

Occupational Exposures in the Middle East And North Africa

Bibliography of Country-Specific & Regional Needlestick, Surveillance, and Exposure Risk Studies

Middle East includes: Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, the Palestinian territories, Qatar, Saudi Arabia, Syria, Turkey, the United Arab Emirates, and Yemen. North Africa includes: Algeria, Egypt, Libya, Morocco, Sudan, Tunisia, Western Sahara.

REGIONAL

Almuneef M, Memish ZA. Effective medical waste management: it can be done. American Journal of Infection Control 2003;31:188-92.

ABSTRACT- BACKGROUND: It was noticed that a large volume of medical waste was being generated for incineration at our hospital. The 2 incinerators at our facility were unable to effectively deal with the load of waste and, therefore, were operating for extended periods of time. This caused a significant amount of soot and other emissions to be produced as pollutants into the surrounding environment, which is considered to be a real health hazard. **METHODS:** A waste-management plan was introduced that included education, mandatory inservice training, auditing of the type and volume of waste generated by each department, and introduction of a written policy on waste management. **RESULTS:** Within a few months of implementation of the waste-management plan, the amount of medical waste was reduced by more than 58%, from 609 skips/mo (2000 kg/day) in the year 1999, to 256 skips/mo (850 kg/day) in the year 2000; skips are steel containers filled with infectious waste. This reduction was maintained throughout the year 2001 and lead to a 50% reduction in total financial costs (17,936 US dollars) with savings in fuel of 5262 US dollars, labor-cost savings of 8990 US dollars, and maintenance and spare parts savings of 3680 US dollars. **CONCLUSIONS:** This article discusses problems encountered in waste management in our health care facility, solutions and control measures introduced, and achievements. It also demonstrates that effective waste management can reduce health risk, save money, and protect the environment.

Memish ZA, Cunningham G, Soule BM. Infection control in the Eastern Mediterranean region: time for collaborative action. [Editorial] American Journal of Infection Control 2005;33:131-3.

Nemes Z, Kiss G, Madarassi EP, Peterfi Z, Ferenczi E, Bakonyi T et al. Nosocomial transmission of dengue. [Letter] Emerging Infectious Diseases 2004;10:1880-1.

Simonsen L, Kane A, Lloyd J, Zaffran M, Kane M. Unsafe injections in the developing world and transmission of bloodborne pathogens: a review. Bulletin of the World Health Organization 1999;77:789-800.

ABSTRACT- Unsafe injections are suspected to occur routinely in developing countries. We carried out a literature review to quantify the prevalence of unsafe injections and to assess the disease burden of bloodborne infections attributable to this practice. Quantitative information on injection use and unsafe injections (defined as the reuse of syringe or needle between patients without sterilization) was obtained by reviewing the published literature and unpublished WHO reports. The transmissibility of hepatitis B and C viruses and human immunodeficiency virus (HIV) was estimated using data from studies of needle-stick injuries. Finally, all epidemiological studies that linked unsafe injections and bloodborne infections were evaluated to assess the attributable burden of bloodborne infections. It was estimated that each person in the developing world receives 1.5 injections per year on average. However, institutionalized children, and children and adults who are ill or hospitalized, including those infected with HIV, are often exposed to 10-100 times as many injections. An average of 95% of all injections are therapeutic, the majority of which were judged to be unnecessary. At least 50% of injections were unsafe in 14 of 19 countries (representing five developing world regions) for which data were available. Eighteen studies reported a convincing link between unsafe injections and the transmission of hepatitis B and C, HIV, Ebola and Lassa virus infections and malaria. Five studies attributed 20-80% of all new hepatitis B infections to unsafe injections, while three implicated unsafe injections as a major mode of transmission of hepatitis C. In conclusion, unsafe injections occur routinely in most developing world regions, implying a significant potential for the transmission of any bloodborne pathogen. Unsafe injections currently account for a significant proportion of all new hepatitis B and C infections. This situation needs to be addressed immediately, as a political and policy issue, with responsibilities clearly defined at the global, country and community levels.

EGYPT:

Darwish MA, Raouf TA, Rushdy P, Constantine NT, Rao MR, Edelman R. Risk factors associated with a high seroprevalence of hepatitis C virus infection in Egyptian blood donors. *American Journal of Tropical Medicine and Hygiene* 1993;49:440-7.

ABSTRACT- We performed serologic tests for hepatitis C virus (HCV) infection on sera obtained from 163 volunteer blood donors seen at one Cairo hospital. We found HCV infection in 36 donors (22%) measured by a second generation enzyme immunoassay. Thirty-five of these 36 positive sera were tested with a second generation recombinant immunoblot assay (RIBA-2); 22 (63%) were reactive and another 12 (34%) showed an indeterminate reaction. Overall, 13.6% (95% confidence interval [CI] = 8.3-18.9%) of these Egyptian blood donors were serologically confirmed to be infected with HCV. Of several demographic variables and medical risk factors examined, the serologically confirmed (RIBA-2 reactive) donors were significantly older than nonreactive donors, and the age-adjusted risk of being HCV-positive was significantly greater in individuals residing outside Cairo. A knowledge of having received injections, of having a history of schistosomiasis, or of having concomitant hepatitis B surface antigen or antibody were significantly associated with an increased risk of HCV-seropositivity; however, after adjusting for confounding demographic factors, only schistosomiasis (odds ratio = 8.9, 95% CI = 2.35-33.52) was significantly associated with HCV infection. The HCV seropositive rate of 13.6% among Egyptians is 5-35-fold higher than that reported from volunteer blood donors in other countries. Screening for HCV should be instituted in

Egyptian blood banks. Blood banks that do not test for HCV should include a history of schistosomiasis in their exclusion criteria used for routine screening of blood donors.

el Gohary A, Hassan A, Nooman Z, Lavanchy D, Mayerat C, el Ayat A et al. High prevalence of hepatitis C virus among urban and rural population groups in Egypt. *Acta Tropica* 1995;59:155-61.

ABSTRACT- Hepatitis C is a major health problem for Egypt. The aim of this study was to determine the seroprevalence of antibodies to hepatitis C virus among different population groups living in urban and in two different rural areas (Suez Canal and North Sinai) of Egypt. Secondary objectives were to study the possible association between multiple blood transfusions, haemodialysis or Schistosomiasis and the seroprevalence of antibodies to hepatitis C. A seroprevalence of hepatitis C virus in the urban blood donor population of 14.5% was found, confirming other reports. In the two rural areas of the Suez Canal and the North Sinai the seroprevalence was 14.4% and 15.5% respectively, showing a comparable seroprevalence in these three different populations. The seroprevalence was 70.4% in haemodialysis patients, 7.7% in health care workers, and 75.6% in thalassaemic children, thus a seroprevalence among multitransfused or haemodialysed patients comparable to the one described in many other countries. Schistosomiasis does not seem to play a role in the seroprevalence of this disease in Egypt.

Ismail NA, Aboul Ftouh AM, El Shoubary WH. Safe injection practice among health care workers, Gharbiya, Egypt. *Journal of the Egyptian Public Health Association* 2005;80:563-83.

ABSTRACT- A cross-sectional study was conducted in 25 health care facilities in Gharbiya governorate to assess safe injection practices among health care workers (HCWs). Two questionnaires, one to collect information about administrative issues related to safe injection and the other to collect data about giving injections, exposure to needle stick injuries, hepatitis B vaccination status and safe injection training. Practices of injections were observed using a standardized checklist. The study revealed that there was lack of both national and local infection control policies and lack of most of the supplies needed for safe injection practices. Many safe practices were infrequent as proper needle manipulation before disposal (41%), safe needle disposal (47.5%), reuse of used syringe & needle (13.2%) and safe syringe disposal (0%). Exposure to needle stick injuries were common among the interviewed HCWs (66.2%) and hand washing was the common post exposure prophylaxis measure (63.4%). Only 11.3% of HCWs had full course hepatitis B vaccination. Infection control--including safe injections--training programs should be afforded to all HCWs.

Ismail NA, Aboul Ftouh AM, El-Shoubary WH, Mahaba H. Safe injection practice among health-care workers in Gharbiya Governorate, Egypt. *Eastern Mediterranean Health Journal* 2007;13:893-906.

ABSTRACT- We assessed safe injection practices among 1100 health-care workers in 25 health-care facilities in Gharbiya Governorate. Questionnaires were used to collect information and 278 injections were observed using a standardized checklist. There was a lack of infection control policies in all the facilities and a lack of many supplies needed for safe injection. Proper needle manipulation before disposal was observed in only 41%

of injections, safe needle disposal in 47.5% and safe syringe disposal in 0%. Reuse of used syringes and needles was reported by 13.2% of the health-care workers and 66.2% had experienced a needle-stick injury. Only 11.3% had received a full course of hepatitis B vaccination.

