



ORIGINAL ARTICLE

ADVERSE EVENTS IN THE USE OF CENTRAL VENOUS CATHETER OF PERIPHERAL INSERTION IN PUBLIC HOSPITAL

EVENTOS ADVERSOS NA UTILIZAÇÃO DO CATETER VENOSO CENTRAL DE INSERÇÃO PERIFÉRICA EM HOSPITAL PÚBLICO

EVENTOS ADVERSOS EN EL USO DEL CATÉTER VENOSO CENTRAL DE INSERCIÓN PERIFÉRICA EN HOSPITAL PÚBLICO

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ABSTRACT

Objectives: recognizing the profile of nurses and identifying adverse events (AEs) in the use of central venous catheter (PICC). **Method:** a descriptive study in a children's hospital in Goiânia (GO), with 26 nurses, from October to November 2012. Data were analyzed using descriptive analysis. The project was approved by the Research Ethics Committee, protocol 15/2012. **Results:** prevailed females (100%), 53,8% had training for insertion of PICC, AEs related to difficulties in progression/ closing of the capillary valve were the most witnessed in the catheter insertion phase (27,8%), in catheter obstruction (61,5%) in maintenance and rupture/breakage of the catheter (15,4%) of removing the catheter. **Conclusion:** it becomes necessary training for nurses, allied to continuing education activities to promote policy and strategy formulation to minimizing flaws and building a professional and institutional culture of safety. **Descriptors:** Patient's Safety; Central Venous Catheters; Nursing Care.

RESUMO

Objetivos: conhecer o perfil dos enfermeiros e identificar os eventos adversos (EA) na utilização do cateter venoso central (PICC). **Método:** estudo descritivo realizado num hospital infantil de Goiânia (GO), com 26 enfermeiros, de outubro a novembro de 2012. Os dados foram analisados pela análise descritiva. O projeto foi aprovado pelo Comitê de Ética em Pesquisa, Protocolo 15/2012. **Resultados:** predominou o sexo feminino (100%), 53,8% realizaram curso para inserção de PICC, os EAs relacionados a dificuldades de progressão/fechamento da válvula capilar foram os mais presenciados na fase de inserção do cateter (27,8%); obstrução do cateter (61,5%) na manutenção e ruptura/quebra do cateter (15,4%) na retirada do cateter. **Conclusão:** faz-se necessário a capacitação dos enfermeiros, aliada a uma política de promoção de atividades de educação permanente e formulação de estratégias para minimizar falhas existentes e a construção de uma cultura de segurança profissional e institucional. **Descritores:** Segurança do Paciente; Cateteres Venosos Centrais; Assistência de Enfermagem.

RESUMEN

Objetivos: conocer el perfil de las enfermeras e identificar los eventos adversos (EA) en el uso de catéter venoso central (PICC). **Método:** un estudio descriptivo conducido en un hospital de niños en Goiânia (GO), con 26 enfermeras, de octubre a noviembre de 2012. Los datos fueron analizados utilizando el análisis descriptivo. El proyecto fue aprobado por el Comité de Ética en la Investigación, el protocolo 15/2012. **Resultados:** las hembras presentaron la mayoría (100%), el 53.8% llevó a cabo curso para inserción del PICC, los EA relacionados con dificultades en la progresión/cierre de la válvula capilar fueron los más presenciados en la fase de inserción del catéter (27,8%), obstrucción del catéter (61,5%) y el mantenimiento de ruptura/rotura del catéter (15,4%) en retirar el catéter. **Conclusión:** es necesaria la formación de enfermeras, aliada a una continuación de las actividades de educación para promover la formulación de políticas y estrategias para minimizar los defectos y la construcción de una cultura de seguridad profesional e institucional. **Descriptores:** Seguridad del Paciente; Catéteres Venosos Centrales; Cuidado de Enfermería.

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INTRODUCTION

The neonatal intensive care units and pediatric and neonatal intermediate care units are often incident scenarios in technical and medical procedures and nursing often this occurs due to the intense workload and high demand for complex procedures and increasing use of advanced technologies.¹

When referring to the field of pediatrics, it is important that children and newborns are vulnerable groups that depend on the care of a multidisciplinary team, which makes them susceptible to adverse events (AEs) during assistance activities.

