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Transfer of Premature Newborn Between Neonatal Units:
Checklist for Nurses' Communication

Marcelo Victor Freitas Nascimento[1]; Monaliza de Goes e Silva[2]
Márcia Teles de Oliveira Gouveia[3]; Willyane de Andrade Alvarenga[4]
Priscilla Cavalcante Lima[5] Amanda Lúcia Barreto Dantas[6]

Highlights:
(1) The checklist called Centranp was created and validated for use by nurses.
(2) The Checklist is valid for safe intra-hospital transfer of preterm infants.
(3) Centranp includes essential points for the transfer of premature newborns.

ABSTRACT

The research aims to build and validate the content of a checklist for safe communication in the process of transferring care for preterm newborns hospitalized between neonatal care units to be used by nurses. Methodological study that used the classical theory of psychometric tests and instrument construction model. Developed in 3 phases: survey of item content, selection and construction of items, structuring of the instrument's content and validation of content and appearance by experts between March and October 2021. 23 experts with expertise in the area of neonatal health participated . Data analysis occurred by calculating the Content Validity Index. The average age of the experts was 32.3 (±5.9) years. Females predominated (65.2%); brown race/color (52.2%); (52.2%) masters and (13.0%) doctors. The majority have a course in neonatal health (91.3%). The Nursing Checklist for Transfer of Preterm Infants is made up of seven domains that evaluate: general data from the unit of origin and destination of the transfer, information about the preterm newborn, past history, vital signs and physical examination, therapeutic planning, list for safe transfer from the neonatal unit, nursing diagnoses and interventions in neonatology. The content validity rates of the Instrument criteria for transferring preterm newborns ranged from 70.0% (illustrations) to 94.6% (content). Considering the global content validation index (0.846), it can be stated that the content of this checklist is valid for the safe transfer of premature newborns between neonatal care units.

Keywords: methodological research in nursing; transfer of patients; newborn premature; neonatal intensive care units.

[1] Universidade Federal do Piauí (Ufpi). Teresina/PI, Brasil. Empresa Brasileira de Serviços Hospitalares https://orcid.org/0000-0003-3465-2595
[2] Universidade Federal do Piauí (Ufpi). Teresina/PI, Brasil. https://orcid.org/0000-0001-5830-3897
[3] Universidade Federal do Piauí (Ufpi). Teresina/PI, Brasil. https://orcid.org/0000-0002-2401-4947
[4] Universidade Federal do Piauí (Ufpi). Teresina/PI, Brasil. https://orcid.org/0000-0001-6114-8293
[5] Universidade Federal do Piauí (Ufpi). Teresina/PI, Brasil. https://orcid.org/0000-0001-7231-0778
[6] Universidade Federal do Piauí (Ufpi). Teresina/PI, Brasil. https://orcid.org/0000-0003-1028-1451

INTRODUCTION

Around 15 million premature newborns (NB) are born worldwide each year, which represents more than one in every ten births1. A preterm newborn (PTNB) is one born before 37 weeks of gestation, who has not yet completed intrauterine growth and development and is four times more likely to develop complications than a full-term newborn[1-2].

Premature babies demand greater attention in the protection and promotion of health for their good development[3]. The PTNB may require hospitalization in a neonatal intensive care unit (Nicu) and in this context, the use of technology and a better understanding of the development of premature babies has enabled the development of new strategies such as the use of technological equipment during hospitalization in order to meet the immediate needs of new individuals, thus increasing their survival[4-5].

From this perspective, concern for the safety of newborns becomes a priority, as they constitute a high-risk population with numerous peculiarities which can increase the chances of suffering harm[5-6.] Patient safety is understood as the reduction of unnecessary risks of any physical or psychological injury, suffering, damage to the structure or function of the body and even death, related to healthcare, to an acceptable minimum[7].

Among the tools used to ensure patient safety is the use of effective communication between the multidisciplinary team, which aims to improve the effectiveness of communication between the team for safe care, through verbal and/or recorded information that is appropriate, accurate and complete8. In this context, the use of Nursing Care Systematization (SAE) organizes care so that the care offered is efficient and of quality[5].

