Equipe.docx	23/05/2012 10:13:38		Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	TCLE_Final_Usuário.docx	23/05/2012 10:13:13		Aceito
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_23965.pdf	25/04/2012 11:42:11		Aceito
Outros	Termos_de_compromissos_pesquisadores.pdf	25/04/2012 11:40:40		Aceito
Outros	Parecer Camara Departamental_completo.pdf	25/04/2012 11:20:30		Aceito
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_23965.pdf	23/04/2012 10:16:14		Aceito
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_23965.pdf	13/04/2012 17:09:20		Aceito
Projeto Detalhado / Brochura Investigador	PMAQ Projeto final.doc	13/04/2012 17:00:38		Aceito

Endereço: Av. Presidente Antônio Carlos, 6627 2º Ad SI 2005

Bairro: Unidade Administrativa II **CEP:** 31.270-901

UF: MG **Município:** BELO HORIZONTE

Telefone: (31)3409-4592

E-mail: coep@prpq.ufmg.br

UNIVERSIDADE FEDERAL DE
MINAS GERAIS



Continuação do Parecer: 1.275.911

Folha de Rosto	Folha de rosto PMAQ.pdf	13/04/2012 16:34:02		Aceito
----------------	-------------------------	------------------------	--	--------

Situação do Parecer:

Aprovado

Necessita Apreciação da CONEP:

Não

BELO HORIZONTE, 13 de Outubro de 2015

Assinado por:

**Telma Campos Medeiros Lorentz
(Coordenador)**

Endereço: Av. Presidente Antônio Carlos, 6627 2º Ad SI 2005

Bairro: Unidade Administrativa II **CEP:** 31.270-901

UF: MG **Município:** BELO HORIZONTE

Telefone: (31)3409-4592

E-mail: coep@prpq.ufmg.br

ANEXO B – Normas para publicação

NORMAS PARA PUBLICAÇÃO NO PERIÓDICO *INTERNATIONAL JOURNAL OF PUBLIC HEALTH*

Description

The International Journal of Public Health publishes scientific articles relevant to global public health, from different countries and cultures, and assembles them into issues that raise awareness and understanding of public health problems and solutions. The Journal welcomes submissions of original research, critical and relevant reviews, methodological papers, and manuscripts that emphasize theoretical content. IJPH sometimes publishes commentaries and opinions. Special issues highlight key areas of current research. The Editorial Board's mission is to provide a thoughtful forum for contemporary issues and challenges in global public health research and practice.

International Journal of Public Health publishes original research and review, either empirical or theoretical, that contributes to understanding and improving public health. Commentary and opinion pieces are invited by the Editors.

Sections of the journal

Manuscripts should be written in view of their submission to one of the following sections:

- Peer reviewed

Papers that report on original quantitative or qualitative research or methods are published as

- Original Articles (4000 words max., structured abstract 180 words max., 40 references max. up to 6 figures and tables))
- Hints and Kinks are short methodological reports (1000 words max., no abstract) presenting topics relevant in survey research and surveillance. They report on experiences with techniques in a variety of areas and topics, such as writing questions, questionnaire design, survey implementation, or new and original ways to show results.
- Research Reviews should concentrate on the most recent developments in the field. Authors may carefully study the Aims & Scopes of IJPH and recently published

Reviews in IJPH to find out if the topic of their Review suitable for IJPH. Reviews should be performed systematically and cover findings that were not part of a previous review on the topic. The systematic Review may or may not include a meta-analysis or statistical summary of the individual study results.

The text body of Reviews will be structured in Introduction, Methods, Results and Discussion and will be in the length range of 4000-4500 words (without reference list), with up to 60 references, and not more than 6 figures and tables. A short Introduction will put the area into context and define the aim. The method section should describe how the studies have been selected for inclusion in the review. The discussion will address the international relevance of the findings.

Narrative Reviews are particularly welcome for the section “Knowledge Synthesis, Translation and Exchange”. Di Ruggiero (2018) [see the link below] specify the contents for narrative reviews within this section. Narrative reviews will have 4500 words max. The methods should be explicit, transparent and clearly stated.

International Journal of Public Health encourages authors from Eastern Europe to submit their work.

IJPH is dedicated to making the increasing public-health knowledge from Eastern Europe available to the scientific community and to promote transfer of knowledge in survey, surveillance and health promotion research between East and West. The journal adopts the WHO definition of Eastern Europe comprising the 13 countries that formerly belonged to the USSR and the countries of Central and Oriental Europe that used to belong to the influence zone of the USSR without being part of it and/or had planned economies. IJPH is committed to assist authors from these countries in adapting their work to the general standards of publication if necessary.