Kabbash IA, El-Sayed NM, Al-Nawawy AN, Abou Salem Mel-S, El-Deek B, Hassan NM. Risk perception and precautions taken by health care workers for HIV infection in haemodialysis units in Egypt. *Eastern Mediterranean Health Journal* 2007;13:392-407. ABSTRACT- A cross-sectional study was made in 32 haemodialysis units in the Nile delta, Egypt to evaluate knowledge and practices towards risk of HIV infection by 317 health care workers. Exposure to needle-stick injury was reported by 48.6% in the previous year. Significantly more workers in government units than in private units had good knowledge of bloodborne infections, universal blood precautions and safe disposal of contaminated items, and recognized asymptomatic HIV patients as a risk. Previous training, but not years of experience, influenced knowledge. Despite good knowledge, the performance of health workers was poor for universal blood precautions, and was worse in private haemodialysis units.

Talaat M, Kandeel A, El-Shoubary W, Bodenschatz C, Khairy I, Oun S, Mahoney FJ. Occupational exposure to needlestick injuries and hepatitis B vaccination coverage among health care workers in Egypt. *American Journal of Infection Control* 2003;31:469-74.

ABSTRACT- Background: The health care worker (HCW) is at substantial risk of acquiring bloodborne pathogen infections through exposure to blood or infectious body fluids. Hepatitis B vaccination of HCWs and optimal HCW practices regarding management of sharps can minimize these risks. This study explores the frequency of exposure to needlestick injuries and the hepatitis B vaccination coverage among HCWs in Egypt. Methods: All HCWs available in a 25% random sample of different types of health care facilities from 2 governorates in Egypt (Nile Delta and Upper Egypt) were included in the study. A total of 1485 HCWs were interviewed. History of exposure to needlestick injuries, vaccination status, and socioeconomic data were collected. Results: Of the 1485 HCWs interviewed, 529 (35.6%) were exposed to at least 1 needlestick injury during the past 3 months with an estimated annual number of 4.9 needlesticks per worker. The most common behavior associated with needlestick injuries was 2-handed recapping. Overall, 64% of HCWs disposed of needles unsafely in nonpuncture-proof containers. Overall 15.8% of HCWs reported receiving 3 doses of hepatitis B vaccine. Vaccination coverage was highest among professional staff (38%) and lowest among housekeeping staff (3.5%). Using Kane's model to predict infections after needlestick exposures, we estimate 24,004 hepatitis C virus and 8617 hepatitis B virus infections occur each year in Egypt as a result of occupational exposure in the health care environment. Conclusion: High rates of needlestick injuries and low vaccination coverage contribute highly to the rates of viral hepatitis infections among HCWs. Prevention of occupational infection with bloodborne pathogens should be a priority to the national program for promotion of infection control. Training of HCWs on safe handling and collection of needles and sharps, and hepatitis B vaccination of all HCWs is required to reduce transmission.

IRAN:

Askarian M, Memish ZA, Khan AA. Knowledge, practice, and attitude among Iranian nurses, midwives, and students regarding standard isolation precautions. *Infection Control and Hospital Epidemiology* 2007;28:241-4.

ABSTRACT- Our goal was to assess the knowledge, attitudes, and practices regarding infection control and standard precautions among a group of nursing and midwifery instructors and students in Iran. A survey questionnaire was completed by 273 nursing and midwifery instructors and students at Shiraz University Medical Sciences during the period from May to November 2002. Two hundred thirty-one (90.9%) of the participants reported that they needed additional infection control education, especially on standard isolation precautions. There was a linear positive correlation between knowledge, practice, and attitude scores for the group of nursing, auxiliary nursing, and midwifery instructors, as well as their students (). Our study shows that there is an urgent need for evaluating education on infection control practices and standard precautions in general, as well as for structured infection control programs among nursing and midwifery staff.

Askarian M, Shaghaghian S, McLaws ML. Needlestick injuries among nurses of Fars province, Iran. *Annals of Epidemiology* 2007;17:988-92.

ABSTRACT- Purpose: A prevalence survey was performed to estimate the magnitude and predictors for needlestick injury (NSI) in nurses of Fars province hospitals. **Methods:** Questionnaires were distributed in 52 hospitals to a stratified random sample of 2,118 (46.3%) nurses between April and September 2005 to collect self-reported NSI in the past 12- months. **RESULTS:** Of the 1,555 nurses who returned a completed questionnaire, 49.6% (95% confidence interval [95 CI] 47.1%-52.1%) recalled at least one sharps injury, of which 52.6% were classified as NSI. Just over one fourth (26.3%; 95 CI 24.1%-28.6%, 409/1,555) of respondents sustained at least one NSI, 75.6% (95 CI 71.1%-79.6%) recalled having sustained between 1 and 4 injuries in the past 12-months, of which 72.2% involved a hollow-bore needle and 95.1% of injuries involved fingers. Predictors of NSI included being a registered nurse (odds ratio [OR] 1.6, 95% CI 1.1-2.3) or midwife (OR 2.4, 95% CI 1.4-3.9) compared with nurse managers, being employed in a hospital located in other cities smaller than Shiraz (OR 1.4, 95% CI 1.1-1.8). Nurses who reported a previous contaminated NSI were less likely to sustain a further injury (OR 0.3, 95% CI 0.2-0.4). **Conclusion:** The prevalence of NSI in Iranian nurses is high, with the majority of injured staff having sustained up to 4 NSIs in a 12-month period. Nearly all NSIs were high-risk injuries involving a hollow-bore needle. Providing nursing staff with safety-engineered devices, including retractable syringes when hollow-bore needles are to be used, will be an important step toward reducing our NSI epidemic.

Hadadi A, Afhami S, Karbakhsh M, Esmailpour N. Study of epidemiological determinants of occupational exposure to HIV, HBV, HCV in healthcare workers in Iran. (Abstract R2240) *International Journal of Antimicrobial Agents* 2007;29(Suppl 2):S648-S649.

ABSTRACT- Introduction: Healthcare workers (HCWs) are at substantial risk of acquiring blood borne infections through contact with blood and other products of patients. Our main objectives were to determinant epidemiological characteristics of

occupational exposure to blood/body fluids and its related risk factors. Methods: This cross sectional study was conducted on healthcare workers at risk of exposure to blood and other body fluids in three hospitals of Tehran University of Medical Sciences. Using a structured interview, all selected HCWs who were at risk were questioned about the exposure to blood born pathogens in the preceding year (Dec 2003–Dec 2004).

Conclusion: Sharp injuries among HCWs are a widespread occupational problem. In this study, job categories, work experience and hospital ward were the most important risks for exposure. An effective and goal oriented education programme targeting HCWs, use of protective barriers, vaccination against hepatitis B are important way to prevent viral transmission among HCWs. Results: Of the 900 HCWs, 391 (43.4%) had at least one occupational exposure to blood and other infected fluids during the previous year, with the total number of 467 exposures (52.88%) with annual rate of 0.5 exposure per HCW. The highest rate of occupational exposure was found among nurses (26.1%) and housekeeping staff (20.2%) and occurred most commonly in the medical and emergency wards (23.3%, 21% respectively). The rate of exposure in HCWs with less than 5 year experience was 53.8%.

Percutaneous injury was reported in 280 participants (58.8%). History of hepatitis B vaccination was positive in 85.93% of HCW among exposed workers. Sixty one percent had used gloves at exposure time. Hand washing was reported in 91.38% and infectious diseases specialist consultation in 29.38%. There were 72 exposures to HIV, HBV, HCV and exposure to HBV was the most common and in 237 of enrolled cases source was unknown.

Javadi AA, Mobasherizadeh S, Memarzadeh M, Mostafavizadeh K, Yazdani R, Tavakoli A. Evaluation of needle-stick injuries among health care workers in Isfahan province, Islamic Republic of Iran. [Letter] Eastern Mediterranean Health Journal 2007;13:209-10.

Mobasherizadeh S, Abne-Shahidi SA, Mohammadi NA, Abazari F. Intervention study of needle stick injury in Iran. Saudi Medical Journal 2005;26:1225-7.

ABSTRACT- Objectives: Injury resulting from contaminated sharp devices among health care workers (HCWs) is one of the most important concerns in medical centers. This can lead to dangerous infections such as human immunodeficiency virus, hepatitis B virus and hepatitis C virus among such people. The documentation of needle stick injuries started in Sadi Hospital, Isfahan, Iran in 2003, and our objective was to study cases of injuries by sharp devices before and after the implementation of intervention methods. Methods: In an intervention survey of the type of before and after study, we studied injuries by needle and other sharp devices among 87 HCWs in Sadi Hospital, a private hospital in Isfahan, Iran, during the years 2003-2004. The groups under study were workers and paramedical staff; and the wards under study included surgery, internal, lab, x-ray and laundry. We entered and evaluated the data in SPSS software. Results: In the first phase of the study in 2003, 55.2% of those injured had been injured by sharp devices. After intervention in 2004, this percentage was reduced to 19.5% ($p<0.05$). At the beginning of the study, 26.4% of the injured had been injured by sharp devices more than twice, and at the end of the study this number was reduced to 2.3% ($p<0.05$). Also, injuries resulting from recapping were 45.8% at the beginning of the study, which was reduced to 5.9% at the end ($p<0.05$). Conclusion: With regard to this study and other

studies carried out in other countries, a large number of injuries by contaminated sharp devices can be prevented by implementing suitable educational programs regarding disposal of sharp devices, and by using safe needle devices.

