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## Hand hygiene in emergency care: cross-sectional study on adherence and behavior of the team

Higienização das mãos em pronto atendimento: estudo transversal sobre adesão e comportamento da equipe

Higiene de manos en atención de emergencia: estudio transversal sobre adhesión y comportamiento del equipo

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### ABSTRACT

**Introduction:** Healthcare professionals working in emergency care perform hand hygiene on a few occasions when in contact with the patient and/or nearby areas. **Aim:** To verify adherence and behavior of healthcare professionals regarding hand hygiene practices in emergency care. **Outlining:** Cross-sectional, descriptive, quantitative study conducted with 39 healthcare professionals working in emergency care. Data were analyzed using descriptive statistics and multiple linear regression. **Results:** A total of 230 observations were made during day and night shifts. The majority did not use adornments during their workday (81.0%). The adherence rate was 33.0%, with the lowest frequency before performing aseptic procedures (24.0%) and before contacting the patient (27.1%). Nurses stood out among the evaluated professionals (39.5%). There was no statistical difference between the products used for hand hygiene and the adherence rate ( $p=0.20$ ). **Implications:** It is necessary to implement strategies to sensitize healthcare professionals about hand hygiene, as the participants' performance was low.

### DESCRIPTORS

Hand Disinfection; Emergency Medical Services; Health Personnel; Patient Safety; Cross Infection.

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## INTRODUCTION

Hand hygiene (HH) is one of the essential measures for the prevention and control of Healthcare-Associated Infections (HAIs), as well as being one of the international goals for Patient Safety. This topic has been widely discussed since the launch of the World Alliance for Patient Safety, and is included in the health and well-being actions of the challenges presented in the 2030 Agenda for Sustainable Development Goals (SDGs).<sup>1-3</sup>

At various levels of healthcare, this practice contributes to the reduction of microorganism transmission among professionals, patients, companions, and visitors. Although it is a simple action with proven effectiveness worldwide, adherence by the multidisciplinary team falls short of ideal, especially regarding the correct technique.<sup>2</sup>

Several initiatives have been developed by national and international organizations, aimed at increasing adherence to HH in healthcare services. In 2021, the World Health Organization (WHO) declared the year of international healthcare workers and caregivers, using the slogan "Seconds save lives. Clean your hands!" This initiative proposed the reduction of HAIs through actions related to improving hand hygiene at all levels of healthcare.<sup>3</sup>

In this context, the WHO proposes the Multimodal Strategy for Hand Hygiene Improvement, aiming to raise awareness among healthcare professionals about the importance of this practice. This strategy consists of five crucial components: training for the team, reminders in the workplace environment, performance monitoring and evaluation, institutional safety culture, and system change.<sup>4</sup>

Thus, the National Health Surveillance Agency (ANVISA) encourages the national implementation of the multimodal strategy for hand hygiene improvement, considering the significant advances in team adherence to the procedure. Among the various suggested healthcare sectors for program implementation, emergency care stands out. The

location is intended for the treatment of urgencies and emergencies, which have a high flow of patients and various invasive procedures, making it necessary to ensure adequate conditions for hand hygiene practices.<sup>5</sup>

A study showed that healthcare professionals working in emergency care performed HH on few occasions of contact with the patient and/or nearby areas, with 90 actions being carried out in a total of 166 evaluated opportunities. In this case, the global average was 54.2%, with higher frequency among the nursing team (66.6%) and lower adherence among resident physicians (41.3%).<sup>6</sup>

Although excessive patient overcrowding is the main challenge of emergency care, especially during seasonal periods, the practice of HH must be considered essential to make care safe and free from harm. It should be noted that several studies conducted in this sector still do not present data related to team behavior and do not describe the consumption of alcohol-based preparations and liquid soap, where only adherence is evaluated through the five moments recommended by the WHO.<sup>6-7</sup>

Given the above, this study aims to verify adherence and behavior of healthcare professionals regarding hand hygiene practices in emergency care.

