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RESEARCH

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VALIDATION OF BUNDLE APPEARANCE FOR HANDLING PERIPHERALLY INSERTED CENTRAL CATHETER IN NEONATES

*Validação de aparência do bundle para manuseio do cateter central de inserção periférica em neonatos**Validación de la apariencia del paquete para el manejo del catéter central de inserción periférica en neonatos***Camila dos Santos Machado¹** **Maria Paula Custódio Silva¹** **Brenda Alves Luzeiro¹** **Cinthia Lorena Silva Barbosa Texeira¹** **Jesislei Bonolo do Amaral Rocha¹** **Divanice Contim¹** 

ABSTRACT

Objective: to validate the appearance of the bundle and ematos of the central insertion catheter by the nursing team. **Method:** methodological study, developed during the months of November 2020 and February 2021, in neonatal units of a teaching hospital. The sample consisted of 43 members of the nursing team and the data analyzed by the content validity index above 80%. An instrument containing identification data, the bundle and relevance to clinical practice on Google Forms was applied. **Results:** all bundle items had a content validity index above 80% and were considered relevant for clinical practice. **Conclusion:** this study allowed us to validate the appearance of the bundle with the nursing team and included care related to the maintenance of peripherally inserted central catheter in neonates.

DESCRIPTORS: Patient care bundles; Infant, newborn; Nursing care; Intensive care units, neonatal; Validation study

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RESUMO

Objetivo: validar a aparência do *bundle* para manuseio do cateter central de inserção periférica em neonatos pela equipe de enfermagem. **Método:** estudo metodológico, desenvolvido durante os meses de novembro de 2020 e fevereiro de 2021, em unidades neonatais de um hospital de ensino. A amostra foi composta por 43 membros da equipe de enfermagem e os dados analisados pelo índice de validade de conteúdo acima de 80%. Aplicou-se um instrumento contendo dados de identificação, o *bundle* e a relevância para prática clínica no Google Formulários. **Resultados:** todos os itens do *bundle* apresentaram índice de validade de conteúdo acima de 80% e foram considerados relevantes para prática clínica. **Conclusão:** este estudo permitiu validar a aparência do *bundle* junto a equipe de enfermagem e incluiu cuidados relacionados a manutenção do cateter central de inserção periférica em neonatos.

DESCRITORES: Pacotes de assistência ao paciente; Recém-nascido; Cuidados de enfermagem; Unidades de terapia intensiva neonatal; Estudo de validação

RESUMEN

Objetivo: validar el aspecto del fascículo para manipulación del catéter central de inserción periférica en neonatos por el equipo de enfermería. **Método:** estudio metodológico, desarrollado durante los meses de noviembre de 2020 y febrero de 2021, en unidades neonatales de un hospital de enseñanza. La muestra estuvo compuesta por 43 miembros del equipo de enfermería y los datos analizados por el índice de validez de contenido superior al 80%. Se aplicó un instrumento que contiene los datos de identificación, el paquete y la relevancia para la práctica clínica en Google Forms. **Resultados:** todos los ítems del paquete tuvieron un índice de validez de contenido superior al 80% y se consideraron relevantes para la práctica clínica. **Conclusión:** este estudio permitió validar la apariencia del paquete con el equipo de enfermería e incluyó cuidados relacionados con el mantenimiento del catéter central de inserción periférica en los recién nacidos.

Descriptores: Paquetes de atención al paciente; Recién nacido; Atención de Enfermería; Unidades de cuidado intensivo neonatal; Estudio de validación

INTRODUCTION

The Peripherally Inserted Central Catheter (PICC) is widely used in children and neonates, due to advantages such as prolonged length of stay, reduced number of punctures, lower risk of phlebitis, infiltration and extravasation.¹ Complications such as injuries, infiltrations and risk of infections are associated with inappropriate conduct in the insertion and maintenance of the device.² Aseptic technique and inadequate hand hygiene culminate in a high rate of Primary Catheter-Related Bloodstream Infections (PCCI-RC).³⁻⁵ Other factors such as rupture, obstruction, and infiltration are observed, but with lower prevalence.⁶

