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INFRASTRUCTURE AND HAND HYGIENE COMPLIANCE INDICATORS IN AN INTENSIVE CARE UNIT

INFRAESTRUTURA E INDICADORES DE ADESÃO À HIGIENE DAS MÃOS EM UNIDADE DE TERAPIA INTENSIVA

INFRAESTRUCTURA E INDICADORES DE ADHESIÓN A LA HIGIENE DE MANOS EN UNIDAD DE TERAPIA INTENSIVA

Alaíde Francisca de Castro[1]
Maria Cristina Soares Rodrigues[2]

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Objective: assess infrastructure and measure hand hygiene compliance indicators in an intensive care unit. Method: Descriptive, exploratory case study, using three structured instruments to record the characteristics of the professionals, infrastructure in the unit and hand hygiene compliance. A chi-square test was applied. Results: the alcohol-based handrub formulations were insufficient and the taps were inappropriate. A total of 516 hand hygiene opportunities were monitored and, of these, hands were washed 337 times, corresponding to a mean compliance of 65.3%, mostly with routine washing. Compliance differed among professionals: physicians had the highest rate (77.9%), followed by physical therapists (73.8%), nurses (72.1%) and nursing technicians (57.7%). The moments prior to touching patients and before clean/aseptic procedures had the lowest compliance rate. There was greater compliance in the morning shifts, and no differences were noted between the days of the week. Conclusion: insufficient infrastructure was reflected in low hand hygiene compliance.

Descriptors: Hand Hygiene. Intensive Care Units. Health Assessment. Care Standard. Patient Safety.

Objetivo: avaliar a infraestrutura e medir indicadores de adesão à higiene das mãos em Unidade de Terapia Intensiva. Método: estudo de caso descritivo-exploratório, utilizando três instrumentos estruturados para registrar as características dos profissionais, a infraestrutura disponível e a adesão à higiene das mãos. Aplicado teste Qui-quadrado. Resultados: as preparações alcoólicas eram insuficientes e as torneiras inadequadas. Foram monitoradas 516 oportunidades de observação e ocorreram 337 ações de higiene das mãos, obtendo-se média de adesão de 65,3%, majoritariamente higiene simples. Existiu diferença da adesão entre os profissionais, com maior taxa dos médicos (77,9%), seguida dos fisioterapeutas (73,8%), enfermeiros (72,1%) e técnicos de enfermagem (57,7%). O momento anterior ao contato com o paciente e antes da realização de procedimentos assépticos apresentaram menor adesão. Evidenciada maior adesão durante a manhã, e sem diferença entre dias da semana. Conclusão: a infraestrutura insuficiente refletiu na baixa adesão à fricção antisséptica.

Descritores: Higiene das Mãos. Unidades de Terapia Intensiva. Avaliação em Saúde. Padrão de Cuidado. Segurança do Paciente.

[1] Nurse. Master's degree in nursing. Head of the Nursing Division. University Hospital of Brasília. Brasília, Federal District, Brazil. castroalaide@gmail.com
[2] Nurse. PhD in health sciences. Postdoctorate. Associate professor in the Nursing Department and Graduate Studies Program in Nursing of the University of Brasília. Brasília, Federal District, Brazil.

Objetivo: evaluar la infraestructura y medir indicadores de adhesión a la higiene de manos en Unidad de Terapia Intensiva. Método: estudio de caso descriptivo-exploratorio, utilizando tres elementos estructurados para registrar las características de los profesionales, la infraestructura disponible y la adhesión a la higiene de manos. Aplicado test Chi-cuadrado. Resultados: las preparaciones alcohólicas eran insuficientes; los grifos, inadecuados. Fueron monitoreadas 516 oportunidades de observación, ocurriendo 337 acciones de higiene de manos, obteniéndose promedio de adhesión de 65,3%, mayoritariamente higienes simples. Existió diferencia de adhesión entre profesionales, con mayor tasa en médicos (77,9%), seguidos por los fisioterapeutas (73,8%), enfermeros (72,1%) y auxiliares de enfermería (57,7%). El momento anterior al contacto con el paciente y antes de realizar procedimientos asépticos presentaron menores adhesiones. Evidenciada mayor adhesión durante la mañana, sin diferencia entre días de la semana. Conclusión: la infraestructura insuficiente se reflejó en la baja adhesión a la higiene antiséptica.

