USE OF ALCOHOL-BASED HAND SANITIZER FOR HAND HYGIENE

USO DA PREPARAÇÃO ALCOÓLICA PARA HIGIENIZAÇÃO DAS MÃOS

USO DE PREPARACIÓN ALCOHÓLICA PARA HIGIENE DE MANOS

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ABSTRACT

Objective: to determine nursing professionals' knowledge about alcohol-based hand rub for hand hygiene. **Method:** descriptive, exploratory and quantitative study conducted with 27 nursing professionals of a hospital belonging to a private health plan provider, who completed a semi-structured questionnaire. The level of knowledge was assessed based on the index of positivity. Correct answers $\geq 80\%$ were considered satisfactory. The results are presented in tables. **Results:** for questions addressing the full coverage of hands with the product and the need of drying the hands after rubbing, the knowledge was satisfactory (92.6% and 85.2%, respectively); however, for the minimal time required by the procedure and need of having the hands dried prior to the procedure, the answers were unsatisfactory (18.5% and 59.3%, respectively). **Conclusion:** nursing professionals' level of knowledge was insufficient. This study draws attention to the need for continuing education on hand hygiene using alcoholic preparations in order to enhance patient safety. **Descriptors:** Patient Safety; Cross Infection; Infection Control; Health Personnel; Nursing Team; Hand Hygiene.

RESUMO

Objetivo: verificar o conhecimento de profissionais de enfermagem sobre a fricção antisséptica das mãos com preparação alcoólica. **Método:** estudo quantitativo, descritivo e exploratório realizado com 27 profissionais de enfermagem de um hospital de operadora de plano privado de saúde, que preencheram um questionário semiestruturado. O nível de conhecimento foi analisado com base no Índice de Positividade e considerado satisfatório quando os acertos foram $\geq 80\%$. Os resultados foram apresentados em tabelas. **Resultados:** para as questões sobre a cobertura das mãos com o produto e necessidade de secagem após fricção, o conhecimento foi satisfatório (92,6% e 85,2%, respectivamente); mas, para o tempo mínimo do procedimento e necessidade das mãos estarem previamente secas foi insatisfatório (18,5% e 59,3%, respectivamente). **Conclusão:** o conhecimento da equipe de enfermagem foi insuficiente. Este estudo chama a atenção para a necessidade de ações de educação permanente sobre higienização das mãos com a preparação alcoólica a fim de fortalecer a cultura de segurança do paciente. **Descritores:** Segurança do Paciente; Infecção Hospitalar; Controle de Infecções; Pessoal de Saúde; Equipe de Enfermagem; Higiene das Mãos.

RESUMEN

Objetivo: verificar el conocimiento de los profesionales de enfermería acerca del lavado de manos con preparación alcohólica. **Método:** estudio descriptivo, exploratorio y cuantitativo llevado a cabo con 27 profesionales de enfermería de un hospital perteneciente a una compañía privada de plan de salud, quienes respondieron un cuestionario semiestructurado. Se analizó el nivel de conocimiento basado en el índice de positividad y considerando satisfactorio $\geq 80\%$ de respuestas correctas. Los resultados se presentan en tablas. **Resultados:** para preguntas acerca de la cobertura completa de las manos con el producto y la necesidad de secado de ellas después del lavado, el conocimiento fue satisfactorio (92.6% y 85,2%, respectivamente); pero, sobre el tiempo mínimo de realización del procedimiento y la necesidad de que las manos estuviesen previamente secas fue insatisfactorio (18.5% y 59,3%, respectivamente). **Conclusión:** el conocimiento del personal de enfermería fue insuficiente. Este estudio llama la atención sobre la necesidad de educación permanente sobre la higiene de las manos con una preparación alcohólica con el fin de fortalecer la seguridad del paciente. Seguridad del Paciente; Infección Hospitalaria; Control de Infecciones; Personal de Salud; Grupo de Enfermería; Higiene de las Manos.