The use of checklists in neonatal units are important tools for SAE and improving nursing practice. There is the patient safety assessment checklist9 and the checklist for patient safety in preparation for discharge from the Nicu[10]. However, there is a lack of appropriate, effective and standardized methods observed in the literature for safe communication during PTNB transfer processes between neonatal units. This gap highlights the need for a tool for this purpose for the safe transfer of care and continuity of care by nursing professionals.

When choosing the appropriate instrument, in order to guarantee the quality of its results, it is necessary to know the items, domains, forms of assessment[7] and how to apply it[11]. In the meantime, the study is justified by the need for an updated instrument, with items considered valid that facilitate the process of transferring PTNBs between neonatal units.

Taking the above into account, the objective was to build and validate the content of a checklist for safe communication in the process of transferring care for preterm infants admitted between neonatal care units to be used by nurses.

METHODS

This is a psychometric study that sought evidence of the content validity of a checklist, based on the classic theory of psychometric tests and the instrument construction model proposed by Pasquali[12]. The study was carried out from March to October 2021 in three phases: survey of item content, selection and construction of items; structuring the instrument's content and validating its content and appearance with experts.

The Nursing Checklist for Transfer of Preterm Infants (Centranp) was developed for clinical use by nurses who transfer PTNBs between neonatal units. Therefore, nurses can use the checklist as a method to guide nurse communication during patient transfer processes. To construct the checklist

items, a literature survey was used to prepare the Centranp items through a scope review, according to guidelines from the Joanna Briggs Institute (JBI)[13], version 2020. The databases of the Health Sciences, such as the Virtual Health Library – Nursing (BDENF); Scielo; Lilacs (Latin American and Caribbean Literature in Health Sciences); Medline (National Library of Medicine-USA), using the acronym PCC and the controlled descriptors and keywords: Neonatal Intensive Care Units, Premature newborns and Patient transfer.

To screen the studies in the review, publications from the period 2011 to 2021 were adopted, justifying this, while changes in neonatal care were promoted with Rede Cegonha in 2011. Therefore, for the selection of included studies, they were adopted inclusion criteria: articles published in the last 10 years, in English, Spanish or Portuguese, that dealt with planning care for PTNBs for safe transfer and/or hospital discharge. Duplicate and review articles, editorials, letters to the editor, summaries and expert opinions or articles that did not meet the objective of the review were excluded.

To compose the checklist content script, we also used the neonatal care monitoring collection form, from the Qualineo strategy[14], the Manual for Humanized Newborn Care: Kangaroo Method15, the International Nursing Diagnoses Definitions & Classification (Nanda)[16], the Nursing Interventions Classification (NIC)[17], as well as the international recommendations of the Joint Commission International (JCI), in partnership with the World Health Organization[18].

The structure of Centranp follows the thematic axes of Qualineo[14], a strategy of the Ministry of Health, which aims to reduce neonatal mortality, improve care for newborns in maternity wards and care practices for newborns at risk, namely: general data from the unit origin and destination of transfer, information on the preterm newborn, past history, vital signs and physical examination, therapeutic planning, list for safe transfer from the neonatal unit, diagnoses and nursing interventions in neonatology.

To validate the content and appearance of the checklist, the American instrument for evaluating understanding and convenience, called Suitability Assessment of Materials (SAM), translated into Portuguese, was used, which consists of a list to check attributes related to content, writing style, appearance, motivation and cultural appropriateness of the material. For each item on the list, there are scoring options, from 0 to 3 points, which consider the items as excellent, adequate, not adequate or that cannot be evaluated[19].

The experts who participated in content validation were selected based on Jasper[20] criteria, where those who met at least two of the requirements were selected: having specialized skills/ knowledge of neonatology, with authority on the subject of prematurity; have skills/knowledge acquired through experience; have special skills in neonatal units; pass a specific test to identify a specialist; and have a high rating assigned by an authority. The number of 22 specialists was adopted as the minimum population, based on the formula for calculating the size of the finite population sample: $n=Za^2.P.(1-P)/e^2$[21].

