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ACTIONS TO REDUCE THE RISK OF HEALTH CARE INFECTIONS

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ABSTRACT: To identify the actions taken by the SCIH and Quality Management team to achieve the goal of reducing the risk of infections related to health care. Exploratory descriptive qualitative study, carried out in two hospitals. There was triangulation of data with interviews, observation and document analysis. For data analysis, content analysis was used. The most performed actions were permanent education, identification and correction of problems in procedures, active search, surveillance and hand hygiene. It was possible to identify the occurrence of adverse events. Communication and structural problems appear as difficulties in reaching the goal. The actions identified are traditional practices and are often inefficient. The prevention and control of infections are still challenges for health institutions. There is a need to adopt innovative strategies to achieve the goal of reducing the risk of infection related to healthcare.

KEY WORD: Cross infection; Hand hygiene; Innovation; Patient safety.

AÇÕES PARA REDUZIR O RISCO DE INFECÇÕES RELACIONADOS À ASSISTÊNCIA À SAÚDE

RESUMO: Identificar as ações realizadas pela equipe de SCIH e Gestão da Qualidade para alcançar a meta redução do risco de infecções relacionadas à assistência à saúde. Pesquisa qualitativa, exploratória e descritiva, realizada em duas instituições hospitalares. Houve triangulação de dados com entrevistas, observação e análise documental. Para a análise dos dados utilizou-se a análise de conteúdo. As ações mais realizadas foram educação permanente, identificação e correções de problemas em procedimentos, busca ativa, vigilância e higienização das mãos. Foi possível identificar a ocorrência de eventos adversos. A comunicação e os problemas estruturais aparecem como dificultadores no alcance da meta. As ações identificadas foram práticas tradicionais e muitas vezes ineficientes. A prevenção e o controle de infecções ainda são desafios para as instituições de saúde. Há necessidade de adoção de estratégias inovadoras para alcançar a meta de redução do risco de infecção relacionada à assistência à saúde.

PALAVRAS-CHAVE: Higiene das mãos; Infecção hospitalar; Inovação; Segurança do paciente.

INTRODUCTION

In 2013, the National Patient Safety Program (NPSP) was created in Brazil, with the objective of contributing to the qualification and safety of health care, with support and recommendation from the World Health Organization (WHO). Patient Safety has acquired worldwide importance in view of the magnitude of adverse events reported in the past decade[1].

In order for health institutions to achieve patient safety, six international goals were established: correctly identifying the patient; improve communication; improve safety in drug administration; ensure surgeries with the correct intervention site, procedure and patient; reduce the risk of healthcare-related infections; reduce the risk of injury to the patient from falls[2].

In addition to the safety goals, in order to adopt the appropriate measures and make the NPSP effective, health services must have the Patient Safety Centers (PSC), an instance created to promote and implement actions aimed at patient safety[1]. It is optional for the health service to use existing commissions, centers and committees to carry out the activities of the PSC,[1] normally, being in charge of the Hospital Infection Control Service (SCIH).

In addition, hospital services, in order to obtain improvements and quality of care, have adhered to the quality management system, and an administrative sector has been established. In addition to proposing actions aimed at the quality of hospital services, they monitor risks related to patient safety, suggesting changes, when necessary[3].

It is worth mentioning that the financial costs attributed to Health Care-Related Infections (HAI) are high, added to the harm to the patient, which will increase the length of hospital stay, reduced social life and the possibility of microbial resistance[4].

The HAIs are acquired during the hospitalization period or detected after discharge, but still related to health care. HAIs also include occupational infections among employees[5-6]. They include bloodstream infections, surgical site infections, respiratory tract infections and urinary tract infections. In all cases, there is a close relationship with Hand Hygiene (HH), so that its proper performance contributes to the non-occurrence and strengthening of patient safety[6].

