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SAFETY IN EQUIPMENT AND DRESSING CHANGES FOR CENTRAL VASCULAR CATHETERS: AN OBSERVATIONAL STUDY

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ABSTRACT

Objective: to evaluate the compliance of the nursing team's care practice in handling the central vascular catheter when changing dressings and equipment in an intensive care unit.
Method: a descriptive, prospective, and observational research study. Data collection was conducted from January to March 2016 in an Intensive Care unit of a public hospital in Sergipe, northeastern Brazil. Direct observation of the professionals was conducted using a safe checklist. Descriptive statistics was used to determine the process indicators, and inferential statistics to determine the association between the variables, using the chi-square and Fisher's tests, with a 5% significance level.
Results: 534 procedures corresponding to the exchange of equipment and dressings were observed, corresponding to 5,073 actions. As for the change of equipment,2,136 actions were evaluated, most of them carried out by nursing technicians. Of the eight actions evaluated in each procedure, only two (25%) reached the desired compliance, with a positivity index between 90% and 99%. Regarding the dressing change,2,937 actions were evaluated, all of which were performed by nurses. Of the eleven evaluated actions, eight (72%) achieved desired compliance, with a positivity index between 80% and 100%.
Conclusion: the results analyzed are far from the desired compliances, demonstrating the need to implement strategies to ensure the safety culture during the care provided.

DESCRIPTORS: Guarantee of the quality of the health care actions. Central venous catheters. Infections related to the catheter. Patient safety. Patient care team.

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SEGURANÇA NA TROCA DE EQUIPOS E CURATIVOS PARA CATETER VASCULAR CENTRAL: UM ESTUDO OBSERVACIONAL

RESUMO

Objetivo: avaliar a conformidade da prática assistencial da equipe de enfermagem no manuseio do cateter vascular central na troca de curativos e de equipos em unidade de terapia intensiva.
Método: pesquisa descritiva, prospectiva, observacional. A coleta de dados ocorreu de janeiro a março de 2016 em uma unidade de terapia intensiva de um hospital público do Sergipe, nordeste do Brasil. Realizada observação direta dos profissionais utilizando *checklist* de verificação segura. A análise descritiva foi utilizada para determinação dos indicadores de processo, e a estatística inferencial para determinar a associação entre as variáveis, usando os testes de Qui-Quadrado e Fisher, com nível de significância de 5%.
Resultados: observados 534 procedimentos correspondentes a troca de equipos e curativos, correspondendo a 5073 ações. Quanto à troca de equipo 2.136 ações foram avaliadas, a maioria realizadas por técnicos em Enfermagem. Das oito ações avaliadas em cada procedimento, apenas duas (25%) alcançaram conformidade almejada, com índice de positividade entre 90% e 99%. Referente a troca de curativo, 2.937 ações foram avaliadas, sendo todas executadas por Enfermeiros. Das onze ações avaliadas, oito (72%) alcançaram conformidade desejada, com índice de positividade entre 80% e 100%.
Conclusão: os resultados analisados estão distantes das conformidades almejadas, demonstrando a necessidade de implementação estratégias para garantir a cultura de segurança durante a assistência prestada.

DESCRITORES: Garantia da qualidade dos cuidados de saúde. Cateteres venosos centrais. Infecções relacionadas a cateter. Segurança do paciente. Equipe de assistência ao paciente.

SEGURIDAD EN EL CAMBIO DE EQUIPOS Y VENDAJES PARA EL CATÉTER VASCULAR CENTRAL: UN ESTUDIO DE OBSERVACIÓN

RESUMEN

Objetivo: evaluar la conformidad de la práctica asistencial del equipo de Enfermería en la manipulación del catéter vascular central al momento de cambiar vendajes y equipos en una Unidad de Cuidados Intensivos.
Método: investigación descriptiva, prospectiva y de observación. La recolección de datos tuvo lugar entre enero y marzo de 2016 en una Unidad de Cuidados Intensivos de un hospital público de Sergipe, noreste de Brasil. Se realizó una observación directa de los profesionales por medio de una *checklist* de verificación segura. Se utilizó análisis descriptivo para determinar los indicadores de proceso, y estadística inferencial para determinar la asociación entre las variables, usando las pruebas de chi-cuadrado y de Fisher, con un nivel de significancia del 5%.
Resultados: se observaron 534 procedimientos correspondientes al cambio de equipos y vendajes, lo que correspondió a 5.073 acciones. En relación al cambio de equipos, se evaluaron 2.136 acciones, la mayoría realizadas por técnicos en Enfermería. De las ocho acciones evaluadas en cada procedimiento, solamente dos (25%) alcanzaron la conformidad deseada, con un índice de positividad del 90% al 99%. En relación con el cambio de vendajes, se evaluaron 2.937 acciones, todas ejecutadas por Enfermeros. De las once acciones evaluadas, ocho (72%) alcanzaron la conformidad deseada, con un índice de positividad del 80% al 100%.
Conclusión: los resultados analizados distan de los niveles de conformidad deseados, lo que demuestra la necesidad de implementar estrategias para garantizar la cultura de la seguridad durante la atención provista.

