

REVIEW ARTICLE

**Patient participation in compliance with hand hygiene by health professionals: an integrative review**

*Participação do paciente na adesão à higiene das mãos pelos profissionais de saúde: revisão integrativa*

*Participación de los pacientes en la adherencia a la higiene de manos por parte de los profesionales sanitarios: una revisión integradora*

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**ABSTRACT**

**Background and objectives:** Healthcare-associated Infections are a global health concern. Although the best strategy for its prevention is hand hygiene (HH), there is still low compliance by health professionals in the execution of the correct technique. In order to improve compliance with HH, the World Health Organization (WHO) implemented the multimodal strategy, which emphasizes patient participation in health services, in order to encourage professionals to wash their hands. With this, we sought to verify the impact of the implementation of educational strategies with patient involvement and participation in compliance with hand hygiene by health professionals. **Methods:** An integrative literature review in the CINAHL, LILACS, PubMed, Scopus and WOS databases. **Results:** The present sample comprised eight international studies that empowered patient participation with intervention strategies on HH and studies in which patients provided feedback on compliance assessment, which reflected in greater compliance with HH by health professionals. **Conclusion:** Educational interventions with patient participation and involvement proved to be effective for health professionals to comply with HH, especially when all components of the multimodal strategy were adequately addressed.

**Keywords:** *Health Education. Hand Hygiene. Patient Participation. Continuing Education. Power.*

**RESUMO**

**Justificativa e objetivos:** As infecções relacionadas à assistência à saúde são um problema de saúde mundial. Embora a melhor estratégia para sua prevenção seja a higiene das mãos (HM), nota-se ainda baixa adesão dos profissionais de saúde na execução da técnica correta. Com o propósito de melhorar a adesão a HM, a Organização Mundial de Saúde (OMS) implementou a estratégia multimodal, que ressalta a participação do paciente nos serviços de saúde, a fim de incentivarem os profissionais a higienizar as mãos. Com isso, buscamos verificar o impacto da implementação de estratégias educativas com o envolvimento e participação do paciente na adesão à higiene das mãos por profissionais de saúde. **Métodos:** Revisão integrativa da literatura nas bases de dados CINAHL, LILACS, PubMed, Scopus e WOS. **Resultados:** Compuseram a presente amostra oito estudos internacionais, que empoderaram a participação do paciente com estratégias de intervenção sobre HM e estudos no qual o paciente foi provedor de *feedback* de avaliação da adesão, o que refletiu em maior adesão à HM pelos profissionais de saúde. **Conclusão:** Intervenções educativas com a participação e envolvimento do paciente se mostraram eficazes para adesão à HM pelos profissionais de saúde, em especial, quando todos os componentes da estratégia multimodal foram adequadamente contemplados. **Descritores:** *Educação em Saúde. Higiene das Mãos. Participação do Paciente. Educação Continuada. Poder.*

## RESUMEN

**Justificación y objetivos:** Las infecciones relacionadas con la asistencia sanitaria son un problema de salud mundial. Aunque la mejor estrategia para su prevención es la higiene de manos (HM), aún existe una baja adherencia por parte de los profesionales sanitarios en la ejecución de la técnica correcta. Para mejorar la adherencia a la HM, la Organización Mundial de la Salud (OMS) implementó la estrategia multimodal, que enfatiza la participación del paciente en los servicios de salud, con el fin de incentivar a los profesionales a lavarse las manos. Con esto, buscamos verificar el impacto de la implementación de estrategias educativas con la implicación y participación del paciente en la adherencia a la higiene de manos por parte de los profesionales sanitarios. **Métodos:** Revisión integradora de la literatura en las bases de datos CINAHL, LILACS, PubMed, Scopus y WOS. **Resultados:** La presente muestra estuvo conformada por ocho estudios internacionales que empoderaron la participación del paciente con estrategias de intervención en HM y estudios en los que el paciente brindó retroalimentación sobre la evaluación de la adherencia, lo que se reflejó en una mayor adherencia a la HM por parte de los profesionales de salud. **Conclusión:** Las intervenciones educativas con participación e involucramiento del paciente demostraron ser efectivas para que los profesionales de la salud se adhieran a la HM, especialmente cuando todos los componentes de la estrategia multimodal se abordaron adecuadamente.

