ISSN: 1981-8963 DOI: 10.5205/reuol.5863-50531-1-ED.0805201444

Journal of Nursing
Revista de Enfermagem
UFPE On Line
ISSN: 1981-8963

NOTE PREVIEW ARTICLE

MONITORING DEVICES: ALLIES OR ENEMIES? HYGIENE PROCESSES OF NON-CRITICAL MONITORING DEVICES

DISPOSITIVOS DE MONITORAMENTO: ALIADOS OU INIMIGOS? PROCESSOS DE HIGIENIZAÇÃO DE DISPOSITIVOS DE MONITORAMENTO NÃO CRÍTICOS

DISPOSITIVOS DE MONITORAJE: ¿ALIADOS O ENEMIGOS? PROCESOS DE HIGIENE DE DISPOSITIVOS DE MONITORAJE NO CRÍTICOS

Roberta Pereira Spala Neves[1], Fátima Helena do Espirito Santo[2]

ABSTRACT

Objective: to identify the best practices found in the literature on the decontamination of main non-critical monitoring devices. ***Method:*** descriptive exploratory study with a quantitative approach, to be developed in three stages: integrative review, preparation of a Protocol and validation by *experts*. For the selection of *experts*, it will be used an adaptation of the model selection of Fehring and the search will be with the snowball technique. The calculation of the percentage of agreement among the *experts* will be by the ponderal average. The research project has been approved by the Research Ethics Committee, **CAAE** nº 22206213.80000.5243. ***Expected results:*** it is expected that the protocol built on this research can contribute to the standardization and systematization of the process of sterilization of these devices which are considered potential vectors of contamination, to reduce the risks of nosocomial infection, increasing patient safety and health team. ***Descriptors:*** Nosocomial Infection; Thermometers; Oximetry; Electrocardiography; Sphygmomanometers.

RESUMO

***Objetivo*:** identificar as boas práticas encontradas na literatura sobre a descontaminação dos principais dispositivos de monitoramento não críticos. ***Método*:** estudo descritivo, exploratório, com abordagem quantitativa, a ser desenvolvido em três etapas: revisão integrativa, elaboração de um protocolo e validação por *experts*. Para seleção dos *experts*, será utilizada uma adaptação do modelo de seleção de Fehring e a busca será com a técnica bola-de-neve. O cálculo do percentual de concordância entre os *experts* será pela média ponderal. O projeto de pesquisa foi aprovado pelo Comitê de Ética em Pesquisa, **CAAE** nº 22206213.8 0000.5243. ***Resultados esperados*:** espera-se que o protocolo construído nesta pesquisa possa contribuir com a padronização e sistematização do processo de higienização destes dispositivos, que são considerados potenciais vetores de contaminação, visando reduzir os riscos de infecção hospitalar, aumentando a segurança dos pacientes e equipe de saúde. ***Descritores*:** Infecção Hospitalar; Termômetros; Oximetria; Eletrocardiografia; Esfigmomanômetros.

RESUMEN

Objetivo: identificar las buenas prácticas encontradas en la literatura sobre la descontaminación de los principales dispositivos de monitoreo no críticos. ***Método:*** estudio descriptivo, exploratorio, con enfoque cuantitativo, a ser desarrollado en tres etapas: revisión integrativa, elaboración de un protocolo y validación por *experts*. Para selección de los *experts*, será utilizada una adaptación del modelo de selección de Fehring y la búsqueda será con la técnica bola-de-nieve. El cálculo del porcentaje de concordancia entre los *experts* será por la media ponderal. El proyecto de investigación fue aprobado por el Comité de Ética en Investigación, CAAE nº 22206213.8 0000.5243. ***Resultados esperados:*** se espera que el protocolo construido en esta investigación pueda contribuir con la estandarización y sistematización del proceso de higiene de estos dispositivos, que son considerados potenciales vectores de contaminación, visando reducir los riesgos de infección hospitalario, aumentando la seguridad de los pacientes y equipo de salud. . ***Descriptores:*** Infección Hospitalario; Termómetros; Oximetría; Electrocardiografía; Esfigmomanómetros.