Adverse events are defined as incidents resulting from health care, with damage, but not intentional and not related to the natural evolution of the underlying disease. The damage can be classified as mild, moderate, severe and to death.² Such events can cause measurable lesions in affected patients, length of stay prolongation and/or death and increased costs.³ May be associated with use of drugs, equipment, diets or performing procedures.⁴

Between the technological arsenal that contributes to the occurrence of these events in these environments, there is Peripherally Inserted Central Catheter the known nationally Catheter Peripherally Inserted Central (PICC).⁵ This device is intended to obtain central venous access and, under the law, its inclusion is the responsibility of nurses and medical professionals.⁶

Nevertheless, the numerous benefits attributed to using PICC catheters, professionals must be aware of the risks involved in using this device, since they are not innocuous procedures and are associated with the occurrence of adverse events may occur in the integration process, while the catheter travels venous path during maintenance and removal.⁷⁻⁸

The interest in researching the use and the occurrence of adverse events related to the use of PICC arose from the concern, everyday care, opposite the observation of the risks provided to children and newborns in the use of new technologies that can be caused by failures arising from the health care process. These failures have led their victims to human suffering and to other aspects, such as longer hospital stays, deprivation early contact with parents and even death. In addition to increasing the costs related to the care and financial burden on the health institution and society.⁸

The analysis of the use of the PICC and the occurrence of AEs in a public referral hospital

under the view of nurses are configured in the first step to provide a contribution of knowledge along with other studies, subsidize the development of care protocols, in order to minimize risks and the development of a safety culture of pediatric and neonatal patient in everyday practice, and generate scientific data for developing and implementing a AEs notification form targeted assistance to this population.

The objective of this study is to analyzing the use of central venous catheter peripherally inserted and the occurrence of adverse events in a children's public hospital from the perspective of nurses.

Recognizing the profile of nurses and identifying adverse events (AEs) in the use of central venous catheter (PICC).

METHOD

This is a descriptive exploratory study of a quantitative nature conducted in neonatal and pediatric intermediate care units and pediatric clinic of a children's hospital in Goiania, Goiás.

The population consisted of 26 nurses, all professionals responsible for the management of PICC. The project followed the recommendations of Resolution 466/12 of the National Health Council⁹ and was approved by the Research Ethics Committee of the Hospital, Protocol 015/2012.

Data collection was carried out between October-November 2012 through a self-administered form similar to that used in a paper titled Adverse Events: *performance assessment instrument in the operating room of a university hospital*.¹⁰ Adjustments were made in order to meeting the objectives of this specific study. The instrument was evaluated by five teachers, thematic expertise in patient safety, adverse events and PICC, and after the Readjustments was conducted pilot testing with nurses from other institutions that also use the PICC.

The final instrument was composed of two parts. The first investigated the characterization data of nurses: gender, age, time of formation, work experience in the profession, the institution and the unit, working hours, training courses and certification in PICC. The second part contained questions relating to the occurrence of adverse events such as: types of events in the stages of the process of insertion, maintenance and removal of PICC experienced / witnessed in the last three months; conduct adopted against the occurrence of an AE and consequences for the patient.

Data were entered into a database Statistical Package for Social Sciences (SPSS) version 20.0. Descriptive analysis was performed.

RESULTS

Study participants were 26 nurses, averaging 37,4 years old and 61,6% with predominant age group 24-40 years old; 7 (26,9%) are specialists and one (3,8%) master; 10 (38,5%) have been formed up to five years, seven (26,9%) is 5 to 10; 14 (53,8%) have up to five years in the hospital; 16 (61,5%) have up to five years of operation time in the unit and handle the PICC; 23 (88,5%) are directly involved in patient care and two (7,7%) occupy the position of manager.

Concerning training for insertion of the PICC, 14 (53,8%) of the nurses took the course of qualification. The training ranged between

seven and 60 months, and six (23,1%) have more than two years of course. Concerning the skill acquired in the theoretical and practical course for catheter insertion, 12 (46,2%) of the nurses responded feel safe for the management of PICC;

The access route most used in the insertion of PICC was the basilica vein (34,6%), followed by cephalic and median cubical with 30,8%.

