Knowledge and Self-Reported Practice of Universal Precautions among Kuwait University Medical Students in Their Clinical Years

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Key Words

Universal precautions • Knowledge • Practice • Medical students • Kuwait University

Abstract

Objectives: This cross-sectional study aimed to assess the knowledge and practice of universal precautions among Faculty of Medicine, Kuwait University, medical students in their clinical years. **Subjects and Methods:** A self-administered questionnaire including 9 knowledge and 9 practice questions of universal precautions was used. A score was calculated for both knowledge and practice. These scores were dichotomized into less than median score (poor) and more than median score (good). 244 students were invited to participate. **Results:** Of the 244 students, 220 (90.2%) accepted to participate. Of the 9 knowledge questions about universal precautions, 7 were answered correctly by more than 60% (range 64.8–90.4) of the students. All questions regarding the practice of universal precautions were answered correctly by over 60% (range 61.8–96.4) of the students. The prevalence of poor knowledge was 38.2% (84/220) and poor practice was 27.7% (61/220). Grade point average was significantly ($p = 0.008$) associated with the knowledge status of the respondents; however, it was not significantly associ-

ated ($p = 0.397$) with practice of universal precautions. Furthermore, neither the knowledge status nor any of the sociodemographic variables were significantly associated with the practice of universal precautions. **Conclusions:** A substantial number of students of the Faculty of Medicine, Kuwait University, in their clinical years appeared to have poor level of both knowledge and practice of universal precautions. Efforts are needed to optimize the level of knowledge and practice among students to minimize the risk of preventable infections.

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Introduction

Healthcare workers and medical students are routinely exposed to a high degree of risk of infection, which is potentially preventable [1–4]. Additionally, for some of these infections, e.g. hepatitis C (HCV) and acquired immunodeficiency syndrome (AIDS), vaccines are not available. In 1987, the Centers for Disease Control and Prevention (CDC), Atlanta, Ga., USA made recommendations for universal precautions. These universal precautions are infection control guidelines and measures to prevent the transmission of infections through blood and

other body fluids among patients and healthcare workers [5].

Published literature revealed poor knowledge of and compliance to universal precautions among healthcare workers and students worldwide [6–12]. It was also shown that immediately after graduation many students in Seattle, USA lacked adequate knowledge of universal precautions regarding the ten common clinical procedures of universal precautions [6]. Similarly, an inadequate knowledge of and low compliance with universal precautions among nursing and allied health practitioners has been shown in the UK [7]. Also, it was noted that anesthesiologists in Australia and New Zealand were not complying with universal precautions [8]. In Nigeria, only 38.8% of final year medical and nursing students had good knowledge about universal precaution [9]. A low level of compliance with universal precautions had been documented among healthcare workers and medical students in Nigeria, Iran and Indonesia [10–12]. Moreover, some laboratory personnel in Lebanon lacked proper knowledge and practice about how to dispose blood-contaminated waste [13]. In Kuwait, hand hygiene compliance among nursing staff in secondary care hospitals had been reported to be poor [14].

During the last 5 years, there has been a change in the medical teaching curriculum in the Faculty of Medicine, Kuwait University. However, the new curriculum seemingly has not been adjusted for the new bedside teaching program by introducing the principles of universal precautions. Both the new and old curricula introduced general prevention guidelines early during the first preclinical year, without stressing universal precautions. Thus far, to our knowledge, no study has assessed the understanding and application of CDC-recommended universal precautions among medical students of the Faculty of Medicine, Kuwait University. Therefore, the aim of this cross-sectional study was to assess the extent of knowledge and measure the degree of self-reported adherence to universal precautions of medical students during their clinical rotations. Also, the associations of several demographic factors with the level of knowledge and practice of universal precautions were explored in this sample.

Subjects and Methods

Study Design and Participants

This cross-sectional study was conducted in October 2010 to assess the knowledge and self-reported application of universal precautions among medical students in their 5th, 6th or 7th clinical years. On an average, annually around 100 new students are

admitted in the FOM. The curriculum consists of seven years of study. The 1st year is premedical (phase I in the new curriculum), the 2nd to 4th are pre-clinical years (phase II in the new curriculum), and the 5th to 7th clinical years (phase III in the new curriculum). Students of the new curriculum were only in 5th and 6th years of study during the time of data collection. The population of our study is medical students in their clinical years of both, the old (5th, 6th and 7th) and new (5th and 6th) curricula. The total number of students registered in these years was 276.

