



ORIGINAL ARTICLE

Comparison of knowledge, attitudes and hand hygiene behavioral intention in medical and nursing students

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Keywords

Hand hygiene • Healthcare occupations students • Training

Summary

Introduction. Hand hygiene is crucial to prevent cross infection. Healthcare students are in a prime position to learn hand hygiene skills. The aim of this study was to analyze hand hygiene behavioral intentions of healthcare students before and after contact with the patient and to compare the knowledge of and attitude towards hand hygiene between medical and nursing students.

Methods. In a descriptive survey research design, convenience selection of a sample of medical students (n=657) and nursing students (n=303) was done from modules taught by the Department of Preventive Medicine and Public Health in both Medicine and Nursing undergraduate degrees in four Spanish universities.

The hand hygiene Questionnaire, a validated instrument to evaluate behavior, knowledge, and attitudes, was used.

Results. A significantly lower percentage of students reported always or almost always carrying out hand hygiene before contact with the patient or invasive procedures in comparison to the percentage complying after contact with secretions or with the patient. Although hand hygiene knowledge appears acceptable, its importance is not sufficiently valued.

Conclusions. There are deficiencies in behavioral intention, knowledge, and attitudes related to hand hygiene in medical and nursing students. Better results are observed among nursing students, especially those who have received specific training.

Introduction

Hand hygiene (HH) is one of the most important measures to prevent the transmission of infectious diseases [1]. It is a key mechanism for controlling hospital infection [2, 3], one of the most common healthcare-related adverse effects [4, 5]. The WHO launched a program against healthcare-associated infection called “Save lives: clean your hands” with the slogan “Clean care is safe care” [6, 7]. This initiative led to considerable action worldwide to implement the WHO Multimodal Hand Hygiene Improvement Strategy, which includes: the ready availability of sinks and alcohol-based hand rub dispensers; the display of HH reminders in the workplace; increased training and education of healthcare professionals on this issue; evaluation and feedback on their knowledge, attitudes, and practices; and the promotion of an institutional climate of safety [7-12]. Despite these efforts, subsequent studies generally found that the average compliance of healthcare professionals with these guidelines is less than 50 per cent [13-19]. Health workers have expressed some resistance to any change of previously learned behaviors [20], and interventional studies have also generally demonstrated a limited efficacy [13, 21]. The formation of future professionals is

therefore of major importance [22], but it has been reported that medical students are not acquiring the knowledge and understanding of HH required by physicians to prevent nosocomial infections [23-26]. Various approaches have proven effective to improve knowledge, attitudes, and practices in the development of healthcare professionals [15, 27, 28]. It has been suggested that students can act as role models for healthcare professionals by complying with HH protocols [3, 29].

The objectives of this study in a sample of medical and nursing students from four Spanish universities were: to analyze their HH behavioral intention before and after contact with the patient; to compare the knowledge of and attitude towards HH between medical and nursing students; and to explore differences between the universities.

Materials and methods

DESIGN

An observational, cross-sectional, and multicenter study was conducted in students enrolled in second- or third-year Public Health modules at the Schools of Medi-

cine and Nursing of four universities (Universities of Granada, Valladolid, La Laguna, and Oviedo) during the academic year 2011-12. These centers were chosen for convenience sampling to ensure a broad geographical distribution.

PROCEDURE

Questionnaires were administered to the students by a researcher during a normal class. The researcher gave a formal presentation of the general aim of the study and the department responsible and then read the questionnaire instructions. The questionnaire took 12 - 18 minutes to complete. The researcher did not respond to any queries from the students, who were asked to write any suggestions at the end of the questionnaire. A convenience sample of 960 students agreed to complete the questionnaire.

INSTRUMENT

The questionnaire gathered sociodemographic data and recorded whether the student had or had not received formal education/training on HH. It incorporated the WHO Hand Hygiene Questionnaire, which has demonstrated adequate validity and reliability to measure behavioral intentions (before and after contact with the patient), knowledge, and attitudes [30]. It contains 50 items measuring 4 dimensions related to HH: behavioral intention before and after patient care, HH knowledge, and attitudes. The first dimension contains 34 items, and the second and third dimensions contain 8 items each. Responses to items are recorded on a Likert scale from 0 = “completely disagree” or “never” to 6 = “completely agree” or “always”.

ETHICAL CONSIDERATIONS

Participants were informed of the purpose of the study, their freedom to volunteer, and the absence of negative consequences for non-participants. The act of filling out the questionnaire and returning it to key personnel was considered to imply consent to study participation. Data collection was conducted after the examination period, ruling out any possible influence on grades.