Regarding the AEs, registered nurses at the stage of the catheter insertion process, the data show that from the 26 nurses, 15 (57,7%) experienced AEs in the insertion of PICC, six (23,1%) of the nurses responsibility and were the major pathways involved axillary vein with five (26,3%) reports, then the jugular four (21%) occurrences.

The types of AEs reported during the phase of the process of insertion of the PICC are shown in Figure 1.

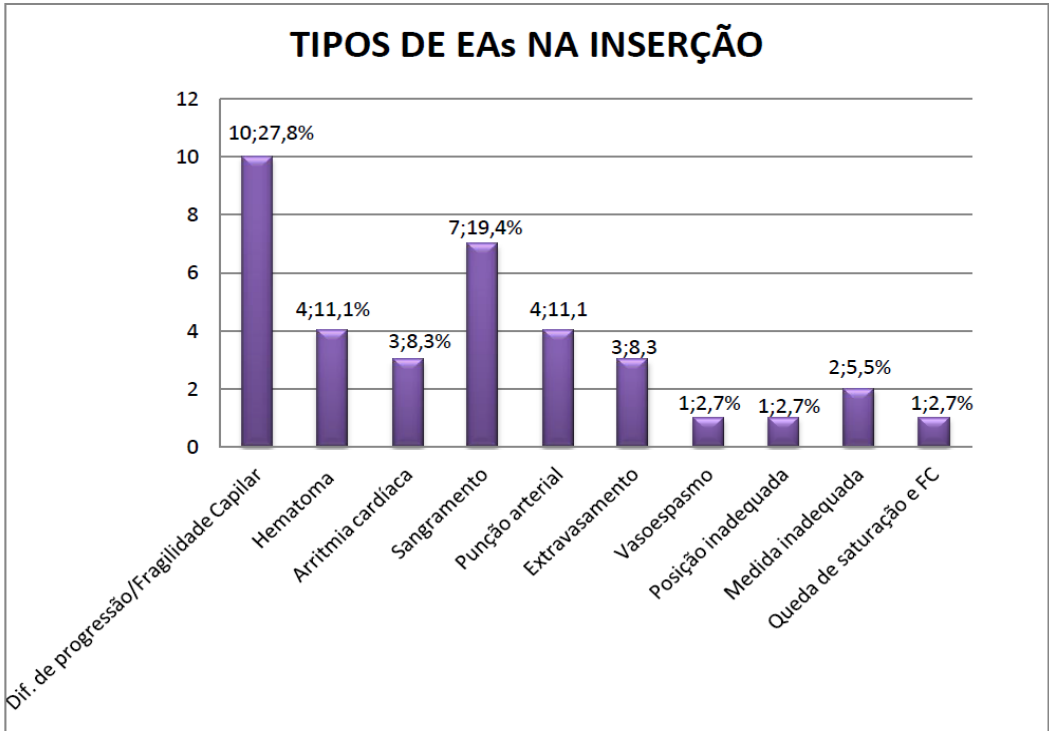


Figure 1. Adverse events that occurred at the phase of PICC insertion process, according to reports of the nurses of a children hospital. Goiania (GO), Brazil. 2012.

Among the AEs occurred in the phase of the PICC insertion process, the difficulty in progression/ closing valve/capillary fragility was reported for 10 (27,8%) nurses, 7 (19,4%) was bleeding and 4 (11,1%) hematoma and accidental arterial puncture.

The consequences for the patient facing the adverse events that occurred in the insertion stage of the procedure are presented in Table 1.

Table 1. Consequences of adverse events to patients, PICC insertion phase, reported by nurses of a children’s hospital in Goiania-GO, 2012. (N=26)

Outcome of AE in insertion	N	%
Consequence for the patient		
Not cause apparent damage	06	23,1
Not cause damage, but required monitoring	03	11,5
Contributed to / or resulted in temporary damage and required intervention	05	19,2
Caused damage and required intervention necessary to keep life	01	3,8
Did not present AE in insertion	11	42,3
Total	26	100

Adverse events caused no apparent damage as 9 reports (34,6%) of the nurses. The main pipelines across adopted the occurrence of EV were clinical/administrative 2 (7,7%) and clinical/ management 2 (7,7%). 15 EA, 7 (26,9%) were communicated to the patient or

family and the principal informant was the nurse as 5 (19,2%) of the reports.

