

# Multimodal strategy to improve the adherence to hand hygiene and self-assessment of the institution for the promotion and practice of hand hygiene

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## ABSTRACT

**Background** Hand hygiene (HH) has a low rate of adherence worldwide. This study aimed to estimate the HH adherence rate before and after the implementation of the multimodal strategy and to perform a self-assessment of an institution for promotion and practice of HH.

**Methods** Before and after study, conducted in a university hospital. Professionals of the medical and nursing staff were included. Data collection was from October 2013 to July 2015, through observations of the HH opportunities and application of the HH self-assessment instrument for the institution. Descriptive and univariate analysis were performed.

**Results** A total of 9500 HH opportunities were observed. The rate of adherence to HH in pre-intervention period was 20.8%, compared to 16.2% and 15.7% in post-intervention. Regarding the evaluation of the institution, it did not have an established ongoing program of training of professionals, no feedback of HH rates to professionals.

**Conclusion** The low rate of HH adherence reflected the evaluation of the institution in relation to its investment in the practice and promotion of HH, showing that the investment policy for HH adherence needs to be reviewed, considering that before the study the hospital has not been trained in the 'My Five Moments for HH'.

**Keywords** hand hygiene, health promotion, health services, public health

## Introduction

Hand hygiene (HH) is recognized as one of the main control measures of healthcare associated infections (HAIs).<sup>1</sup> However, it is known that worldwide HH adherence rates rarely exceed 50%.<sup>2,3</sup>

Considering this reality, the World Health Organization (WHO), together with other national and international institutions, developed approaches to improve HH practices among healthcare professionals.<sup>1</sup> Among these, the global challenge 'Clean care is safe care', the campaigns 'Clean hands save lives', 'My five moments for HH' and the 'Multimodal HH improvement strategy', stand out.<sup>1</sup>

The multimodal strategy to improve HH adherence is based on five key components, related to institutional changes, education/training, evaluation and feedback,

reminders in the workplace and an institutional safety climate.<sup>1</sup>

Several studies have investigated the efficacy of the multimodal strategy to quantitatively and qualitatively improve HH among healthcare professionals, in the international context,<sup>4–6</sup> however, the subject is still incipient in Brazil, with few studies about this strategy.<sup>7,8</sup>

Another recommendation of the WHO regarding the practice of HH refers to the evaluation of the institutions, so

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that, from pre-defined parameters, the level of investment in policies and practices related to the improvement of HH among professional can be identified, directly reflecting the involvement of the administration and institutional safety culture.<sup>9</sup>

Thus, this study aimed to estimate the HH adherence rate before and after the implementation of the multimodal strategy and to perform a self-assessment of the institution for the promotion and practice of HH, according to the classification proposed by WHO considering that before the study the hospital has not been trained in the 'My Five Moments for HH'.

## Methodology

This was a before and after study, conducted in a large, tertiary care, university hospital of Belo Horizonte, Minas Gerais, Brazil, and was approved by the Research Ethics Committee of the institution (CAAE: 18477913.1.0000.5149).

Part of the study included professionals of the medical and nursing staff that provided direct patient care and who agreed to participate after signing the terms of consent form.

Following the principles proposed for the implementation of the WHO multimodal strategy, initially a pre-intervention or baseline evaluation was carried out through direct observation of HH adherence by researchers trained according to WHO observer training manual,<sup>10</sup> from October 2013 to December 2013 in an adult intensive care unit (ICU) and from January to February of 2014 in an pediatric ICU.

After observation there was a period of 30 days for interventions (January for adult ICU and March 2014 for pediatric ICU), which included education and training, assessment and feedback and reminders in the workplace.

Next, two evaluations of HH adherence rates were performed, the first was 1 month after the interventions and the second 6 months later (post-intervention periods 1 and 2, respectively) which happened from February to April 2014 in adult ICU/from Mai to June 2014 in pediatric ICU (post-intervention period 1); and from July to August 2014 in adult ICU/from September to November 2014 in pediatric ICU (post-intervention period 2).

The direct observation of professional's HH took place in a way in which they were not aware that they were being observed in relation to HH, minimizing the Hawthorne effect. In this sense the person who applied the terms of consent form was different from the person who did the observation months later.