To reduce the risk of HAIs, HH is considered the most important measure. Simple, effective and low cost measure, recommended by the WHO, Centers for Disease Control and Prevention (CDC) and the National Health Surveillance Agency (ANVISA)[4]. Studies[6,7] reveal that HH has routinely reached levels below 50% ,[6,7] which suggests the need for new strategies, innovations and / or new practices to reduce HAIs, justifying this research. It should be noted that innovation comprises the introduction and exploration of new products, processes, inputs and forms of organization[8].

Besides HH, to avoid bloodstream infections, the professional must observe the perfusion of fluids in the catheter before, during and after the preparation and administration of medications, as well as performing the disinfection of the infusion routes. In order to avoid surgical site infections, it is important for the professional to control blood glucose in the pre- and postoperative period, monitor body temperature and prepare the skin with alcoholic solutions[9].

To avoid respiratory tract infections, especially pneumonia associated with mechanical ventilation, it is necessary for professionals to raise the head of the bed, assess sedation, perform oral hygiene with antiseptics and perform subglottic aspiration routinely. We can also highlight some actions to prevent urinary tract infections, such as using a smaller caliber catheter, cleaning the meatus, using lubricating gel and changing the system when there is a leak or break in the aseptic technique[9].

Given the above, the following questions are raised: How have Quality Management and the SCIH teams been working to achieve the goal of reducing the risk of HAIs? What actions have been implemented? It is assumed that these professionals have sought innovative strategies to reduce the risk of HAIs[8].

Evidence demonstrates fatigue in traditional campaigns, which also justifies this research.8 Thus, this study aims to identify the actions taken by the SCIH and Quality Management team to achieve the goal of reducing the risk of infections related to health care.

METODOLOGY

This is an exploratory descriptive study with a qualitative approach. Qualitative research seeks to understand the meanings, reasons and attitudes carried out10, thus, it allowed us to understand the actions and interpret the actions of professionals, in view of the reduction of risk of infections within the reality experienced and shared by them.

The units of analysis were two teams from SCIH and Quality Management, from two hospital institutions, with similar characteristics, located in the area of Mata Mineira, Brazil. These locations were chosen because they are educational institutions, linked to a local federal university, and which have sought to carry out actions aimed at quality, risk management and patient safety. To facilitate understanding, the research scenarios were named hospital A and hospital B.

Hospital A, with 116 beds, had a SCIH team composed of a nurse, a doctor and a nursing technician, and a nurse in quality management. Hospital B, with 122 beds, had a nurse, a nursing technician and a doctor for SCIH, and an administrator for quality management.

The research participants were the health professionals who were members of the SCIH and Quality Management committees of the two hospitals, selected intentionally, for composing these commissions and working to reduce IRAS. The inclusion criteria were: having an employment relationship with the institution, being a member of the SCIH or of Quality Management, regardless of the length of time in the position. Professionals removed from the position for any reason during the data collection period were excluded, totaling eight participants in the research, without any refusal or exclusion.

Data were collected through data triangulation, with documentary analysis, interviews and observation. The collection was carried out by the main researcher. For document analysis, data from reports of SCIH meetings and quality were used; for the interviews, a semi-structured script was used and non-participant observation was used to identify the activities developed by the people inserted in the context of the action, with notes in a field diary and occurred during and after the interviews.

Data collection took place from February to May 2017. The interview questions addressed aspects about the participants' knowledge about patient safety goals, actions taken by the teams to reduce the risk of HAIs, practices, strategies and difficulties to reduce HAIs and the occurrence of adverse events.

A pilot test was carried out to validate the script with two SCIH nurses from another institution and after analysis it was maintained, without any changes.

Participants were contacted beforehand, via phone or in person, to explain the purpose of the survey and schedule the interview. The interviews were individual, audio recorded at the workplace, in an environment chosen by the participants to expose their experiences with tranquility and security, through their own consent. It lasted an average of 15 to 30 minutes. Subsequently, the data were transcribed in full and returned to participants via e-mail, without corrections. In order to preserve anonymity, the participants were referred to by the letter P, preceded by the number corresponding to the order in which the interviews were conducted, namely: P1, P2, P3 and so on.