Motamed N, BabaMahmoodi F, Khalilian A, Peykanheirati M, Nozari M. Knowledge and practices of health care workers and medical students towards universal precautions in hospitals in Mazandaran Province. *Eastern Mediterranean Health Journal* 2006;12:653-61.

ABSTRACT This study investigated knowledge of and practices towards universal precautions among 540 health care workers and medical students in 2 university hospitals in Mazandaran Province, Islamic Republic of Iran. Only 65.8% and 90.0% staff in the 2 hospitals and 53.5% of medical students had heard about universal precautions. Overall, there was a low understanding of precautions, except concerning disposal of sharps, contact with vaginal fluid, use of mask and gown or cleaning spilled blood. Health workers had difficulty distinguishing between deep body fluids and body secretions that are not considered infectious. Good practices were reported regarding hand-washing, disposal of needles, and glove, mask and gown usage.

Shariati B, Shahidzadeh-Mahani A, Oveysi T, Akhlaghi H. Accidental exposure to blood in medical interns of Tehran University of Medical Sciences. *Journal of Occupational Health* 2007;49:317-21.

Open access: http://www.jstage.jst.go.jp/article/joh/49/4/49_317/article

ABSTRACT- Healthcare workers and medical students are at risk of exposure to blood-borne viruses such as HBV, HCV HIV, etc. Here we report the results of a survey of the frequency and causes of cutaneous blood exposure accidents (CBEA) among medical students. Anonymous questionnaires were randomly distributed to 200 interns in their second year of internship in hospitals affiliated to Tehran University of Medical Sciences. A definite exposure was defined as injury by a sharp object causing obvious bleeding, whereas a possible exposure was defined as subtle or superficial injury due to contact with a contaminated instrument or needle but without bleeding, or contamination of an existing wound with blood or other body fluids. One hundred eighty-four subjects (92% of the original sample) responded to the questionnaire. We recorded 121 definite exposures and 259 possible exposures over a mean time interval of 14 months. Needles were the most common objects (41% of exposure episodes) causing CBEAs, while phlebotomy and suturing were the hospital procedures that accounted for the highest percentage of exposure episodes (30 and 28 percent, respectively). Only a minority of students regularly observed basic safety measures (wearing gloves, not recapping used needles and proper disposal of sharp objects). Considering the high incidence of blood exposure in medical interns at Tehran University of Medical Sciences and the ensuing risk of blood-borne infections, the subjects are likely to develop such infections during their internship period.

ISRAEL:

Calfee DP. Prevention and management of occupational exposures to human immunodeficiency virus (HIV). *Mt Sinai Journal of Medicine* 2006;73:852-6.

ABSTRACT- Occupational exposure to blood and other potentially infectious body fluids places health care workers at risk for acquisition of bloodborne pathogens, including the human immunodeficiency virus (HIV). Utilizing appropriate techniques, personal protective equipment, and safer "sharp" technology can minimize the risk of these exposures. When exposure does occur, immediate evaluation and initiation of post-exposure prophylaxis, when indicated, can substantially reduce the risk of transmission of HIV. In this article, the basic concepts of exposure prevention and management are reviewed.

Froom P, Ribak J, Cohen H. [The risk of bloodborne infections in health care workers and their patients: possible preventive steps][in Hebrew]. *Harefuah* 2001;140:977-82,990.

Karpuch J, Scapa E, Eshchar J, Waron M, Bar-Shany S, Shwartz T. Vaccination against hepatitis B in a general hospital in Israel: antibody level before vaccination and immunogenicity of vaccine. *Israel Journal of Medical Sciences* 1993;29:449-52.

ABSTRACT- We offered hepatitis B vaccine (Heptavax B) to 809 of the health care personnel of a 650-bed regional hospital; 290 accepted the offer. Anti-HBs measurement was done by enzyme immunoassay (AUSAB EIA, Abbott, UK) and expressed in mIU/ml. Seroconversion was determined at a level of 2.1 mIU/ml. Of 290 employees 58 (20%) were found positive for hepatitis B antibodies before vaccination. Of the laboratory technicians, 40.9% were found positive for antibodies before vaccination, as were 26.5% of nurses and 10.9% of physicians. Among vaccine recipients 35.8% responded after the first dose, 86.6% after the second and 92.7% after the third. Seventeen workers (7.3%) were nonresponders, of whom 14 received the whole vaccine series. There was no difference in immune responses to the vaccine between men and women. The present study confirms the relatively high prevalence of HBV infection in health care workers. Furthermore, vaccination of employees has been highly effective and well tolerated. The present data, therefore, support the introduction of active vaccination against HBV in health care workers in Israel.

Rosen E, Rudensky B, Paz E, Isacsohn M, Jerassi Z, Gottehrer NP, Yinnon AM. Ten-year follow-up study of hepatitis B virus infection and vaccination status in hospital employees. *Journal of Hospital Infection* 1999;41:245-50.

ABSTRACT- We sought to determine the incidence of infection with hepatitis B virus (HBV) amongst hospital employees over a 10-year period and to assess the extent and efficacy of vaccination against HBV in this population. In 1984 a cohort of 301 hospital employees was tested for hepatitis B surface antibody (anti HBs), hepatitis B core antibody (anti HBc), and hepatitis B surface antigen (HBsAg). Ten years later, 160 (53%) of these workers remained at the hospital and were re-tested. In addition, they were tested for hepatitis C virus antibody (anti HCV). Records of the hospital vaccination program were inspected to determine the rate and effectiveness of vaccination in these workers. Over the ten year period two of the 160 retested workers (1.25%) had sero-converted to anti HBc positive, yielding an incidence density of 0.27 cases per 100 person-years exposed in unvaccinated workers. While the overall seroprevalence of anti HBc did not change significantly between 1984 (81/301, 27%) and 1994 (39/160, 24%), it was much greater than that of the general population (10%). A significantly greater percentage of

Jews of Sephardi ancestry (22/65, 34%) were positive for anti HBc than those of Ashkenazi ancestry (15/90, 17%, $P < 0.05$). In addition, doctors were found to be less likely to be anti HBc positive than nurses (4% vs. 25%, respectively, $P < 0.01$). Two cases of anti HCV positivity were discovered yielding a prevalence of 1.25% in the 1994 cohort as compared to 0.15% in the population of healthy blood donors. Of the 93 employees of the 1994 cohort eligible for vaccination (i.e., anti HBc-negative and employed in an occupation involving potential exposure to HBV), 53 (57%) had received vaccination and showed protective antibody titers (anti HBs $> \text{or} = 10 \text{ i.u./ml}$). 17/52 workers with documented vaccinations (33%) did not have detectable antibody levels one to eight years after vaccination. In conclusion, the seroprevalence of anti HBc and anti HCV is significantly higher in this cohort of hospital employees than in the general population. The relatively low vaccination rate among at-risk personnel emphasizes the need for more effective vaccination programs.

Shalom A, Ribak J, Froom P. Needlesticks in medical students in university hospitals. *Journal of Occupational and Environmental Medicine* 1995;37:845-9.

ABSTRACT- The incidence of needlesticks and the effect of experience and other personal characteristics on the risk of needlesticks in medical students are unknown. Eighty-nine medical students were given a self-administered questionnaire. The questionnaire was completed by 86 students, and there were 91 sticks in 43 students. The incidence of needlesticks was 5.8/1000 procedures on the first rotation and 0.1/1000 during the second 4-month period (relative risk, 6.5, with 95% confidence interval (CI) of 3.4-125; $P < 0.001$). Personal characteristics were not associated with needlesticks except for tension felt while drawing blood and accident proneness. Those who were stuck during the first rotation were more likely to be stuck subsequently (odds ratio, 9.0, with 95% CI of 1-422; $P < 0.05$). We conclude that experience decreases the risk for needlesticks and therefore effective instructional intervention may have the biggest impact during the first medical student ward experience. Emphasis may have to be placed on those students who are accident prone or have been stuck in the past. Further studies are warranted to substantiate our findings and to test the effectiveness of various interventional approaches.

Sermoneta-Gertel S, Donchin M, Adler R, Baras M, Perlstein T, Manny N et al. Hepatitis C virus infection in employees of a large university hospital in Israel. *Infection Control and Hospital Epidemiology* 2001;22:754-61.

