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## HAND HYGIENE AND PATIENT SAFETY: PERSPECTIVES OF PROFESSORS AND UNDERGRADUATE STUDENTS

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**ABSTRACT:** Quantitative exploratory study with the objective to identify the perspectives of professors and undergraduate students on aspects regarding hand hygiene and healthcare associated infections in their daily care practice. The study instrument was a questionnaire with seven statements related to the studied theme, which was answered by 109 undergraduate students and 53 professors at a public university in São Paulo, Brazil. Significant disagreement between the two groups was observed in regard to the statement that internship settings make supplies available at points that promote hand hygiene practices ( $p=0.02$ ), while significant agreement ( $p<0.01$ ) was observed in regard to the unavailability of alcohol-based handrub preparation for hand hygiene. Practical activities developed by the professors and undergraduate students take place at locations where there is not proper infrastructure for recommended hand hygiene practices, which may contribute to lapses in the care process and compromise patient safety.

**DESCRIPTORS:** Hand disinfection. Patient safety. Cross infection.

## HIGIENIZAÇÃO DAS MÃOS E A SEGURANÇA DO PACIENTE: PERSPECTIVA DE DOCENTES E UNIVERSITÁRIOS

**RESUMO:** Pesquisa exploratória, de abordagem quantitativa, com objetivo de identificar a perspectiva de docentes e universitários da área da saúde sobre aspectos relacionados à higienização das mãos e infecções relacionadas à assistência à saúde no cotidiano de sua prática. Responderam o instrumento estruturado com sete assertivas relacionadas à temática, 109 universitários e 53 docentes de uma universidade pública de São Paulo, Brasil. Observou-se discordância significativa entre os grupos quanto à afirmativa de que os locais de estágio dispõem de suprimentos em pontos que favoreçam a higienização das mãos ( $p=0.02$ ), e concordância significativa ( $p<0.01$ ) quanto à indisponibilidade de álcool gel para higienização das mãos. As atividades práticas desenvolvidas pelos docentes e universitários ocorrem em locais nos quais não há adequada infraestrutura para práticas preconizadas de higienização das mãos, fato que pode contribuir para a ocorrência de falhas no processo de cuidar e compromete a segurança do paciente.

**DESCRIPTORES:** Lavagem de mãos. Segurança do paciente. Infecção hospitalar.

## HIGIENE DE LAS MANOS Y LA SEGURIDAD DEL PACIENTE: LA PERSPECTIVA DE LOS PROFESORES Y UNIVERSITARIOS

**RESUMEN:** Investigación cuantitativa y exploratoria, que objetivó identificar perspectivas de profesores y estudiantes sobre higiene de las manos y infecciones relacionadas con el cuidado de la salud en su cotidiano de práctica. Respondieron el instrumento estructurado con siete declaraciones relacionadas con el tema, 109 universitarios y 53 profesores de una universidad pública en São Paulo, Brasil. Fue observada discordancia significativa entre los grupos en relación con la afirmativa de que los sitios de enseñanza práctica tienen materiales que favorezcan la higiene de manos ( $p=0.02$ ) y una concordancia significativa ( $p<0.01$ ) cuanto a frecuente indisponibilidad de alcohol en gel para la higiene de manos. Las actividades prácticas desarrolladas por los profesores y universitarios ocurren en lugares donde no hay infraestructura adecuada para las prácticas recomendadas de higiene de manos, contribuyendo para la ocurrencia de fallos en el proceso de cuidado y comprometiendo la seguridad del paciente.

