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☑ Implementation science in nursing, health, and education

Elaboration and validity of admission and discharge checklists in Neonatal Intensive Care Units

Elaboração e validação de checklists de admissão e alta em Unidades de Terapia Intensiva Neonatal

Elaboración y validación de listas de verificación de ingreso y alta en Unidades de Cuidados Intensivos Neonatales

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ABSTRACT

Objective: To develop and validate the content of checklists for safe admission and discharge in Neonatal Intensive Care Units.

Methods: A methodological study conducted between 2018 and 2020 in four stages: 1) literature review; 2) checklist construction; 3) content validity by 32 neonatal nursing specialists from different Brazilian states, predominantly from the southeastern region; 4) development of the final version of the instruments. Validity was performed using a Likert-type scale. Items with a Content Validity Index of 0.90 or higher were accepted. Descriptive statistics were used for data analysis.

Results: The contents of two checklists were constructed and validated: one for admission, with 18 items, and another for discharge, with seven items. For the admission checklist, 41.03% of items were validated in the first round, 33.33%, in the second, and 23.08%, in the third. One item was excluded for not achieving the minimum Content Validity Index (>0.90). For the discharge checklist, all items achieved a CVI ≥ 0.90, with 64.7% validated in the first round and 35.3% in the second round. No items were excluded.

Conclusion: The content of patient safety checklists for admission and discharge in Neonatal Intensive Care Units was considered valid.

Descriptors: Patient Safety. Neonatal Intensive Care Units. Checklist. Patient Admission. Patient Discharge.

RESUMO

Objetivo: Elaborar e validar o conteúdo de *checklists* para a admissão e alta seguras em Unidades de Terapia Intensiva Neonatal.

Métodos: Estudo metodológico, realizado entre 2018 e 2020, em quatro etapas: 1) revisão de literatura; 2) construção dos *checklists*; 3) validação de conteúdo por 32 enfermeiros especialistas em neonatologia de diferentes estados brasileiros, predominantemente da região Sudeste; 4) elaboração da versão final dos instrumentos. A validação se deu por meio de escala tipo Likert. Foram aceitos itens com Índice de Validade de Conteúdo igual ou superior a 0,90. Para análise dos dados, utilizou-se estatística descritiva.

Resultados: Foram construídos e validados os conteúdos de dois *checklists*: um para admissão, com 18 itens, e outro para alta, com sete itens. Para o de admissão,41,03% dos itens foram validados na primeira rodada,33,33%, na segunda, e 23,08%, na terceira. Um item foi excluído por não atingir Índice de Validade de Conteúdo mínimo (>0,90). Para o *checklist* de alta, todos os itens obtiveram ICV ≥ 0,90, sendo 64,7% validados na primeira rodada e,35,3%, na segunda rodada. Nenhum item foi excluído.

Conclusão: O conteúdo dos *checklists* de segurança do paciente para a admissão e alta em Unidades de Terapia Intensiva Neonatal foi considerado válido.

Descritores: Segurança do Paciente. Unidades de Terapia Intensiva Neonatal. Lista de Checagem. Admissão do Paciente. Alta do Paciente.

RESUMEN

Objetivo: Elaborar y validar el contenido de listas de verificación para la admisión y el alta seguras en Unidades de Cuidados Intensivos Neonatales.

Métodos: Estudio metodológico realizado entre 2018 y 2020 en cuatro etapas: 1) revisión de la literatura; 2) construcción de

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las listas de verificación; 3) validación de contenido por 32 enfermeros especialistas en neonatología de diferentes estados brasileños, predominantemente de la región Sudeste; 4) elaboración de la versión final de los instrumentos. La validación se realizó mediante una escala Likert. Se aceptaron ítems con un Índice de Validez de Contenido igual o superior a 0,90. Se utilizó estadística descriptiva para el análisis de los datos.

Resultados: Se construyeron y validaron los contenidos de dos listas de verificación: una para la admisión, con 18 ítems, y otra para el alta, con siete ítems. Para la lista de verificación de admisión, el 41,03% de los ítems fueron validados en la primera ronda, el 33,33%, en la segunda, y el 23,08%, en la tercera. Un ítem fue excluido por no alcanzar el Índice de Validez de Contenido mínimo (>0,90). Para la lista de verificación de alta, todos los ítems obtuvieron un IVC ≥ 0,90, con un 64,7% validados en la primera ronda y un 35,3% en la segunda ronda. Ningún ítem fue excluido.