The content was analyzed by Content Analysis in the following stages: pre-analysis, exploration of the material and treatment of the results, inference and interpretation.11 Initially, a fluctuating and exhaustive reading of the interviews was carried out in order to familiarize with the text and obtain full understanding about what the participant sought to convey. Then, the thematic selection was carried out, which consisted of identifying the nuclei of meaning, or semantically similar elements, for further categorization and interpretation in the light of the literature.11 With the analysis, 42 codifications and three categories derived from the data were elaborated, named: HAIs and actions aimed at improving patient safety; Undesirable outcomes and patient safety goals: perceptions and difficulties experienced.

The study was conducted according to the rules of Resolution 466/2012 of the National Health Council. All participants signed the Free and Informed Consent Form. The research was approved by the Research Ethics Committee with Human Beings of the Federal University of Viçosa and the research institutions, under CAAE n °: 44109015.0.0000.5149

RESULTS

Eight professionals participated in the study (Table 1), aged between 27 and 38 years. The average working time at SCIH was 11.9 months (standard deviation of 13.5) and in the quality management sector the average working time was 15.5 months (standard deviation of 12). Two research participants had postgraduate degrees (Accreditation in health and Infectology and business management).

Table 1. Description of the research elements, Minas Gerais, Brazil, 2017

Hospital	Type of management	Profissionals who are members of SCIH	Quality management professionals	Constitution of PSC	Protocol of HH	Frequency of meetings	Main performed actions
A	Philantropic	Doctor (n=1), nurse (n=1), technician (n=1)	Nurse (n=1)	Managed by the nurse of the SCIH	Yes	Monthly	Training team meetings surveillance and active search hands hygiene Identification of problems in loci
B	Public	Doctor (n=1), nurse (n=1), technician (n=1)	Company manager (n=1)	Managed by a nurse who is not in the mentioned committees	Yes	Monthlyor bimonthly	Training Permanent education team meetings surveillance and active search hands hygiene

Source: Research data (2017).

The categories presented below emerged from the data analysis and addressed the actions taken by professionals to achieve the goal of reducing the risk of HAIs; the occurrence of adverse events in the category such as undesirable outcomes and the perception of professionals about the six international goals for patient safety; and the difficulties encountered in reaching them, in the latter category.

HAIs AND ACTIONS TO IMPROVE PATIENT SAFETY

Based on observation, interviews and documentary analysis, the main actions taken by the teams to reduce the risk of HAIs were permanent education measures; mechanisms for identifying and correcting problems in clinical procedures performed by professionals, with on-site visits in the sectors; surveillance and risk management actions. Training was the most cited action, followed by active search and HH. These results were reported in the statements: "*Training with the multiprofessional team [...] So, what we have been doing is taking the biggest problems that we experience inside the hospital, related to assistance, and providing training related to that. [...] we always come to the same subject. When it comes to hospital infection, it ends up in hand washing*". (P7)

Participants consider training as a routine action, which is why it is sometimes neglected by the health team, making it inefficient: "*Today my perception of hand hygiene training within the reality of the hospital is [..] very, very , very low, for me today it is useless. Everyone knows what has to be done, there is nothing new about it. It's the same thing, training. Only people still insist on not having adequate adherence. In fact, what has to be studied are incentives [..] the great innovation is to find out what those incentives are. When I say incentive here, I mean it in a very broad sense, positive incentives or even punishments. I don't know which is the best way, this has to be studied*". (P8)

Among the participants, the majority stated that they did not carry out any innovative strategy or action, but that they took usual actions to achieve the goal of reducing the risk of HAIs. However, two actions emerged that were considered innovative by them: data generation

beyond that required by Anvisa and an introductory course for beginning students: "*Anvisa today requests the critical area that is ICU [Intensive Care Unit] but we generate this monthly report that encompasses all sectors of the hospital [...] this is innovative*". (P4) *"Sometimes we do it with the employees, but we started doing it with academics, especially since the hospital is a teaching hospital [...] like an introductory one even from the hospital, I talk about the quality sector [...] it's an innovative thing that I didn't have in the hospital*". (P5)

