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INTRAVENOUS CANNULATION BY NURSING PROFESSIONALS: OBSERVATIONAL STUDY

CATETERIZAÇÃO VENOSA PERIFÉRICA POR PROFISSIONAIS DE ENFERMAGEM: ESTUDO OBSERVACIONAL

CANALIZACIÓN INTRAVENOSA PERIFÉRICA POR PROFESIONALES DE ENFERMERÍA: ESTUDIO OBSERVACIONAL

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ABSTRACT

Objective: to describe the performance of intravenous cannulation by nursing professionals and to evaluate the adequacy of this procedure based on a protocol. ***Method:*** an observational, quantitative study, performed by nurses and nursing technicians of a tertiary hospital, who were observed during the insertion and removal of peripheral catheters based on a protocol of standardized procedures. ***Results:*** the sample consisted of 46 professionals, of whom 73.9% had no specific training for the procedure, 86.3% had their hands washed before the procedure, all of them used protective equipment and 50% stated that the maximum duration of tourniquet use is 1 minute. Nineteen professionals used 70% alcohol to clean the insertion site. The average time spent in the procedure was 17 minutes. ***Conclusion:*** the nursing team used protective measures during the procedures, but there are points that denote the need for professional. ***Descriptors:*** Nursing Team; Neonatal Nursing; Peripheral Catheterization.

RESUMO

Objetivo*:** caracterizar a realização do cateterismo venoso periférico por profissionais de enfermagem e avaliar sua adequação com base em um protocolo. ***Método*:** estudo observacional, de abordagem quantitativa, realizado com enfermeiros e técnicos de um hospital terciário, que foram observados durante a inserção e remoção de cateteres periféricos com base em um protocolo de procedimentos padronizados. ***Resultados*:** a amostra foi constituída por 46 profissionais dos quais 73,9% não tinham curso de capacitação específico para o procedimento, 86,3% lavaram as mãos antes do procedimento, todos utilizaram equipamento de proteção e 50% afirmaram que o tempo máximo para uso do garrote é 1 minuto. Dezenove profissionais utilizaram álcool a 70% para a higienização do local de inserção do cateter. A média de tempo despendido no procedimento foi 17 minutos. ***Conclusão*:** a equipe de enfermagem utilizou medidas de proteção durante os procedimentos, porém há pontos que denotam a necessidade de atualização dos profissionais. ***Descritores: Equipe de Enfermagem; Enfermagem Neonatal; Cateterismo Periférico.

RESUMEN

Objetivo: describir la ejecución de la canalización intravenosa por profesionales de enfermería y evaluar la idoneidad de este procedimiento basado en el protocolo. ***Método:*** estudio observacional cuantitativo, realizado con enfermeros y técnicos de enfermería de un hospital de tercer nivel, que fueron observados durante la inserción y extracción de catéteres periféricos basado en el protocolo de procedimientos normalizados. ***Resultados:*** la muestra estuvo constituida por 46 profesionales, de los cuales 73,9% no tenían formación específica para el procedimiento, 86,3% se lavaron las manos antes del procedimiento, todos utilizaron equipos de protección y 50% declaró que la duración máxima de uso del torniquete es 1 minuto. Diecinueve profesionales utilizaron alcohol de 70% para limpiar el sitio de inserción. El tiempo medio de permanencia en el procedimiento fue de 17 minutos. ***Conclusión:*** el equipo de enfermería utilizó medidas de protección durante los procedimientos, pero hay puntos que denotan la necesidad de actualización profesional. ***Descriptores:*** Equipo de Enfermería; Enfermería Neonatal; Cateterismo Periférico.