Potential experts were selected after consulting the curriculum on the Lattes Platform. Invitations were sent to around 50 professionals via invitation letter via electronic mail, individually. The invitation letter explained the purpose of participating in the study, contained the consent form and a Uniform Resource Locator link that directed them to Google Forms to fill out a questionnaire to characterize and judge the items. Each item was evaluated for relevance and ease of understanding. The checklist was evaluated by 23 experts who agreed to participate in the research.

For data analysis, the Content Validity Index (CVI) was applied. A CVI ≥ 0.80 was considered to be an indicator of a valid item to be kept in the instrument. The CVI calculation was performed on all items in the instrument's content and the Global CVI was given by the simple arithmetic mean of all CVI's for each item[22].

The development of the research followed national ethics standards for research involving human beings, with approval by the Research Ethics Committee with CAAE 46931621.6.0000.5214[23].

RESULTS

From the integrative review, 278 articles were found, 240 were excluded after reading the title and abstract, and 38 studies were read in full, 7 articles were included from the databases. Subsequently, the data collected from the articles and references adopted were systematically analyzed and synthesized to identify and select the main care and conduct relevant to the safe transfer and follow-up of the PTNB during hospital admission, giving rise to the seven domains of the instrument (Table 1)

Table 1 – Domains and content items of the Nursing Checklist for Transfer of Preterm Infants (Centranp). Teresina, Piauí, Brazil, 2021

DOMAINS	ITENS CONTENT
DOMAIN 1 – General data of the unit of origin and destination of the transfer	Identification of the origin and transfer unit; Date and time of transfer.
DOMAIN 2 – Data on preterm newborns	Identification; dates of hospital and unit admission; date of birth; gestational age; age; birth weight and current weight and sex.
DOMAIN 3 – Previous history	Summary of the premature newborn's past history
DOMAIN 4 – Vital signs and physical examination	Temperature, heart rate, saturation, diet, devices and medications in use and type of precaution
DOMAIN 5 – Therapeutic planning	Identification of exams, vaccines and procedures carried out such as: Retinal mapping (from the 28th day of life); BCG vaccine (from 2000g); Hepatitis B vaccine; Palivizumab; Foot test; Ear test; Echocardiogram; Transfontanelle ultrasound; if any exam is to be carried out; if you need any special care; Kangaroo started; carrying out speech therapy assessment; surgical procedures and first bath? (depending on gestational age)
DOMAIN 6 – List for safe transfer from the neonatal unit	Checking data to identify the correct patient (Bracelet, incubator plate or heated crib and medical prescription), clinical stability, clean, dated and fixed dressing; Prior contact with the team that will receive the RN; checking transfer permission; guidance from family members, maternal guidance regarding the importance of breastfeeding; medication conference; token; Qualineo duly completed; complete medical record; child's notebook.
DOMAIN 7 – Nursing diagnoses and interventions in neonatology	13 possible nursing diagnoses in neonatology: Ineffective breastfeeding; Poor sucking reflex in the infant; Interrupted breastfeeding; Neonatal hyperbilirubinemia; Urinary retention; Ineffective breathing pattern; Link risk; Risk of disorganized child behavior; Risk of aspiration; Risk of impaired skin integrity; Risk of sudden infant death; Risk of hypothermia; Characterized acute pain; Other diagnoses and their respective interventions

Source: Authors (2021).

Twenty-three experts evaluated the checklists from September to October 2021. The characteristics of the participating experts are presented in Table 2.

