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Prevention of infections related to health care with a focus on hand hygienization

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ABSTRACT: Background: Healthcare-associated infections (HAIs) are among the various health problems that affect the quality of care in healthcare services. The prevention of HAIs is achieved through the practice of epidemiological surveillance in health services and the adoption of effective measures to control these situations. Among these measures, we can mention hand hygiene, which is a highly effective, easily accessible, and low-cost measure. Objective: To evaluate the effectiveness of hand washing and hygiene strategies as a measure to prevent infections in a hospital environment. Methodology: In order to prepare this study, an integrative literature review was carried out through the selection of publications relating to the theme explored. The research was conducted from January to March 2023 in the Virtual Health Library (VHL) and Semantic Scholar databases, using the keywords hand hygiene, infections, and hospital. 17 works were found that completely covered the topic addressed. Results: Only part of the healthcare team, especially nurses, adequately adheres to hand hygiene and cleaning in the context of caring for hospitalized patients. In many studies, it is possible to observe a low rate of adherence to correct hand hygiene, considering all professional categories. However, the lack of supplies may be associated with low adherence to hand hygiene, but it does not explain the cause since hospitals, even in precarious situations, have places for hand hygiene, even if they are in smaller quantities. Strategies based on complementary stimuli should be adopted, as they improve adherence to hand washing by up to 70%. Conclusion: Therefore, it is essential to ensure adequate training of healthcare professionals to increase adherence to hand hygiene recommendations. It is essential to find solutions that go beyond teaching techniques to improve hand hygiene adherence rates by healthcare staff in hospitals. Institutional leadership plays a crucial role in establishing clear policies, providing adequate resources, and promoting an organizational culture that values patient safety.

Keywords: *Patient safety. Hand disinfection. Health team.*

INTRODUCTION

Healthcare-associated infections (HAIs) are a factor in the deterioration of the public health system in Brazil and other countries. This problem is intrinsically linked to healthcare professionals' lack of hand hygiene. HAI involves the entry and proliferation of specific microorganisms in an individual in a healthcare setting. Infections that develop after a patient is admitted to the hospital but were incubated before admission cannot be characterized as nosocomial infections because they were not conceived in a healthcare setting. Community infections and infections acquired in settings other than hospitals are also a concern for facilities receiving infected people because they can be acquired if transferred to another person in the healthcare setting (Mendonça *et al.*, 2022). In healthcare environments, patients are often exposed to infectious processes developed by hospital microorganisms found in that space. To overcome this situation, measures are needed to make the hospital environment less harmful to patients and healthcare professionals (Dutra *et al.*, 2015). Healthcare-associated infections (HAIs) are among the various health problems that affect the quality of healthcare services. There are an estimated 1.7 million cases of HAI per year in the United States, resulting in a total of 99 thousand registered deaths. In Europe, infections affect approximately 2,609,911 hospitalized patients annually, with approximately 37 thousand reported deaths. In the Brazilian context, rates are comparable to those in other developing countries, exceeding 10.8%, and vary according to the complexity of the health services available (Fortaleza *et al.*, 2017). The prevention of HAIs is achieved through epidemiological surveillance in health services and the adoption of effective measures to control these situations. One of the tactics involves the execution of the Hospital Infection Control Program (PCIH), conceptualized by the Ministry of Health as a set of activities conducted deliberately and systematically to minimize the incidence and severity of infections as much as possible (Alvim; Couto; Gazzinelli, 2023). Among the measures implemented, hand hygiene stands out as a simple and low-cost procedure, with notable effectiveness in promoting infection control and improving the quality of care provided to patients. Furthermore, it contributes to reducing expenses, morbidity, and mortality, fundamental aspects in the search for effectiveness in the health field. Consistent adherence to this practice has become an effective method to ensure health safety, especially in sectors characterized by high complexity, where extreme attention is necessary due to the fragility of patients in severe conditions (Vasconcelos *et al.*, 2018).

