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INTEGRATIVE REVIEW ARTICLE

PRIMARY BLOOD STREAM INFECTION PREVENTION

PREVENÇÃO DA INFECÇÃO PRIMÁRIA DA CORRENTE SANGUÍNEA

PREVENCION DE INFANCIA PRIMÁRIA DE LA CORRIENTE SANGUÍNEA

Carla Larissa Fernandes Pinheiro Araújo [1], Elisângela Franco de Oliveira Cavalcante[2]

ABSTRACT

Objective: to identify the factors that determine the prevention of primary bloodstream infections associated with the use of the central venous catheter and the role of infection control professionals. ***Method***: this is a descriptive bibiographic study, type integrative literature review, with searches in LILACS, MEDLINE and Chocrane from May to July 2017. The results were presented in figures and categorized from the Thematic Content Analysis. ***Results***: 10 articles with predominance of English publications were selected. It is revealed that two articles dealt with aspects related to the adherence of professionals to preventive measures and the others were focused on institutional interventions. ***Conclusion***: the use of multimodal actions and the realization of longitudinal institutional policies as conditioning factors for the prevention of these infections were evidenced, based on a professional performance free of preventable damages. Further research is suggested to identify the difficulties faced in care practice, since it was not possible to find reasons for not adhering to safe practices. ***Descriptors:*** Catheter-Related Infections; Prevention & Control; Professional Infection Controllers; Patient safety; Hospital Infection; Central Venous Catheters.

RESUMO

Objetivo*:** identificar os fatores condicionantes da prevenção das infecções primárias da corrente sanguínea associadas ao uso do cateter venoso central e o papel dos profissionais controladores de infecção. ***Método*:** trata-se de estudo bibiográfico, descritivo, tipo revisão integrativa de literatura, com buscas na LILACS, MEDLINE e *Chocrane* no período de maio a julho de 2017. Apresentou-se os resultados em figuras e categorizados a partir da Análise Temática de Conteúdo. ***Resultados*:** selecionaram-se 10 artigos com predomínio das publicações em inglês. Revela-se que dois artigos trataram de aspectos relativos à adesão dos profissionais às medidas de prevenção e os demais estavam voltados para as intervenções institucionais. ***Conclusão: evidenciou-se a utilização de ações multimodais e a realização de políticas institucionais longitudinais como fatores condicionantes para a prevenção dessas infecções, com base numa atuação profissional livre de danos evitáveis. Sugere-se a realização de novas pesquisas para identificar as dificuldades enfrentadas na prática assistencial, uma vez que não foi possível encontrar os motivos de não adesão às práticas seguras. ***Descritores*:** Infecções Relacionadas a Cateter; Prevenção & Controle; Profissionais Controladores de Infecções; Segurança do Paciente; Infecção Hospitalar; Cateteres Venosos Centrais.

RESUMEN

Objetivo: identificar los factores condicionantes de la prevención de las infecciones primarias del flujo sanguíneo asociadas al uso del catéter venoso central y el papel de los profesionales controladores de infección. ***Método:*** se trata de estudio bibliográfico, descriptivo, tipo revisión integrativa de literatura, con búsquedas en LILACS, MEDLINE y Chocrane en el período de mayo a julio de 2017. Se presentaron los resultados en figuras y categorizados a partir del Análisis Temático de Contenido. ***Resultados:*** se seleccionaron 10 artículos con predominio de las publicaciones en inglés. Se revela que dos artículos trataron de aspectos relativos a la adhesión de los profesionales a las medidas de prevención y los demás estaban dirigidos a las intervenciones institucionales. ***Conclusión:*** se evidenció la utilización de acciones multimodales y la realización de políticas institucionales longitudinales como factores condicionantes para la prevención de esas infecciones, con base en una actuación profesional libre de daños evitables. Se sugiere la realización de nuevas investigaciones para identificar las dificultades enfrentadas en la práctica asistencial, ya que no fue posible encontrar los motivos de no adhesión a las prácticas seguras. ***Descriptores*:** Infecciones Relacionadas com Catéteres; Prevención & Control; Profesionales para Control de Infecciones; Seguridad del Paciente; Infección Hospitalaria; Catéteres Venosos Centrales.