Some participants recognized the importance of developing innovative actions and strategies to achieve the goal: "*Too much. Innovation is always good, updating is much more [...]*". (P7) "*Sometimes, yes, because if you put something new, you can take more than an old thing. Routine actions do not always have an effect [...] ".* (P2)

UNDESIRABLE OUTCOMES

Participants reported the occurrence of adverse events in their institution, which could have been prevented by measures of HH: "*Cross infection due to the lack of hand washing, always, every infection is because of this. Wash hands*". (P4) "*Already [occurred], even witnessed ... a doctor was seen examining a patient infected with MRSA without a cloak, without a glove and without hand hygiene, he went to the second patient who was not infected [...] and examined the patient again without washing his/her hands, without putting on his gloves, that is to say, cross infection for sure*". (P7)

Another report is the occurrence of an adverse event related to the surgical incision: "*We clearly see patients in the postoperative period with inflammatory signs in the surgical incision, so, obviously, something is missing in the process. I believe that at the time of hand washing, perhaps an inappropriate technique for performing the dressing*". (P3)

Through observation, it was identified that with the implantation of the PSC, the researched institutions notified the adverse events that occurred, first in a specific form, with description of the type and severity of the event, and subsequently notified ANVISA. However, the institutions under study did not have patient safety indicators systematically fed and analyzed.

PATIENT SAFETY GOALS: EXPERIENCED PERCEPTIONS AND DIFFICULTIES

Regarding the international patient safety goals, no participant emphasized the six goals, however, the goal related to reducing the risk of HAI appeared in most statements: "*I have heard of [the goals], but I am not sure about all of them. Not even [...] now, like this, no* ". (P6) "*Communication between professionals, patient identification, risk of falling, safe surgery, wound protocol and hand washing*". (P5)

Concerning the goal of reducing the risk of HAIs: "*I work with some. I know that what we do most is to try to sanitize our hands so as not to take anything from one environment to another [...]*". (P2) "*Within SCIH, in infection control you end up working directly with the patient's safety because if you prevent infection, you assure the patient that he had good, quality care. So, within the CCIH we work with the infection rate, the infection rates at the surgical site, per procedure [...]*". (P4)

Administrative and financial problems that influence the achievement of the HAIs reduction goal were emphasized: "*Some cases turn out to be administrative and lack of money. There is not much to do [...] what is worth doing is, with the hand washing, to be really strict, you reach the door alcohol dispenser here, and there is no alcohol*". (P1)

Another difficulty presented was the overload of the team with several assignments in different commissions: "*There must be a patient safety nucleus, so as not to spend hiring with another nurse, with another team, the same team is used, but for me it is a mistake*". (P8)

Communication between professionals was also cited as an obstacle in reducing the risk of infections:

"*I think there is a lack of communication between the nurse and the technician, between the doctor and the nurse, which is what has very little in the hospital. You have to improve communication between professionals to reduce infections*". (P6)

As communication strategies, through observation, posters of the correct HH technique were identified in the institution.

DISCUSSION

The prevention and control of infections are still challenges for most health institutions. The main activity for preventing and eliminating infections is proper hand hygiene. However, according to the results presented, this action was not the most cited among the participants, despite the fact that the two teams instituted the HH protocol, as recommended by the Ministry of Health. The results showed that the two teams worked in a similar way.

The most developed action by the teams was permanent education. An international study demonstrated greater adherence to HH after an interactive process of information, training, observation and feedback for all health professionals[12]. In addition, continuing education is an important strategy for WHO multimodal improvement in changing collective and individual behavior. In addition to this action, the WHO brings other elements as strategy: system change, monitoring and performance feedback, reminders in the workplace and institutional safety climate[13]. Although not included in the testimonials, and not recognized as strategies for participants, through observation, we identified posters of the correct HH technique in the institution.

The presented results demonstrate that the research participants, even in the position of leaders, have not used any innovative strategy to reduce the risk of HAIs; despite recognizing its importance. Studies have already shown that, innovating is characterized as a need to increase HH adherence by professionals[8,14].