DESCRIPTORES: Garantía de la calidad de la atención de la salud. Catéteres venosos centrales. Infecciones relacionadas al catéter. Seguridad del paciente. Equipe de asistencia al paciente.

INTRODUCTION

Healthcare-associated infections (HAIs) are considered a serious public health problem, being among the main causes of morbidity and mortality among patients, increasing the period of hospitalization and causing costly services.[1] Primary Bloodstream Infections (PBIs) associated with the use of the central catheter represent a problem of great magnitude, being one of the main causes of HAIs in Intensive Care Units (ICUs), due to the greater frequency in handling, the lack of technical skill in the use of the device, and the prolonged stay time.[2]

It is known that the Central Vascular Catheter (CVC) brings numerous benefits to patients admitted to the ICU; however, nearly 90% of the patients have complications linked to its use, the main being bloodstream infection.[3]

It is estimated that in the United States of America,30,000 new cases of PBIs occur annually in these units. In the European continent, a rate close to 13.3 infections per 1,000 CVCs/day was observed.[4–5] In Brazil, epidemiological data on PBI related to CVC in the ICU show that, from 2010 to 2015, the rates ranged from 4.1 to 5.1 infections per 1,000 CVCs/day, which can cause a mortality rate of up to 69%.[1]

Concerned with this context, international organizations have been discussing and elaborating practical evidence-based recommendations to develop and support clinical procedures of health teams in the management of the CVC, as is the case of the Infusion Nurses Society (INS) and the Institute of Healthcare Improvement (IHI).[6–7]

In this perspective, the IHI created the CVC bundle, based on scientific evidence, composed of a set of preventive measures indicated for patients using CVC. In this regard, a number of studies demonstrate the effectiveness of preventive interventions in the effective reduction of PBIs when they are implemented in care units. These interventions were called insertion bundles and maintenance bundles for CVC. Actions for the first intervention include pre-insertion hand hygiene, use of a maximum precautionary barrier, skin antisepsis with chlorhexidine, and selection of the appropriate location for its installation. Maintenance actions include hand hygiene by pre-handling, use of protective equipment as a maximum barrier of precaution, disinfection of connections before the administration of injectables, change of dressings, and daily assessment of the permanence.[7]

However, despite the IHI's initiative in the elaboration of these interventions, the health teams have not yet incorporated these practices, compromising the quality of care and, consequently, patient safety. This is evidenced in Brazil by the high mortality rates due to PBIs: between 6.7% and 75%.[7]

The nursing team, for being responsible for the continuous assistance and for most of the procedures involving the handling and maintenance of the CVC, has a primary function in minimizing risks through preventive actions. Furthermore, it is expected that it will demonstrate both proficiency and competence as well as scientific knowledge and technical skills, being a promoter of safe practices.[8]

Changing dressings and equipment for patients using CVC are essential routine and care recommendations made by the nursing staff for the prevention and control of Primary Bloodstream Infections (PBIs). The literature mentions that the dressing should be changed every 48 hours, when the dressing is with gauze and sterile adhesive tape. Every seven days, for dressings with sterile semipermeable transparent membrane or changed immediately, regardless of the term, if it is dirty, loose or moist, since the risk of PBI increases from four to twelve times.[1]

The replacement of complementary equipment and devices depends on several factors, such as the frequency of infusion, type of solution used, suspected contamination, or when the integrity of the system or product is damaged. However, it is necessary to consider that, even if the dressing and equipment changes are carried out as recommended, failure to use a safe technique can cause serious adverse events, such as bloodstream infections.[1]

Maintaining control parameters for cases of infections is essential to ensure the quality of care offered to the patient. Highlighting as a fundamental role of the health team its identification, notification, and action to effectively control these adverse events, especially with regard to infections associated with the use of CVC.[7]

