ARTIGO ORIGINAL

Hand hygiene in neonatal and pediatric intensive care units: comparative study

Adesão da equipe de enfermagem na higienização das mãos em unidade de terapia intensiva neonatal e pediátrica

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Abstract

Introduction: Hand hygiene is the main measure in the control of hospital infections as well as it is the most effective and lower cost. **Objective:** Evaluate hand hygiene on hospital infection in neonatal and pediatric intensive care units. **Material and Methods:** This is a descriptive, observational, and prospective study conducted at a hospital specialized in Women's and Child Health. A direct observation of the nursing team was performed by two of the researchers concerning the 5 moments for hand hygiene in neonatal and pediatric intensive care units. **Results:** In the Neonatal Intensive Care Unit, the adherence of the professionals to the five moments was: 1 (95.1%), 2 (75.4%), 3 (67.2%), 4 (73, 8%) and 5 (21.3%). Nurses showed higher adherence in 2 (100%) and nursing technician (93.5%) in 1. In the pediatric intensive care unit, the adherence of the professionals to the five moments was: 1 (70.8%), 2 (66.7%), 3 (85.7%), 4 (79.2%), and 5 (50.0%). Nurses showed higher adherence in 1 and 3 (99.9%) and nursing tech-nicians (85%) in 3. The morning shift was the one with higher adherence, and the most-used product was alcohol-based sanitizer in both units. **Conclusion:** The study revealed that adherence to hand hygiene was 63.3% in the Neonatal Unit and 70.8% in the pediatric unit, providing room for improvement.

Descriptors: Hand Hygiene; Cross Infections; Nursing, Team; Intensive Care Units Neonatal; Intensive Care Units, Pediatric.

Resumo

Introdução: A higiene de mãos é a principal medida no controle das infecções hospitalares, além de ser mais eficiente e de baixo custo. **Objetivo:** Avaliar a higiene das mãos em relação à infecção hospitalar em unidades de terapia intensiva neonatal e pediátrica. **Material e Métodos:** Estudo descritivo, observacional e prospectivo em hospital de ensino especializado em Saúde da Mulher e da Criança. Dois dos pesquisadores realizaram observação direta da equipe de enfermagem quanto aos cinco momentos da higienização nas UTI neonatal e pediátrica**. Resultados:** Na Unidade de Terapia Intensiva Neonatal, a adesão dos profissionais aos cinco momentos foi: 1 (95,1%), 2 (75,4%), 3 (67,2%), 4 (73,8%) e 5 (21,3%). O enfermeiro apresentou maior adesão no 2 (100%) e o técnico de enfermagem (93,5%) no 1. Na Unidade de Terapia Intensiva Pediátrica, a adesão dos profissionais aos cinco momentos foi: 1 (70,8%), 2 (66,7%), 3 (85,7%), 4 (79,2%) e 5 (50,0%). O enfermeiro apresentou maior adesão nos 1 e 3 (99,9%) e o técnico de enfermagem (85%) no 3. O turno de trabalho com maior adesão foi o matutino e o produto mais utilizado o alcoólico, em ambas as unidades. **Conclusão:** O estudo permitiu identificar que adesão à higienização de mãos foi de 63,3% na Unidade Neonatal e de 70,8% na Unidade Pediátrica, mostrando espaço para ações de melhorias.

Descritores: Higiene das Mãos; Infecção Hospitalar; Equipe de Enfermagem; Unidades de Terapia Intensiva Neonatal; Unidades de Terapia Intensiva Pediátrica.

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Introduction

Hand hygiene (HH) is globally considered an essential and primary action for prevention and control of the health-care--associated infections (HAIs) and the key instrument of health workers[1]. HH consists in the act of cleaning the hands to prevent transmission of microorganisms, as well as HAIs[2].

