

INFRASTRUCTURE AND ADHERENCE TO HAND HYGIENE: CHALLENGES TO PATIENT SAFETY

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ABSTRACT

Considering the importance of hands in the chain of transmission of microorganisms, this observational research investigated the material infrastructure and compliance of hand hygiene in an intensive care unit in the south of Brazil, in 2010. The data was collected by direct non-participant observation and through the use of self-administered questionnaires to be completed by the 39 participants, which was analyzed with the assistance of the χ^2 Test, descriptive statistics and quantitative discourse analysis. Although health professionals overestimate compliance rates, recognize the practice as relevant to the prevention of infection and refer there are no impeding factors, of the 1,277 opportunities observed, compliance was 26% and significantly lower before patient contact and the use of aseptic procedures than after patient contact: infrastructure was shown to be deficient. The results indicate risk to patient safety, and, thus, the planning of corrective actions to promote hand washing is relevant.

Descriptors: Hand washing. Cross infection. Safety management. Health knowledge, attitudes and practice. Patient safety.

RESUMO

Considerando a importância das mãos na cadeia de transmissão de microrganismos, esta pesquisa observacional investigou a infraestrutura material e a adesão à higienização das mãos em unidade de terapia intensiva do sul do Brasil, em 2010. Os dados foram coletados por observação direta não participante e emprego de instrumento autoaplicável a 39 profissionais, analisados com auxílio de Teste do χ^2 , estatística descritiva e análise de discurso quantitativa. Embora os profissionais superestimem a adesão, reconheçam a prática como relevante para a prevenção de infecções e refiram não haver fatores de impedimento, entre 1277 oportunidades observadas, a adesão foi de 26,6%, e significativamente menor antes do contato e dos procedimentos assépticos do que após o contato com o paciente. A infraestrutura apresentou-se deficiente em funcionalidade. Os resultados implicam risco para a segurança dos pacientes, sendo relevante o planejamento de ações corretivas e que promovam essa prática.

Descritores: Lavagem de mãos. Infecção hospitalar. Gerenciamento de segurança. Conhecimentos, atitudes e prática em saúde. Segurança do paciente.

Título: *Infraestrutura e adesão à higienização das mãos: desafios à segurança do paciente.*

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RESUMEN

Con base en la importancia de las manos en la cadena de transmisión de microorganismos, esta investigación observacional tuvo el objetivo de observar la infraestructura material y la adhesión a la higienización de las manos en unidad de terapia intensiva del sur de Brasil, en 2010. Los datos fueron recogidos por la observación directa no participante y empleo de instrumento autoaplicable a 39 participantes, analizados con ayuda del Test de χ^2 , estadística descriptiva y análisis de discurso cuantitativo. A pesar de que los profesionales sobrestimen la adhesión, reconocen la práctica como relevante para la prevención de infecciones y refieren no haber factores de impedimento. Entre 1277 oportunidades observadas, la adhesión fue del 28,6% y significativamente menor antes del contacto y procedimientos asépticos que después del contacto con el paciente; la infraestructura se ha presentado deficiente en funcionalidad. Los resultados revelan riesgo para la seguridad de los pacientes siendo relevante el planeamiento de acciones correctivas y que promuevan esa práctica.

Descriptor: Lavado de manos. Infección hospitalaria. Administración de la seguridad. Conocimientos, actitudes y práctica en salud. Seguridad del paciente.

Título: Infraestructura y adhesión a la higienización de las manos: desafíos a la seguridad del paciente.