For the direct observation procedure a structured instrument was used, with information related to the opportunity for HH according to the Five Moments for HH of WHO

and the type of HH performed (handwashing or handrubbing). The observation sessions were distributed over the morning, afternoon and night shifts, with each professional being observed for at least 20 HH opportunities for each session, totaling an average interval of 40–60 min of observation. The calculation of the HH adherence rate was carried out as follows:

$$\text{HH adherence} = \frac{\text{number of times that the professional performed HH}}{\text{total opportunities for the performance of HH}} \times 100$$

Furthermore, in July of 2015, the HH self-assessment questionnaire, proposed by the WHO,<sup>9</sup> divided into 5 components and 27 indicators, was applied to a professional who was trained and worked with infection control in the study institution, aiming to trace the profile of the hospital regarding the promotion and practice of HH. Each answer was given a score, from the proposed 500 possible points. Thus, the institution was classified according to its investment in infrastructure, human resources, training and feedback, and defined policies aimed at the promotion and practice of HH. From the indicators obtained in this evaluation, the overall performance of the institution can be identified, from the total score obtained, as: inadequate (0–125 points), basic (126–250 points), intermediate (251–375 points) and advanced (376–500 points).

Data were tabulated and processed using the Statistical Package for the Social Sciences (SPSS) version 19.0. Descriptive univariate analysis was performed, using the chi-square test, in order to verify statistical associations between the independent variables and HH adherence.

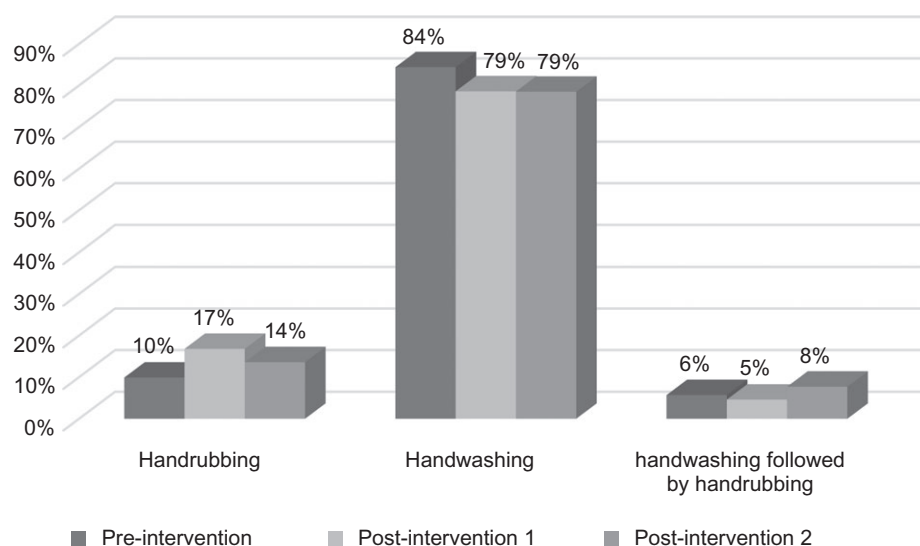
## Results

A total of 9500 HH opportunities were observed, with 3137 during the baseline period, 3526 in the post-intervention 1 period and 2837 in the post-intervention 2 period, from a total of 93 professionals.

With respect to the rate of HH adherence, in the baseline period, this was 20.8%, compared to 16.2% ( $P = 0.000$ ) in the post-intervention 1 period and 15.7% ( $P = 0.000$ ) in the post-intervention 2 period. However, despite the reduction in rates of HH adherence, an increase was obtained in the use of antiseptic handrubbing although the use of soap and water was predominant, as the preferred form of HH (Fig 1).

The distribution of rates of HH adherence for the pre-intervention and post-intervention 1 and 2 periods is showed at Table 1.

The self-assessment of the institution for the promotion and practice of HH is presented at Table 2.



**Fig. 1** Distribution of frequency of types of hand hygiene predominant among the multiprofessional team by study periods (pre- and post-intervention 1 and 2) (n = 9500); Belo Horizonte, 2015.