Health-care-associated infections (HAIs), compose one of the most serious problems of public health in the world. Its high rate of occurrence causes a long hospital stay and mortality risk. Consequently, it increases hospital costs[3]. There is an estimate that every day it affects 1.4 million people in the world[4]. Furthermore, in developing countries, such as Brazil, HAIs is an important cause of morbidity and mortality in the Neonatal Intensive Care Units (Neonatal ICU). Firstly, it is because in neonates the risk of infection is higher due to the immaturity of the immune system, invasive procedures for life support, and the use of medications[5]. Children in Pediatric Intensive Care Units (Pediatric ICU) often have factors as crucial conditions for the contamination through infection, such as congenital or acquired immunodeficiencies, immunosuppressant use, and prolonged length of hospital stay with infection rates ranging from 3% to 27% than adult intensive care units (ICU)[6].

Because of these factors, focusing on patient safety, prevention, and control of HAIs the Ministry of Health / National Health Surveillance Agency (ANVISA) / Fiocruz published the "Annex 01: PROTOCOL FOR PRACTICE OF HAND HYGIENE ON HEALTH SERVICES". It recommends the indications, HH technique, products, and at which moment to perform them[2] because the practice of HH is a global concern once the hands are the primary means of infection transmission[7]. However, although it is the most effective measure, studies have shown low adherence of professionals to perform this practice[8].

For better guidance of professionals, when there is visible dirt on hands or body fluids the Centers for Disease Control and Prevention (CDC) and World Health Organization (WHO) established the cleaning by water, and soap as the most appropriate. However, the alcohol-based product is an effective alternative when there is no visible dirt, which may and should be used at all times of HH[2-9]. The literature describes the use of alcohol-based product as a way to increase the adherence of health professionals on HH, because the time spent on this technique is lower than using water and soap, but the efficiency is the same[10]. However, national studies reveal that the product of higher adherence is soap and water, demonstrating that it is not part from the culture of these professionals the antiseptic usage as first choice yet[4,11]. In contrast, the Health Department CDC (2002) in the United States (US), indicate that the preference of professionals for HH is the antiseptic rubbing with the alcoholproduct[1].

It may be seen by the data presented that the HAIs in ICUs is higher than in other hospital facilities, once they are high complexity areas and due to the characteristics of patients who require constant care. Moreover, in Neonatal and Pediatric ICU, the risk is even higher because infection rates range from 3% to 27%, which is superior to the adult ICU. This aspect makes crucial not only the professionals' technical skill, but also the knowledge about the infection route, how to prevent HAIs by cleaning hands, and ensure patient safety.

Therefore, the purpose of this study is to evaluate hand hygiene on hospital infection in neonatal and pediatric intensive care units.

Materials and Methods

This is a descriptive, observational, and prospective study conducted in one neonatal and one pediatric ICU, in a large, educational, and specialized Women's and Child Health hospital (180 beds). Specifically, the neonatal ICU has 34 beds and 77 nursing professionals and the pediatric unit 8 and 25, respectively. Data will be presented in real numbers, percentage and Chi--square test. It was used classic Chi-square test for comparison of frequencies. The program used was GraphPad Instat (3.0). The level of significance adopted was $p \leq 0.05$.

The Research Ethics Committee (Opinion N º 907.640) approved the study. Thus, it was observed the 5 moments of HH performed by health professionals (assistants, nursing technicians and nurses) in April and May of 2014, during the morning, afternoon, and night shifts, and major period of care activities. Two of the researchers collected the data by observations of the professionals in the units. They observed if the professionals cleaned their hands, in which moment they did and which product, they used to perform HH. After observations, the data was recorded on a form consisting of the following variables: opportunities, indications, HH performed and not performed and used products, alcohol-based product or soap and water. According to the new global guidelines by WHO,HH is classified and must be performed in five stages: 1º Before patient contact; 2º Before aseptic task; 3º After body fluids exposure risk; 4º After patient contact and 5º After contact with the patient surroundings[12]. Incomplete forms were excluded.