The presence of microorganisms on the skin, capable of being transferred between different areas, whether directly or not, aggravates hospital infections. Lack of adherence to hand hygiene by healthcare professionals is also an aggravating factor. Infections that occur during the hospitalization period or up to 48 hours after discharge and those acquired during intrapartum or up to 48 hours after discharge, excluding infections originating from the placenta, are classified as HAIs (Soares *et al.*, 2019). Considering the primary role of healthcare professionals' hands in disseminating microorganisms, the appropriate hand hygiene practice assumes an essential professional nature to mitigate this risk. In general, these environments have information signs that highlight the

appropriate hygiene procedure, whether by washing hands with soap and water for 40 to 60 seconds or using an alcoholic solution for an interval of 20 to 30 seconds. Resources for this practice must always be accessible to professionals, patients, and their companions (Dutra *et al.*, 2015).

Ojanperä, Kanste, and Syrjala (2020) conducted an internal audit survey at a tertiary care hospital in Finland between 2013 and 2018, where infection control nurses observed hand hygiene practices based on World Health Organization (WHO) guidelines. Adherence to hand hygiene was calculated by dividing the number of observations in which the total number of observations required practiced hand hygiene. Annual adherence increased significantly from 76.4% in 2013 to 88.5% in 2018, while healthcare-associated infections decreased from 2012 to 1831 cases, with a weak but significant negative correlation between the monthly incidence of infections and adherence to hand hygiene. The improvement in healthcare professionals' adherence to hand hygiene was related to reducing infections, highlighting the problem's existence and the importance of this practice in reducing healthcare-related infections.

Furthermore, Martos-Cabrera *et al.* (2019) evaluated hand hygiene training and the effectiveness of different educational methods among healthcare professionals, analyzing correct adherence over time. 17 clinical trials involving 5747 professionals and students were considered. Strategies such as audible reminders, hands-on simulations, videos and audiovisual media have been shown to improve hand hygiene adherence, resulting in up to a 60% increase in hours of adherence. The use of povidone-iodine proved to be particularly effective, reducing colony formation compared to the use of soap. The study concluded that educational approaches beyond lectures may be more effective in increasing hand hygiene adherence. Combinations of teaching approaches have improved user satisfaction by allowing self-management, flexibility, and repetition.

Thus, the importance of educational approaches about correct hand hygiene for healthcare professionals is highlighted. Unfortunately, few studies on healthcare personnel training and adherence to hygiene recommendations have been done, despite the obvious implications for patient safety. It was noted that although healthcare professionals may be perfectly familiar with hand hygiene ideas and may be willing to put them into practice, the technique is performed correctly by only 52% of healthcare professionals and sometimes even less. This gap between theory and practice raises serious concerns. Therefore, it is essential to analyze training strategies and the degree of professionals' adherence to hand hygiene guidelines, considering that effective action in this regard contributes greatly to preventing the spread of hospital infections (Piras *et al.*, 2018).

Despite all the evidence supporting the significance of hand hygiene in preventing hospital-acquired infections and its contribution to reducing infection rates, healthcare professionals often underestimate a seemingly simple action, resulting in an inadvertent contribution to the mechanisms essential for spreading infectious diseases. The negligence by healthcare professionals in practicing regular hand hygiene is a global issue. According to data from the WHO, this low adherence by professionals is related to integrating this practice into the daily routine and established habits and not to the absence of theoretical knowledge (Portela *et al.*, 2020).

The choice of this topic is justified by its broad impact both inside and outside the hospital environment, which generates ongoing concerns among researchers and health professionals. The problem of hospital infections has assumed severe proportions over time, causing implications for society in general. Hence, there is a need for specific studies that expose the seriousness of the lack of hand hygiene on the part of healthcare professionals.

In this context, the present study aims to evaluate the effectiveness of hand washing and hygiene strategies to prevent infections in a hospital environment.

MATERIALS AND METHODS

The present study consists of an integrative literature review type of research, considering that this is an alternative type of research that aims to search for and analyze published knowledge regarding a specific topic. To this end, qualitative research was carried out and extracted from books, e-books, and scientific articles from the Google Scholar and Virtual Health Library (VHL) databases. The search was carried out from February to August 2023 using the following keywords: hand hygiene, infections, hospital, and healthcare team.