Questionnaire Development and Pretesting

A structured and self-administered questionnaire in English was used to collect the information. The study questionnaire had two main sections with 30 questions. Section I was on sociodemographic characteristics (10 questions), including age, gender, nationality, marital status, governorate, family income, year of study, type of curriculum, grade point average (GPA) and the current rotation. Section 2 was on universal precautions (20 questions). It was subdivided into two subsections: (a) to assess student's knowledge regarding universal precautions (11 questions) that included a question regarding the knowledge of the term 'universal precautions' (i.e. whether or not the students had heard or read about the term, and (b) the self-reported practice of these precautions (9 questions). The questions included in section 2 were essentially derived from the CDC recommendations and used by others [11]. The questionnaire was pretested on 34 randomly selected medical students in their clinical years.

Sample Size and Data Collection

Of the 276 registered students, 244 were contacted and 220 agreed to participate in the study and were therefore interviewed. This sample size was large enough to estimate a prevalence of 23% of knowledge or poor practice in this population, assuming a 95% CI, with absolute precision of 5% around the estimate [15]. The students were invited to participate in the study without consideration of grades, position or any other factor and were approached during problem-based learning sessions or break period.

Ethical Considerations

Written informed consent was obtained from each participant after an explanation of the study objectives. Participants were assured that participation in the study was voluntary and the confidentiality of the information obtained would be maintained. Permission to administer the questionnaire to the study population was obtained from the Vice Dean, Academics, Faculty of Medicine, Kuwait University. The study protocol and data collection instrument were reviewed and approved by the Ethics Committee and the Department of Community Medicine and Behavioral Sciences.

Statistical Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 19. Descriptive statistics for sociodemographic variables, frequencies (%) of correct answers for knowledge and practice questions on universal precautions, and scores for each participant based on the correct answers separately for the knowledge and practice questions were computed. Moreover, the knowledge and practice scores at their median values were dichotomized to create binary variables, i.e. knowledge (1 = poor

Table 1. Knowledge of universal precautions among medical students of Kuwait University in their clinical years, academic year 2010/2011 (n = 220)

Characteristic	Correct answer	
	n	%
Infection control guidelines are applied to patients with HIV and HBV only (F)	183	85.1
Infection control guidelines should be applied to all persons regardless of their infection status (T)	152	69.7
Infection control guidelines are not necessary in situations that might lead to contact with saliva (T)	30	13.7
Isolation is necessary for patients with blood-borne infections (F)	143	65.3
Used needles can be recapped after giving an injection (F)	197	90.4
For decontamination of devices such as manometer (with only contact with skin) washing with usual detergent is enough (T)	95	44.2
Subcutaneous injuries during intravenous injections are the most common cause of occupational infections (T)	142	64.8
Health care workers with non-intact skin should not be involved in direct patient care until the condition resolves (T)	144	66.1
Blood spills should be cleaned up promptly with sodium hypochlorite (T)	176	81.1

T = True; F = false.

knowledge if the score < median; 0 = good knowledge, if the score $\geq$ median) and practice (1 = poor practice if the score < median; 0 = good practice if the score $\geq$ median). Subsequently, the status of knowledge score (poor vs. good) and the status of practice score (poor vs. good) were considered to be outcome variables and the relationship of sociodemographic variables with these two outcome variables were evaluated using χ^2 analyses or χ^2 analysis for trend in case of ordinal variables. When expected cell frequencies for a variable were less than five, the Fisher-Freeman-Halton exact test was used to evaluate the potential association. For the variables that the practice score status was the outcome, the knowledge score status was also included as an independent variable to evaluate whether poor knowledge translates into poor practice in our study population.

Results

Characteristics of the Participants

Of the 220 students, 118 (53.6%) were females. The majority (120; 54.5%) were older than 22 years of age. The number of Kuwaitis was 193 (87.7%), and 178 (80.9%) were unmarried. 204 (92.7%) students had a total family income of 1,000 Kuwaiti Dinar (KD) or more per month (1 KD = 3.6 USD). The participants lived mostly in Hawalli (80; 36.4%) and Al-Asimah (61; 27.7%), with a very small number living in Al-Ahmadi (8; 3.6%) and Al-Jahra (7; 3.2%). Two thirds of the participants, 146 (66.4%), were studying in the new curriculum, mostly 5th year students (86; 39.1%). 142 (64.5%) students were either in medical or surgical rotations. The self-reported GPA of 99 (45.0%) students was between 2.5 and 2.99 out

of 4.0, with 13 (5.9%) students with a GPA of over 3.5 out of 4.0.

Knowledge and Practice of Universal Precautions

Of the study participants, 74 (33.6%) students had heard and/or read about the term 'universal precautions' previously. 55 (74.3%) of them first heard this term during university teaching sessions, 9 (12.2%) during hospital teaching sessions, 4 (5.4%) from friends and 6 (8.1%) from other sources.