**DESCRIPTORES:** Desinfección de las manos. Seguridad del paciente. Infección hospitalaria.

## INTRODUCTION

Health-care Associated Infections (HAIs) occur in every health care institution, in every country, both developed and developing, and affect 1.4 million patients per year worldwide.<sup>1</sup> HAIs result in higher rates of morbidity and mortality, prolonged hospital stay, long-term disability, increased resistance of microorganisms to antimicrobials, higher costs for patients, families and health care systems, and preventable deaths. Their causes are multifactorial and related to the complexity of the system, processes of care provision, economic restrictions and human behavior, this latter being conditioned by education among other factors.<sup>1-2</sup> Given the importance of this issue to patient safety, it is recommended that the surveillance and prevention of HAIs be prioritized by services committed to delivering safer health care.<sup>1</sup>

In 2005 the World Alliance for Patient Safety of the World Health Organization (WHO) proposed the First Global Patient Safety Challenge titled "Clean care is safer care". One of the primary goals of this initiative is the improvement of hand hygiene practices in an effort to prevent infections and promote safety of both patients and professionals.<sup>1-2</sup> Although hand hygiene is the most effective method to prevent transmission of pathogenic microorganisms, studies show insufficient adherence to the procedure by multidisciplinary health care teams.<sup>1-2</sup>

Based on the tenets of patient safety and recommendations of the WHO that all countries participate in the proposed challenge, the objective of this study was to identify the perspectives of professors and undergraduate students in the health care field on aspects regarding hand hygiene and HAIs in their daily practice.

## METHODS

This was an exploratory quantitative study involving undergraduate nursing and medical students and nursing professors from a public university in São Paulo, Brazil.

The students who participated in the study were in the third and fourth years of the undergraduate nursing program, and the fourth and fifth years of the undergraduate medicine program, as students already develop practical activities during these years. In 2011, there were

350 students enrolled in the undergraduate nursing program, distributed in four years, and 740 students in the undergraduate medicine program, throughout six years. Eighty-eight third-year nursing students were identified, along with 89 fourth-year students, with 120 students each in the fourth and fifth years of the medicine course, totaling 417 students eligible to participate in the study. Of the 417 eligible participants, 399 (95.7%) provided their email address to participate in the study, and 109 (27.3%) completed the questionnaire.

Among the 75 nursing professors eligible to participate in the study, only 70 (93.3%) received the questionnaire due to vacation and medical leave, and 53 (75.7%) of them returned the completed questionnaires. Thus, the total study sample was 162 participants.

Following approval of the ethical aspects of the research proposal (protocols 1478/10 and 1522/10), acceptance and signature of informed consent by participants, data were collected between April and May of 2011. The questionnaire structured with seven statements related to the study theme was sent to participants via email. The participants were asked to indicate their opinion on the statements using a Likert scale. Answer options included: "Strongly agree;" "Agree;" "No opinion;" "Disagree;" and "Strongly disagree."

The variables investigated were related to sample demographics and the participants' perspectives regarding the structure and processes for hand hygiene practices and HAI prevention.

The data collection instrument was developed based on the literature regarding hand hygiene and patient safety, and submitted to evaluation by three Ph.D. researchers with more than 10 years of research experience on the subject. This evaluation was based on the Delphi technique, which consists of the consolidation of the intuitive judgment of a group of specialists regarding events and trends. The Delphi technique is based on the structured use of knowledge, experience and creativity of a group of experts, assuming that collective judgment, when properly organized, is better than the individual opinion.<sup>3</sup>

The statements were analyzed through an evaluation form in which specialists were instructed to choose on a Likert scale among the

options "Agree," "Do not agree, nor disagree," and "Disagree" to each statement. It was stipulated a level of agreement of two-thirds along with the possibility of suggestions in the event of disagreement. The statements that presented disagreement were reformulated based on the proposed suggestions and submitted to a second round of Delphi technique. Following 100% consensus and agreement, the study instrument was finalized with the seven statements:

- Statement A: the infrastructure of health services promotes the adoption of precaution measures and the proper use of individual protection equipment while performing care.
- Statement B: there are sinks in proper locations supplied with soap, paper towels and alcohol-based handrub preparation in every internship location/sector, favoring the implementation of hand hygiene.
- Statement C: alcohol-based handrub preparation for hand hygiene is frequently unavailable in the internship setting.
- Statement D: patients and their families should demand that all health care workers clean their hands before performing procedures.
- Statement E: all students are trained to correctly perform hand hygiene.
- Statement F: all professors are trained to correctly perform hand hygiene.
- Statement G: internship locations have higher rates of infection in comparison to units that do not receive students.