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INTRODUCTION

Health professionals' compliance with hand hygiene is one of the priorities focuses on safe and high quality healthcare promotion. In this way, both nationally and internationally, researchers, managers, and professionals working in the health field have investigated, discussed, created, and implemented strategies to perform this procedure properly in the necessary occasions in healthcare settings.

The term "hand hygiene" generally represents an action for preventing the transmission of microorganisms between patients and those involved in healthcare. Hand hygiene is worldwide recognized as a primary measure to be adopted for controlling healthcare-related infections.¹

Since the creation of the World Alliance for Patient Safety, in 2004, the World Health Organization has created programs and guidelines to sensitize and mobilize health professionals and the population, disseminating knowledge to allow changes in the world scenario. An example is the first global challenge launched by this initiative with the slogan "Clean care is safer care", focused on prevention and control of healthcare-related infections and health professionals' knowledge about hand hygiene.²

In line with the guidelines of the World Health Organization, the global challenge was agreed and implemented in Brazil by the National Health Surveillance Agency (ANVISA). In this context, the Ordinance No. 529 of 1st April 2013 implemented the National Program for Patient Safety, which established the need of creating and implementing protocols for patient safety in all Brazilian healthcare settings. In July 2013, the Ordinance No. 1,377 approved the Patient Safety Protocols, which included recommendations for hand hygiene.¹

It is recognized that, especially in hospitals, healthcare requires physical contact with patients/customers/users, because, to carry out their activities, health professionals often touch the patients, their utensils and equipment. For these reasons, their hands are the main vehicle for the transmission of infectious agents in the hospital environment. This way, to stop the cycle of cross-transmission of microorganisms between patients and

workers, it is necessary to adopt basic standards to guide the practice of hand hygiene.³⁻⁴

Basic standards for hand hygiene include: when this procedure should be performed; the product to be used; the description of the technique; and the appropriate duration of the procedure in accordance with each situation.^{1,2} With respect to monitoring health professionals' compliance with these requirements, the main healthcare departments point out hand hygiene as an important indicator of patient safety and quality healthcare.^{2,4}

Although hand hygiene has been widely discussed over the years, the technique and the products used have changed. This fact can be observed in the use of alcoholic preparations for antiseptic hand rub replacing conventional washing with soap and water in the following occasions: when hands are not visibly dirty; before and after touching the patients; after removing the gloves; and, also, before handling medications or preparing food.^{1,2}

Antiseptic hand rub with an alcoholic preparation is a type of procedure that lasts from 20 to 30 seconds. It is intended to reduce the microbial load in the hands and consists of the application of this product in sufficient amount to cover all areas of both hands. Therefore, there is no need to rinse the hands and dry them with paper towel or another type of material/equipment.^{1,4}

The advantages of using an alcoholic preparation include: the elimination of most germs; short time required to complete the procedure; easy provision of the product at healthcare units; better tolerability of skin; and little or no change in the physical structure of the facilities for installing dispensers.⁵

It is worth mentioning that only in 2010 ANVISA published the Resolution of the Collegiate Board No. 42, of 25th October, which establishes the obligation of health institutions to provide alcoholic preparations for antiseptic hand rub in the country.⁵ According to this resolution, the alcoholic preparation should be made available in healthcare units, in visible places with easy access and in a way that health professionals do not need to leave the site to sanitize their hands.⁵

Therefore, it is important to assess the knowledge of healthcare professionals regarding hand hygiene performed with an

alcoholic preparation, especially for nursing staffs, because these professionals provide direct and uninterrupted care to patients 24 hours a day.

Considering that hand hygiene is one of the main items for patient safety, and that compliance with this procedure is related to theoretical knowledge in daily practice,³ the present study becomes relevant, because the results can promote new studies, discussions, and changes in healthcare management, with positive repercussions for patients and health teams.

Taking into consideration that the effectiveness of hand hygiene depends on the duration of the procedure and the technique used,¹ the question is: Do nursing professionals know the technique of alcohol-based hand rub for hand hygiene?

