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# Knowledge and information sources on standard precautions and infection control of health sciences students at King Saud bin Abdulaziz University for Health Sciences, Saudi Arabia, Riyadh

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ABSTRACT

*Background:* Only one study has been conducted in Saudi Arabia to assess medical students' knowledge of standard precautions (SPs) and infection control (IC). In this study, we examined knowledge of SPs and IC among clinical students attending the King Saud bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia.

*Methods:* In this cross-sectional study, we targeted clinical students from the following five colleges: Medicine (fifth and sixth years); Dentistry (second semester of the third, fourth, fifth, and sixth years); Applied Medical Sciences (third and fourth years); Nursing (third and fourth years); and Pharmacy (third, fourth, and fifth years). The data collection instrument was an adopted 41-item questionnaire that measured knowledge of SPs and IC in five domains. A score of ≥24 (60%) indicated sufficient knowledge.

*Results:* The participants comprised 129 students (67 men). The proportions of participants from each college were: Medicine, 58.1% ($n = 75$); Dentistry, 14% ($n = 18$); Applied Medical Sciences, 13.2% ($n = 17$); Nursing, 10.9% ($n = 14$); and Pharmacy, 3.9% ($n = 5$). Most students (73.6%) demonstrated sufficient knowledge (men, 67.2% and women, 80.6%). The highest scores were obtained for the domains "general concept of SPs", "hand hygiene", and "personal protective equipment", whereas the lowest scores were obtained for "disposal of and injuries from sharp objects" and "health-care providers' care". The main information source was formal curricular teaching.

*Conclusions:* In Saudi Arabia, students' knowledge of SPs and IC is satisfactory, with no significant differences between the sexes or between colleges. Thus, formal curricular teaching is an effective way to increase students' knowledge of SPs and IC.



## Introduction

Infection control (IC) practices have been developed to prevent and control hospital-acquired infections among patients and health-care providers. IC is classified into standard precautions (SPs) and expanded precautions (EPs). SPs are implemented in all patients regardless of their diagnosis. SPs include hand hygiene, appropriate handling of bodily fluids and waste, and prevention of injuries with sharp objects. In contrast, EPs are applied in specific situations depending on the mode of disease transmission, i.e. contact, droplet, and airborne precautions [1].

Little is known about health-care students' knowledge of SPs and IC in Saudi Arabia. A recent literature review revealed that only one study, conducted in 2012 at the King Faisal University, Al-Ahsa, Saudi Arabia, has examined knowledge of SPs among Saudi-Arabian medical students in their clinical years [2]. The researchers reported that participants' knowledge was low, and

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that self-directed learning and informal bedside practices were the main sources of knowledge. In contrast, many studies have addressed this crucial aspect of IC worldwide. In 2008, a study conducted at Rouen University, Normandy, France, reported differing levels of knowledge for different categorized domains (e.g., hand hygiene, nosocomial infection, and SPs) [3]. The study targeted four specialties (Medicine, Nursing, Radiography, and Physiotherapy). The best scores were related to SPs, and the university curriculum was the primary source of students' knowledge. Another study conducted in 2014 at the University of Tirana, Tirana, Albania, demonstrated that students in four specialties (Medicine, Physiotherapy, Radiography, and Nursing) had a moderate knowledge of IC [4]. Formal, in-class training was their main information source.

Students at the King Saud bin Abdulaziz University for Health Sciences (KSAU-HS) experience early exposure to clinical practice. The diverse colleges of the KSAU-HS include Medicine, Dentistry, Applied Medical Sciences, Nursing, and Pharmacy. Academic lectures and procedural skill sessions on IC are part of the curricula of all KSAU-HS colleges. During the clinical phase, students are at an elevated risk of becoming infected or transmitting diseases to patients and their colleagues. In addition, the risk of sharp object injuries is constant [1,5,6].

Knowing and practicing SPs and IC are crucial for the safety of both health-care workers and patients. Hand hygiene is the most practical and cost-effective method of reducing infection transmission [7,8]. Although hand hygiene is crucial and simple, compliance with hand hygiene practice is suboptimal among health-care providers (<40%) [9,10]. Consequently, in this study, we assessed knowledge of SPs and IC among clinical students attending colleges of the KSAU-HS and identified their primary information source.

