

## **Occupational Exposures in Europe: Bibliography of Country-Specific & Regional Needlestick, Surveillance, and Exposure Risk Studies**

### **REGIONAL/MULTI-COUNTRY STUDIES:**

Abiteboul D. Blood exposure data in Europe. In: Collins CH, Kennedy DA, editors. Occupational blood-borne infections: risk and management. New York: CAB International; 1997. p. 59-74.

**SUMMARY:** In Europe (Europe of the Twelve plus Austria, Finland, Norway, Sweden and Switzerland) 6.5 million workers (or 6.8 including students) are potentially exposed to the hazards of blood contact. Before studying the incidence and the causes of blood exposures the characteristics and risk factors of accidents that have led to infection by [HIV, hepatitis B and hepatitis C] will be reviewed, based on European data.

Clarke SP, Schubert M, Korner T. Sharp-device injuries to hospital staff nurses in 4 countries. *Infection Control and Hospital Epidemiology* 2007;28:473-8.

**ABSTRACT-** Objective: To compare sharp-device injury rates among hospital staff nurses in 4 Western countries. Design: Cross-sectional survey. Setting: Acute-care hospital nurses in the United States (Pennsylvania), Canada (Alberta, British Columbia, and Ontario), the United Kingdom (England and Scotland), and Germany. Participants: A total of 34,318 acute-care hospital staff nurses in 1998-1999. **RESULTS:** Survey-based rates of retrospectively-reported needlestick injuries in the previous year for medical-surgical unit nurses ranged from 146 injuries per 1,000 full-time equivalent positions (FTEs) in the US sample to 488 injuries per 1,000 FTEs in Germany. In the United States and Canada, very high rates of sharp-device injury among nurses working in the operating room and/or perioperative care were observed (255 and 569 injuries per 1,000 FTEs per year, respectively). Reported use of safety-engineered sharp devices was considerably lower in Germany and Canada than it was in the United States. Some variation in injury rates was seen across nursing specialties among North American nurses, mostly in line with the frequency of risky procedures in the nurses' work. **Conclusions:** Studies conducted in the United States over the past 15 years suggest that the rates of sharp-device injuries to front-line nurses have fallen over the past decade, probably at least in part because of increased awareness and adoption of safer technologies, suggesting that regulatory strategies have improved nurse safety. The much higher injury rate in Germany may be due to slow adoption of safety devices. Wider diffusion of safer technologies, as well as introduction and stronger enforcement of occupational safety and health regulations, are likely to decrease sharp-device injury rates in various countries even further.

Puro V, Cicalini S, De Carli G, Soldani F, Ippolito G; European Occupational Post-Exposure Prophylaxis Study Group. Towards a standard HIV post exposure prophylaxis for healthcare workers in Europe. *Euro Surveillance* 2004;9:40-3.

**ABSTRACT-** Antiretroviral prophylaxis (PEP) after occupational exposure to HIV in healthcare workers (HCWs) is used across Europe, but not in a consistent manner. A panel of experts, funded by the European Commission, formulated a set of recommendations. When it has been decided that the characteristics of the exposure indicate the initiation of PEP, PEP should be started as soon as possible; initiation is discouraged after 72 hours. PEP should be initiated routinely with any triple combination of antiretrovirals approved for the treatment of HIV-infected patients; a two class regimen is to be preferred. The source patient's treatment history should be sought. Counselling, psychological support, HIV testing and clinical evaluation should be performed at baseline, at 6-8 weeks, and at least 6 months post exposure. Additional clinical and laboratory monitoring at one and two weeks should be considered, as adherence with and tolerance of the regimen can highlight adverse reactions and potential toxicity. Routine HIV resistance tests in the source patient, and direct virus assays in the exposed HCW are not recommended.

Yazdanpanah Y, De Carli G, Miguères B, Lot F, Campins M, Colombo C, et al. Risk factors for hepatitis C virus transmission to health care workers after occupational exposure: a European case-control study. *Clinical Infectious Diseases* 2005;41:1423-30.