Results

The nursing staff was composed of 102 professionals (100%). Of these, 85 (83.3%) were observed, 30 of these were nurses (35.3%), 51 (60%) technicians and 4 (4.7%) assistants. Among the observed professionals 61 (71.8%) were allocated in the Neonatal ICU and 24 (28.2%) in Pediatric.

The adherence of the professionals in the 5 moments varied from 21.3% in moment5 to 95.1% in moment 1. Among the categories, the performance of HH by nurses ranged from 22.2% in moment 5 to 100% in moment 2; by the technician, it was 22.6% in moment 5 to 93.5% in moment 1, and by the assistant 0% in moment 5 to 100% in moments 1 and 2.

The alcohol-based product was used by 22.2% of the nurses in moment 5 and by 100% of the assistants in moment 2. Water and soap were chosen by 6.5% of the technician and by 42.3% of the nurses, both in moment 2.

Table 1. Distribution of the nursing team during the 5 moments of hand hygiene, according to professional occupation in a Neonatal ICU. São José do Rio Preto/SP, 2015

Professional	Action	Five Moments									
		Moment 1 Before patient contact		**Moment 2** Before aseptic task		**Moment 3** After body fluids exposure risk		**Moment 4** After patient contact		**Moment 5** After contact with patient surroundings	
		N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
NURSES	ABP	24	88.9	16	59.3	11	40.7	12	44.4	06	22.2
	WS	02	7.4	11	40.7	09	33.4	09	33.4	-	-
	NP	01	3.7	-	-	07	25.9	06	22.2	21	77.8
TECHN.	ABP	25	80.6	14	45.1	17	54.8	17	54.8	07	22.6
	WS	04	12.9	02	6.5	03	9.8	05	16.2	-	-
	NP	02	6.5	15	48.4	11	35.4	09	29.0	24	77.4
ASSIST.	ABP	02	66.7	03	100	01	33.3	02	66.7	-	-
	WS	01	33.3	-	-	-	-	-	-	-	-
	NP	-	-	-	-	02	66.7	01	33.3	03	100
Total %			95.1		75.4		67.2		73.8		21.3

TECHN. – Nursing technician; ASSIST. – Nursing assistant; ABP – Alcohol-based product; WS – Water and soap; NR – Not performed.

In the Pediatric ICU, adherence to the five moments was 50% in moment 5 to 87.5% in moment 3. Among the occupation, nurse's adherence ranged from 0% in moment 5 to 99.9% in moments 1 and 3; the technician ranged from 60% in moment5 to 85% in moment3 and the assistant 0% in moment 5 to 100% in moments 1, 2, 3 and 4.

The alcohol-based product was used by 66.7% of the nurses and 100% of the assistants, both in the moments. The choice for soap and water has been made by the 5% of the technician in moment 5 and 100% of the assistants in moment 2.

Table 2. Distribution of the nursing team during the 5 moments of hand hygiene, according to professional occupation in a Pediatric ICU. São José do Rio Preto/SP, 2015.

Professional	Action	Five Moments									
		Moment 1 Before patient contact		**Moment 2** Before aseptic task		**Moment 3** After body fluids exposure risk		**Moment 4** After patient contact		**Moment 5** After contact with patient surroundings	
		N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
NURSES	ABP	02	66.6	01	33.3	02	66.6	02	66.6	-	-
	WS	01	33.3	-	-	01	33.3	-	-	-	-
	NP	-	-	02	66.6	-	-	01	33.3	03	100
TECHN.	ABP	09	45	12	60	07	35	10	50	11	55
	WS	04	20	02	10	10	50	06	30	01	05
	NP	07	35	06	30	03	15	04	20	08	40
ASSIST.	ABS	01	100	-	-	01	100	01	100	-	-
	WS	-	-	01	100	-	-	-	-	-	-
	NP	-	-	-	-	-	-	-	-	01	100
Total%			70.8		66.7		87.5		79.2		50

TECHN. – Nursing technician; ASSIST. – Nursing assistant; ABP – Alcohol-based product; WS – Water and soap; NR – Not performed.