ABSTRACT- Objective: To assess whether hospital work constitutes a risk factor for hepatitis C virus (HCV) infection among employees of a large hospital in Israel. Design: Seroprevalence survey. Setting: A 1,006-bed, tertiary-care university hospital in Jerusalem. Participants: All 5,444 employees (18-65 years old) were eligible; 4,287 (79%) participated in the survey. Methods: Sera were tested for antibodies to HCV (anti-HCV) using a third-generation enzyme immunoassay. A third-generation strip immunoblot assay was used for confirmation. Participants were interviewed regarding their occupational history, and they completed a self-administered questionnaire covering history of non-occupational exposure to blood and country of birth. Other demographic information was obtained from the personnel department. Rates and odds ratios (ORs) were calculated, and multivariate logistic-regression analyses were performed to adjust

for potential confounding variables. Results: Anti-HCV was found in 0.9% of employees (37/4,287; 95% confidence interval, 0.6-1.1), ranging from 0.1% among those born in Israel to 5.7% among those born in Central Asia. After age, gender, social status, country of birth, and history of blood transfusion were controlled for in a logistic regression, occupational exposure to blood \geq 10 years was significantly associated with the presence of antibodies (OR, 2.6; $P=0.01$). Presence of anti-HCV also was associated with country of birth (range: Israel OR, 1; West OR, 3.8 [$P=0.1$]; Central Asia OR, 48.6 [$P<0.0001$]) and history of blood transfusion (OR, 2.7; $P=0.01$). No significant associations were found between anti-HCV and age, gender, social status, history of tattoo, acupuncture, current occupation, department, exposure to blood in current occupation, adherence to safety precautions, or history of percutaneous injury. The association with length of exposure was stronger (OR, 3.6; $P=0.01$) when the same logistic regression was run excluding the outlier ethnic group of Central Asia. Conclusions: Hospital work does not seem to constitute a major risk factor for HCV infection in Israel today. A higher prevalence of anti-HCV among employees with longer versus shorter lengths of occupational exposure may be due to a cumulative effect of exposure over the years. Infection control efforts in recent years may have contributed to this association.

JORDAN:

Al-Dwairi ZN. Infection control procedures in commercial dental laboratories in Jordan. *Journal of Dental Education* 2007;71:1223-7.

ABSTRACT- The risk of cross-infection in dental clinics and laboratories has attracted the attention of practitioners for the past few years, yet several medical centers have discarded compliance with infection control guidelines, resulting in a non-safe environment for research and medical care. In Jordan, there is lack of known standard infection control programs that are conducted by the Jordanian Dental Technology Association and routinely practiced in commercial dental laboratories. The aim of this study was to examine the knowledge and practices in infection control among dental technicians working in commercial dental laboratories in Jordan. Data were collected from the dental technicians by a mailed questionnaire developed by the author. The questionnaire asked respondents to provide demographic data about age and gender and to answer questions about their knowledge and practice of infection control measures: use of gloves, use of protective eyeglasses and face shields, hepatitis B virus (HBV) vaccination, laboratory work disinfection when sent to or received from dental offices, and regularly changing pot water or pumice slurry. Of the total respondents, 135 were males (67.5 percent) and sixty-five were females (32.5 percent) with a mean age of twenty-seven years. The results showed that 24 percent of laboratory technicians wore gloves when receiving dental impressions, while 16 percent continued to wear them while working. Eyeglasses and protective face shields were regularly worn by 35 percent (70/200) and 40 percent (80/200) of technicians, respectively. Fourteen (14 percent) had received an HBV vaccination, and 17 percent inquired if any disinfection measures were taken in the clinic. Eighty-six percent of the technicians reported that pumice slurry and curing bath water were rarely changed. Only five dental technicians (two males and three females) were considered to be fully compliant with the inventory of infection control measures, a compliance rate of 2.5 percent with no significant difference between males

and females ($p>0.05$). In conclusion, there is lack of compliance with infection control procedures of dental technicians working in commercial laboratories in Jordan.

Bdour A, Altrabsheh B, Hadadin N, Al-Shareif M. Assessment of medical wastes management practice: a case study of the northern part of Jordan. *Waste Management* 2007;27:746-59.

ABSTRACT- This study includes a survey of the procedures available, techniques, and methods of handling and disposing of medical waste at medium (between 100 and 200 beds) to large (over 200 beds) size healthcare facilities located in Irbid city (a major city in the northern part of Jordan). A total of 14 healthcare facilities, including four hospitals and 10 clinical laboratories, serving a total population of about 1.5 million, were surveyed during the course of this research. This study took into consideration both the quantity and quality of the generated wastes to determine generation rates and physical properties. Results of the survey showed that healthcare facilities in Irbid city have less appropriate practices when it comes to the handling, storage, and disposal of wastes generated in comparison to the developed world. There are no defined methods for handling and disposal of these wastes, starting from the personnel responsible for collection through those who transport the wastes to the disposal site. Moreover, there are no specific regulations or guidelines for segregation or classification of these wastes. This means that wastes are mixed, for example, wastes coming from the kitchen with those generated by different departments. Also, more importantly, none of the sites surveyed could provide estimated quantities of waste generated by each department, based upon the known variables within the departments. Average generation rates of total medical wastes in the hospitals were estimated to be 6.10 kg/patient/day (3.49 kg/bed/day), 5.62 kg/patient/day (3.14 kg/bed/day), and 4.02 kg/patient/day (1.88 kg/bed/day) for public, maternity, and private hospitals, respectively. For medical laboratories, rates were found to be in the range of 0.053–0.065 kg/test-day for governmental laboratories, and 0.034–0.102 kg/test-day for private laboratories. Although, based on the type of waste, domestic or general waste makes up a large proportion of the waste volume, so that if such waste is not mixed with patient derived waste, it can be easily handled. However, based on infections, it is important for healthcare staff to take precautions in handling sharps and pathological wastes, which comprises only about 26% of the total infectious wastes. Statistical analysis was conducted to develop mathematical models to aid in the prediction of waste quantities generated by the hospitals studied, or similar sites in the city that are not included in this study. In these models, the number of patients, number of beds, and hospital type were determined to be significant factors on waste generation. Such models provide decision makers with tools to better manage their medical waste, given the dynamic conditions of their healthcare facilities.

Khuri-Bulos NA, Toukan A, Mahafzah A, Al Adham M, Faori I, Abu Khader I, Abu Rumeileh ZI. Epidemiology of needlestick and sharp injuries at a university hospital in a developing country: a 3-year prospective study at the Jordan University Hospital, 1993 through 1995. *Am J Infect Control* 1997;25:322-9.

ABSTRACT- Objective: To study the epidemiology of needlestick and sharp injuries in a university hospital in a developing country, Jordan. Methods: A prospective study was undertaken of all needlestick and sharp injuries among workers at the Jordan University

Hospital between 1993 and 1995. Health care workers were asked to report in person to the infection-control team to verify the incident and to respond to a questionnaire. Blood was obtained from patients and health care workers immediately and from the health care workers 6 months later for hepatitis B virus, hepatitis C virus, and HIV testing. Results: During the 3-year period, 248 health care workers had needlestick and sharp injuries. Of these, 34.6% were staff nurses, 19%, environmental workers, 15.7%, interns, 11.7%, residents, 8.5%, practical nurses, and 6% were technicians. The incidence density was highest for the interns followed by staff nurses and environmental workers. Of incidents, 22.6% occurred during blood drawing, 11.3% during placing intravenous lines, 8.5% during administration of medication, 11% during recapping the needle, 10.5% during needle disposal, 12.5% during garbage collection, and 5% were caused by a neglected needle. Only 117 patients were identified; 36 of 62 of these had positive results for hepatitis B surface antigen, and 8 of 13 for hepatitis C virus. Conclusion: Needlestick and sharp injuries occur frequently in developing countries. Safer disposal facilities and routine hepatitis B vaccine should be adopted.

LEBANON

Musharrafieh UM, Bizri AR, Nassar NT, Rahi AC, Shoukair AM, Doudakian RM, et al. Health care workers' exposure to blood-borne pathogens in Lebanon. *Occupational Medicine (Oxford)* 2008;58:94-8.

ABSTRACT- Background: Accidental exposure to blood-borne pathogens (BBPs) is a risk for health care workers (HCWs). AIM: To study the pattern of occupational exposure to blood and body fluids (BBFs) at a tertiary care hospital. Methods: This study reports a 17-year experience (1985-2001) of ongoing surveillance of HCW exposure to BBFs at a 420-bed academic tertiary care hospital. Results: A total of 1,590 BBF exposure-related accidents were reported to the Infection Control Office. The trend showed a decrease in these exposures over the years with an average +/- standard error of 96 +/- 8.6 incidents per year. In the last 6 years, the average rate of BBF exposures was 0.57 per 100 admissions per year (average of needlestick injuries alone was 0.46 per 100 admissions). For 2001, the rates of exposure were found to be 13% for house officers, 9% for medical student, 8% for attending physicians, 5% for nurses, 4% for housekeeping, 4% for technicians and 2% for auxiliary services employees. The reason for the incident, when stated, was attributed to a procedural intervention (29%), improper disposal of sharps (18%), to recapping (11%) and to other causes (5%). Conclusions: The current study in Lebanon showed that exposure of HCWs to BBPs remains a problem. This can be projected to other hospitals in the country and raises the need to implement infection control standards more efficiently. Similar studies should be done prospectively on a yearly basis to study rates and identify high-risk groups.