It is perceived that training of professionals, development of protocols and guidelines are not sufficient to ensure adherence in practice to care with the PICC and other types of intravenous devices.^{4,7} One of the strategies to minimize these complications and ensure patient safety is the systematization of care through protocols, guidelines, checklists and bundles. It is worth noting that these strategies are developed by experts and based on the best evidence to make healthcare practices safer and reduce adverse events.^{5,8} Bundles, unlike conventional protocols, group a small group of simple, evidence-based, low-cost interventions that have better clinical consequences when performed in an integrated manner than separately.^{8,9}

This type of tool is important to support nursing practice at the bedside, highlighting the essential criteria for care, being able

to reduce the indicators of complications related to devices, in particular the PICC.⁸ These tools contain standardized actions and contribute to the improvement of clinical practice, guide the work process of the nursing team in handling the PICC and aim to reduce gaps between theory and practice, contributing to patient safety.⁹ Moreover, because this tool contains a sequence of well-defined and interconnected interventions, it may be a facilitator of clinical judgment for decision making about this procedure. Thus, the aim of this study was to validate the appearance of the bundle for handling the peripherally inserted central catheter in neonates by the nursing team.

METHOD

Methodological research, guided by the guidelines of the Standards for Quality Improvement Reporting Excellence (SQUIRE) of the EQUATOR network, conducted between November 2020 and February 2021, in a Neonatal Intensive Care Unit (NICU) and a Neonatal Intermediate Care Unit (NICU) of a teaching hospital, affiliated to the Brazilian Company of Hospital Services, located in the interior of Minas Gerais. The study population was composed of 54 nursing technicians and 22 nurses who worked in the unit where the study was developed. Inclusion criteria were: to work as a care nurse or nursing technician in the Neonatal Intensive Care Unit, who participated

in both stages of the study. Professionals away from work due to health or maternity leave and vacations were excluded. The sample was non-probabilistic, consisting of 14 nurses and 29 nursing technicians, totaling 43 members of the nursing team, after losses for not participating in all stages.

The recruitment of these professionals was based on an invitation by means of an online message application WhatsApp. For this online invitation, we used the duty roster provided by the nursing technical manager of the sector. After acceptance, the link to the free electronic tool Google Forms was sent, with the Informed Consent Form, a questionnaire to characterize the sociodemographic profile, and the first version of the bundle validated for its content¹¹, so that they could evaluate its appearance. For this step, a deadline of ten days was set for the feedback. The variables for the characterization were: age, gender, area of training, time of training, function/position in the institution where they work, time of work, and degree.

The bundle used in this study was validated by the same group of researchers as to content by nine judges in 2019, it has eight items and encompasses care for PICC handling in neonates, such as hand hygiene before and after handling, daily inspection of catheter integrity and function, disinfection of intelligibility, permeability test, adequate syringes, care in bathing, and changing the system in cases of dirt or blood.¹¹

The bundle was evaluated based on a Likert-type scale for the following weightings: strongly disagree, partially disagree, agree, partially agree, and strongly agree. At the end, the question “Do you believe that this bundle will be relevant in your clinical practice?” was included, also answered with a Likert scale.

Statistical analysis was performed using data imported from Google Forms into a database in Excel® format. Agreement between participants was assessed by the Content Validity Index (CVI) above 0.80.¹²

This study was submitted to the Research Ethics Committee of the Hospital de Clínicas da Universidade Federal do Triângulo Mineiro and followed the legal issues determined by Resolution 466/2012 of the National Health Council.

RESULTS

Forty-three members of the nursing team participated in the study, 14 nurses and 29 nursing technicians, all female, mean age 35.3 years, with a minimum of 25 and a maximum of 56 years. The variables related to characterization are presented in Table 1.

In the first round of appearance validation, all items presented CVI > 0.80, however, minor adjustments were made in the wording for better intelligibility and the instrument was forwarded for further evaluation, without new suggestions. Chart 1 shows the original and adapted versions of the bundle by suggestions from the target population with the CVI of the first and second

rounds. In the first item, the sequence of adornment removal was changed and it was included that alcohol gel 70% should be used only if hands are visibly clean. In the second item, communication was inserted if any technical complaint is identified, and in the fourth, the volume used during the flush was recorded. In the fifth item, serotherapy for flush was changed and in the eighth item, the administration of blood products was removed.