The search strategy identified a total of 93 publications. After reading the article in full, those that did not meet the topic addressed were excluded, resulting in 17 works of relevance to the development of the topic. The following inclusion criteria were considered: complete articles in Portuguese, English, and Spanish, indexed and published between 2012 and 2023, in addition to sources of significant relevance such as books and websites relevant to the topic. As exclusion criteria, literature that did not directly contribute to the research theme To select the material, they was analyzed and selected based on titles and, later on abstracts to insert them into the field of a public health problem that seeks, through a theoretical discussion, elements that can assist in the intervention of individuals affected by work-related disorders. Finally, the data collected was analyzed for its development, for drawing conclusions about the study, and for establishing consensus with the substantiated objectives (Marconi; Lakatos, 2021).

RESULTS AND DISCUSSIONS

The selected studies addressed, in different ways, the issue of hand hygiene and cleaning among health professionals working in hospital environments, investigating its relevance in preventing hospital-acquired infections in patients. Analyzers adopted many approaches to examine the relationship between adherence to hand hygiene practices and the risk of hospital-acquired infections.

Polidoro *et al*. (2022) analyzed adherence to hand hygiene among 30 healthcare professionals in a coronary care unit. Then, 498 hand hygiene opportunities were recorded, with 190 actions carried out, resulting in an overall adherence rate of 38.2%. Adherence varied according to the moments defined by the WHO, being lowest before contact with the patient (16.8%) and highest after the risk of contamination by fluids (66.7%). The most used products were alcohol gel and soapy water, with greater use of the latter (21.1%) despite low adherence.

Teixeira *et al*. (2021) aimed to analyze the role of nurses in preventing infections related to the use of catheters in the Intensive Care Unit (ICU), through an integrative review. Several good practices have been identified. All healthcare professionals can adopt those to ensure quality device care, including measures such as hand hygiene, double checking, disinfection strategies, efficient communication between professionals, and approaches to dealing with risk factors. Those can interfere with catheter management, such as stress, insecurity, and professional exhaustion.

Soares *et al.* (2019) aimed to identify the microorganisms present in the hands of ICU professionals and their relationship with hospital infections. 51 hand samples were collected from healthcare professionals, distributed between the adult and neonatal ICU. The majority of participants was from the nursing field, including technicians (56.8%) and nurses (15.7%). The average count of mesophilic bacteria per hand was 5.3x106 CFU/hand, being lower in the adult ICU compared to the neonatal ICU, and also lower during the morning compared to the night. Around 60.8% of professionals were contaminated by microorganisms from the transient microbiota, with enterobacteria predominant. Isolates of *Acinetobacter spp.*, *P. aeruginosa* and *E. coli* were found only in the neonatal ICU, with antibiotic resistance, while the cephalosporin resistance profile was prevalent among Gram-negatives, including the production of ESBL-type enzymes.

In the work of Mello and Oliveira (2019), the knowledge and adherence of nursing professionals and doctors to hand hygiene were assessed, according to the five moments recommended by the WHO. The majority of nurses (98.3%) claimed to know these moments, but when asked to describe them, most demonstrated ignorance. The average estimate of adherence to hand hygiene was around 77.2% in ICUs and 76.4% in care units for the nursing team, while for the medical team it was 50.1% in care units and 52.4% % in ICUs. Cleaning with soap and water was most common, and rubbing with 70% alcohol was performed by 63.3% in ICUs and 53.3% in care units. As for infrastructure, some sinks did not have touchless taps (23.3%), and the majority had easy-to-clean soap dispensers (93.3%). However, some did not have a product available for use at the time of the visit (15.0%). As for personal protective equipment, the majority used talcum powder gloves (65.0%) and fabric coats (56.6%).