OBJECTIVE

- To determine nursing professionals' knowledge about alcohol-based hand rub for hand hygiene.

METHOD

Quantitative, descriptive and exploratory study conducted in a hospital belonging to a private health plan provider, located in the northwest of the State of Paraná, Brazil. This hospital began operations in 2008 and currently has 23 beds for low and medium complexity hospitalizations in medical-surgical, maternal-and-child, and semi-intensive care units, in addition to seven observation beds in the emergency unit.

The nursing staff of this institution was composed of seven nurses and twenty-six nurse technicians, working 42 hours per week. We invited the nursing professionals that met the following criteria to participate in the study: a) being part of the nursing staff of the hospital; b) aged 18 years or older; and c) formally accept to participate in the study.

The data were collected from 27 professionals (six nurses and 21 nursing technicians), who completed a questionnaire containing questions relating to data on the participants (questions 1 to 12), the infrastructure of the hospital related to the availability of alcoholic preparation for the professionals (questions 14 and 15), and those specifically related to alcohol-based hand rub technique (questions 18 and 19), contained in the

instrument called Hand Hygiene Knowledge Test for Health Professionals.⁶

The data were collected and processed in spreadsheets by means of statistical analysis using the Statistical Package for the Social Sciences (SPSS) and Epilinfo 7.1.3™ softwares.²⁰ We used descriptive statistics to measure the dispersion of continuous variables, as well as frequencies and percentages of categorical variables. With respect to inferential statistics, we used Fischer's exact test (5% significance level) to assess the association between the number of correct answers and the professional categories (nurses and nurse technicians) and years spent in the nursing profession, which was dichotomized into lesser or greater using the average as a cut-off point (seven years).

Due to the lack of a parameter for assessing the health professionals' level of knowledge using the Hand Hygiene Knowledge Test for Health Professionals,⁶ we used the positivity index, which has been used in the field of nursing to assess healthcare quality.⁷ This index is interpreted from the number of positive answers (correct) as follows: desirable (100% positivity); adequate (90% to 99% positivity); safe (80% to 89% positivity); borderline (71% to 79% positivity); and poor (70% or less positivity).⁷ This way, we considered that 80% or a higher percentage of correct answers in each question was a satisfactory result.

The present study complied with all the ethical and legal aspects and the research project was approved by the Standing Research Ethics Committee for research involving humans of the State University of Maringá, PR, Brazil, Opinion No. 435,164/2013, and CAAE No. 22926613.1.0000.0104.

RESULTS

The participants of the study were three men (11.1%) and 24 women (88.9%) aged from 21 to 70 years (average = 33.3 years; standard deviation = 10.011 years). The years spent in the nursing profession were between three and 35 years (average = 7.3 years; standard deviation = 7.40 years) and the time spent working at the hospital ranged from one month to six years (average = 2.36 years; standard deviation = 1.78 years). Table 1 illustrates the distribution of answers to questions

relating to the infrastructure of the institution.

Table 1. Distribution of frequencies and percentages of the answers to the questions relating to the infrastructure of the institution. Paranavaí (PR), Brazil, 2014.

Question	Yes		No	
	n	%	n	%
14. Participation in training on hand hygiene.	2	9	2	7
	5	26		0.4
15. Availability of alcohol-based hand sanitizer at the institution.	2	1	-	-
	7	0		

It is worth mentioning that only one nurse (3.7%), who had worked in the profession for nine years and at the institution for three years, answered all the questions relating to specific knowledge

about alcohol-based hand rub for hand hygiene correctly. The distribution of the answers referring to the classification of the level of knowledge can be observed in Table 2.

Table 2. Distribution of answers and classification of nursing professionals' knowledge about alcohol-based hand rub. Paranavaí (PR), Brazil, 2014.