Descriptores: Higiene de las Manos. Unidades de Cuidados Intensivos. Evaluación en Salud. Nivel de Atención. Seguridad del Paciente.

Introduction

Healthcare-associated infections (HAIs) are a major problem in public health, in that they are adverse events that jeopardize patient safety. It is currently estimated that at least ten out of every hundred inpatients in developing countries and seven in developed countries will contract a healthcare-associated infection[1]. In Brazil and the Federal District, HAI rates in intensive care units (ICU) by multidrug-resistant microorganisms are very high and alarming[2-3]. The rates of HAIs associated with the use of invasive devices ranged from 4.6 to 13.6 per 1,000 devices/days in Brazilian ICUs in 2016. Antimicrobial resistance identified among microorganisms involved in primary bloodstream infections varied from 9.9 to 85.8%[2].

Among the main measures recommended by the World Health Organization (WHO) is fighting antimicrobial resistance through prevention of HAIs and cross-transmission of microorganisms in hospital environments, particularly in care areas with critical patients, such as intensive care units[1].

Since improved compliance with standard precautions and, in specific cases, special precautions by health professionals are known to be the most successful way of reducing HAIs and cross-transmission of microorganisms, managers must make efforts to make adjustments to infrastructure and perform detailed analyses of indicators that measure these practices[1-5].

Standard precautions are used in the care of patients, products, equipment and surfaces, such as: hand hygiene by health professionals; proper use of personal protective equipment; placing patients in locations according to risk; respiratory hygiene or cough etiquette; safe handling/collection of clothing, waste and sharps; adequate cleaning and disinfection practices in relation to articles, equipment and surfaces; and safe injection management practices[4-5]

There are four recommended types of hand hygiene: routine handwash with liquid soap and water; antiseptic handrub with alcohol-based formulations, considered the gold standard; antiseptic handwash; and surgical antisepsis. The type of hand hygiene chosen depends on the degree of invasiveness of the procedure that will be performed on the patient and the presence or not of dirt on the hands. Hands, fingernails, and wrists must not have any adornments, since the four different techniques involve full washing of all parts of the hands and fingers[6].

The necessary infrastructure in ICUs are sinks for hand hygiene, with non-hand operated taps, supplied with liquid soap, antiseptic and paper towels. All beds must be equipped with alcohol-based handrub formulations within arm's reach of professionals, either in the form of dispensers on the wall or at the foot of the bed, or in mobile bottles that can be placed on carts, counters or in one's pocket. Important best practices strategies include training and reminders

about the importance of hand hygiene in the workplace, as well as instructions on techniques and moments[6].

Despite scientific evidence on the impact of good hand hygiene practices on preventing HAIs, the compliance of health professionals is low. Hand hygiene compliance has been studied in different parts of the world and has indicated that it is lower than 40%. In developing countries, publications indicate a high variance in hand hygiene compliance rates. In some services, for example, very low rates (10%) were found[4-9].

In Brazil, the National Health Surveillance Agency (ANVISA) stipulates that ICUs must have a minimum care team, composed of one physician, one nurse and one physical therapist for every ten patients, one nursing technician for every two patients, as well as a staff physician in the morning and afternoon periods[10].

According to the WHO, teams trained in health facilities with adequate physical infrastructure and resources for hand hygiene are able to achieve over 60% compliance. Some services, mainly in neonatal and pediatric care, can obtain compliance rates exceeding 80%[6]. A 2018 study assessed infection rates and found they decreased substantially when teams with already high hand hygiene compliance rates were able to boost these rates to approximately 95%[11].