INTRODUCTION

In Intensive Care Units (ICUs) critically ill patients are submitted to invasive procedures and are at increased risk for adverse events, including infections related to healthcare (IRAS), highly prevalent in this population^(1,2). In the IRAS epidemiology, the hands of health professionals are a source and vehicle of transmission of microorganisms from various body sites of one single patient, between patients and between these and the healthcare setting. Washing hands with alcohol-based solution, liquid soap or solutions that kill germs⁽³⁾ is recommended to reduce microbial load. The healthcare setting also plays an important role in the epidemiology of these infections, since contaminated surfaces that are frequently handled by professionals, can act as a source of transmission of microorganisms, mainly by the hands⁽⁴⁾. In this context, hand hygiene (HH) when professional care is provided to critically ill patients, contributes to the prevention of IRAS because it is an opportunity to stop the main form of transmission of pathogens, which is the direct contact between caregiver, patient and the healthcare setting.

Recognizing the importance of establishing world strategies for the promotion of hand hygiene and contribute to patient and worker safety, the World Health Organization (WHO) launched, in 2007, the program Clean Care is Safe Care, and recommends, among other strategies, observation and adherence to hand washing standards, ensuring the necessary infrastructure for HH. The Program emphasizes five moments that represent the most frequent opportunities for HH in the healthcare context, as follows: before patient contact (opportu-

nity 1), before carrying out aseptic procedure (opportunity 2), after body fluid exposure (opportunity 3), after patient contact (opportunity 4), and after contact with patient surroundings (opportunity 5). An opportunity determines the need to wash the hands, and in the face of an opportunity, **indication** is the reason why this practice is needed, and **action** is what is done or not in the face of the indication. Thus, adherence is expressed by the rate of actions and opportunities⁽⁵⁾.

Given the complexity of healthcare, in ICU up to 22 opportunities for HH practice can be obtained per hour and per professional. This frequency is directly proportional to the organization of the work process, but also to the physical and clinical conditions of the assisted patient and to the available workforce⁽³⁾. However, the study demonstrates that adherence is inversely proportional to the opportunities. Therefore, in areas that demand more opportunities, adherence rates are lower⁽⁶⁾.

Behavior observation is a strategy to promote adherence to HH, since self-administered questionnaires alone are not enough to measure it⁽⁷⁾ and, thus, knowing the healthcare context is important for its understanding^(3,8). Hence, the justification for conducting the present study is that it provides information on how often health professionals who work in ICUs wash their hands, considering the opportunities during assistance, as well as structural conditions and inputs. In this light, the guiding question for this research was: "What are the conditions of material infrastructure for HH and adherence of professionals to this practice in the face of the opportunities during healthcare practice in an intensive care unit?". And the aim of this study

was to investigate the material infrastructure and adherence to hand hygiene in intensive care unit.

METHOD

This is an observational study conducted from March to June 2010 at an ICU for adult patients of a teaching hospital in the capital of the state of Paraná, in the southern region of Brazil. The inclusion criteria for participants were: be part of the medical, nursing or physiotherapy staff and active in healthcare assistance during the study period. Exclusion criteria were withdrawal from study, failure to return the self-administered questionnaire and non observation of the recommendations of the questionnaire during direct assistance to the patient. The target population in the study period was 55 health professionals. These professionals were listed and individually hired during the work shift, were invited to participate and informed that they would be observed, though without being aware of the period and instrument of observation. 49 healthcare professionals agreed to participate in the research and signed the Informed Consent prior to the beginning of data collection. The research was approved by the Research Ethics Committee under registration CEP/SD: 759.094.09.07.

Three instruments were used in data collection: one self-administered questionnaire and two questionnaires administered by two researchers trained to observe activities as non-participants who are in internship to fulfill curriculum requirements in the referred unit. The Instrument I concerns the questionnaire used to collect information on material infrastructure for HH, which comprises inputs and facilities, adapted from a previous study⁽⁹⁾ and administered in March 2010, after authorization of the service during two hours, and simultaneously by two observers.