Silva and Oliveira (2017) evaluated the competence of the multidisciplinary team that works in the adult ICU to prevent infections related to central venous catheters. The estimated rate of hand hygiene by the team before handling the catheter was 64.3%. Regarding the "five moments" recommended for hand hygiene, 64.9% of professionals stated that they were aware of the method, 15.3% of which were nurses. There was a higher frequency of hygiene opportunities before (92.3%) and after contact with the patient (100%), as well as before aseptic procedures (61.5%). Notably, there was less adherence in the moments after contact with the surface (30.8%) and after the risk of contact with bodily fluids, the latter being not mentioned by nurses.

Melo *et al.* (2016) investigated the adherence of healthcare professionals and students to the simple hand hygiene protocol. Only 10% of professionals correctly adhered to the practice, but only before carrying out procedures. None of these episodes occurred before sterile procedures. The category of nursing technicians had the highest participation (36%), but none of them adequately followed the hand hygiene protocol. During observation in the ICU, situations were noted in which the protocol was not applied, including leaving and returning to the unit without hand hygiene, using a new glove over the previous one, carrying out multiple procedures with the same glove and using adornments.

Paula and Oliveira (2015) aimed to evaluate a multimodal strategy's impact on hand hygiene adherence among a multidisciplinary team. During the observation of 113 employees, including 64 from the adult ICU and 49 from the pediatric ICU, they registered 3.956 opportunities for hand hygiene. Nursing technicians represented the majority of opportunities (80.4%). Adherence to the "Five moments for hand hygiene" varied, with 26.1% before contact with the patient, 8.9% before a clean/aseptic procedure, 12.4% after the risk of contact with bodily fluids, 21.6% after contact with patients, and 31.0% after contact with surfaces. Furthermore, after six months of interventions, the number of professionals who reported washing their hands more frequently did not change. However, the majority of professionals who trained improved their knowledge and recognized the general improvement in hygiene, realizing its impact on preventing healthcare-related infections.

Bathke *et al.* (2013) evaluated the infrastructure and adherence to hand hygiene in an ICU. One thousand two hundred seventy-seven opportunities for hand hygiene were observed, with adherence rates of 28.6% in the morning, 22.8% in the afternoon, and 28.8% at night, totaling an overall positive adherence rate of 26.5%. The most common opportunities were before and after contact with the patient/environment. Adherence was greater after contact than before. The most used hygiene methods were water and

liquid soap (90.5%), followed by alcoholic solution (6.0%). Most participants preferred liquid soap and alcohol to clean their hands. The regression analysis showed that doctors and nursing assistants had significantly higher adherence rates than nursing technicians, nurses, and physiotherapists.

This research brings together a compilation of studies carried out over the last 10 years that show the context of adherence to hand hygiene by the healthcare team in various hospitals. Here it was possible to observe that actions and opportunities occur especially before procedures or contact with the patient. With regard to context recommendations for hand hygiene, there is less action or opportunity for hand hygiene after risk or contact with biological fluids and after contact with a patient. This result is in line with studies in which hand hygiene was perceived more as a self-care practice than as a practice focused on patient care. Such habits can help with the increased incidence of infections in these environments.

As discussed by Polidoro *et al.* (2022), Healthcare-Associated Infections (HAIs) constitute a substantial risk to patient safety on a global scale, also generating significant impacts on the economic aspect due to the high costs associated with treatment. When analyzing the range of information presented, the indispensability of preventive measures in relation to infections that emerge in healthcare environments becomes even more evident. This is especially crucial because conducting a variety of clinical procedures can potentially give rise to complications, which emphasizes the crucial role played by the healthcare team in patient care (Teixeira *et al.*, 2021).

Soares *et al.* (2019), when carrying out their investigation, they unequivocally identified the presence of microorganisms directly associated with hospital infections on the hands of healthcare professionals, raising the hypothesis of an insufficiency or lack of due attention when performing hand hygiene.

