

Impact of Institutional Training on Central Venous Catheter Dressing Technique: Audit in ICU

Impacto do Treinamento Institucional na Técnica de Curativo de Cateter Venoso Central: Auditoria em UTI
Impacto de la Capacitación Institucional en la Técnica de Curación de Catéter Venoso Central: Auditoría en UCI

RESUMO

Objetivo: Avaliar o impacto de um treinamento institucional sobre a técnica de curativo em cateter venoso central (CVC), considerando a prática dos enfermeiros e a adesão às recomendações de segurança em UTI. **Método:** Estudo descritivo, quantitativo, qualitativo e comparativo, realizado em hospital público de São Paulo, com 12 enfermeiros. Os dados foram coletados por formulário padronizado do SCIH. **Resultados:** Após o treinamento, a troca de curativos aumentou de 17% para 76%, o uso de filme transparente de 7% para 17%, o sangue nas extensões reduziu de 2% para 0% e a sujidade nos conectores de 9% para 5%. O aumento da sujidade nos curativos (7% para 17%) pode estar relacionado à maior rigorosidade da auditoria. **Conclusão:** O treinamento teve um impacto positivo na prática assistencial, promovendo padronização e maior adesão aos protocolos de segurança. Isso reforça a necessidade de capacitações periódicas e auditoria contínua para a qualidade do cuidado em UTI. **DESCRIPTORIOS:** Cateter Venoso Central; Cuidados de Enfermagem; Auditoria em Enfermagem; Segurança do Paciente.

ABSTRACT

Objective: To evaluate the impact of an institutional training program on the technique of central venous catheter (CVC) dressing, considering nurses' practice and adherence to safety recommendations in the ICU. **Method:** A descriptive, quantitative, qualitative, and comparative study conducted in a public hospital in São Paulo with 12 nurses. Data were collected using the standardized SCIH form. **Results:** After the training, dressing changes increased from 17% to 76%, the use of transparent film from 7% to 17%, blood in extensions decreased from 2% to 0%, and dirtiness in connectors from 9% to 5%. The increase in dirtiness in dressings from 7% to 17% may be related to stricter auditing. **Conclusion:** The training had a positive impact on nursing practice, promoting standardization and greater adherence to safety protocols. This reinforces the need for periodic training and continuous auditing to ensure quality of care in the ICU.

DESCRIPTORS: Central Venous Catheter; Nursing Care; Nursing Audit; Patient Safety.

RESUMEN

Objetivo: Evaluar el impacto de una capacitación institucional sobre la técnica de curación en el catéter venoso central (CVC), considerando la práctica de los enfermeros y la adhesión a las recomendaciones de seguridad en la UCI. **Método:** Estudio descriptivo, cuantitativo, cualitativo y comparativo, realizado en un hospital público de São Paulo, con 12 enfermeros. Los datos fueron recolectados mediante el formulario estandarizado del SCIH. **Resultados:** Después de la capacitación, los cambios de curación aumentaron del 17% al 76%, el uso de película transparente del 7% al 17%, la presencia de sangre en las extensiones disminuyó del 2% al 0% y la suciedad en los conectores del 9% al 5%. El aumento de suciedad en las curaciones (del 7% al 17%) puede estar relacionado con una mayor rigurosidad en la auditoría. **Conclusión:** La capacitación tuvo un impacto positivo en la práctica asistencial, promoviendo la estandarización y una mayor adhesión a los protocolos de seguridad. Esto refuerza la necesidad de capacitaciones periódicas y de auditoría continua para la calidad del cuidado en la UCI.

DESCRIPTORIOS: Catéter Venoso Central; Cuidados de Enfermería; Auditoría de Enfermería; Seguridad del Paciente.