## METHOD

This is a cross-sectional, descriptive, quantitative study conducted in the emergency department of a private hospital in Belo Horizonte, MG, Brazil. The methodological stages of this research were guided by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.<sup>8</sup>

The institution has an open clinical staff, with a focus on cardiology, general surgery, orthopedics, and neurosurgery. The emergency department handles approximately 320 patients per day and has a nine-bed observation room, ten medical examination rooms, two nursing stations, two isolation beds, an emergency room, two medication preparation and

administration rooms, a secretary's office, an arsenal, and an expurgation room.

Regarding the physical structure and inputs evaluated for hand hygiene, there are sinks in all examination rooms, nursing stations, isolation units, and the emergency room, totaling 13 sinks. The observation, medication preparation, and administration rooms have 21 dispensers of 70% alcohol. Paper towels are available near the sinks, and the manual activation devices containing alcohol preparation and faucets were functioning properly during the evaluation period.

For this research, a non-probabilistic convenience sampling method was used. Out of the estimated population (n=54), 39 (72.2%) healthcare professionals were eligible, including 22 nursing technicians, 10 nurses, and 7 physicians. A power analysis was performed using G\*Power 3.1 software to verify the sample size required for contingency table statistics, considering a 95% confidence interval, alpha of 0.05, and effect size of 0.15, with satisfactory results. Inclusion criteria were providing direct patient care and wearing a professional identification badge. Professionals who did not belong to the sector or clinic's professional staff, attending only emergencies, were excluded.

Data collection was carried out by the researchers themselves from March to June 2022, using daily visits, in situ observation, and subsequent note-taking on a form. The WHO-proposed instrument was used, adapted to include aspects related to participants' adherence and behavior.<sup>9</sup> Independent variables related to the five moments for hand hygiene were analyzed, including before patient contact, before performing aseptic procedures, after exposure to bodily fluids, after patient contact, and after contact with areas near the patient. Other variables included professional category (physician, nurse, and nursing technician), gender (male or female), inputs used (alcohol preparation and/or liquid soap), indications and opportunities for hand hygiene, the use of accessories and gloves associated

with hand hygiene. The adherence rate was the dependent variable used in this study.

Information on alcohol preparation and liquid soap consumption (ml) was provided by the quality control department, fed monthly by infection control professionals, and validated by the Patient Safety Center.

The data was inputted into the Microsoft Excel 2020® program and analyzed using the Statistical Packages for the Social Sciences (SPSS) software version 21. The variables assigned to the behavior and adherence of healthcare professionals were analyzed using simple descriptive statistics, presenting absolute and relative values. Measures of central tendency represented the evaluation of alcohol preparation consumption, liquid soap use, and time (in minutes) dedicated to hand hygiene observations in the emergency department.

The following formula was used to evaluate the hand hygiene compliance rate: the number of actions performed divided by the number of evaluated opportunities, multiplied by 100, during the period. The model adopted to evaluate the consumption of alcohol preparation and liquid soap was: the total number of inputs (in ml) under the total number of monthly attendances, during the period. Subsequently, multiple linear regression verified the influence of predictor variables in relation to the outcome (compliance rate).

This study is part of the research entitled "Robotics applied to sensitize healthcare professionals regarding hand hygiene," which was approved by the Research Ethics Committee (CEP) under opinion number 1,887,633.

## RESULTS

In this study, 39 (100%) healthcare professionals were evaluated, including 10 (25.6%) nurses, 22 (56.4%) nursing technicians, and 7 (18.0%) physicians. The majority of participants were female (76.9%). From March to June 2022, 230 hand hygiene observations were performed, ranging from 57 to 80 minutes per month, with a mean of 64.7 ( $\pm 10.4$ ). Of

the total, 179 (77.8%) opportunities were observed during the day shift (7am to 7pm) and 51 (22.2%) during the night shift (7pm to 7am).

Regarding healthcare professionals' behavior, the majority did not wear jewelry during their workday (81.0%). When observed during procedures, few performed hand hygiene before donning gloves (12.0%). Adherence was higher when removing personal protective equipment (56%). It is worth noting that hand hygiene practices during moments 1 and 2 prioritized the use of liquid soap (79.5%). In the other moments recommended by WHO, alcohol-based hand rub gained prominence in the sector (83.4%).

