Knowledge, practice and attitude towards standard isolation precautions in Iranian medical students

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Summary Medical students are at high risk of being exposed to blood-borne pathogens. The aim of this study was to identify the levels of knowledge, attitude and practice of medical students regarding standard isolation precautions in Iran. A questionnaire was filled out by 468 medical students in their fifth to seventh year of study. Their mean knowledge, attitude and practice levels of standard isolation precautions were 6.1 ± 1.5 (maximum possible score 9), 32.3 ± 3.5 (out of 45), and 2.3 ± 1.6 (out of 9), respectively. Statistically significant positive correlations were observed between knowledge and attitude, knowledge and practice, and practice and attitude. Ninety percent of medical students in Shiraz had received no education of standard isolation precautions, and 75% of respondents wanted more education on standard isolation precautions. Education on infection control issues should not only be focused on healthcare workers, but should also include medical students.

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Introduction

Epidemiological studies indicate that the incidence of acquired immunodeficiency syndrome is increasing rapidly in Iran, especially in intravenous drug abusers. The incidence of hepatitis B infection ranges between 1.75 and 5%, and that of hepatitis C ranges between 0.2 and 1.5% in different geographical parts of Iran.

Due to their limited experience in performing invasive procedures, medical students are at particular risk of exposure to blood-borne pathogens. However, increased knowledge of possible hazards, education regarding common nosocomial transmission mechanisms, and teaching on how to...
avoid blood and body fluid exposure should mean that acquisition of blood-borne viral pathogens such as hepatitis B virus, hepatitis C virus and human immunodeficiency virus is preventable. Several investigations on the efficacy and consequences of this concept have been published. Standard isolation precautions are designed to reduce the risk of acquiring occupational infections from both known and unknown sources in the healthcare setting. Awareness and compliance with these recommendations is crucial for the prevention of occupational nosocomial infections in healthcare workers (HCWs), including medical students. Therefore, the aim of our study was to evaluate the levels of knowledge, attitude and practice in different groups of medical students in Shiraz, the capital city of the province of Fars in the South of Iran, regarding standard isolation precautions.

Methods

Subjects and sampling

The medical course at the Shiraz University of Medical Sciences has a seven-year duration. Theoretical basic education, including medical microbiology, is given in the first five semesters and is followed by theoretical and bedside clinical education for a further four semesters. Theory and practice of infectious diseases is covered specifically in the seventh semester. However, the curriculum does not include specific infection control training.

From May to November 2002, a survey was conducted among all 622 medical students who had successfully finished their theoretical clinical education (students from the ninth semester onwards, encompassing students in their fifth, sixth and seventh years). Researchers visited the students and distributed questionnaires together with information on how to fill them out.

Questionnaire design

Questionnaires were handed to participants who were willing to take part in the survey. An infection control expert, and a psychiatrist prepared the questionnaire according to international guidelines on standard isolation precautions. The questionnaire included demographic data and knowledge, attitude and practice of standard isolation precautions, and was piloted on a random sample of participants to ensure practicability, validity and interpretation of answers. Validity was assessed by infection control experts from the Iranian national expert group of infection control specialists. The reliability coefficient for the knowledge test (using Kuder Richardson test for reliability) was 0.726, and scores for attitude and practice of standard infection control precautions (using Cronbach’s alpha internal consistency coefficient) were 0.782 and 0.765, respectively.

The knowledge, attitude and practice levels of respondents regarding standard isolation precautions were measured using nine questions (Table I).

Knowledge assessment questions had three possible answers (yes; no; I don’t know). One point was given for each correct answer. For all other responses, zero points were assigned. Therefore, the score for knowledge ranged between zero (no correct answers) and nine (all answers correct).

Attitude assessment questions had five possible responses (very high; high; intermediate; low; no importance), where the answer ‘very high’ was given five points and ‘no importance’ received one point. Therefore, the total score ranged from nine (all questions regarded as not important) to 45 (all questions regarded as very important). For categorical analysis, an answer of ‘very high’ or ‘high’ was regarded as a positive attitude.

Practice assessment questions had five possible answers (always; often; sometimes; seldom; never). One point was allocated to 'always' and zero points for all other answers. The total scores ranged from zero (all questions answered with 'never') to nine (all questions answered with 'always').

Statistical analysis

For knowledge, attitude and practice, frequencies together with means and standard deviations were computed. Analysis of variance and multiple ranges test (Duncan) were performed to detect differences of knowledge, practice and attitude between the three groups in general and in subgroups of demographics. Spearman’s correlation coefficient was applied to compute knowledge-practice, knowledge-attitude and attitude-practice correlations. The chi-square test was used to compare the distribution of answers to different questions in fifth, sixth and seventh year students. A two-sided P-value of 0.05 was considered to be significant.