**Table 1** Hand hygiene adherence rate of the multiprofessional staff in the pre-intervention and post-intervention 1 and 2 periods (n = 9500); Belo Horizonte, 2015

Variable	Adherence (%)				
	Pre-(n = 3137)	Post-1 (n = 3526)	P*	Post-2 (n = 2837)	P**
Day of the week					
Weekdays	21.0	16.7	<b>0.000</b>	16.0	<b>0.000</b>
Weekend	17.4	13.9	0.289	7.7	<b>0.027</b>
Shift					
Day	20.6	17.3	<b>0.005</b>	16.4	<b>0.001</b>
Night	21.3	13.9	<b>0.000</b>	14.3	<b>0.000</b>
Gender					
Female	21.7	16.3	<b>0.000</b>	16.2	<b>0.000</b>
Male	15.6	15.4	0.937	13.0	0.291
Professional category					
Nurse	25.5	18.1	<b>0.029</b>	18.8	0.057
Physician	39.5	29.6	<b>0.034</b>	29.6	0.102
Technician	19.1	14.9	<b>0.000</b>	14.8	<b>0.000</b>
HH moment					
Moment 1 Before touching the patient	13.6	12.0	0.336	13.6	0.995
Moment 2 Before aseptic procedure	5.9	7.7	0.386	7.1	0.579
Moment 3 After risk of contact with fluids	36.9	24.2	<b>0.000</b>	25.7	<b>0.001</b>
Moment 4 After contact with the patient	34.8	32.3	0.324	21.1	<b>0.000</b>
Moment 5 After contact with surfaces	14.7	10.0	<b>0.001</b>	12.7	0.214
Patient in contact isolation					
Yes	16.4	11.8	<b>0.028</b>	38.9	<b>0.000</b>
Use of gloves					
Yes	21.5	11.3	<b>0.000</b>	19.9	0.319

\*P value comparing pre- and post-1; \*\*P value comparing pre- and post-2. The values in bold mean that they were statistically significant.

## Discussion

### Main finding of this study

In this study, the proposed interventions did not lead to an impact on HH adherence rates among the healthcare professionals.

Although the rates of HH adherence for the pre-intervention and post-intervention 1 and 2 periods of 20,8%, 16,2% and 15,7%, respectively, were statistically different, there was only a 4.5 and 5.1 Percentage Points (PP) different. In general, all these rates are extremely poor and may reflect the range of poor behavior or that healthcare workers may have been confused, over whelmed, or needed more training and reinforcement as My five Moments are complex for novices (although the 'My five moments' is not entirely a new concept as healthcare workers were obliged to perform before- and after patient contact and before and after glove use before the 'My five moments' guidelines but they were never taught it as a single concept).

The same can be observed on Moment three which had a statistically difference reduction of 11 PP (36,9%, 24,2%, 25,7%), on Moment 4 of 14 PP (34,8%, 32,3%, 21,1%) but still remaining as a poor rate. In this sense, there may be the possibility that healthcare workers are very task oriented and need a longer intervention period to include this additional patient-centered care step.

In relation to the 'Five moments for HH', HH adherence occurred more often after patient contact and after a risk of contact with bodily fluids. Accordingly, the lowest rate of adherence was noticed before carrying out an aseptic procedure. The moment after touching surfaces also presented low rates of HH adherence.

Regarding the types of HH, despite the significant increase in the performance of antiseptic handrubbing (10%

in the pre-intervention period and 17% in post-intervention 1 period;  $P = 0.000$ ), there was still a predominance of the use of soap and water (Fig. 1). For the post-intervention 2 period, a reduction in the use of antiseptic handrubbing was observed compared to the post-intervention 1 period. When verified against the baseline, the post-intervention 2 period presented no statistical difference.

Seeking to comprehend the reflection of the efforts of infection control made by the institution and by the professionals related to consolidation of good HH practices, the institution was evaluated, obtaining a total score of 190 points out of a possible 500, as presented in Table 2, according to the key components of the multimodal strategy, as well as the non-conformities encountered.

With regard to the promotion and practice of HH, the evaluation of the institution showed that some measures were in place, however, there was still no satisfactory standard, demonstrating the need for greater investment in the area. Thus, the institution was classified as presenting basic performance, indicating that further efforts were required and that the HH policy needed to be reviewed.

Thus, from the evaluation of the institution, it was clearly identified that the lack of impact of the multimodal HH adherence strategy implementation can be a reflection of the low investment in campaigns and policies aimed at promoting and improving HH adherence.