- Not peer reviewed
- Editorials are invited, short essays that express the author’s viewpoint or explain journal policies (800 words, 10 references max).
- Young researcher editorials (YREs) are invited editorials on topical discussions in public health written by PhD students from across the world (until 12 months after completion of the PhD). YREs convey a single, clear message. They have a short and catchy title, are 800 words long, and have at least five to ten (maximum) references. Doctoral students of Swiss School of Public Health+ will review YREs.

After acceptance, all YREs receive free professional copyediting funded by the Swiss School of Public Health+.

YREs

- Raise novel issues in public health
- Discuss recent publications or themes addressed in IJPH or elsewhere
- Debate public health science and related policies
- Promote discussions about science careers in public health and related challenges
- Place public health challenges in a broader context
- Address matters of global or multi-regional relevance

YRE is a capacity-building project for PhD students, offered by the Swiss School of Public Health+. Please find more details about the project at the link below.

- Commentaries are invited, more in depth opinion pieces (1000 words, 10 references max) usually on peer-reviewed articles; commentaries and the article are assembled as Forum in the printed issues of the Journal.
- Speakers corner: For this section, the Editors-in-Chief invite 3–4 experts to write an opinion piece.
- Letters to the Editors are reactions relating to articles previously published in IJPH. These are usually submitted within 3 months of online-first publication of the article.
- Young Researcher Editorials

Manuscript Submission

Submission of a manuscript implies: that the work described has not been published before; that it is not under consideration for publication anywhere else; that its publication has been approved by all co-authors, if any, as well as by the responsible authorities – tacitly or explicitly – at the institute where the work has been carried out. The publisher will not be held legally responsible should there be any claims for compensation.

Permissions

Authors wishing to include figures, tables, or text passages that have already been published elsewhere are required to obtain permission from the copyright owner(s) for both the print and online format and to include evidence that such permission has been granted when submitting their papers. Any material received without such evidence will be assumed to originate from the authors.

Online Submission

Please follow the hyperlink “Submit online” on the right and upload all of your manuscript files following the instructions given on the screen.

Please ensure you provide all relevant editable source files. Failing to submit these source files might cause unnecessary delays in the review and production process.

ENGLISH LANGUAGE SUPPORT

For editors and reviewers to accurately assess the work presented in your manuscript you need to ensure the English language is of sufficient quality to be understood. If you need help with writing in English you should consider:

- Asking a colleague who is a native English speaker to review your manuscript for clarity.
 - Visiting the English language tutorial which covers the common mistakes when writing in English.
 - Using a professional language editing service where editors will improve the English to ensure that your meaning is clear and identify problems that require your review. Two such services are provided by our affiliates Nature Research Editing Service and American Journal Experts. Springer authors are entitled to a 10% discount on their first submission to either of these services, simply follow the links below
- .
- English language tutorial
 - Nature Research Editing Service
 - American Journal Experts

Please note that the use of a language editing service is not a requirement for publication in this journal and does not imply or guarantee that the article will be selected for peer review or accepted.

If your manuscript is accepted it will be checked by our copyeditors for spelling and formal style before publication.

Please note:

Before submission the section „Integrity of research and reporting“ (below) should have been considered and the requested paragraphs added to the manuscript.

Submission of a new manuscript

requires the following files (mandatory):

- Contact details of all authors (first and last names in full, addresses)
- The manuscript excluding author names, affiliations and acknowledgements

Cover letter, acknowledgements, figures and tables are optional.

Before submission the section "Compliance with ethical standards Integrity of research and reporting“ (below) should have been considered and the requested paragraphs added to the manuscript.

Submission of a revision

requires the following files (mandatory):

- Contact details of all authors (first and last names in full, addresses)
- Revised manuscript including author names (first names first, in full, without titles), affiliations and acknowledgements, no track changes. The numbered affiliations should contain institution, town/city, and country (but without streets, post codes)
- Revised manuscript excluding author names, affiliations and acknowledgements, with track changes

Cover letter, acknowledgements, figures and tables are optional.

TITLE PAGE

The title page should include:

- Only for Revisions: The name(s) of the author(s) (first names first, full, without titles)
- A concise title (no abbreviations; 20 words max.)

- The numbered affiliation(s) of the author(s): institutions, cities/towns, and country (without streets and post codes)
- The e-mail address, telephone and fax numbers of the corresponding author
- The number of words of the Abstract and the text body (without reference list)

Key words

Please provide 4 to 6 keywords which can be used for indexing purposes

Abstract

Please provide an Abstract for Original articles (180 words max.), and Reviews (180 words max.). The Abstract should be structured into:

- Objectives (stating the main purposes and research question)
- Methods
- Results
- Conclusions

TEXT

Text Formatting

Manuscripts should be submitted in Word.

- Use a normal, plain font (e.g., 10-point Times Roman) for text.
- Use italics for emphasis.
- Use the automatic page numbering function to number the pages.
- Do not use field functions.
- Use tab stops or other commands for indents, not the space bar.
- Use the table function, not spreadsheets, to make tables.
- Use the equation editor or MathType for equations.
- Save your file in docx format (Word 2007 or higher) or doc format (older Word versions).