Within the context of patient safety, failure by health professionals to perform hand hygiene before a care procedure is considered a violation. A violation is a deliberate divergence from a surgical procedure, standard or rule, usually intentional, though rarely malicious, which become a routine or automatic in specific contexts[12].

The WHO Multimodal Strategy for improving hand hygiene compliance has been widely implemented in the world in different forms and contexts, with highly varying results. However, a study pointed out that studies have still been unable to determine the best strategy for raising and maintaining high hand hygiene compliance rates among health professionals[13]. The method for measuring hand hygiene compliance in the WHO strategy involves direct observation of care practices by trained professionals, using a specially developed form for this purpose[6,14]. This method is influenced by the Hawthorne effect, which refers to a change of attitude in people when they know they are being observed[14-15].

During the provision of care, there are hand hygiene indications and opportunities that arise as procedures occur. In making it easier for professionals to understand, hand hygiene is summarized into five moments: before touching a patient; before clean/aseptic procedures; after body fluid risk; after touching a patient; and after touching patient surroundings[6,14].

In contexts of high HAI rates, which are considered result indicators, it is necessary to assess the structure and process indicators involved, especially in university hospitals, which serve as places for preliminary and continued training of students, residents and health professionals. This led the researchers to pose the following question: What hand hygiene infrastructure is available and what is the compliance rate of professionals in ICUs of teaching hospitals?

In view of the study justification and question, the objective was to assess handwashing infrastructure and measure hand hygiene compliance in an intensive care unit.

Method

This was a descriptive and exploratory case study, with a quantitative approach, conducted from September to December 2015, in a large teaching hospital in the city of Brasília (Federal District, Brazil). The study site chosen was an adult ICU with 18 beds, at which time only 10 of the beds were active and allocated to caring for clinically acute and surgical patients. The site was chosen because it had high HAI rates and frequent presence of patients colonized and/or infected by multidrug-resistant microorganisms, as is common in Brazilian ICUs.

The study was conducted in four stages: the research team went to the field and the free

and informed consent forms were signed; a questionnaire was administered to characterize the professionals participating in the study; the observer was trained; and infrastructure and hand hygiene compliance were checked.

Health professionals from the permanent ICU staff were included in the study, comprised of 55 employees who agreed to participate in the study: intensive care physicians (n=9; 16.3%), nurses (n=10; 18.1%), physical therapists (n=5; 7.2%) and nursing technicians (n=31; 58.1%). Staff members on medical leave, holidays or otherwise absent during the data collection period were excluded. A total of three professionals (5.4%) were excluded.

Three instruments were applied. The first was a structured, self-administered questionnaire for collecting variables related to the study participants, administered by the main researcher to the ICU professionals after they had accepted the invitation to participate in the study. To record the direct observation of hand hygiene compliance, a validated form or type of checklist was used, from the WHO Multimodal Hand Hygiene Improvement Strategy, found in the "Guide to Implementation: WHO Multimodal Hand Hygiene Improvement Strategy", from the Pan American Health Organization and ANVISA[6,12]. In order to reduce the Hawthorne effect (the main limitation of the study), a research assistant whom the professionals from the unit did not know was trained to apply the compliance form and infrastructure questionnaire.

In accordance with the WHO guidelines, the compliance observation sessions lasted 20 to 30 minutes each, were distributed between the morning (n=15; 34.8%), afternoon (n=18; 41.8%) and night (n=10; 23.2%) shifts and took place three to four times a week from October to December 2015. To collect the data, the observer stationed himself in the middle of the ICU and started the observation session, in a non-participatory way but, at the same time, not hiding his presence. Observation of care practices was done one professional at a time, randomly selected by whichever one started giving care to a patient or performed hand hygiene. The names of those observed were recorded on the form for controlling the number of observations. The professionals were observed individually in three to five hand hygiene opportunities, to enable the largest number of participants to be represented and, thereby avoid biases in the selection of shifts and people.