Question	No.	%	
18. Minimal time for destruction of most microorganisms in hands by alcohol-based hand sanitizer.			
a) 3 seconds	3	11.1	Poor
b) 10 seconds	9	33.3	
c) 20 seconds*	5	18.6	
d) 1 minute	10	37	
19a. Need of covering both hand surfaces with alcohol-based hand sanitizer,			
True*	25	92.6	Adequate
False	2	7.4	
19b. Need of having both hands dried before using alcohol-based hand sanitizer.			
True*	16	59.3	Poor
False	11	40.7	
19c. It is allowed to dry the hands with paper towels after alcohol-based hand rub.			
True	4	14.8	Safe
False*	23	85.2	

Note. *Correct answer

The results of Fisher's exact test indicated that there was no statistically significant association between the professional category—or years spent in the

nursing profession—and the number of correct answers to questions relating to alcohol-based hand rub for hand hygiene (Table 3).

Table 3. Association between correct answers relating to the use of alcohol-based hand rub for hand hygiene. Paranavaí (PR), Brazil, 2014.

Question	Category		p value	Years spent in the nursing profession		
	N	NT		<7 years	>7 years	p value
	No. (%)	No. (%)		No. (%)	No. (%)	
18	2 (33.3)	3 (14.3)	0.303	3 (16.7)	2 (22.2)	1
19a	6 (100)	19 (90.5)	1	18 (100)	7 (77.8)	0.102
19b	2 (33.3)	14 (66.7)	0.187	11 (61.1)	5 (55.6)	1
19c	5 (83.3)	18 (85.7)	1	15 (83.3)	8 (89.9)	0.631

Note. N = nurse; NT = nursing technician; p value = 5% significance level for Fisher's exact test.

DISCUSSION

Most participants were women (88.9%), with an average age of 33.3 years. This finding is in line with data from other studies that had also investigated hand hygiene.⁸⁻⁹ With respect to the years spent in the nursing profession, the institution

preferred hiring experienced professionals, given that these professionals had from three to 35 years of experience, as described earlier.

When questioned about the infrastructure provided by the institution for alcohol-based hand rub (Table 1), most of the professionals (92.6%) reported that

they had received some kind of training on hand hygiene (question 14). All of them reported that they knew about the existence/availability of alcoholic preparations for hand hygiene at the hospital (question 15). This last finding, in particular, indicates the compliance with ANVISA standards regarding the obligation to provide such product in healthcare units.⁵

Even though the level of knowledge related to infrastructure issues was satisfactory, only one nurse (3.7%) knew in full the recommendations for the correct use of alcohol-based hand rub. This indicates the existence of knowledge gaps among the professionals assessed, which had not been resolved by participating in training on hand hygiene.

It should be noted that none of the four specific questions about alcohol-based hand rub for hand hygiene was correctly answered by all the participants (Table 2), and in two questions the level of knowledge was considered "poor" (questions 18 and 19b, Table 2). Without a doubt, these data are causes for concern, because inappropriate or incorrect hand hygiene can spread microorganisms, including those referred to as multiresistant organisms, which have been the subject of investigations due to their potential to cause damage to the patients.^{4,8} In order to minimize such problem, the literature points out that the professionals should be sensitized, motivated, and guided, so that they can put into practice the knowledge acquired in training programs.³

The analysis of the answers to all the question about the use of alcohol-based hand rub indicated that only five participants (18.5%) provided correct answers to the question about the minimal time required by the alcoholic preparation to destroy the majority of microorganisms existing in the hands (question 18), which was classified as "poor" level of knowledge. This is an alarming result, because the duration of the hand rub procedure is an essential condition for the destruction of the microorganisms and, in the present study, it was lower than that of a research conducted with 24 health professionals from a public hospital of Parnaíba, State of Piauí, Brazil, which did not find a

satisfactory level of knowledge about the same question.¹⁰

It should be noted that 12 professionals (44.4%) indicated alternatives with less than 20 seconds, and 10 of them (37.1%) indicated one minute as enough or necessary time for performing alcohol-based hand rub for hand hygiene. These results need to be improved, because they indicated insufficient professionals' knowledge about the proper technique and how to perform it.