Conclusión: Se consideró válido el contenido de las listas de verificación de seguridad del paciente para la admisión y el alta en Unidades de Cuidados Intensivos Neonatales.

Descriptores: Seguridad del Paciente. Unidades de Cuidado Intensivo Neonatal. Lista de Verificación. Admisión del Paciente. Alta del Paciente.

INTRODUCTION

Care in Neonatal Intensive Care Units (NICUs) can be threatened by the occurrence of adverse events (AEs), which present obstacles to patient safety (PS), negatively impacting the clinical outcomes of hospitalized newborns (NBs)[1,2].

The discussion surrounding AEs is of international relevance: in Germany, researchers identified an occurrence rate of 1.1 AEs per hospitalized neonate in the NICU[3]. In Brazil,30 AEs were observed among 22 hospitalized pediatric and neonatal patients[4]. In the United States, 14.1% of neonates experienced an AE after discharge, with nearly half being preventable[5]. This highlights a need for strategies to prevent the occurrence of AEs, and promoting PS.

Neonatal care requires measures to ensure safety from admission through discharge from the NICU[6]. During admission, complex care is necessary to ensure the survival of the NB[7]. Discharge, however, is no less challenging, as parents need to cope with stress, fear, uncertainty and lack of confidence in their role as parents, in addition to needing to develop adequate skills to continue caring for the NB at home[6–9].

The transition of care from the delivery room to the NICU or from the NICU to home is characterized as a critical moment in care, characterized by significant changes in the NB's care plan, in which there is a formal transfer of patient information and responsibilities related to the neonate care[10,11]. These moments of transition of care present additional risks for errors[12], such as communication failures, omission of important information or inappropriate transfer of information[13]. Therefore, to avoid the occurrence of AEs associated to the transition of care, it is essential to adhere to four pillars: communication; teamwork; family integration; and standardization[11].

As a strategy to mitigate variability and improve the transition of care at the time of admission and discharge, the implementation of checklists can be an efficient tool for systematizing actions, providing reminders to professionals, promoting communication among the professional team, increasing family engagement, and providing data for analysis and improvement of care *performance*, thereby preventing the omissions of a certain task or its incorrect execution[14,15].

Within the scope of healthcare services, professionals recognize this tool as important for the quality of care[16], and its use has brought important impacts, such as safe surgery, as proposed by the World Health Organization[14]. In NICUs, checklists are used to systematize central venous access puncture, sedation and analgesia, and orotracheal intubation[14]. However, there is an alert for a knowledge gap regarding the use of checklists in the context of safe care at admission and discharge in neonatology[16], which is the focus of this study.

Thus, the process of developing and validating checklists that address nursing care based on PS at admission and discharge of newborns is presented as a strategy to establish safety barriers and enhance neonatal care. This study aimed to develop and validate checklist content for safe admission and discharge in NICUs.

METHOD

This is a methodological study aimed at developing and validating the content of two nursing care checklists on PS in NICUs during NB admission and discharge. The study was conducted in four phases: literature review; construction of the first version of the checklist; content validation by experts; and final development of the instrument. These stages were defined based on psychometrics principles, which guide the development of health measurement instruments[17].

The first stage consisted of developing an integrative review based on the research question: what elements should comprise nursing care checklists for PS in NICUs? Studies published between 2010 and 2019 that described nursing care recommendations for NB safety during admission and discharge from NICUs were considered.

The literature search was conducted in seven databases: Medical Literature Analysis and Retrieval System Online (MEDLINE) via PubMed; *Banco de Dados em Enfermagem* (BDENF); Cumulative Index to Nursing and Allied Health Literature (CINAHL); US National Library of Medicine (PubMed);

Latin American and Caribbean Literature in Health Sciences (LILACS); *Cochrane Library*; and Scopus. For the Virtual Health Library (VHL), the Health Sciences Descriptors (DeCs) and Medical Subject Headings (MeSH) were used *"Segurança", "Medidas de Segurança", "Gestão da Segurança", "Segurança do Paciente", "Erros de Medicação", "Pele", "Sistemas de Identificação de Pacientes", "Cuidados de Enfermagem", "Unidades de Terapia Intensiva Neonatal", "Cuidados Críticos", "Comunicação", "Recém-Nascido"* and *"Controle de Infecções e Acidentes por Quedas"*. For MEDLINE, BDENF, CINAHL, PubMed, LILACS, Cochrane Library and Scopus, the following were used: "Safety", "Safety Measures", "Safety Management", "Patient Identification System", "Patient Safety", "Medication Errors", "Intensive Care, Neonatal", "Critical Care", "Infant Newborn", "Communication", "Skin", "Neonate", "Infection", "Accidental Falls".