**Palabras clave:** *Educación en Salud. Higiene de Manos. Participación del Paciente. Educación Continuada. Poder.*

## Background

Healthcare-associated Infections (HAIs) are a worldwide public health concern and are defined by Ordinance 2616 of the Brazilian Ministry of Health as any infection acquired after patient admission to a health facility, manifested after forty-eight (48) hours after admission or after discharge, when associated with surgeries or invasive procedures.<sup>1,2</sup>

In the United States of America (USA), in 2016 it was estimated that about 10% of hospitalized patients had HAI. The Brazilian Ministry of Health considers that incident reaches

a proportion of 15% or more on this country. The Latin American Sepsis Institute (LASI) points out that annually 400,000 new cases are diagnosed and about 240,000 people die from HAIs.<sup>3</sup>

Aiming at the prevention of this problem, the Brazilian Health Regulatory Agency (ANVISA - *Agência Nacional de Vigilância Sanitária*) recommends the mandatory notification of the four types of HAI: primary bloodstream infection (BSI) associated with central venous catheter (CVC), ventilator-associated pneumonia (VAP), urinary tract infection (UTI) and surgical site infections (SSI).<sup>4</sup>

The simplest and most used strategy for HAI prevention is hand hygiene (HH), which consists of performing the procedure using appropriate technique and time, using water and soap or 70% alcoholic solution, in order to remove dirt and microorganisms.<sup>5</sup> Studies have shown that 99.9% of transitory colonization of the hands of health professionals was eliminated with the correct HH technique, following the steps recommended by the World Health Organization (WHO) guidelines.<sup>6</sup>

However, the world literature reports a low compliance of health professionals with HH. A study in Switzerland that aimed to improve HH compliance by professionals through performance feedback and patient participation found that less than 66% of professionals comply with the five moments of HH,<sup>7</sup> namely: 1) before touching a patient; 2) before a procedure; 3) after a procedure or body fluid exposure risk; 4) after touching a patient; 5) after touching a patient's surroundings.<sup>8</sup>

In developing countries, the situation worsens. Research carried out in southern Brazil found that the compliance rate with the five (5) moments of HH was only 54.5% by health professionals working at a teaching and research hospital.<sup>9</sup> In southeastern Brazil, a study conducted in an Intensive Care Unit demonstrated that less than 43% of professionals performed HH adequately.<sup>10</sup>

Aiming at encouraging compliance with HH practices, the WHO implemented, in 2009, the multimodal strategy (MS), which is composed of five complementary and interdependent components of intervention, which have been proven to help in compliance with HH, both medium and short term, namely: 1) system change; 2) training & education; 3) monitoring & feedback; 4) reminders & communication; and 5) culture change.<sup>8,11</sup>

It is worth noting that the components monitoring & feedback and culture change emphasize the importance of patient participation, which should be strongly encouraged in educational interventions based on the aforementioned MS. For this to occur, it is necessary to empower the user about the importance of HH by health professionals during the care provided. The WHO states that patient empowerment is a process in which they understand their role

when receiving knowledge and skills from their health care provider, in order to understand the care process and ensure subsidies to intervene in the actions received.<sup>8</sup>

Given the proven effectiveness of HH to reduce HAI, low compliance of health professionals with this technique and the relevance of patient participation in actions that promote HH in health care environments, it was necessary to know: What is the impact of implementing educational strategies with patient involvement and participation in compliance with HH by health professionals?

The objective of this study was to verify the impact of implementing educational strategies with patient involvement and participation in compliance with HH by health professionals.