According to the basic hygiene technique, the hands should be rubbed until the alcohol-based preparation has completely dried, and rubbing hands for less than 20 seconds means no interruption of pathogens transmission, which can lead to the occurrence of healthcare-related infections.^{1,4} The time spent for hand hygiene directly influences the reduction of skin microbiota acquired by professionals during direct contact with the patients (colonized or infected), the environment, and contaminated surfaces.⁴

Despite the fact that the reduction of bacterial load in hands depends on the type and concentration of alcohol in the preparations used for antiseptic hand rub, most microorganisms are eliminated with an estimated time of a third of the time spent on hand washing with soap and water, whose duration should be 40 to 60 seconds. Therefore, the recommended time for antiseptic hand rub is 20 to 30 seconds.^{1,4}

Based on the foregoing, alcohol-based hand rub performed for a short time (3 and 10 seconds) was reported as correct by 12 participants (44.4%) (Table 2). These answers were considered ineffective. To minimize the lack of knowledge and/or compliance with the minimal time required by the alcoholic solution to reach the desired effect, it is suggested that the "Hand Hygiene Posters" prepared by the ANVISA/MS are placed just above the dispensers of the alcoholic preparation. In this way, the professionals will be constantly reminded about the proper technique for alcohol-based hand rub.⁴

Another issue that exhibited "poor" level of knowledge was the need of having the hands dried before using the alcoholic preparation (question 19b, Table 2). In part, this result can be explained by the lack of clarity in the latest protocol

released by an official body of the country.¹ This protocol does not provide that information relating to the application of sufficient amount of alcohol preparation in one hand, which is considered the first step of antiseptic hand rub.

On the other hand, the participants' level of knowledge was considered "adequate" for questions relating to the need of full coverage of the hands with the alcoholic preparation for antiseptic hand rub (92.6%, question 19a), and "safe" with respect to the need of drying the hands with paper towels after alcohol-based hand rub (85.2%, question 19c), as can be seen in Table 2. These data indicate that the majority of the respondents had knowledge about the issues questioned; however, when it comes to the use of alcohol-based hand rub, which is considered a necessary, efficient, easy, quick, and common procedure,^{1,4} it can be assumed that the number of correct answers should or could have been higher.

It should be noted that there was inconsistency of knowledge about the need of full coverage of the surface of both hands by the alcoholic preparation (question 19a), and the minimal time required for the destruction of most microorganisms in the hands by the alcoholic preparation (question 18), considered "adequate" and "poor", respectively (Table 2). It should be considered that—according to the basic hygiene technique—the hands should be rubbed until the alcohol-based preparation is completely dried.^{1,4} This means that antiseptic hand rub performed for less than 20 seconds can imply the use of insufficient amount of alcohol-based preparation.^{2,11}

Even though formal protocols have not normalized the required amount of alcoholic-based preparations for antiseptic hand rub, it is recommended that the amount should be sufficient to cover all areas of both hands, so that, after drying the product, the hands may be free of contamination.¹ A study tested six alcohol-based preparations in different presentations (foam, liquid, and gel) and found that complete drying had occurred with amounts ranging from 1.7 to 2.1 ml. However, with respect to effectiveness, the minimal amount required had been 3 ml.¹³ It is worth mentioning that the amount of product should be determined in

accordance with the size of each professional's hands.¹²

The knowledge gap observed in the participants assessed (Table 2) can be due to two factors, namely: not performing hand hygiene procedures in daily work; and/or not recognizing the effectiveness of alcoholic preparations. These assumptions are reinforced by the literature, according to which health professionals prefer to sanitize their hands with soap and water, rather than using alcoholic preparations, regardless of the healthcare procedure and/or recommendations.^{8,10}