The Instrument II concerns the structured questionnaire of observation of HH elaborated for the present study and based on two guidelines for the observation of adherence^(5,10). Four opportunities were considered for HH: (1) before contact with patient and/or patient surroundings, (2) before carrying out aseptic procedure, (3) after body fluid exposure, (4) after contact with patient and/or patient surroundings. Thus, in this research, the opportunities 4 (after contact with patient) and 5 (after contact with patient surroundings), recommended by the WHO⁽⁵⁾, were grouped into only one opportunity because we understand they concern the same **indication** or reason,

that is, reducing the transmission of microorganisms for the healthcare professional and the healthcare setting. The opportunities 1, 2 and 3, in turn, have different indications, as follows: reduce transmission of pathogenic microorganisms to patients, reduce the transmission of pathogenic microorganisms during aseptic procedure and reduce transmission of microorganisms to the healthcare professional and the healthcare setting, that result from the contact with body fluids. Also, the reason for grouping the opportunities is that patient and the healthcare setting are, for the purposes of the observation of the referred opportunities, only one element, because the patient admitted to the ICU is placed in an individual box.

The Instrument II was tested in two ICUs, distinct from that of the study, for two hours in each unit; on this occasion, the observers were simultaneously trained. After adjustments in the instrument, data collection was performed through distant non-participant direct observation, to avoid influence behavior, though being present. With the purpose of not interfering with the behavior of the participants, regarding hand-hygiene practice, the observations were made from the nursing station, in the central area of the ICU, and from which it is possible to observe the inside of the individual boxes of assistance, surrounded by a half glass wall. In this setting, in the first two hours of each work shift and during four consecutive days in the month of April 2010, 24 hours of non-simultaneous observation were made by two researchers. Each opportunity observed was followed by the registration of the indication and action (implemented or not), besides the encrypted identification of the participant.

The Instrument III is a semi-structured and self-administered questionnaire for the collection of data complementary to the discussion related to adherence and material infrastructure that was returned after the observation period. For the organization of the data, Excel 2007 was used, which were analyzed using χ^2 test and descriptive statistics. The open answers from the Instrument III were grouped by similarity and evaluated by quantitative discourse analysis⁽¹¹⁾.

RESULTS

Characterization of structure and materials for HH

During the study period the ICU had 14 active beds, 21 HH stations (HH station understood as

the set of sink, soap dispenser, dispenser or oil can with alcohol-based solution, paper towel dispenser and wastebasket) located as follows: a station at the entrance of the unit, two in the dressing rooms, 13 inside the boxes, two at the entrance of the boxes (one of the boxes had a station at the entrance and another one inside) and three in the nursing station. The results of the structural conditions of the HH stations are shown in Table 1.

Characterization of the study participants

Of the 49 health professionals who agreed to participate in the study, 39 were observed and answered the self-administered questionnaire. Of these, 21 (54%) were nursing assistants, 5 (2.8%) nurses, 5 (12.8%) nursing technicians, 6 (15.3%) physicians and 2 (5.1%) physiotherapists. Most participants reported having received guidance on HH during their professional training (94.8%, N=37) and in-service training on the subject in the last 12 months (87.1%, N= 34).

Characterization of the HH practice

In total we observed 1,277 opportunities for HH, 43.5% in the morning period, 35.5% in the af-

ternoon period and 21% in the night period, with adherence of 28.6%, 22.8% and 28.8%, respectively; the overall rate of adherence was 26.5% (N=338), and non-adherence was 73.5% (N=939). Most opportunities were observed **before and after contact with patient/healthcare setting**, as shown in Table 2.

In 702 opportunities of HH **before contact with patient and before aseptic procedure**, 82 adherences were observed; and in 575 opportunities **after contact with patient and/or healthcare setting and after contact with body fluids** 256 adherences were observed. Therefore, the rate of adherence before contact or procedure was 11.68% and adherence after contact was 44.52%. In χ^2 test, the p value is lower than 0.001, thus, the rate of adherence **after contact** (moments 3 and 4) was significantly higher than the rate of adherence **before contact** (moments 1 and 2).