Evaluating the working shifts, the professionals' adherence to the five moments in the Neonatal ICU ranged from 7.1% in moment 5 (afternoon) to 100% in moment 1(morning). In the Pediatric ICU, it varied from 33.3% in moments 1 and 2 (afternoon) to 90.9% in moments 3 and 4 (night).

In the Neonatal ICU, the alcoholic product was used by 7.1% of the professionals in the afternoon and by 100% professional in the morning. In Pediatric ICU, it was used by 33.3% in the afternoon and by 85.7% in the morning period. In the Neonatal ICU, soap and water were the choice to perform HH made by 0% (morning) of the professionals in moment 2 and by 33.3% (night) of them in moment. In the Pediatric ICU, it was 0% (morning) in moments 2 and 5; 0% (afternoon) in moments 1 and 2, and 66.7% (afternoon) in moment 3.

Table 3. Distribution of the nursing team during the 5 moments of hand hygiene, according to working shifts in a Neonatal and Pediatric ICUs. São José do Rio Preto/SP, 2015

Working Shift	Action	Five moments									
		Moment 1 Before patient contact		**Moment 2** Before aseptic task		**Moment 3** After body fluids exposure risk		**Moment 4** After patient contact		**Moment 5** After contact with patient surroundings	
NEONATAL ICU		**N**	**%**	**Nº**	**%**	**N**	**%**	**Nº**	**%**	**N**	**%**
Morning	ABP	20	100	15	75.0	11	55.0	11	55.0	07	35.0
	WS	-	-	-	-	03	15.0	02	10.0	-	-
	NP	-	-	05	25.0	06	30.0	07	35.0	13	65.0
Afternoon	ABS	11	78.6	08	57.1	05	35.7	05	35.7	01	7.1
	WS	01	7.1	-	-	03	21.4	03	21.4	-	-
	NP	02	14.3	06	42.9	06	42.9	06	42.9	13	92.9
Night	ABS	20	74.1	10	37.0	13	48.2	15	55.6	05	18.5
	WS	06	22.2	02	7.4	06	22.2	09	33.3	-	-
	NP	01	3.7	15	55.6	08	29.6	03	11.1	22	81.5

Adherence by working shift - Morning: 69.0%; Afternoon: 52.9%; Night: 64.4% - Total adherence: 63.3%

PEDIATRIC ICU		**N**	**%**	**Nº**	**%**	**N**	**%**	**Nº**	**%**	**N**	**%**
Morning	ABS	03	42.9	06	85.7	03	42.8	04	57.1	04	57.1
	WS	03	42.8	-	-	02	28.6	01	14.3	-	-
	NP	01	14.3	01	14.3	02	28.6	02	28.6	03	42.9
Afternoon	ABS	02	33.3	02	33.3	02	33.3	02	33.3	03	50.0
	WS	-	-	-	-	04	66.7	02	33.3	-	-
	NP	04	66.7	04	66.7	-	-	02	33.3	03	50.0
Night	ABS	07	63.6	06	54.5	05	45.4	07	63.6	04	36.4
	WS	02	18.2	02	18.2	05	45.5	03	27.3	01	9.1
	NP	02	18.2	03	27.3	01	9.1	01	9.1	06	54.5

Adherence by working shift - Morning: 74.3% ; Afternoon: 56.7%; Night: 76.4% - Total adherence: 70.8%

ABP – alcohol-based product; WS – water and soap; NP – Not performed.

Source: Research data

When applied the test, Neonatal ICU presented results p=0.047 among the number of observations in relation to the working shifts and the type of product used, indicating significant difference. On the other hand, the Pediatric ICU is p=0.3155 showing no significance in the variables compared. The same applies when compared the 5 moments and products, which presents significance in the Neonatal ICU, p<0.0001 and in the Pediatric ICU not significant, p<0.3114.