Headings

Please use no more than three levels of displayed headings.

Abbreviations

Abbreviations should be defined at first mention and used consistently thereafter.

Footnotes

Footnotes can be used to give additional information, which may include the citation of a reference included in the reference list. They should not consist solely of a reference citation, and they should never include the bibliographic details of a reference. They should also not contain any figures or tables.

Footnotes to the text are numbered consecutively; those to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data). Footnotes to the title or the authors of the article are not given reference symbols.

Always use footnotes instead of endnotes.

Acknowledgments

Acknowledgments of people, grants, funds, etc. should be placed in a separate section on the title page. The names of funding organizations should be written in full.

Please note:

- Original Articles and Reviews should be structured as follows:
 - Introduction (actual state of knowledge, the problems dealt with, objectives, and hypotheses);
 - Methods (material and methods, and population studied);
 - Results
 - Discussion (A heading Conclusions [not mandatory] should be a sub-heading of the main Discussion section).
- It is recommended to make use of unnumbered subtitles to the structured text, but only three levels of visible headings (including the main headings [Introduction, Methods, Results, Discussion]) should be used.
- The text body of Hints and Kinks, and articles without peer-review can be structured freely. These article types do not require abstracts or keywords.
- In text, headings and captions all words apart from the first one should begin with lower case letters. Exceptions are names and fixed expressions.
 - Example: Public health facts: why don't they lead to public health policy?
- No bold or underlined characters throughout your manuscript.

- Do not use footnotes and endnotes throughout the text. Footnotes are permitted only for tables.

REFERENCES

Citation

Cite references in the text by name and year in parentheses. Some examples:

- Negotiation research spans many disciplines (Thompson 1990).
- This result was later contradicted by Becker and Seligman (1996).
- This effect has been widely studied (Abbott 1991; Barakat et al. 1995a, b; Kelso and Smith 1998; Medvec et al. 1999, 2000).

Reference list

The list of references should only include works that are cited in the text and that have been published or accepted for publication. Personal communications and unpublished works should only be mentioned in the text. Do not use footnotes or endnotes as a substitute for a reference list.

Reference list entries should be alphabetized by the last names of the first author of each work. Order multi-author publications of the same first author alphabetically with respect to second, third, etc. author. Publications of exactly the same author(s) must be ordered chronologically.

- **Journal article**
 Gamelin FX, Baquet G, Berthoin S, Thevenet D, Nourry C, Nottin S, Bosquet L (2009) Effect of high intensity intermittent training on heart rate variability in prepubescent children. *Eur J Appl Physiol* 105:731-738. <https://doi.org/10.1007/s00421-008-0955-8>
 Ideally, the names of all authors should be provided, but the usage of “et al” in long author lists will also be accepted:
 Smith J, Jones M Jr, Houghton L et al (1999) Future of health insurance. *N Engl J Med* 341:325–329
- **Article by DOI**
 Slifka MK, Whitton JL (2000) Clinical implications of dysregulated cytokine production. *J Mol Med*. <https://doi.org/10.1007/s001090000086>

- Book
South J, Blass B (2001) The future of modern genomics. Blackwell, London
- Book chapter
Brown B, Aaron M (2001) The politics of nature. In: Smith J (ed) The rise of modern genomics, 3rd edn. Wiley, New York, pp 230-257
- Online document
Cartwright J (2007) Big stars have weather too. IOP Publishing PhysicsWeb. <http://physicsweb.org/articles/news/11/6/16/1>. Accessed 26 June 2007
- Dissertation
Trent JW (1975) Experimental acute renal failure. Dissertation, University of California

Always use the standard abbreviation of a journal's name according to the ISSN List of Title Word Abbreviations, see

- ISSN LTWA

If you are unsure, please use the full journal title.

For authors using EndNote, Springer provides an output style that supports the formatting of in-text citations and reference list.

- EndNote style (zip, 2 kB)

Please note:

- Please use Basic style (name, year) for your citations and reference list, following the instructions above.
- In Endnote this style is represented by the following journals: Human Genetics, Psychopharmacology and Experimental Brain Research.
- Do not use " & ".
- The free articles available on this site (Editors' Choice articles) demonstrate the requested reference format.

TABLES

- All tables are to be numbered using Arabic numerals.
- Tables should always be cited in text in consecutive numerical order.

- For each table, please supply a table caption (title) explaining the components of the table.
- Identify any previously published material by giving the original source in the form of a reference at the end of the table caption.
- Footnotes to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data) and included beneath the table body.

Table Captions

Tables and captions should be fully self-explanatory. Add place, year and - if possible - name of the study to all table captions.

Explain in full all abbreviations and codes used.

All words of the caption apart from the first one in a sentence should begin with lower case letters. Exceptions are names and fixed expressions.