**ABSTRACT-** Background: Additional studies are required to identify risk factors for hepatitis C virus (HCV) transmission to health care workers after occupational exposure to HCV. Methods: We conducted a matched case-control study in 5 European countries [France, Italy, U.K., Switzerland, Spain] from 1 January 1991 through 31 December 2002. Case patients were health care workers who experienced seroconversion after percutaneous or mucocutaneous exposure to HCV. Control subjects were HCV-exposed health care workers who did not experience seroconversion and were matched with case patients for center and period of exposure. Results: Sixty case patients and 204 control subjects were included in the study. All case patients were exposed to HCV-infected fluids through percutaneous injuries. The 37 case patients for whom information was available were exposed to viremic source patients. As risk factors for HCV infection, multivariate analysis identified needle placement in a source patient's vein or artery (odds ratio [OR], 100.1; 95% confidence interval [CI], 7.3-1365.7), deep injury (OR, 155.2; 95% CI, 7.1-3417.2), and sex of the health care worker (OR for male vs. female, 3.1; 95% CI, 1.0-10.0). Source patient HCV load was not introduced in the multivariate model. In unmatched univariate analysis, the risk of HCV transmission increased 11-fold for health care workers exposed to source patients with a viral load  $>6 \log_{10}$  copies/mL (95% CI, 1.1-114.1), compared with exposures to source patients with a viral load  $\leq 4 \log_{10}$  copies/mL. Conclusion: In this study, HCV occupational transmission was found to occur after percutaneous exposures. The risk of HCV transmission after percutaneous exposure increased with deep injuries and procedures involving hollow-bore needle placement in the source patient's vein or artery. These results highlight the need for widespread adoption of needlestick-prevention devices in health care settings, together with other preventive measures.

#### **BELGIUM:**

Leens E. Accidental blood exposure: start-up of a national surveillance system in Belgian hospitals. *Hospital* 2004;6(1):45-6. (*Hospital: Official Journal of the European Assn. of*

Hospital Managers – [www.hospital.be](http://www.hospital.be))  
[no abstract available]

**DENMARK:**

Fisker N, Mygind LH, Krarup HB, Licht D, Georgsen J, Christensen PB. Blood borne viral infections among Danish health care workers--frequent blood exposure but low prevalence of infection. *European Journal of Epidemiology* 2004;19:61-7.

**ABSTRACT-** Denmark is a country with low prevalence and incidence of blood borne viral infections. Among health care workers (HCWs) vaccination for hepatitis B is only offered to high-risk groups. The aims of this cross sectional survey were to determine the prevalence of hepatitis B, -C, and human immunodeficiency virus (HIV) among the staff at a Danish University hospital and to correlate this with risk factors for transmission. Additionally, we wanted to examine the current frequency of blood exposure, reporting habits and hepatitis B vaccination status in the staff. Of 1439 eligible hospital staffs included, 960 (67%) were HCWs. The overall prevalence of human immunodeficiency virus (HIV), hepatitis C Virus (HCV), and hepatitis B virus (HBV) was 0% (0/1439), 0.14% (2/1439), and 1.6% (23/1439), respectively. Twenty-three percent of HCWs were vaccinated against HBV. Age, blood transfusion and stay in endemic areas were associated independently to HBV infection as opposed to job-category, duration of employment, HBV vaccination status and blood exposure. Based on a 4-week recall period, the incidence of percutaneous blood exposure was 1.5/person-year. In conclusion the HIV and hepatitis prevalence was low despite frequent blood exposure and the principal risk factors were unrelated to work. Danish HCWs do not seem to be at increased risk of hepatitis B even though universal HBV vaccination has not been implemented.

Fleerackers Y, Colebunders R, Van Broeckhoven J, Van den Abbeele K. Port-a-Cath needlestick injuries. [Letter] *Infection Control and Hospital Epidemiology* 1993;14:562-3.

Nelsing S, Nielsen TL, Nielsen JO. Percutaneous blood exposure among Danish doctors: exposure mechanisms and strategies for prevention. *Eur J Epidemiol* 1997;13:387-93.