[1]Nurse, Master degree, Master degree in Nursing Assistance, Nursing School Aurora de Afonso Costa, Fluminense Federal University /EEAAC/UFF. Niterói (RJ), Brazil E-mail: roberta.spala@yahoo.com.br; [2]Nurse, Doctorate in Nursing, Associate Professor of the Medical-Surgical Department of Nursing, Nursing School Aurora de Afonso Costa, Fluminense Federal University /EEAAC/UFF. Niterói (RJ), Brazil. E-mail: professorafh@vm.uff.br

ISSN: 1981-8963 DOI: 10.5205/reuol.5863-50531-1-ED.0805201444

INTRODUCTION

The decontamination of non-critical medical devices was little discussed for a long time, because they are articles considered with low risk of infection and larger attention tends to focus on the decontamination of critical and semi-critical devices. For this reason, perhaps there are gaps of knowledge about the processing of these articles. The decontamination of non-critical devices is accomplished in a variety of ways and generally, each health unit elaborates their standard procedure according to their needs and service routines.

However, studies have pointed to the non-critical monitoring devices as the main villains in the appearance of epidemics of multi-resistant bacteria in hospitals, especially in intensive care units (adult or neonatal).

An article published in 2012 in *Chicago Journals* describes as the main reservoir caused of the outbreak of *Staphylococcus aureus* with heterogeneous resistance to glycopeptides, in an intensive care unit, the oximeter sensors.[1] Another publication in 2002, in the *Journal of hospital Infection*, aims the thermometer as one of the sources causing outbreak of *Enterobacter cloacae* in a neonatal unit, suggesting thereby modifying the decontamination method of this device[2].

In 2010, an article published in the *American Journal of Critical Care*, describes that after culture of 320 ECG clean cables, it was found bacterial growth in 201 cables and from these nine species of risk were identified, five species with potential risk and ten without risk or with rare risk.[3] Pathogenic bacteria were also detected in sphygmomanometers, through a study published in 2006 in the *Journal Hospital Infection* was held of 24 non-invasive pressure sleeves, being detected viable microorganism growth in all sleeves. In 11 of them were isolated pathogenic organisms: MSSA (Methicillin-sensitive *Staphylococcus aureus*), MRSA (Methicillin-resistant *Staphylococcus aureus*) and Clostridium difficile.[4]

In light of this evidence, the study proposes the construction of a protocol of hygiene of the main non-critical monitoring devices, aiming to contribute to standardize and systematize the process of sterilization of these articles, minimizing the risks related to their use in health institutions. Accordingly, it will be discussed the relationship of cross-infection with the use of non-critical monitoring devices covered in this research are: EKG cables, sphygmomanometer, thermometer and oximeter. The procedures for cleaning these articles will also be discussed.

The interest in the theme was from the author's professional practice who realized the need for a closer look for cleaning non-critical monitoring devices, considering such equipment represent potential vectors of cross-infection if not sanitized properly, besides observing the lack of standard operating procedures to respond to that question. These devices are reusable and have become more sophisticated over the years due to advances in diagnostic and therapeutic medicine. The equipments were gaining more sophisticated designs and shapes with varied surfaces and recesses, which made the procedures for cleaning, disinfecting and sterilizing more difficult and questionable.[5]

The emergence of infections in health care environments may be related to the use of improper cleaning and disinfection techniques. Therefore, the service of cleaning and disinfection of surfaces in health services has important role in the prevention of healthcare-related infections, being essential to the improvement of the use of effective techniques for cleaning and disinfecting.[6]

The hospital infection reaches the whole world and represents one of the leading causes of death in hospitalized patients. In Brazil, the average rate of nosocomial infection is approximately 15%, while in the U.S.A. and Europe is of 10%.[7] According to the Center for *Disease Control and Prevention* (CDC), the most common infections related to health care are: urinary tract infection, respiratory tract infection, surgical infection and infection of bloodstream.[8-11]

The hospital is a large reservoir of virulent pathogens and opportunistic. The main factors that influence the acquisition of infection in hospitals are: immune status, age (newborns and the elderly are most vulnerable), overuse of antibiotics, medical procedures, in particular, the invasive, immunosuppression and flaws in infection control procedures.[12] Among the factors involved in the acquisition of hospital-acquired infections, the question of the failure of procedures for prevention and control of infection has highlighted in this study because inanimate objects can be potential sources of infection, being essential to define and standardize the most effective cleaning procedure for each equipment.