Ana Carolina Santos da Silva Oliveira

Specialist. Graduate of Cruzeiro do Sul University – UNICSUL.
ORCID: <https://orcid.org/0009-0000-6914-2830>

Madeleine de Oliveira Silva Nahun

Specialist. Euryclides de Jesus Zerbini Transplant Hospital
ORCID: <https://orcid.org/0009-0004-8390-5928>

Mirian de Oliveira Cichelero Gonzalez

Specialist. Graduate of Cruzeiro do Sul University – UNICSUL.
ORCID: <https://orcid.org/0009-0005-0908-441X>

Vaniele Carlos de Oliveira

Nurse. Graduate of Cruzeiro do Sul University (UNICSUL).
ORCID: <https://orcid.org/0009-0009-4180-878X>

Marco Aurélio Ramos de Almeida

Doctor. Paulista University – UNIP.
ORCID: <https://orcid.org/0000-0003-4757-1073>

Letícia de Fátima Lazzarini

PhD. Euryclides de Jesus Zerbini Transplant Hospital
ORCID: <https://orcid.org/0000-0003-1377-8690>

Received: 03/09/2025

Approved: 19/09/2025

INTRODUCTION

The central venous catheter (CVC) is vital for the treatment of critically ill patients, allowing the administration of vasoactive drugs, parenteral nutrition, chemotherapy, and hemodynamic monitoring. However, inappropriate use

of CVCs can lead to bloodstream infections (BSIs), which, although less common than other hospital infections, are among the leading causes of morbidity and mortality and high hospital costs⁽¹⁻³⁾.

In 2015, the rate of CVC-BSIs was 5/1000 catheter-days, with a mortality rate of up to 69%. In the US, the medical costs associated with CVC-BSIs reach US\$ 45 billion annually. In Brazil, patients with healthcare-associated infections (HAIs) generate costs that are 55% higher. Anvisa aims to reduce HAI and microbial resistance (MR) rates by 2025⁽¹⁻⁴⁾.

According to Foka (2021), some simple interventions can significantly reduce the risk of CVC-related infections. Among them are: hand hygiene, use of sterile barriers, skin disinfection, appropriate choice of insertion site, and daily review of the need for catheter permanence⁽⁵⁾.

The dressing should follow aseptic technique, using gauze, sterile gloves, microporous adhesive tape, and 0.5% chlorhexidine alcohol solution or 70% alcohol. Changing the dressing is recommended only in cases of soiling, bleeding, wear, or after 7 days. The use of sterile transparent film reduces the need for daily changes and can reduce maintenance costs by up to 3.7 times without compromising the safety of the device⁽¹⁻⁶⁾.

Studies and recommendations from entities such as the World Health Organization (WHO), Anvisa, and Mendonça et al. (2011) reinforce already established practices, such as hand hygiene, the use of sterile barriers, and daily review of the need for CVC. In addition, they recommend the use of sterile transparent dressings, which can remain in place for up to seven days, except in cases of soiling or wear^(1,3,8).

Training, continuing education programs, and adherence to CVC-related infection prevention bundles are

essential for better results. Such measures reduce the risk of developing SARI, local infections, and the length of hospital stay for patients who need the device^(1,6,9).

The nursing team plays a crucial role in monitoring and safely managing CVCs, adopting essential care to prevent complications and developing protocols based on evidence and current legislation. They should also participate in educational and research activities promoted by the Hospital Infection Control Service (SCIH). Technical knowledge about CVC care is essential to ensure quality care, strengthen standardized routines, and promote adherence to institutional protocols, such as the catheter handling bundle. The standardization of practices and the audit of the techniques employed are justified by the need to reduce the risks of CVC-related ICS. In this sense, continuous and structured training contributes to patient safety and the strengthening of evidence-based nursing⁽¹⁰⁻¹¹⁾.

Given the above, the guiding question of this study arises: how does the institutional training offered to nurses, focused on the CVC dressing technique, influence professional practice and adherence to safety recommendations? Thus, the objective of this study is to understand the impact of institutional training on the conduct of nurses, specifically in the dressing of CVCs, analyzing whether there is a correspondence between the content taught and the practice observed at the bedside, according to current protocols.

METHOD

A descriptive, qualitative, quantitative, and comparative study was conducted in the Intensive Care Unit (ICU) of a public transplant hospital in São Paulo. The hospital, a reference in the Unified Health System (SUS)

for various specialties, such as organ transplants and treatments in areas such as urology and neurosurgery. With 153 beds, including 2 ICUs, and a team of 12 nurses working alternating shifts, the research was conducted during the second half of 2023 and the first half of 2024, aiming to explore relevant aspects of the care provided at the institution.