In this perspective, care indicators have been used as resources that enable the assessment of the quality and compliance of the care practices, being defined as quantitative measures that allow for the evaluation of processes involving health care management, besides revealing potentialities and vulnerabilities.[9]

Compliance is understood as the performance of an activity or process systematized based on pre-established rules and standards that aim to meet a certain degree of trust. The compliance rate is able to define the quality of a process and direct the activities developed by a service. Accordingly, the Positivity Index[10] has been used by researchers to measure quality of care. This methodology provides the classification of the compliance rates of the care practice in four levels of quality, in which 100% positivity indicates desirable care; 90 to 99% adequate care; 80 to 89% safe care; and 70 to 79% unwanted or deficient care.[10]

Thus, the Carter Positivity Index was adopted in this study in order to determine the quality of care in the care processes during the handling and maintenance of the CVC, by assessing the compliance of the care practice by the nursing staff of an ICU in the handling and maintenance of the central vascular catheter, when changing equipment and dressings.

In view of the above, the following question arises: What are the compliance rates identified in the care practices performed by the ICU nursing team, involving the handling of the central vascular catheter? Faced with this question, the study aimed to assess the compliance of the nursing team's care practice in handling the CVC when changing dressings and ICU equipment; to verify if there is an association between the professional, gender, and work shift variables, and the dressing and equipment change procedures.

It is expected with the results of this study to diagnose quality of care, through the compliance of the activities carried out by the nursing team, identifying potentialities and weaknesses in the processes involving the manipulation of central catheters. Still, it aims to assist in the development of strategies that enable better adherence to safe practices, reducing the risk of PBIs in ICUs and offering greater safety to critical patients using this device.

Thus, obtaining these results will contribute to the recognition of the compliance of the activities carried out by the nursing team, highlighting the functional deviations and the potentialities existing in the care process. In addition, it is expected to assist in the elaboration of strategies that favor the improvement of care for critical patients using central vascular catheters.

METHOD

A descriptive, prospective, and observational research study, having as study locus an ICU of the largest public hospital of Sergipe, northeastern Brazil. The unit has 27 beds and a team of 80 nursing technicians and 23 nurses.

To determine the sample, a previous survey was carried out over a period of seven days, to verify the number of procedures performed by the nursing team, involving the change of equipment and dressing. Means of 9.7 changes of equipment and 9.6 changes of dressing per day were identified. With these data, the *n* for a period of three months was calculated, making 874 changes of equipment and 866 changes of dressing.

The sample, non-probabilistic and of the intentional type, was calculated considering a significance level of 95% and a margin of error of 5%, consisting of 267 observations for changing the equipment and 267 observations for changing the dressings. It is noteworthy that for the observation

of each care practice, the sample was distributed in the morning, afternoon and night work shifts, promoting homogeneity of the evaluated data.

The inclusion criteria adopted for conducting the observations were all the procedures for changing equipment and dressing in patients using a central vascular catheter, performed by nursing professionals who worked in the ICU for at least six months. Procedures performed on weekends were excluded, as professionals worked on duty, which made it impossible for the team to distinguish between the morning and afternoon periods. Procedures performed by teams that did not have the necessary materials for execution were also excluded from the study.

The construction of the two data collection instruments was based on the Guideline for prevention of intravascular catheter-related infections,[11] being organized and structured in two parts, the first relating to the characterization of the vascular catheter used (identification of the location, composition, and length of stay of the device) and characterization of the nursing professionals (professional category, gender, and work shift).

The second part is composed of bundles with eight actions to observe the equipment change procedure; and with eleven actions for the dressing change procedure. In addition, data on the availability of equipment and supplies in the service were recorded in the instruments, before observing each procedure.

Subsequently, the instrument underwent a pilot test, with the objective of evaluating aspects related to functionality and correcting any flaws before its definitive implementation. For this purpose, a unit with characteristics similar to those of the study was chosen, with 27 changes of equipment and 27 changes of dressing over a period of seven days.[12]

Data collection took place from January to March 2016 and was performed through direct observation of the professionals during the execution of the exchange procedures, using the bundles constructed. Two undergraduate students of the Nursing course participated as observers, being previously trained to develop such activity. The Kappa test was calculated to verify the agreement between both, resulting in an agreement of 0.993 for changing the equipment and of 0.970 for changing the dressing, meaning an almost perfect agreement between the data collected by both observers.