Discussion

Correct measures of contact prevention are directly connected with HAIs, since the HH adherence can reduce these infections in 40%[13]. In the Neonatal ICU, the findings showed that the adherence to the 5 moments of HH was high in moment 1 (95.1%) and low in moment 5 (21.3%). The total adherence, among professional occupation, was observed in moment 2 by the nurses and in moments 1 and 2 by the assistant. In Rio Grande do Sul, study in adult ICU with several professional categories indicated that adherence in moments 1 - before contact with the patient (81.6%) and 2 - before aseptic task (79.1%) - were lower compared with the moments 4 and 5 - after contact with the patient and after contact with the patient surroundings, respectively[4]. In Paraná, also in adult ICU, an observational study investigated three professional categories. After analyzing the opportunities and professionals' adherence to the 5 moments of HH, it was found higher adherence to the moments 3 and 4 than to the moments 1 and 2[14].

It is important to point that the ICU environment, adult or not, receive critically ill patients presenting an increased risk of infections. In this way, the moment 2 draws attention because 48.4% of technicians did not perform HH before the aseptic task. Thus, it can be inferred that the patient has been exposed to a high risk of infection in approximately 50% of the invasive procedures. Research about HH also in Neonatal ICU, shows that low compliance of the HH implies in a high risk of transmission of pathogens that causes infections to babies and also poses a great challenge for the infection-control service[14].

In the pediatric ICU, the total adherence to HH among professional categories was of the assistant at all moments, except in moment 5. It is relevant to emphasize that this category sample was limited. The recommendation is that only technician and nurse categories should work in ICU due to better qualifications to watch high-complexity patients[15]. Moreover, data indicated the moment 3 as the highest adherence (85.5%), whereas when the moment 5 (50%), was the lowest. A survey of HH performed in Pediatric Extended Care facilities also showed higher adherence at that same moment and low adherence to the moment 5 (42%)[16].

In this study, Table 2 (Pediatric ICU) reveals that moment 2 was the second in lower adherence, totalizing 66.7% of HH by all professionals. Supporting this, a research in adult ICU, in Rio Grande do Sul, showed low adherence also at this same moment, in which 81.6% of the professionals did not perform HH. The similarity of this reality can be highlighted in Brazilian studies and in international studies as well, for example; in the US, three pediatric Long-Term Care (pLTC) stated that adherence was low in moment 2 (16%) and higher after body fluid exposure - (61%)[17].

In addition, a research conducted in a hospital in São Paulo, found that only after body fluid exposure risk – moment 3 - professionals presented adherence above the defined compliance rate (65.6%)[18]. These results draw attention because once in direct patient care and contact with body fluids, professionals demonstrate conscience of the necessity to HH when there are visible and perceptible dirt on the hands. While in moment 5, the handling of the devices and the indirect activities to patients, it seems that workers do not see risk of infection for the patient by not cleaning hands. This indicates the necessity for educational measures to awareness about the colonized environment of the patient and transmission of microorganisms from the service point to the general environment of the ICU.

The presented findings in the Neonatal ICU showed that all working shifts had better adherence in moment 1 and poor in moment5. The overall adherence was 63.3%, the morning shift - 69%, afternoon - 52.9% and night - 64.4%. The product of choice was alcohol followed by water and soap. The morning shift was the only one to present 100% of compliance to moment 1. However, in other moments, there are still professionals who do not perform HH. The afternoon shift also had the highest rate in moment 1 (85.7%), and low in moment 5 showing that 92.9% of the professionals did not clean their hands. The night shift showed satisfactory adhesion to moment 4 (88.9%) and low in moment 5 (81.5%). Between the working shifts, the moments 1 (100%), 2 (75%) and 5 (65%) had better adherence in the morning shift, while moments 3 (70.4%) and 4 (88.9%) had a higher adhesion in the night shift.