## **METHODS**

### ***Study design***

This study is an integrative literature review, which provides the introduction of experimental and non-experimental studies, in order to obtain a greater compression of the phenomenon. This type of study articulates information from theoretical and empirical literature, in addition to integrating several purposes, such as definition of concepts, review of theories and investigation of methodological problems of a specific topic.<sup>12, 13, 14</sup>

The integrative review analyzes the current knowledge on a specific topic, being designed to identify, analyze and synthesize results of different studies on the same topic, aiming at the quality of care provided to patients.<sup>15</sup> This study design is composed of six phases: 1) selection of research hypothesis or question ; 2) search strategy (establishment of inclusion and exclusion criteria, database and selection of studies); 3) categorization of studies (extraction, organization and summarization of data); 4) assessment of studies included in the review; 5) interpretation of results; and 6) synthesis of knowledge.<sup>12, 16, 17, 18</sup>

### ***Inclusion and exclusion criteria***

Experimental, quasi-experimental or “before/after” scientific articles, which used an educational intervention to improve compliance with HH by health professionals, including patient participation, published in English, Spanish or Portuguese, from 2009 to 2019, were included. This period of time is justified by the year of dissemination of MS for HH by the WHO.

Theses, dissertations, studies in which the method was not adequately described, carried out only with health professionals, or which were not fully available were excluded.

### ***Search strategies and data organization***

Literature searches were conducted from April to July 2019. Primary studies were searched in the following databases: Medical Literature Analysis and Retrieval System Online (MEDLINE), Latin American and Caribbean Literature in Health Sciences (LILACS), Current Nursing and Allied Health Literature (CINAHL), SCOPUS and Web of Science (WOS).

To guide the study, the PICO strategy (Participant, Intervention, Comparison and Outcomes)<sup>15</sup> was used in order to identify in the texts the answer to the following question: What is the impact of implementing educational strategies with patient involvement and participation in compliance with HH by health professionals?

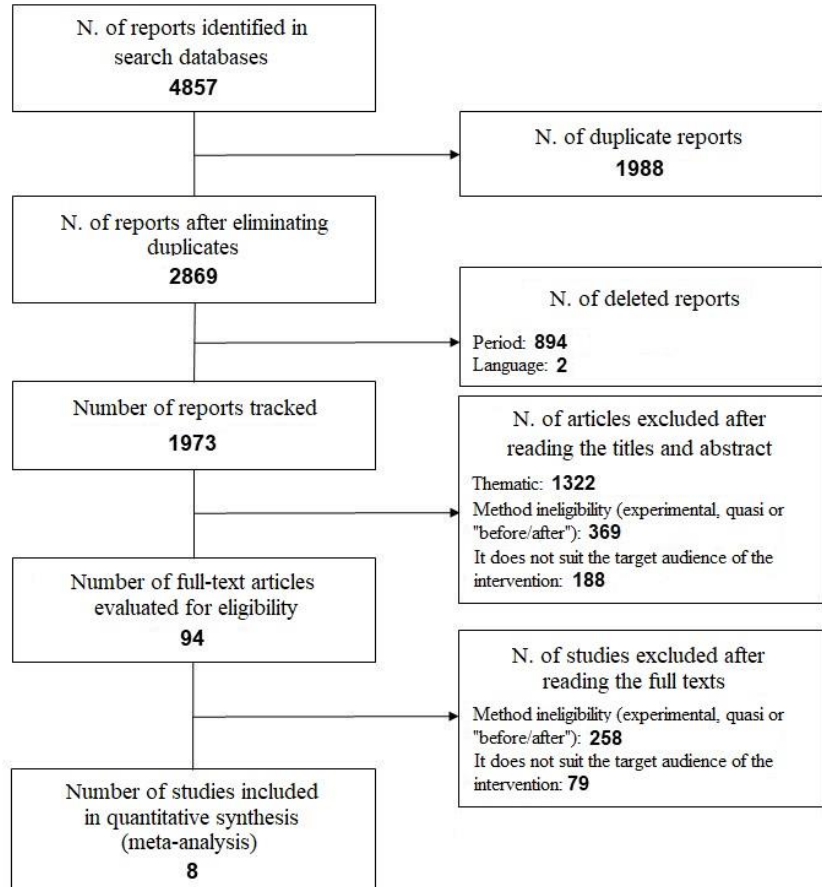
To ensure a thorough search, the Health Science Descriptors (DeCS), Medical Subject Headings (MeSH), uncontrolled descriptors (keywords) and the CINAHL Subject Headings were defined. The following DeCS, MeSH and CINAHL Subject Headings used were: health education, hand hygiene, patient participation, handwashing. The keywords used were: multimodal strategy, in addition to synonyms found on the DeCS and MeSH websites. Boolean operators AND and OR were used, in order to allow intersection and union between descriptors and keywords.