[1]Masters, Federal University of Rio Grande do Norte / UFRN. Natal (RN), Brazil. Email: carlinhalfp@hotmail.com ORCID iD: https://orcid.org/0000-0001-8395-6275; [2]PhD, Federal University of Rio Grande do Norte / UFRN. Natal (RN), Brazil. Email: elisangelafranco2@gmail.com ORCID iD: https://orcid.org/0000-0002-3578-0153

INTRODUCTION

Health-care-related infections (HCRI) are known in practice as adverse events in health services responsible for increased length of hospital stay, hospital costs, in addition to contributing to a rise in death rates and lethality corresponding to about of 20 to 30% of hospital outcomes.[1-3]

It is known that in Brazil, about 50% of registered deaths of patients in Intensive Care Units (ICUs) had infections related to their hospitalization, and the chances of developing death 2.6 times higher in patients event. It is estimated that approximately 60% of the HCRI are associated with some intravascular device, leading to prolonged periods of hospitalization and high cost for care, reaching a mortality rate of 69%.[4-7]

The importance of primary bloodstream infections (PBSI) is reserved for national health indicators, and ANVISA has made notification of these infections in ICU mandatory. It may be inferred from the understanding of the prevailing pathophysiology that the event occurs due to shortcomings in the practices and basic measures of infection control, one that is perpetuated by professionals from the inadequate manipulation.[5]

Although PBSI prevention measures are in place, much still needs to be done, since evidence continues to point to unsatisfactory levels of performance by health professionals involved in the process.[8-10]

Priority should be given to safe patient care at an ICU for the implementation of measures related to infection prevention, more severe damage control and complications to reduce length of hospital stay and improve the quality of care provided.[5]

OBJECTIVE

- To identify the factors conditioning the prevention of PBSI associated with the use of the central venous catheter (CVC) and the role of infection control professionals.

METHOD

This is a bibiographic, descriptive study, type integrative literature review, carried out in the Latin American and Caribbean Literature on Health Sciences (LILACS) database, MEDLINE® (Medical Literature Analysis and Retrieval System Online), and in the database of reviews available from the Cochrane Library, from May to July 2017.

This research modality has the potential to build broad and in-depth knowledge about a subject based on the exhaustive analysis of previous studies, and also to identify scientific gaps that are important for subsidizing the direction of new research, as well as the basis for evidence-based practices.[11]

For this purpose, it is necessary to carry out six important stages in the elaboration of this research: the selection of the theme and the research question; the establishment of criteria for inclusion and exclusion of studies; categorization and evaluation of included studies; interpretation of the results and presentation of the knowledge synthesis.[12]

From the definition of the topic, the following research question was identified: "What have the studies revealed about the prevention of PBSI and what is the role of infection control professionals in this context?".

The research was performed using the Boolean operator AND after selecting four descriptors: "Catheter-Related Infections", "Prevention & Control", "Infection Control Professionals" and "Patient Safety", with appropriate crossings in the selected databases.

Inclusion criteria were articles for research involving human beings and texts available in full in Portuguese, English and Spanish in the last five years. Articles dealing with other forms of catheterization were excluded: bladder, pleural, peritoneal, peripheral venous, or central peripheral insertion catheter; texts related to Pediatrics or Neonatology and, finally, articles.

The studies were analyzed from the identification of common themes, initially, by reading the abstracts, taking into account the frequency of key information and the organization of the main results found from them. In those cases where the analysis of the abstracts was not enough to select the studies for this review, the reading of the articles in full.

The research was carried out by two researchers, in an isolated and independent manner, and the results of the selection were confronted, in the end, in order to gather the articles that could contribute to the elucidation of the research question. Only the relevant studies were analyzed in a descriptive way.

In the search, 4590 articles were found. A total of 495 articles were selected with the inclusion and exclusion criteria, of which 341 were excluded because they dealt with subjects related to other types of

catheterization (bladder, peripheral venous, PICC, pleural, among others) related to Pediatrics and/or to Neonatology and repeated articles. In that sense, 154 articles were analyzed in their entirety, with only ten articles being included for the analysis, interpretation of the results and presentation of the syntheses (Figure 1).

previously prepared instrument was used for data collection that took into account the authors' description, year of publication, methodological characteristics, main results presented and classification according to level of evidence (LE). Based on the information gathered by the instrument, it was possible to compile the synthesis with the main information of the articles, as shown in figure 3.

