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Contamination of white coats by health professionals in providing health care

Contaminação de jalecos pelos profissionais de saúde na prestação de assistência à saúde

Contaminación de batas por parte de profesionales de la salud al brindar atención médica

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ABSTRACT

Introduction: Health care-related infections are considered a public health problem, as they compromise the safety and quality of care provided to users of this service. The objective is to describe the occurrence of contamination of textile clothing by health professionals in the provision of health care. **Outline:** Integrative literature review conducted in October 2018 in SciELO and the VHL. Controlled health descriptors were used: 'cross infection' AND 'health personnel' AND 'clothing'. After the selection steps, 11 articles remained. **Results:** It is observed that four (36.36%) articles have as objectives: to determine the biological characteristics of microorganisms present in the white coats, what type, level, frequency and places of contamination of the white coats; four (36.36%) are aimed at identifying transmission potentials and reducing contamination and infection control strategies through the use of gloves and white coats; one (9.09%) aims to evaluate domestic washing procedures and one (9.09%) aims to examine the maintenance and use of lead clothing by assessing microbiological contamination in surgical procedures. **Implications:** There is a challenge to be faced which is related to educational actions and continuing education.

DESCRIPTORS

Cross Infection; Health Personnel; Clothing.

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INTRODUCTION

The Healthcare-associated Infections (HAI's) can be defined as those linked to the performance of procedures aimed at health care, and can be acquired in different care provider environments.[1] In this sense, the HAIs are considered a public health problem, since they compromise the safety and quality of the assistance provided to users of this service, increasing the length of hospital stay and costs, in addition to increasing morbidity and mortality rates.[2-3]

According to ANVISA,[4] there was an increase in hospitals that reported cases of HAI in 2016, from 1,001 to 2,212, of which 71.3% are linked to the Unified Health System (SUS). It should also be noted that 20 to 30% of HAI's are considered preventable through the adoption of infection control and prevention programs and measures.

In the occurrence of HAIs, there is a crucial route of transmission of microorganisms that occurs through the hands of health workers and patients. However, the equipment and environmental surfaces close to the patients and which are touched by the professional become contaminated and serve as reservoirs for microorganisms, thus favoring cross-transmission.[2]

The use of the white coat by health professionals aims to prevent contamination, minimizing the chances of accidents that may cause injuries, intoxications or even contaminate professionals during the care provided to patients.[1,5] However, studies show that health professionals who use the white coat not only use it in their work environment, but also in non-private health care environments, such as snack bars and bookstores.[6-9]

The literature demonstrates that the biggest areas of contamination in the coat of health professionals are the regions of the pockets and abdomen, with the predominance of the microorganism *Staphylococcus* spp., in which it is resistant to penicillin, erythromycin, oxacillin and clindamycin.[2]

Given the assumption, the aim of this study was to describe the occurrence of contamination of textile clothing by health professionals in the provision of health care.

METHOD

This study is an Integrative Literature Review (ILR), which, in order to achieve the proposed objective, considered the following steps: the identification of the theme and establishment of the research question. Thus, the following guiding question was formulated: what are the factors related to the contamination of textile garments used by health professionals during health care?; of the objective; the inclusion and exclusion criteria of articles; the standardization of the elements to be obtained from the elected articles; analysis and discussion of the results found; and the exposure of the review.[10]

The selection process of the articles started in October 2018, being consulted: the Scientific Eletronic Library Online (SciELO) and the Virtual Health Library (VHL) Portal, comprising scientific articles available in the bases: Latin American and Caribbean Literature in Health Sciences (LILACS) and Medical Literature Analysis and Retrievel System Online (MEDLINE). The available DeCS descriptors were used: 'cross infection', 'health personnel', 'clothing', combined using the Boolean operator AND.

Inclusion criteria were articles published between 2015 and 2017 in Portuguese, English and Spanish, describing the existence of microorganisms in the clothing of health professionals concerning the occurrence of HAI's. Articles repeated in the databases that did not meet the inclusion criteria were excluded from the study. The delimited search period included articles published in the last 3 years, presenting itself as a limitation of the study, once the existence of studies of literature reviews on the topic