It is important to note that, before starting the observations, the collector recorded whether all the materials needed to perform the procedures were available, including: glove, mask, parenteral infusion equipment, hand sanitizer (soap/alcohol gel), and alcoholic substance for disinfecting injectors and skin antisepsis.

To reduce the observation biases, such as behavior and performance changes, the forms and actions to be evaluated were not presented to the study participants. Despite the possible changes in behavior, this factor was considered to be of little relevance, since this situation, according to references, can only occur in the researcher's first contacts with the observed participant.[13]

The participating nursing professionals were informed about the objectives and contributions of the research, giving their consent by signing the Free and Informed Consent Form. The patients did not suffer interventions from the researchers during the study, and there was no interruption or negative implications in the assistance offered; thus, the research did not bring them risks.

A descriptive analysis of the data was performed to determine the process indicators, and thus the compliance rates, general and specific, were calculated for later classification as to the level of quality of the care provided. For this, the Carter Positivity Index was used.[10]

Inferential statistics was adopted to determine the association between the variables (professional category, work shift, and gender) and the two procedures observed. The inferential tools were the Chi-Square and Fisher's Exact tests, using the free R software, version 3.2.3, adopting a significance level of 5% and $p < 0.05$.

In compliance with the ethical issues, the project was approved by the Research Ethics Committee, observing Resolution 466/2012. Patients using CVC did not undergo any intervention during the research, so they did not suffer any risks or negative implications during their care.

RESULTS

A total of 534 procedures for changing the equipment and dressing were observed, corresponding to 5,073 specific actions, in the three work shifts (morning, afternoon, and night).

During data collection, 72 (70%) nursing professionals were observed, most of them being female, 54 (72%). Of the total of professionals, 55 (76%) were nursing technicians and 17 (24%) were nurses, distributed between the morning, 16 (22%); afternoon, 13 (18%); and night, 43 (60%) shifts.

It is noteworthy that, in all the observations, the availability of the necessary supplies for the execution of the care processes was verified; thus, if there were no such materials, the observation would not be carried out.

In the assessment of care using the prevention bundle for changing equipment,2,136 specific actions were evaluated in 267 observed procedures. Of the total of procedures, 17 (6.4%) were carried out by nurses and 250 (93.6%) by nursing technicians.

The general compliance for the equipment changes procedure was null. Thus, care was considered unwanted for all the observations. As for specific compliance, of the eight evaluated actions contained in the bundle, two (25%) achieved the desired compliance, Action-2 (opens the equipment package and keeps the connection place protected) and Action-4 (uses procedure gloves) being classified as adequate, with a PI between 90% and 99%.

As for the prevention bundle for dressing changes, 267 procedures were observed, 89 in each work shift, making a total of 2,937 specific actions evaluated, all of which were performed by nurses. In the assessment of general compliance, the procedure was classified as an unwanted care process, that is, there was zero adherence to all the stages recommended by the bundle. However, of the eleven specific actions, nine (81.8%) achieved the desired compliance and two were classified as unwanted, being Action-1 (sanitizes hands before the procedure) and Action-4 (sanitizes hands before applying the dressing).

In Table 1, it can be seen that Action-7 was the only one that presented a statistically significant difference (p=0.049), being exclusively performed by nursing technicians.

Table 1 – Association between the professional category variable and the prevention bundle for equipment changes. Aracaju, SE, Brazil, 2016. (n=267)

Actions observed during equipment change	Assessment	Nurse	Technician	p-value
1- Sanitizes hands before the procedure.	C*	-	4 (100.00)	1.000
	NC†*	17 (6.46)	246 (93.54)	
2- Opens the equipment package and keeps the connection place protected.	C	15 (5.77)	245 (94.23)	0.066
	NC	2 (28.75)	5 (71.43)	
3- Disinfects the injector of the parenteral solution before introducing the equipment.	C	-	9 (100.00)	1.000
	NC	17 (6.59)	241 (93.41)	
4- Uses procedure gloves.	C	14 (5.76)	229 (94.24)	0.187
	NC	3 (12.50)	21 (87.50)	
5- Performs the disinfection of the tap with alcoholic solution before introducing the equipment.	C	-	8 (100.00)	1.000
	NC	17 (6.56)	242 (93.44)	

Table 1 – Cont.