These striking findings echo the observation of adherence rates to hand hygiene practices highlighted in the study conducted by Paula and Oliveira (2015). This study pointed out a tendency to overestimate rates when they are self-reported, thus revealing a scenario that deserves a closer analysis. Within this context, the findings from this research intertwine, forming a coherent narrative about the need to address persistent gaps in adherence to hand hygiene guidelines. A holistic and proactive approach to addressing this issue emerges as a clear and urgent priority. However, it is essential to note that the interventions used, as detailed by the authors above, were unable to result in a measurable increase in adherence to hand hygiene among the different groups examined. Despite this observation, it is comforting to see that the intervention was not in vain. A positive effect was observed in terms of specific hand hygiene methods after implementing corrective measures. This is evidenced by the notable improvement in antiseptic rubbing with alcoholic preparation. In the initial assessment period after the intervention, compliance rates increased from 10% to 17% in direct observations and from 10% to 34% in self-reports. This increase, even if moderate, is an encouraging reminder that incremental changes can, over time, lead to considerable improvements in adherence to vital safety protocols in healthcare settings.

According to Melo *et al.* (2016), low adherence to hand hygiene highlights a significant concern: professionals are not familiar with the correct application of the HH protocol, which increases the spread of contaminating microorganisms in the environment, affecting both patients and professionals. Given this, it is clear that a lack of protocol adherence is a crucial educational issue. In this context, nursing administration must encourage healthcare professionals to adopt the appropriate HH protocol and technique.

Thus, according to Soares *et al.* (2019), to reduce hospital infections, it is essential to invest in continuing education, monitoring adherence to hand hygiene, maintenance of equipment, responsible use of antibiotics, and promotion of hand hygiene. In this scenario, Polidoro *et al.* (2022) argue that hand hygiene emerges as an effective intervention to reduce the prevalence of HAIs and improve the quality of care provided. Furthermore, Silva and Oliveira (2017) highlight the relevance of providing continuing education to increase compliance with these measures. This can positively impact patient safety, contribute to the control and prevention of infections, and encourage the active participation of these professionals in improving the quality of care offered to patients.

Despite the importance of educating these professionals, the study by Bathke *et al.* (2013) revealed the presence of deficiencies in material infrastructure and adherence to hand hygiene. According to the authors, health professionals recognize hand hygiene as an HAI prevention strategy. However, they overestimate their own adherence while denying obstacles to this practice. Adherence was higher in situations aimed at protecting the professional than those aimed at protecting the patient. Despite variations between professional categories, low adherence to hand hygiene in the unit investigated puts the safety of seriously ill patients at risk. According to Melo *et al.* (2016), the frequency of hospital infections differs depending on the particularities of each Health Unit, covering factors such as infrastructure, types of diseases treated, continuous education, and availability of human resources.

According to Mello and Oliveira (2019), personal customs and individual beliefs may have a more pronounced influence on adherence than knowledge of precautionary and infection control measures, as indicated by previous studies. However, several elements can harm adherence, including the lack of inputs, such as the presence of sinks with working taps and soap dispensers. This issue was also highlighted in the present study, although professionals did not identify factors that inevitably prevent hand hygiene. This result prompts a more in-depth analysis of which factors may contribute to lower adherence to hand hygiene, covering knowledge, perceived importance, usual practices, workload, and aspects of care management. In this context, according to Bathke *et al.* (2013), exploring this topic through additional approaches would be valuable to investigate potential factors that may influence this practice.

In studies by Bathke *et al.* (2013) and Mello and Oliveira (2019), it was observed that on more than 90% of the occasions in which hand hygiene was performed, participants chose to use water and liquid soap, one of the products mentioned as preferred. According to the authors, liquid soap is recommended when hands are visibly dirty, while the combination of soap and antiseptic solution is recommended when hands are contaminated with protein material. However, the WHO establishes alcoholic solutions as the gold standard for hand hygiene due to their effectiveness, low infrastructure requirements, short application time, and good skin tolerance. Although participants also expressed a preference for those solutions, they were only used in 6% of opportunities. Therefore, it is recommended to promote the use of alcoholic solutions in the unit, in line with national guidelines that encourage hand hygiene (Bathke *et al.*, 2013).