A total of twenty-seven articles were selected that presented nursing care recommendations for NBs based on the National Patient Safety Program[18] and the International Patient Safety Goals[19].

In the second stage, the first version of the two checklists was developed based on the results found in the literature review. The instruments were structured on a double-sided page, with the title, heading and actions for improving PS. The actions were organized into two columns: the first had the item to be checked; and the second column had a box for marking the answer "yes" or "no". The back of the checklist contained instructions for completing each item.

The third stage consisted of sending the checklists to neonatology experts for validation purposes. For the selection of experts, nurses with at least two years of experience in neonatal units, specialization/residency in neonatology or master's/doctoral/postdoctoral degrees with a dissertation/thesis in child health were included.

The professionals were selected by convenience and through the Lattes Platform, using targeted searches with the keywords "Neonatology", "Child Health", "Patient Safety" and "Neonatal Intensive Care". To identify professionals who were not in the research and teaching area and, therefore, did not have a CV registered on the Lattes Platform, the "snowball" technique was used[20]. Thus, the initial participants suggested the names and e-mails of potential respondents who met the inclusion criteria. In the first contact, made via the Lattes Platform or by e-mail, an explanatory letter was sent about the relevance of the concepts involved and the instruments, the study objective, the description of the checklists, how to fill them out, and the reason why they were invited to participate in the research. A total of 263 professionals were invited, of which 220 did not return contact within a period of up to ten days and were excluded from the study. Thus, 43 professionals participated and signed the Informed Consent Form (ICF). A period of up to 15 days was considered for completing and returning the instruments. Participants answered questions regarding their characteristics (age, gender, time since graduation, time working in neonatology and additional training) and questions to evaluate the checklist items.

The questionnaires used in the validation stage were created on the Survey Monkey® platform and sent to all participants. Professionals gave their opinions on the relevance, objectivity, clarity and relevance of each of the items described[21]. For this, a Likert-type scale was used, with: 1 = disagree; 2 = neither agree nor disagree; and 3 = agree. When marking the answers 1 or 2, the participant was asked to justify their answer and make suggestions or comments for item modifications.

After each round of responses, the data were analyzed based on the Content Validity Index (CVI)[20]. This score was calculated from the sum of the items marked as "agree" (3) and divided by the total number of responses. The content that did not achieve a CVI of 0.90 was reformulated and sent to a new round of validation[20].

Finally, the fourth stage involved proposing the final version of the two checklists after the validation process by the experts.

This study was conducted following the ethical precepts of Resolution No. 466/2012 of the National Health Council, and received approval from the Research Ethics Committee of the *Universidade Federal de Minas Gerais*, under Opinion No.2,172,832 and Certificate of Presentation for Ethical Assessment (CAAE) No. 69001317,0,0000,5149.

RESULTS

The literature review pointed out to six main dimensions of PS, on which the first version of the checklists was based: patient identification; effective communication with family inclusion; safe medication administration; prevention of healthcare-associated infections; prevention of falls; and prevention of skin lesions. Considering good practices in open science communication, the data related to the 27 studies considered in the review can be found in the SciELO Data repository under DOI available at: https://doi.org/10.48331/scielodata.OGNKQV.

In the second stage, the first version of the two checklists was developed based on the actions extracted from the review studies. The checklists were initially named "Neonatal patient safety checklist – admission" and "Neonatal patient safety checklist – discharge planning". The admission checklist was structured with 18 items, and the discharge checklist, with seven items. All items presented instructions

beginning with a verb that indicated how to perform the PS improvement activity.

The third stage consisted of three rounds, and of the 263 professionals invited, 220 did not return the initial contact. Therefore, 43 professionals completed the first round of validation. In the second round, the same 43 professionals were invited again to answer the questionnaire, and 33 responded. In the third round, 32 of the 33 professionals contacted responded to all items. Ten professionals withdrew between the first and second rounds of validation, and one professional withdrew between the second and third rounds due to lack of response after four attempts to contact them.

The profile of the experts who participated in all stages of content validation (n=32) was predominantly female (96.87%), with an average age of 40.34±8.12 years. In this research, we made sure to include at least one expert from each of the five regions of Brazil, with the majority coming from the Southeast region (75%). Regarding professional training, 30 nurses (93.75%) had additional training, five of whom had doctorates (15.82%), six had master's degrees (18.75%) and 19 were experts in neonatology (59.93%), with 13.22±8.16 years of experience in neonatology.

