ORIGINAL ARTICLE

REVISTA ENFERMAGEM ATUAL IN DERME

CHLOREXIDINE DRESSING ASSOCIATED WITH REDUCING CENTRAL VENOUS CATHETER INFECTION: AN INTEGRATIVE REVIEW

CURATIVO DE CLOREXIDINA ASSOCIADO À REDUÇÃO DA INFECÇÃO DE CATETER VENOSO CENTRAL: UMA REVISÃO INTEGRATIVA

RESUMO

Introdução: O Cateter Venoso Central (CVC) é amplamente utilizado, principalmente, em pacientes críticos, afinal, por meio deste dispositivo que é ofertado diversos componentes, os quais são fundamentalmente necessários para manutenção e homeostase do organismo. Objetivo: Analisar através da literatura científica a efetividade do curativo impregnado de clorexidina para redução da infecção relacionada a cateter venoso central. Metodologia: Trata-se de uma revisão integrativa. Foram utilizados 7 publicações científicas das bases de dados LILACS, MedLine, BDENF e Scielo com recorte temporal de 2007 a 2017. A seleção dos artigos foi realizada nos meses de janeiro e fevereiro de 2018. Os critérios de inclusão foram: artigos publicados em português, espanhol e inglês, indexados nos bancos de dados, disponíveis em domínio público e na íntegra. Para a análise descritiva dos resultados, foram preenchidos gráficos e quadros, elaborados por meio do programa *Microsoft Office Excel versão 2010*. Resultados: Dos artigos incluídos, 57,14% (quatro) foram publicados na base de dados MedLine. Os anos que apresentaram maior prevalência de publicações foram os anos de 2012, 2014 e 2015 com percentual igualmente distribuído. No que se refere aos objetivos dos estudos grande parte abordaram a eficácia do antisséptico clorexidina na redução de microrganismos. Conclusão: Portando, o presente estudo teve como objetivo central, analisar a importância da clorexidina na prevenção das infecções primárias da corrente sanguínea associadas a um dispositivo. Desta forma, os estudos analisados demostram um potencial relação entre o antimicrobiano e a efetiva redução do potencial de desenvolvimento de infecções relacionadas ao CVC.

Palavras-chave: Infecções Relacionadas a Cateter; Clorexidina; Antibacterianos.

ABSTRACT

Introduction: The Central Venous Catheter (CVC) is widely used, especially in critically ill patients. After all, it is through this device that several components are offered, which are fundamentally necessary for the maintenance and homeostasis of the organism. Objective: To analyze through scientific literature the effectiveness of chlorhexidine-impregnated dressings to reduce central venous catheter-related infection. Methodology: This is an integrative review. We used 7 scientific publications from LILACS, MedLine, BDENF and Scielo databases with a time frame of 2007 to 2017. The selection of articles was carried out in January and February 2018. The inclusion criteria were: articles published in Portuguese, Spanish and English, indexed in the databases, available in the public domain and in full. For the descriptive analysis of the results, graphs and charts were completed using Microsoft Office Excel version 2010. Results: Of the articles included, 57.14% (four) were published in the MedLine database. The years with the highest prevalence of publications were 2012, 2014, and 2015, with an equally distributed percentage. With regard to the objectives of the studies, most of them addressed the efficacy of chlorhexidine antiseptic in reducing microorganisms. Conclusion: Therefore, this study aimed to analyze the importance of chlorhexidine in preventing primary bloodstream infections associated with a device. Thus, the analyzed studies demonstrate a potential relationship between the antimicrobial and the effective reduction of the potential development of CVC-related infections.

Keywords: Catheter-Related Infections; Chlorhexidine; Antibacterials.

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INTRODUCTION

The Central Venous Catheter (CVC) is a device widely used by patients in critical health situations. However, its use generates a number of complications, among which Primary Bloodstream Infection (PBSI), which corresponds to the first bloodstream infection in patients using a CVC for more than 48 hours, and whose blood infection is not related to another site[1].