The study instrument was incorporated into LimeSurvey® Quick Stats, an open source survey computer program which develops questionnaires using online data collection, user access control, sequential responses and data storage, in addition to providing descriptive analysis of the findings. The form was sent to the participants via email and a period of 30 days was stipulated for their completion.

In regard to the analysis, the categorical variables are presented according to absolute and relative frequencies, and the numeric variables according to the mean and standard deviation.

The Chi-squared, Fisher's Exact and binomial tests were used for statistical analysis, adopting the significance level of 0.05.

## RESULTS

Of the 53 professors who answered the questionnaire, 94.3% were women. In regard to age, 22 (41.5%) were between 51 and 60 years old, and 20 (37.7%) were between 41 and 50. The level of academic degree among the professors varied: 56.6% (30) had a Ph.D., 28.3% (15) had a master's degree, 7.5% (4) had a post-doctoral degree, 5.7% (3) were specialists and 1.9% (1) had an undergraduate degree. Among the locations cited for patient care internship, hospital units were predominant (67%) followed by community health care (33.9%) and outpatient care units (28.3%). It is worth highlighting that the participants could indicate more than one answer to this question.

In regard to the undergraduate participants, 109 questionnaires were obtained from 84 (77.1%) women and 25 (22.9%) men. The mean age of the students was 22.84 ( $\pm$  2.82) years. Twenty-three (21.1%) students were in the third year and 52 (47.7%) were in the fourth of the undergraduate nursing course, whereas 24 (22%) were in the fourth year of the undergraduate medical course and 10 (9.2%) were in their fifth. According to primary data, of the 11 (10.1%) undergraduate students who already worked in health care area, nine (8.3%) worked in patient care, one (0.9%) worked in research and one (0.9%) developed administrative activities.

The majority of nursing (98.7%) and medical (55.9%) undergraduate students stated they had studied contents related to patient safety during their internship, and 58.5% of the professors indicated they do not teach contents on patient safety in the undergraduate nursing course.

The analysis of the participants' answers to the statement "The infrastructure of health services promotes the adoption of precaution measures and the proper use of individual protection equipment while performing care" showed a significant disagreement ( $p < 0.01$ ) (Table 1), although individual evaluation by group showed a minor difference of opinion among undergraduate students, and major disagreement among professors (Table 2).

**Table 1 - Perspectives of professors and undergraduate students on the statements presented. São Paulo - São Paulo, 2011**

Statement	Professors		Undergraduate students		Total		Statistical test
	n	%	n	%	n	%	
Statement A							
Strongly disagree/disagree	40	75.5	49	48.0	89	57.4	$\chi^2=10.74$ p<0.01
Strongly agree/agree	13	24.5	53	52.0	66	42.6	
Total	53	100.0	102	100.0	155	100.0	
No opinion	7						
Statement B							
Strongly disagree/disagree	37	71.2	91	85.8	128	81.0	$\chi^2=4.90$ p=0.02
Strongly agree/agree	15	28.8	15	14.2	30	19.0	
Total	52	100.0	106	100.0	158	100.0	
No opinion	4						
Statement C							
Strongly disagree/disagree	20	38.5	20	19.0	40	25.5	$\chi^2=6.90$ p<0.01
Strongly agree/agree	32	61.5	85	81.0	117	74.5	
Total	52	100.0	105	100.0	157	100.0	
No opinion	5						
Statement D							
Strongly disagree/disagree	4	7.8	3	2.8%	7	4.4%	Fisher † p=0.21
Strongly agree/agree	47	92.2	104	97.2	151	95.6	
Total	51	100.0	107	100.0	157	100.0	
No opinion	4						
Statement E							
Strongly disagree/disagree	15	29.4	22	20.8	37	4.4	$\chi^2=1.43$ p=0.23
Strongly agree/agree	36	70.6	84	79.2	120	95.6	
Total	51	100.0	106	100.0	157	100.0	
No opinion	5						
Statement F							
Strongly disagree/disagree	19	39.6	20	20.2%	39	26.5	$\chi^2=6.23$ p=0.01
Strongly agree/agree	29	60.4	79	79.8%	108	73.%	
Total	48	100.0	99	100.0%	147	100.0	
No opinion	15						
Statement G							
Strongly disagree/disagree	28	75.7	39	72.2	67	73.6	$\chi^2=0.15$ p=0.71
Strongly agree/agree	9	24.3	15	27.8	24	26.4	
Total	37	100.0	54	100.0	91	100.0	
No opinion	71						