Furthermore, according to Mello and Oliveira (2019), some gaps in the physical structure and availability of supplies can potentially compromise adequate adherence to infection prevention and control guidelines within healthcare units. Those limitations may include the presence of taps with rotating actuation mechanisms, the lack of essential products for hand hygiene, and the arrangement of soap and alcohol solution dispensers side by side in the sinks, both at nursing stations and in the patients' rooms.

Given this, Bathke *et al.* (2013) argue that these infrastructure deficiencies can result in additional obstacles to the regular and effective hand hygiene practice by healthcare professionals. The presence of more complex actuation taps may require additional effort for correct handling, which may discourage consistent adhesion. The lack of essential products, such as soap and alcohol solutions, can make hand hygiene more challenging to carry out at the appropriate time, especially in urgent situations. Furthermore, the inadequate arrangement of dispensers in work spaces can make access and proper use of these products difficult.

Under these conditions, Mello and Oliveira (2019) argue that there is even greater relevance in understanding that medical care units must continually commit to evaluating and improving their infrastructure and availability of inputs to effectively sustain hand hygiene practices. In this context, those improvements reflect a tangible commitment to patient safety and well-being and play a fundamental role in promoting a culture of patient safety, directly impacting the reduction of infection rates associated with healthcare.

Thus, Soares *et al.* (2019) argue that these represent the main difficulties faced by professionals working in infection management, as the rate of compliance with the guidelines for this practice is low and can vary between hospital areas, depending on work circumstances and infrastructure.

Given the results and gaps identified in the studies addressed by Teixeira *et al.* (2021), the authors emphasize the urgency of intensifying efforts to develop and implement more uniform and comprehensive protocols and sets of measures. Furthermore, hospital institutions must understand that the design of these measures alone does not ensure practical application. To achieve successful ongoing adherence, it is necessary to address factors beyond what is established, such as raising awareness among teams and improving the quality and frequency of continuing education.

According to Melo *et al.* (2016), individual, collective, and institutional elements exhibit unique variations from one individual to another and are intrinsically connected. This occurs because personal habits, the influence of the professional category, the dynamics of the collective, the institutional structure, and the lack of encouragement from the organization contribute to the growing lack of adherence to hand hygiene protocol.

Melo *et al.* (2016) suggest the implementation of some programs to promote broader adherence to hand hygiene. Therefore, incentives for this practice are proposed through continuous educational approaches, such as the use of technologies that involve automated alcohol solution dispensers, the display of messages encouraging adherence to hand hygiene on computer screen protectors, and presentations to raise awareness among professionals about infection control.

The contributions of Melo and Oliveira (2019) point to the pressing need for a comprehensive review of relevant public policies. They highlight the importance of stimulating and promoting continuous and regular training of the professionals involved, recognizing that continuing education plays a vital role in updating knowledge and developing skills. Furthermore, they emphasize that greater involvement from senior leadership is crucial to establishing an environment that prioritizes patient safety and promotes a culture of quality care.

Finally, it is worth highlighting that, although the adherence rates identified in the studies present less than ideal results, it is crucial to recognize that the partial implementation of hand hygiene measures in hospital environments indicates a real opportunity to achieve substantial improvements. It is notable that the low adherence observed in both standard precautions and the five designated moments for hand hygiene points to areas of critical concern that require even more intense attention.

This finding underscores the continued importance of educational and training programs for healthcare professionals. These programs aim to enrich knowledge, raise awareness, and improve practices related to hand hygiene. By highlighting these points, it becomes clear that there is plenty of space for improvement and optimization in healthcare to strengthen patient safety and mitigate the spread of infections.

CONTRIBUTION TO KNOWLEDGE

Education is a transformation tool capable of driving behavioral and cultural changes within health institutions. Furthermore, promoting adherence to infection prevention and control measures requires a coordinated effort beyond individual training. Institutional leadership is crucial in establishing clear policies, providing adequate resources, and promoting an organizational culture that values patient safety. Therefore, a comprehensive and integrated approach, encompassing education, institutional support, and multidisciplinary engagement, emerges as a promising path to raising hand hygiene standards, reducing hospital-acquired infections, and strengthening patient care quality.