In the Pediatric ICU, the overall adherence was 70.8%. As for the working shift, data are the following: morning - 74.3%, afternoon - 56.7% and night -76.4%. Comparing working shifts, the night shift was the one with greater adherence. In the Pediatric ICU, the product of first choice for HH was the alcohol-based product, followed by water and soap. Further, it can be noticed that the night shift stands out in the adherence to HH using alcohol-based sanitizer.

The morning shift presented higher adherence to moments 1 and 2 (both 85.7%). However, it was lower in moment 5 (42.9%). The afternoon shift had 100% of compliance in moment 3 (100%) and, differently of the morning shift, showed low adherence in moments 1and 2 (66.7% both). The night shift indicated low adherence in moment 5 (54.5%). In contrast, moments 3 and 4 showed high adherence (90.9% both). Between the working shifts, moments 1 (85.7%), 2 (85.7%), and 5 (57.1%) had better adherence by the morning shift; the moment 3 (100%) by the afternoon shift and the moment 4 had high adherence by the night shift (90.9%). In Paraná, observational study in adult ICU investigated HH opportunities, reporting adherence of 26.5% and 73.5% of non-compliance; between shifts, the adherence was 28.6% in the morning, 22.8% in the afternoon and 28.8% in the night[14].

It may be noted by data presented that, although in some moments, the nursing team showed low adherence (7.1% - moment 5), and by category, assistants and nurses, often present 0% to HH adherence; in other moments, there are high adherence rates such as in moment 1 (100%) by the team in the Neonatal ICU. The product chosen by most professionals was the alcohol-based product, both in the Pediatric and Neonatal ICU. However, studies show that higher adherence is the use of soap and water [4, 14], demonstrating that the use of antiseptic is still not part of the routine of these professionals. Thus, the findings from this research show a change that reflects in a new culture and opening by the professionals in the adherence to new products. As

a confirmation of this, a prospective study conducted, in Turkey, in an ICU, with nurses, stated that these professionals had a preference for HH using alcohol-based product (65%) instead of soap and water (18.3%)[19]. In another study, participants in a survey in the Neonatal ICU reported that among the factors that prevent infections the HH using the product in one of them, including to clean material[20]

Many times, HH gives the impression of taking long time and becomes the reason for lack and low adherence[13]. However, several studies suggest that alcohol gel dispensers and reminders promote an improvement to HH adherence, resulting in lower rates of nosocomial infections[5, 12, 21].

In order to improve HH, WHO brings the multimodal strategy guide presenting key components, such as System change - alcoholic solution in service points, availability of water, soap and paper towels; Training/education; Evaluation and feedback; Reminders in the workplace; Institutional safety climate - participatory management[2,21]. A multicenter study conducted for two years, which implemented this strategy, encouraged the health professionals to HH compliance. In addition to the improved knowledge in relation to health care as a result of these practices and activities, the adherence that was 51% among professionals, increased to 67.2%[21].

Educational activities and greater quantities of sinks and alcohol-based sanitizer are measures that help to contain outbreaks and epidemics. Three elements are essential for the prevention of disease transmission through the hands of professionals, which are: topical agent with antimicrobial efficacy, proper technique and time indicated, and regular adherence of professionals to its use at the recommended moments[2,12].

A limitation of this study is that the nursing assistants were in low numbers in the pediatric ICU. For greater reliability, it is suggested to replicate this study more comprehensively and in other facilities.

Conclusion

The study allowed identifying that adherence to HH in the neonatal ICU was 63.3% and in the pediatric ICU was 70.8%. When analyzing the moments, it is possible to see that the adherence in moment 5 -after contact with patient surroundings- is alarming once the patient environment is colonized and transmission of pathogens from this service point can cause IRAs. In the Neonatal ICU nurses showed higher adherence in 2 (100%) and technician in 1 (93.5%) while in the Pediatric ICU nurses presented higher adherence in 1 and 3 (99.9%) and technicians in 3 (85%). The most used product was alcohol sanitizer in both units. In the Neonatal ICU, the morning working shift presented highest adherence to HH while in the Pediatric ICU it was the night shift.

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