**ABSTRACT-** The objective of this study was to describe the mechanisms of percutaneous blood exposure (PCE) among doctors and discuss rational strategies for prevention. Data were obtained as part of a nation-wide questionnaire survey of occupational blood exposure among hospital employed doctors in Denmark. The doctors were asked to describe their most recent PCE, if any, within the previous 3 months. Detailed information on the instruments, procedures, circumstances and mechanisms that caused the PCE was obtained. Of 9375 doctors, 6256 (67%) responded, and 6005 questionnaires were eligible for analysis. Of 971 described PCE the majority were caused by suture needles (n = 483), IV-catheter-stylets (n = 94), injection needles (n = 75), phlebotomy needles (n = 53), scalpels (n = 45), arterial blood sample needles (n = 41) and bone fragments (n = 23). Inattentiveness was the most common cause, contributing to 30.5% of all PCE. Use of fingers rather than instruments was a major cause of injury in surgical specialties and was a contributing cause of 36.9% PCE on suture needles. Common contributing causes when fingers were used (n = 199) were poor space in (30.2%) or view of (18.6%) the operation field. It was often argued that instruments were

not practical to use or might harm the tissue. Of 689 PCE in surgical specialties, 17.4% were inflicted by colleagues. Up to 53.3% of PCE on hollow-bore needles could be attributed to unsafe routines like recapping only, but other mechanisms like sudden patient movements and acute situation were common, especially in the case of PCE on iv-catheter-stylets. It is concluded that the exposure mechanisms of PCE reflect both unsafe routines, difficult working conditions and unsafe devices. Education in safer working routines are needed in all specialties. Introduction of safer devices should have a high priority in surgical specialties, and should be considered in non-surgical specialties too.

Nelsing S, Nielsen TL, Nielsen JO. Occupational blood exposure among health care workers: II. Exposure mechanisms and universal precautions. *Scandinavian Journal of Infectious Diseases* 1993;25:199-205.

**ABSTRACT-** We investigated mechanisms of mucocutaneous exposure (MCE) and percutaneous exposure (PCE) to blood, and compliance with protective barriers among all former and presently employed medical staff at a Danish Department of Infectious Diseases. All subjects were asked to complete an anonymous questionnaire. 135 out of 168 (80%) subjects responded. 37 incidents of PCE and 15 MCE were described. More than 50% of PCE had occurred without obvious explanation during medical procedures, or were caused by unexpected patient movement, while only 1 PCE was caused by recapping. 35% of PCE occurred during drawing of venous blood samples. Compliance with usage of gloves was high (70-100%), depending on the procedure, and 72% of the subjects claimed to have sufficient knowledge of the risk of blood exposure and how to prevent it. Yet 11 (73%) out of 15 MCE might have been prevented by appropriate use of protective barriers. To further reduce the frequency of blood exposure, the development of safer instruments and unceasing education in safer technique and use of protective barriers are of major importance.

Nelsing S, Nielsen TL, Nielsen JO. Occupational blood exposure among health-care workers (HCW) in a department of infectious diseases (DID). *International AIDS Conference* 1992 (Jul 19-24);8:179 (abstract no. PuC 8158).

**ABSTRACT-** Objective: To study the epidemiology of blood exposure among staff in a DID with a high prevalence of HIV-positive patients, from 1987-1991. Methods: All former and present employed staff members, attending physicians and chief physicians, nurses and nursing assistants were asked to fulfill an anonymous questionnaire. Subjects were asked to detaily describe all percutaneous (PCE) and mucocutaneous (MCE) exposures to blood during their employment at the department. Results: 80% (135 out of 168) responded. 45 persons experienced 37 PCE and 15 MCE. In 83% of the exposures the index patient was known to be HIV-positive. In 73% of PCE and 33% of MCE the subject had a HIV test performed. 65% of PCE and only 13% of MCE were reported. 76% of the subjects claimed to wear appropriate protection during the exposure. Rate of PCE per person year (py) was highest among staff members 0.51 PCE/py compared to 0.09-0.11/py among other groups. Staff members perform the major part of sharp procedures. Rates of MCE/py was highest among doctors in general 0.17-0.21/py and lowest among nurses 0.03 MCE/py. Almost 50% of PCE happened during the first 6 months of employment. No relation between anciennity and exposure rates in general

was found for neither staff members, nor nurses. Exposure mechanisms were for PCE: Unexpected patient movement 8, during disposal 7, picking up instrument 4, left instrument 2, recapping 1, stuck by colleague 1, during procedure 12. For MCE: Unexpected patient movement 3, unexpected colleagues movement 1, during procedure 11. Conclusions: Blood exposure is still a considerable problem, even among staff experienced in caring for patients with infectious diseases. Recapping was no major cause of PCE in this study. Most PCE happens during the first 6 months of employment, while anciennity does not seem to influence on the risk of blood exposure. Staff members are at highest risk of blood exposure. The importance of reporting and being HIV-tested following blood exposures needs to be stressed.