Researchers point out that the Electronic HH monitoring system is an innovative strategy using hard technology. This system works online and wirelessly, in which an infrared sensor captures the moment when the health professional uses liquid soap and / or gel alcohol. When it approaches the bed, a light on its head turns green, signaling that the professional performed the HH before contact with the patient. If this action has not been performed, a red light remains on[15]. This innovation offers better feedback to the institution regarding the realization of HH and to the patient who can be alerted to the achievement of the goal.

Other actions cited in the literature do not involve hard technologies and have obtained positive results. The integrated action of SCIH and nursing assistants aims to find an effective way to increase HH adherence by all hospital professionals. In this work, SCIH's assistance professionals and team work together. SCIH observed weaknesses in the sector and, in partnership with professionals, proposed measures to improve HH adherence[8,12].

Measures to encourage professionals were also observed in the literature, using musical parodies to increase the duration of surgical disinfection. Professionals listened to popular music during practice. Despite the measure being limited, there was an increase in time for younger people.16 Low cost strategies can be used as reminders, posters and audits, making everyone protagonists of the process and demonstrating its importance in reducing HAIs[8].

Regarding the adverse events presented in the results, and the knowledge gaps presented by the teams in the same category, these events have a direct impact on the achievement of the goal of reducing the risk of HAIs. By reducing HAIs, teams will be able to significantly reduce the occurrence of adverse events[3,17-18]. It is known that multidrug-resistant microorganisms (methicillin-resistant Staphylococcus aureus-MRSA) can be acquired by direct contact between professional and colonized patient. This microorganism is responsible for serious cases of nosocomial infections and causes the death of many patients. The health professional can prevent the transmission of infection by the simple act of washing hands[17,19].

It is worth to make it clear that adverse events are damages, caused to the patient's health due to health care, such as failures during health care; during surgical procedure; drug administration, diets and medicinal gases and health care-related infection[20].

One of the participants evidenced the transmission of MRSA among patients admitted to the intensive care unit. This type of event increases the use

of antimicrobials by patients, the risk of death and the length of hospital stay, generating avoidable costs for the hospital[17-19].

It becomes evident that the reduction of these preventable adverse events is related to the practice of HH and requires changes in habits and the individual's responsibility for their actions[3], it also demonstrates the need to develop efficient and innovative strategies to reduce preventable adverse events.

To increase adherence to HH, the need for an active SCIH team and the support of the hospital administration is evident, however, this study revealed difficulties related to the lack of materials, absence of administrative support, excessive workload and performing tasks other than those related to SCIH.

These are problems that can be solved by changing the system[13], which includes improving infrastructure, equipment, supplies and additional resources. This change must be achieved so that all healthcare professionals find HH easy in their practice routine. Physical, administrative and resource problems were also shared by other SCIH nurses[21]. The misuse of professionals leaves them overburdened and hinders the development of activities related to infection control in the institution[21].

In accordance with the present research, another study demonstrated that failure in communication, lack of motivation, adequate resources, time and awareness of the importance of HH, are also considered factors that hamper the practice of HH[18].

All the mentioned obstacles imply difficulty in carrying out the surveillance of the HAIs and notifying them. However, the implementation of the PSC in institutions is an alternative to minimize the problem, since the actions related to the promotion of the patient safety culture, prevention, monitoring and adverse events are the responsibility of the PSC. It is worth mentioning that the joint work of the SCIH and the PSC promotes quality in health care and a safe environment for patients and professionals involved in care.

CONCLUSION

The actions developed by the SCIH and Quality Management teams identified in this study were traditional and often inefficient practices. Permanent education actions, hand hygiene, identification and correction of problems in clinical procedures, on-site visits, surveillance and risk management actions were found. There were reports of adverse events, structural and communication problems as difficulties.

There is an urgent need to use innovative strategies to reduce the risk of HAIs because the prevention and control of infections are still challenges for health institutions. The responsibility must be shared with all the professionals involved, as the correct hand hygiene is the main way.