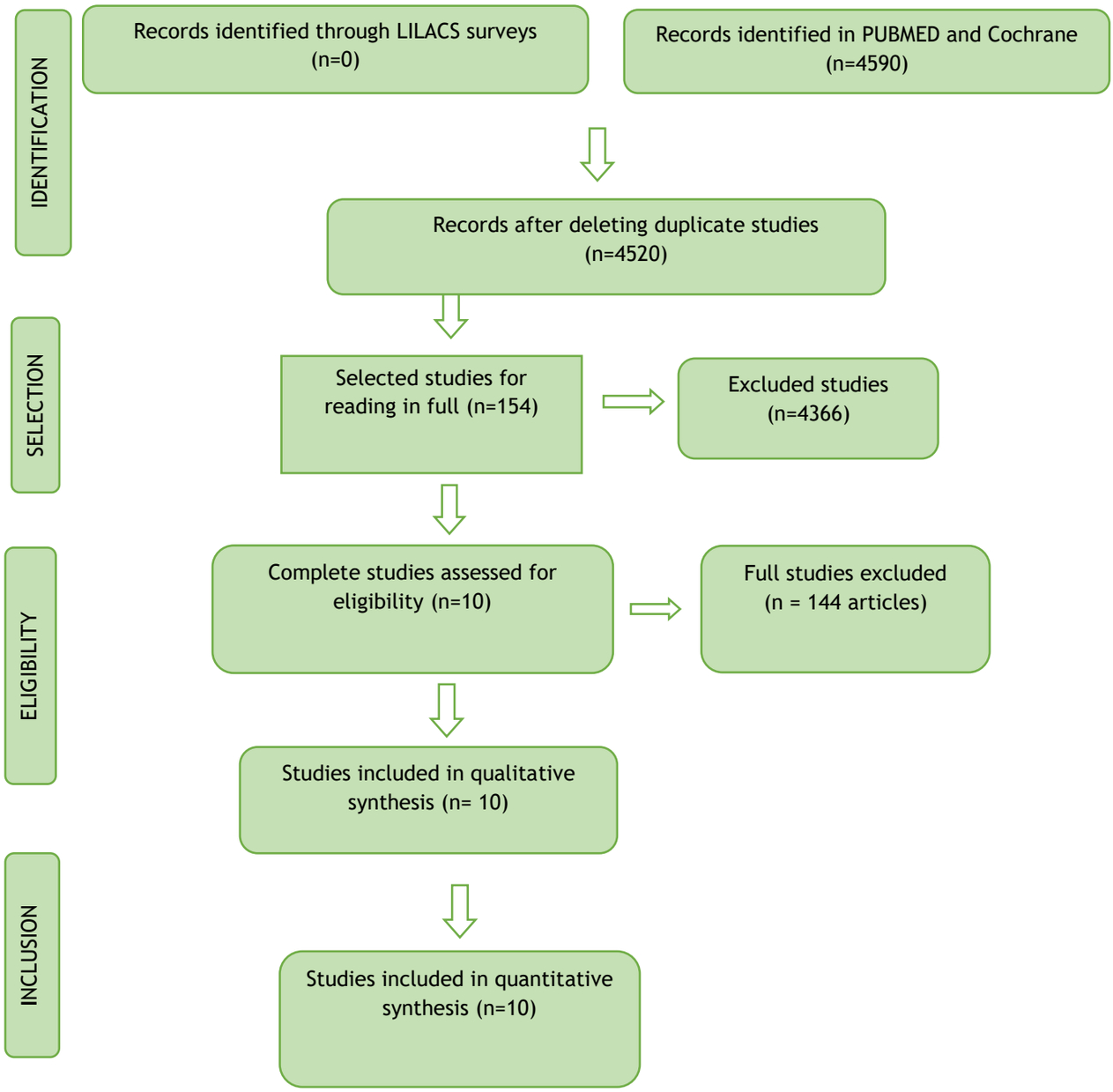

Figure 1. Flowchart of the selection of studies performed in the integrative review. Natal (RN), Brazil, 2018.