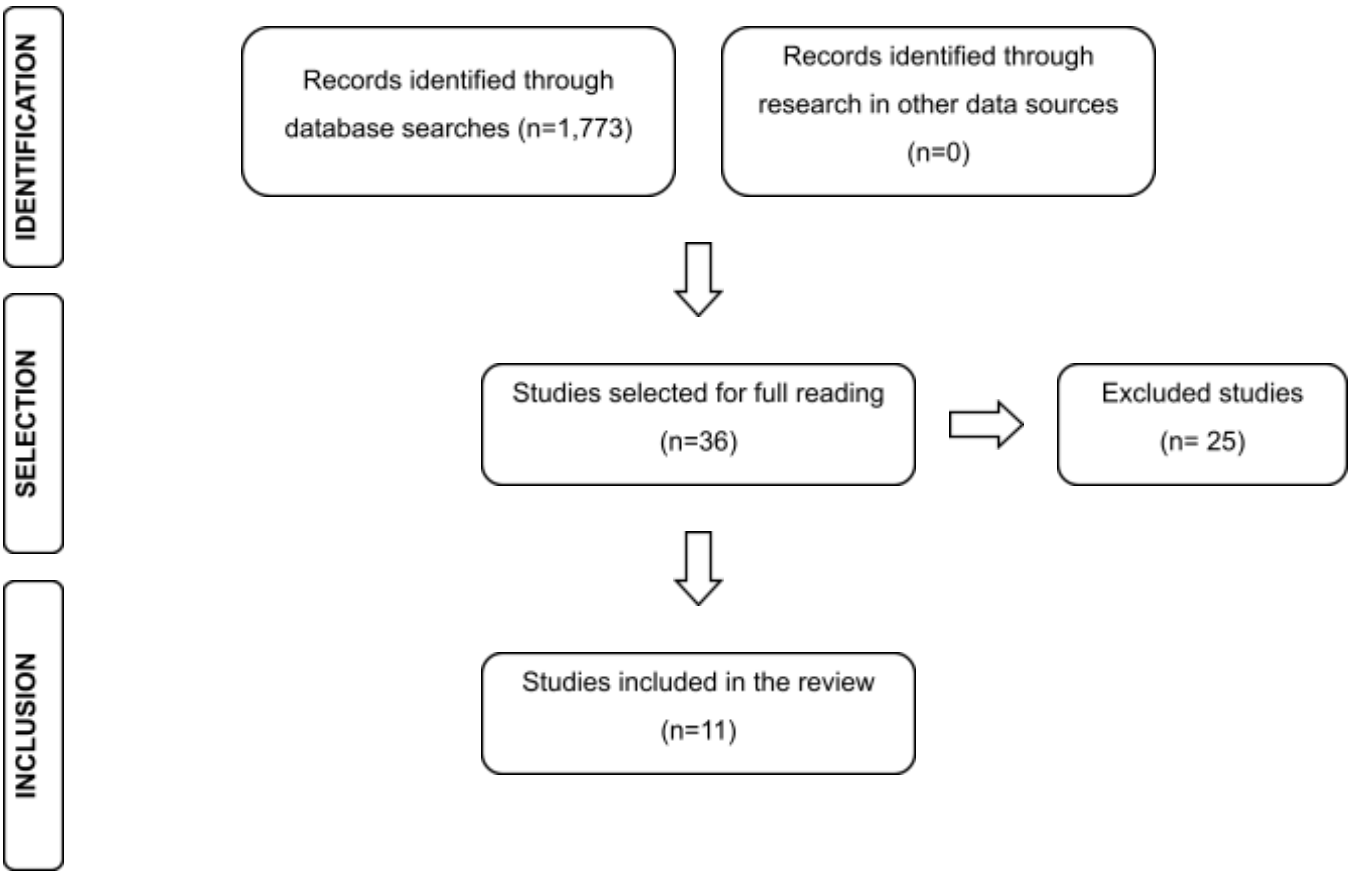
previously published was verified.[11-13] It is also justified, the fact that 2018 was not included in the search period, due to the occurrence of the stage of the RIL being carried out in the middle of the same year.

In order to contribute to a better analysis and grouping of articles, a form was created, which included the information of: identification of the manuscript and authorship, periodical and purpose.

To define the level of evidence, the criteria validated in the study were chosen,[14] being: I- systematic reviews or meta-analysis; II- randomized, controlled study; III- Controlled clinical studies without randomization; IV- Cohort or Control Case; V- Systematic review of qualitative or descriptive studies; VI- Descriptive or qualitative study; VII- Expert opinion or consensus.

Initially, a thorough assessment was carried out by means of the title of the manuscripts and their abstracts. Then, the selected articles were read in full in order to verify whether they were related to the guiding question. From the critical analysis of the abstracts, 11 (100%) articles that met the proposed selection criteria were selected at the end. Below it is possible to observe the results resulting from the searches with the intersections of the descriptors (Figure 1):

Figure 1 – Flowchart of study selection. Coxim (MS), Brazil, 2018.