Table 1 – Description of the characterization variables of the 43 participants. Uberaba, MG, Brazil, 2021

| Variables | | % |
|--------------|---|------|
| Occupation | Nurse | 32,6 |
| | Nursing technician | 66,4 |
| Work sector | Neonatal Intensive Care Unit | 76,7 |
| | Neonatal Intermediate Care Unit | 23,3 |
| Shift work | Morning | 41,9 |
| | Afternoon | 44,2 |
| | Night | 14 |
| Hourly load | 6 hours | 83,7 |
| | 12/36 hours | 16,3 |
| Type of bond | Consolidations of Labor Laws | 95,3 |
| | Unique Legal Regime | 4,7 |
| If a nurse | Specialization in pediatrics or neonatology | 66,7 |
| | Operates with the specialization | 68,8 |
| | Training course for insertion and maintenance of the Peripherally Inserted Central Catheter | 77,8 |

DISCUSSION

The elaboration and implementation of bundles has been highlighted for improving the processes and patient outcomes and preventing health problems, especially from causes considered as preventable.¹³⁻¹⁵ The use of this tool contributes to the standardization of the actions of the nursing team, reducing the variability of care.⁵

The validation process gives methodological quality to the bundle and evaluating the opinion of the target population is a fundamental step to improve the understanding of the items.¹⁶⁻¹⁷ The need for simple and objective tools in clinical practice is perceived, considering the demand and resources of health services.

The insertion of the PICC and the change of dressings are private actions of the nurse, but maintenance is performed by the nursing team.¹⁸ Therefore, it is relevant to include everyone in the validation process. When handling the PICC, there are steps to be followed to avoid complications and the studies reinforce the need for awareness of simple actions, such as hand hygiene.^{6,19}

Chart 1 – Original and adapted version of the bundle according to the suggestions of the target population with the CVI. Uberaba, MG, Brazil, 2021

| Original version* | Adapted version | CVI 1 | CVI 2 |
|--|--|-------|-------|
| Wash your hands for 40 to 60 seconds before and after handling the PICC with chlorhexidine gluconate antiseptic solution and/or 70% alcohol gel, wear gloves, and remove adornments. | Remove adornments and perform hand hygiene for 40 to 60sec before and after manipulating the PICC with degerming antiseptic solution and/or alcohol gel 70% if hands are visibly clean, use procedure gloves for manipulation of the catheter. | 0,91 | 0,96 |
| Perform inspection of catheter integrity and function on a daily basis and when there is an adverse event or technical complaint during drug infusion and serum therapy. | Perform inspection of catheter integrity and function on a daily basis and report any adverse events or technical complaints during drug infusion and serum therapy. | 0,95 | 0,96 |
| Disinfect the intelligibility and connections after each handling, with alcohol at 70% by rigorous rubbing with at least five circular movements. | Disinfect the cannulas and connections after each handling, with alcohol at 70% by rigorous rubbing with at least five circular movements. | 0,93 | 0,96 |
| Perform the permeability test of the access before and after use, injecting 0.9% sodium chloride solution to twice the internal volume of the catheter, using the positive pressure or pulsatile flushing technique. | Perform the access permeability test before and after use, injecting 0.9% sodium chloride solution to twice the catheter's internal volume, using the positive pressure or pulsatile flushing technique, and record. | 0,91 | 0,97 |
| Use 10 and 20 ml syringes for medication infusion and serum therapy. | Use 10 and 20 ml syringes for medication infusion and flush. | 0,93 | 0,97 |
| Perform bed baths of the neonate with the PICC and never wet the dressing. | Perform bed baths of the neonate with the PICC and never wet the dressing. | 0,93 | 0,96 |
| Perform dressing changes, using aseptic technique, if soiled, at risk of peeling, or if wet. | Perform dressing changes, using aseptic technique, if soiled, at risk of dislodging, or if wet. | 0,95 | 0,99 |
| Replace the cannulas, connectors, extenders, and equipments immediately when clots are present or when blood products are administered, and every 72 to 96 hours if they remain intact, identifying the date when the devices were replaced. | Change the cannulas, connectors, extenders, and equipments immediately when dirt or blood is present, and every 72 to 96 hours if they remain intact, identifying the date when the devices were changed. | 0,92 | 0,96 |
| Relevance to clinical practice. | 0,86 | 0,93 | |