CVCs are important components for: fluid infusion, fluid and electrolyte replacement, transfusions, and blood collection. Their tip location is in the superior or inferior vena cava. In addition, they are classified as short term, the umbilical venous catheters, the central venous catheters inserted by puncture of the femoral, internal jugular, and subclavian vein, and those inserted by venous dissection; or long term, such as the peripherally inserted central venous catheter (PICC), the semi-implanted catheters (Broviac and Hickman) and the totally implanted ones[2].

In this sense, antimicrobials are fundamental to prevent the microbial proliferation of the bloodstream associated with the device, chlorhexidine being the best antiseptic among those available. Its substance binds to the invading agent and subsequently causes rupture of the cytoplasmic membrane, resulting in precipitation or coagulation of proteins and nucleic acids[3].

Thus, a study like this is of fundamental importance, as it will contribute to the promotion of measures to reduce primary infections related to CVCs, which contribute to increased morbidity and mortality rates. As the patients affected by this complication have their hospitalization time increased between seven and 21 days, with consequent increase in hospital costs[4].

This study is justified due to the little knowledge about chlorhexidine dressings available in the literature, and the available evidence does not show with statistical significance the effectiveness of this technology in reducing the rates of CVC-related infections, which hinders the incorporation of this new technology in nursing practice[5]. The study aimed to analyze through scientific literature the effectiveness of chlorhexidine-impregnated dressings to reduce central venous catheter-related infection.

METHODOLOGY

This is an integrative review study with a qualitative approach. The integrative review makes it possible to summarize the research already completed and to draw conclusions from a topic of interest. A well-conducted integrative review requires the same standards of rigor, clarity, and

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replication as primary studies. However, the methods for conducting integrative reviews are diverse and varied[7].

To construct the integrative review the following patterns/steps were followed: 1st Phase: Identification of the theme or questioning of the integrative review, 2nd Phase: Sampling or literature search, 3rd Phase: Categorization of studies, 4th Phase: Evaluation of the studies included in the integrative review, 5th Phase: Interpretation of results, and 6th Phase: Synthesis of the knowledge evidenced in the articles analyzed or presentation of the integrative review[7].

To survey the articles in the literature, we used scientific publications with a time frame of 2007 to 2017 published in national and international journals in the Virtual Health Library (VHL), indexed in the Latin American Literature (LILACS), Medical Literature Analysis and Retrieval System Online (MedLine), Nursing Database (BDENF) and Scientific Electronic Library Online (SciELO) databases, The descriptors used were DeCS (Descriptors in Health Sciences) / MeSH: "Chlorhexidine", *"Clorhexidina* ", *"Clorexidina"*, "Therapeutics"*, "Terapéutica* ", *"Terapêutica"*, "Nurses"*, "Enfermeros*" *"Enfermeiras e Enfermeiros"* associated with the Boolean operators "OR" and "AND".

Os critérios de inclusão utilizados foram: artigos publicados em português, espanhol e inglês, indexados nas bases de dados mencionadas acima nos últimos dez anos, disponíveis no domínio público, em sua totalidade, e que discutiam aspectos relacionados ao tema em estudo. Estes critérios foram adotados em função dos limites de tempo e recursos financeiros para a realização da pesquisa.

The exclusion criteria were articles repeated in databases considering only one, secondary studies, such as literature reviews and meta-analysis (for being syntheses of knowledge), books, dissertations, theses, monographs (for not being indexed), case reports, experience reports and editorials (for not presenting results).

For data analysis, the researchers read the titles and abstracts, respectively, and then the articles were analyzed in full and only those that answered the guiding question were selected; Mendeley software was used for reference management. Thus, 63 articles were found, 37 of which were excluded for not meeting the inclusion criteria; ten for duplicity, after reading the titles; nine were eliminated after reading the abstracts, since they did not match the objective of the study. Thus, we obtained a final sample of seven articles, which were read in full (Figure 1).