Results

The response rate was 75.2% (468/622). The
distribution of the education levels was well balanced, 23.9% \((N=112)\) of the respondents were in their fifth year, 32.6% \((N=176)\) were in their sixth year, and 38.5% \((N=180)\) were in their seventh year.

Total respondents’ mean standard deviation for knowledge was 6.09(1.51); scores for attitude and practice were 32.34(3.54) and 2.32(1.63), respectively. Medical students in their fifth year of education had a mean knowledge score that was statistically significantly less than the other two groups 5.74(1.92) vs. 6.18(1.36) and 6.21(1.31); \(P<0.05\). However, regarding attitude and practice, differences between the three groups were not statistically significant, and were not stratified by sex or marital status.

The knowledge–attitude \((r=0.423, P<0.05)\), knowledge–practice \((r=0.267, P<0.05)\) and practice–attitude \((r=0.328, P<0.05)\) correlations \((r=\) Spearman’s correlation coefficient) revealed that there were linear positive correlations between knowledge, practice and attitude scores in the total group of medical students \((P<0.001)\). These correlations were statistically significant within the students’ level of education \((P<0.004)\).

Table I  Questions assessing knowledge, attitude and practice of standard infection control measures

| Q1 | Washing hands before and after patient care |
| Q2 | Washing hands before and after using gloves |
| Q3 | Washing hands when unwanted contact with blood, body fluids, excretions and contaminated items had occurred |
| Q4 | Wearing gloves before touching mucous membranes and non-intact skin |
| Q5 | Wearing goggles to protect mucous membranes of the eyes during procedures that are likely to generate splashes or sprays of blood and body fluids |
| Q6 | Washing hands with betadine after contact with patients during procedures and activities that are likely to generate splashes or sprays of blood and body fluids |
| Q7 | Wearing a surgical mask to protect nose and mouth during procedures and activities that are likely to generate splashes or sprays of blood and body fluids |
| Q8 | Bending needles before disposal |
| Q9 | Wearing a gown during procedures that are likely to generate splashes or sprays of blood and body fluids |

Guidelines for standard isolation precautions are mainly developed to prevent transmission of blood and body fluid pathogens to HCWs. Our study revealed a generally poor compliance with standard isolation precautions among medical students. The results suggest that while the level of knowledge and attitude regarding standard isolation precautions among medical students is acceptable, compliance is poor. Despite regulations regarding infection control practices, compliance with adequate use of barriers such as gloves, goggles and hand disinfection are poor, as found in other studies.\(^{13-16}\) The disparity between knowledge and practice could be due to the unavailability of protective barriers, inadequate equipment, carelessness, malpractice of senior colleagues or interference of devices with working skills.

A limitation of our study was the method for assessing the practice of infection control measures among medical students. We were not able to observe the study participants. Our results are solely based on their subjective views. We have to assume that the level of practice is even lower than reported. This speculation is supported by the
results of Question 5. Although 89% of the students knew that wearing goggles to protect the eyes during procedures was likely to generate splashes or sprays of blood and body fluids was recommended and 88% expressed a positive attitude towards this, only 14% stated that they always follow this recommendation. However, like most hospitals in the world, our hospitals are not equipped with dispensers for goggles in the patient rooms, and busy clinical practice often does not allow time to search for visors. Therefore, a compliance of 14% in always wearing goggles seems to be too high.

The percentage of correct answers to Question 6 was particularly low. In order to design our questionnaire, we used recommendations published in 1996 for washing hands with betadine after contact with patients during procedures and activities that are likely to generate splashes or sprays of blood and body fluids. Only 7% of the respondents marked this statement as correct, and only 6% regarded it as very highly or highly important. Only 10% stated that they always practice accordingly. However, there has been a misconception between the terms handwashing and hand disinfection for a long time. While in the USA and UK, handwashing is mostly used as a synonym for hand disinfection, in Iran and most European countries, these are different tasks. Furthermore, we teach our students to use alcoholic solutions for hand disinfection before and after each patient contact. This issue is now better explained in the new guidelines for hand hygiene in the healthcare setting, and we might have had different results if we had adapted our questionnaire accordingly.

Spearman’s correlation coefficients revealed linear positive correlations between knowledge, practice and attitude scores in the total group of medical students ($P<0.001$), and these correlations were statistically significant within the students’ level of education ($P<0.004$). However, this does not necessarily indicate that the better the knowledge, the better the attitude and the better the practice of infection control. While it seems rational that knowledge and attitude should have an impact on practice, no change will be observed if it is not possible to comply with existing recommendations, for instance, due to lack of gowns or gloves.

In conclusion, knowledge of transmission pathways and a positive attitude towards infection control measures alone does not influence compliance with current recommendations. As our results reveal, practice of standard isolation precautions is poor among medical students of the Shiraz University of Medical Science. Therefore, future education campaigns on infection control issues must not only be focused on HCWs, but should also include medical students, and stress the need for improving the facilities to allow adherence to infection control policies.

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