Actions observed during equipment change	Assessment	Nurse	Technician	p-value
6- Sanitizes hands after the procedure is finished.	C	4 (4.26)	90 (95.74)	0.432
	NC	13 (7.51)	160 (92.49)	
7- Records the date of the equipment change.	C	-	50 (100.00)	0.049
	NC	17 (7.83)	200 (92.17)	
8- The frequency of equipment changes is in accordance with the recommendations.	C	1 (3.85)	25 (96.15)	1.000
	NC	16 (6.64)	225 (93.36)	

* Compliant; † Non-Compliant; ‡ Statistically significant. Chi-square and Fisher's Exact tests

It is observed in Table 2 that three of the eight actions evaluated, in the prevention bundle for equipment changes, presented statistical relevance, as follows: Action-1 (0.035), in which the actions in compliance were carried out exclusively by the night shift teams; Action-3 (0.022); and Action-7 (0.014).

Table 2 – Association between the work shift variable and the prevention bundle for equipment changes. Aracaju, SE, Brazil, 2016. (n=267)

Actions observed during equipment change	Assessment	Morning	Afternoon	Night	p-value
1- Sanitizes hands before the procedure.	C*	-	-	4 (100.00)	0.035‡
	NC†	89 (33.84)	89 (33.84)	85 (32.32)	
2- Opens the equipment package and keeps the connection place protected.	C	86 (33.08)	86 (33.08)	88 (33.85)	0.705
	NC	3 (42.86)	3 (42.86)	1 (14.29)	
3- Disinfects the injector of the parenteral solution before introducing the equipment.	C	1 (11.11)	1 (11.11)	7 (77.78)	0.022‡
	NC	88 (34.11)	88 (34.11)	82 (31.78)	
4- Uses procedure gloves.	C	82 (33.74)	79 (32.51)	82 (33.74)	0.662
	NC	7 (29.17)	10 (41.67)	7 (29.17)	
5- Performs the disinfection of the tap with alcoholic solution before introducing the equipment.	C	1 (12.50)	1 (12.50)	6 (75.00)	0.054
	NC	88 (33.98)	88 (33.98)	83 (32.05)	
6- Sanitizes hands after the procedure is finished.	C	35 (37.23)	33 (35.11)	26 (27.66)	0.333
	NC	54 (31.21)	56 (32.37)	63 (36.42)	
7- Records the date of the equipment change.	C	15 (30.00)	10 (20.00)	25 (50.00)	0.014‡
	NC	74 (34.10)	79 (36.41)	64 (29.49)	
8- The frequency of equipment changes is in accordance with the recommendations.	C	10 (38.46)	6 (23.08)	10 (38.46)	0.506
	NC	79 (32.78)	83 (34.44)	79 (32.78)	

* Compliant; † Non-Compliant; ‡ Statistically significant. Chi-square and Fisher's Exact tests

Table 3 shows that Action-1 (0.001), Action-3 (0.000) and Action-5 (0.000), in the prevention bundle for equipment changes, were statistically significant when associated to the gender variable.

Table 3 – Association between the gender variable and the prevention bundle for equipment changes. Aracaju, SE, Brazil, 2016. (n=267)

Actions observed during equipment change	Assessment	Female (%)	Male (%)	p-value
1- Sanitizes hands before the procedure.	C*	-	4 (100.00)	0.001***
	NC**	214 (81.37)	49 (18.63)	
2- Opens the equipment package and keeps the connection place protected.	C	208 (80.00)	52 (20.00)	1.000
	NC	6 (85.71)	1 (14.29)	
3- Disinfects the injector of the parenteral solution before introducing the equipment.	C	2 (22.22)	7 (77.78)	0.000***
	NC	212 (82.17)	46 (17.83)	
4- Uses procedure gloves.	C	196 (80.66)	47 (19.34)	0.693
	NC	18 (75.00)	6 (25.00)	
5- Performs the disinfection of the tap with alcoholic solution before introducing the equipment.	C	-	8 (100.00)	0.000***
	NC	214 (82.63)	45 (17.37)	
6- Sanitizes hands after the procedure is finished.	C	77 (81.91)	17 (18.09)	0.710
	NC	137 (79.19)	36 (20.81)	
7- Records the date of the equipment change.	C	40 (80.00)	10 (20.00)	1.000
	NC	174 (80.18)	43 (19.82)	
8- The frequency of equipment changes is in accordance with the recommendations.	C	19 (73.08)	7 (26.92)	0.488
	NC	195 (80.91)	46 (19.09)	

* Compliant; † Non-Compliant; ‡ Statistically significant. Chi-square and Fisher's Exact tests

Table 4 shows that Action-10 (p=0.000) was the only one that presented a statistically significant difference. The actions in compliance with the bundle were carried out, mostly, in the night shift.