A total of 4857 articles were identified in the databases, as shown in Figure 1. These articles were initially organized using Clarivate EndNote Online, whose program facilitated the process of removing duplicates and articles that did not correspond to the period adopted for this study. This resulted in 1,988 duplicate articles and 894 that did not fit into the period adopted for this review.

Data were systematized using a guide called Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) for the categorization of studies. Figure 1 outlines the main steps taken, whose outcome met the inclusion of eight studies.

**Figure 1.** PRISMA flowchart for included studies

IDENTIFICATION  
SELECTION  
ELIGIBILITY  
INCLUSION



Layout ↑

## CONTENT AND DISCUSSION

After search refinement using the PRISMA tool, the final sample consisted of eight (8) articles. The selected studies resulted in four (4) WOS studies, two (2) MEDLINE database studies, and two (2) Scopus studies. Data regarding educational interventions and study results are presented in Chart 1.

**Chart 1.** Synthesis of key information from the eight (8) articles included in this integrative review, Brazil, 2019

AUTHOR	YEAR	PLACE	PERIOD	POPULATION	INTERVENTIONS USED	RESULTS BEFORE THE INTERVENTION	RESULTS AFTER THE INTERVENTION	CONCLUSION
BITTLE, <i>et al.</i> <sup>19</sup>	2009.	The Johns Hop - University Hospital located in Baltimore – USA.	2008 to 2009.	The intervention was carried out with fifty (50) patients and professionals who were in the otolaryngology, plastic surgery and medical clinics.	In 2008, direct observation of compliance with HH by professionals was carried out, collecting their self-reports and the number of antiseptic products used. Patients were educated to assess professionals' HH, taking responsibility for the role of observer. Patients performed formal reports about HH opportunities they witnessed.	The rate of health professionals who performed HH was 40% in July 2008.	The compliance rate to HH in 2009 was 80%.	It was found that patient participation as an observer increased the levels of compliance with HH.
AL-TAWFIQ, <i>et al.</i> <sup>20</sup>	2013.	Saudi Aramco Medical Services (SAMSO) Public Hospital in Saudi Arabia.	January 2007 to January 2011.	The intervention was carried out with patients and professionals from cardiology, surgery, medical, neonatal and pediatric clinics, which totaled three hundred	In 2007, the program started the intervention with educational presentations on the importance of HH, and, after that, opportunity observations were carried out. In the following years, targets for compliance with the five (5) moments of HH were defined for 85% and the inclusion of MS components in the program. In 2011, the second stage of interventions	The rate of health professionals performing HH was 38% in 2007.	The compliance rate in 2011 was 85%, (p=0.005).	The study found a positive improvement in the change in professionals' behavior in relation to HH, reaching the proposed compliance goal.