### What is already known on this topic

Despite these non-positive results found after the implementation of the HH strategy, the multimodal strategy has been implemented worldwide, with positive results in improving HH being most often reported, in contrast to the data of this study.<sup>5,7</sup> Furthermore, the association of educational

**Table 2** Hand hygiene self-assessment of the study institution; Belo Horizonte, 2015

Component	Score	Non-conformities
Change in the system	85/100	Budget policy to purchase products for HH was unknown
Education and training	15/100	Lack of an established ongoing training program with registration of participants Absence of availability of HH guidelines for the health professionals Absence of a system of observers in place for training and validation of HH compliance Absence of specific budget for HH training
Evaluation and feedback of information	20/100	Indirect monitoring of HH adherence (consumption of supplies) performed only for alcohol-based solution No direct monitoring (observation) or feedback of the data
Reminders in the workplace	25/100	Absence of audits of damage or need for replacement of HH illustrative posters
Institutional safety climate for hand hygiene	45/100	Absence of an implemented system for identifying HH leaders Lack of patient involvement in the process
<b>Total</b>	<b>190/500</b>	

campaigns with changes in the organizational culture has shown good results, indicating the importance of this safety climate for a change of behavior.<sup>11,12</sup>

There is controversy in the literature as to the type, hand-washing or antiseptic handrubbing, most used by professionals, varying by country, study type, unit and interventions.<sup>13–17</sup> In Brazil, professionals use soap and water more, when compared to the use of alcohol-based products, reaching rates greater than 90%,<sup>18</sup> the same was found in Turkey and Italy.<sup>14,15</sup> It can be observed that professionals, in general, have a greater tendency to use handwashing, since it provides a better perception of the hands being clean, especially in tropical countries.<sup>1</sup> Nevertheless, after being subjected to interventions from the multimodal HH improvement strategy, the adherence to antiseptic handrubbing with an alcohol-based solution immediately achieved greater adherence.<sup>13,16,17</sup>

In Brazil, legislation of the Health Surveillance Agency (*Agência Nacional de Vigilância Sanitária—ANVISA*) of the Ministry of Health has made it mandatory, since 2010, to provide alcohol-based preparation in care points of all health services, regardless of their complexity, in a conspicuous and accessible place so that antiseptic handrubbing is facilitated.<sup>19</sup>

With regard to the ‘Five moments for HH’, the practice of HH usually occurs more frequently when related to personal protection and at a lower rate when related to infection prevention for patients.<sup>13</sup> Also, the low adherence rates after touching surfaces can be related to the professional’s lack of knowledge that the surface may also serve as a source or reservoir for micro-organisms, having an important role in the transmission of infection.<sup>1,20,21</sup> Furthermore, unnecessary contact with surfaces is evidenced when professionals touch the bed rails, table, doors and other equipment and areas of the unit of the patient, without even noticing this contact, thus, not perceiving these situations as opportunities to perform HH.<sup>6,22</sup>

Regarding the evaluation of the institution for the promotion and practice of HH, in which the hospital was classified as presenting basic performance, it is known that, according to ANVISA, in Brazil, 901 healthcare establishments responded to the HH self-assessment instrument of WHO used in this study, in which 45.4% were classified at the basic level, 34.3% intermediate and 9.5% advanced level, with the others being inadequate, obtaining a score below 100 points.<sup>9</sup> It appears that the reality found in this study is in agreement with the situation of the country, with regard to policies aimed at HH.

### What this study adds

There is a lack of results about the implementation of a multimodal strategy to improve HH in Brazil, and this study

shows how challenging it can be, especially in developing countries where, due to economic and cultural difficulties and lack of access to better information and practices, they find themselves in situations of reduced investment in HAIs prevention, even including HH, a measure considered less expensive and more effective.

According to the results of this study, it is shown that HH promotion campaigns must occur in accordance to the safety climate of the institution to promote appropriately improvements in HH adherence. Also, the practice of handrubbing with alcohol-based products should be encouraged, respecting the specific indications for each type of cleaning.

### Limitations of this study

As limitation of this study, it can be noted that the prospective follow-up is prone to subject replacements, expressed by losses for several reasons, such as vacation, absenteeism, health licenses and layoffs during the data collection. Beyond this, it can be highlighted the fact that the study had been done in a single health institution in Brazil.

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