To summarize the articles included in the research, a table (Chart 1) was prepared in which important information from each article and of interest to the researchers was compiled. The elaboration of the instrument favored the collection of information in order

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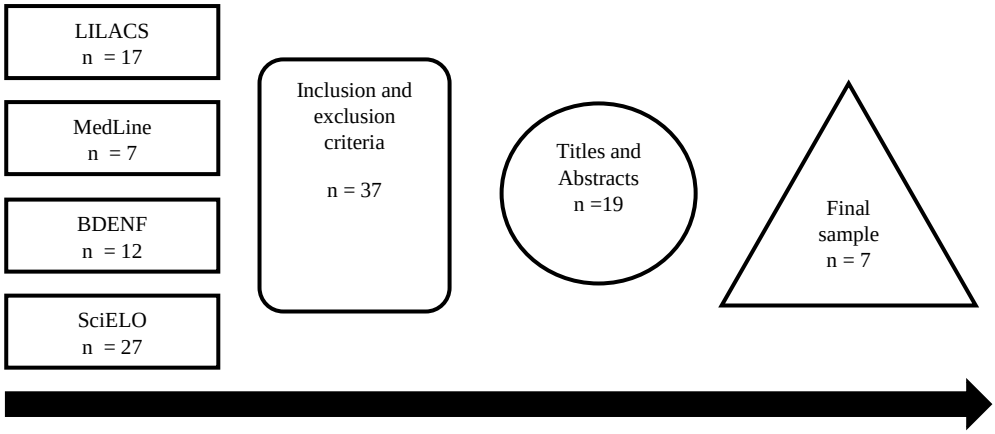
to answer the guiding question of this review, composed of the following variables: authors, year of publication, title, objectives, and methodology.

For the descriptive analysis of the results, graphs and charts were completed using Microsoft Office Excel version 2010. The descriptive analysis of the data occurred through the summary table, graph and discussion of the results found.

Since this is an integrative review, it did not require evaluation and approval from the Ethics Committee, as assured by resolution 466/12 of the National Health Council.

Figure 1 – Diagram of the selection of articles for integrative review.



Source: Research Data, 2017.

RESULTS

Of the articles included, 57.14% (four) were published in the MedLine database; 28.57 % (two) in LILACS; 14.28% (one) in SciELO. As for the years of publication of the articles, the years with the highest prevalence were 2012, 2014 and 2015 with 28.57% equally distributed, followed by 2017 with 14.28% of the publications, which does not configure a linear growth of publications over ten years in this theme (Figure 2).

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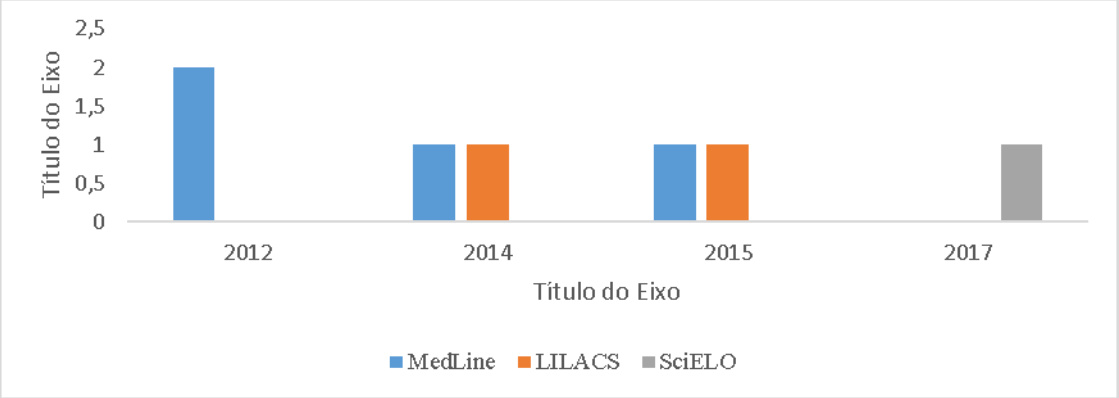
Figure 2 - Distribution of articles according to year of publication and database



Source: Research Data, 2018.