This study aimed to assess the compliance of central venous catheter (CVC) dressing procedures in a public hospital in São Paulo with institutional protocols, in order to verify whether the training offered to nurses results in safe and consistent practices. The analysis was performed through auditing and direct observation in the Intensive Care Unit (ICU), with the objective of reducing the risk of CVC-related bloodstream infections and promoting safe and standardized patient care. The investigation included monitoring the practices established by the Hospital Infection Control Service (SCIH), with an emphasis on the quality of dressing techniques, the use of appropriate materials, and the training offered to nursing professionals through the Continuing Education program.

Between July 2023 and February 2024, data were collected in two distinct stages, enabling the comparison of practices and compliance with protocols over time. During the research, Resolution 466/2012 was respected, with approval from the Research Ethics Committee under Opinion No. 6,298,056. All nurses were informed about the study's objectives, and their participation involved signing the Free and Informed Consent Form (FICF), allowing direct observation of their dressing practices, as well as dressings previously performed. The study focused on nurses working in the hospital's ICU, responsible for dressing wounds using materials such as sterile transparent film or gauze with hypoal-

lergenic adhesive tape. Nurses working in the Intensive Care Unit with at least six months of experience in the sector, who performed central venous catheter dressings during the data collection period, were included in the study. Professionals who were on vacation, medical leave, or who, for any reason, did not participate in practical activities during the observation period were excluded. The selection of participants followed convenience sampling criteria, considering availability during the shifts established by the institution. A total of 12 nurses participated.

To collect and standardize the information, a form adapted from the original SCIH form, called "Dressing Assessment," was used. This form was adjusted to allow observation of the dressing application and the technique used by the nurses. Three (3) specific items were added: hand hygiene, aseptic technique, and use of personal protective equipment (PPE), composing a more comprehensive instrument for this research.

The training was conducted by the nurse from the SCIH Continuing Education Service, with nurses from the Intensive Care Units (ICU) in the four shifts, lasting approximately 30 minutes each. The methodology included lectures, practical demonstrations of the correct dressing technique using transparent film, and discussion of the standards established by the institutional protocol, emphasizing the importance of adherence to standards to ensure patient safety.

Data were collected in two phases—pre- and post-training—and classified into four main categories: correct use of techniques, description of compliance found, catheter insertion site, and type of dressing applied. With this methodology, the study offers a detailed analysis of compliance with the institutional protocol for CVC dressings and the effectiveness of the

training provided.

RESULTS

The analysis of the collected data allowed for a more accurate understanding of the effects of institutional training on healthcare practices related to central venous catheter (CVC) dressings. To facilitate the interpretation and organization of the findings, the results were grouped into four main categories: use of the correct technique (Table 1), description of compliance found (Table 2), CVC insertion site (Table 3), and type of dressing used (Table 4). This classification was constructed based on the main axes evaluated by the audit instrument and allowed for a clearer visualization of the changes that occurred before and after the educational intervention or training. Next, each category is presented and discussed individually, highlighting areas for improvement and opportunities for reinforcement in the nursing team's practices.

Use of Correct Technique (Table 1): the analysis of aseptic technique, hand hygiene, and the use of Personal Protective Equipment (PPE) revealed important nuances in the behavior of professionals after training.

In the case of aseptic technique, the increase from 10% to 14% compliance in complete audits represents an increase in the number of professionals who were able to perform the technique properly under direct observation, which may indicate greater safety and internalization of the content taught. As for hand hygiene, a high standard of compliance was maintained, with a slight increase in the percentage of "Yes" responses, from 8% to 12%, which reinforces the stability of this practice in the routine of nurses. The maintenance of only 2% of "No" responses at both times may indicate specific gaps, possibly related to the automation of tasks.