\*  $\chi^2$ : Chi-squared test; †Fisher's exact test.**Table 2 - Binomial distribution regarding the statements presented. São Paulo - São Paulo, 2011**

Category		PO*		Probability	p
Statement A					
Professors	Strongly agree/agree	13	0.25	0.50	<0.01
	Strongly disagree/disagree	40	0.75		
Undergraduates	Strongly agree/agree	53	0.52	0.50	0.767
	Strongly disagree/disagree	49	0.48		
Statement B					
Professors	Strongly agree/agree	15	0.29	0.50	0.03
	Strongly disagree/disagree	37	0.71		



Undergraduates	Strongly agree/agree	15	0.14	0.50	<0.01
	Strongly disagree/disagree	91	0.86		
<b>Statement C</b>					
Professors	Strongly agree/agree	32	0.62	0.50	0.126
	Strongly disagree/disagree	20	0.38		
Undergraduates	Strongly agree/agree	85	0.81	0.50	<0.01
	Strongly disagree/disagree	29	0.19		
<b>Statement D</b>					
Professors	Strongly agree/agree	47	0.92	0.50	<0.01
	Strongly disagree/disagree	4	0.8		
Undergraduates	Strongly agree/agree	104	0.97	0.50	<0.01
	Strongly disagree/disagree	3	0.03		
<b>Statement E</b>					
Professors	Strongly agree/agree	36	0.71	0.50	0.05
	Strongly disagree/disagree	15	0.29		
Undergraduates	Strongly agree/agree	84	0.79	0.50	<0.01
	Strongly disagree/disagree	22	0.21		
<b>Statement F</b>					
Professors	Strongly agree/agree	29	0.60	0.50	0.193
	Strongly disagree/disagree	19	0.40		
Undergraduates	Strongly agree/agree	79	0.80	0.50	<0.01
	Strongly disagree/disagree	20	0.20		
<b>Statement G</b>					
Professors	Strongly agree/agree	9	0.24	0.50	0.03
	Strongly disagree/disagree	28	0.76		
Undergraduates	Strongly agree/agree	15	0.28	0.50	0.01
	Strongly disagree/disagree	39	0.72		

\* PO: Proportion observed.

The professors and undergraduate students significantly disagreed on statement B: "there are sinks in proper locations, supplied with soap, paper towels and alcohol-based handrub preparation in every internship location/sector, favoring the implementation of hand hygiene" ( $p=0.02$ ) (Tables 1 and 2).

Study participants significantly agreed ( $p<0.01$ ) on the unavailability of alcohol-based handrub preparation (Statement C), with the undergraduate students also showing statistical significance ( $p<0.01$ ) (Tables 1 and 2).

Regarding the statement that the patient and his/her family should demand that all health care workers sanitize their hands before performing a procedure, inter- and intragroup agreement of the participants was detected (Tables 1 and 2).

In regard to the statements E: "all students are trained to correctly practice hand hygiene;" F: "all professors are trained to correctly practice hand hygiene;" and G: "internship locations have higher rates of infection in comparison to units that do not receive students," there was agreement for E and F, and disagreement for G (Tables 1 and 2).