From another perspective, a study conducted in a public hospital of Parnaíba, State of Piauí, Brazil, assessed hand hygiene procedures and the knowledge of 24 health professionals (physicians, nurses, nursing technicians, physiotherapists, and x-ray technicians). It found that 18 participants (75%) did not perform the correct technique for hand hygiene, and the main justification (61.1%) referred to work overload and insufficient time for completing the procedure.¹⁰ In such environment, the use of alcohol-based hand rub should be the best choice (as long as specific indications are followed),² because it has the potential to save time, especially when dispensers are located at strategic places, as advocated.⁵

Another study conducted with 135 nursing professionals of a public hospital of Londrina, State of Paraná, Brazil, found that compliance with hand hygiene was influenced by personal satisfaction of 45 participants (33.3%), and job satisfaction of 58 participants (42.9%).¹⁴ This way, compliance with hand hygiene can be influenced by motivational factors, such as the possibility of professionals' participation in assessing the quality of materials and supplies to be purchased for this procedure,¹⁴ as well as in the assessment of products used at the institution. On this basis, it is important that health institutions consider the opinion of their professionals for acquiring alcoholic preparations that can be homogeneously distributed without causing irritation and/or dryness of the skin.

Regarding the association between correct answers to questions relating to the use of alcohol-based hand rub, according to the professional category and years spent in the nursing profession (Table 3), we did

not observe significant statistical difference in any question. However, the answers analyzed considering the professional category indicated that there was greater proportion of answers to questions relating to the need of having the hands dried before using the alcoholic preparation (question 19b) and need of drying after the procedure (question 19c). It is worth noting that this fact occurred in the nursing technical category (66.7 and 85.7%, respectively) and not in the nurse category (33.3 and 83.3%, respectively).

The data previously discussed are worrying, because nurses are responsible for the actions involving the other professionals of the nursing staff. This way, they should have updated knowledge (amount and quality).¹⁵ The differential between nursing categories is scientific knowledge, which was observed among nursing technicians. Without a doubt, this is a paradox that deserves to be investigated, so that actions can be planned in different fields of nurses' training and practice.

Regarding the proportion of correct answers, according to the years spent in the nursing profession (Table 3), there was greater number of correct answers to specific questions about the technique for hand hygiene using antiseptic hand rub among the professionals with less years spent in the nursing profession. It was expected that professionals with less than seven years spent in the nursing profession had greater proportion of correct answers, given that their training had occurred in the same period that Brazil established the obligation of providing alcoholic preparations for hand hygiene in all health institutions.⁵

Based on the above, it can be considered that educational and risk management actions geared to the implementation of alcohol-based hand rub were necessary for the nursing staff of the institution assessed.

CONCLUSION

The knowledge of the nursing staff assessed about alcohol-based hand rub for hand hygiene was insufficient. Although only one nurse answered all the questions relating to alcohol-based hand rub correctly, the knowledge of the nursing professionals about the need of covering all areas of both hands with the alcoholic

preparation for antiseptic hand rub, and drying the hands with paper towels after performing the procedure was satisfactory. On the other hand, the knowledge about the minimal time required for destruction of most microorganisms in the hands by the alcoholic preparation, and having the hands dried to use the alcoholic preparation was unsatisfactory.

Even though we did not observe a statistically significant association between the number of correct answers and the professional category, or years spent in the nursing profession, in questions relating to antiseptic hand rub, the nursing technicians had a higher proportion of correct answers than nurses in half of the questions. This fact requires more specific studies, because nurses and healthcare managers should necessarily have theoretical and practical knowledge about the most important and basic nursing techniques, i.e., hand hygiene, either traditionally performed with soap and water or using alcoholic preparations.

This study contributes by providing theoretical subsidies to managers and health professionals to address the knowledge of professionals about alcohol-based hand rub for hand hygiene. At the same time, it points to the need of continuing education initiatives geared towards strengthening patient safety and providing harm-free healthcare.

The main limitations of the present study were the fact of not having included other categories of health professionals, and not having assessed the knowledge of the participants *in loco*. Therefore, we suggest that further studies should be conducted with other health professionals, with a focus on theoretical knowledge, but, mainly, on practice.

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