Table 1 shows the team's adherence to hand hygiene opportunities. The worst results were attributed to hand hygiene before performing aseptic procedures (24.0%) and before patient contact (27.1%). The highest frequency was after patient contact (41.8%). During the study period, the adherence rate was 33.0%. The best result was attributed to nurses (39.5%) and physicians had the lowest adherence (24.0%). However, there was no statistical difference between professional categories, gender, and shift ( $p>0.05$ ).

**Table 1** - Evaluation of hand hygiene practices in the emergency department: opportunities, actions, and adherence rate from March to June 2022. Belo Horizonte, MG, Brazil.

Variables	Opportunities	Actions	Adherence rate (%)	p-value*
<b>Five moments for HH</b>				
1. Before contact	85	23	27.1	0.12
2. Before procedure. aseptic	25	06	24.0	
3. After body fluids	43	16	37.2	
4. After contact	67	28	41.8	
5. After surfaces	10	03	30.0	
Total	230	76	33.0	
<b>Professional category</b>				
Technician nursing	124	38	30.6	0.08
Nurse	81	32	39.5	
Doctor	25	06	24.0	
Total	230	76	33.0	

Legend: \*Multiple linear regression.

Source: own elaboration from research data, 2022.

Regarding the evaluation of inputs used for hand hygiene, table 2 shows that the average consumption of alcohol-based hand rub and liquid

soap was, respectively, 4.8 ( $\pm 3.5$ ) and 4.6 ml/attendance-month ( $\pm 3.0$ ). There was no statistical difference between the products used and the hand hygiene adherence rate ( $p=0.20$ ).

**Table 2** - Consumption of alcohol-based hand rub and liquid soap for hand hygiene from March to June 2022. Belo Horizonte, MG, Brazil.

Measurements	Alcohol consumption (ml)	Soap consumption (ml)	number of appointments	Alcohol preparation consumption rate ¥	Liquid soap consumption rate +
Average	16,633	15,900	4,202	4.8	4.6
Median	14,700	15,600	3,945	2.9	3.8
SD	5,889	5,863	1,560	3.5	3.0
Minimum	10,800	10,200	2,420	2.0	1.6

Maximum	26,400	24,000	6,393	10.9	8.4
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p= 0.02\*

Legend: \*Multiple linear regression. †Alcohol-based hand rub consumption/number of visits, per period; ‡Liquid soap consumption/number of visits, per period. SD = standard deviation.  
Source: own elaboration from research data, 2022.

## DISCUSSION

In our study, the moments with the highest adherence to hand hygiene were after patient contact and after contact with bodily fluids. The lowest rates were observed before aseptic procedures and before patient contact, in that order. Another noteworthy behavior was the lack of use of adornments in the service.

Regarding overall adherence to hand hygiene in the present study, the observed rate was approximately one-third (33.0%), lower than the values found in a survey conducted in an emergency room located in the southern region of Brazil (54.2%) and higher than another one carried out in the emergency department of a university hospital in Thailand (16.0%).<sup>6,10</sup>

A systematic review published in 2019, focusing on an intensive care unit (ICU), estimated a weighted average adherence to hand hygiene of more than half (59.6%). In a descriptive study also developed in a similar setting, it was found that 55.4% of healthcare professionals performed hand hygiene with soap and water or friction with alcohol-based preparations.<sup>12</sup> However, the emergency room requires the same concern related to this preventive measure due to the offer of complex care, invasive procedures, and diagnostic tests to which patients are daily subjected.

Researchers who evaluated adherence to infection prevention and control measures in 85 countries according to the core components proposed by the WHO pointed out that the global hand hygiene rate was 50%, higher than the results of this study. Higher percentages were observed among developed countries, but there was no statistical difference between the groups of participating countries,

indicating that adherence to hand hygiene remains a global challenge.<sup>13</sup>

When evaluating by professional category, the best result was attributed to nurses (39.5%) and the lowest adherence was found among doctors (24.0%). It is worth noting that these two categories showed a difference of more than 10% between them. Studies have corroborated these findings, highlighting nurses with the highest adherence (66.6%), followed by nursing technicians (50.6%) and finally resident doctors (41.3%). This is attributed to the fact that the literature shows greater participation of the nursing team in the training proposed by health services, which promotes awareness in the execution of the technique during patient care.<sup>6,11</sup>