In HH running water and liquid soap were used in 306 (90.5%) opportunities; friction with alcohol-based solution in 20 (6.0%); running water and liquid soap followed by friction with alcohol-based solution in 8 (2.4%); running water and solution that kills germs in 4 (1.2%) opportunities. Liquid soap and alcohol were the preferred products for washing the hands by 29 (74.4%) participants, and among the others, 5 (12.8%) reported no pref-

Table 1 – Structural conditions for hand hygiene. Curitiba, PR, 2010.

Structural Conditions for HH	Yes % (n)	No % (n)
Washbasin with educational material*	33 (06)	67 (15)
Washbasin with unrestricted access [‡]	74 (15)	26 (06)
Clean washbasin	78 (16)	22 (05)
Washbasin with proper water drainage	09 (01)	91(20)
Washbasin allows HH without touching the edges	100 (21)	--
Washbasin with hot and cold water mixer	09 (01)	91 (20)
Washbasin allows HH avoiding splashing onto clothes	35 (07)	65 (14)
Washbasin with automatic faucet control [†]	74 (15)	26 (06)
Washbasin with liquid soap dispenser	100 (21)	-
Functional soap dispenser	52 (11)	48 (10)
Functional and filled soap dispenser [§]	38 (08)	62 (13)
Paper towel dispenser filled	90 (19)	10 (02)
Functional paper towel dispenser	81 (17)	19 (04)
Alcohol-based solution available in the HH station [¶]	48 (10)	52(11)
Alcohol-based solution available on the edge of the bed	64 (09)	36(05)

*contained indications and technical information; [‡]unrestricted access; [†]duration of water flow varied from 1 to 9 seconds, so that the pump switch had to be repeatedly activated; [§]average volume of 1 ml of liquid soap dispensed in 91% and 2 ml in the others; [¶]HH- hand hygiene. Source: Research data.

erence, 4 (10.2%) said they preferred soap, alcohol and chlorhexidine, and 1 (2.6%) participant did not answer this question.

Data on the number of participants and their relationship to the number of opportunities for HH, ratio between the opportunities by professional category and rate of adherence to HH are shown in Table 3.

In a simple logistic regression for adherence rate, with the professional category as factor, we found that there was no significant difference between physician and nursing assistant. However, they differed significantly ($p < 0.001$) from the other categories. The rate of adherence to HH between physicians and nursing assistants was significantly higher than that of nursing technicians, nurses, physiotherapists, and these did not differ among themselves.

Infection control and personal protection were the main factors reported as important elements that stimulated HH. The situations in which the professionals affirmed they never failed to make HH are shown in Chart 1.

Despite the low adherence to the opportunities, 26 (66.67%) the health professionals believe they

wash their hands with **sufficient** frequency to ensure adherence to HH practice, 7 (17.95%) believe their frequency is **more than necessary** and 6 (15.38%) report their frequency is **less than necessary**. The answers to questions about factors that discourage HH and deterrent factors are shown in Table 4.

DISCUSSION

The relationship between the number of washbasins and the number of hospital beds is in accordance with the Brazilian legislation that stipulates one washbasin for every five ICU beds⁽¹²⁾; the studied unit has the ratio of 1.4 washbasins for every active bed. However, less than half the stations of HH had optimal structural and supply conditions, that is, functional, filled, available and with unrestricted access, factors that may negatively contribute to adherence. The availability of materials for HH was considered by health professionals as a stimulus; it is important to stress that although ideal structural conditions are essential to HH, they do not necessarily imply a greater adherence^(3,13).

Table 2 – Opportunities for hand hygiene and adherence. Curitiba, PR, 2010.

Indication (opportunity)	No of opportunities observed	Rate of adherence (No of opportunities with HH)
Before contact with patient/healthcare setting (1)	536	13% (69)
Before aseptic procedure (2)	166	7.8% (13)
After risk/contact with body fluids (3)	77	35% (27)
After contact with patient and/or healthcare setting (4)	498	46% (229)

Source: Research data.

Table 3 – Ratio between the opportunities by category and percentage of adherence. Curitiba, PR, 2010.