Regarding the choice of journals, one article (14.28%) was published in each journal namely: Latin American Journal of Nursing, Archives of Health Sciences, American Journal of Infection Control, Anna Nery School, Critical Care Nurse, Critical Care Medicine and the Journal of Nursing of UERJ, which shows a preference for the choice of journals from different areas of health.

Regarding the methodological design of the research, the studies presented the following approaches: quantitative non-experimental study; retrospective study; quantitative study with descriptive approach; observational study; randomized clinical trial; randomized clinical trial, and finally a pilot test of a randomized clinical trial, where it can be evidenced that part of the studies were based on a methodology with a low level of scientific evidence.

As to the objectives of the articles, it was observed that the main objectives were the duration of the dressing, the prevention measures, the economic cost, the efficacy and effectiveness of the dressing, thus proving their adequacy to the objectives set by this research.

The following table presents the compilation of the selected articles according to the variables selected for the study (Table 1).

Chart 1- Presentation of articles according to the variables names of authors / year of publication, titles of articles, objectives and methodology. Aracaju, 2018.

AUTHOR ANS YEAR	TITLE	OBJECTIVES	METHODOLOGY	AUTHOR ANS YEAR
Daniel et al., 2015	Nursing time and materials used in the chlorhexidine gel dressing	To identify the nursing time and the amount of materials used to perform the procedure to change	Quantitative, non-experimental study	Daniel et al., 2015

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		the chlorhexidine gel dressing on the long-term central venous catheter of patients undergoing Hematopoietic Stem Cell Transplantation.		
Lorente et al., 2015	Efficiency of chlorhexidine-silver sulfadiazine-impregnated venous catheters at subclavian sites	To determine whether the use of CHSS-impregnated catheters is an effective measure to prevent CRBSI in patients with venous access associated with a low risk of CRBSI.	Retrospective study	Lorente et al., 2015
Dolci et al., 2017	Frequency of change of chlorhexidine-impregnated gel dressings for central venous catheters in critically ill patients	To identify the permanence time of the chlorhexidine gel dressing applied at the insertion site of the central venous catheter, describe reasons for changing it and identify the quantity used per adult patient admitted to an intensive care unit.	Quantitative study with descriptive approach	Dolci et al., 2017
Pfaff et al., 2012	Use of a 1-piece chlorhexidine gluconate transparent dressing on critically ill patients	To compare the effectiveness of the 1-piece occlusive dressing with chlorhexidine gluconate in maintaining the low rate of catheter-related blood infections in the intensive care unit and to assess nurses' satisfaction and cost of the new dressing.	Observational study	Pfaff et al., 2012
Schwebel et al., 2012	Economic evaluation of chlorhexidine-impregnated sponges for preventing catheter-related infections in critically ill adults in the Dressing Study	Assess the economic impact of arterial CHGIS use of central vein catheters from an ICU perspective	Randomized Clinical Trial	Schwebel et al., 2012
Pedrolo et al., 2014a	Chlorhexidine	To evaluate the	Randomized Clinical	Pedrolo et al., 2014a

	dressing and gauze and tape for central venous catheter: randomized clinical trial	effectiveness of the chlorhexidine antimicrobial dressing, comparing it to gauze and tape	Trial	

Source: Research data, 2018.

DISCUSSION

The main objective of this study was to analyze the effectiveness of chlorhexidine in central venous catheter dressings, since its use has been deeply studied, especially in the international literature, and its efficacy is suggested in the face of an important and significant reduction in catheter colonization and device-related infections[7,8].

For Schwebel[9] adequate antisepsis at the moment of insertion of the central venous catheter contributes to the reduction of infection related to it; and that the use of chlorhexidine sponge is effective in preventing the proliferation of microorganisms.

In this perspective it is important to highlight the existence of the sponge-type dressing impregnated with chlorhexidine, which thus needs another covering such as the transparent polyurethane dressing to fix it; and the transparent adhesive integrated with a 2% chlorhexidine gluconate gel plate[5].