Please avoid lengthy tables.

Electronic Figure Submission

- Supply all figures electronically.
- Indicate what graphics program was used to create the artwork.
- For vector graphics, the preferred format is EPS; for halftones, please use TIFF format. MSOffice files are also acceptable.
- Vector graphics containing fonts must have the fonts embedded in the files.
- Name your figure files with "Fig" and the figure number, e.g., Fig1.eps.

Line Art

- Definition: Black and white graphic with no shading.
- Do not use faint lines and/or lettering and check that all lines and lettering within the figures are legible at final size.
- All lines should be at least 0.1 mm (0.3 pt) wide.
- Scanned line drawings and line drawings in bitmap format should have a minimum resolution of 1200 dpi.
- Vector graphics containing fonts must have the fonts embedded in the files.

Halftone Art

- Definition: Photographs, drawings, or paintings with fine shading, etc.
- If any magnification is used in the photographs, indicate this by using scale bars within the figures themselves.

- Halftones should have a minimum resolution of 300 dpi.

Combination Art

- Definition: a combination of halftone and line art, e.g., halftones containing line drawing, extensive lettering, color diagrams, etc.
- Combination artwork should have a minimum resolution of 600 dpi.

Color Art

- Color art is free of charge for online publication.
- If black and white will be shown in the print version, make sure that the main information will still be visible. Many colors are not distinguishable from one another when converted to black and white. A simple way to check this is to make a xerographic copy to see if the necessary distinctions between the different colors are still apparent.
- If the figures will be printed in black and white, do not refer to color in the captions.
- Color illustrations should be submitted as RGB (8 bits per channel).

Figure Lettering

- To add lettering, it is best to use Helvetica or Arial (sans serif fonts).
- Keep lettering consistently sized throughout your final-sized artwork, usually about 2–3 mm (8–12 pt).
- Variance of type size within an illustration should be minimal, e.g., do not use 8-pt type on an axis and 20-pt type for the axis label.
- Avoid effects such as shading, outline letters, etc.
- Do not include titles or captions within your illustrations.

Figure Numbering

- All figures are to be numbered using Arabic numerals.
- Figures should always be cited in text in consecutive numerical order.
- Figure parts should be denoted by lowercase letters (a, b, c, etc.).
- IJPH does not publish any appendices to the text (figures or tables), but publishes separate online appendices (Electronic Supplementary Material).
- Figures in online appendices should be numbered separately.

Figure Captions

- Each figure should have a concise caption describing accurately what the figure depicts.
- Include the captions in the text file of the manuscript, not in the figure file.
- Identify all elements found in the figure in the figure caption (or in the figure legend); and use boxes, circles, etc., as coordinate points in graphs.

- At the end of each caption should appear the study name (if any; in full), the country, and year(s) of the study.
- Avoid unexplained abbreviations in the caption (or figure or figure legend).
- Figure captions begin with the term Fig. in bold type, followed by the figure number, also in bold type.
- No punctuation is to be included after the number, nor is any punctuation to be placed at the end of the caption.
- All words of the caption apart from the first one in a sentence should begin with lower-case letters (apart from names and fixed expressions).

Figure Placement and Size

- Figures should be submitted separately from the text, if possible. If added to the manuscript text file, they should appear (like tables) at the end of this file after the reference list.
- When preparing your figures, size figures to fit in the column width.
- For most journals the figures should be 39 mm, 84 mm, 129 mm, or 174 mm wide and not higher than 234 mm.

Permissions

IJPH publishes original work. If it is essential for your report to include figures that have already been published elsewhere, you must obtain permission from the copyright owner(s) for both the print and online format. Documentation of the permission must be included with the submission. Please be aware that some publishers do not grant electronic rights for free and that Springer or IJPH will not be able to refund any costs that may have occurred to receive these permissions. In such cases, material from other sources should be used.

Accessibility

In order to give people of all abilities and disabilities access to the content of your figures, please make sure that

- All figures have descriptive captions (blind users could then use a text-to-speech software or a text-to-Braille hardware)
- Patterns are used instead of or in addition to colors for conveying information (colorblind users would then be able to distinguish the visual elements)
- Any figure lettering has a contrast ratio of at least 4.5:1

ELECTRONIC SUPPLEMENTARY MATERIAL

International Journal of Public Health (IJPH) accepts supplementary files to be published online along with an article.

The material will be published as received from the author without any correction, conversion, editing, or reformatting. There will be no proof reading for supplementary material. Please make sure, before submission, that all material is free from errors and typos.

Submission

Supply supplementary material in only one file if possible. In case you submit multiple files, please name them consecutively, e.g. "ESM_3.mpg", "ESM_4.pdf".

Please include in the supplementary file(s) the following information at the top of the page: article title, journal name, author names; affiliation, and e-mail address of the corresponding author.