Table 1 – Use of correct technique

	Pre-training (%)			Post-training (%)		
	N/A	YES	NO	N/A	YES	NO
Aseptic Technique	90%	10%		86%	14%	
Hand hygiene	90%	8%	2%	86%	12%	2%
Use of PPE	90%	10%		86%	14%	

Source: Own work

Table 2, which describes the compliance levels found, reveals significant advances in practices that are fundamental to patient safety. The total elimination of blood in the extensions after training represents a significant gain, signaling greater attention to handling. Similarly, the reduction in dirt on connectors from 9% to 5% indicates that professionals have begun to value important steps in dressing changes. The rate of dirt on dressings

increased from 7% to 17% after training, which may indicate an important opportunity to reinforce appropriate guidelines, daily assessment, and criteria for changing dressings. The significant improvement in dressing changes, which increased from 17% to 76% after training, reflects the assimilation of technical content and a concrete change in professionals' perception of the preventive role of this practice.

Table 2 – Description of compliance found

	Pre-training (%)		Post-training (%)	
	YES	NO	YES	NO
Dirt on the dressing	7%	93%	17%	83%
Dirt on connectors	9%	91%	5%	95%
Blood on the extension cord	2%	98%	0%	100%
Dressing change	17%	83%	76%	24%

Source: Own work

Based on Table 3, the data reveal a change in the pattern of access site use after training, which may reflect a multi-disciplinary alignment on the risks and benefits of each insertion. There was a reduction in the use of the right internal jug-

ular vein, from 43% to 31%, and the left, from 22% to 14%, with a notable increase in the use of the left femoral vein, from 5% to 21%, and in the use of the right subclavian vein, which had not been used in the pre-training period (0%) and now accounted for 10% of insertions.

Table 3 – Insertion site

	Pre-training (%)	Post-training (%)
RIJ – Right Internal Jugular Vein	43%	31%
LVJ – Left Vena Jugularis Interna	22%	14%
VFE – Left Femoral Vein	5%	21%
RFD – Right Femoral Vein	17%	14%
LSV – Left Subclavian Vein	12%	10%
RSCV – Right Subclavian Vein	0%	10%

Source: Own work

According to Table 4, after training, there was an increase in the use of transparent film as the preferred material for CVC dressings, from 7% to 17%. At the same time, there was a reduction in the use of gauze with transparent film, from 9% to 5%, and total elimination of gauze with microporous tape, which went from 2% to 0% and is now considered a less safe choice. More than a simple change in material, this data shows an import-

ant movement toward standardization and technical awareness. The transparent film allows for better visualization of the insertion site, facilitates daily inspection, and contributes to faster decisions. These results indicate that the team began to value not only the execution of the technique but also the choice of material as part of patient safety, strengthening evidence-based care and the principles of the institutional protocol.

Table 4 – Type of dressing

	Pre-training (%)	Post-training (%)
Transparent film	7%	17%
Gauze + Transparent film	9%	5%
Gauze + Microporous adhesive tape	2%	0%

Source: Own work

DISCUSSION

The prevention of central venous

catheter (CVC) related infections is one of the priorities in intensive care units (ICUs), considering the high risks of bloodstream infections (BSIs)

associated with prolonged use and improper handling of the device. The results of the audit conducted in the ICU showed the direct institutional impact on the CVC dressing technique, reflected in practical changes in nurses' conduct⁽¹⁻³⁾.

The audit conducted before and after training revealed important aspects about the reality of care and the direct impacts of training on the conduct of professionals. According to Taja (2014), the scarcity of publications on health auditing can be attributed to the limited appreciation of the topic by professionals⁽¹²⁾.

One finding that deserves critical discussion is the increase in soiled dressings, from 7% to 17% after training. This seemingly contradictory result can be interpreted by various methodological and contextual biases. It is possible that the auditor developed greater sensitivity to identify non-conformities after training; this phenomenon is known as “detection bias” and is common in audit studies, when evaluators become more skilled at identifying problems. Work overload during the post-training period may also have contributed, as the ICU may have faced greater demand for care, resulting in overload of professionals and compromising the quality of dressings. National studies show that work overload is directly related to the quality of care provided. In addition, the interval between training and the second data collection may have coincided with a period of adaptation to new practices, during which professionals were still internalizing the proposed changes⁽¹⁹⁻²⁰⁾.