The observations of care procedures identified and recorded whether hand hygiene occurred when the professionals had the opportunity to do it, and whether the right technique was used. A hand hygiene opportunity arises whenever one or more of the five moments occurs, i.e.: before touching a patient; before clean/aseptic procedures; after body fluid risk; after touching a patient; and after touching patient surroundings.

The number of opportunities observed was obtained by convenience sampling. Therefore, the opportunities that arose could be observed during the established period and schedule for the data collection. The compliance rate was calculated with a formula, where the numerator represented the number of hand hygiene operations performed using the full technique, and the denominator corresponded to the number of hand hygiene opportunities observed, multiplied by 100.

The observations of the infrastructure, such as availability of materials and personnel, were recorded on another structured, checklist-type questionnaire, built and adapted on the basis of the validated indicators from the "Manual for Evaluating the Quality of Hospital Infection Control Practices"[16]. At the end of each compliance observation session, the infrastructure questionnaire was filled out by the observer.

The distribution of handwashing stations, among those in operation, was composed of four sinks on the sides of the nursing station, which occupied the center of the unit, two basins on the sides of the drug preparation counter, one sink in the sluice room, one in the isolation room and one in the area of the isolation room bathroom.

The taps of the sinks were pressure-activated, eliminating the need for hand contact, and the

basin taps were turned on and off manually. In total, there were nine sinks and two basins, which were sufficient to comply with national regulations. All the sinks and basins were equipped with disposable, refillable liquid soap dispensers and paper towels, except for one. The two basins also had containers with chlorhexidine gluconate antibacterial cleanser.

The alcohol-based handrub formulations were supplied in gel form in disposable, refillable dispensers attached to the walls, totaling five dispensers in the inner part of the unit. There was only one dispenser at the point of care, attached to the wall next to bed three; the other dispensers in the unit were attached to columns distributed along the path between the beds and the nursing station, all at a distance of more than two meters from the beds.

There was a board with routine handwashing instructions and a poster with a phrase to encourage hand hygiene compliance. On one column, there was a folder with guidelines for standard and special precautions. Four institutional documents with guidelines on precautions and epidemiological surveillance routines for multidrug-resistant microorganisms were available for consultation in the unit, in printed and electronic formats.

The data was input into EPIINFO Version 3.5.1 and Excel Version 7.0, of Microsoft. The absolute frequencies of the responses were calculated, and the chi-square independence test (χ^2) was applied when pertinent. Yates correction was necessary in some situations, due to the small number of observations, when stratified by the four professional categories and five indications/ moments. Afterwards, the descriptive level (or p-value) was calculated, where a value of $p<0.05$ was considered significant.

The project was approved by the Human Research Ethics Committee of the Faculty of Health Sciences of the University of Brasília, under No. 1.188.047/2015. The health professionals expressed their agreement to participate in the study by filling out a free and informed consent form, and secrecy and anonymity were ensured.

Results

A total of 52 professionals participated in the study: 29 (55.7%) nursing technicians, 10 nurses (19.2%), 9 physicians (17.3%) and 4 physical therapists (7.7%). The majority were women (n=34; 65.3%), ranged in age from 30 to 49 years (n=29; 55.7%), had been exercising their profession from 6 to 10 years (n=19; 36.5%) and worked up to 40 hours a week (n=31; 59.6%).

Among the four professional categories assessed, most of the participants (n=50; 96.1%) reported having received hand hygiene training during their academic studies. As for training at work, only four physicians (44.4%) said they had received some; among the other categories, the majority (n=40; 93%) said they had received some. The statistical analyses did not indicate any significant difference ($\chi^2$0.097, p=0.99).

The availability of hand hygiene products was assessed in 36 observation sessions. The supply of liquid soap and alcohol-based handrub formulations was irregular; in the majority of the sessions (n=24; 66.6%), there was an empty liquid soap dispenser and depleted alcohol-based formulation dispenser (n=27; 75%).