Submit your supplementary material in PDF format; .doc or .ppt files are not suitable for long-term viability. A collection of figures may also be combined in a PDF file.

To accommodate user downloads, please keep in mind that larger-sized files may require very long download times and that some users may experience other problems during downloading.

If supplying supplementary material, the main text of the article must make specific mention of the material as a citation, similar to that of figures and tables.

Refer to the supplementary files as "Online Resource", e.g., "as shown in the animation (Online Resource 3)", "... additional data are given in Online Resource 4".

Text, Figures, and Tables

Text, figures, tables, and references are formatted in IJPH format style.

All tables and figures and other parts of the supplementary material have a concise title or caption describing the content and mentioning the study name (if applicable), country, and year of the study.

Name the files consecutively, e.g. "ESM_3.mpg", "ESM_4.pdf".

Spreadsheets

Spreadsheets should be converted to PDF if no interaction with the data is intended.

If the readers should be encouraged to make their own calculations, spreadsheets should be submitted as .xls files (MS Excel).

Audio, Video, and Animations

Aspect ratio: 16:9 or 4:3

Maximum file size: 25 GB

Minimum video duration: 1 sec

Supported file formats: avi, wmv, mp4, mov, m2p, mp2, mpg, mpeg, flv, mxf, mts, m4v, 3gp

Specialized Formats

Specialized formats such as .pdb (chemical), .wrl (VRML), .nb (Mathematica notebook), and .tex can also be supplied.

Collecting Multiple Files

It is possible to collect multiple files in a .zip or .gz file.

Accessibility

In order to give people of all abilities and disabilities access to the content of your supplementary files, please make sure that:

The manuscript contains a descriptive caption for each supplementary material.

Video files do not contain anything that flashes more than three times per second (so that users prone to seizures caused by such effects are not put at risk).

RESEARCH DATA POLICY

The journal encourages authors, where possible and applicable, to deposit data that support the findings of their research in a public repository. Authors and editors who do not have a preferred repository should consult Springer Nature's list of repositories and research data policy.

List of Repositories

Research Data Policy

General repositories - for all types of research data - such as figshare and Dryad may also be used.

Datasets that are assigned digital object identifiers (DOIs) by a data repository may be cited in the reference list. Data citations should include the minimum information recommended by DataCite: authors, title, publisher (repository name), identifier.

Data Cite

Springer Nature provides a research data policy support service for authors and editors, which can be contacted at researchdata@springernature.com.

This service provides advice on research data policy compliance and on finding research data repositories. It is independent of journal, book and conference proceedings editorial offices and does not advise on specific manuscripts.

ETHICAL RESPONSIBILITIES OF AUTHORS

This journal is committed to upholding the integrity of the scientific record. As a member of the Committee on Publication Ethics (COPE) the journal will follow the COPE guidelines on how to deal with potential acts of misconduct.

Authors should refrain from misrepresenting research results which could damage the trust in the journal, the professionalism of scientific authorship, and ultimately the entire scientific endeavour. Maintaining integrity of the research and its presentation is helped by following the rules of good scientific practice, which include*:

- The manuscript should not be submitted to more than one journal for simultaneous consideration.
- The submitted work should be original and should not have been published elsewhere in any form or language (partially or in full), unless the new work concerns an expansion of previous work. (Please provide transparency on the re-use of material to avoid the concerns about text-recycling ('self-plagiarism').
- A single study should not be split up into several parts to increase the quantity of submissions and submitted to various journals or to one journal over time (i.e. 'salami-slicing/publishing').
- Concurrent or secondary publication is sometimes justifiable, provided certain conditions are met. Examples include: translations or a manuscript that is intended for a different group of readers.
- Results should be presented clearly, honestly, and without fabrication, falsification or inappropriate data manipulation (including image based manipulation). Authors should adhere to discipline-specific rules for acquiring, selecting and processing data.
- No data, text, or theories by others are presented as if they were the author's own ('plagiarism'). Proper acknowledgements to other works must be given (this includes material that is closely copied (near verbatim), summarized and/or paraphrased), quotation marks (to indicate words taken from another source) are used for verbatim copying of material, and permissions secured for material that is copyrighted.

Important note: the journal may use software to screen for plagiarism.

- Authors should make sure they have permissions for the use of software, questionnaires/(web) surveys and scales in their studies (if appropriate).

- Authors should avoid untrue statements about an entity (who can be an individual person or a company) or descriptions of their behavior or actions that could potentially be seen as personal attacks or allegations about that person.
- Research that may be misapplied to pose a threat to public health or national security should be clearly identified in the manuscript (e.g. dual use of research). Examples include creation of harmful consequences of biological agents or toxins, disruption of immunity of vaccines, unusual hazards in the use of chemicals, weaponization of research/technology (amongst others).
- Authors are strongly advised to ensure the author group, the Corresponding Author, and the order of authors are all correct at submission. Adding and/or deleting authors during the revision stages is generally not permitted, but in some cases may be warranted. Reasons for changes in authorship should be explained in detail. Please note that changes to authorship cannot be made after acceptance of a manuscript.