At the stage of PICC maintenance process, the nurses witnessed and/or experienced 22 (84,6%) adverse events of 59 types, as shown in Figure 2.

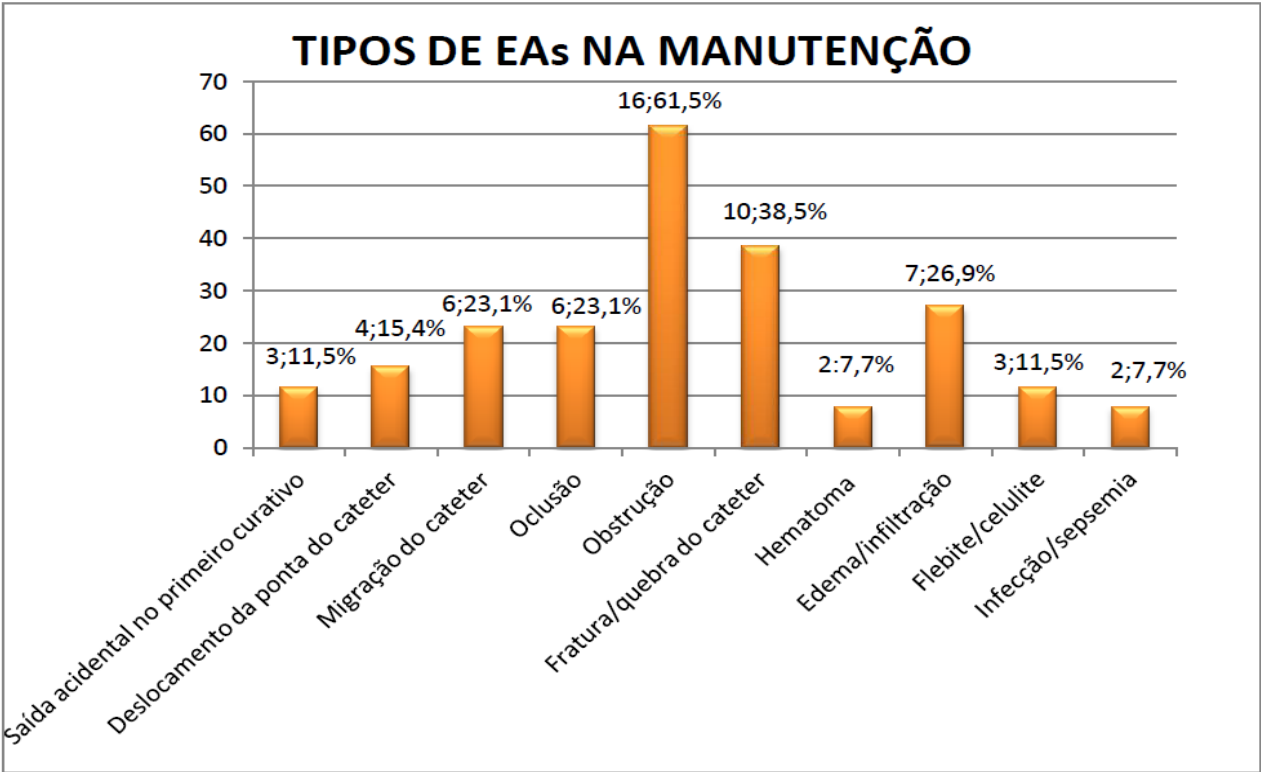


Figure 2. Types of adverse events recorded during the maintenance process of the PICC, according to reports of the nurses of a public children’s hospital. Goiania-GO, 2012.

The obstruction of the catheter was the AE most cited by nurses 16 (61,5%) caused by blood reflux, drug incompatibility, and lack of inadequate infusion washing (flushing) of the catheter, then the fracture/breakage of the

catheter 10 (38,5%).

The consequences of the AE for the patient and the approaches adopted in PICC maintenance phase are shown in Table 2.