				and fifty (350) beds.	started through monthly monitoring, frequent or immediate feedback, on-site observation campaigns, readjustment of materials for HH and distribution of alcohol gel for professionals and patients. Patients were educated by the interventional team to question the professional before contact, with phrases such as "Have you sanitized your hands?".			
ALVAREZ <i>et al.</i> <sup>21</sup>	2015.	Tertiary care hospital in Spain.	2014 to 2015.	The intervention was carried out in the one hundred and twenty-five (125) beds of the hospital, distributed in oncology, hematology, surgical endocrinology, ICU and resuscitation unit wards, and had seven hundred and thirty-seven (737) health professionals working in these units.	The educational program used MS in its entirety in conjunction with patient and family empowerment. The study used the five (5) components of the aforementioned strategy and raised awareness and training on the importance of HH, distributed informational leaflets and held training workshops on the World HH Day for patients and families. Patients were also included as observers and feedback providers, as they were encouraged to question practitioners about HH.	The rate of health professionals who perform HH was 44.8% in 2014.	The compliance rate in 2015 was 69.9% (p<0.05).	The study concludes that MS with patient participation resulted in a significant increase in the rates of compliance with HH by professionals. The study also highlights the need for constant monitoring and training of those involved.
CAINE, <i>et al.</i> <sup>22</sup>	2015.	Hospital in the state of New	2008 to 2014.	The study was carried out with one hundred and sixty-six (166)	The intervention was carried out through educational lectures on HH with patients and health professionals,	Before the intervention, the compliance rates	After the intervention, compliance rates	The intervention adopted had a significant



		Hampshire in the USA.		patients from inpatient clinics and health professionals who worked in these units.	availability of alcohol gel, paper towels and soap, in addition to reminders in the workplace. Patients were encouraged to act as observers of HH opportunities by health professionals and to question the conduct when deemed necessary.	of professionals to HH were 82%.	rose to 93% (p<0.0001).	result, as the rates of compliance with HH increased significantly. Furthermore, professional-patient interaction was strengthened with the intervention.
CHEN, <i>et al.</i> <sup>23</sup>	2015.	Kaohsiung Taiwan Veterans General Hospital.	2003 to 2014.	The study involved the one thousand four hundred and eight (1,408) hospital beds and two thousand four hundred and sixty-three (2,463) health professionals, including physicians, nurses, technicians and nursing assistants.	The five (5) components of MS were used in full, with the addition of patient participation as an evaluator of the HH of professionals, encouraging them to question professionals about compliance with HH before touching them. Patients who agreed to participate received badges to identify their participation in the study.	The compliance rate of HH of the professionals was 62.3%.	The compliance rate was 73.3% (p<0.001).	The study concluded the intervention was successful, as there was an improvement in the change in the professionals behavior in relation to HH.
FONGUH <i>et al.</i> <sup>24</sup>	2016.	Held in Belgium in tertiary care institutions.	2005 to 2015.	The study was carried out with professionals and patients from Intensive Care Units.	The program used six national campaigns to reduce HAI rates, namely: "Hand hygiene with alcohol-gel;" "Hand hygiene: do it correctly;" "Hand hygiene: unadorned and proper use of gloves;" "Doctor, don't forget, it works	The compliance rate with HH by health professionals was only 19%.	The post intervention rate was 69% (p<0.05).	The study found that HH compliance rates increased significantly with campaigns, but makes it clear

					and you're a model;" "Hand hygiene, do it correctly before any contact with patient" and "Hand hygiene together with patient." It is important to highlight that in the last campaign patients were encouraged about HH and instructed to ask about the technique by a professional before the first contact with their body, equipment or belongings. During the intervention, the trained teams observed HH opportunities of professionals three (3) months before and three (3) months after the launch of the campaign.			that it is necessary to repeat them periodically to achieve and sustain the compliance rate.
STEWARTSON, <i>et al.</i> <sup>7</sup>	2016.	Switzerland, Geneva University Hospitals.	2010 to 2014.	The study involved health professionals and patients from the two hundred (200) beds of medical and surgical clinics.	Control group: applied to MS; Performance feedback group: HH observation sessions. At the end, verbal feedback was provided and, when feasible, a card informing about the steps of HH with individual counseling on how to improve the technique was given. This card illustrated the steps and five (5) ideal moments to perform the technique, with a view to reaching 80% compliance goal. Improved feedback group with patient participation: the same activity as the previous group was carried out, with the addition of patient participation, the distribution	Control group: 66%.  Performance feedback group: 65%.  Improved feedback group + patient participation: 66%.	Control group: 73%.  Performance feedback group: 75% (p=0.19).  Improved feedback group + patient participation: 77% (p=0.048).  Compliance with Moment One of HH by WHO: p=0.03 in the control group and p<0, 0001 in the other two groups.	It was observed that there was an improvement in the change in professionals' behavior in relation to HH, but it did not reach the recommended goal of 80% compliance.