Regarding the behavior of professionals, the practice of zero adornment has been disseminated and implemented in various institutions. The study participants did not use adornments during their work activities (81.0%). In line with these results, a survey conducted in Brazil indicated the absence of adornments among 93.8% of professionals, emphasizing that this practice has been effective.<sup>14</sup> Another study conducted in different countries showed variation in behavior attributed to non-use of adornments in emergency services, with 100% in Denmark, 70% in Sweden, 45% in Finland, and 29% in Australia.<sup>15</sup> Among these components, health education impacts adherence, since it allows for updating and improvement of professionals' knowledge regarding the subject.

Regarding adherence to the five recommended moments for hand hygiene (HH), the worst results were attributed before performing aseptic procedures (24.0%). This data is lower than that found in a study conducted in Ethiopia, in which 36.3% of professionals reported that they sanitized

their hands before procedures.<sup>16</sup> Adherence rates lower than those found in this investigation have been reported internationally, ranging from 2.0% to 11.0%.

Hand hygiene before patient contact showed low adherence by the team, reaching about a quarter of the participants (27.0%). Another study highlighted similar results with only 23.1% of professionals.<sup>16</sup> These data differ from cross-sectional studies conducted in Brazil in neonatal ICU services, which presented values above 65%.<sup>12,14</sup> On the other hand, a survey involving emergency services in four countries identified adherence to HH before patient contact in only 3.0% of opportunities, ranging from zero to 5.0%.<sup>15</sup>

After patient contact was the moment that obtained the highest adherence to HH in this study (41.79%), approaching double the adherence found before patient contact (24.0%). The same trend was reported by other researchers, achieving results of up to 30.0%.<sup>10,15</sup> It is inferred that the higher adherence can be attributed to professional self-protection and the fear of being colonized by microorganisms during direct patient care.

Therefore, there is a tendency for higher adherence to HH after patient contact. Studies conducted in critical sectors have reported higher values, ranging from 60.9% to 88.7%.<sup>12,14</sup> Overall, the adherence rate to hand hygiene after exposure to bodily fluids found (37.2%) was higher than that found in neonatal ICU (4.9%) and emergency medical services in four countries (9.0%).<sup>12,15</sup>

Regarding the consumption of alcohol-based hand rub and liquid soap for hand hygiene (HH) in this study, an average consumption of 4.8 ml and 4.6 ml, respectively, was found. The WHO's recommendations indicate a minimum expected consumption of 20 ml per patient-day for alcohol-based hand rub. However, it is worth noting that there is still no standardized ideal value in the literature that should be used in emergency departments, as the denominator is related to the number of patient visits per day. For

this reason, we cannot affirm that there was low consumption of supplies in the unit responsible for conducting this research.

The choice of using alcohol-based hand rub for HH was also observed globally, reaching 27.6%, ranging from 10.0% to 40.9%.<sup>13</sup> As it is a fundamental input associated with the technique's performance, the need to constantly monitor its use in healthcare services as an important care indicator is understood.

A study that compared the consumption of alcohol-based hand rub in a teaching hospital before and after the COVID-19 pandemic recorded a significant increase in the post-pandemic period.<sup>17</sup> It is believed that the care experience during the public emergency period may have influenced healthcare professionals' behavior in different scenarios regarding the HH procedure, including the emergency department. However, in any context where concern for HH is not encouraged by top management, adherence and behavior towards HH may be reduced.

Some factors related to the use of alcohol-based hand rub may contribute to low adherence to HH, such as strong odor with unpleasant characteristics, perception of sticky hands after use, exacerbation of dermatological changes, and hypersensitivity to alcohol or other additives present in some preparations. In addition, some glove powders in contact with alcohol-based hand rub can leave residues on healthcare professionals' hands.<sup>18</sup>

This research is unprecedented in presenting the consumption of alcohol-based hand rub and liquid soap in the emergency department, as WHO and ANVISA manuals and epidemiological studies do not highlight indicators in this unit using the denominator of visits per month. For this reason, the formula defined during data analysis represents the reality of the sector and allows comparisons in the literature. Another contribution involves the dissemination of multifaceted information about low adherence to hand hygiene, which will support the construction of guidelines aimed at educating healthcare professionals about hand hygiene, in order to achieve

higher levels that influence patient safety in emergency services.