RESULTS

Regarding the characterization of the articles studied, the majority, nine (81.81%) were published in 2015, two (18.18%) were published in 2016. Among the studies, three (27.27%) were published in epidemiology journals, one (9.09%) published in bacteriology magazine, one (9.09%) in virology magazine, one (9.09%) infectology , one (9.09%) in a medical magazine in Ribeirão Preto, one (9.09%) in a nursing magazine, one (9.09%) JAMA international medicine, one (9.09%), Ann ig, one (9.09%) bank notes.

Regarding the type of study, three (27.27%) are cross-sectional studies, three (27.27%) randomized, two (18.18%) cohort, one (9.09%) quantitative, one (9.09%) literature review and a descriptive quantitative (9.09%).

It is observed that four (36.36%) of the articles have as objectives: to determine the biological characteristics of microorganisms present in the white coats, to determine the type, the level, the frequency and the contamination places of the white coats; four (36.36%) are aimed at identifying potentials for transmission, reduction of contamination and infection control strategies through the use of gloves and white coats; one (9.09%) aims to evaluate domestic washing procedures and one (9.09%) aims to examine the maintenance and use of lead clothing by assessing microbiological contamination in surgical procedures.

Regarding the level of evidence, five (45.45%) are qualitative or cross-sectional studies, three (27.27%) are randomized studies, two (18.18%) are control or cohort cases and one (9.09 %) is a systematic review of qualitative or descriptive studies.

Regarding the place where the studies were carried out, a large part, nine (81.81%) were carried out in hospitals and only one (9.09%) in an ambulance and one (9.09%) in databases.

Regarding the category of professionals who wore white coats in the study, five (45.45%) were doctors and nursing staff, three (27.27%) analyzed the white coats of professionals who maintained direct contact with the patient, two (18.18%) analyzed physical therapists and one (9.09%), only physicians.

Of the articles analyzed, nine (81.81%) portray that the main places of contamination in white coats are pockets, wrists and abdomen.

Also, according to the research, the articles bring actions / strategies to reduce contamination, seven (63.63%) bring actions such as correct use, storage, exchange and washing of the white coats to reduce contamination, another strategy analyzed in the articles was the proper hand hygiene, two (18.18%) portray it and an article (9.09%) emphasizes on permanent education.

In order to facilitate the visualization of the results, a synoptic table (Table 1) was constructed with the titles of the articles, the journals in which they were published, the year of publication, the purpose of the studies, the research design and the level of evidence.

Table 1 – Scientific production about the monitoring process. Coxim, MS, Brazil, 2018.

Code	Title	Periodical / Year of Publication	Objective	Method	Level of Evidence
E1	Respiratory syncytial virus is present in the neonatal intensive care unit	J Med Virol, 2016	Identify potential sources of transmission of the respiratory syncytial virus in the neonatal intensive care unit to better inform infection control strategies.	Cohort study	IV
E2	[Health worker coats: a potential reservoir of microorganisms]	Medicina (Ribeirão Preto), 2015	To determine the epidemiological characteristics of microorganisms in the coats of health workers in a large hospital.	Cross-sectional study	VI
E3	Role of healthcare apparel and other healthcare textiles in the transmission of pathogens: a review of the literature	J Hosp Infect, 2015	Provide a summary review of the current evidence for risks around textiles in health settings and the potential benefits of new fabrics to prevent the transmission of infectious agents to and from health care workers.	Literature review	V
E4	Impact of universal gowning and gloving on health care worker clothing contamination.	Infect Control Hosp Epidemiol, 2015	Determine whether the use of aprons and gloves for all patient care reduces contamination of the healthcare professional's clothing, compared to usual practice.	Randomized study	II