*All of the above are guidelines and authors need to make sure to respect third parties rights such as copyright and/or moral rights.

Upon request authors should be prepared to send relevant documentation or data in order to verify the validity of the results presented. This could be in the form of raw data, samples, records, etc. Sensitive information in the form of confidential or proprietary data is excluded.

If there is suspicion of misbehavior or alleged fraud the Journal and/or Publisher will carry out an investigation following COPE guidelines. If, after investigation, there are valid concerns, the author(s) concerned will be contacted under their given e-mail address and given an opportunity to address the issue. Depending on the situation, this may result in the Journal's and/or Publisher's implementation of the following measures, including, but not limited to:

- If the manuscript is still under consideration, it may be rejected and returned to the author.
- If the article has already been published online, depending on the nature and severity of the infraction:
 - an erratum/correction may be placed with the article
 - an expression of concern may be placed with the article
 - or in severe cases retraction of the article may occur.

The reason will be given in the published erratum/correction, expression of concern or retraction note. Please note that retraction means that the article is maintained on the platform, watermarked “retracted” and the explanation for the retraction is provided in a note linked to the watermarked article.

- The author’s institution may be informed
- A notice of suspected transgression of ethical standards in the peer review system may be included as part of the author’s and article’s bibliographic record.

Fundamental errors

Authors have an obligation to correct mistakes once they discover a significant error or inaccuracy in their published article. The author(s) is/are requested to contact the journal and explain in what sense the error is impacting the article. A decision on how to correct the literature will depend on the nature of the error. This may be a correction or retraction. The retraction note should provide transparency which parts of the article are impacted by the error.

Suggesting / excluding reviewers

Authors are welcome to suggest suitable reviewers and/or request the exclusion of certain individuals when they submit their manuscripts. When suggesting reviewers, authors should make sure they are totally independent and not connected to the work in any way. It is strongly recommended to suggest a mix of reviewers from different countries and different institutions. When suggesting reviewers, the Corresponding Author must provide an institutional email address for each suggested reviewer, or, if this is not possible to include other means of verifying the identity such as a link to a personal homepage, a link to the publication record or a researcher or author ID in the submission letter. Please note that the Journal may not use the suggestions, but suggestions are appreciated and may help facilitate the peer review process.

ENGLISH LANGUAGE EDITING

For editors and reviewers to accurately assess the work presented in your manuscript you need to ensure the English language is of sufficient quality to be understood. If you need help with writing in English you should consider:

- Asking a colleague who is a native English speaker to review your manuscript for clarity.

- Visiting the English language tutorial which covers the common mistakes when writing in English.
- Using a professional language editing service where editors will improve the English to ensure that your meaning is clear and identify problems that require your review. Two such services are provided by our affiliates Nature Research Editing Service and American Journal Experts. Springer authors are entitled to a 10% discount on their first submission to either of these services, simply follow the links below.
 - English language tutorial
 - Nature Research Editing Service
 - American Journal Experts

Please note that the use of a language editing service is not a requirement for publication in this journal and does not imply or guarantee that the article will be selected for peer review or accepted.

If your manuscript is accepted it will be checked by our copyeditors for spelling and formal style before publication.

ATIVIDADES ACADÊMICAS E PRODUÇÃO INTELECTUAL DURANTE O DOUTORADO

Doutorado Sanduíche

2018-2019

Bolsista Capes do Programa de Doutorado Sanduiche no Exterior 2017/2018 (Edital No 47/2017) no Dental Institute - Population and Patient Health Division, King's College London, de 01 de agosto de 2018 a 31 de janeiro de 2019, sob supervisão da Professora Dra. MBE Jennifer E Gallagher.

Vínculo Institucional

2019-2019

Professora Substituta (Contrato por prazo determinado) no Departamento de Pediatria da Faculdade de Medicina da Universidade Federal de Minas Gerais. Disciplinas de Iniciação à Atenção Primária I e Iniciação à Atenção Primária II. Carga horária 20 horas semanais.

2019-2019

Professora convidada no Departamento de Pediatria da Faculdade de Medicina da Universidade Federal de Minas Gerais. Disciplina de Iniciação à Atenção Primária III. Carga horária 04 horas semanais.

Artigos completos publicados

Mendes SR, Martins RC, Matta-Machado ATG, Mattos GC, Gallagher JE, Abreu MHNG. Dental Procedures in Primary Health Care of the Brazilian National Health System. *Int J Environ Res Public Health* **JCR**, v. 14, p. 1480, Dec 2017.

Mendes SR, Silva MES, Firmo JOA, Abreu MHNG. What haematopoietic stem cell transplant patients think about health and oral care: a qualitative study in a Brazilian health service. *Eur J Cancer Care* **JCR**, v.27, n.3, e12851, May 2018.