Use of adornments was high among all the care categories of the ICU team. Only in four sessions (11.1%) were there no professionals with adornments on their hands.

With respect to the number of human resources by professional category, there were no staff physicians in the total (100%) and no physical therapist in just one observation session (2.7%). In most of the sessions, however, there were more professionals than the required minimum, distributed as follows: nurses, in 13 sessions (36.1%); physical therapists, in 12 sessions (33.3%); and nursing technicians, in 32 sessions (88.8%).

A total of 516 hand hygiene opportunities were monitored, out of which hand hygiene was performed 337 times, corresponding to a compliance rate of 65.3%. The results are presented in Table 1. In two situations, $p<0.01$ was obtained, demonstrating a dependency between compliance rate and hand hygiene

indications (five moments) and in relation to the professional categories. However, in regard to days of the week and shift, the difference was not significant.

Table 1 – Hand hygiene compliance of professionals working in direct patient care, in the intensive care unit of the teaching hospital. Brasília, Federal District, Brazil – 2015 (N=52)

Variables	Number of opportunities (n)	Number of times hands were washed (n)	Hand hygiene compliance rate (%)	p-value
Indications/opportunities/five moments				
Before touching a patient	117	47	40.1	<0.0001
Before clean/aseptic procedures	77	22	28.5	
After body fluid risk exposure	148	129	87.1	
After touching a patient	136	114	83.8	
After touching patient surroundings	73	48	65.7	
Professional category				
Nursing Technician	279	161	57.7	0.001
Nurse	104	75	72.1	
Physician	68	53	77.9	
Physiotherapist	65	48	73.8	
Day of the week				
Monday	103	65	63.1	0.28
Tuesday	73	42	57.5	
Thursday	225	156	69.3	
Friday	115	74	64.3	
Shift				
Morning	187	133	71.1	0.10
Afternoon	209	128	61.2	
Night	120	76	63.3	
Total	**516**	**337**	**65.3**	

Source: Created by the authors.

Since the compliance rates by professional category were varied and significant for □=1% and there was no significance by work shifts, it was decided to analyze the compliance of each professional category in each work shift separately. The compliance of nursing technicians varied significantly between the morning (72.2%), afternoon (50.4%) and night (45.5%) shifts. Among nurses, there was also significant variation in the morning (75%), afternoon (61.1%) and night (92.3%) shifts. Compliance of physicians varied from 67.6% in the morning shift to 90% in the afternoon and 85.1% at night. Physical therapists had compliance rates of 66.6% in the morning, 78.1% in the afternoon and 75% at night. A significant correlation with $p<0.01$ was noted for the afternoon ($p=0.003$) and night ($p=0.0003$) shifts, due to the low compliance of nursing technicians on these shifts.

To increase sensitivity and supplement the analyses, the work shifts were assessed individually, by professional categories. In this case, there was a dependency ($p<0.05$) between nurses and work shifts, with higher compliance among night shift nurses (92.3%).

Discussion

The information regarding the characteristics of the multiprofessional team studied were as follows: in relation to age, more than half (55.7%) of the professionals were in the age group of 30 to 40 years; more than one-third (36.5%) had 6 to 10 years of experience in the profession; the majority had only one or two places of employment (59.6% reported only working up to 40 hours a week) and were knowledgeable about precautions (96.1% had received academic training and 93% received training at work), which are positive aspects for better hand hygiene compliance[6,14].

In terms of infrastructure, the number and distribution of hand hygiene facilities were in accordance with best practices. However, the taps of the basins in the ICU did not meet the non-hand activation requirement.

One of the five golden rules of hand hygiene is that it should be performed at points of care, understood as the place where health professionals give care to patients. Therefore, all beds should be equipped with alcohol-based handrub formulations within arm's reach of professionals. In relation to the inadequate location and amount of alcohol-based handrub formulation dispensers noted in the study, it should be pointed out that in ICUs where beds are separated by curtains, other means of providing alcohol-based formulations are indicated, such as in mobile bottles that can be placed on carts, counters or in people's pockets, or also, attached to the foot of beds[6,14].