Pedersen EB. [Potentially hazardous exposure to blood among hospital personnel: A retrospective study of systematically registered exposure during the period 1990-1994.] [Danish]. *Ugeskr Laeger* 1996;158:1807-11.

**ABSTRACT-** The purpose of this study was to investigate the self-reported incidence of needlesticks and other exposures to patients' blood or body fluids among employees at Glostrup County Hospital, Copenhagen. Furthermore the nature of and circumstances under which these exposures occurred were explored. Four hundred and thirty-two reports of exposure were received from 389 health care workers during a period of four years (1990-1994). Ninety-three percent of the exposures were percutaneous, 7% mucocutaneous. The incidence rates of exposure per full-time employee per year were as follows: Midwives: 0.11; doctors: 0.093; laboratory - technicians: 0.084; registered nurses: 0.068; auxiliary nurses: 0.025; porters: 0.024 and housekeeping staff: 0.016. Accidents related to disposal containers, where the health care worker is injured while disposing a needle or handling the disposal container, account for 10% of all percutaneous exposures. Improper placing of sharp instruments account for 7% and recapping is responsible for 6% of all percutaneous exposures. Mucocutaneous exposure was caused by unexpected splash during the procedure, in 86% of the cases the conjunctivae were contaminated. No occupationally acquired infections were observed. It is concluded that occupational exposure to blood and body fluids among health care workers is considerable. To reduce the frequency of blood exposure education of the health care workers and safer equipment are needed. A good strategy for preventing exposures must be based on careful registration of the accidents, which is obtained by encouraging reporting of the exposures among the health care workers. Data base registration would be desirable.

**FINLAND:**

Anttila VJ, Kalima S, Ristola M. [Occupational needlestick injuries.] [Finnish] *Duodecim* 2000;116:2217-24.  
[no abstract available]

**FRANCE:**

Caillard J-F, Iwatsubo Y, Gehanno J-F, Saurel D. [Onze années de surveillance des AES à l'assistance publique-hôpitaux de Paris.] [Eleven years of accidental blood exposure surveillance in the public Parisian hospitals.] [French] *Hygienes* 2003;11:108-11.

ABSTRACT- Au cours de la période 1990-2000, une surveillance a porté sur les accidents d'exposition au sang (AES) parmi les personnels de l'AP-HP. 24143 questionnaires standardisés ont été remplis par les médecins du travail au décours de chaque accident. D'après les résultats obtenus, les professionnels les plus exposés sont les infirmières (48 % des déclarations d'AES), les médecins et les étudiants en médecine (26 %). Entre 1995 et 2000, le taux d'incidence est passé chez les infirmières de 9,52 à 8,22 pour 100 équivalents temps pleins et pour l'ensemble des personnels paramédicaux de 4,10 à 3,97. L'évolution de la nature des accidents montre la prédominance persistante des piqûres et l'augmentation relative des projections. La fréquence des accidents percutanés les plus graves est en diminution: 69 % de blessures profondes en 1990 et 34 % en 2000 ( $p < 0,001$ ). La survenue d'accidents liés à des prélèvements a été divisée par deux. La recherche des sérologies VIH et VHC du patient-source s'est beaucoup développée. De plus, 99 % des victimes d'AES étaient protégées contre le VHB en 2000. Les taux de séroconversion VIH et VHC ont été estimés respectivement à 0,22 et 0,80 %. Parmi les facteurs de risque identifiés en 2000 figurent des éléments liés au contexte de travail (urgence, surcharge de travail, malade agité...). Les efforts de formation et d'organisation du travail doivent donc être poursuivis parallèlement à la mise à disposition des matériels de sécurité.

de Wazières B, Gil H, Vuitton DA, Dupond JL. Nosocomial transmission of dengue from a needlestick injury [letter]. *Lancet* 1998;351:498.

Fabrégas B. [Accidental exposure to blood and hepatitis C][in French] *Soins: La Revue de Référence Infirmière* 1999;641:47-8.

Henrotin JB, Pocheron MH, Smolik C, Latour N. [Accidental blood exposure in nurses: research on individual risk factors.][French] *Revue de l'Infirmière* 2004;105:28-31. [no abstract]

Herida M, Larsen C, Lot F, Laporte A, Desenclos JC, Hamers FF. Cost-effectiveness of HIV post-exposure prophylaxis in France. *AIDS* 2006;20:1753-61.