The classification of the articles according to LE was used using variations from one to seven and considering at level 1 the evidence from a systematic review or meta-analysis of all relevant controlled randomized controlled trials or those from clinical guidelines based on systematic reviews of randomized controlled trials; at level 2, evidence derived from at least one well-delineated randomized controlled trial; level 3 as the evidence obtained from well-delineated clinical trials without randomization; at level 4, those from a well-delineated cohort and case-control study; in level 5, those originating from a systematic review of descriptive and qualitative studies; level 6, derived from a single descriptive or qualitative study and, finally, level 7, with evidence from the opinion of authorities and/or expert committee reports.[12]

The data were categorized according to the technique of Bardin Content Thematic Analysis. Thus, after the final analysis of the results, the findings of the research were then allowed to reach two broad categories of analysis: Professionals adherence to PBSI

prevention measures and Institutional interventions to ensure the prevention of PBSI.

Gaps in the literature were also identified about the subject and, thus, considering the infection control professionals as those responsible for implanting and supervising policies and procedures to reduce the risk of infection to patients and professional staff, there were no studies that specifically addressed the role of these professionals in a direct way.

Finally, the research results were interpreted in order to complete a critical analysis of the thematic that can bring theoretical foundation contributing, in particular, to the conduct of a practice centered on the safe care that can imminently reflect in the critical patient care.

RESULTS

It is reported that, from the database search, 154 articles fulfilled the inclusion criteria and were analyzed in their entirety for the understanding of the context and the association with the research objective, thus totaling the final sample of ten selected articles for this integrative review.

It is revealed that, of the selected studies, for the year of publication, only one article was from 2012, four from 2013, four from 2015 and one from 2014, nine articles being published in English and only one in Portuguese. The publications of the Medline and Cochrane databases were extracted. In two articles, the interventions and the experiments carried out in a city in the Southeast region of Brazil.

From the key conceptual analyses found, six subcategories of the categories already presented were created: improvement programs, quality and health; Health education; institutionalization of secure insertion protocols; innovative technologies and professional relationship, as shown in figure 2.

Categories	Subcategories	Articles (n)
Adherence of professionals to PBSI prevention measures	Professional relationship	1
	Health education	2
Institutional interventions to ensure the prevention of PBSI	CVC Secure Insertion Protocols	2
	Innovative technologies	2
	Health improvement and quality improvement programs	3

Figure 2. Distribution of studies into categories and subcategories. Natal (RN), Brazil, 2018.

The following is the result of the characterization of the ten articles selected to compose the analysis necessary for this research, characterized according to the LE qualification (Figure 3).[12]

Authors and Year of Publication	Method	Results	Level of evidence
Jardim, Lacerda, Soares, Nunes (2013)[8]	Cross-sectional and observational study	Importance of procedural evaluation and direct observation for the direction of educational practices.	6
Exline, Ali, Zikri, Mangino, Torrence, Vermillion, et al. (2013)[13]	Observational cohort	Highlight the adhesion to the CVC insertion package; multidisciplinary approach; longitudinal hospital support and unit leadership.	4
Flodgren, Conterno, Mayhew, Omar, Pereira, Shepperd (2013)[14]	Systematic review	Study of educational interventions with more than one active element and administered repeatedly over time.	1
Zhang, Keogh, Rickard (2013)[15]	Integrative review	The approach of nanotechnology as one of the most promising fields of research for PBSI prevention.	6
Perl, Blot, Bergs, Vogelaers, Blot, Vandijck (2014)[16]	Systematic review and meta-analysis	The implementation of CVC checklists shows stronger rate reductions.	1
Herzer, Niessen, Constenla, Ward Jr, Pronovost (2014)[17]	Analytical, comparative and longitudinal	Multifaceted program of quality improvement to reduce PBSI rates and deaths, as well as associated economic costs.	3
Paula, Oliveira, Miranda, Felix, Lorigados, Giovani, et al. (2012)[18]	Cohort	Interaction between infection control and ICU professionals in a long-term program.	4
Boev, Xia Y (2015)[19]	Qualitative and Longitudinal	The nurse-physician collaboration with significant effect related to HCRI.	6
Zingg, Cartier, Inan, Touveneau, Theriault, Gayet-Ageron, et al.	Cohort	Multiprofessional and multimodal training strategy in reducing PBSI.	4

English/Portuguese

(2014)[20]			
Safdar, O'Horo, Ghufran, Bearden, Didier, Chateau, et al. (2014)[21]	Meta-analysis	The dressing impregnated with chlorhexidine as an effective strategy to prevent colonization of CVC and PBSI.	5

Figure 3. Characterization of the articles selected for the study. Natal (RN), Brazil, 2018.

