

Letters to the Editor

A Survey of Vaccine Coverage Among Iranian Final-Year Medical Students

To the Editor:

Medical students are at risk for exposure to and possible transmission of vaccine-preventable diseases.¹ As they become more involved in patient care, medical students are more likely to be exposed to blood and patient secretions than are other healthcare staff.

The Centers for Disease Control and Prevention strongly recommends that all healthcare workers be vaccinated against (or have documented immunity to) hepatitis B, measles, mumps, rubella, influenza, and varicella.¹ However, many medical students in a variety of countries remain susceptible to these diseases.^{2,9}

In Iran, there is no national vaccination program for mumps, varicella, or influenza. National vaccination programs against measles and hepatitis B were first introduced in 1961 and 1993, respectively. A national vaccination program incorporating measles and rubella was started in January 2003. Thus, compared with medical students in countries with long-standing vaccination programs for hepatitis B, measles, mumps, rubella, and varicella, Iranian medical students have a higher risk of exposure and insufficient childhood vaccine uptake. Despite the fact that medical students are among the healthcare providers who have been identified as important vectors for transmission of vaccine-preventable diseases,⁷ Iranian medical schools lack a definite policy to ensure students' immunity to vaccine-preventable diseases prior to their clinical clerkships.

A cross-sectional descriptive survey was conducted in October 2002 among seventh-year medical students at Tehran University of Medical Sciences. The study was approved by the Institutional Board Review and the Medical Ethics Committee of Tehran

University of Medical Sciences. All of the seventh-year medical students ($n = 150$) were invited to participate in the survey. Verbal informed consent was obtained from all participants. Self-administered, anonymous questionnaires were used to obtain data regarding age; gender; history of hepatitis B, measles, mumps, rubella, varicella, and diphtheria-tetanus (dT) vaccines' uptake and age at receiving each vaccine; and history of chickenpox.

Statistical analysis was performed using SPSS software for Windows (version 11; SPSS, Inc., Chicago, IL). A P value of less than .05 was considered statistically significant.

One hundred twenty-one (80.6%) of the 150 students participated in the survey. Their mean age was 24.5 ± 1.29 years. Men comprised 63.6% of the study group. One hundred thirteen students (90.9%) reported that they had completed their three-dose hepatitis B immunization. Of those students who had not completed the hepatitis B vaccination, 5 (62.5%) said that they had received the first 2 vaccine doses and that they had forgotten to get the third dose. There was no difference between men and women regarding hepatitis B vaccine compliance ($P = .67$).

All students reported that they had received two doses of primary measles vaccination during childhood. Thirty-seven (30.6%) of the students had received measles-mumps-rubella (MMR) vaccine; 45.5% of the female and 22.1% of the male students reported MMR vaccine uptake ($P = .003$); and 79.2% of the students had received MMR vaccination after entering medical school. The median age for MMR vaccine uptake was 23 years.

None of the participants reported varicella vaccine uptake. However, 61.8% reported being certain of having contracted chickenpox at the mean age of 9.96 ± 3.77 years. Two students reported chickenpox after starting medical school at 19 and 23 years of age, respectively. All students had received vaccines against diph-

theria and tetanus in the form of triple diphtheria-pertussis-tetanus (DPT) vaccine, whereas only 61.2% reported a booster dose of diphtheria and tetanus during the past 10 years.

In this study, we found significant gaps in vaccination against various vaccine-preventable diseases. Iranian medical students have free and easy access to dT and hepatitis B vaccination, so incomplete vaccination against these diseases most probably reflects students' low compliance with vaccine uptake.

The national vaccination program against rubella and measles was started in 2003 with the support of the United Nations Children's Fund, the World Health Organization, and the Centers for Disease Control and Prevention. The program covered the entire population between 5 and 25 years of age. Because there had been no such immunization program prior to 2003, the vaccination rates of mumps and rubella were poor among our subjects. According to the national vaccination strategy, administration of MMR to medical students without at least one documented previous dose appears to be justified.

Our findings regarding hepatitis B vaccination are also of concern. The hepatitis B carrier rate is 1.7% in Iran,¹⁰ and only 90% of the students had completed the primary vaccination series. This warrants further efforts to provide adequate vaccine coverage against hepatitis B for medical students at Iranian universities.