Table 2 – General characterization of experts. Teresina, PI, Brazil, 2021. (n=23)

Characteristics	M±DP€	Yes(%)	No(%)	n (%)
Gender				
Male				8 (34,8)
Female				15 (65,2)
Race/Color				
Whitea				7 (30,4)
Black				4 (17,4)
Dark skin				12 (52,2)
Age range	32,3±5,9			
Higher degree				
Especialization				8 (34,8)
Master degree				12 (52,2)
PHD				3 (13,0)
Experience in the field of neonatal health		20(87,0)	3(13,0)	
Years of experience in neonatal health (n=20)				
< 1year				3 (15,0)
2 a 5 years				10 (50,0)
5 a 10 years				5 (25,0)
> 10 years				2 (10,0)
Training in the field of neonatal health				
Experience in Neonatal Intensive Care Units		21(91,3)	2(8,7)	
Years of experience in Neonatal Intensive Care Units (n=13)				
		13(56,5)	10(43,5)	
	3,2±2,4			
< 1 year				4 (30,8)
2 a 5 years				7 (53,8)
5 a 10 years				2 (15,4)
> 10 years				0 (0,0)
Experience ine UCINCo£ ou UCINCa¥		17(73,9)	6(26,1)	
Years of experience in UCINCo£ ou UCINCa¥ (n=17)	2,4±2,4			
< 1 year				9 (52,9)
2 a 5 years				6 (35,3)
5 a 10 years				2 (11,8)
> 10 years				0 (0,0)
Teaching experience in the area of neonatal health		13(56,5)	10(43,5)	
Years of teaching experience in the area of neonatal health (n=13)	2,9±1,9			
< 1 year				4 (28,6)
2 a 5 years				9 (64,3)
5 a 10 years				1 (7,1)
> 10 years				0 (0,0)

Scientific production in the area of neonatal health	20(87,0)	3(13,0)	
Previous participation in instrument construction	10(43,5)	13(56,5)	
Previous participation in instrument evaluation	12(52,2)	11(47,8)	
State in which you reside			
Piauí			12 (52,3)
Ceará			3 (13,1)
Maranhão			2 (8,8)
Pernambuco			1 (4,3)
Alagoas			1 (4,3)
Paraíba			1 (4,3)
Pará			1 (4,3)
Rio de Janeiro			1 (4,3)
Paraná			1 (4,3)

Caption: €M±SD: mean±standard deviation; £:Conventional Intermediate Care Unit; µ: Kangaroo Intermediate Care Unit

Source: Authors, 2021

The CVI calculation was performed on all items in the instrument's content and the Global CVI was given by the simple arithmetic mean of all CVI's for each item. The results are presented in Table 3.

Table 3 – Content Validity Index of the Nursing Checklist for Transfer of Preterm Infants (CENTRANP) criteria, as assessed by experts. Teresina, PI, Brazil, 2021. (n=23)

Criterium	**CVI$^{\beta}$**
Content	**0,946**
The purpose of the checklist is clear	0,957
The content of the checklist deals with behaviors and conduct that will benefit the newborn/premature infant	0,971
Content is focused on purpose (safe preterm transfer)	0,957
The content highlights the main points to be covered at discharge	0,899
Literacy Requirement	**0,887**
What is written is easy to understand	0,884
Use active voice writing	0,884
Uses vocabulary with common words in the text	0,913
Context comes before new information	0,797
Completion is made easier by topics	0,957
Illustratiions	**0,700**
The purpose of the illustration referring to the text is clear	0,673
Types of illustrations	0,673
The figures/illustrations are relevant	0,647
Lists, tables, etc. there is an explanation	0,806
***Layout* e presentation**	**0,825**
Layout features	0,884
Form and organization of the checklist	0,855
Size and type of font used	0,768
Subtitles are used	0,791

Stimulation/Motivation of Learning	**0,831**
The checklist interacts with the professional who will fill it out	0,841
The guidelines are specific and give examples	0,812
There is motivation to complete	0,841
Cultural Suitability	**0,899**
The checklist matches your logic, language and experience	0,899
The language present in the checklist is in accordance with your culture/reality	0,899
Total CVI$^{\beta}$	**0,846**

Source: Authors, 2021. Legend: β :IVC: Content Validity Index

The CVI of the Centranp Instrument criteria ranged from 70.0% (illustrations) to 94.6% (content). As for Content (IVC=88.7%), the lowest index referred to the emphasis given to the main points to be covered upon discharge (89.9%). In the Literacy Requirement section, the item with a CVI below the recommended level (80%) was related to the context of the instrument, if it comes before the new information (79.7%).