The experts evaluated both the item to be assessed and its instructions for completion, as well as the title, guidance and heading, in three rounds of validation. To facilitate the presentation of the items, they were numbered and identified as PA (patient admission), in the items belonging to the admission checklist, and PD (patient discharge), for the discharge checklist.

Charts 1 and 2 present, respectively, the final version of the items of the admission and discharge checklists, with the final CVI and the round in which the item was validated.

In Chart 1, of the 39 topics evaluated regarding the patient admission checklist, 48.72% (n=19) were validated in the first round. The remaining items were modified according to the experts' suggestions, with 30.77% (n=12) being validated in the second round and 17.95% (n=7) in the third. Only one item, which referred to medication safety (item PA7), was evaluated with a CVI of 0.88 at the end of the three rounds and was therefore excluded from the final version of the checklist.

Chart 2 shows the CVI of the checklist for the period of preparation for patient discharge. The experts' evaluation resulted in 100% of the 17 items evaluated with a CVI greater than or equal to 0.90 until the second round of validation, with 64.70% (n=11) in the first round, and the remaining items validated in the following round after suggested adjustments.

Chart 1 – Final Content Validity Index of the admission checklist items. Belo Horizonte, Minas Gerais, Brazil, 2024.

Item	Final Description	Final CVI* (n experts†)	Validation round
Title	Patient safety checklist for nursing care for admission to Neonatal Intensive Care Units.	0.94 (n=30)	3rd
Guidance	To be completed by the nurse responsible for the admission of the newborn to the Neonatal Intensive Care Unit, immediately after respiratory and hemodynamic stabilization. Keep it near the bedside, in a visible place, easily accessible to professionals and the patient's family. TBelow are the instructions for each item in the checklist.	0.94 (n=31)	2nd
Header	Mother's name – Newborn's name – Bed number – Medical record – Gender (Female, Male or Undefined) – Date of birth – Days of life – Time of birth – Gestational age at birth – Corrected age – APGAR (1st min/5th min) – Birth weight – Admission weight.	0.91 (n=29)	3rd
PA1‡	Wristband attached to one of the lower limbs, preferably containing the mother's name, without abbreviations, and the newborn's date of birth legible.	0.91 (n=30)	2nd

Chart 1 – Cont.

Item	Final Description	Final CVI* (n experts†)	Validation round
Instruction PA1	Check whether the identification wristband is present and attached, preferably to one of the ankles, containing the mother's name, without abbreviations, and the newborn's date of birth, legible.	0.94 (n=30)	3rd
PA2	Newborn's wristband data should be verified against the mother's data by double-checking with the father, a companion or another health professional (in the absence of the former).	0.81 (n=30)	2nd
Instruction PA2	Check with a family member or companion authorized by the mother, in her absence, whether the data on the identification wristband matches the mother's data. If they are not present, another health professional may perform the verification.	0.98 (n=42)	1st
PA3	Check for an identification plate of the newborn affixed to the crib or incubator containing the mother's name, without abbreviations, newborn's name, gender, hospital registration number, date of birth, and admission date.	0.91 (n=29)	3rd
Instruction PA3	Check for an identification plate on the bed containing the mother's name, newborn's name, gender, hospital registration number, date, time, and birth weight.	1.0 (n=32)	3rd
PA4	Companion informed with accessible language about the unit's routine and the indication for hospitalization, who should explain to the nurse the message they just received to avoid misunderstanding.	0.90 (n=38)	1st
Instruction PA4	Check if the companion was informed and understood the information received (by repeating the instructions) regarding unit routines, such as hand hygiene, noise reduction, prohibition of cell phone use, free access for parents to accompany the newborn (remaining only in the patient's bed area), and rules for visit release.	0.94 (n=31)	2nd
PA5	Companion encouraged to be beside the newborn.	0.91 (n=39)	1st
Instruction PA5	Check if the companion, preferably the mother or father, was encouraged to be beside the newborn during their stay in the Neonatal Intensive Care Unit, as the Child and Adolescent Statute guarantees the companion's full-time presence, and family participation contributes to patient safety.	0.91 (n=39)	1st
PA6	Companion informed about the procedures to be performed, and the care provided to the newborn upon admission, who should explain to the nurse the message they just received to avoid misunderstanding.	0.98 (n=42)	1st

Chart 1 – Cont.