Seven out of the nine knowledge questions regarding universal precautions were answered correctly by the majority of the students. However, 30 (13.6%) participants knew that infection control guidelines are not necessary in situations that might lead to contact with saliva, and 95 (43.2%) knew that it was enough to use usual detergents to decontaminate devices that have contact only with the skin (table 1). All the questions regarding the practice of universal precautions were answered correctly by more than 60% of the students. 203 (92.3%) students disposed of used needles in a sharp box after injections and washed their hands after each contact with a patient (table 2). Of the total possible score of 9 each for knowledge and practice, the median scores for knowledge and practice were 6 and 7, respectively. This yielded the prevalence of poor knowledge and poor practice as 38.6% (85) and 27.7% (61), respectively.

Of the sociodemographic variables, current GPA of the respondents showed a significant ($p = 0.008$) positive association with the knowledge score status, i.e. with im-

Table 2. Practice of universal precautions among medical students of Kuwait University in their clinical years, academic year 2010/2011 (n = 220)

Characteristic	Correct answer	
	n	%
I assume that blood and all body fluids of patients are infectious (T)	170	77.3
I wear mask, gown and eye wear if procedures and patient care activities are likely to cause splashing of blood and deep body fluids (T)	175	79.9
I dispose of used needles into a sharp box after injection (T)	203	92.3
I wear gloves as the first step in cleaning surfaces contaminated with blood or other body fluids (T)	188	85.8
Washing with soap and water for 5 minutes is my first step after contact with contaminated material (T)	137	62.6
I apply infection control guidelines in situations that might lead to contact with sweat (F)	136	61.8
If I have a wound, I wear gloves before caring for patients (T)	177	80.5
I wear sterile gloves for procedures involving contact with normally sterile areas of the patient's body (T)	147	67.1
When dealing with patients, I wash my hands after each contact with a patient (T)	212	96.4

T = True; F = false.

proved GPA there was a tendency of improved knowledge score (table 3). None of the sociodemographic variables were significantly associated with practice score status (table 4). However, some differences in the proportions of universal precautions practice scores by some sociodemographic variables were noted. For example, more Kuwaiti (56; 29.0%) than non-Kuwaiti students (5; 19.2%) had a poor practice score. In addition, a higher proportion (22; 30.6%) of 6th year students had a poor practice score compared to 5th (23; 26.6%) and 7th (16; 25.8%) year students. Furthermore, 45% of the students currently in pediatrics rotation had a poor practice score compared to less than 30% in each of all the other four rotations (Medicine, Surgery, Community Medicine, and Obstetrics and Gynecology. 26 (31%) students who had a poor knowledge score also had a poor practice score.

Discussion

In this cross-sectional study, only 33.5% of the participants had heard about the term 'universal precautions' previously and this percentage is much lower than a 53.5% reported among medical students in Iran [11]. The difference could possibly be attributed to the poor attendance rate in classroom teaching and discussions among students of the Faculty of Medicine, Kuwait University. It could also be due to more emphasis on the concept of universal precautions in Iran compared to that of this institution.

Poor knowledge (38.4%) and poor practice (27.7%) of universal precautions were similar to those in Iranian study [11] to final year medical students in the University of Washington School of Medicine [6] and the poor knowledge and poor practice are worrisome.

The only 13.7% of the participants who correctly answered the question regarding the necessity of universal precautions in situations involving contact with saliva is not alarming because saliva is one of the body secretions that perhaps do not require such precautions [5].

The 90.4% of the participants in our study who knew that needles should not be recapped after use was higher than 58% reported in the Iranian study. Furthermore, compared to 77.3% of the students in our study, 100% of the students in an Iranian study thought that blood and all bodily fluids of patients are infectious [11]. These differences between students of two medical colleges may be due to the institutional difference in the methods of guiding the students on the application of universal precautions.

While there was no relationship between the level of knowledge and actual practice of universal precautions in our study; a significant positive association ($p < 0.001$) was recorded between knowledge and practice among the students in the Iranian study [11]. Many researches have shown that people with a good practice are not necessarily knowledgeable and vice versa [16]. Studies done among healthcare workers in Pakistan and Texas, USA, found the disparity between the level of knowledge and actual practice of universal precautions [17, 18]. These studies consistently found that the optimal practice

Table 3. χ^2 analyses of the relationships of sociodemographic characteristics and knowledge score of universal precautions among medical students of Kuwait University in their clinical years, academic year 2010/2011 (n = 220)