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INTRODUCTION

Peripheral intravenous cannulation (PIC) is an invasive procedure characterized by the insertion of a catheter into a venous vessel, which may or may not be taped to the skin, requiring periodic care and supervision.[1] This procedure is indicated mainly for rapid intravenous therapy (including non-vesicant drug infusions or chemotherapy), blood tests and the administration of blood products.[2]

Intravenous therapy is a frequent treatment used in Neonatal Intensive Care Units (NICUs). A study carried out in Rio de Janeiro showed that 99.6% of newborns (NB) hospitalized in a NICU underwent intravenous therapy during hospitalization and, of these, 49.2% used peripheral devices.[3] Intravenous therapy requires technical and scientific competencies that include the ability to select an appropriate site for venipuncture, the ability to choose an appropriate catheter and the proficiency in performing venoclysis technique, among others.[4]

The low durability of peripheral intravenous catheters is an important factor and the use of this type of device is associated with the occurrence of complications.[5] Complications associated with the use peripheral catheters were detected in a cohort of neonates admitted to a NICU in the city of Curitiba during 5 months in 63.15% of the observed cases, including infiltration/extravasation (69.89%), phlebitis (17.84%), and obstructions (12.27%).[6] Another study also held in Curitiba pointed out the occurrence of 65.52% complications in another NICU.[7]

Given this problem, it should be emphasized that the nursing team plays a significant role in preventing complications associated with invasive procedures performed at the NICU.[8] However, it is observed that in practice, the PIC procedure does not always follow standards, which compromise the safety of newborns and lead to serious and potentially fatal complications such as phlebitis, embolism, thrombosis and pyrogenic shock.[9]

The demand for the PIC procedure in the NICUs is high, and the procedure is performed by health professionals with different levels of training and dexterity. Thus, it is relevant to develop investigations at healthcare settings to identify possible deficits that compromise the proper execution of this procedure and hence the quality of care. This study aims to describe the performance of intravenous cannulation by nursing professionals and to evaluate the adequacy of this procedure based on a protocol.

METHOD

This is an observational study with quantitative approach. The research was performed in a tertiary hospital in the city of Sobral, in Ceara state. The study was performed in four NICUs of the hospital, which comprise two low-risk units and two intensive care units.

The study population consisted of all nurses, nursing technicians, and auxiliary nurses from the NICUs located at the study site, totaling 11 nurses and 46 technicians/auxiliary nurses (57 professionals). Nursing professionals (nurses, nursing technicians, and auxiliary nurses) who were on call at the time of data collection, and who performed the PIC procedure in the unit were included in the study. Trainees and undergraduate nursing students were excluded from the study.

After applying the inclusion and exclusion criteria, a sample of 46 professionals was obtained, from which 22 were observed during the insertion and 13 were observed during the removal of the peripheral venous catheters. The purpose of the study was explained to each participant before consent for the research. Participants were then observed using the non-participant method.

Professionals who consented for the research were observed during the morning, afternoon, and evening. The observer filled out a standardized operational protocol checklist containing information such as: hand hygiene performance for the procedure, use of personal protective equipment (PPE) during the procedure, type of antiseptic solution used for newborn skin preparation, use of measures for reducing pain, duration of tourniquet application, number of attempts for successful insertion, and equipment used to secure the catheter.

Data were analyzed and processed using the statistical software SPSS version 20.0. Dispersion, absolute and relative frequencies were obtained. Data were distributed in tables for a better display of the research results.

The research project was submitted for evaluation by the Research Ethics Committee of the institution that hosted the study under the Protocol Nº 110.329, according to the regulations from the Resolution No. 466 from December 12, 2012, of the National Health Council, with a favorable opinion on

2012/28/09 (CAAE No. 02563612.6.0000.5197).

RESULTS

Eleven nurses (23.9%), 16 technicians (34.8%) and 19 auxiliary nurses (41.3%) were interviewed, totaling 46 professionals. The average time of professional exercise in the unit was 4.83 (±0.38) years. Table 1 shows the distribution of professionals according to self-reported knowledge and skills for performing the procedure.

Table 1. Distribution of nursing professionals according to self-reported knowledge and skills for performing the procedure. Sobral (CE), Brazil, 2016.

Variables	n	%
The person has completed capacitation course in IV cannulation		
Yes	12	26.1
No	34	73.9
The person can identify catheter malfunction		
Yes	46	100.0
The person has autonomy to replace catheters		
Yes	45	97.8
No	1	2.2
The person can perform the procedure safely		
Yes	40	87.0
No	5	10.9

Table 2 shows the distribution of professionals according to the use of safety and infection prevention measures during catheter insertion, based on direct observation.