Table 4 – Association between the work shift variable and the prevention bundle for dressing changes. Aracaju, SE, Brazil, 2016. (n=267)

Actions observed during dressing change	Assessment	Morning (%)	Afternoon (%)	Night (%)	p-value
1- Sanitizes hands before the procedure.	C*	2 (40.00)	2 (40.00)	1 (20.00)	1.000
	NC†	87 (33.21)	87 (33.21)	88 (33.59)	
2- Puts on procedure gloves and removes previous dressing.	C	88 (33.21)	89 (33.58)	88 (33.21)	1.000
	NC	1 (50.00)	-	1 (50.00)	
3- Removes procedure glove.	C	59 (31.05)	73 (38.42)	58 (30.53)	0.021
	NC	30 (38.96)	16 (20.78)	31 (40.26)	
4- Sanitizes hands before the dressing is performed.	C	1 (20.00)	2 (40.00)	2 (40.00)	1.000
	NC	88 (33.59)	87 (33.21)	87 (33.21)	
5- Uses the common mask to perform the procedure.	C	70 (31.11)	80 (35.56)	75 (33.33)	0.120
	NC	19 (45.24)	9 (21.43)	14 (33.33)	
6- Uses sterile gloves to perform the dressing.	C	85 (32.57)	88 (33.72)	88 (33.72)	0.374
	NC	4 (66.67)	1 (16.67)	1 (16.67)	
7- Uses alcoholic solution for antisepsis of the central vascular catheter insertion site.	C	89 (33.33)	89 (33.33)	89 (33.33)	-
	NC	-	-	-	
8- Covers the insertion site with sterile material.	C	89 (33.33)	89 (33.33)	89 (33.33)	-
	NC	-	-	-	

Table 4 – Cont.

Actions observed during dressing change	Assessment	Morning (%)	Afternoon (%)	Night (%)	p-value
9- Sanitizes hands after changing the dressing.	C	82 (32.41)	84 (33.20)	87 (34.39)	0.277
	NC	7 (50.00)	5 (35.71)	2 (14.29)	
10- Records the procedure performed.	C	65 (28.63)	78 (34.36)	84 (37.00)	0.000‡
	NC	24 (60.00)	11 (27.50)	5 (12.50)	
11- The frequency of dressing changes is in accordance with the recommendations.	C	75 (31.38)	80 (33.47)	84 (35.15)	0.088
	NC	14 (50.00)	9 (32.14)	5 (17.86)	

* Compliant; † Non-Compliant; ‡ Statistically significant. Chi-square and Fisher's Exact tests

As recorded in the previous association, as recommended by the prevention bundle for dressing changes, Action-10 was the only significant one (p=0.000), according to Table 5. It is noteworthy that, because it was performed only by nurses, the professional category variable was not evaluated.

Table 5 – Association between the gender variable and the prevention bundle for dressing changes. Aracaju, SE, Brazil, 2016. (n=267)

Actions observed during dressing change	Assessment	Female (%)	Male (%)	p-value
1- Sanitizes hands before the procedure.	C*	5 (100.00)	-	1.000
	NC†	230 (87.79)	32 (12.21)	
2- Puts on procedure gloves and removes previous dressing.	C	234 (88.3)	31 (11.7)	0.226
	NC	1 (50.00)	1 (50.00)	
3- Removes procedure glove.	C	169 (88.95)	21 (11.05)	0.597
	NC	66 (85.71)	11 (14.29)	
4- Sanitizes hands before the dressing is performed.	C	5 (100.00)	0 (0.00)	1.000
	NC	230 (87.79)	32 (12.21)	
5- Uses the common mask to perform the procedure.	C	202 (89.78)	23 (10.22)	0.073
	NC	33 (78.57)	9 (21.43)	
6- Uses sterile gloves to perform the dressing.	C	230 (88.12)	31 (11.88)	0.539
	NC	5 (83.33)	1 (16.67)	
7- Uses alcoholic solution for antisepsis of the central vascular catheter insertion site.	C	235 (88.01)	32 (11.99)	-
	NC	-	-	
8- The frequency of equipment changes is in accordance with the recommendations.	C	235 (88.01)	32 (11.99)	-
	NC	-	-	
9- Sanitizes hands after changing the dressing.	C	223 (88.14)	30 (11.86)	0.678
	NC	12 (85.71)	2 (14.29)	
10- Records the procedure performed.	C	207 (91.19)	20 (8.81)	0.000‡
	NC	28 (70)	12 (30)	
11- The frequency of dressing changes is in accordance with the recommendations.	C	209 (87.45)	30 (12.55)	0.548
	NC	26 (92.86)	2 (7.14)	