DATA ANALYSIS

SPSS version 16.0 was used for the statistical analyses. Means with standard deviation (SD) and frequencies were calculated, and the normality of data distribution and the homoscedasticity of variance were tested with Levene’s test. Comparisons were performed using the Student’s t-test for independent samples or Analysis of Variance (ANOVA) with *post-hoc* Bonferroni’s correction for multiple comparisons (assuming equal variances). P < 0.05 was considered significant.

Results

The study included 960 participants, 657 (68.4%) medical students and 303 (31.6%) nursing students. Their mean (SD) age was 21.91 (3.15) years, ranging from 18 to 46 years; 731 participants were female (76.1%); 431 students (44.9%) were from the University of Granada, 98 (10.2%) from the University of Valladolid, 328 (34.2%) from the University of La Laguna, and 103 (10.7%) from the University of Oviedo.

Table I shows some examples of the responses on HH behavior intention for some of the Five Moments for Hand Hygiene according to the WHO. A significantly

Tab. I. Declarative intention of hand hygiene behavior for some examples of the 5 moments for hand hygiene by WHO (N = 960).

Percentages of response to the question “how often would you wash your hands before or after ...?”	Never or very rarely (response 0-1)	Sometimes (response 2-4)	Quite often or always (response 5-6)
Before patient contact			
Placing cables for cardiac monitoring	21.7	47.6	30.7
Mobilizing a patient	15.8	47.5	36.7
Measuring blood pressure	33.5	52.7	13.8
Before invasive procedures			
Administering medication using a three-way stopcock	7.4	38.3	54.3
Cannulating	0.9	10.4	88.7
After contact with secretions			
Assisting bronchial mucus aspiration	0.9	13.2	85.9
Intramuscular injection of medication	3.2	24.8	72.0
After patient contact			
Connecting parenteral nutrition	4.8	29.2	66.0
Patient hygiene	1.0	10.9	88.1
Adjusting glasses or oxygen mask	13.2	45.7	41.1
After contact with patient surroundings			
Adjusting the perfusion rate	33.8	45.6	20.6
Raising the bed of the patient	39.6	39.2	21.2

lower percentage of students reported always or almost always carrying out HH before contact with the patient, before invasive procedures, and after contact with the environment in comparison to the percentage complying with good HH practices after contact with secretions or the patient.

Table II gives the results for HH knowledge, which can be considered acceptable, with more than 65% of participants responding correctly to the items “hand hygiene is unnecessary when gloves are worn” and “rubbing hands with alcohol-based handrub before patient contact reduces the risk of infection transmission”. The mean (standard deviation) score for knowledge was 4.59 (0.72) out of six, with only 4.69% of respondents scoring 3 or less and 80% scoring above 4 points.

Table II also summarizes the scores for attitudes toward HH, with 44% of respondents agreeing that peer pressure would improve their behavior. The results suggest that the importance of HH is not sufficiently valued, with over 50% agreeing that they would wash their hands more often if it really was so important. Only 28.1% completely or highly agreed that they would improve their HH practice if asked about their compliance by patients or their families.

The comparative results in Table III show that higher mean scores were obtained in all four dimensions by the nursing students in comparison to the medical students ($p < 0.001$). Mean scores were also higher ($p < 0.001$) in students who had received previous education/training in HH in comparison to those who had not (Tab. IV).

Tab. II. Some examples of responses to items on knowledge and attitudes in relation to hand hygiene (Percentage response to the question “Express your level of agreement with each of the following statements ...”) (n = 960).

	Completely or highly disagree (response 0-1)	Somewhat agree (response 2-4)	Completely or highly agree (response 5-6)
Declarative knowledge			
Hand hygiene is unnecessary when gloves are worn	71.7	20.3	6.6
Hand hygiene is unnecessary after touching the vital signs monitor	23.4	62.4	14.2
Rubbing hands with alcohol-based handrub before patient contact reduces the risk of infection transmission	4.0	30.0	66.0
Attitudes			
I would wash my hands more often if the nurses and / or healthcare professionals did so when we start an activity	28.2	30.7	41.1
I would wash my hands more often if my colleagues called me out for not doing so	24.7	31.3	44.0
I would wash my hands more often if it really was so important	23.8	23.6	52.6
Patients and / or their companions should ask me if I've washed my hands before performing any activity	33.4	38.5	28.1

Tab. III. Comparison between medical and nursing students in dimensions of hand hygiene behavioral intention before/after patient contact, knowledge, and attitudes.

	Medicine (N = 657)		Nursing (N = 303)		T	p value
	Mean	Standard deviation	Mean	Standard deviation		
Mean of the dimension formed by items on behavior intention before patient contact	3.79	0.85	4.07	0.97	-4.53	< 0.001
Mean of the dimension formed by items on behavior intention after patient contact	4.00	0.90	4.38	0.94	-5.96	< 0.001
Mean of the dimension formed by items on knowledge of hand hygiene	4.49	0.71	4.78	0.69	-5.91	< 0.001
Mean of the dimension formed by items on attitude towards hand hygiene	2.66	0.46	3.24	0.98	-8.65	< 0.001

Tab. IV. Comparison between students who reported previous specific training in hand hygiene and those did not in dimensions of behavior intention before/after patient contact, knowledge, and attitudes.