Standardization of systematic routines for filling dispensers is also necessary, to avoid them from becoming empty. Structural problems related to the number and quality of hand hygiene stations and products were frequently cited in the literature as being associated with low hand hygiene compliance[6,8,14].

Reminders about the importance of hand hygiene in the workplace, as well as instructions on techniques and indicated moments, were mentioned as being important for improvement strategies[6.14]. In the unit studied, such reminders were insufficient. In critical care areas, such as ICUs, papers or posters should not be attached to walls, since they cannot be cleaned. For these areas, it is recommended that signage be made out of cleanable materials, such as acrylic or plastic boards.

The quality of the hand hygiene technique is impaired when adornments are worn on the hands, such as rings, bracelets, watches or artificial nails[6,14]. Proper hand hygiene cannot be performed when adornments are used. In the ICU being assessed, in most of the observation sessions, there were health professionals in all the categories who had some adornment on their hands, the most common being wedding rings and rings. In the present study, during the hand hygiene compliance assessment, an observation opportunity was considered to be when professionals performed the full hand hygiene technique, but the presence of adornments on their hands compromised hand hygiene quality.

As for the assessment of the amount of human resources, the main insufficiency noted was the lack of a staff physician. In contrast, there were a large number of nurses and nursing technicians. In the case of physical therapists, the distribution of these professionals on the shifts and workdays was not proportional to the number of beds occupied, which led to a difference in one observation session. The redistribution of professionals on work shifts should prioritize the needs of the service. Lack of human resources in adequate numbers and qualification was pointed out as one of the main hindrances to compliance with best practices and specific care protocols[4-6,14].

The hand hygiene compliance rate in the unit, verified through direct observation, was higher than those in three other national studies where compliance was 26.5% and 43.7% [8-9,17]. This compliance rate is higher than the general mean in other hospital departments, and is compatible with or lower than the rates found in other studies that assessed hand hygiene compliance in ICUs, when working with patients with and without contact precautions[11,18-19].

Findings related to differences in compliance among professional categories showed that the compliance rate was highest among physicians, followed by physical therapists and nurses, and the lowest was among nursing technicians. This differed from other studies conducted in ICUs, which identified lower compliance rates among physicians[7,18-21]. However, in Brazil, another study also found a higher compliance rate among physicians and nursing assistants and a lower rate among physical therapists[8]. A more recent national study from 2015 found a very low hand hygiene compliance rate of 43.7%, with higher compliance among physical therapists and lower compliance among nursing technicians[17]. Lower compliance rates in afternoon and night shifts was also noted in other studies[17,20].

In relation to the type of hand hygiene performed by the professionals in the ICU of the teaching hospital, it was predominantly with soap and water, similar to the findings of studies in other ICUs in Brazil[8,17].

Routine handwashing with soap and water or antiseptic handwashing with water and an antibacterial cleanser were the types of hand hygiene that predominated in care practices until 2002, at which time data was published indicating the superiority of alcohol-based handrub formulations for hand hygiene. Afterwards, in 2005, with the launch of the WHO Multimodal Strategy, which prioritized hand hygiene in health care with alcohol-based handrub formulations, the use of these products started being incorporated into Brazilian health services. ANVISA only made it obligatory to use alcohol-based formulations for hand hygiene in hospitals in 2010.

Greater experience with and the habitual use of soap and water for handwashing may by one of the reasons for the preference of health professionals to use the routine handwash technique. Another reason pointed out was related to the type of procedure gloves used in the health service being studied, which were latex and had a small amount of talcum powder. The presence of talcum powder on the hands, after removal of the gloves, does not permit the use of alcohol-based formulations and requires professionals to use soap and water. Antiseptics should also be available at the sinks, since the majority of the patients in the unit required contact precautions.