Item	Final Description	Final CVI* (n experts†)	Validation round
Instruction PA6	Check if the companion is aware and understood the information received (by repeating the instructions) regarding the necessity and importance of the procedures and care to be provided to the newborn during the admission process in the Neonatal Intensive Care Unit.	0.91 (n=39)	1st
PA7	Nursing professional informed about the safe medication administration process, who should explain to the nurse the message they just received to avoid misunderstanding.	0.88 (n=28)	Retirada
Instruction PA7	Check if the nursing professional is aware and understood the information received (by repeating the instructions) regarding the safe medication administration process, considering the nine standardized rights and if they use them in their daily practice: right patient – with verification of the identification wristband at each administration, right medication, right route, right time, right dose, right documentation, right action, right form, and right response.	0.91 (n=30)	Retirada
PA8	Vascular access lines identified with the corresponding infusion solution and connectors secured.	0.94 (n=31)	2nd
Instruction PA8	Check if the vascular access lines are identified with the corresponding infusion solution, according to the medical prescription, and if the connectors are secured and leak-free.	0.94 (n=31)	2nd
PA9	Infusion pumps and labels of solutions checked.	0.93 (n=39)	1st
Instruction PA9	Check if the infusion pumps are labeled with the corresponding solution, total volume, and appropriate flow rate, as per the medical prescription. Check if the labels contain at least the patient's full name, bed number, medical record number, name of the solution/medication to be infused, qualitative and quantitative description of the components added to the solution, volume and infusion rate, route of administration, date and time of preparation, and identification of the professional who prepared it. Such labels should preferably be printed by the pharmacy and delivered to the nursing professional along with the medication and components for the solution preparation.	0.91 (n=30)	2nd
PA10	Nursing professional certifies the existence of infection-related risks.	0.94 (n=30)	3rd

Chart 1 – Cont.

Item	Final Description	Final CVI* (n experts†)	Validation round
Instruction PA10	Check if the nursing professional certifies the existence of actions and devices that prevent infection-related risks, such as precautionary norms, hand hygiene moments, disinfection of vascular catheter connectors with 70% alcohol or alcoholic chlorhexidine, the necessity of catheter, tube, and probe permanence, as well as concurrent disinfection of surfaces, materials, and equipment in the bed.	0.91 (n=29)	3rd
PA11	Hand sanitizer dispenser near the patient.	0.91 (n=39)	1st
Instruction PA11	Check if there is a gel alcohol dispenser near the patient for hand hygiene.	0.93 (n=40)	1st
PA12	Temperature and humidity of the incubator or crib temperature appropriate for gestational age and the newborn's needs.	0.95 (n=41)	1st
Instruction PA12	Check if the temperature and humidity of the incubator or the crib temperature are appropriate for the gestational age and needs of the patient. It is suggested that reference values be kept near the bed to facilitate verification by the nursing team.	1.00 (n=33)	2nd
PA13	Wheels of the crib or incubators locked.	1.00 (n=43)	1st
Instruction PA13	Check if the wheels of the crib or incubator are locked, due to the risk of equipment movement and consequent falls, as the MS fall prevention protocol advises that accommodations and furniture be adapted to the age of the patients.	1.00 (n=43)	1st
PA14	Sides of the heated crib or port holes locked.	0.98 (n=42)	1st
Instruction PA14	Check if the sides of the heated crib or the port holes are properly locked, due to the risk of patient falls.	0.98 (n=42)	1st
PA15	Incubator tray and elevation of the heated crib or incubator functioning.	1.00 (n=43)	1st
Instruction PA15	Check if the incubator tray and the elevation of the head of the crib or incubator are moving and locking properly, due to the risk of patient falls.	0.98 (n=42)	1st
PA16	Gastric tube and vascular, ventilatory, and monitoring devices positioned and secured to prevent injuries.	0.95 (n=41)	1st

Chart 1 – Cont.

Item	Final Description	Final CVI* (n experts†)	Validation round
Instruction PA16	Check if the gastric tube and vascular, ventilatory, and monitoring devices are positioned and secured to prevent injuries and other complications resulting from improper positioning, such as accidental extubation, loss of vascular access, and gastric tube, which could necessitate new procedures that could have been avoided.	0.91 (n=39)	1st
PA17	Nursing professional certifies the positioning of the newborn, including the frequency of position changes and pressure relief according to their clinical condition.	0.97 (n=32)	2nd
Instruction PA17	Check if the nursing professional certifies the positioning of the newborn according to their clinical condition, including position changes/pressure relief and rotation of the oximetry sensor. Always observe the need for a containment nest with height proportional to the patient.	0.94 (n=30)	3rd
PA18	Removal of residual chlorhexidine from the newborn's skin.	0.91 (n=30)	2nd
Instruction PA18	Check whether the chlorhexidine has been completely removed from the newborn's skin after the end of the procedures in which its use was necessary, to avoid burns.	0.91 (n=39)	1st

*CVI = Content Validity Index; †n= number of experts who evaluated the item with a score of 3 = agree; ‡PA = admission.