## DISCUSSION

According to the WHO patient safety is a serious global public health problem. In the last decade, this issue became increasingly relevant and fundamental in health care education. It is defined as the absence of harm to patients during the care process, and comprises the promotion of efficient, equitable and timely health assistance based on the best scientific information and on comprehensive and individual needs of patients and their families.<sup>4,5</sup> Although the majority of undergraduate participants stated they had formal education on patient safety during their internship, more than half of the professors stated they do not address the topic in the undergraduate nursing course.

Literature shows that the topic of patient safety in undergraduate programs is more frequent in developed countries such as the United States (USA) and United Kingdom and that in general it is an optional discipline, not being formally included in the required health care curriculum. Although there are disagreements in the courses' curriculum, studies' results show that undergraduate students have greater knowledge and improvement of skills

and attitudes regarding patient safety after the subject implementation. All members of multi-professional health care teams, including students, should be capable of identifying risk situations, providing notification of errors and adverse events in a systematic manner, analyzing the system and disclosing the occurrence of such events to patients and family members, thereby contributing to promote safe and quality care, as they have the proper training, orientation and support.<sup>6-7</sup>

Standard precautions were established in 1996 by the Centers for Disease Control and Prevention in the USA to be adopted during the care of all patients, regardless their diagnosis.<sup>8</sup> The recommended measures include hand hygiene and the use of individual protection equipment.<sup>8-9</sup> In Brazil programs for prevention and control of HAIs are required by law (9.431/1997) in all hospitals, and a decree (2.616/1998) states the directives and norms for the prevention and control of such events, along with the suggested measures.<sup>9-11</sup> Nevertheless, the difficulty of complying with the cited scientific and governmental recommendations in Brazilian hospitals is recognized, even in wealthier regions of the country, due to the disparities of care characteristics and availability of resources.<sup>11</sup>

The minor difference of opinion of undergraduate students in regard to infrastructure (statement A) suggests that the perception of this fact requires greater practical experience and critical sense, since all participants developed practical activities predominantly in public hospital institutions (Table 2). Specialists state that the approach to this problem should go beyond focused and restrictive actions, since this is fundamentally related to the manner in which health policies are introduced and disseminated, to the quality of care in general, to the reformulation or innovation of technical care models and to the development of evaluation strategies.<sup>11</sup>

The groups showed disagreement on statement B: "there are sinks in proper locations, supplied with soap, paper towels and alcohol-based handrub preparation in every internship location/sector, favoring the implementation of hand hygiene" (Tables 1 and 2).

The financial and resource difficulties faced by Brazilian public hospitals are well known, and experienced on a daily basis by patients, health care students and professionals. A systematic review published by the WHO showed that HAIs are the primary health problem in developing countries where they have greater epidemio-

logical importance. Comparison of HAI events' prevalence in Europe (7.1%) and their estimated incidence in the US (4.5% in 2002) shows that in low or middle income countries like Brazil their occurrence is substantially greater (10.1%, varying from 5.7% to 19.0%).<sup>12</sup>

Hand hygiene is recognized as the most efficient measure to prevent HAIs, as evidenced in studies that show reduced transmission of pathogenic microorganisms parallel to increased adherence to the procedure by health care professionals.<sup>1,13</sup> Yet despite its epidemiological importance, promotion of adherence to hand hygiene practices is described as a great challenge. A multicentric study conducted in the USA showed that adherence to hand hygiene is approximately 50% or less, a similar finding to other observational studies.<sup>14-15</sup> Literature shows that the unavailability and difficult access to the necessary resources for hand hygiene constitute significant barriers in this process. According to the WHO, the preparation of health care institutions through provision of infrastructure and resources supply is a fundamental requirement for the promotion of hand hygiene practices.<sup>1</sup>

There was agreement among all of the participants regarding statement C: "alcohol-based handrub preparation for hand hygiene is frequently unavailable in the internship setting" (Table 1). The WHO recommends the use of an alcohol-based handrub as the preferred means for routine hand antisepsis once it is the only known method for rapidly and effectively inactivating a wide array of potentially harmful microorganisms on hands. It should not be used when hands are visibly dirty or visibly soiled with blood or other body fluids, if exposure to potential spore-forming pathogens is strongly suspected or proven and after using the toilet, when hands should be washed with soap and water. Additionally, adherence to hand hygiene practices is greater when alcohol-based handrub preparation is available and easy to access.<sup>1</sup> In Brazil the National Health Surveillance Agency requires the provision of alcohol-based handrub preparation in all health care services.<sup>16</sup> Nevertheless, many institutions do not seem to comply with this guideline.