* Compliant; † Non-Compliant; ‡ Statistically significant. Chi-square and Fisher's Exact tests

In the association between the professional category variable and the bundle recommended for equipment changes, Action-7 was the only one to present a statistically significant difference (p=0.049). It was observed that, for this action, the compliances were performed exclusively by nursing technicians.

When associated with the work shift variable, three of the eight bundle actions evaluated were statistically relevant. Action-1 (0.035), in which the actions in compliance were carried out exclusively by the night shift teams, Action-3 (0.022), and Action-7 (0.014) showed better compliance in this same work shift.

Action-1 (0.001), Action-3 (0.000) and Action-5 (0.000) were statistically significant when associated with gender and the equipment change procedure, the male gender standing out with the highest number of compliances in the three actions.

When correlated to the work shift variable and the actions of the bundle related to the dressing change procedure, only Action-10 (p=0.000) showed a statistically significant difference. Compliance actions are mostly carried out during the night shift.

When the gender, professional category, and work shift variables were related to the recommendations of the prevention bundles, the greatest number of actions in compliance were performed by male professionals and in the night shift.

As recorded in the previous association, Action-10 was the only one to be significant (p=0.000) in the relationship between the gender variable and the dressing change procedure. It is noteworthy that, because this action was performed only by nurses, the professional category variable was not analyzed.

DISCUSSION

Nursing professionals represent the main category with involvement in the manipulation of vascular accesses, consequently, they are more likely to act in the prevention of complications.[14] For this reason, the nursing team must be involved and prepared to make the best decisions and implement preventive practices to offer safe patient care and reduce the chances of adverse events occurring.[15]

In this study, it was possible to observe the predominance of the female gender, which reinforces the characteristic of female work in the scope of health and in ICUs.[16] Regarding the professional profile, most of them are nursing technicians, which corroborates with other studies carried out in Brazil, where the ICU nursing team, through a specific regulation, is reported as one nursing technician for every two patients, while there is one nurse for every 10 patients.[9,17]

The direct observation of the professionals has shown low adherence to hand hygiene, especially before procedures, as well as low adherence to disinfection of materials, injectors and invasive devices used.

Hand hygiene is recognized as the most effective practice in the prevention of healthcare-related infections. However, it is known that, even with its importance, adherence to this practice is worrying, coinciding with a study carried out in a São Paulo ICU with 66 nurses, with the objective of assessing the knowledge of nurses about the prevention and control actions for bloodstream infection by CVC, showing a frequency lower than 27%.[18] Another study, corroborating the results, shows that out of 446 opportunities for hand hygiene in the ICU, only 43.7% were adherent.[19] Apparently, the regulated rules regarding HH are not being incorporated into the daily practice of the health professionals. Thus, it is understood that urgent strategies need to be discussed and implemented.

However, there are several factors that are mentioned because they are making it difficult for the nursing team professionals to adhere, such as forgetfulness, short time to perform tasks, distance from the sink, lack of observation of attitudes towards safe care, skin dryness, scarcity of

human resources, lack of knowledge of the need of hand hygiene, bad distribution of dispensers, and presence of allergy to the available products.[20]

Regarding the necessary materials, the assessment of available resources carried out in this study shows that, even with the material and complete supplies for carrying out the actions, adherence to hand hygiene was not satisfactory, a weakness that favors the cross-exchange of microorganisms, especially in critical patients.

The use of gloves among the professionals was greater when compared to hand hygiene. A study that aimed to assess the adherence of the health professionals to the practice of hand hygiene showed that only 29.2% performed this procedure before using gloves.[18] A research study on the hand washing practice found that only 8.5% of the nursing technicians did not wash their hands before using procedure gloves.[21]

Although, before each observation performed, the lack of supplies needed to perform the procedures was not identified, and the hand hygiene action was shown to have low adherence, an alarming scenario when we think of patient care and protection as a primary objective for the safety culture. Even because this is a simple and effective measure for infection control.