Table 2. Consequences for patients of adverse events occurring in the maintenance of the PICC; reported by nurses of a hospital children of Goiania -GO, 2012. (N=26)

Outcome of AE in maintenance	n	%
Consequence for the patient		
Not cause apparent damage	10	38,5
Not cause damage, but required monitoring	05	19,2
Contributed to or resulted in temporary damage and required intervention	05	19,2
Caused damage and required intervention necessary to keep life	01	3,8
Resulted in temporary damage, required intervention and prolonged hospitalization	01	3,8
Did not presented AE in maintaining	04	15,4
Total	26	100

The consequences of the AE occurred with patients in the maintenance phase of the PICC, 10 (38,5%) did not cause damage, 12

(46%) required monitoring or clinical intervention and prolonged hospital stay. The interventions were delayed or lack of

administration of prescription drugs, new central or peripheral access and removal of the catheter.

Six (23,1%) nurses reported only the adoption of clinical approaches for AE, in an attempt to minimize the consequences for the patient, such as catheter removal by breakage or obstruction, insertion of a new catheter, attempted clearance with the technique of standard operating procedure, close observation, venous dissection when another PICC was not possible, patient monitoring and other clearing maneuvers.

Nurses accounted for four (15,4%) of the AE occurred but 13 (50%) did not answer this question. The communication of adverse events were held in 13 parents (50%)

Table 3. Consequences of adverse events for patients in the phase of discharge from the PICC, reported by nurses of a children’s hospital of Goiania-GO, 2012. (N=26)

Outcome of AE on withdrawal	n	%
Consequence for the patient		
Not cause apparent damage	01	3,8
Not cause damage, but required monitoring	01	3,8
Contributed to / or resulted in temporary damage and required intervention	01	3,8
Did not answer	01	3,8
Did not present AE on withdrawal	22	84,6
TOTAL	26	100

As a consequence of the AE for the three patients (11,4%) reported the need for monitoring and intervention by temporary damage related to the need for new central venous puncture. Concerning the intubations, two (7,7%) were only reported the adoption of new clinical procedures such as puncture programming 24 hours after catheter removal and monitoring of the puncture site.

Regarding the professional responsible for the removal of PICC, two (7,7%) were withdrawn by nursing technicians. The AE information for parents was reported in two instances (7,7%) by nurses.

DISCUSSION

The analysis of the use of central venous catheter peripherally inserted and the occurrence of adverse events in a children's public hospital, from the perspective of nurses provided an understanding of the complexity of care involving this device and showed flaws in all phases of the management process PICC: insertion, maintenance and removal.

Study participants were nurses 100% female, a fact justified to be nursing a profession historically feminine and the predominant age group between 24-40 years old to 61,6% noted a relatively young professional profile within a specialized environment and training to manage the PICC, postgraduated in pediatrics and neonatology

occurrences, six (23,1%) by nurses.

Regarding the AE, the phase of the PICC withdrawal process, have been reported four (15,4%) AEs and these were caused by rupture/breakage of the catheter. The professional responsible for catheter removal was the nurse.

The consequences of AE to the patient in the PICC withdrawal phase are presented in Table 3.

most have more than five years in the unit and are directly involved in patient care. It is worth mentioning the importance of the experience acquired over the years by professionals, as institutions seek in hiring human resources, basically, knowledge, skill, health and availability for activities.⁸

However, the workload of the weekly average working between 30 and 60 hours, 92,3% of nurses becomes an aggravating factor which can lead to adverse events. In Brazil, nursing professionals have recognized long working hours that can lead to exhaustion and fatigue, which may affect patient care. In addition, depending on the female-dominated, professional work day is added also to housework and make up to call all day or total workload.¹¹

According to the Federal Nursing Council Resolution (COFEN) of 12nd July 2001, the insertion of PICC is of the responsibility of nurses, after qualification and/or professional training.¹² The study found that only 53,8% of nurses took the course of qualification for insertion PICC. Another study showed that 64,8% of nurses working in neonatal intensive care units had no qualification for insertion of PICC and reported that gained experience with handling the catheter acting in professional practice.¹³

Most (57,7%) of the nurses have experienced or witnessed AEs in phase

insertion of the PICC being the most common site of insertion, the basilica vein. The nurse was the professional responsible for most adverse events being more present, the difficulty of progression/valve closing (38,5%), followed by bleeding and hematoma. Similar data were observed in a study that showed that at the PICC insertion phase, there was predominance of nurse participation and the most common site for insertion of the PICC was the basilica vein.⁸