An important limitation of this research refers to the sample size, represented in small numbers, which allows us to consider that the results found cannot be generalized, suggesting new researches in this area.

The study contributes to the professional practice of leaders and other health professionals by reflecting on the importance of adopting strategies to improve patient safety, HAI control, and especially HH adherence. The results indicated allow us to infer that there are many challenges for nursing practice, teaching and research, so that professionals, managers and patients contribute to the control of HAIs. There is a need to adopt innovative strategies and to overcome problems such as communication failures and structural difficulties. Furthermore, it is hoped that this research will provide subsidies for good practices by professionals and for the leadership of SCIH and Quality Management, regarding the strategies that have been used in the control of HAIs and support the development of new researches in this area.

REFERENCES

1. Brasil. Ministério da Saúde. Portaria n. 529, de 1º de abril de 2013. Institui o Programa Nacional de Segurança do Paciente. Brasília; 2013. Disponível em: http://bvsms.saude.gov.br/bvs/saudelegis/gm/2013/prt0529_01_04_2013.html

2. Aguiar LL, Guedes MVC, Oliveira RM, Leitão IMTA, Pennafort VPS, Barros AA. Enfermagem e metas internacionais de segurança: avaliação em hemodiálise. Cogitare Enferm. [Internet]. 2017 [acesso em 2020 Jan 1]; 3(22): e45609. Disponível em: https://revistas.ufpr.br/cogitare/article/view/45609/pdf

3. Oliveira JLC, Magalhães AMM, Bernardes A, Haddad MCFL, Wolff LDG, Marcon SS et al. Influence of hospital Accreditation on professional satisfaction of the nursing team: mixed method study. Rev Latino-Am Enfermage0m. [Internet]. 2019 [acesso em 2020 Jan 1]; 27: e3109. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-11692019000100310&tlng=en

4. Oliveira AC, Pinto SA. Patient participation in hand hygiene among health professionals. Rev Bras Enferm. [Internet]. 2018 [acesso em 2020 Jan 1]; 71(2):259-64. Disponível em: http://dx.doi.org/10.1590/0034-7167-2016-0124

5. Belela-Anacleto ASC, Peterlini MAS, Pedreira MLG. Hand hygiene as a caring practice: a reflection on professional responsibility. Rev Bras Enferm. [Internet]. 2017 [acesso em 2020 Jan 1]; 70(2): 442-5. Disponível em: http://dx.doi.org/10.1590/0034-7167-2016-0189.

6. Souza ES, Belei RA, Carrilho CMDM, Matsuo T, Yamada- Ogatta SF, Andrade G, et al. Mortalidade e riscos associados a infecção relacionada à assistência à saúde. Texto-contexto Enferm. [Internet].2015 [acesso em 2020 Jan 1]; 24(1):220-8. Disponível em: 10.1590/0104-07072015002940013.

7. Figueiró AC, Santos MA, Kabad J, Cruz MM, Hartz Z. Avaliação da Rede Programa de Desenvolvimento e Inovação Tecnológica em Saúde Pública - Teias: inovação e produtos em questão. Saúde debate. [Internet]. 2017 [acesso em 2020 Jan 1]; 41 (esp): 290-301. Disponível em: http://dx.doi.org/10.1590/0103-11042017s21.

8. Tartare E, Piers D, Bellissimo-Rodrigues F, Kraker M, Borzykowski TH, Allegranzi B, et al. The global hand-sanitizing relay: promoting hand higyene through innovation. J Hosp Infect [Internet]. 2017 [acesso em 2020 Jan 1]; 95(2):189-93. Disponível em: https://www.ncbi.nlm.nih.gov/pubmed/28081910

9. Ferreira LL, Azevedo LMN, Salvador PTCO, Morais SHM, Paiva RM, Santos VEP. Cuidado de enfermagem nas infecções relacionadas à assistência à saúde: scoping review. Rev Bras Enferm [Internet]. 2019;72(2):498-505. Doi: http://dx.doi.org/10.1590/0034-7167-2018-0418

10. Minayo MCS, Deslandes SF, Gomes R. Pesquisa social: teoria, método e criatividade. 34.ed., Petrópolis, RJ: Vozes, 2015.