Professional Category	NS (%)	NO (%)	Ratio between NO and NS	Rate of adherence (%) To HH
Assistant	21 (54.0)	613 (48)	2.2	34
Physician	06 (15.3)	358 (28)	4.6	38
Technician	05 (12.8)	140 (11)	2.2	11
Nurse	05 (12.8)	102 (8)	1.6	12
Physiotherapist	02 (5.1)	64 (5)	2.5	5

NS- number of subjects; NO- number of opportunities for hand hygiene; HM- hand hygiene

Source: Research data.

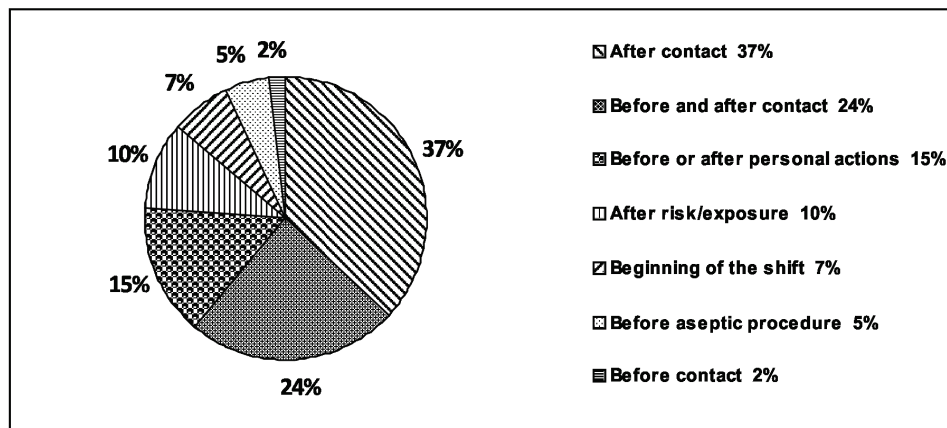


Chart 1 – Situations in which the professionals reported never failing to observe HH practice. Curitiba, PR, 2010.

Table 4 – Factors identified by health workers as discouraging or deterrent to hand hygiene. Curitiba, PR, 2010.

Factors	discouraging	deterrent
There is no factor	50%	51%
Lack of materials	28%	13%
Poor quality materials	5%	-
Emergencies	6%	27%
Non-functional equipment	5%	-
Excess of tasks/lack of time	3%	3%
Forgetfulness	-	3%
Lack of awareness	-	3%
Injured hands	3%	-

Source: Research data.

The National Health Surveillance Agency (ANVISA) recommends for HH the use of sufficient amount of liquid soap, so as to cover the entire surface of the hands and wrists⁽³⁾, but does not define such a quantity. In this study, the volume of 1ml dispensed by more than 90% of the devices was considered insufficient for an adequate hand-hygiene practice. Two seconds was also considered an insufficient period of time for water flow, since the recommended period of time for adequate HH is 40 to 60 seconds when liquid soap is used, with the repeated activations of the switch, which may lead to haste and even, recontamination of hands⁽³⁾.

The number of opportunities observed and the observation time were higher than the minimum

recommended by the Observer's Manual⁽⁵⁾, as well as the opportunities for HH per hour⁽³⁾. On the other hand, adherence to HH was very low compared to other studies⁽¹³⁻¹⁵⁾, and worse in the opportunities that represent patient protection compared to the opportunities that represent the protection of the health professional. This result corroborates studies in which hand hygiene represented more a self-care practice than a patient care practice^(8,14,16). A survey also showed greater adherence to HH after contact with possibly contaminated areas such as armpits and groin⁽¹⁷⁾, which corroborates that feelings of self-protection such as discomfort and repulsion contribute to promote adherence to HH⁽⁵⁾. On the other hand, such perception is not observed before contact with patient, as demonstrated in an obser-

vational study in which none of the nurses washed hands before Pap smear collection⁽¹⁸⁾.