Characteristic	Total	Poor knowledge score status (n = 84)	p value
Age ^a			
≤22 years	97	34 (35.1%)	0.426
>22 years	119	48 (40.3%)	
Gender			
Male	101	41 (40.6%)	0.561
Female	117	43 (36.8%)	
Nationality			
Kuwaiti	193	73 (37.8%)	0.550
Non-Kuwaiti	25	11 (44.0%)	
Marital status ^a			
Unmarried	177	69 (39.0%)	0.565
Married	41	14 (34.1%)	
Total family income			
<1,000 KD/month	15	8 (53.3%)	0.698 ^b
1,000–2,000 KD/month	88	31 (35.2%)	
>2,000 KD/month	116	45 (38.8%)	
Governorate			
Al-Ahmadi	8	4 (50.0%)	0.210
Al-Asimah	61	23 (37.7%)	
Al-Farwaniyah	27	14 (51.9%)	
Al-Jahra	7	4 (57.1%)	
Hawalli	80	31 (38.8%)	
Mubarak Al-Kabeer	35	8 (22.9%)	
Type of curriculum			
New curriculum	146	58 (39.7%)	0.555
Old curriculum	73	26 (35.6%)	
Year of study			
5th	86	31 (36.0%)	0.920 ^b
6th	72	31 (43.1%)	
7th	61	22 (36.1%)	
Current rotation			
Medicine	68	27 (39.7%)	0.924
Surgery	73	27 (37.0%)	
Community medicine	28	9 (32.1%)	
Obstetrics and gynecology	30	13 (43.3%)	
Pediatrics	20	8 (40.0%)	
Grade point average (GPA) ^a			
≥3.5	13	0 (0.00%)	0.008 ^c
3.0–3.49	34	17 (50.0%)	
2.5–2.99	99	40 (40.4%)	
<2.5	52	21 (40.4%)	

^a Numbers do not add up to 84 because of missing values.

^b Linear-by-linear association.

^c Fisher-Freeman-Halton exact test.

Table 4. χ^2 analyses of the relationships of sociodemographic characteristics and knowledge score, with the practice score of universal precautions among medical students of Kuwait University in their clinical years, academic year 2010/2011 (n = 220)

Characteristic	Total	Poor practice score status (n = 61)	p value
Age ^a			
≤22 years	97	24 (24.7%)	0.389
>22 years	120	36 (30.0%)	
Gender			
Male	101	27 (26.7%)	0.732
Female	118	34 (28.8%)	
Nationality			
Kuwaiti	193	56 (29.0%)	0.296
Non-Kuwaiti	26	5 (19.2%)	
Marital status			
Unmarried	178	48 (27.0%)	0.542
Married	41	13 (31.7%)	
Total family income			
<1,000 KD/month	16	6 (37.5%)	0.064 ^b
1,000–2,000 KD/month	88	29 (33.0%)	
>2,000 KD/month	116	26 (22.4%)	
Governorate			
Al-Ahmadi	8	3 (37.5%)	0.556
Al-Asimah	61	20 (32.8%)	
Al-Farwaniyah	27	10 (37.0%)	
Al-Jahra	7	2 (28.6%)	
Hawalli	80	18 (22.5%)	
Mubarak Al-Kabeer	36	8 (22.2%)	
Type of curriculum			
New curriculum	146	42 (28.8%)	0.628
Old curriculum	74	19 (25.7%)	
Year of study			
5th	86	23 (26.7%)	0.949 ^b
6th	72	22 (30.6%)	
7th	62	16 (25.8%)	
Current rotation			
Medicine	69	19 (27.5%)	0.481
Surgery	73	19 (26.0%)	
Community medicine	28	7 (25.0%)	
Obstetrics and gynecology	30	7 (23.3%)	
Pediatrics	20	9 (45.0%)	
Grade point average (GPA) ^a			
≥3.5	13	2 (15.4%)	0.397 ^b
3.0–3.49	35	10 (28.6%)	
2.5–2.99	99	26 (26.3%)	
<2.5	52	16 (30.8%)	
Knowledge score status			
Poor	84	26 (31.0%)	0.772 ^c
Good	135	35 (25.9%)	

^a Numbers do not add up to 61 because of missing values.

^b Linear-by-linear association.

^c Fisher-Freeman-Halton exact test.

score was less than the level of knowledge of universal precautions among healthcare workers. Several plausible explanations may explain this opposing relationship between the knowledge and practice of universal precautions including the fact that students know the information but translating knowledge into actual practice depends upon many personal attributes including personality, feeling of inconvenience, pressure of work, time limitations, etc.

Conclusion

This study showed a high prevalence of poor knowledge and poor practice of universal precautions among medical students in the Faculty of Medicine, Kuwait University and raises the need to address these issues during the clinical years. Any gaps in the knowledge and practice of universal precautions among upcoming physicians and surgeons in our and similar settings should be addressed during their formative years and be evaluated subsequently.

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