As for the methodological design, it was described that there was a great variation of the evidence for the clinical practice. Two studies were classified in classification 1, only one with level 3, compatible with well-designed clinical trials, despite the absence of randomization; three were category 4; two, classified with evidence level 5 and two, level 6.

DISCUSSION

The discussion will be based on a better understanding according to the categories: Professionals adherence to PBSI prevention measures and Institutional interventions to ensure the prevention of primary infection of the bloodstream.

♦ Adherence of professionals to PBSI prevention measures

The HCRI are currently a major challenge in hospital care practices, since, historically, the context of infections dates back a long time and has been updating, mainly, with the need to adapt care practices, human resources training and rationalization of antimicrobial uses.[2]

In this context, some risk factors are indicated in the occurrence of these events, since they can cover the aspects related to good insertion practices, such as the adequate choice of the site, the use of maximum sterile barrier and the choice of antiseptic solution, to those related to the care and maintenance of catheters that permeate handwashing, the evaluation of dressings with strict inspection, adequate manipulation, the control of the connectors and infusions, and the daily evaluation of the need to remove them.[5,22-4]

In view of this, and recognizing the need to intervene, in an emerging way, in preventive measures, the current perspectives are an increasingly multifaceted need for practices that also involve the sensitization of professionals and institutional support with the development of longitudinal policies.[6,13]

This is evidenced by the persistence of residual cases of infections, to the detriment of positive precautionary measures with longitudinal educational actions, infrastructure improvements and professional awareness, the need for a causal diagnosis of the problem in order to plan institutional actions to consecrate a culture to replace, often costly, random practices that do not necessarily reflect positive results in the context of patient safety.[13,25]

It is also necessary to recognize some aspects that may interfere in the adherence of these infection control professionals, which often arise due to difficulties in daily practice related to the accumulation of attributions and services, evidenced by a reality portrayed by the gap in the professionals, gaps in the performance and participation of institutional and managerial representations, lack of educational activities and lack of search and monitoring actions for the prevention of adverse events because they directly reflect the lack of attitudinal attitude of the professionals and engagement for the preventive purpose.[26-7]

For this purpose, it is used the use of procedural indicators through the technique of direct observation, a perspective of monitoring the practices in the institutions, functioning as a foundation for the elaboration of continuous educational activities centered in the causal diagnosis.[8]

It is also worth noting that the frequent demand for updates to the professionals in the exercise of their duties also refers to a reflection on the way the subject is approached in the academic curricula since the training process, since it reflects, directly on the creation of the critical-reflective profile of the professionals and skills making them able to meet the demands of the labor market, as well as on the responsibility of ethical and legal aspects for the occurrence of infections.

In addition, despite the low evidence of satisfactory assessments for the adherence of professionals to infection control measures, the relationship between job satisfaction and physician-nurse collaboration as a component for improving professional performance and reducing HCRI[14,19,28]

Thus, it is revealed by the medical-nursing duo in the decision making for patient safety, a redefinition of health care from the perception of mutual collaboration during the practice. It is also reflected in the presence of the majority of trained nurses in a unit, in lower rates of infections.[19]

Thus, professional involvement and more effective participation in institutional actions

as an emerging need to consecrate a safety culture are necessary, and interventions are required to envisage the engagement of the multidisciplinary team, based on a hospital program based on scientific evidence, to lead to successful results.[25]

Thus, among the varieties of factors related to the professionals' performance in the prevention of infections, the absence of events with high preventive profiles ends up negatively impacting health care delivery.