Table 2. Distribution of nursing professionals according to the use of safety and infection prevention measures during catheter insertion, based on direct observation. Sobral (CE), Brazil, 2016.

Variables		n	%
Hands were washed before the procedure			
Yes		19	86.3
No		3	13.6
PPE* was used during the procedure			
Yes		22	100.0
Type of PPE used during the procedure			
Cap		3	13.6
Cap, mask and gloves		11	50.0
Cap and mask		2	9.0
Cap and gloves		2	9.0
Cap, mask, gloves, and gown		3	13.6
Cap, mask, gloves, gown, and goggles		1	4.5
Duration for tourniquet use			
Less than 1 minute		2	9.0
1 minute		11	50.0
More than 1 minute		9	9.0
Catheter insertion site preparation			
70% Alcohol		19	86.3
2% Chlorhexidine		3	13.6
Number of peripheral IV insertion attempts			
One		5	22.7
Two		4	18.1
Three		8	36.3
More than three		5	22.7
Variable	Mean	Minimum	Maximum
Total procedure duration	17.27	4.00	45.00

*Personal Protective Equipment.

Table 3 shows the distribution of professionals according to the use of measures to reduce pain during the catheter insertion, based on direct observation.

Table 3. Distribution of professionals according to the use of measures to reduce pain during the catheter insertion, based on direct observation. Sobral (CE), Brazil, 2016.

Variables	n	%
Measures to reduce newborn pain during the procedure		
Glucose solution on a gauze placed in the newborn's mouth	11	50.0
Analgesics/sedatives	2	9.0
Do not use any method to reduce pain	6	27.2
Uses two or more methods to reduce pain	3	13.6
Interval of time between catheter insertion attempts		
None	5	22.7
< 5 minutes	15	68.1
5 minutes	1	4.5
10 minutes	1	4.5
Equipment used to secure the catheter		
Micropore™ tape	6	27.3
Transparent film	8	36.3
Micropore™ tape and transparent film	8	36.3
Number of professionals involved in the procedure		
One	13	59.0
Two	9	41.0

Table 4 shows the distribution of professionals according to the use of safety and infection prevention measures during catheter removal, based on direct observation.

Table 4. Distribution of professionals according to the use of safety and infection prevention measures during catheter removal, based on direct observation. Sobral (CE), Brazil, 2016.

Variables	n	%
Hands were washed before the procedure		
Yes	5	38.4
No	8	61.5
Solution used for catheter removal		
Phisiologic solution	3	23.0
70% Alcohol	5	61.5
2% Chlorhexidine-alcohol	2	15.3
None	3	23.0
PPE was used during the procedure		
Yes	13	100.0
Type of PPE used during the procedure		
Cap	2	15.3
Cap, mask, and gloves	5	61.5
Cap and mask	3	23.0
Cap and gloves	1	7.6
Cap, mask, gloves, gown, and goggles	2	15.3

DISCUSSION

Forty-six nursing professionals participated in the study, 22 PIC procedure observations and 13 catheter removal observations were made. Most professionals in charge of the procedure were auxiliary nurses who had not completed a specific training course for the PIC procedure. Training and continuous education are key for the formation of a team with critical thinking abilities and awareness for the prevention and control of complications associated with the PIC procedure.[10] Therefore, it is necessary to intensify the educational activities that promote reflection, updating and behavior change aiming to the improvement of health professionals' performance.