11. Bardin L. Análise de conteúdo. Lisboa: Edições 70; 2011.

12. Magdalena Hoffmann, Gerald Sendlhofer, Gudrun Pregartner, Veronika Gombotz. Christa Tax, Renate Zierler et al. Interventions to increase hand hygiene compliance in a tertiary university hospital over a period of 5 years: An iterative process of information, training and feedback. J Clin Nurs. [Internet]. 2019 [acesso em 2020 Jan 1]; 28:912–9. Disponível em: https://www.ncbi.nlm.nih.gov/pubmed/30357973.

13. Kilpatrick C, Bourqui L, Peters A, Guitart C, Allegranzi B, Pittet D. Hand hygiene: Sounds easy, but not when it comes to implementation. J Infect Public Health. [Internet].2019 May [acesso em 2020 Jan 1]; 12(3):301-3. Disponível em:10.1016/j.jiph.2019.04.008. Epub 2019 Apr 30.

14. French K. Tem articles on hand higyene innovation that have been reported in Journal of Hospital Infection. Journal of Hospital Infection. [Internet]. 2018 [acesso em 2020 Jan 1]; 100:242-4. Disponível em:10.1016/j.jhin.2018.07.045

15. Marra AR, Camargo TZS, Magnus TP, Blaya RP, Batista dos Santos G, Guastelli LR, et al. The use of real-time feedback via wireless technology to improve hand hygiene compliance. American journal of infection control. [Internet]. 2014 [acesso em 2020 Jan 1] ;42(6):608-11. Disponível em: 10.1016/j.ajic.2014.02.006

16. Gautschi N, Marschall J, Candinas D, Banz VM. Effect of music on surgical hand disinfection. J Hosp Infect. [Internet].2017 [acesso em 2020 Jan 1]; (95): 352-4. Disponível em: https://www.ncbi.nlm.nih.gov/pubmed/28202191

17. Goerig T, Dittmann K, Kramer A, Diedrich S, Heidecke CD, Huebner NO. Infection control perception and behavior: a question of sex and gender? Results of the AHOI feasibility study. Infect Drug Resist. [Internet].2018 [acesso em 2020 Jan 1]; 4(11):2511-2519. Disponível em: https://doi.org/10.2147/IDR.S178922

18. Mackrill J, Dawson C, Garvey B, Gould D. Exploring new approaches to improve hand hygiene monitoring in healthcare. Infection, Disease & Health. [Internet]. 2017 [acesso em 2020 Jan 1] ;22(1):21-27. Disponível em: https://doi.org/10.2147/IDR.S178922

19. Kelly JW, Blackhurst D, McAtee W, Steed C. Electronic hand hygiene monitoring as a tool for reducing health care–associated methicillin-resistant Staphylococcus aureus infection. American journal of infection control. [Internet]. 2016 [acesso em 2020 Jan 1]; 44(8):956-957. Disponível em: http://dx.doi.org/10.1016/j.ajic.2016.04.215

20. Maia CS, Coradi FDR, Gallo LG, Araújo WN. Notificações de eventos adversos relacionados com a assistência à saúde que levaram a óbitos no Brasil, 2014-2016. Epidemiol. Serv. Saude. [Internet]. 2018 [acesso em 2020 Jan 1];27(2):e2017320. Disponível em: http://scielo.iec.gov.br/pdf/ess/v27n2/2237-9622-ess-27-02-e2017320.pdf

21. Barros MMA, Pereira ED, Cardoso FN, Antunes da Silva R. O enfermeiro na prevenção e controle de infecções relacionadas à assistência à saúde. Universitas: Ciências da Saúde. [Internet].2016 [acesso em 2020 Jan 1]; 14(1):15-21. Disponível em: https://www.publicacoesacademicas.uniceub.br/cienciasaude/article/viewFile/3411/3066