E5	Bacterial Contamination of Medical Doctors and Students White Coats at Kilimanjaro Christian Medical Centre, Moshi, Tanzania	Int J Bacteriol, 2015	This study was conducted to determine the type of bacterial contamination in the white coats of doctors and students and factors associated with bacterial infection.	Cross-sectional study	VI
E6	Effect of chlorhexidine bathing and other infection control practices on the Benefits of Universal Glove and Gown (BUGG) trial: a subgroup analysis.	Infect Control Hosp Epidemiol, 2015	To determine the interaction between universal glove and gown with CHG bath and other infection control interventions, we performed a subgroup analysis of the BUGG assay.	Randomized study	II
E7	Washing uniforms at home: adherence to hospital policy	Nurs Stand, 2015	Evaluate domestic washing procedures followed by National Health Service employees at four hospitals.	Quantitative study	VI
E8	Impact of universal gowning and gloving on health care worker clothing contamination	Infect Control Hosp Epidemio, 2015	Determine whether the use of aprons and gloves for all patient care reduces contamination of the healthcare professional's clothing, compared to usual practice.	Randomized study	II
E9	UniStatus - a cross-sectional study on the contamination of uniforms in the Danish ambulance service	BMC Research Notes, 2015	Examine the contamination level of the uniforms worn by ambulance personnel after a shift and test the effect of washing the uniform with and without a detergent containing acetic peroxide.	Cross-sectional study	VI
E10	Contamination of health care personnel during removal of personal protective equipment	JAMA Intern Med, 2015	Determine the frequency and places of contamination on the skin and clothing of personnel during PPE removal and assess the effect of an intervention on the frequency of contamination.	Cohort study	IV
E11	Surveillance of microbiological contamination and correct use of protective lead garments	Ann Ig, 2016	Examine the use and maintenance of protective lead garments in the operating room, assessing, in particular, their microbiological contamination and their practical use by health professionals during surgical procedures.	Quantitative, descriptive study	VI

DISCUSSION

The use of white coats by health professionals is mainly related to three aspects: allowing to identify the employee in the company, professional differentiation and providing barrier protection. However, it is more and more frequent to identify that the uniforms of health professionals are contaminated with microorganisms.[15]

In their use, the tissues can suffer contamination process, being essential to wash, however the failure in the disinfection process or the new contamination can favor the spread of pathogens. It is relevant to highlight that surfaces with a high risk of reservoir, such as bedding and pajamas, in addition to being clean, must undergo a disinfection process, the same applies to surgical curtains and sheets in intensive care units.[16]

Health service uniforms are not always sanitized by hospital laundry services, cleaning processes are often carried out at home. Evidence showed that 44% of employees who wash their uniforms at home did not follow the recommendations for cleaning, such as the recommended non-adoption of temperatures (60°C).[17] In another study, carried out with nursing professionals, through an audit process, it was observed that the team changes the white coat whenever it is dirty and does the washing at home, passing the white coat at the highest temperature.[18]

As evidenced in the results, concern about infection control measures is frequent, and this theme is increasingly more current with an increasing number of studies,[15] a fact verified by the predominance of publications in recent years. Another data found in this research refers to the question that this theme was more widely published in journals focused on epidemiology and the medical field, a counterpoint, since the largest number of

health professionals who wear white coats are nursing professionals.

In what permeates the issue of places, there is also a predominance of this theme to be worked mainly in the hospital context, that is, it is essential to expand the look at the prevention of out-of-hospital HAI's, involving Primary Health Care.[19] Another environment that has become a scenario for the provision of health care is home care, which should also be the focus of infection prevention actions. It is essential to develop studies that allow the design of biologically safe home care.[20]

Contamination in health professionals' white coats in the wrist areas occurs mainly due to the lack of hand hygiene, the professionals touch contaminated surfaces and equipment, which serve as reservoirs for microorganisms, and end up forgetting to sanitize their hands to touch their respective white coats.[15,21]

The literature shows that the contamination of white coats in the region of the pockets and wrist is related to the failure in hand hygiene during work, whether in hospitals or in a basic health unit; and that contamination in the abdomen is related to direct contact with the patient.[15]

According to other studies,[7-8] in addition to the failure in hand hygiene, another factor that contributes to the contamination of white coats is the lack of knowledge related to the use of white coats. Professionals end up using the white coat outside their work environment and using it for more than one shift, causing cross contamination.[22]

Still in this context, it is clear that many health professionals do not know in which environments it is necessary to wear white coats, what is the correct way to wear such a garment, what is the function of using the white coat and also about the use of Personal Protective Equipment (PPE).[17,23]

In this sense, all the factors presented for contamination in white coats are related to the process of continuing education and to educational actions in health institutions, where the use of a white coat is essential. However, studies show that, in order to reduce the contamination of white coats, it is essential to carry out educational actions for health professionals and continued action, as well as having proper hand hygiene practices, training of health workers, pointing out the indication of use, care with storage and frequency of changing of white coats.[23-27]

A new strategy that has been thought of is the making of white coats with different fabric compositions from those used in the composition of ordinary clothes.[15] Still, a study states that washing at home with temperature at 60°C (140°F) for 10 minutes is enough for decontamination and reduction of microbial load.[28]

Therefore, in order to reduce the contamination of white coats, it is necessary to have health education and continuing education actions in institutions, aiming at improving knowledge about the correct use of coats as well as the importance of hand hygiene.