					of encouraging pins to health care professionals and setting reminders in the workplace. Such participation was made by involving patients to receive, on admission to service, an information leaflet about HH and a bottle of alcohol gel. Patients were instructed to interact with health professionals, in order to encourage HH focusing on moment one: before touching patients.			
CHENG, <i>et al.</i> <sup>25</sup>	2017.	Held in two units of the Hong Kong West Healthcare Region Hospital.	2016.	Intervention performed in the nine hundred and thirty (930) beds of the two hospital units and the seven inpatient wards, with the participation of one hundred and sixty-seven (167) patients and one hundred and fourteen (114) professionals from the aforementioned wards.	Focus groups were held to delineate the intervention for patients and health professionals. The intervention was carried out through educational lectures and bedside guidance encouraging patients to ask "Have you ever cleaned your hands?" to health care professionals before the first contact. Patients who were unable to question verbally were given an elucidating sign with this question.	The compliance rate of professionals with HH was 87.2%.	The compliance rate increased to 87.9% (p=0.891).	It describes the importance of patient participation, but says that the percentage of increased compliance of health professionals with HH was not high, justified by the short intervention time.

Note: MS: multimodal strategy; HH: hand hygiene.

Participants in the interventions were composed of nursing, medical and other health professionals who worked predominantly in adult Intensive Care Unit (ICU), medical clinic, emergency, pediatric clinic and surgical clinic sectors. The studies also involved patients admitted to tertiary care clinics who stayed at least three days in the health facility, as well as their caregivers or family members, when applicable.

In 62.5% of the studies, MS was used contemplating its five (5) components and patient participation stands out as a member of the fifth component “culture change”. In 25% of the articles, patient participation was included in the proposed interventions, and in 12.5% of the articles, patient participation was the only intervention performed.

As shown in Chart 1, the most used strategy was continuing education with patients, giving them the autonomy to question health professionals about HH in the moments before touching them, handling care equipment (e.g., infusion pumps, catheters and probes, mechanical ventilator, among others) and before touching objects placed in patients’ vicinity.

In all studies included in this sample, both patients and their caregivers and family members were trained to perform the correct HH, highlighting its importance due to the high rates of infections in the selected institutions, aiming to reduce HAIs, making them protagonists of their security process.

Three of these studies pointed out that patients are intimidated by questioning the health team, reporting that they are not comfortable in questioning their caregivers about their work tasks.<sup>7, 21, 25</sup> In these studies, health professionals were composed of a multidisciplinary team, with the largest presence of physicians, nurses and nursing technicians.

However, the articles showed an increase in the HH rate by health professionals after the intervention was carried out using patients as part of the educational strategy.

HAIs represent a major global health problem, and their control is relevant both in developed and underdeveloped countries, as they generate a high cost for health institutions, since treatment is costly and can often be ineffective. Moreover, it causes harm to both the patient and the health professional, as both are susceptible to contamination by pathogenic microorganisms.<sup>26</sup>

The steps that comprise MS to achieve HH actions are done through the change in the system, which concerns the institution’s infrastructure changes to ensure that health professionals can sanitize their hands and an organizational culture of installed safety, transversal to professionals, patients, direct supervisors and superiors. The favorable institutional safety climate is guided by the management responsibility to create an environment

that facilitates professionals' awareness and promotes positive perceptions of patient safety, ensuring HH improvement as a priority at all levels of health care.<sup>27,12</sup>

In that regard, an essential part of this process is professionals' education and training, through training and regular and permanent training on the implementation of the proper HH technique, contemplating the five (5) moments proposed by the WHO.<sup>27</sup> Through health education activities, the multidisciplinary team motivation also becomes viable, making them perform local actions that reinforce HH as a fundamental measure for HAI prevention and control and feel that they are protagonists in this process.<sup>28</sup>