The EV occurred 34,6% of AEs caused no apparent damage, but some cases required monitoring. A similar study on the EAs analysis in surgical clinic showed that the consequences of the event for the patient, for the most part, resulted in temporary harm.¹⁴ Another study with 218 newborns, found that 183 (84%) presented some type of adverse event, and 76% resulted in temporary harm and/or prolongation of hospital stay, but none of them resulted in death.¹⁵

Among the measures adopted against the occurrence of AEs, the clinical (26,9%) were the most prevalent at the stage of the catheter insertion process, such as the exchange of access with more rigorous observation of the place, the traction of the catheter and radiological monitoring peripheral venipuncture passing another PICC catheter removal when necessary compressive dressing in case of bleeding, change of administration route of drugs for oral or intramuscular administration where possible and blood transfusion. A study conducted in Rio Grande do Sul and Região Serrana pointed out that the ICU nursing team conducts were mostly clinics established in their care practice.⁸

The reporting of adverse events to the relatives were 26,9% and main informant, the nurse, responsible for 15,4% of the occurring events. Low communication to family members can be justified by embarrassment or fear of punishment, a factor that hinders communication or notification of AEs.¹⁴

In the maintenance phase, the majority 69,2% of nurses reported having witnessed and/or experienced some kind of event, and the obstruction of the catheter was the most cited with AE (61,5%). Similar results were seen in a study in which a catheter obstruction obtained 47,4% of the reports.⁷ Other studies have found the lumen obstruction in 30,9% to 36% of PICC maintenance.^{16,8}

Concerning the damage caused to the patient, 46% required monitoring or clinical intervention, burdening costs of materials and extending the length of stay.

Nurses were the most recorded of the AE occurred, a fact justified for being the professional responsible for the management of PICC in the hospital. However, noteworthy that 50% did not answer that question. In general, the professional has difficulty in reporting the incidents for feelings like shame, self-punishment, fear of criticism from others and litigation. However, that the reporting of incidents to be truly effective, you need a great effort to ensure that professionals that the goal is to improve safety and never accuse or punish.¹⁰ A study on the perception of nurses as patient safety has shown that when asked about the factors that influence the act of not report adverse events cited: lack of interest (10,2%), fear of punishment (9,5%) and negligence (8,2%).¹⁷

In the phase of removal of PICC, 15,4% reported rupture/breakage of the catheter and the professional responsible for catheter removal was the nurse. One study found that among the reasons for the removal of PICC catheters, 50,8% were due to mechanical and infectious complications, 35,6% by the end of therapy, 11,9% of them died and 1,7% by changing the type due to the presence of a catheter or other catheter.⁸ However, rupture of the catheter can become serious AEs occurring in the bloodstream.

As consequences of AEs for patients have been reported, clinical management and monitoring and intervention by temporary damage, requiring new central venous puncture. A survey showed that the main clinical approach adopted in the unit which was developed the study was the immediate removal of the catheter and getting a new access, confirming the findings of this study.⁷

The information of the occurrence of AE was passed on to parents in two cases, and once by the doctor and the other by the nurse. Study on medication errors in hospitalized children in a pediatric intensive care unit found that 95,5% of patients suffering errors and their families were not notified of its occurrence by the health team.¹⁸ This demonstrates that communication is still incipient on adverse events, a fact also reported in this study.

CONCLUSION

It is expected that the study will stimulate the managers of the institution to provide professional guidance focused on safety culture and the encouragement of spontaneous reporting of events in the units, so that they are used as lessons for other professionals through training and capacitation. This will enable the reduction of

length of stay and reducing hospital costs, and ensure the neonatal and pediatric clientele the warmth of their parents and soon living with their families.

To nurses who have legal support to conduct this procedure, it is expected to stimulate the epistemological curiosity on the subject patient safety and AE in order to inform themselves about this technology and develop scientific knowledge in this area, which will support decision clinical decisions and promotion of good results, improving the quality of intensive care in neonatology and pediatrics.

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Submission: 2015/02/19

Accepted: 2015/07/04

Publishing: 2015/08/01

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