Both groups participating in the study showed agreement regarding statement D: "patients and their families should demand that all health care workers sanitize their hands before performing procedures." A study with health care users in the USA showed that four out of five people would have asked their health care provider if she/

he had cleaned his/her hands if they had received information beforehand regarding the importance of the procedure.<sup>17</sup> The WHO recommends patient participation in initiatives to promote their own safety, and considers patients to be essential members of health care teams.<sup>1,18</sup> Studies show that the desire of patients to be involved with specific tasks depends directly on the institutional attitude in regard to their safety and participation.<sup>1,17,19</sup>

Both professors and undergraduates agreed on statements E and F, that they are properly trained for performing adequate hand hygiene.

Studies show that students overestimate their adherence to hand hygiene practices. A study performed with medical students showed that the rate of adherence to hand hygiene varied from 9% to 27% during the clinical exam, which is considered to be low.<sup>20</sup> A national study conducted with undergraduate students in the second, third and fourth years of an undergraduate nursing program indicated that adherence to hand hygiene practices before and after performing a procedure diminishes as students advance in the course. The proportion of fourth-year students who performed the technique steps at the correct moments was much lower (12.5%) in comparison to second-year (82.1%) and third-year (59.4%) students. None of the fourth-year students performed the procedure correctly.<sup>21</sup>

There is consensus that knowledge among nursing and medical students regarding the control of HAIs is crucial both for their current and future clinical practice, as well as for patient safety. Thus, it is important that all health care teaching institutions ensure implementation of proper hand hygiene education programs and evaluation procedures that promote the teaching and learning of safe practices, so that hand hygiene practice becomes an integral part of the care process of health care students.<sup>22-23</sup>

In regard to professors, studies addressing the theme of hand hygiene specifically by this group were not found. Although the evidence shows unsatisfactory adherence of health care professors to hand hygiene procedures, the authors of the present study believe that the responsibility and influence they exert on intern students is the foundation for the significant agreement by students and professors in regard to the statements that these groups are properly trained for proper hand hygiene.

No study was found substantiating the hypothesis that a greater occurrence of infection is found in internship locations in comparison to units where training does not occur. In some studies, association between higher rates of bloodstream infec-

tions and surgical site infections are observed when the procedures are done by medical residents.<sup>24</sup>

Intra or interinstitutional comparison of HAI infection rates requires the use of global indicators with the same classification criteria, which makes such analysis difficult.<sup>25</sup> A study discussing the evolution and characteristics of university hospitals evaluates that making more qualified personnel available does not necessarily mean that these institutions will provide better quality of care. Although university hospitals should be a model for professionals in training, they often present serious deterioration of care standards.<sup>26</sup>

## LIMITATIONS OF THE STUDY

The limitations of this study included the description of the reality of a single health care institution, and a limited study sample of health care students and professors. Nevertheless, the results of the study evidence the need to provide inputs and basic conditions to improve care and safety in the health care system in one of the most developed cities of Brazil.

## CONCLUSION

The study showed that, according to the perspectives of professors and undergraduate students in the health care area, internship activities take place at locations where there is not adequate infrastructure for recommended hand hygiene practices, a fact that contributes to the occurrence of lapses in the care process, and compromises patient safety. Therefore, the study verifies the need to improve the infrastructure and availability of resources for hand hygiene, in addition to deepening the approach to prevention and control of infections as a strategy to promote patient safety during the education of health care professionals.

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