Methodological characteristics related to the cross-sectional design are identified as limitations of the study. Additionally, because the study's setting is a service with specific characteristics, these pieces of information need to be considered when evaluating the findings. Furthermore, the non-probabilistic sample does not allow for the generalization of results.

## CONCLUSION

The assessment of HM practices in emergency departments reveals low adherence to the five moments recommended by the WHO. The data indicate the need to increase the frequency of hand

hygiene before performing aseptic procedures and before patient contact, especially among physicians. However, the behavior of healthcare professionals showed a favorable scenario for not wearing jewelry in the service. It is necessary to implement awareness-raising strategies among professional categories, since the participants' performance showed insufficient results. Nurses achieved good adherence, but the overall rate is still below ideal. The role of all healthcare professionals requires recognizing this measure as essential and indisputable for the prevention and control of HAIs, even considering emergency departments as a sector of rapid care, but one that requires the same concern when compared to any other care sector.

## RESUMO

**Introdução:** Os profissionais de saúde atuantes no pronto atendimento realizam a higiene de mãos em poucas oportunidades de contato com o paciente e/ou áreas próximas. **Objetivo:** verificar adesão e comportamento dos profissionais de saúde em relação às práticas de higienização das mãos no pronto atendimento. **Delineamento:** Estudo transversal, descritivo, de natureza quantitativa realizado com 39 profissionais de saúde atuantes em pronto atendimento. Os dados foram analisados por estatística descritiva e regressão linear múltipla. **Resultados:** Foram realizadas 230 observações ao longo dos plantões diurno e noturno. A maioria não utilizava adornos durante a jornada de trabalho (81,0%). A taxa de adesão foi 33,0%, obtendo a menor frequência antes de realizar procedimentos assépticos (24,0%) e antes do contato com o paciente (27,1%). Enfermeiros se destacaram entre os profissionais avaliados (39,5%). Não houve diferença estatística entre os produtos utilizados para higiene das mãos e a taxa de adesão ( $p=0,20$ ). **Implicações:** É preciso implementar estratégias de sensibilização para a higienização das mãos entre as categorias profissionais, visto que o desempenho dos participantes foi baixo.

## DESCRITORES

Desinfecção das Mãos; Serviços Médicos de Emergência; Profissionais de Saúde; Segurança do Paciente; Infecção Hospitalar.

## RESUMEN

**Introducción:** Los profesionales de la salud que trabajan en atención de emergencia realizan la higiene de manos en pocas oportunidades de contacto con el paciente y/o áreas cercanas. **Objetivo:** verificar la adhesión y el comportamiento de los profesionales de la salud en relación a las prácticas de higiene de manos en atención de emergencia. **Delineación:** Estudio transversal, descriptivo, de naturaleza cuantitativa realizado con 39 profesionales de salud que trabajan en atención de emergencia. Los datos fueron analizados por estadística descriptiva y regresión lineal múltiple. **Resultados:** Se realizaron 230 observaciones a lo largo de los turnos diurno y nocturno. La mayoría no utilizaba adornos durante la jornada laboral (81,0%). La tasa de adhesión fue del 33,0%, obteniendo la menor frecuencia antes de realizar procedimientos asépticos (24,0%) y antes del contacto con el paciente (27,1%). Los enfermeros se destacaron entre los profesionales evaluados (39,5%). No hubo diferencia estadística entre los productos utilizados para la higiene de manos y la tasa de adhesión ( $p=0,20$ ). **Implicaciones:** Es necesario implementar estrategias de sensibilización para la higiene de manos entre las categorías profesionales, ya que el desempeño de los participantes fue bajo.

## DESCRIPTORES

Desinfección de las Manos; Servicios Médicos de Urgencia; Personal de Salud; Seguridad del Paciente; Infección Hospitalaria.

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#### **CONFLICTS OF INTEREST**

There are no conflicts of interest to declare.