LIBYA:

de Oliveira T, Pybus OG, Rambaut A, Salemi M, Cassol S, Ciccozzi M, et al; Benghazi Study Group. HIV-1 and HCV sequences from Libyan outbreak. *Nature* 2006;444:836-7. **ABSTRACT-** In 1998, outbreaks of human immunodeficiency virus type 1 (HIV-1) and hepatitis C virus (HCV) infection were reported in children attending Al-Fateh Hospital in Benghazi, Libya. Here we use molecular phylogenetic techniques to analyse new virus

sequences from these outbreaks. We find that the HIV-1 and HCV strains were already circulating and prevalent in this hospital and its environs before the arrival in March 1998 of the foreign medical staff (five Bulgarian nurses and a Palestinian doctor) who stand accused of transmitting the HIV strain to the children.

Visco-Comandini U, Cappiello G, Liuzzi G, Tozzi V, Anzidei G, Abbate I, et al.; Libya Project Task Force. Monophyletic HIV type 1 CRF02-AG in a nosocomial outbreak in Benghazi, Libya. *AIDS Research and Human Retroviruses* 2002;18:727-32.

ABSTRACT- A cluster of HIV-1 infection has been identified in Libya in 1999, involving 402 children admitted to "El-Fath" Children's Hospital in Benghazi (BCH) during 1998 and 19 of their mothers. Nosocomial transmission has been indicated as responsible for the spread of infection. Out of this group, 104 children and 19 adult women have been followed at the National Institute for Infectious Diseases L. Spallanzani in Rome during 1 year. At BCH, all children had received intravenous infusions but not blood or blood products. A single child receiving a blood transfusion in 1997 and the 17 infected mothers were never hospitalized in Benghazi. In addition, two nurses were diagnosed as HIV-1 infected. In 40 subjects out of this group HIV-1 gag, env, and pol fragments were amplified and sequenced. The phylogenetic analyses showed that a monophyletic recombinant HIV-1 form CRF02-AG was infecting all of the HIV-1-seropositive patients admitted at BCH with no close similarities to the other CRF02-AG reported to GenBank. A different strain was found in the child infected by blood transfusion. The data thus suggest a highly contagious nosocomial spread of HIV-1 infection and possibly transmission of the virus from child to mother during breastfeeding in connection with primary HIV-1 infection.

Yerly S, Quadri R, Negro F, Barbe KP, Cheseaux J, Burgisser P et al. Nosocomial outbreak of multiple bloodborne viral infections. *Journal of Infectious Diseases* 2001; 184:369-72.

ABSTRACT- In resource-limited countries, nosocomial transmission of bloodborne pathogens is a major public health concern. After a major outbreak of human immunodeficiency virus (HIV) infection in approximately 400 children in 1998 in Libya, we tested HIV, hepatitis C virus (HCV), and hepatitis B virus (HBV) markers in 148 children and collected epidemiological data in a subgroup of 37 children and 46 parents. HIV infection was detected in all children but one, with HCV or HBV coinfection in 47% and 33%, respectively. Vertical transmission was ruled out by analysis of parents' serology. The children visited the same hospital 1-6 times; at each visit, invasive procedures with potential blood transmission of virus were performed. HIV and HCV genotypic analyses identified a HIV monophyletic group, whereas 4 clusters of HCV sequences were identified. To our knowledge, this is the largest documented outbreak of nosocomial HIV transmission.

QATAR:

Shaha SF, Bener A, Al-Kaabi S, Al Khal AL, Samson S. The epidemiology of needle stick injuries among health care workers in a newly developed country. *Safety Science* 2006;44:387-94.

ABSTRACT- Objective: The main objective of the study is to characterize the epidemiology of needle-stick injuries (NSI) of health care workers (HCWs) working at Hamad Medical Corporation, Doha. Design: This is a prospective descriptive study among the health care workers on the details of needle stick injuries in the year 2001. Setting: 1357-bed three tertiary hospitals of the Hamad Medical Corporation, Doha, Qatar. Subjects and methods: During the year 2001, a survey was carried out among health care workers working in the three tertiary care hospitals. Of the 1274 HCWs who were approached to participate in this study, 1022 workers responded to the questionnaire on needle stick injury with a response rate of 80.2%. Face to face interviews were conducted on the recruited subjects based on a questionnaire that included variables on age, socio-demographic status and immunization history of studied subjects. Results: Of the total studied subjects (1022), 214 studied subjects (20.9%) were victims of the needle stick injuries. 911 HCWs (89.1%) from the total had been vaccinated against hepatitis B (HBV). Higher percentage of sharp injuries occurred among 148 female HCWs (69.2%) than males (30.8%). Percentage of incidence of sharp injuries occurred were more among 10 specialists (25%) and 10 residents (25%) than consultants (12.5%). The highest incidence of episodes of needle stick injuries occurred in the area of specialty such as 28 workers in medicine (13.1%), 20 in laboratory (9.3%) and 19 in emergency (8.9%) followed by 17 in pediatric (7.9%). 195 of 214 HCWs (91.1%) who had sharp injuries had taken HBV vaccination. But, the rest of the 19 HCWs (8.9%) had neglected HBV vaccination. Conclusion: The present study revealed that sharp injuries constitute a considerable proportion of NSI incidents (21%) and could pose the greatest risk of blood borne virus transmission. It could be the reason that the HCWs fully knew of the risk but impediments to prevention of NSIs exist. This could be a topic for further research in the future.

SAUDI ARABIA:

Abu-Gad HA, Al-Turki KA. Some epidemiological aspects of needle stick injuries among the hospital health care workers: Eastern province, Saudi Arabia. *European Journal of Epidemiology* 2001;17:401-7.

ABSTRACT- This study was conducted to provide some epidemiological aspects of needle stick injuries among health care workers in the eastern province in Saudi Arabia. Data about 282 injuries reported from the hospitals of the Eastern Province of Saudi Arabia were collected through specially designed questionnaire retrospectively from 1995 to 1997. Results showed that 50% of injuries occurred in the first 3 years of employment. Workers in medical and surgical specialties suffered an equal degree of reported exposure. The highest percentage (46.8%) of injuries occurred during syringe related actions. Patients' wards were the major location of incidents (48.5%) followed by ICUs and dialysis units (17.7%), theatres (15.6%) and accidents and emergency departments (13.8%). There was no significant association between injuries and type of shifts. The middle hours of the shifts showed a significant association with injuries. The pattern of injuries was significantly associated with over loaded periods of medical practices. Deficiencies in implementing the standard recommendations for prevention and control of needle stick injuries were noted in the studied hospitals.

Abulrahi HA, Bohlega EA, Fontaine RE, al Seghayer SM, al Ruwais AA. Plasmodium falciparum malaria transmitted in hospital through heparin locks. *Lancet* 1997;349:23-5.

ABSTRACT- Background: After a community investigation had implicated hospital admission as a shared feature of a cluster of acute Plasmodium falciparum malaria (AFM) cases in Riyadh, Saudi Arabia, we began an in-hospital investigation to determine the method of transmission. **Methods:** We investigated all AFM patients admitted to one paediatric hospital for any reason from December, 1991, to April, 1992. We classified AFM as locally acquired (LAFM) if during the month before AFM onset the patient had not visited a malarious area, and as hospital acquired (HAFM) if the LAFM patient had been admitted to hospital during that month. We compared exposures of HAFM cases with those of other patients sampled from the same wards. We observed nursing practices and investigated by anonymous questionnaire how nurses administered parenteral drugs. **Findings:** Of 21 LAFM cases, 20 (95%) had a previous hospital admission (exposure admission) compared with 15 (25%) of 61 other patients ($p < 0.001$; chi 2 test). During the exposure admission, all HAFM patients had occupied the same room as, or a room adjacent to, an AFM patient; 14 (23%) of 60 other patients occupied the same room or rooms adjacent to an AFM patient ($p < 0.001$, chi 2). 90% of HAFM patients received infusions through a heparin lock during the exposure admission, compared with 49% of 120 general patients ($p < 0.001$, chi 2). 10% of nurses admitted to using one syringe for more than one heparin lock and 50% filled syringes with enough heparin for three to ten heparin locks. **Interpretation:** P falciparum was transmitted between patients when single syringes were used on heparin locks of sequential patients. This practice would easily transmit other blood-borne agents.

Al Habdan I, Corea JR, Sadat-Ali M. Double or single gloves: which is safer in pediatric orthopedic surgery? *Journal of Pediatric Orthopedics* 2006;26:409-11.