Mendes SR, Martins RC, Mambrini JVM, Matta-Machado ATG, Mattos GCM, Gallagher JE, Abreu MHNG. Using Item Response Theory to evaluate the psychometric characteristics of questions in a Brazilian programme and the performance of dental teams in primary care, *PLoS ONE* **JCR**, v.14, n.5, e0217249, May 2019.

Abreu MHNG, Morato ALFN, Marinho AMCL, Cunha MAM, **Mendes SR**. What has changed in the dental prosthesis procedures in Primary Health Care in Brazil?. *Braz Dent J*. 2019 sep-oct;**30**(5):519-22. doi: 10.1590/0103-6440201902695

Trabalhos apresentados em eventos científicos

XIII Encontro Científico da Faculdade de Odontologia - UFMG. “Percepções sobre saúde bucal e tratamento odontológico: estudo qualitativo com transplantados de células tronco hematopoiéticas”. 2016. [Pôster]

33ª Reunião Anual da Sociedade Brasileira de Pesquisa Odontológica (SBPqO). “Percepções sobre saúde bucal e tratamento odontológico: estudo qualitativo com transplantados de células tronco hematopoiéticas”. 2016. [Pôster]

34ª Reunião Anual da Sociedade Brasileira de Pesquisa Odontológica (SBPqO). “Procedimentos clínicos realizados pelas Equipes de Saúde Bucal aderentes ao segundo ciclo do PMAQ AB”. 2017. [Pôster]

96th General Session and Exhibition of the International Association for Dental Research (IADR). Using Item Response Theory to Evaluate Primary Care in Dentistry. 2018. [Apresentação Oral]

36ª Reunião Anual da Sociedade Brasileira de Pesquisa Odontológica (SBPqO). The influence of dentists’ profile and work management in the performance of Brazilian dental teams. 2019. [Apresentação Oral – Fórum Científico]

Resumos publicados em anais de congressos

Mendes SR, Silva MES, Firmo JOA, Abreu MHNG. Percepções sobre saúde bucal e tratamento odontológico: estudo qualitativo com transplantados de células tronco hematopoiéticas. In: 33ª Reunião Anual da SBPqO, 2016, Campinas. *Brazilian Oral Research*, 2016. v. 30. p. 511-511.

Mendes SR, Silva MES, Firmo JOA, Abreu MHNG. Percepções sobre saúde bucal e tratamento odontológico: estudo qualitativo com pacientes transplantados de células tronco hematopoiéticas. In: XIII Encontro Científico da Faculdade de Odontologia - UFMG, 2016, Belo Horizonte. *Arquivos em Odontologia*, 2016. v. 52. p. 31-31.

Mendes SR, Matta-Machado ATG, Martins RC, Abreu MHNG. Procedimentos clínicos realizados pelas Equipes de Saúde Bucal aderentes ao segundo ciclo do PMAQ AB. In: 34ª Reunião Anual da Sociedade Brasileira de Pesquisa Odontológica, 2017, Campinas. 34th SBPqO Annual Meeting. São Paulo: Caboverde, 2017. v. 31. p. 379-379.

Mendes SR, Martins RC, Mambrini JVM, Matta-Machado ATG, Mattos GCM, Gallagher JE, Abreu MHNG. Using Item Response Theory to Evaluate Primary Care

in Dentistry. In: 96th IADR/PER General Session and Exhibition, 2018, Londres. Journal of Dental Research, 2018. v. 97 B. p. 0689.

Morato ALFN, Abreu MHNG, Cunha MAM, Mendes SR, Marinho AMCL. Avaliação dos procedimentos de prótese dentária pelas Equipes de Saúde Bucal entre 2011 e 2014. In: XXVII Semana de Iniciação Científica da UFMG, 2018, Belo Horizonte. Anais da XXVII Semana de Iniciação Científica - PRPq UFMG, 2018.

Mendes SR, Martins RC, Mambrini JVM, Matta-Machado ATG, Mattos GCM, Gallagher JE, Abreu MHNG. The influence of dentists' profile and work management in the performance of Brazilian dental teams. In: 36ª Reunião Anual da Sociedade Brasileira de Pesquisa Odontológica, 2019, Campinas. Brazilian Oral Research - 36th SBPqO Annual Meeting. São Paulo: Cobo Verde, 2019. v. 33. p. 79-79.

Outras atividades acadêmicas

2016–2016

Voluntária: Acompanhamento e orientação de estudantes de graduação em relação ao atendimento clínico odontológico, sob supervisão do Professor Dr. Mauro Henrique Nogueira Guimarães de Abreu, na disciplina de "Atenção ao Adulto II", no segundo semestre de 2016. Quatro horas semanais, totalizando 48 horas/aula.