ABSTRACT- Objective: To assess the cost-effectiveness of HIV post-exposure prophylaxis (PEP) in France. Methods: We used a decision tree to evaluate, from a society's perspective, the cost of PEP per quality-adjusted life-year (QALY) saved. We used 1999-2003 PEP surveillance data and literature-derived data on per event transmission probabilities, PEP efficacy and quality of life with HIV. HIV prevalence and lifetime cost of HIV/AIDS management in the HAART era were derived from French studies. We assumed that mean life expectancy in full health was 65 years among uninfected individuals and that the mean survival time after HIV infection was 22.5 years. The costs of PEP drugs and follow-up were derived from the French public sector. A 3% annual rate was used to discount future costs and effects. Results: During 1999-2003, PEP was prescribed to 8958 individuals (heterosexual sex: 47.6%; homosexual sex: 28.4%; occupational exposure: 23.4%; drug injection: 0.6%); of those, 2143 were exposed to a known HIV-infected source. PEP was estimated to prevent 7.7 infections and saved 64.5 QALY at a net cost of euro 5.7 million, resulting in an overall cost-effectiveness ratio of euro 88,692 per QALY saved. PEP was cost saving for 4.4% of

cases and cost effective (< euro 50,000 per QALY) in a further 11.3% of cases. In contrast, 72 and 52% of prescriptions had a cost-effectiveness ratio exceeding euro 200,000 and euro 2 millions, respectively, per QALY saved. Conclusion: Overall, the French PEP programme is only moderately cost effective. PEP guidelines should be revised to target high-risk exposures better.

Johanet H, Antona D, Bouvet E. [Risks of accidental exposure to blood in the operating room. Results of a multicenter prospective study. Groupe d'Etude sur les Risques d'Exposition au Sang] [French]. *Annales de Chirurgie* 1995;49:403-10.

ABSTRACT- A multicentric prospective trial was conducted to evaluate the frequency and kind of blood exposure in operating room. From march to june 1992, 3554 procedures were observed in 22 surgical units (visceral, orthopaedic and vascular), with 129 surgeons, 133 residents and 216 nurses. Statistic analysis was done on Epi Info 5 (CDC Atlanta) and EGRET (Statistic and Epidemiology Research Corporation, Seattle). 11.7% of procedures were the case for an incidental blood exposure: 4.2% for percutaneous exposure; 8.4% for cutaneous or mucosal exposure. Rates change with the surgical specialty. Surgeons were involved in 50.7% of percutaneous exposure and 58.7% of the cutaneous or mucosal exposures, especially when they were operators (respectively 2 and 5.6% person-act). A significative rate was founded between incidental blood exposure and the length of procedure, the sepsis character of the procedure, but not with emergency or number of globular units transfused. To diminish the incidental blood exposure and its risks, this data suggests three kinds of practice: a better work for vaccination; in our study 59% of surgeons declare an adequate vaccination against hepatitis B; a best operative hygiene, with knowing of risks factor of blood exposure, depending of the kind of procedure, changing between different units; the use of protections: non coated dressing, double gloving, ocular protection.

Lamontagne F, Abiteboul D, Lolom I, Pellissier G, Tarantola A, Descamps JM, Bouvet E. Role of safety-engineered devices in preventing needlestick injuries in 32 French hospitals. *Infect Control Hosp Epidemiol* 2007;28(1):18-23.

ABSTRACT – Objectives: To evaluate safety-engineered devices (SEDs) with respect to their effectiveness in preventing needlestick injuries (NSIs) in healthcare settings and their importance among other preventive measures. Design: Multicenter prospective survey with a 1-year follow-up period during which all incident NSIs and their circumstances were reported. Data were prospectively collected during a 12-month period from April 1999 through March 2000. The procedures for which the risk of NSI was high were also reported 1 week per quarter to estimate procedure-specific NSI rates. Device types were documented. Because SEDs were not in use when a similar survey was conducted in 1990, their impact was also evaluated by comparing findings from the recent and previous surveys. Setting: A total of 102 medical units from 32 hospitals in France. Participants: A total of 1,506 nurses in medical or intensive care units. Results: A total of 110 NSIs occurring during at-risk procedures performed by nurses were documented. According to data from the 2000 survey, use of SEDs during phlebotomy procedures was associated with a 74% lower risk ( $P<.01$ ). The mean NSI rate for all relevant nursing procedures was estimated to be 4.72 cases per 100,000 procedures, for a 75% decrease since 1990 ( $P<.01$ ); however, the decrease in NSI rates varied considerably

according to procedure type. Between 1990 and 2000, decreases in the NSI rates for each procedure were strongly correlated with increases in the frequency of SED use ( $r=0.88$ ;  $P<.02$ ). Conclusion: In this French hospital network, the use of SEDs was associated with a significantly lower NSI rate and was probably the most important preventive factor.