In the Illustrations section, the only item with a CVI above the recommended level was related to the existence of explanations in the lists and tables (80.6%). In the Layout and Presentation section, two items had a CVI lower than 80%, these are: size and type of font used (76.8%) and the use of subtitles (79.1%). The Learning Stimulation/Motivation and Cultural Adequacy sections both had all items with CVI greater than 80%, with 83.1% and 89.9% being the average indexes respectively for each of the sections, as shown in Table 3.

A space was made available at the end of the form for experts' considerations, the main ones being described in Table 4.

Table 4 – Changes made to the first version of the instrument. Teresina, Piauí, Brazil, 2021

Espert	Expert considerations	After evaluation
1 and 19	Reduce the amount of information, make the checklist less extensive	Reduced from 5 pages to 4 pages, removing items deemed unnecessary
2 and 5	Increase the font used	Changed from font 12 to 14
6	Add corrected gestational age to NB data	Added next to the item: Gestational Age
13	Insert captions in the acronyms of items 4 and 5	Caption inserted below the table
19	Remove items from the RN such as CVC, phototherapy and Mechanical Ventilation	Removed the items Mechanical Ventilation and Non-Invasive Ventilation
21	Add discharge time	Added next to transfer date

Source: Authors (2021).

The experts' considerations were considered in the instrument, with data related to the PTNB's clinical status that make transfer from the unit unfeasible, such as some types of ventilatory support (mechanical ventilation, non-invasive ventilation) and data such as corrected gestational age, date and transfer time. The other considerations were about the size of the instrument, presentation and arrangement of information, with the majority of suggestions being accepted.

The first version called Nursing Checklist for Transfer of Preterm Infants contains 64 items grouped into 7 domains, in which domains 5 (Procedures performed/programming/therapeutic plan), 6 (List for safe

transfer from the neonatal unit) and 7 (Diagnoses and nursing interventions in neonatology) have 3-point Likert-type response items (1- Yes; 2- No; and 3-Not applicable). In relation to the score and the expected results for the response items, they provide greater security for transferring the PTNB between neonatal units, in which, by obtaining higher scores in domains 5, 6 and 7, the greater the level of security for transfer of the unit.

DISCUSSION

A checklist for safe communication in the process of transferring PTNB care admitted between neonatal care units, called Centranp, was created and is valid for use by nurses. The instrument constructed took into account the 6 global patient safety goals created in 2009 by the World Health Organization (WHO), namely: correct patient identification; clear and effective communication; safety in medication administration; greater safety in surgeries, reduced risk of infection and patient falls[18]. The development of this instrument enables the evolution of care and, consequently, patient safety[24].

It is important to follow up on actions taking into account the 6 goals, given that in Brazil there is still a high rate of adverse events in hospitals[25]. Planning for the safe transfer of the PTNB from the unit must begin upon admission or as soon as the newborn's chances of survival are estimated. Planning the transfer of neonatal units involves not only determining the clinical conditions of the newborn, but also identifying the needs after it[6].

During the process of creating the checklist, initially the PTNB data were listed, such as name and date of birth, minimum indicators according to goal 1[18]. At the suggestion of one of the experts, the corrected gestational age was added in addition to the other items already present. The items gestational age, corrected gestational age, birth weight and current weight are relevant to start the procedures, as these factors directly interfere with procedures such as vaccination, initiation of the Kangaroo Mother Care and others[15].

Topics related to the provision of information about the clinical case and transfer to family members and the team of the unit that will receive the PTNB were added to the checklist, with the aim of minimizing this communication gap. Bibliographic study on effective communication in Intensive Care Units[22] points out that in order to achieve the expected results, effective communication is essential in order to obtain good development in the work process between teams. However, communication has weaknesses and is not always effective[25].