ABSTRACT- Background and aim: Surgical gloves should form an efficient barrier between surgeons and patients to prevent cross infection. Single gloves (SGs) have long been reported unsafe, and usage of double gloves (DGs) is still not universal. No study has reported the usage of DGs in pediatric orthopedic operations. The aim of this study was to assess the efficacy of DGs versus SGs in prevention of body fluid contact between patients and surgeons during pediatric orthopedic surgery. **Methodology:** After 150 pediatric orthopedic operations, DGs and SGs were collected and tested for perforations. Gloves were tested for size, site, and number of perforations among principal surgeons, assistant surgeons, and scrub nurses. Gloves were not changed during long surgical procedures and were changed only if perforations were identified and recorded. The DGs used were Maxitex Duplex, powder-free indicator gloves and the SGs were of Gammex-Ansell. One hundred unused gloves of each group were tested as controls. Medical records of the patients were reviewed for age, sex, type of operation, duration of operation, and any postoperative wound infection. The data were entered in database and analyzed using SPSS package. The data were compared between double and SGs using t test with a level of statistical significance at P less than 0.05. **Results:** Five hundred twenty-six DGs and 316 SGs were tested. Forty-three perforations were detected in DGs (8.1%). Outer gloves were breached in 7.8% and inner in 0.3% as compared with SGs in which 28 (8.7%) were perforated. In DGs, 4% had multiple perforations compared with 11.9% in SGs. There was a statistical significance ($P < 0.001$) when the perforations of

inner gloves were compared with the SGs. None of the inner perforations were recognized during surgery, but the outer gloves of the DGs were recognized in 71% as compared with 9% in SGs ($P < 0.001$). The majority of perforations were seen in the nondominant hand in surgeons and assistants hands, whereas scrub nurses had 85% of perforations in the dominant hand. The index finger was the site of perforations in DGs (53.4%; SGs, 43%). The inner gloves were breached only when the outer glove was found to be perforated. The duration of surgery had a direct impact on the number of perforations. There were no perforations in DGs in less than 60 minutes as compared with 3 (10.7%) in SGs. Between 60 and 120 minutes, the perforations in the DGs were 11, and in SGs, 21. During the study period, 4 patients had surgical site infection. Three were superficial and one deep-seated infection. In 3 patients with infection, the gloves were found to be perforated, and 1 patient with infection had no perforations in the gloves. Conclusion: Our study confirms that DGs are safer than SGs during pediatric orthopedic operations. In the event of nonavailability of DGs, SGs should be changed on an hourly basis during long procedures. Lastly, there exists a relationship between surgical site infection and glove perforations.

Al-Sohaibani MO, Al-Sheik EH, Al-Ballal SJ. Occupational risk of hepatitis B and C infections in Saudi medical staff. *Journal of Hospital Infection* 1995;31:143-7.

ABSTRACT- The prevalence of markers for hepatitis B virus (HBV) and hepatitis C virus (HCV) was studied among final year medical students and the medical staff at two university teaching hospitals in Saudi Arabia. At King Khalid University Hospital (KKUH) in Riyadh, evidence of exposure to HBV in the male medical staff (42.9%) was significantly greater than among medical students (25.3% males, 19.3% females ; $P = 0.0041$) or the controls (28.6% males, 17.1% females ; $P = 0.0095$). At King Fahad University Hospital (KFUH) in Al-Khobar, although the prevalence of exposure in the medical staff (28.3%) was higher than that in the controls (18.5%) the difference was not statistically significant ($P > 0.05$) and this could be due to the small numbers tested (46 physicians, 54 controls). Regarding exposure to HCV there was no significant difference in markers of the virus among the three categories investigated (1.7% in the controls, 2.6% in medical students and 1.9% in the medical staff). The low risk of transmission in the medical staff could be due to the small amount of the virus in the blood of HCV carriers. It can be concluded from the study that, in contrast to HCV, the occupational risk of HBV infection is high among Saudi physicians and hence HBV vaccination to unexposed medical staff is the only way for effective prevention of infection.

al-Turki KA, Abu-Gad HA. Frequency of and prevention measures for needle-stick injuries among hospital healthcare workers in Saudi Arabia. *Journal for Healthcare Quality* 2000;22:23-8.

ABSTRACT- This study was undertaken to determine the frequency of needle-stick injuries among healthcare workers in hospitals in the Eastern Province of Saudi Arabia from 1995 to 1997, and to gather information about the measures these hospitals are taking to protect their employees against these injuries. Precautionary measures taken to protect healthcare workers from injury and the follow-up after injuries were surveyed. The total overall prevalence rate of needle-stick injuries was significantly lower among healthcare workers in governmental hospitals than among those in private hospitals. The

extremely low prevalence rate of needle-stick injuries indicated that there were serious defects in the reporting systems of the hospitals studied. All hospitals should have a mandatory, clear, and unified policy to help reduce the number of needle-stick injuries. Hospitals must adopt a policy to ensure that precautions are taken to reduce healthcare workers' accidental exposures to potentially infected blood.

Daw MA, Siala IM, Warfalli MM, Muftah MI. Seroepidemiology of hepatitis B virus markers among hospital health care workers: Analysis of certain potential risk factors. *Saudi Medical Journal* 2000;21:1157-60.

ABSTRACT- Objectives: To determine, the prevalence of hepatitis B virus markers among hospital health care workers, to determine the influence of some risk factors on such prevalence and to outline the specific policies to tackle such problems among hospital health care workers. Methods: Hepatitis B virus markers including hepatitis B surface antigen, anti-hepatitis B surface antigen and anti-hepatitis B core antigen were determined from sera samples collected from 459 hospital health care workers at different hospital departments. The prevalence of hepatitis B virus among these employees was correlated by a variety of risk factors such as gender, age, blood transfusion, and needle-stick and sharps injuries, and previous history of jaundice using logistic regression analyses. Results: Of the hospital health care workers studied 143 (31%) of employees showed evidence of previous hepatitis B virus infection, including 17 (4%) carriers. The highest incidence was among those who were working at infectious diseases departments where 22 (43%) employees were found to be seropositive, followed by 26 (41%) employees from surgical departments. The risk factors, which were found to influence seropositivity, include age over 40 years old, needle-stick and sharps injuries and previous blood transfusion. Other factors such as gender, and previous history of jaundice were statistically insignificant. Conclusion: The hepatitis B virus infection was high among the hospital health care workers studied. This was influenced by certain potential occupational risk factors. As there is emerging evidence that vaccination among health care workers was ineffective. Specific measures should be implemented to reduce such risk. These may include strict policies on sharps and considering any blood or other body fluids being a potential risk. Education, clinical advice and health insurance should be available for health care workers who are at a higher risk of contracting hepatitis B virus infection.

Jahan S. Epidemiology of needlestick injuries among health care workers in a secondary care hospital in Saudi Arabia. *Annals of Saudi Medicine* 2005;25:233-8.

ABSTRACT- Background: Accidental needlestick injuries sustained by health care workers are a common occupational hazard in health care settings. The aim of this study was to review the epidemiology of needlestick injuries in Buraidah Central Hospital, a 212-bed secondary care hospital in Buraidah, Saudi Arabia. Methods: We conducted a retrospective survey of all self-reported documents related to needlestick injuries, for the period between January 2002 and December 2003. The data was analysed to determine the age, sex and job category of the health care worker suffering the injury as well as the risk factors responsible for needlestick injuries. Results: During the 2-year period, employees reported 73 injuries from needles and other sharp objects. Nurses were involved in 66% of instances, physicians in 19%, technicians in 10%, and nonclinical

support staff in 5.5%. The majority (53.4%) of the injuries occurred after use and before disposal of the objects. Syringe needles were responsible for 63% of all injuries. Most injuries occurred during recapping of used needles (29%), during surgery (19%), and by collision with sharps (14%). Disposal-related (11%) causes as well as injuries by concealed sharps (5%) occurred while handling linens or trash containing improperly disposed needles. Conclusion: This data emphasizes the importance of increased awareness, training and education of health care workers for reporting and prevention of needlestick injuries.

Karkar A. Hepatitis C in dialysis units: The Saudi experience. *Hemodialysis International* 2007;11:354-67.

ABSTRACT- Hepatitis C virus (HCV) infection is a significant health problem, as it can lead to chronic active hepatitis, liver cirrhosis, and hepatic carcinoma. Patients undergoing hemodialysis treatment are at increased risk of contracting HCV and other viral infections. This is primarily due to their impaired cellular immunity, underlying diseases, and blood exposure for a prolonged period. Transmission of viral hepatitis, and in particular HCV in dialysis units, has been showing a progressive increase worldwide, ranging between 5% in some western countries and up to 70% in some developing countries. The annual rate of HCV seroconversion in Saudi Arabia is 7% to 9%, while its prevalence is variable between 15% and 80%. This prevalence remained at almost 50% in recent years, despite the further increase in number of patients with end-stage renal disease and the expansion of dialysis services. The most prevalent genotypes in Saudi Arabia are genotype 4 followed by genotypes 1a and 1b, whereas genotypes 2a/2b, 3, 5, and 6 are rare. Genotypes 1 and 4 were associated with different histological grades of liver disease. Mixed infections with more than one genotype were observed in some studies. Isolation of dialysis machines and infected patients, together with strict application of infection-control policies and procedures and continuous education and training of nursing staff, remain the cornerstone in prevention and control of the spread of HCV infection in dialysis units. Interferon (INF)- α or pegylated INF, alone or in combination with ribavirin, have shown great promise in the treatment of chronic HCV in dialysis patients.

Kennedy M, O'Reilly D, Mah MW. The use of a quality-improvement approach to reduce needlestick injuries in Saudi Arabian hospital. *Clinical Performance and Quality Health Care* 1998;6:79-83.