One other important fact was that 8 professionals (36.3%) needed three attempts to complete the PIC procedure. Current guidelines for intravenous therapy in neonates recommend that professionals perform only two attempts and, in the event of failure, request the assistance of another professional. It is also recommended that the practitioner never reintroduces the needle in case of failure due to the risk of catheter fragmentation and consequent vascular embolism.[11] The Brazilian Health Ministry recommends that the PIC be performed by two professionals, a fact that occurred in 9 (59%) of the total of 22 observations made in this study.[12]

It was also observed that 19 professionals (86.3%) washed their hands before the PIC procedure. However, there were professionals who did not wash their hands, which is noteworthy since hand hygiene is at the heart of precautions. Hand hygiene should be

performed in a conventional manner and with appropriate sanitizers: water and liquid soap (which may be an antiseptic soap with chlorhexidine gluconate or polyvinylpyrrolidone iodine (PVPI), whenever there is visible dirt or contamination with organic material). The replacement of conventional sanitizers by alcoholic gel without rinsing can be done when the hands have no visible dirt.[13]

With regards to pain management during the procedure, half of the professionals (50%) used glucose solution on a gauze placed in the newborn's mouth to reduce pain and 6 (27.2%) professionals did not use any method. The latest guidelines published by the American Academy of Pediatrics on pain management in neonatal units advocate that pharmacological and non-pharmacological measures of pain relief be used consistently. The use of oral sucrose and/or glucose solutions is recommended for mild to moderately painful procedures, provided these solutions are prescribed and screened as a medicine. Measures such as cuddling the newborn, promoting non-nutritive sucking and allowing breastfeeding or providing human milk during the procedure may be adopted if pharmacological measures are not available.[14]

With regards to antisepsis of the puncture site, it was verified that most of the professionals used 70% alcohol, which agrees on current guidelines. For insertion of central catheters, the use of 0.5 to 2% chlorhexidine alcohol gluconate, 2% chlorhexidine aqueous gluconate or 10% aqueous PVPI is recommended.[15]

It was also observed that most professional used transparent polyurethane film to secure the catheter after insertion. This procedure agrees on the current recommendations, which emphasize that peripheral intravenous catheter sites should be dressed with sterile dressings that can be semi-occlusive (gauze and tapes) or occlusive (semipermeable transparent membrane).[16]

Regarding the use of PPE, it was observed that all professionals used some PPE during the procedures, but this behavior did not occur homogeneously: while only one professional used all PPE recommended for the procedure, the others used only a few PPEs. The use of PPE is mandatory during the performance of certain procedures as a measure of prevention of work accidents. Procedures involving biological fluids (such as blood) require individual precautionary measures (such as wearing gloves, goggles, gown and mask) and collective measures (such as establishing biosafety standards, conducting training, and purchasing safety devices).[17]

Although the existence of protective equipment in health care services is a key factor for the adoption of standardized procedures, the provision of such equipment it is not enough if the behavior of health professionals is not adequate. Authors of a study observed the occurrence of several risk situations for exposure to biological fluids, such as non-use of PPE, underreporting and the existence of misconceptions in health, among others.[15]

Regarding the tourniquet use, the Brazilian Health Ministry recommends that this procedure is done with the practitioner's hands to avoid the excessive and prolonged pressure of the insertion site and that it should not exceed one minute to avoid complications due to excessive pressure.[12] In the present study, although 11 (50%) professionals complied with these recommendations, nine left the newborn's arm tourniquet for more than one minute, thus indicating a need for change.

The results obtained in this research evidenced that the observed nursing team provided an individualized assistance to the newborns and met the parameters of physical, chemical and mechanical risks associated with PIC. However, some discrepancies in relation to the recommendations pointed out in the literature for this procedures were detected, such as: deficiency in the permanent education of professionals (most had no training course to perform the procedure), use of inappropriate substance for insertion and removal of the catheter, and use of no method to minimize the pain of the newborns. This indicates that these professionals should be more cautious about some procedures adopted at the time of insertion and removal of the catheter.

CONCLUSION

The development of the present study generated a great expectation in sharing the results with the professionals from the institution that held the study. It is believed that the dissemination of these findings may contribute to the development of permanent education strategies and training courses, considering that professionals with scientific knowledge are necessary to promote patient safety and healthcare quality.

Some limitations such as time constraints, difficulties in the acceptance of some participants and unavailability of material were found during the study but did not prevent the achievement of the proposed

objectives. Thus, it is considered that the study can contribute as an alert for nursing professionals that should adopt the precaution measures to avoid infections, reduce pain and improve the quality of health care in the NICUs.

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