Lot F, Delarocque-Astagneau E, Thiers V, Bernet C, Rimlinger F, Desenclos J-C, Chaud P, Dumay F. Hepatitis C virus transmission from a healthcare worker to a patient. *Infection Control and Hospital Epidemiology* 2007;28:227-9.

ABSTRACT- We investigated the source of infection in a patient who developed acute hepatitis C virus infection after cardiothoracic surgery. A healthcare worker was found to be infected with hepatitis C virus, and molecular analysis indicated the strain was similar to that found in the patient. The exact mode of transmission was not identified; however, atopic eczema on the healthcare worker's hands may have contributed to the transmission.

Méchai F, Quertainmont Y, Sahali S, Delfraissy JF, Ghosn J. Post-exposure prophylaxis with a maraviroc-containing regimen after occupational exposure to a multi-resistant HIV-infected source person. *Journal of Medical Virology* 2008;80:9-10.

ABSTRACT- We report the case of a health care worker who received a post-exposure prophylaxis including an investigational drug, maraviroc, after a needlestick percutaneous injury to an HIV-infected patient with late-stage disease and harboring a multi-drug resistant virus. Post-exposure prophylaxis including maraviroc was pursued for a total of 28 days, with a weekly clinical and biological evaluation. Post-exposure prophylaxis was well tolerated, with no increase in liver function tests. The health care worker remained HIV-negative after a 6- month follow-up.

Parneix P, Branger B, Talon D, Tarantola A, Vincent A, L'Heriteau F. La surveillance des AES en France = Accidental blood exposure surveillance in France. [French] *Hygiènes* 2003;11:101-7.

ABSTRACT: La surveillance épidémiologique des accidents avec exposition au sang (AES) s'inscrit en France dans un cadre réglementaire et de bonnes pratiques. Articulée autour du Médecin du travail, cette surveillance doit faire appel à une méthodologie standardisée permettant une homogénéité du recueil et une comparabilité des données. Sur la base des travaux du GERES, les centres de coordination de lutte contre les infections nosocomiales ont mis en place depuis 1995 des réseaux multicentriques de surveillance des AES. L'analyse des résultats disponibles permet déjà une bonne approche descriptive des AES survenant dans les établissements de santé ainsi que le calcul de différents indicateurs d'incidence (par catégorie professionnelle, selon le nombre de lits et d'admissions ou encore en fonction de l'usage de certains dispositifs médicaux à risque). Ces différents travaux ont abouti à la création d'une méthodologie commune nationale de surveillance sous l'égide du réseau d'alerte, d'investigation et de surveillance des infections nosocomiales et à la mise en place en 2003 d'un recueil national de données.

Pellissier G, Miguères B, Tarantola A, Abiteboul D, Lolom I, Bouvet E. Risk of needlestick injuries by injection pens. *Journal of Hospital Infection* 2006;63:60-4.

**ABSTRACT:** Injection pens are used by patients when auto-administering medication (insulin, interferon, apokinon etc.) by the subcutaneous route. The objective of this study was to evaluate the rate of injection pen use by healthcare workers (HCWs) and the associated risk of needlestick injuries to document and compare injury rates between injection pens and subcutaneous syringes. A one-year retrospective study was conducted in 24 sentinel French public hospitals. All needlestick injuries linked to subcutaneous injection procedures, which were voluntarily reported to occupational medicine departments by HCWs between October 1999 and September 2000, were documented using a standardized questionnaire. Additional data (total number of needlestick injuries reported, number of subcutaneous injection devices purchased) were collected over the same period. A total of 144 needlestick injuries associated with subcutaneous injection were reported. The needlestick injury rate for injection pens was six times the rate for disposable syringes. Needlestick injuries with injection pens accounted for 39% of needlestick injuries linked with subcutaneous injection. In all, 60% of needlestick injuries with injection pens were related to disassembly. Injection pens are associated with needlestick injuries six times more often than syringes. Nevertheless, injection pens have been shown to improve the quality of treatment for patients and may improve treatment observance. This study points to the need for safety-engineered injection pens.