ABSTRACT- Objective/Design: An increase was noted in the incidence of needlestick injuries in our institution. A retrospective study was carried out analyzing the accident reports and medical records of needle-stick injuries from January 1995 to July 1996. Study variables included monthly incidence; location; injury site; mechanism; staff vocational status; source virological status; staff immunity; and serological conversion to hepatitis B and C viruses and the human immunodeficiency virus (HIV). Setting: 350-bed general hospital in Western Saudi Arabia employing 2,083 employees of many different nationalities. Results: 126 injuries were identified. Thirty percent of injuries occurred in the operating room and 28% on general wards. Twenty-five injuries occurred during a surgical procedure in the operating room, 22 injuries were caused by undisposed sharps, 11 occurred during suturing, 11 occurred during injection, and 10 occurred while

disposing of refuse. At least 38% of the injuries were avoidable. Sixty percent of those injured were nurses, 30% were medical staff, and 6% were housekeeping staff. Nine of the identifiable sources were hepatitis B surface antigen-positive, nine were hepatitis C antibody-positive, and none were anti-HIV positive. Eighty-nine percent of injuries involved the hands. None of our injured employees had seroconverted at 3, 6, or 9 months follow-up to HIV, hepatitis C, or hepatitis B. Eighty-four percent of injured staff were hepatitis B immune. Conclusion: Steps taken to reduce the future incidence of injuries included the provision of readily accessible sharps boxes, a hospitalwide education program focusing on safe handling and disposal of sharps, and the development of clear policies and procedures for dealing with sharps injuries. A further study will be conducted 12 months after the introduction of these measures.

Memish ZA. Infection control in Saudi Arabia: meeting the challenge. *American Journal of Infection Control* 2002;30:57-65.

ABSTRACT- Hospital-acquired infection poses significant clinical and economic burden worldwide. In the Kingdom of Saudi Arabia, infection control is a young, rapidly growing specialty. An infrastructure to expedite the growth of this important discipline is fast being established. The kingdom faces unique challenges when addressing infection control, which are the subject of this review. Much of the policy-making in domestic infection control is driven by the preventive medicine concerns of the annual pilgrimage (Hajj) to Mecca, which are unparalleled. The Saudi Ministry of Health acts to contain and control public health risks at this gathering of 2 million. Infectious hazards at the Hajj include meningococcal meningitis, respiratory tract infections, bloodborne diseases, and zoonotic diseases, all of which have international ramifications as pilgrimating Muslims return home. In the wake of the extraordinary pace of modernization in Saudi Arabia, deficiencies in infection control remain, which are slowly being redressed. This review examines the anatomy of infection control and its evolution in the kingdom. Future goals and infection control policy-making are given particular emphasis. Saudi Arabia seeks increasing international partnership in the area of infection control and preventive medicine. The Saudi health care system was formed on the basis of Western models to resounding success. Saudi Arabia is now in a position to provide experience and knowledge in return. International dialogue in the infection control arena is of mutual value. Important public health progress is afoot in this young kingdom, and these advances translate both regionally and on the international platform.

Memish ZA, Almuneef M, Dillon J. Epidemiology of needlestick and sharps injuries in a tertiary care center in Saudi Arabia. *American Journal of Infection Control* 2002;30:234-41.

ABSTRACT- Background: Health care workers (HCWs) are frequently exposed to the danger of infectious agents through needlestick and sharps injury (NSSI). In Saudi Arabia, the hepatitis B and C viruses pose a great threat to the HCW because of their high prevalence rate (8%-10% and 2%-6%, respectively). Method: A prospective study on the management of NSSI at King Fahad National Guard Hospital from 1996 to 2000. Data relating to the epidemiology of NSSI were collected with the Exposure Prevention Information Network (EPINet) data collection tool, 1997. Results: The results were compared with data as reported by EPINet 1998. Consistency was demonstrated between

King Fahad National Guard Hospital and EPINet 1998 for the occupational categories, locations, and the devices involved. Three anomalies were noted: (1) housekeeping staff injuries ranked third at our facility and eighth as reported by EPINet 1998; (2) injuries caused by devices discarded inappropriately commonly occurred at this facility but were not reported by EPINet; and (3) injuries due to unsafe practices ranked third at our hospital but ranked seventh in EPINet. To date, only 1 employee in our hospital had a seroconversion to hepatitis C. CONCLUSION: This surveillance highlighted risky practices and demonstrated employees and locations frequently involved in NSSIs. An education program was designed for all staff at risk of exposure, targeting higher-risk employees.

Memish Z, Sobayo E. Personalized education improves hepatitis B vaccination rate among physicians in Saudi Arabia. [Letter] *Infection Control and Hospital Epidemiology* 1998;19:887-8.

Paul T. Self-reported needlestick injuries in dental health care workers at Armed Forces Hospital, Riyadh, Saudi Arabia. *Military Medicine* 2000;165:208-10.
ABSTRACT- The objective of the present study was to assess the incidence of sharps/needlestick injuries among dental health care workers (DHCWs) at Armed Forces Hospital Riyadh. A questionnaire was distributed among all dental staff, including dentists, hygienists, and dental surgery assistants. Results show that 65 individuals (58%) had sharps/needlestick injuries, and of these, more than half did not report these injuries to the appropriate department. At the time of injury, the majority of the DHCWs were vaccinated or immune, but a few of them were not vaccinated against hepatitis B virus. This study concludes that every DHCW should be immunized against hepatitis B virus to avoid cross-infection from sharps/needlestick injuries, which are quite common in a dental practice. The high frequency of these injuries could be reduced by simple interventions.

Shanks NJ, al Kalai D. Occupation risk of needlestick injuries among health care personnel in Saudi Arabia. *J Hosp Infect* 1995; 29:221-6.
ABSTRACT- In a four-year study of penetrating injuries potentially contaminated with blood among health care personnel, the majority of cases occurred amongst nurses (65%). The wards were the commonest place for injury to occur (39%) which questions whether difficult practical procedures should be performed there. Injuries occurred most commonly during the afternoons (63%). Although needles were the most frequent implement (79%) causing injury, very few cases (7%) were related to the re-sheathing of cannulae. The commonest injured area (46%) was the palmar surface of the distal forefinger of the non-dominant hand. Western staff reported most incidents. There were no episodes of repeated needlestick injury. No staff developed any blood-borne infection (HIV, hepatitis B, treponemal infection) within a one year follow-up period after such a penetrating injury.

TURKEY:

Ayranci U, Kosgeroglu N. Needlestick and sharps injuries among nurses in the healthcare sector in a city of western Turkey. *Journal of Hospital Infection* 2004;58:216-23.

ABSTRACT- The aims of this study were to determine the rate of bloodborne infections after needlestick and sharps injuries in nurses at work, to estimate the number of vaccinations administered, and to assess whether universal precautions were being followed. The study involved 289 nurses working in five hospitals and six primary healthcare centres in Turkey. Between 1 April 2002 and 31 June 2002, a total of 139 practising nurses were included in the study following a needlestick or sharps injury. The results of completed questionnaires were collated, and Chi-squared test was used for analysis. The rate of hollow-bored needle-related injuries was 76.2% (106/139). Most nurses (69.1%) did not report any details of their injuries and 32.4% (45/139) of nurses had not been vaccinated against hepatitis B virus (HBV). Only 5.3% of the nurses who responded to the compliance question indicated that they always complied with universal precautions. Of 139 nurses, 1.4% and 7.9% showed evidence of HBV infection and hepatitis C virus (HCV) infection, respectively. All those who had hepatitis B were aged 30 years or under, whereas most of those who were anti-HCV positive (81.8%) were over 30 years old ($P < 0.05$). Nurses working in the Turkish healthcare sector are frequently exposed to bloodborne infections. Precautions and protection from needlestick and sharps injuries are important in preventing infection of nurses. Education about the transmission of bloodborne infections, vaccination and post-exposure prophylaxis must be implemented. Further investigations are warranted to elucidate the risk to nurses of contracting these potentially serious infections.

Azap A, Ergonul O, Memikoglu KO, Yesilkaya A, Altunsoy A, Bozkurt GY, Tekeli E. Occupational exposure to blood and body fluids among health care workers in Ankara, Turkey. *American Journal of Infection Control* 2005;33:48-52.

ABSTRACT- Background: The risk of occupational acquisition of bloodborne pathogens via exposure to blood and body fluids is a serious problem for health care workers in Turkey. Because there are no systematic recording programs in Turkey, national data concerning frequency of exposures are not readily available. Objective: To determine the risk factors of exposure to blood and body fluids among health care workers (HCWs). Methods: This study was conducted in the hospitals of Ankara University School of Medicine. A structured survey form was administered by person-to-person interview. Results: The study included 988 HCWs: 500 nurses (51%), 212 residents (21%), 152 nurse assistants (15%), and others (13%). Six hundred thirty-four (64%) of the HCWs had been exposed to blood and body fluids at least once in their professional life (0.85 exposure per person-year). The most frequent cause of the sharps injuries was recapping the needle (45%). Of the injured HCWs, 60 (28%) were not using any personal protective equipment, and 144 (67%) did not seek any medical advice for injury. Conclusions: Systematic control measures, including an effective and goal-oriented education program targeting HCWs, prospective record keeping, and instillation of a special unit for the health of HCWs should be implemented in the hospital setting.