The importance attached by participants to HH for infection control reflects a rhetoric, which, however, was not implemented in the observed practice. In assessing the frequency with which they clean their hands, most participants considered it at least sufficient, diverging from the low adherence observed. These data corroborate a study carried out in a pediatric ICU where 41% of the professionals of the multidisciplinary team reported performing HH in up to 100% of the opportunities. However, 40% estimated that their colleagues performed this practice in 75% of the opportunities⁽¹⁹⁾. Therefore, knowledge of individual and group performance contribute to behavioral changes, pointing to the importance of observational studies on adherence to HH^(5,10).

Habit and personal beliefs may exert greater influence on adherence than the knowledge of precaution and infection control measures⁽¹⁶⁾. However, many are the factors that negatively affect adherence, such as damage to the skin, lack of inputs, forgetfulness and unawareness, skepticism and lack of example of colleagues and leaders, among others^(8,16). Some of these elements were also mentioned in the present study, although half of the professionals said there were no discouraging or deterrent factors to hand hygiene. This finding encourages reflection on the factors contribute, in the investigated unit, to a very low adherence to HH, such as knowledge, values, habits, work overload and managerial aspects of health assistance. Thus, we believe that this theme should be investigated from different perspectives, with the inclusion of the other possible factors that influence this practice.

When HH was performed, in more than 90% water and liquid soap were used, with liquid soap cited by participants as one of the preferred cleaning products. The use of liquid soap is recommended when the hands are visibly dirty, and the use of soap associated to antiseptic solution is recommended in case of contamination with protein material⁽⁵⁾. Nevertheless, the WHO recommends as golden standard for HH the use of alcohol-based solutions due to their effectiveness, low infrastructure requirements, little time necessary for application and good skin tolerance. Although participants said they preferred these solutions, they were only used in 6% of the opportunities. Therefore, the use

of alcohol-based solutions should be encouraged in ICU since it is supported by a national guideline for HH promotion⁽²⁰⁾.

FINAL CONSIDERATIONS

The study identified deficiencies in material infrastructure and adherence to HH; it showed that health professionals recognize this action as a strategy for the prevention of IRAS; overestimate their adherence and also report there are no factors that deter or discourage this practice. There was higher adherence in the indications that reflect protection of the health professional compared to those related to patient protection, and although there were variations between the professional categories, it can be affirmed that assistance in the investigated unit, given the low adherence to HH, implies risk to the safety of critically ill patients.

HH represents scientific evidence for the prevention of IRAS; however, daily care contributes to the simplification of steps, in order to expedite the work, and promotes the routinization of missed opportunities for HH, a practice often neglected in the establishment of priority of care activities. Different strategies can be used in the unit to promote adherence to HH, such as *feedback* to healthcare professionals, encouragement of the use of alcohol-based solutions and the establishment of a plan of goals, with the involvement of the leaders and staff.

Some limitations of the present study were, as follows: investigation of other possible factors involved in the practice of HH, such as labor force in relation to the number and severity of patients assisted and awareness of the sparing use of alcohol-based solutions. Thus, it is understood that these and other gaps can be investigated in the future.

REFERENCES

- 1 Moura MEB, Campelo SM, Brito FCP, Batista OMA, Araujo TME, Oliveira ADS. Infecção hospitalar: estudo de prevalência em um hospital público de ensino. Rev Bras Enferm. 2007;60(4):416-21.
- 2 Vincent JL, Rello J, Marshall J, Silva E, Anzueto A, Martin CD, et al. International study of the relevance and outcomes of infection in intensive care units. J Am Med Assoc. 2009;302(21):2323-9.