Thus, this study proposes as a product hygiene protocol of non-critical monitoring

devices that can contribute to reducing the incidence of cross infection, decreasing mortality rates among patients admitted, the length of hospitalization and hospital spending related to the adverse event.

OBJETIVES

● To identify best practices found in the literature about cleaning of non-critical monitoring devices.

● To elaborate a protocol of sanitization of non-critical monitoring devices.

● To validate this protocol by a group of *experts* in hospital infection.

METHOD

Exploratory, descriptive study, with a quantitative approach, based on the principles of evidence-based practice, which brings problems encountered in practice to be discussed in the light of the available scientific knowledge, returning to the professional practice proposal for a solution to the problem be found.[13]

In order to identify good practices of hygiene monitoring non-critical equipment, this study will be performed in the following stages: integrative literature review, preparation of the protocol of sanitization of non-critical equipment monitoring and protocol validation by experts in hospital infection.

The first stage was held an integrative review, respecting the phases: 1. Identification of the theme, 2. Establishment of criteria for inclusion and exclusion/search in the literature, 3. Categorization of studies, 4. Critical analysis 5. Discussion of results, 6. Synthesis of knowledge.[14]

The literature search was performed in major databases (PUBMED and BVS) which give access to LILACS, IBECS and MEDLINE bases, and SCIELO library, in addition to the manual searches in books, dissertations, and articles. It was used as inclusion criteria: every scientific productions indexed in the databases mentioned previously, in English, Spanish and Portuguese, published over the last 16 years. Scientific productions were excluded in the forms of: letter type studies, editorial, opinions, regulations and resolutions and those that showed no relationship with the subject.

The search was conducted in the period from July to September 2013, with membership of the following key words in English: *oximety and cross infection, electrocardiography and cross infection and cross infection, sphygmomanometers, thermometers and cross infection*. With the key words, the items that were selected from reading the summaries were found, noting their relationship with the theme proposed and subject to the inclusion/exclusion criteria.

253 articles were found in all, but applying the inclusion and exclusion criteria 13 articles in this review were obtained. It was held by associating key words as already mentioned previously. When the key words associated with oximetry and cross infection, 19 articles were found, but two were selected after reading the abstracts. Of these, one had its publication greater than 16 years, so an article was just obtained.

Using the electrocardiography descriptors and cross infection, 170 articles were found, but only six were selected after reading the abstracts. Of these, three had their publication for more than 16 years and one was a letter to the reader (which is one of the factors of exclusion), leaving two articles for research. When performing a search with the keywords *sphygmomanometers and cross infection*, were located 14 articles, however, after reading the summaries, 11 were selected, being that there were five that its publication for over 16 years; of the remaining six, one was an invasive equipment (it was detected while reading the full article) and one was not found, remaining four selected in the review.

The search with the keywords *thermometers and cross infection*, resulted in 49 articles, however, when reading the abstracts, 16 were selected, seven with publication for more than 16 years, leaving nine articles, which three have not been found. Thus, only six remained in this selection.

At the moment, we are categorizing studies, analyzing each to subsequently carry out the discussion and synthesis of the content. Then it will be built a protocol of hygiene of non-critical monitoring devices that in the third stage of the study will be submitted to validation by *experts* in the field of nosocomial infection.

In the literature we note that, in addition to the term *expert*, other terms such as 'specialist', 'experts' and 'experienced' are also used referring to a professional who has experience and knowledge in an area, and may assume the role of judge on certain subjects in their field of expertise. However, the selection of a trader is an issue that generates controversy in the literature, as there is no consensus on the criteria that make a nurse expert in a particular area.[15]

In this study, we opted for an adaptation of the model selection of *experts* suggested by Fehring on nursing diagnosis area.[16] Fehring suggests that the professional to be considered an *expert* in the area of nursing diagnosis must achieve a minimum score of 5 points, assigning to each title a score: Master Degree in Nursing (4 points), Master Degree in Nursing with dissertation directed the relevant content to the nursing diagnosis studied (1 point), Publication of article about nursing diagnosis in reference journals (2 points), Article published on nursing diagnoses and with relevant content to the area in focus (2 points), Doctorate focusing on nursing diagnosis (2 points), Clinical experience of at least one year in the area of diagnosis in study (1 point), Certificate of clinical practice relevant to the diagnostic area under study (2 points).[16]