Chart 2 – Final Content Validity Index of the discharge preparation checklist items. Belo Horizonte, Minas Gerais, Brazil, 2024

Item	Final Description	Final CVI* (n experts†)	Validation round
Title	Checklist for patient safety in preparing for discharge from the Neonatal Intensive Care Unit.	1.00 (n=33)	2nd
Guidance for completion	To completed by the nurse responsible for the child as soon as the discharge planning for the newborn from the Neonatal Intensive Care Unit begins (whether transfer to a Joint Accommodation, another hospital institution, or discharge home) and completed before the newborn's departure. The guidance should be verbally provided by the nurse to the mother, father, or caregiver, who preferably has been accompanying the child during hospitalization and will continue to care for them after discharge. They should explain to the nurse the message they just received to avoid misunderstandings and potential errors that could harm the newborn. It will remain near the bedside in a visible location for access by all professionals and family members of the patient. Below are the instructions for each item in the instrument.	0.95 (n=41)	1st

Chart 2 – Cont.

Item	Final Description	Final CVI* (n experts†)	Validation round
Header	Mother's name – Newborn's name – Bed number – Medical record – Gender (Female, Male, or Undefined) – Days of life – Days of hospitalization – Date of birth – Gestational age at date of birth – Corrected age – Birth weight – Discharge weight – Developed any allergies? If yes, to: – Exclusive breastfeeding – Reason for hospitalization.	0.94 (n=31)	2nd
PD1‡	Child's booklet filled with identification data of the newborn, complete information about prenatal care, delivery, postpartum, birth, and hospital admission.	0.91 (n=39)	1st
Instruction PD1	Check if the child's booklet is correctly filled with complete identification data of the newborn, complete information about prenatal care, delivery, birth, and the discharge summary with relevant information from the hospital admission, including vaccinations and neonatal screening tests, according to the newborn's age, weight, and clinical condition.	0.97 (n=32)	2nd
PD2	Companion informed about the need for follow-up on the newborn's health conditions.	0.95 (n=41)	1st
Instruction PD2	Check if the companion was informed about the importance of maintaining follow-up consultations for the newborn at the Health Center in their home area and whether the first appointment was scheduled, either in Primary Care and/or in the reference service outpatient clinic of the institution.	1.00 (n=33)	2nd
PD3	Companion informed on the prescription and storage of medications for home use.	0.91 (n=39)	1st
Instruction PD3	Check if the companion was informed about the prescription and storage of home medications.	0.94 (n=31)	2nd
PD4	Companion trained for the administration of home medications.	0.91 (n=39)	1st
Instruction PD4	Check if the companion was trained for the administration of home medications.	0.94 (n=31)	1st
PD5	Companion informed about infection risks in the extra-hospital environment.	0.95 (n=41)	1st
Instruction PD5	Check if the companion was informed about the risks of infection in the extra-hospital environment, such as hand hygiene before touching the newborn or handling objects they might put in their mouth, avoiding exposure to extreme weather conditions, cigarette smoke, and house dust mites.	0.93 (n=40)	1st

Chart 2 – Cont.

Item	Final Description	Final CVI* (n experts†)	Validation round
PD6	Companion informed about fall risks and proper transportation of the newborn.	0.98 (n=42)	1st
Instruction PD6	Check if the companion was informed about the risks of falls and the proper way to transport the newborn.	0.95 (n=41)	1st
PD7	Companion informed about skin care and body hygiene.	0.98 (n=42)	1st
Instruction PD7	Check if the companion was informed about skin care and body hygiene, such as the appropriate temperature for immersion bathing and preventing the accumulation of secretions in the diaper area.	0.95 (n=41)	1st

*CVI = Content Validity Index; †n= number of experts who evaluated the item with a score of 3 = agree; ‡PD = discharge.

The final versions of the checklists available at https://doi.org/10.48331/scielodata.OGNKQV address the dimensions "patient identification", "effective communication", "medication safety", "prevention of healthcare-associated infections", "fall prevention" and "skin injury prevention". The structure is maintained on a single page (front and back).