*original version⁽¹⁾

The SSTI-CR is one of the most frequent complications in NICU, increases the length of stay, hospital costs and the impact on mortality and morbidity.²⁰ Studies that evaluated the occurrence of SSTI-CR before and after the implementation of a central venous catheter bundle showed a significant decrease in rates, but point to the lack of adherence to care.^{8,19} It is recommended constant stimulation of preventive actions for staff motivation, establishment of a safety culture and the provision of updated information based on the best evidence.^{5,13,15}

Research has described the occurrence of other complications, such as phlebitis presumed by the catheter or mechanical phlebitis due to handling, obstruction, infiltration, catheter rupture and accidental expulsion.^{6,21} Factors such as the material and quality of the catheter may influence, as well as the selection of the vein, aseptic technique for insertion, the NB's clinical status and the sequence of care during each handling.⁶ The completion of evaluation forms from insertion to removal contributes to further evaluations and the planning of actions aimed at the most common factors in each institution.^{6,21}

The permeability test before and after use, recommended in the fourth item, in addition to identifying that the device is patent, contributes to prevent obstructions after use with the techniques of positive pressure or pulsatile flushing and the adequate use of syringes, in the fifth item, avoids the risk of rupture by pressure.^{15,21} Not wetting the dressing during bathing, in the sixth item, avoids

accidental outflow of the PICC, which, differently from other centers, are not fixed with sutures, it is recommended to bathe it in bed and cover the dressing with transparent plastic film.²¹ Moreover, the humid environment may favor bacterial growth.²⁰ Other suggested cares, such as hand hygiene, cannula disinfection, dressing and connection changes, contribute significantly to lower risk of IPCS-RC and phlebitis.^{3-4,21}

The suggested adjustments in appearance validation permeated among five of the eight bundle items and were related to improvements in the understanding of care. The first suggestion was to insert removing adornments at the beginning of the sentence of the first item. It was noticed that although adornments are prohibited by the RDC 52, their use still happens due to lack of supervision by some institutions, which can compromise hand hygiene.²²

The second was in relation to the use of alcohol gel 70%, hand hygiene should preferably be performed with water and chlorhexidine gluconate antiseptic solution, but rubbing with alcohol gel 70% is allowed when they are visibly clean. Hand hygiene appears as the first item in most healthcare bundles and stands out as the simplest measure to avoid infections, but with limitations in adherence by professionals.²³

The next two suggestions were for inclusion of words that determine the conduct upon identification of problems. In neonates, the volume of flushes must be rigorously calculated in the

fluid balance, especially when dealing with premature infants, so the record reminder was included in the new version. It was also included to communicate technical complaints as soon as they are identified, so that they can be resolved more effectively and quickly.²⁴

In the last one, it was suggested to remove the administration of blood products, since the caliber of the catheters used in neonates, smaller than 3.8 French, does not allow the administration of these components and blood collections due to risk of obstruction and thrombosis.²

The limitation of this study is related to the inclusion of the target audience of only one Brazilian institution; the diversity of regions could give rise to suggestions that were not raised. However, there is a need to understand the translation of scientific evidence in the handling of the PICC, contributing to patient safety.

This research provides the opportunity for other subsequent studies to evaluate the impact of the bundle in the complication rates of the PICC in newborns in several contexts and, despite the existence of bundles for insertion and maintenance of central catheters, this one addresses specific issues of the PICC in newborns. It is observed the need to realize the translation of scientific evidence in the management of the PICC, contributing effectively to patient safety.

CONCLUSION

This study allowed validating the appearance of the bundle by a group of 43 nursing team members and all items presented CVI above the recommended, small adjustments were incorporated improving the overall understanding. All participants considered the bundle relevant to clinical practice, further studies are needed to evaluate the effectiveness of each care used.

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