CONCLUSION

From the data analysis, it was observed that the contamination of white coats occurs due to failure in hand hygiene and the lack of information regarding the duration of the white coat use, as professionals end up using the same white coat in more than one work shift, causing cross contamination.

When faced with such statements, from the research conducted, it is identified that there is a challenge to be faced, which is related to educational actions and continuing education. In view of this, it can be said that continuing education demands actions to be carried out in the institutions, aiming to improve the perception of employees about the use of white coats and their relationship with the HAI's, as well as the importance of performing correct hand hygiene.

The study has as a limitation the fact of seeking only studies in the 3-year spectrum, an

aspect related to the large volume of reviews published on the theme. Another limitation corresponds to the characteristic of the integrative review, which does not develop statistical analysis of the studies found. In this context, it is essential to develop new studies focused on adherence to biosecurity measures by health professionals and to expand the theme to the extra-hospital scenario.

RESUMO

Introdução: As infecções relacionadas à assistência à saúde são consideradas um problema de saúde pública, uma vez que comprometem a segurança e a qualidade da assistência prestada aos usuários deste serviço. Objetiva-se descrever a ocorrência de contaminação de vestimentas têxteis pelos profissionais de saúde na prestação de assistência à saúde. **Delineamento**: Revisão integrativa da literatura realizada no mês de outubro de 2018 no SciELO e na BVS. Utilizou-se os descritores controlados em saúde: 'cross infection' AND 'health personnel' AND 'clothing'. Após as etapas de seleção, permaneceram 11 artigos. **Resultados**: Observa-se que quatro (36,36%) dos artigos tem como objetivos: determinar as características biológicas de microrganismos presentes nos jalecos, qual o tipo, o nível, a frequência e os locais de contaminação dos jalecos; quatro (36,36%) estão voltados para identificação potenciais de transmissão e redução da contaminação e as estratégias controle de infecção por meio do uso de luvas e jalecos; um (9,09%) traz como objetivo avaliar os procedimentos de lavagem domesticas e um (9,09%) tem por objetivo examinar a manutenção e utilização do vestuário de chumbo avaliando a contaminação microbiológica em procedimentos cirúrgicos. **Implicações**: Há um desafio a ser enfrentado e que está relacionado com as ações educativas e à educação continuada.

DESCRITORES

Infecção Hospitalar; Pessoal de Saúde; Vestuário.

RESUMEN

Introducción: Las infecciones relacionadas con la atención de la salud se consideran un problema de salud pública, ya que comprometen la seguridad y calidad de la atención brindada a los usuarios de este servicio. El objetivo es describir la ocurrencia de contaminación de prendas textiles por parte de profesionales de la salud en la provisión de atención médica. **Delineación**: Revisión integrativa de la literatura realizada en octubre de 2018 en SciELO y la BVS. Se utilizaron descriptores de salud controlados: 'cross infection' AND 'health personnel' AND 'clothing'. Después de los pasos de selección, quedaron 11 artículos. **Resultados**: Se observa que cuatro (36,36%) de los artículos tienen como objetivos: determinar las características biológicas de los microorganismos presentes en las batas, qué tipo, nivel, frecuencia y lugares de contaminación de las batas; cuatro (36,36%) tienen como objetivo identificar la posible transmisión y reducción de la contaminación y estrategias de control de infecciones mediante el uso de guantes y batas; uno (9,09%) tiene como objetivo evaluar los procedimientos de lavado doméstico y uno (9,09%) tiene como objetivo examinar el mantenimiento y uso de la ropa con plomo mediante la evaluación de la contaminación microbiológica en los procedimientos quirúrgicos. **Implicaciones**: Hay un desafío a enfrentar y está relacionado con las acciones educativas y la educación continua.

DESCRIPTORES

Infección Hospitalaria; Personal de Salud; Vestuario.

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COLLABORATIONS

RP, LRS, AGSJ and FRS: Contributions to study conception and outline; to data collection, analysis or interpretation; to article writing or to its critical review. MCRF and JDRP: Contributions to article writing and to its critical review. All the authors agree and take responsibility for the content of this manuscript version to be published.

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AVAILABILITY OF DATA

Not applicable.

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Not applicable.

CONFLICTS OF INTEREST

There are no conflicts of interest to declare.