2017–2017

Voluntária: Acompanhamento e orientação de estudantes de graduação em relação ao atendimento clínico odontológico, sob supervisão do Professor Dr. Mauro Henrique Nogueira Guimarães de Abreu, na disciplina de "Atenção ao Adulto II", no segundo semestre de 2017. Quatro horas semanais, totalizando 48 horas/aula.

2017-2017

Monitoria Voluntária: Monitora voluntária de Pós-Graduação nas disciplinas de "Metodologia da Pesquisa Odontológica I e II" e "Normalização Bibliográfica". Quatro horas semanais, perfazendo uma carga horária total de 54 horas/aula.

2017-2017

Professora Convidada: Professora convidada no Curso de Auxiliar de Saúde Bucal - ASB da Faculdade de Odontologia da UFMG no 1º semestre de 2017. "Materiais e Prótese" com carga horária de duas horas; "Administração de Consultório" com carga horária de oito horas; "Anatomia Teórica e Prática" com carga horária de quatro horas; "Epidemiologia" com carga horária de quatro horas.

2018-2018

Organização: organização do 2º Curso de Verão – Capacitação em Métodos de Pesquisa e Produção do conhecimento, coordenado pela Profa. Isabela Almeida Pordeus e realizado no período de 29 de janeiro de 2018 a 08 de fevereiro de 2018, na Faculdade de Odontologia da Universidade Federal de Minas Gerais.

2018-2018

Monitoria Voluntária: Monitora voluntária do 2º Curso de Capacitação de Métodos de Pesquisa e Produção do Conhecimento – “Bioestatística”; coordenado pela Profa. Isabela Almeida Pordeus e realizado na Faculdade de Odontologia da UFMG, no período de 29 de janeiro de 2018 a 02 de fevereiro de 2018, com carga horária total de 45 horas.

2018-2018

Monitoria Voluntária: Monitora voluntária do 2º Curso de Capacitação de Métodos de Pesquisa e Produção do Conhecimento – “Modelos de Regressão Lineares e Logística em Saúde”; coordenado pela Profa. Isabela Almeida Pordeus e realizado na Faculdade de Odontologia da UFMG, no período de 05 de fevereiro de 2018 a 08 de fevereiro de 2018, com carga horária total de 32 horas.

2018-2018

Voluntária: Acompanhamento e orientação de estudantes de graduação em relação ao atendimento clínico odontológico, sob supervisão do Professor Dr. Mauro Henrique Nogueira Guimarães de Abreu, na disciplina de "Atenção ao Adulto II", no primeiro semestre de 2018. Quatro horas semanais, totalizando 48 horas/aula.

2019-2019

Professora Voluntária na disciplina optativa ‘Oficina de elaboração de artigos científicos’ do Programa de Pós-Graduação em Odontologia, nível Mestrado e Doutorado, da Faculdade de Odontologia da UFMG, no período de 18 a 22 de fevereiro de 2019, com carga horária total de 20 horas.

2019-2019

Professora Voluntária na disciplina de "Prática de Saúde Baseada em Evidências", ministrando a aula teórica "Utilização do CASP - Critical Appraisal Skills Programme", com carga horária total de 04 horas.

2019-2019

Equipe de apoio na 36ª Reunião Anual da Sociedade Brasileira de Pesquisa Odontológica (SBPqO). Campinas, São Paulo. 2019.

Bancas e Comissões Julgadoras

2018-2018

Comissão de pré-avaliação de projetos para a 17ª Feira Brasileira de Ciências e Engenharia, da Escola Politécnica da Faculdade de São Paulo, nos meses de novembro e dezembro de 2018.

2019-2019

Avaliadora de trabalhos científicos no I Encontro Científico de Odontologia da Faculdade Arnaldo. Faculdade Arnaldo. Belo Horizonte, MG. 2019.

2019-2019

Participação da banca do trabalho de Rafael Franco de Lima. 'Tempo de espera e experiência de dor dos pacientes com necessidade de tratamento endodôntico: do referenciamento da atenção primária ao atendimento especializado'. Trabalho de Conclusão de Curso (Graduação em Odontologia) - Universidade Federal de Minas Gerais. 2019.

2019-2019

Comissão de Bolsas para avaliar solicitações feitas ao Colegiado de Pós-Graduação em Odontologia da UFMG (EDITAL 2019) - representante discente. Universidade Federal de Minas Gerais. 2019.

2019-2019

Comissão Escrutinadora na Eleição para Representante Discente 2019/2020 de Pós-Graduação em Odontologia da Universidade Federal de Minas Gerais. 10 de setembro de 2019.

2019-2019

Comissão de Avaliação durante a XXVIII Semana de Iniciação Científica, promovida pela Pró-Reitoria de Pesquisa da Universidade Federal de Minas Gerais, no período de 14 de outubro de 2019 a 18 de outubro 2019.