CONCLUSION

From this study, it is possible to conclude that only a tiny percentage of health professionals adequately adhere to hand hygiene and cleaning in patient care. In many studies, it is possible to observe a low rate of adherence to hand hygiene, considering all professional categories. Therefore, it is essential to ensure adequate training for healthcare professionals to increase adherence to hand hygiene recommendations. Furthermore, strategies based on complementary stimuli must be adopted, as they improve adherence to hand washing by up to 70%. However, the lack of supplies may be associated with low adherence to hand hygiene, but it does not explain the cause, as hospitals still have places for hand cleaning, even in smaller quantities. Therefore, it is essential to ensure adequate training for healthcare professionals to increase adherence to hand hygiene recommendations. It is essential to find solutions beyond teaching techniques to improve hand hygiene adherence rates by healthcare staff in hospitals. The leaders of institutions play a crucial role in establishing clear guidelines, providing all of the necessary resources, and promoting an organizational culture that values patient safety and staff education.

Conflict Of Interest
As the authors of this manuscript, we certify that we have no affiliations with or involvement in any organization or entity with any financial or non-financial interest in the subject matter or materials discussed in the manuscript.

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REFERENCES

Alvim, A. L. S., Couto, B. R. M. G. and Gazzinelli, A. 2023. Qualidade das práticas de profissionais dos programas de controle de infecção no Brasil: estudo transversal. Escola Anna Nery, 27, e20220229, p. 1-7. DOI: DOI: 10.1590/2177-9465-EAN-2022-0229pt

Bathke, J., Cunico, P. A., Maziero, E. C. S., Cauduro, F. L. F., Sarquis, L. M. M., Cruz, E. D. A. 2013. Infraestrutura e adesão à higienização das mãos: desafios à segurança do paciente. Revista Gaúcha de Enfermagem, 34 (2), 78-85. DOI: 10.1590/S1983-14472013000200010.

Dutra, G. G., Costa, M. P., Bosenbecker, E. O., Lima, L. M., Siqueira, H. C. H., Cecagno, D. 2015. Controle da infecção hospitalar: função do enfermeiro. Revista de Pesquisa Cuidado é Fundamental Online, 7 (1), 2159-2168. DOI: 10.9789/2175-5361.2015.v7i1.2159-2168.

Fortaleza, C. M. C. B., Padoveze, M. C., Kiffer, C. R. V., Barth, A. L., Carneiro, I. C. D. R. S., Giamberardino, H. I. G., Rodrigues, J. L. N., Santos Filho, L., de Mello, M. J. G., Pereira, M. S., Gontijo Filho, P. P., Rocha, M., Servolo de Medeiros, E. A., and Pignatari, A. C. C. 2017. Multi-state survey of healthcare-associated infections in acute care hospitals in Brazil. The Journal of hospital infection, 96 (2), 139–144. DOI: 10.1016/j.jhin.2017.03.024.

Marconi, M. A., Lakatos, E. M. Fundamentos de Metodologia Científica. Atlas. 2021. 9ª ed., Atlas, 368p.

Martos-Cabrera, M. B., Mota-Romero, E., Martos-García, R., Gómez-Urquiza, J. L., Suleiman-Martos, N., Albendín-García, L. and Cañadas-De la Fuente, G. A. 2019. Hand Hygiene Teaching Strategies among Nursing Staff: A Systematic Review. International Journal of Environmental Research and Public Health, 16, (17), 3039. DOI: 10.3390/ijerph16173039.

Mello, M. S., Oliveira, A. C. 2019. Ações para a prevenção e controle da resistência bacteriana em hospitais de grande porte de Minas Gerais. Dissertação [Mestrado] – Programa de Pós-Graduação da Escola de Enfermagem da Universidade Federal de Minas Gerais, Belo Horizonte, Brazil.