- 3 Agência Nacional de Vigilância Sanitária (BR). Segurança do paciente. Higienização das mãos. Brasília: Ministério da Saúde; 2008.
- 4 Ferreira AM, Andrade D, Rigotti MA, Almeida MTG. Staphylococcus aureus resistente à metilicina em superfícies de uma unidade de terapia intensiva. Acta Paul Enferm. 2011; 24(4):453-8.
- 5 World Health Organization. Guidelines on hand hygiene in health care. First global patient safety challenge: clean care is safer care. Genebra: WHO; 2009.
- 6 Pessoa-Silva CL, Posfay-Barbe MD, Touveneau S, Perneger TV, Pittet D. Attitudes and perceptions toward hand hygiene among healthcare workers caring for critically ill neonates. Infect Control Hosp Epidemiol. 2005;26(3):305-11.
- 7 Oliveira AC, Paula AO. Monitorização da adesão à higienização das mãos: uma revisão de literatura. Acta Paul Enferm. 2011;24(3):407-13.
- 8 Cruz EDA, Pimenta FC, Palos MAP, Silva SEM, Gir E. Higienização das mãos: 20 anos de divergências entre as práticas e o idealizado. Cienc Enferm. 2009;15(1):33-8.
- 9 Cunico PA. As condições de trabalho e a aplicabilidade do gerenciamento de risco à prática de higienização de mãos [trabalho de conclusão de curso]. Curitiba (PR): Universidade Federal do Paraná; 2009.
- 10 Organização Pan-Americana da Saúde, Agência Nacional de Vigilância Sanitária. Manual para observadores: estratégia multimodal da OMS para a melhoria da higienização das mãos. Brasília: Organização Pan-Americana de Saúde; Agência Nacional de Vigilância Sanitária; 2008.
- 11 Bardin L. Análise de conteúdo. Lisboa: Edições 70; 2009.
- 12 Agência Nacional de Vigilância Sanitária (BR). Resolução RDC n. 50, de 21 de fevereiro de 2002: dispõe sobre o regulamento técnico para planejamento, programação, elaboração e avaliação de projetos físicos de estabelecimentos assistenciais de saúde. Brasília; 2002.
- 13 Neves ZCP, Tipple AFV, Souza ACS, Pereira MS, Melo DS, Ferreira LR. Higienização das mãos: o impacto de estratégias de incentivo à adesão entre profissionais de saúde de uma unidade de terapia intensiva neonatal. Rev Latinoam Enferm. 2006;14(4):546-52.
- 14 Lee A, Chalfine A, Daikos GL, Garilli S, Jovanovic B, Lemmen S, et al. Hand hygiene practices and adherence determinants in surgical wards across Europe and Israel: a multicenter observational study. Am J Infect Control. 2011;39(6):517-20.
- 15 Martinez MR, Campos LAAF, Nogueira PCK. Adesão à técnica de lavagem de mãos em unidade de terapia intensiva neonatal. Rev Paul Pediatr. 2009;27(2):179-85.
- 16 Oliveira AC, Cardoso CS, Mascarenhas D. Contact precautions in intensive care units: facilitating and inhibiting factors for professionals' adherence. Rev Esc Enferm USP. 2010;44(1):161-5.
- 17 Whitby M, McLaws ML, Ross RW. Why health-care workers don't wash their hands: a behavioral explanation. Infect Control Hosp Epidemiol. 2006;27(5):484-92.
- 18 Eduardo KGTE, Ferreira ERM, Pinheiros AKB, Ximenes LB. Utilização do instrumento de melhoria de desempenho na avaliação do exame de Papanicolaou por enfermeiros. Cogitare Enferm. 2008;13(3):329-35.
- 19 Cauduro FLF. Cuidado limpo é cuidado seguro: uma promoção para a segurança do paciente [trabalho de conclusão de curso]. Curitiba (PR): Departamento de Enfermagem, Universidade Federal do Paraná; 2011.
- 20 Ministério da Saúde (BR). Resolução Diretiva Colegiada (RDC) n. 42, de 25 de outubro de 2010: dispõe sobre a obrigatoriedade de disponibilização de soluções alcoólicas para a fricção antisséptica das mãos, pelos serviços de saúde do País, e dá outras providências. Brasília; 2010.

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