Aseptic technique, which is fundamental to the safety of the procedure, showed a slight improvement after training. These data are in line with the proposals of ANVISA and WHO, reinforcing that practical and theoretical training contributes to greater adherence to institutional protocols⁽³⁻¹³⁾.

With regard to hand hygiene, the training promoted a better understanding of the step, although continued reinforcement is recommended⁽¹⁴⁻¹⁵⁾.

The proper use of Personal Protective Equipment (PPE) also showed progress after training. This observation is in line with the NR-6 guidelines and the findings of Oliveira, which highlight the positive impact of continuing education on adherence to the use of PPE⁽¹⁶⁻¹⁷⁾.

Costa et al. (2020) found similar results in a multicenter study on the CVC Bundle, in which some indicators improved while others remained stable or declined temporarily after the intervention. Foka et al. (2021) reported that educational interventions in ICUs demonstrate variable effectiveness, depending on the institutional context and the methodology employed⁽⁵⁻¹⁴⁾.

Miriam et al. (2021) identified that theoretical knowledge does not always translate into adequate practice, especially in a highly complex environment such as the ICU, where multiple factors can interfere with the application of techniques⁽¹⁵⁾.

Regarding dressing changes, adherence jumped from 17% to 76%, one of the indicators that responded best to training. This result demonstrates the effectiveness of the intervention, especially with regard to understanding the frequency and clinical criteria for dressing changes⁽¹⁸⁾.

Regarding the CVC insertion site (Table 3), a redistribution among the most commonly used veins was observed. The right internal jugular vein (RIJV), considered safer in terms of infectious complications, maintained the highest proportion, 43% pre-training and 31% post-training. There was an increase in the use of the Left Femoral Vein, from 5% to 21%, and the Right Subclavian Vein, from 0% to 10%. Despite this, the choice of site

remains influenced by clinical and anatomical factors, as highlighted in RDC 365⁽¹⁴⁻¹⁹⁾.

Data on the type of dressing show an increase in the use of transparent film, from 7% to 17%, and a reduction in the use of gauze with microporous adhesive tape, from 2% to 0%. This result is in line with the recommendations of Pedrolo et al. and Gomes, who point to transparent film as a safe, durable, and more cost-effective option⁽²⁰⁻²¹⁾.

This study has some limitations that should be considered when interpreting the results. The sample of 12 nurses, although representative of the ICU team studied, is relatively small for generalizing the findings to other contexts. The presence of the researcher during dressing changes may have influenced the behavior of the professionals (Hawthorne effect). The interval between the two collection phases may have coincided with organizational or seasonal changes that influenced the results. Individual variability should also be considered, since factors such as professional experience, academic background, and personal characteristics of the participants were not controlled.

Overall, the study reinforces the importance of institutional training and auditing as tools for quality management in healthcare. The indicators that showed improvement after training indicate that training directly influences healthcare practice and is therefore essential to maintain periodically⁽²⁰⁻²¹⁾.

Continuing education should be understood as a continuous process capable of transforming practices, sustaining change, and promoting patient safety. As demonstrated in this study, adherence to practices recommended by ANVISA, WHO, and CDC is increased when professionals have access to well-structured training and accessible educational materials⁽²²⁾.

CONCLUSION

This study offered a close look at the impact of institutional training on nursing practice, especially in the care of central venous catheters in intensive care units. The results pointed to concrete advances, such as a significant increase in dressing changes, the elimination of blood in extensions, and the more consistent adoption of transparent film as standard material—changes that demonstrate the transformative power of education when applied in a targeted manner.

Although not all indicators have evolved positively, the data reveal how much professional behavior can be shaped by continuous educational actions. The increase in dressing contamination, for example, indicates that sustainable changes require more than a single training session: they need continuity, follow-up, and, above all, the involvement of the entire team.

The practical implications are clear. The study reinforces the importance of periodic training aligned with institutional protocols, auditing as a tool for continuous improvement, and a multidisciplinary approach as a way to ensure safety and quality in care. In addition, it paves the way for new investigations that deepen the findings, expand their validity, and consider the experiences of the professionals involved.