♦ Institutional interventions to ensure the prevention of PBSI

Institutional interventions to reduce infection rates from the deployment of safe insertion checklists to the availability and use of innovative technologies, as well as the valuation of a security program based on improvements and quality, long term, can generate results indicators capable of evaluating infections and avoidable deaths due to the occurrence of the event.[16-7]

Multimodal and multidisciplinary practices are emerging in the process of accountability and dissemination of the safety culture, associated with training strategies for the insertion of CVC, in order to institute good practices to promote the stimulus to behavioral changes, as well as the valorization of the standardization of techniques and professional empowerment in changing a scenario without necessarily including the use of special devices and innovative technologies.[20]

Thus, safe insertion protocols are introduced as intervention mechanisms to reduce infection rates from the analysis of compliance rates of compliance with safety packages, as well as to provide an instrument that supports evidence-based practice for prevention strategies, encompassing professional accountability and identifying weaknesses in the process to predict interventions, improve epidemiological surveillance, strengthening the hospital safety culture.

The beneficial effects of the use of these protocols are suggested by including prior and post-implantation evaluations, recommending the need for other associated practices and continuous employability with other interventions for associated quality improvements.[16]

In addition, other communication strategies, teamwork, and the development of a unit-based institutional safety program to reduce rates of bloodstream infections in primary care units are prioritized through other strategies widely used in ICUs in the USA with long-term economic results.[17]

Results indicators are therefore focused on evaluating infections and preventable deaths, associated with cost savings, through the non-occurrence of these events in the ICUs that used the methodology of the program in comparison with those that did not use.[17]

The evaluation of the long-term effect of a ICU program in Brazil was comparatively different, since it was focused on measures of daily inspection of patients using CVC and educational activities to the individual team recommended technique for insertion and maintenance of devices.[18]

It is known that the intention was to achieve significant results in the reduction of infection rates from educational measures that did not represent an increase in hospital costs and take into account professional valuation through qualified listening.[18]

The use of technologies for medical devices is also emerging as a promising prospect for strategies to prevent infections associated with vascular devices resulting from colonization or biofilm formation in catheters.[15]

The use of antimicrobial or antiseptic-impregnated catheters, needleless connectors or chlorhexidine-impregnated dressings as an additive alternative to the ones mentioned above should be considered, based on the principle of prevention based on human fallibility, in which evidence-based practices associated with standardization of devices that minimize risks and damages during the provision of health care.[15]

The efficacy of chlorhexidine-based topcoats has been demonstrated, for example, by meta-analysis with randomized clinical trials, suggesting that use in critically ill patients and at high risk for bloodstream infections demonstrated superiority compared to conventional topcoats.[21]

Compared to the use of conventional gauze coverings of chlorhexidine transparent film, the beneficial effect of reducing the rates of catheter-related infections has been demonstrated, suggesting higher profitability for hospital costs.[21,29-30]

By these analyzes, it is understood that, despite the evolution of technology and the growing studies related to bloodstream infections, without effective and continuous adherence to preventive measures by professionals, this evolution will not be sufficient for the change Therefore, the importance of the participation of professionals in adhering to these practices

and institutional support in order to avoid the occurrence of these HCRI.

CONCLUSION

Through this integrative review, it was possible to show in the literature that adherence to preventive measures and intervention for safe care are factors that determine the prevention of PBSI associated with the use of CVC. It is essential, in this context, the role of infection control professionals in order to strengthen the entire adherence process and the implementation of interventions that ensure a care free of preventable damages.

It is understood that health education strategies and multimodal actions will always be decisive tools in the improvement of this scenario if they are associated to the process indicators that allow the evaluation of the actual assistance changes found from an active intervention.

It was noticed that the teams lack awareness, from the recognition of the real impact of their actions in the care of patients who receive care, as well as the standardization of practices and routines in the care of vascular devices, such as the implementation of a checklist for the safe insertion of CVC and basic preventive measures that avoid the perpetuation of microorganisms with a high degree of antimicrobial resistance.

It is inferred that, in general, it was not possible to identify, through the research, the reasons that lead to the non-adherence of professionals to the safe practices for the prevention ofPBSI, already duly clarified in the literature.

It is suggested that studies be conducted not only to outline scenarios of practices, but also to research the reasons and difficulties faced in the care routine that lead to the failure to follow preventive measures by professionals.

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Corresponding Address

Condomínio Bairro Latino
Carla Larissa Fernandes Pinheiro Araújo
Alameda das Mansões, 3693 / bloco 24 / Ap. 302 -
Bairro Candelária
CEP: 59064-902 – Natal (RN), Brazil