## Materials and methods

### *Design and setting*

This cross-sectional study utilized a questionnaire to assess students' knowledge. The KSAU-HS was formally established in 2005 in response to positive feedback about postgraduate programs in various medical fields offered by the National Guard Health Affairs, Riyadh, Saudi Arabia, since the mid-1980s. The main campus of the KSAU-HS is in Riyadh, with two additional campuses in Jeddah and Al-Ahsa. This study took place at the Riyadh campus in 2017 at the following colleges: Medicine, Dentistry, Applied Medical Sciences, Nursing, and Pharmacy.

### *Participants*

In this study, the target population was clinical health sciences students in the following years of study: Medicine (fifth and sixth years); Dentistry (second semester of the third, fourth, fifth, and sixth years); Applied Medical Sciences (third and fourth years); Nursing (third and fourth years); and Pharmacy (third, fourth, and fifth years). The total number of clinical students across all five colleges was 655. We included students of both sexes; however, we excluded students from the Health Informatics College and students in the basic science or preparatory phases of their designated colleges. We analyzed the data using Raosoft software (Raosoft, Inc., Seattle, WA, USA) with a margin of error of 5% and a confidence interval of 95%. Similar to the response distribution obtained from the study conducted at King Faisal University (26.7%), the sample size in this study was 207 students. The participants were selected using convenience sampling.

### *Data collection process*

The proposals for this study began on January 19, 2017. Ethics approval was granted by the King Abdullah International Medical Research Center, Riyadh, Saudi Arabia, on February 27, 2017. E-form questionnaires with a brief introduction about the study's aims and importance were emailed to participants on February 29, 2017, and re-sent to non-respondents on March 4, 2017. The consent form was attached. Data collection was completed on May 13, 2017, and 129 responses were obtained.

The adopted questionnaire examined demographic data, information sources, and five domains consisting of 41 items measuring students' knowledge of SPs and IC. Demographic information included sex, college, and year. The five domains comprised: general concept of IC and SPs (five questions); hand hygiene (10 questions); personal protective equipment (PPE; nine questions); disposal of and injuries from sharp objects (eight questions); and health-care providers' care (nine questions). The questions were closed-ended true/false (34 questions) or multiple-choice questions (seven questions). Each correct answer was worth one point (maximum score, 41 points). The information source question was asked prior to the questions about the five domains. The questionnaire was in English, which is the formal teaching language at the KSAU-HS.

### *Data analysis*

Excel® (Microsoft Corp., Redmond, WA, USA) was used for data entry, and SPSS version 24 (IBM Corp., Armonk, NY, USA) was used for data management and analysis. The cutoff for sufficient knowledge of SPs and IC was 24/41 (60%), consistent with the study conducted at King Faisal University [2]. Thus, a score of 23 or lower was considered to reflect insufficient knowledge. The chi-squared test was used to assess the relationship between knowledge and categoric variables expressed as percentages and frequencies (e.g., knowledge and speciality). The *t*-test was used to assess the difference between knowledge and quantitative values expressed as means and standard deviation (e.g., domain and sex). The significance level was set at $p < 0.05$.

## Results

One hundred twenty-nine students responded (67 men and 62 women). The proportions of participants from each college were as follows: Medicine, 58.1% ($n = 75$); Dentistry, 14% ($n = 18$); Applied Medical Sciences, 13.2% ($n = 17$); Nursing, 10.9% ($n = 14$); and Pharmacy, 3.9% ($n = 5$).

The sources of information on IC and SPs reported by the students comprised: self-directed learning, 48.8% ($n = 63$); informal practical learning in the ward (e.g., at bedside), 58.9% ($n = 76$); formal curricular teaching, 66.7% ($n = 86$); and IC courses, 58.9% ($n = 76$). For this question, participants could choose more than one source.

The percentage of respondents with sufficient knowledge on IC and SPs was 73.6% ($n = 95$): 67.2% ($n = 45$) of men and 80.6% ($n = 50$) of women. There was no significant difference between the sexes in knowledge of SPs and IC ($p = 0.082$). The correct response rates for each question are provided in Table 1.

Differences between the sexes in the correct response rates for each domain are shown in Table 2. General concepts of SPs were answered correctly 81.6% of the time, followed by hand hygiene (68.2%), PPE (66.5%), disposal of and injuries from sharp objects (54.5%), and health-care providers' care (53.05%).

Students' knowledge of SPs and IC at each college is shown in Table 3. Students' knowledge of SPs and IC at each college was as fol-

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