Investing in team training, promoting dialogue between sectors, and using audit data to inform decisions are fundamental strategies for ensuring safer dressings, more protected patients, and better-prepared professionals. Continuing education, in this context, is not only technical: it is also an ethical commitment to excellence in healthcare.

References

1. Silva APA, Araújo D, et al. Atuação do enfermeiro frente à infecção da corrente sanguínea associada ao uso do cateter venoso central. *Rev Eletron Atualiza Saude*. 2018 [citado 2023 ago 23];8(8):29-36. Disponível em: <https://atualizarevista.com.br/articulo/atuacao-do-enfermeiro-frente-infeccao-da-corrente-sanguinea-a-associada-ao-uso-do-cateter-venoso-central-v8-n8>
2. Neto LV, et al. Prevenção e controle de infecções: cateter venoso central em unidade de terapia intensiva adulto. *Rev Eletron Rebis*. 2020 [citado 2023 ago 23];2(4). Disponível em: <https://revis-tarebis.rebis.com.br/index.php/rebis/article/view/152>
3. Brasil. Agência Nacional de Vigilância Sanitária. Programa Nacional de Prevenção e Controle de Infecções Relacionadas à Assistência à Saúde: PNPCIRAS 2021-2025. Brasília: Anvisa; 2021 [citado 2023 ago 23]. Disponível em: https://www.gov.br/anvisa/pt-br/centraisdeconteudo/publicacoes/servicosdesaude/publicacoes/pnpciras_2021_2025.pdf
4. Marcomini EK, et al. Infecções relacionadas ao uso cateter venoso central: revisão integrativa. *Rev Saude.com*. 2021 [citado 2023 ago 23];17(2). Disponível em: <https://periodicos2.uesb.br/index.php/rsc/article/view/7331>
5. Foka M, et al. Prevention of central line-associated bloodstream infections through educational interventions in adult intensive care units: a systematic review. *Cureus*. 2021 [citado 2023 ago 23]. Disponível em: <https://pubmed.ncbi.nlm.nih.gov/34552831/>
6. Caló FO, et al. Custo-minimização de curativos para cateter venoso central: gaze estéril versus filme transparente. *Rev Enferm UERJ*. 2020 [citado 2023 ago 23];28:e42285. Disponível em: <https://www.e-publicacoes.uerj.br/enfermagemuerj/article/view/42285>
7. Mendonça KM, et al. Atuação da enfermagem na prevenção e controle de infecção de corrente sanguínea relacionada a cateter. *Rev Enferm UERJ*. 2011 [citado 2023 ago 23];19(2):330-3. Disponível em: <https://pesquisa.bvsalud.org/portal/resource/pt/lil-601595>
8. Cassia TDA, et al. Curativo de clorexidina associado à redução da infecção de cateter venoso central: uma revisão integrativa. *Rev Enferm Atual In Derme*. 2021 [citado 2023 ago 23];95(34):e-021057. Disponível em: <https://revistaenfermagematual.com/index.php/revista/article/view/984>
9. Severo TO, et al. Construção de um bundle para prevenção de infecção de corrente sanguínea associada ao cateter venoso central. *Rev Enferm Atual In Derme*. 2021 [citado 2023 ago 23];95(33):e-021025. Disponível em: <https://revistaenfermagematual.com/index.php/revista/article/view/737>
10. Brasil. Ministério da Saúde. Portaria nº 2616, de 12 de maio de 1998. Dispõe sobre o controle de infecção hospitalar e mantém a obrigatoriedade de um Programa de Controle de Infecções Hospitalares em todos os hospitais do país. Brasília: Ministério da Saúde; 1998 [citado 2023 ago 23]. Disponível em: https://bvsms.saude.gov.br/bvs/saudelegis/gm/1998/prt2616_12_05_1998.html