Another reason for low compliance in the use of alcohol-based handrub formulations was their low availability in the unit. Apart from being available in dispensers attached to the wall, generally outside the point of care, they were also located close to the sinks and were often empty.

The first two hand hygiene moments (before touching a patient and before clean/aseptic procedures) are directly linked to protecting patients from HAIs, and the other three moments are linked to the protection of professionals and/or reducing contamination in the environment. In the ICU studied, the first two moments had significantly lower compliance rates than the rest, which suggests that the professionals were more committed to their own safety.

Assessments of work processes through direct observation has advantages and disadvantages, which have been discussed in the literature by different authors and institutions[6-8,11-15]. The Hawthorne effect, which refers to a change in people's behavior when they know they are being observed, is the most recognized limitation of the direct observation method. However, the present study sought to minimize this through the participation of a trained research assistant not connected to the institution. The limitations were overcome, because a standardized and uniform method was used for the data collection, and also avoiding biases in the selection of shifts or people, since the observations were performed on all the shifts of the workday and the number of observations were distributed among the participants.

Therefore, this study makes important contributions to the field of nursing and health surveillance, since it enabled arriving at particular conclusions about the unit under assessment, which indicated limited infrastructure for hand hygiene compliance on part of the professionals. Consequently, the study provides further

knowledge on the topic investigated in this scientific area in Brazil. In addition, an instrument was created for carrying out the study which can be used as an auxiliary tool in observational monitoring of availability of inputs and use of PPE in Brazilian hospitals.

An important reflection converging with the thoughts of researchers on the current agenda of studies and discussions on patient safety and health promotion is that the culture and climate of safety must be a part of care environments, so that they provide safe conditions for planning continuous improvement actions with adequate physical infrastructure, human resources, materials and equipment for carrying out safe health activities[23]. From this perspective, the senior management of the teaching hospital in question, based on the premise of involvement and engagement of the health managers and care professionals in the unit studied, needs to focus on actions that will provide safer and high quality care, such as: educational measures and training, in addition to indispensable improvement of the infrastructure.

Conclusion

When assessing age, length of time in the profession, weekly working hours and participation in educational initiatives and training, it was found that the set of information collected on the characteristics of the multiprofessional team from the ICU of the teaching hospital in the Federal District is conducive to better performance in relation to hand hygiene compliance. However, limitations were detected in human resources, such as the absence of a staff physician, as well as in the infrastructure, such as hand-activated sink taps, and the availability of hand hygiene products, which were not adequate or sufficient, as well as lack of alcohol-based handrub formulations within arms' reach of the beds.

The mean hand hygiene compliance rate was 65.3%, and routine handwashing was the main technique used. There was a statistically significant difference in compliance among the professional categories, i.e., there was a higher compliance rate among physicians, followed by physical therapists and nurses, and the lowest rate was observed among nursing technicians. Although statistically significant differences were noted in the compliance rate of nursing technicians in the afternoon and night shifts, there were none in relation to days of the week. The moments corresponding to before touching a patient and before clean/aseptic procedures had the lowest compliance rate.

The inadequacies related to infrastructure and human resources, as well as insufficient supplies, may have had a bearing on low compliance in antiseptic handrubs with alcohol-based formulations, considered the gold standard. At the same time, the direct observation technique used for the data collection may have been a limitation in the study due to the Hawthorne effect. However, the results depict the overall scenario, behavior and practices of the professionals which provide relevant indicators of the infrastructure and processes in the unit studied, in light of the importance of the continuous challenge to boost hand hygiene compliance and reduce HAIs and cross-transmission of microorganisms, especially in critical care units.

Collaborations:

1. conception, design, analysis and interpretation of data: Alaíde Francisca de Castro and Maria Cristina Soares Rodrigues;

2. writing of the article and relevant critical review of the intellectual content: Alaíde Francisca de Castro and Maria Cristina Soares Rodrigues;

3. final approval of the version to be published: Alaíde Francisca de Castro and Maria Cristina Soares Rodrigues.

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