Adapting the model suggested by Fehring and keeping the minimum score of 5 points to consider hospital infection professional expert, criteria and scores to be used in this study for selection of experts are: PhD thesis defended in the field of nosocomial infection (4 points), master's degree with thesis defended in the field of nosocomial infection (3 points), lato sensu in nosocomial infection (1 point), Scientific literature about nosocomial infection in recent 10 years (1 point for each production), at least 1 year experience in hospital infection control Committee (CCIH) in the last 10 years (2 points).[16]

These professionals will be identified through an initial consultation with a specialist in the subject of interest, requesting the indication of other participants, which also will be analyzed as the criteria for selection of *experts*. In touch with those indicated, it calls for a new indication and so on, becoming the technique of snowball. 17

Before they get through selection, noting the inclusion criteria as *experts*, professionals must have their graduation in healthcare and Brazilians, because the Protocol should be validated according to the reality of Brazil. After selected the *experts*, a contact via email requesting the participation of professionals in the research will be carried out, also forwarded an informed consent (TFCC), respecting the ethical precepts of 466/12 Resolution of the National Health Council.

The study was approved by the Research Ethics Committee of the University Hospital Antônio Pedro/Fluminense Federal University (UFF), under the CAAE nº 22206213.8 0000.5243. After this step, the Protocol will be forwarded to the *experts* who evaluate each item using a Likert type scale with four levels of support: 1) Completely appropriate; 2) most appropriate; 3) smallest part; 4) inadequate. Each level receives a score for the calculation of average weight. 1 level = 1 point; Level 2 = 0.67; Level 3 = 0.33; Level 4 = 0.

To evaluate the contents of nursing diagnosis, Fehring suggests the use of Delphis technique for obtaining consensus by the *experts*.[18] However, following the suggestion of Fehring on hospital infection area, and understand that this technique meets the needs of this research on obtaining the consensus of a group about a particular phenomenon, the technique of Delphis will be used. It can be understood as a systematic method of trial information, destined to reach the consensus of opinions about a particular subject, knowledge of a group of experts, through hinged validations in rounds of questionnaires.[17-20]

The operationalization of the Delphis technique is performed by successive rounds. In the first round, it is sent to the specialists the document to be evaluated. From his return, the answers are analyzed. The issues that obtain consensus stipulated by researcher are extracted and the questionnaire is reviewed by the author, taking into consideration the suggestions of experts; So begins the second go-round, with new trial. Other rounds can be used until it reaches the pre-defined consensus or until the level of disagreement is reduced in level of saturation. Generally speaking, in a study with the Delphi technique are held two to three rounds of reviews.[17]

To assess the degree of agreement among the *experts*, Fehring recommends the weighted average. The researcher observes to be appropriate such as recommendation to measure the percentage of agreement among the *experts* in relation to each item of equipment hygiene Protocol non-critical monitoring.[18]

The items that get average less than 0.5 are revised according to suggestions from experts until they are approved or discarded. The items that present fillet 0.5 to 0.8 will be considered as "important procedures on disinfecting non-invasive monitoring devices" and the items that present the concordance percentage greater than 0.8 will be considered as "necessary procedures on disinfecting non-invasive monitoring devices".

At the end of the step protocol validation by *experts*, through the Delphi technique and

considering the percentage of agreement of each item by the experts, it will be obtained a final Protocol that will contribute to the prevention of cross-infection related to contamination of non-critical monitoring equipment and reusable in hospitalized patients.

EXPECTED RESULTS

Once decontamination guidelines were found not specific to such equipment, concepts, classifications and other information for construction of the proposed Protocol are used in the study.

This study fills a gap, observed by the author in its experience as a nurse and confirmed with the scarcity in literature, as the procedures for decontamination of non-critical monitoring devices through good practices found in the literature, pointing out possibilities for other studies to test the effectiveness of these processes, in order to guarantee adequate decontamination of such devices.

It is expected that the Protocol built on this research can contribute to the standardization and systematization of the process of sterilization of these devices, considered potential vectors of contamination, to reduce the risks of infection and consequently, increasing patient safety and health team at the hospital.

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Submission: 2013/02/14
Accepted: 2014/03/16
Publishing: 2014/05/01

Corresponding Address

Roberta Pereira Spala Neves
Rua Paranapanema 1100 / Ap. 804
Bairro Olaria
CEP: 21073-185 — Niterói (RJ), Brazil