11. Tajra FS, et al. Analysis of scientific production on audit and public health based on the Virtual Health Library database. *Saude Debate*. 2014 [citado 2023 ago 23];38(100). Disponível em: <https://www.scielo.br/j/sdeb/a/w3vW9WtzVKRdVWxdGqzVJb/?lang=pt&format=pdf>
12. Pereira AS, et al. Metodologia da pesquisa científica. Santa Maria: UFSM, NTE; 2018 [citado 2023 ago 23]. Disponível em: https://repositorio.ufsm.br/bitstream/handle/1/15824/Lic_Computacao_Metodologia-Pesquisa-Cientifica.pdf?sequence=1
13. Brasil. Agência Nacional de Vigilância Sanitária. Medidas de prevenção de infecção relacionada à assistência à saúde. Brasília: Anvisa; 2017 [citado 2023 ago 23]. Disponível em: <https://www.gov.br/anvisa/pt-br/centraisdeconteudo/publicacoes/servicosdesaude/publicacoes/caderno-4-medidas-de-prevencao-de-infeccao-relacionada-a-assistencia-a-saude.pdf/view>
14. Miriam S, et al. Infecções de corrente sanguínea relacionada a cateteres centrais: entendimento e prática da equipe de enfermagem. *Rev Pesqui Cuid Fundam*. 2021 [citado 2023 ago 23]. Disponível em: <https://pesquisa.bvsalud.org/portal/resource/pt/biblio-1222692>
15. Souza EM, et al. Manual de cuidados de enfermagem em procedimentos de intensivismo. Porto Alegre: Ed UFCSPA; 2020 [citado 2023 ago 23].
16. Oliveira BCC, et al. Conhecimento dos profissionais de saúde, com ênfase na enfermagem, sobre infecções relacionadas ao uso do cateter venoso central de duplo lúmen em pacientes dialíticos em uma clínica de nefrologia do agreste de Pernambuco. *Braz J Dev*. 2020 [citado 2023 ago 23];6(7):44436-50. Disponível em: <https://ojs.brazilianjournals.com.br/ojs/index.php/BRJD/article/view/12842>
17. Almeida TM, et al. Prevenção de infecções relacionadas ao cateter venoso central não implantado de curta permanência. *Rev Enferm UERJ*. 2018 [citado 2023 ago 23];26:e278-83. Disponível em: <https://www.e-publicacoes.uerj.br/enfermagemuerj/article/view/31771>
18. Rodrigues HF, et al. Cateter de Hickman no transplante de células-tronco hematopoéticas: implante cirúrgico, retirada e assistência de enfermagem. *Rev Enferm UERJ*. 2015 [citado 2023 ago 23];23(3):304-9. Disponível em: <https://www.e-publicacoes.uerj.br/enfermagemuerj/article/view/4995>
19. Gomes MLS, et al. Avaliação das práticas de curativo de cateter venoso central de curta permanência. *Rev Enferm UERJ*. 2017 [citado 2023 ago 23];25:e18196. Disponível em: <https://www.e-publicacoes.uerj.br/enfermagemuerj/article/view/18196>
20. Pedrolo E, et al. Ensaio clínico controlado sobre o curativo de cateter venoso central. *Acta Paul Enferm*. 2011 [citado 2023 ago 23];24(2):278-83. Disponível em: <https://doi.org/10.1590/S0103-21002011000200019>
21. Lima YC, et al. Contribuições da enfermagem na prevenção de infecções relacionadas ao cateter venoso central em unidades de terapia intensiva: revisão integrativa. *Rev Eletron Acervo Enferm*. 2021 [citado 2023 ago 23];13:e8455. Disponível em: <https://acervomais.com.br/index.php/enfermagem/article/view/8455>
22. Teixeira R, et al. Ações do enfermeiro na prevenção de infecções associadas ao uso de cateteres em unidade de terapia intensiva: revisão integrativa. *Rev Cienc Plural*. 2021 [citado 2023 ago 23];7(2):253-71. Disponível em: <https://periodicos.ufrn.br/rcp/article/view/21600>
23. Faria RV, et al. Infecção de corrente sanguínea relacionada a cateter venoso central: avaliação dos fatores de risco. *Health Rev*. 2021 [citado 2023 ago 23];4(3):10143. Disponível em: <https://ojs.brazilianjournals.com.br/ojs/index.php/BJHR/article/view/29556>