Melo, O. P., Miranda, L. N., Nagliate, P. C., Trindande, R. C., Neves, S. F., Freitas, D. A., Vasconcelos, E. L. 2016. Estudo observacional da adesão dos profissionais da saúde ao Protocolo de higiene das mãos. Revista de Enfermagem UFPE On Line, 10 (7), 2537-2543. DOI: 10.5205/reuol.9106-80230-1-SM1007201630.

Mendonça, M. E., Brito, J. C., Santos, A. K., Barros, A. V., Araujo, L. G. Higienização das mãos e sua relação com o controle das infecções relacionadas a assistência a saúde. Dilemas Éticos na Assistência à Saúde. 2022. 1ª ed., Científica Digital, 102p. DOI: 10.37885/210906260.

Ojanperä, H., Kanste, O. I., and Syrjala, H. 2020. Hand-hygiene compliance by hospital staff and incidence of health-care-associated infections, Finland. Bulletin of the World Health Organization, 98 (7). DOI: 475–483. DOI: 10.2471/BLT.19.247494.

Paula, A. O. E Oliveira, A. C. 2015. Impacto da estratégia multimodal na adesão a higiene de mãos entre a equipe multiprofissional. Tese [Doutorado] – Programa de Pós-Graduação da Escola de Enfermagem, Belo Horizonte, Brazil.

Piras, S. E., Minnick, A., Lauderdale, J., Dietrich, M. S., and Vogus, T. J. 2018. The Effects of Social Influence on Nurses' Hand Hygiene Behaviors. The Journal of nursing administration, 48 (4), 216–221. DOI: 10.1097/NNA.0000000000000602.

Polidoro, A. F., Lopes, A. E. R., Gaspar, G. G., Lopes, N. A. P., Vendrusculo, A. C. S., Molina, F. M. R., Polachini, M. M., and Menegueti, M. G. 2022. Avaliação da adesão à higiene de mãos em unidade coronariana. Revista De Enfermagem Do Centro-Oeste Mineiro, 12. DOI: 10.19175/recom.v12i0.4618.

Portela, D. A., Mouta, A. A. N., Alves, A. R. R., Almeida, F. C. R., Silva, A. C. B., Lopes, P. F., Gândara, B. F., Mendes, E. A. S., Albuquerque, V. A., Beltrão, R. P. L. 2020. A importância da higienização das mãos nas unidades de terapia intensiva: os perigos das infecções relacionadas à assistência à saúde. Revista Eletrônica Acervo Saúde, 12 (9), 1-7, 2020. DOI: 10.25248/reas.e3854.2020.

Silva, A. G.; Oliveira, A. C. 2017. Competências da equipe multiprofissional para as medidas de prevenção da infecção da corrente sanguínea relacionada ao cateter venoso central. Dissertação [Mestrado] – Programa de Pós-Graduação da Escola de Enfermagem, Belo Horizonte, Brazil.

Soares, M. A., Rodrigues, N. M., Menezes, M. R. O., Gerace, D. N., Duarte, C. M., Brandão, P. M., Borges, L. F. A. 2019. Microrganismos multirresistentes nas mãos de profissionais da saúde em Unidades de Terapia Intensiva. Revista de Epidemiologia e Controle de Infecção, 9 (3), 187-192. DOI: 10.17058/reci.v9i3.12674.

Teixeira, R., Silva, M. V., Silva, E. M., Santos, R. S. N., Vanderley, E. C. S., Silva, C. C. and Oliveira, D. A. L. (2021). Ações do enfermeiro na prevenção de infecções associadas ao uso de cateteres em unidade de terapia intensiva: revisão integrativa. Revista Ciência Plural, 7 (2), 253–271. DOI: 10.21680/2446-7286.2021v7n2ID21600.

Vasconcelos, R. O., Alves, D. C. I., Fernandes, L. M. and Oliveira, J. L. C. 2018. Adesão à higienização das mãos pela equipe de enfermagem em unidade de terapia intensiva. Enfermería Global, 17 (50), 430-476. DOI: 10.6018/eglobal.17.2.284131.

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