	With training (n = 712)		Without training (n = 247)		T-student	p value
	Mean	Standard deviation	Mean	Standard deviation		
Mean of the dimension formed by items on behavior intention before patient contact	4.00	0.89	3.64	0.86	5.17	< 0.001
Mean of the dimension formed by the items on behavior intention after patient contact	4.24	0.92	3.88	0.92	4.63	< 0.001
Mean of the dimension formed by items on knowledge of hand hygiene	4.65	0.71	4.40	0.70	4.65	< 0.001
Mean of the dimension formed by items on attitude towards hand hygiene	2.90	0.99	2.68	0.86	3.01	< 0.005

Table V shows the results of comparing the data among the universities. For HH behavioral intention before patient contact, scores were significantly higher for students in universities 1 and 3 *versus* universities 2 and 4. For HH behavioral intention after patient contact, scores were significantly higher for students in university 4 *versus* university 1. For knowledge and attitudes, scores were significantly lower for students from university 1 *versus* university 4 for knowledge and *versus* university 3 for attitudes.

Discussion

In this study, medical and nursing students revealed poor compliance with correct HH behavioral intention for each of the five moments specified in WHO guidelines, especially in regard to HH behavior before contact with patients, before invasive procedures, and after contact with the patient’s surroundings, when less than half of the students reported washing their hands always or almost always. Their responses to the questionnaire reveal a greater concern for HH after than before contact with patients, in line with direct observations of the behavior of healthcare professionals [25, 31-34]. This finding suggests that the principles learned by students are largely directed at self-protection rather than patient protection, as also reported in healthcare professionals [16, 17, 35, 36].

Knowledge of HH principles appears to be generally good, although an intermediate or ambiguous score (of 2-4) was given for many items that should have received a more robust response, indicating that basic knowledge has not been properly assimilated by many of the participants, as observed by other researchers [23, 37-43]. One widely held mistaken belief is that HH is unnecessary when gloves are used. Weaknesses in the knowledge of participants were also detected in relation to intended HH behavior. Thus, low scores were obtained for the administration of medication using a three-way stopcock, suggesting that this intervention is not considered an invasive procedure. These deficits in knowledge support the need for improvements in HH training in

medical and nursing degree courses, as advocated by the WHO [23, 42-44].

The results obtained for attitudes were less conclusive, and no specific trends were observed. However, the responses indicate that a significant percentage of subjects react favorably to behavioral interventions based on external reinforcement and suggest that reference figures may be important for the implementation of correct HH behavior. This is an extremely important factor, because interventions conducted in collaboration with the students can shape positive behaviors and avoid erroneous habits that are later very difficult to change.

Major differences in behavior, knowledge, and attitudes were observed between the medical and nursing students. The nursing students obtained higher scores for the two dimensions of behavior, displayed greater knowledge of HH and, perhaps most importantly, a better attitude. This is consistent with findings by observational studies that compliance rates are worse for medical than nursing staff [23, 42, 43, 45], and it underscores the need for an emphasis on the importance of HH and related indications and techniques in the curriculum of medical students. A higher mean score was obtained for all dimensions from students reporting a previous specific training on HH in medical or nursing programs, although this result should be treated with caution due to possible recall bias.

Significant differences in all dimensions were observed among students from the different universities, with a lesser divergence in knowledge. The training of students on HH is heterogeneous among universities and highly influenced by the units used for clinical placements. Other studies highlighted the need for common guidelines across centers/departments, especially in relation to HH indications, procedures, and skills in healthcare professionals [35, 46, 47]. The study population is a convenience sample and cannot be considered representative, although the universities selected are widely distributed in the North, Center and South of Spain and in the Canary Islands.

In conclusion, there are deficiencies in behavioral intention, knowledge, and attitudes related to hand hygiene in medical and nursing students. Better results are ob-

served among nursing students, especially those who have received specific training in HH, suggesting that current weaknesses can be overcome by appropriate training strategies, which should be a priority issue.

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Conflict of interest statement

The authors declare no conflict of interest.

Authors' contributions

JC-M and AB-C are responsible for the design of the study. They analyzed the data and wrote the paper. MF-P and JG-C designed and validated the questionnaire. CR-L, AA-G, AL-P and AB-C dealt with the collection of information respectively in the medical and nursing faculties of the universities of La Laguna, Valladolid, Oviedo and Granada.

All authors reviewed and approved the final version of the manuscript.

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