Erdem Y, Serpil Talas M. Blunt and penetrating object injuries in housekeepers working in a Turkish university hospital. *American Journal of Infection Control* 2006;34:208-14.

ABSTRACT- Background: Hospitals have been described as hazardous work environments with an increase in job-related injuries. This situation creates great risks and hazards for housekeepers while carrying out their job. Methods: This descriptive

study was performed on 402 housekeepers working in patient-care services in Turkey. The data of this study were collected using a questionnaire form. This form included 26 questions about general features of housekeepers and working units, blunt and penetrating object injuries in the past 3 months and hepatitis B virus immunization. Results: The majority of housekeepers (71.1%) are men, (54%) are graduates of primary school or are illiterate, and (73.6%) are married. Their mean age is 31.5 years; the mean length of employment is 3.2 years. Sixty-two point nine percent of them are working in medical/surgical units, 88.8% of them are working in routine cleaning, and 29.1% of them have been injured with various blunt and penetrating objects while working in hospital in the past 3 months. Only 26.6% of the housekeepers have been administered the hepatitis B vaccination. Conclusion: This study showed a high frequency of blunt and penetrating object injuries in housekeepers. Therefore, more efforts are necessary to increase compliance with vaccination in housekeepers.

Ertem M, Dalar Y, Cevik U, Sahin H. Injury or body fluid splash incidence rate during three months period in elective surgery procedures, at Dicle University Hospital, Diyarbakir, Turkey. *Ulusal Travma ve Acil Cerrahi Dergisi [Turkish journal of trauma & emergency surgery]* 2008;14:40-5.

ABSTRACT- Background: In this study we aimed to determine the prevalence of sharp injuries (SI) and blood and body fluid (BBF) splashes in health care workers during elective surgery procedures (ESP). This study would help to plan the preventive measures for injuries and BBF splashes. Methods: All ESP were recorded during three months period and SI and BBF splashes were analyzed in Hospital of Dicle University. Hospital employees who reported SI or BBF splashes were interviewed about the types of devices causing injury and the circumstances of the injury. Results: During three months period, 1988 ESPs were recorded. SIs were reported in 111 procedures (5.6%) and BBF splashes were in 145 (7.3%). Incidence rate of SI was 2.8 per person year in teaching staff, 5.6 in residents, 6.3 in nurses and 1.5 for other health care workers. Incidence rate of BBF splashes was 14.5 per person year in trainers, 6.9 in residents, 8.4 in nurses, respectively. Duration of ESP, start time of ESP and number of employed personnel in the ESP were the factors that significantly influenced SI incidence. Duration of ESP and total person worked in ESP was effective on BBF splashes. SI was occurred in 14.4% of mandibulofacial, 12.2% of general surgery, 10.5% of chest surgery and 8.4% of brain surgery ESP. BBF splashes occurred in 14.4% of general surgery's, 13.5% of urology's, 14% of chest surgery's, 14.7% of cardiovascular surgery's ESP. The most frequently injured tissue was index finger (33.9%) and the pollex finger (31.4%). Conclusion: SIs and BBFs are important health risks for health professionals who are involved in surgery, as it is in all other medical practices. SI and BBF splashes should be monitored and preventive measures should be planned urgently.

Ersozlu S, Sahin O, Ozgur AF, Akkaya T, Tuncay C. Glove punctures in major and minor orthopaedic surgery with double gloving. *Acta orthopaedica Belgica* 2007;73:760-4.

ABSTRACT- We assessed the frequency of glove perforation during major and minor orthopaedic surgeries, in order to determine the efficacy of double gloving. A total number of 1528 gloves (622 inner and 906 outer) used in 200 procedures (100 major-100

minor), and 100 pairs of unused gloves were examined. Glove perforation rate, incidence among surgical team, location of perforation and duration of surgery were compared. The overall perforation rate was 15.8% (242/1528). Perforation rates for major versus minor surgical procedures were 21.6% and 3.6%, respectively. The perforation rate for the unused control group was 1% (2/200). Inner-outer gloves perforation rates were 3.7% (23/622) and 22.7% (206/906), respectively. Surgeons had a higher perforation rate compared with the other staff. The right thumb and left index finger had more punctures than other fingers. Routine use of double gloving during orthopaedic procedures is recommended, because this significantly reduces the perforation of inner gloves.

Kosgeroglu N, Ayranci U, Vardareli E, Dincer S. Occupational exposure to hepatitis infection among Turkish nurses: frequency of needle exposure, sharps injuries and vaccination. *Epidemiology and Infection* 2004;132:27-33.

ABSTRACT- The aim of this study was to assess the demographic factors and pattern of injuries sustained by nurses, and to determine the occupational hazard of exposure to hepatitis B (HBV) and C (HCV) viruses among nurses. The study involved 906 hospital-based nurses working in three large hospitals. Between August 2002 and January 2003 a total of 595 practising nurses were accepted for inclusion. The results of questionnaires completed were collated and χ^2 and ratios were used for analysis. Of the 595 nurses, 111 (18.7%) had evidence of previous or current HBV infection and 32 (5.4%) of HCV infection. We found that 11.2% of the nurses who had worked for a period of between 0 and 5 years and 37.1% of those who had worked for a period between 16 and 20 years had evidence of HBV or HCV infection. Of the nurses working in surgical clinics, 59.4% had evidence of previous HBV or HCV infection and those working in hospital clinics had an 18.2% infection rate. Of the nurses occupationally exposed to HBV and HCV infections, 22.4% had received sharps injuries from apparatus and 63.6% had suffered needlestick exposure. Findings also showed 2.7% HBsAg positivity and 5.4% anti-HCV positivity. Of the 452 (76%) nurses who faced the occupational hazard of exposure to hepatitis infections, 27.7% (125/452) had not been vaccinated against HBV. Nurses working in our health-care sector are frequently exposed to occupational exposure for HBV and HCV infections. In order to prevent the infection of nurses with hepatitis, we advocate precautions and protection from sharps injuries. A programme of education, vaccination and post-exposure prophylaxis must be implemented.

Utkan A, Dayican A, Toyran A, Tümüöz MA. [Seroprevalences of hepatitis B, hepatitis C, and HIV in patients admitted to orthopedic and traumatology department] [in Turkish] *Acta Orthopaedica et Traumatologica Turcica* 2006;40:367-70.

ABSTRACT- Objectives: Orthopedic surgeons are at a higher occupational risk for blood-borne infections because of frequent handling of sharp instruments and bone fragments. We investigated the seroprevalences of hepatitis B, hepatitis C, and human immunodeficiency virus (HIV) among patients treated at orthopedic and traumatology department. Methods: Data on age, sex, diagnoses, and the seroprevalences of HBsAg, anti-HCV and anti-HIV were reviewed in 1,040 patients hospitalized between September 2003 and December 2004. The patients were divided into two groups as orthopedics (n=646; mean age 37.8 years) or trauma (n=394; mean age 38.3 years) according to the initial cause of presentation. The results were compared with those of 28,642 blood

donations during the same period. Results: HBsAg positivity was similar in the patients (2.3%) and the controls (2.1%). HBsAg was detected in 16 patients (2.5%) in the orthopedics group and eight patients (2%) in the trauma group ($p>0.05$), three of whom were younger than one year. Similarly, the prevalences of anti-HCV antibodies were similar in the patient (0.6%) and control (0.3%) groups. Four patients (0.6%) in the orthopedics group and two patients (0.5%) in the trauma group were positive for anti-HCV ($p>0.05$), and all had a past history of operations. Anti-HIV positivity was not detected in the patient group, whereas it was 0.2% in the control group. Conclusion: The similarities between patients admitted to orthopedic and traumatology department and blood donors in the prevalences of HBsAg, and anti-HCV and anti-HIV antibodies suggest that data obtained from blood banks can be used for risk calculations.

UNITED ARAB EMIRATES:

Ganczak M, Barss P, Al-Marashda A, Al-Marzouqi A, Al-Kuwaiti N. Use of the Haddon matrix as a tool for assessing risk factors for sharps injury in emergency departments in the United Arab Emirates. *Infection Control and Hospital Epidemiology* 2007;28:751-54. ABSTRACT- We investigated the epidemiology and prevention of sharps injuries in the United Arab Emirates. Among 82 emergency nurses and 38 doctors who responded to our questionnaire, risk factors for sharp device injuries identified using the Haddon matrix included personal factors (for the pre-event phase, a lack of infection control training, a lack of immunization, and recapping needles, and for the postevent phase, underreporting of sharps injuries) and equipment-related factors (for the pre-event phase, failure to use safe devices; for the event phase, failure to use gloves in all appropriate situations). Nearly all injuries to doctors were caused by suture needles, and among nurses more than 50% of injuries were caused by hollow-bore needles.