The final version of the admission checklist included three items in each of the dimensions: "patient identification", "effective communication", "prevention of healthcare-associated infections", "fall prevention" and "skin injury prevention". In the item "medication safety", the checklist was finalized with two items.

The final version of the discharge preparation checklist included one item in each of the dimensions "patient identification", "effective communication", "prevention of healthcare-associated infections", "fall prevention" and "skin injury prevention" and two items in the dimension "medication safety".

DISCUSSION

Due to the increasing complexity of healthcare, the number of AEs and incidents related to this care has increased substantially, making PS the central focus of the activities developed by professionals[14]. Therefore, maximum protection and prevention barriers are necessary, through various strategies. In the present study, two checklists were proposed: one for admission and another for discharge of newborns in the NICU, which has been encouraged as a strategy to promote PS, and can also be adapted to individual care contexts, minimizing the occurrence of AEs[16].

Among the main characteristics of a checklist are its non-normative and rigid nature, as well as its simplicity, objectivity, and solid theoretical basis[14,22]. By systematizing care and reducing variability among professionals, these instruments enhance teamwork and effective communication, in addition to allowing tasks to be carried out in a specific order and minimizing the forgetfulness of any step due to inattention or overconfidence[14,22].

Additionally, checklists need to be applicable in different scenarios and capable of measurement[14]. To achieve these characteristics, it is crucial to ensure a careful process of development and validation, as well as the involvement of experienced professionals. The participation of specialized nurses in bedside care with expertise in teaching/research significantly contributes to the theoretical evaluation of the content of an instrument and its applicability in clinical practice[16]. Corroborating the evidence found, the collaboration of experts in the development of the items of both checklists proposed in the present study is notable, resulting in agreement rates that evolved from 0.30 to 0.91. It is worth noting that it was possible to obtain CVI > 0.9 in almost all items evaluated.

Regarding the theme of checklists, a literature review indicated that, in the field of pediatrics, these tools are mainly aimed at safe surgery, safe use of medications, effective communication, intensive care, tracheal intubation, transfusion of blood components and radiography[23]. Similar content was addressed in the checklist resulting from the present study,

which was also based on a literature review but focused on the neonatal population. This demonstrates that the concerns in neonatology and pediatrics are similar, despite the specificities of each age group. However, no checklists for the moments of discharge and admission were found in the literature, making this study pioneering in this context.

The moments of admission and discharge are considered critical in the neonatal scenario. Admission to neonatal units is essential to ensure the survival of critical neonates, especially premature ones. This is a period of adaptation of the fetal pattern to the extrauterine environment, in which physiological immaturity is evident. The actions adopted at this time, therefore, significantly impact their prognosis and development[9].

The increasing advancement in healthcare has allowed the survival of many critically ill newborns. However, many of these patients present complex and chronic health problems that remain permanent after hospital discharge[24]. Therefore, the moment of discharge is also considered critical, since the safe transition and coordination of care, which is sometimes quite specific, from health professionals to family or caregivers must be ensured[9].

An ideal transition of care should be safe, timely, efficient, effective, equitable, patient- and family-centered, and socially responsible[11]. To achieve these criteria, standardization and efficiency of communication and care have been defined as factors to be considered. In turn, these can be efficiently achieved through the use of instruments such as checklists[11]. A limiting and challenging point in preparing for hospital discharge is the lack of systematization, standardization, and recording of actions, which can influence parental stress, waste of time, and increase insecurity[9,11]. Therefore, there is a clear need to systematize and ensure quality and safety during these two moments of neonatal hospitalization. Notably, the checklists proposed in this study make progress on these points, potentially serving as crucial factors in the systematization and standardization of admission and discharge[25].

Among the international PS goals, correct patient identification stands out, and failures in this process predispose to AEs, especially at crucial moments such as admission and discharge. A scoping review, which focused on mapping the strategies used to identify newborns, showed the use of identification bracelets in ten of the 11 articles included in the search[26]. However, another study conducted during the admission of newborns to a NICU showed that, although 80% of the newborns had identification wristbands, none of these wristbands contained their validated information[27]. This failure in the verification may be an indication of the lack of importance assigned by the team to safety measures aimed at patient identification[26,28]. Thus, the use of the checklist once again serves as a reminder to professionals and, above all, an important systematization tool in these processes.