The checklist domains are based on the neonatal care monitoring form of the Qualineo strategy[14] and the Kangaroo Method Manual[15]. Another study of construction and content validation of a systematized teaching instrument for nursing care[26], which used Nanda-I[16] to develop the domains. The disagreement is also related to the purpose of the study and the research population, since RNPTS are totally dependent and incapable of promoting self-care.

Preterm newborns need to postpone some interventions depending on clinical stability or until weight gain is considered adequate, often being discharged from the Neonatal Intensive Care Unit before reaching this point. This factor only makes an instrument for monitoring the procedures carried out during hospitalization, as well as pending issues, more essential. An item was added to the instrument regarding the use of intravenous access and medications and the items were satisfactorily accepted by the experts. The use of intravenous devices requires the nursing team to take care related to the maintenance of the catheters[27] and discrimination during the transfer of medication use is important to facilitate the passage of the clinical case, thus facilitating the continuity of treatment.

The survey of the main nursing problems detected allows the targeting of actions, according to the needs of each patient. To formulate nursing diagnoses and interventions, the NANDA-I[16] and NIC[17] taxonomies were used, as well as a study on the construction of an instrument for ostomized patients[28].

Two checklist items had a CVI lower than ideal, namely the size and type of font used and the use of subtitles. After consideration, the font size was increased and subtitles were added to the items below the topics. In another study on the construction of educational material for bladder self--catheterization[29], experts agreed with the items and suggested improvements related to language adequacy.

The illustrations criterion, after the experts' evaluation, obtained the CVI below the recommended level (0.70) due to the absence of images, diverging from a study on the construction of technology for deaf patients[30] which used explanatory illustrations, aiming to facilitate the detection of signs, symptoms and the use of Brazilian sign language to facilitate communication between professional and patient. On the other hand, the aforementioned study did not go through the validation stage.

After the experts' evaluation process, it was observed the need to make changes, such as deleting and adding items. The final instrument was also reduced after the experts' evaluation process, with 2 of the 23 warning about the dynamics of the Nicu that could make it difficult to complete during the transfer of the newborn.

Patient safety during hospitalization is essential, therefore the use of light technologies, such as instruments such as the one developed in this study, can assist in professional practice, contributing to safer and quality care. As a limitation, it should be noted that the checklist needs to be tested in other Portuguese-speaking contexts to confirm its cross-cultural validity, as well as its practical use, interpretation and clinical usefulness.

CONCLUSION

The content section used to create the Checklist for preterm newborns obtained the highest number of positive evaluations by experts, in contradiction to the illustrations section which obtained a CVI below the recommended level, making further adjustments necessary.

Considering the Instrument Validation Index as the Global CVI (0.846), it can be stated that the content of this instrument presents satisfactory validity, since the Global CVI is greater than the minimum acceptable value. The instrument aims to facilitate the transfer of the PTNB, as it includes essential points aimed at a safe intra-hospital transfer, however, due to its extension, the services that implement it will have to adapt it to the dynamics of each neonatal unit and despite the Checklist being self-explanatory, it was necessary to carry out training with nurses to emphasize the objective of the instrument, as well as its correct completion.

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Marcelo Victor Freitas Nascimento: Conceptualization, methodology, formal analysis, financial acquisition, project administration, supervision, Writing – review and editing.

Monaliza de Goes e Silva: Writing of the original manuscript, Research, Writing – review and editing.

Márcia Teles de Oliveira Gouveia: Formal analysis, methodology.

Willyane de Andrade Alvarenga: Formal analysis, methodology, Writing – review and editing.

Priscilla Cavalcante Lima: Formal analysis, Writing – review and editing.

Amanda Lúcia Barreto Dantas: Writing – review and editing

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Corresponding author:
Marcelo Victor Freitas Nascimento
Federal University of Piauí (Ufpi)
Minister Petrônio Portella University Campus, Ininga neighborhood - Teresina – PI, Brazil.
ZIP code: 64049-550
marcelovyctor16@hotmail.com

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