Thus, a study conducted at the Hospital das Clinicas in Ribeirão Preto emphasized some advantages and disadvantages of using other types of dressings in relation to chlorhexidine; highlighting that the dressings with sterile gauze have the disadvantage of not visualizing the insertion site of the CVC, as well as requiring exchange within 24 to 48 hours. On the other hand, the transparent film dressing, depending on exudation, can remain for up to seven days and allows visualization of the catheter insertion site[1,10].

However, the transparent film needs constant changes when in the presence of exudate. Therefore, the chlorhexidine film is the most indicated in these situations, due to its high gel absorption power, and besides the possibility of remaining for more than seven days even with the presence of exudate, as long as it does not exceed the edges of the chlorhexidine pad or prevent the visualization of the catheter insertion site[10].

Regarding the presence of microorganisms, a meta-analysis performed by Ho[12] showed a 60% reduction in central venous catheter-related infections when this type of dressing was used. Corroborating this study Pedrolo[5] showed that these dressings significantly reduce pathogenic microorganisms compared to conventional clear film dressings.

Consistent with the previous paragraph, international studies compared the use of transparent polyurethane film dressing with

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chlorhexidine dressing and found a reduction in bloodstream infections when the second type of dressing was used instead of the first[5,8].

In the same direction, a randomized clinical trial points to a reduction of microorganisms in the chlorhexidine group and shows 0.4 catheter-related bloodstream infections per 1,000 catheter days in the chlorhexidine group and 1.3 per 1,000 catheter days in the polyurethane group (p = 0.005, CI 0.09-0.65)[8,12]. However, regarding the adherence of the dressing, a study has shown that catheter permanence time longer than five days increases the risk of detachment by more than five times, and increases four times the risk of developing local reaction by continuous contact with the skin[13].

In this context, Brazilian and, especially, international studies report that non-fixed dressings favor the potential increase of microorganism entry and presence at the CVC insertion site, which culminates in complications and, consequently, patient aggravation, as well as increased hospital costs due to the patient's stay in the sector[14,15].

Corroborating the aforementioned studies, a randomized clinical trial tested chlorhexidine and polyurethane transparent film covers, regarding detachment and its association in generating infections, representing that more than two changes of dressings are associated with three times more catheter-related infections (p = 0.023). In addition, they identified that after the second change this increase may reach 12 times more the number of these infections (p = 0.0001), thus highlighting that the more changes for debonding the greater the occurrence of catheter-related bloodstream infection[16].

As for allergic reactions, we emphasize the low incidence of severe reactions associated with the use of the dressing, which favors its use, avoiding it only for those patients with known hypersensitivity to the antimicrobial chlorhexidine[17,18].

In addition, the study by Lorente[17] was a pioneering study which reported data to compare the costs of using subclavian CVCs with chlorhexidine and standard CVCs in the jugular and femoral veins.

This corroborates the current guidelines which recommend the use of CVC with chlorhexidine-impregnated dressings when the access remains for more than five days, so that in this way I can prevent and avoid a potential infection related to the solution of continuity and its permanence[19].

CONCLUSION

Therefore, this study aimed to analyze the importance of chlorhexidine in preventing primary bloodstream infections associated with a device, the CVC. Thus, the analyzed studies demonstrate a potential relationship

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between the antimicrobial and the effective reduction of the potential development of CVC-related infections.

Therefore, the use of chlorhexidine in dressings has significant benefits, especially in reducing microorganisms and possible colonization, i.e., minimizing local and systemic infections and reducing hospital stays. In addition, aseptic practice and correct dressing fixation lead to patient safety in preventing sepsis. In this way, the use of chlorhexidine also reduces the financial costs to health care institutions of complications caused by local and systemic infections.

In this sense, the use of chlorhexidine dressings on central venous catheters is important to reduce catheter-related infections, and the use of this type of dressing is recommended with high statistical significance; after all, they contribute to the prevention and promotion of primary bloodstream infections in critically ill patients.

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