Regarding the variable of effective communication, which is part of this checklist, this is a process whose failures also lead to AEs, which is why it was established as the second international goal of PS and is the subject of a significant number of scientific publications. Thus, it is recommended that preparation for discharge should begin immediately after admission, together with the family[24]. This timely preparation allows the family to develop competencies and skills for home care, reducing stress, anxiety and readmission rates[25,29]. It is the nurse's responsibility to provide guidance and supervise this transition of care, with effective communication being essential strategy to ensure a safe discharge. Some educational technologies can contribute to this moment, such as booklets, folders and the use of checklists[29].

Regarding the domain of medication safety, an integrative literature review indicated that the use of a checklist focused on this topic contributed to increasing the quality of medical prescriptions, reducing administration errors, and early identification of these errors for timely interventions[23]. Regarding the home setting, it is noteworthy that medication errors are the main AEs after discharge[24] and, therefore, this is a fundamental issue for discussion during both the admission and discharge of neonatal patients.

Infections associated with healthcare are among the greatest concerns of NICUs since, during the neonatal period, the immaturity of the immune system contributes to infections being an important cause of morbidity and mortality of hospitalized NBs. Therefore, infection prevention should occur from birth until the newborn's hospital discharge. A cohort study that followed preterm NBs for 24 months showed that 47% needed to be readmitted after hospital discharge, 70% of which were due to respiratory tract infections and 15% due to other infectious diseases[30]. In line with this information, hand hygiene emerges as a simple strategy to be followed by healthcare professionals and the family and should be continued at home. In a Nigerian study, in which 459 opportunities for hand hygiene in the home environment during newborn care were observed, only 1% were considered adequate[31]. This same study shows that recommendations at discharge are infrequent and not standardized, resulting in mothers forgetting them one week after discharge[31].

The care of the newborn's skin, as addressed in the proposed checklists, is also highlighted. The skin is the main barrier of the human body against pathogens, favoring thermoregulation and electrolyte balance[32]. Due to the immaturity of the newborn's skin – especially the stratum

corneum – and its consequent vulnerability to the external environment, it is essential to monitor the skin and temperature of the NB from admission[32]. In addition to guiding caregivers on body hygiene and skin care, caregivers must practice these care procedures under supervision during hospitalization, which reduces stress and insecurity[25].

Regarding the risk of falls, the proposed checklists indicate the systematic evaluation of wheel locks on cribs and incubators, closing of doors and providing information to the companion about this issue. A study that evaluated the adherence of healthcare professionals to neonatal PS actions during admission indicated unlocked wheels in 55.5% of observations[27]. Furthermore, a second study showed low compliance in providing information regarding the risk of falls of the newborn at the time of discharge[24].

Overall, the literature indicates that the family has a significant emotional burden at the time of discharge, which can influence their learning of information. Therefore, it is not enough for the nurse to simply provide guidance, but it is necessary to verify whether the caregivers understood and assimilated the instructions[9,25]. These points can be checked when completing this checklist.

Although the checklist is used in a well-structured manner in certain settings, such as surgical centers, promoting positive outcomes, in Intensive Care Units (ICUs), its use is still incipient, especially in neonatology[16]. Knowledge translation is a dynamic and iterative process that includes synthesis, dissemination, exchange and ethical application of knowledge, to achieve beneficial results for society. However, in practice, this process still faces various barriers at individual and institutional levels[33].

Among the difficulties encountered in implementing checklists in practice, there is the difficulty in monitoring the use of the instrument, the fact that some professionals do not believe that these tools are capable of preventing care errors or, that they are experienced enough not to need reminders in their workflow[15,22]. Therefore, one of the strategies is to include them in the formulation of these instruments and/or involve them in the implementation, review and evaluation stages. For the checklist to prove effective, however, after elaboration and validation, training, implementation, review and continuous evaluation are necessary[14], stages that are still necessary for this instrument.

A limitation is the fact that the instrument has not yet been tested in clinical practice. It is recommended to conduct pilot studies in practice environments and consider validation tests with end-users, to achieve other criteria and attributes, such as sensitivity, reliability and practicality in the professional daily routine.

CONCLUSION

The content of two checklists aimed at safe admission and discharge in NICUs was developed and validated. These instruments have transformative potential in practice, as they were proposed based on scientific evidence and recommended practices, and they can be adapted to individual care contexts.

The involvement of experienced professionals ensured the checklist's relevance, evidenced by high agreement rates. The implementation of these checklists represents an advance in the promotion of safety, quality of care and information documentation, thereby reflecting an important quality indicator in healthcare.

Further studies that apply the checklists in practice are needed to evaluate their usability and possible impacts on neonatal PS. Continuous reviews and evaluations are also necessary to guarantee the effectiveness of care.

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