Given the consequences of varicella exposure in hospitals or other healthcare settings, serologic testing is recommended for those without a reliable history, followed by two doses of vaccine for those who are seronegative.

Currently, it is the medical students' responsibility to ensure adequate immunity in Iran. It is recommended that an obligatory vaccination program be assigned as a prerequisite for entering the clinical clerkships. Medical schools could facilitate this by providing low-cost and accessible vaccination services.

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Polymicrobial Deep Joint Replacement Infection Temporally Associated With Building Construction: A Case Series

To the Editor:

We report four polymicrobial infections occurring in total joint arthroplasty performed at our general district hospital that were associated temporally with the construction of a new emergency department adjacent

to the operating theater suite (Figure). Construction of the new building began at the end of 2001 and finished in December 2002. Three hundred fifty arthroplasties were performed in the 20 months before the outbreak with only one deep joint infection. Twenty-one were performed in August and September and the infection rate increased from less than 1.0% to approximately 20% (relative risk, 62; $P < .00005$). Four infections occurred in a cluster around the end of August and were unusual in the variety and number of organisms involved.

Four patients had total joint arthroplasty with standard antibiotic prophylaxis (1 g of cephalothin 30 minutes prior to incision), povidone-iodine preparation, and gentamicin-loaded cement (dePuy CMW1 and CMW3, DePuy Orthopaedics, Warsaw, IN). They all presented between 11 and 13 days postoperatively with deep joint infections and were surgically washed out. The organisms isolated from these cases are listed in the table. The organisms were disparate, with only *Staphylococcus aureus* (three oxacillin sensitive and one methicillin resistant) being common to all cases. Unfortunately, typing of the organisms and sampling of the staff and the environment were not conducted, so the true source of the organisms remains unidentified.

Potential risk factors were considered. There was no significant association with any particular surgical, anesthetic, central sterile supply, or ward staff member and there had been no change in technique for either surgeon. Additionally, no patient factors contributed to the increased infection rate. There was no association with the prosthesis implanted or the type of cement. The only positive association was that all of the procedures had occurred in the same operating room (operating room 4), which is mainly used for orthopedics. During this period, other surgical services did not report an increased infection rate and the only other orthopedic infection was in a healthy 21-year-old man who developed a *Klebsiella pneumoniae* infection in his fifth metacarpal plate in July.

Air quality was monitored in the operating room during and after procedures and increased colony counts of coagulase-negative staphylococci, *Bacillus*, and *Pseudomonas* species were found in the circulated air in all rooms.

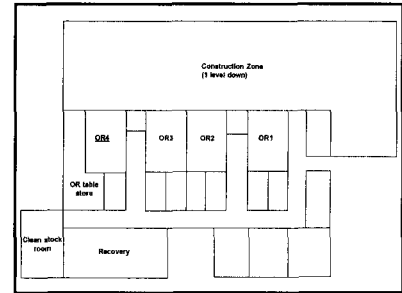


FIGURE. The operating theater suite and the construction zone. Operating room (OR) 4 is used for orthopedics. Water was found leaking into the storage room for operating room table equipment.

Fractures were noted around the air filter mounts and the high-efficiency particulate air filters thus could have been bypassed. There was no barrier between the construction site and the hospital corridors on the level below the operating room until late September. After the air conditioning system was upgraded to higher flow volume high-efficiency particulate air filters and the construction was completed, air quality was markedly improved and the number of colony-forming units during working hours was reduced by half.

Plumbing equipment in the ward immediately above operating room 4 was noted to be leaking into the ceiling space during this time and required replacement. No water was leaking into the operating room, but when maintenance was conducted, a leak into an adjacent room where the operating room table equipment was stored was found. A considerable amount of vibratory and air-hammer work was being done in August. The theater floors could be felt shaking and staff often had to shout to each other during surgery.

When the increased infection rate was noticed in the second week of September, arthroplasty was stopped for 3 months until construction and air and plumbing maintenance were completed. Arthroplasty has since resumed in the unit with only 2 infections among 195 deep joint procedures (1 of these patients fell in the shower, opened his wound, and developed a methicillin-resistant *S. aureus* infection; the other had hemarthrosis during anticoagulation for pulmonary embolus).

Building construction work has been associated with an increased incidence of invasive aspergillosis,¹⁻³