On the other hand, adherence to the good practices for disinfecting connectors, injectors, ampoules, and ampoule bottles did not achieve the expected general compliance, according to the bundle. Accordingly, an Australian study aimed at implementing a tool to monitor the compliance with the disinfection of the injectors evidenced weaknesses, on the part of the nursing professionals, in the execution of this practice, reaching a compliance of 60%, below the expected.[22]

With regard to dressing change, there was a greater number of actions in compliance when compared to other procedures evaluated. A research study, which assessed the prevention and control practices for bloodstream infection related to the CVC, showed that, unlike equipment changes, the practices related to the dressing change frequency (93.1%) and to the record of dressing exchange (91.7%) presented high rates of compliance.[17] It is assumed that, because it was performed exclusively by nurses, the dressing change obtained better compliance values, due to the higher qualification and preparation of this professional category, with regard to the care for critical patients.

The dressing change procedure involving the use of alcoholic solution for antisepsis of the CVC insertion site and the coverage of the site with sterile material are noteworthy, as they have reached 100% compliance. In this regard, the 0.5% alcoholic solution is considered one of the most suitable solutions, due to its behavior as a microbicidal agent,[1] an action that reinforces patient safety in meeting their needs during their stay in the researched locus.

A fact that draws the attention in this study is that, although the majority of the nursing professionals are female, it was observed that male professionals showed greater adherence to the prevention bundles for the equipment and dressing change procedures.

Unlike the results in the present study, female professionals who had training in preventing CVC infection obtained the best results in adhering to the prevention bundles for CVC insertion, as well as better performance in adherence to the specific procedures for CVC maintenance performed by ICU nurses. This Greek study carried out with health professionals in ICUs of public and private hospitals referred to a relationship between the independent variables (gender, previous training) and the adherence to the good practices for insertion and maintenance of CVCs.[23] In view of the above findings, it is necessary to carry out new studies involving these variables.

The fact that the results presented are directly related to the specificities of an institutional scenario limits its generalization to other units in different regions and cultures. However, these results can provide important information to the Hospital Infection Control Commission (*Comissão de Controle de Infecção Hospitalar*, CCIH), nursing managers and Permanent Education, for the elaboration and implementation of strategies to improve the care practice in the management of the CVC. It is

understood that there may be other factors that contribute to the weaknesses identified, such as the number of professionals and factors related to the crisis that the country is going through, but, on the other hand, it is understood that these factors cannot overlap with the ethics and commitment of the professional to care for human beings.

Regarding the observation bias, it is known that possible changes in behavior and embarrassment can occur in the first contacts between the observer and the observed participant. Despite this, this factor is not very relevant given the data obtained with the study, as it provides greater knowledge about the reality of the care processes. In addition, the checklists were not presented to the observed professionals, in order to avoid changes in behavior and performance of the participating team, as well as the observers stayed during the first two months without collecting data, only observing procedures in a random manner, at the time the training occurred.

It is suggested that new research studies be carried out to identify other factors that may interfere with the adherence of the professionals to the safe practices, especially the equipment and dressing change procedures for CVC.

CONCLUSION

It is observed that there are weaknesses during the procedures observed. The general compliance rate was not achieved, that is, in none of the procedures observed did the professional perform all the necessary actions to make the procedure safe. Most of the specific actions with adherence to the bundle were evident during the dressing change. The minority of the actions reached the desired compliance, with emphasis on the activities that offered safety for the professionals themselves, among them: use of procedure gloves, common mask, and hand hygiene after the dressing change.

The use of sterile dressing during dressing change achieved total compliance. It is assumed that, because it was executed only by nurses, the actions involving this procedure presented better results. In the association between the variables and the procedures observed, the largest number of actions in compliance was performed by male and night shift nursing professionals. No differences were observed between the professional categories.

In view of the above, the relevance of the results presented is notorious. It is understood that the collection instruments were essential to gather and analyze the data, with a view to providing subsidies to the target unit, the CCIH team, and the nursing management through recognition in the execution of the care practice performed by the nursing team.

Through the construction of the bundles for good practices in the equipment and dressing change procedures for CVC, instruments were developed containing criteria for assessing the actions performed by the health team. The follow-up of service protocols and standards to provide safe and quality care must be a policy to be implemented in the researched institution, in favor of the potential prevention of harms to the patient, in line with the safety policy.

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NOTES

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There is no conflict of interest.

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