Thus, it is necessary that professionals and patients have technical knowledge about the correct mode of HH so that they can excellently comply with practice aimed at reducing HAIs. Note the importance beyond a health education activity, but as an artifact to optimize new practices and search for quality of care by both.<sup>28</sup>

Based on the above, it is necessary to implement this theme in the training process of health professionals, as there is a need for technical and scientific development of this theme through the use of active methodologies, in order to emphasize the importance of HH.<sup>29</sup>

The assessment and feedback component comprises monitoring the changes that have occurred, from monitoring HH practices to infrastructure, verifying whether educational interventions were effective in improving compliance. On the other hand, reminders in the workplace are instruments used to highlight the indications and importance of HH, performance of the appropriate technique and procedures, in places with greater circulation of professionals.<sup>30</sup>

The aforementioned studies that make up the sample of this review showed the importance of patient participation as part of safe care and a favorable institutional safety climate, since compliance with HH was significantly improved with interventions that included patient empowerment.

Observational research in a specialized pediatric hospital in the Brazilian Midwest showed a considerable increase in HH by health professionals after the implementation of the five (5) components of MS after the implementation of the five (5) components of MS together with patient participation".<sup>31</sup>

In the same way, a study carried out in Switzerland with health care professionals from a hospital in Geneva, aiming at improving compliance with HH by these health professionals, showed that patient involvement was effective in compliance with HH, proving to be statistically significant ( $p < 0.04$ ), increasing compliance with HH from 66% to 77% after the implementation of the educational strategy.<sup>7</sup>

Exploratory qualitative study, carried out in Porto Alegre to understand the perception of family members and caregivers in relation to patient safety, reinforced the need and relevance of training professionals to include the family, in order to promote safe care.<sup>32</sup>

Educational strategies aimed at patient safety require effective communication between professionals and health services. Communication failures can affect the quality of services, resulting in incidents, errors and damages, such as medication administration errors that can be avoided with efficient communication between work team members.<sup>33, 34, 35</sup>

Institutions and health professionals need to ethically commit to improving communication, to ensure and preserve safety, integrity and respect for patients, coworkers and their own rights as professionals and citizens.<sup>36</sup>

It is noteworthy that, in Brazil, the Resolution of the Collegiate Board of Directors (RDC) 63/2011 was established in 2011, which provides for the Requirements for Good Operating Practices for Health Services. In Article 8 of this RDC, it is established that a health service must institute strategies and actions aimed at patient safety, including “guidelines to encourage patient participation in the care provided”.<sup>37</sup>

Based on the above, it was observed in this study that patient participation has a positive influence on compliance with HH by health professionals, although many patients are still intimidated by questioning the health team about performing the technique. The results showed that the main obstacle to this effective communication between patients and caregivers is the fact that users believe that this questioning or assessment of professionals’ practice can interfere with their care process.<sup>20, 21, 25</sup>

In the same way, it is necessary to involve patients as active subjects in promoting improved compliance with HH of health professionals, as this is a useful and promising educational strategy, which should be part of the safety culture of health institutions.

Patient participation as a unique form of intervention is not an effective and long-lasting strategy for compliance with HH. WHO recommends that it is necessary to use several actions to address institutional obstacles and established behavioral cultures.<sup>37,38</sup> Cultural changes do not occur quickly and spontaneously, so they need to be permanent and always re-assessed.<sup>8</sup>

The present review showed that health education with patient participation has been shown to be effective in raising and maintaining the compliance rates with HH. Innovative methods with the inclusion of patients should replace conservative behaviors, in order to empower the subjects and keep them active in their care process.

## CONCLUSION

Educational strategies that used patient participation and involvement in HH promotion by health professionals proved to be effective for greater compliance of health professionals with this essential technique. Thus, the interventionist strategies described here can support patient involvement in future actions aimed at improving HH in health facilities.

However, the lack of studies carried out in the Brazilian territory is highlighted, demonstrating the need for further discussion and application of MS components in health establishments, since compliance with HH is considerably lower than recommended and infection rates related to health care show worrying rates.

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