Rogues AM, Verdun-Esquer C, Buisson-Valles I, Laville MF, Lashéras A, Sarrat A, Beaudelle H, Brochard P, Gachie JP. Impact of safety devices for preventing percutaneous injuries related to phlebotomy procedures in health care workers. *American Journal of Infection Control* 2004;32:441-4.

**ABSTRACT- Background:** Use of protective devices has become a common intervention to decrease sharps injuries in the hospitals; however few studies have examined the results of implementation of the different protective devices available. **Objective:** To determine the effectiveness of 2 protective devices in preventing needlestick injuries to health care workers. **Methods:** Sharps injury data were collected over a 7-year period (1993-1999) in a 3600-bed tertiary care university hospital in France. Pre- and postinterventional rates were compared after the implementation of 2 safety devices for preventing percutaneous injuries (PIs) related to phlebotomy procedures. **Results:** From 1993 to 1999, an overall decrease in the needlestick-related injuries was noted. Since 1996, the incidence of phlebotomy-related PIs has significantly decreased. Phlebotomy procedures accounted for 19.4% of all percutaneous injuries in the preintervention period and 12% in the postintervention period (RR, 0.62; 95% CI, 0.51-0.72;  $P < .001$ ). Needlestick-related injuries incidence rate decreased significantly after the implementation of the 2 safety devices, representing a 48% decline in incidence rate overall. **Conclusions:** The implementation of these safety devices apparently contributed to a significant decrease in the percutaneous injuries related to phlebotomy procedures, but they constitute only part of a strategy that includes education of health care workers and collection of appropriate data that allow analysis of residuals percutaneous injuries.

Tarantola A, Golliot F, L'Heriteau F, Lebascle K, Ha C, Farret D, Bignon S, Smaïl A, Doutrelot-Philippon C, Astagneau P. Assessment of preventive measures for accidental blood exposure in operating theaters: A survey of 20 hospitals in Northern France. *American Journal of Infection Control* 2006;34:376-82.

**ABSTRACT- Background:** Accidental exposures to blood of body fluids (ABE) expose health care workers (HCW) to the risk of occupational infection. **Objectives:** Our aim was to assess the prevention equipment available in the operating theater (OT) with reference to guidelines or recommendations and its use by the staff in that OT on that day and past history of ABE. **Methods:** Correspondents of the Centre de Coordination de la Lutte contre les Infections Nosocomiales (CCLIN) Paris-Nord ABE Surveillance Taskforce carried out an observational multicenter survey in 20 volunteer French hospitals. **Results:** In total, 260 operating staff (including 151 surgeons) were investigated. Forty-nine of the 260 (18.8%) staff said they double-gloved for all patients and procedures, changing gloves hourly. Blunt-tipped suture needles were available in 49.1% of OT; 42 of 76 (55.3%) of the surgeons in these OT said they never used them. Overall, 60% and 64% of surgeons had never self-tested for HIV and hepatitis C virus (HCV), respectively. Fifty-five surgeons said they had sustained a total of 96 needlestick injuries during the month preceding the survey. Ten of these surgeons had notified of 1 needlestick injury each to the occupational health department of their hospital (notification rate, 10.4%). **Conclusion:** The occurrence of needlestick injury remained high in operating personnel in France in 2000. Although hospitals may improve access to protective devices, operating staff mindful of safety in the OT should increase their use of available devices, their knowledge of their own serostatus, and their ABE notification rate to guide well-targeted prevention efforts.

Tarantola A, Golliot F, Astagneau P, Fleury L, Brucker G, Bouvet E; CCLIN Paris-Nord Blood and Body Fluids (BBF) Exposure Surveillance Taskforce. Occupational blood and body fluids exposures in health care workers: four-year surveillance from the Northern France network. *American Journal of Infection Control* 2003;31:357-63.

**ABSTRACT-** The risk of accidental blood and body fluid (BBF) exposure is a daily concern for health care workers throughout the world, and various strategies have been introduced during the past decade to help reduce that risk. To assess the impact of multifocal reduction strategies introduced in hospitals affiliated with the Northern France network, we recently examined data from 4 years of BBF-exposure reports filed by network employees. A total of 7,649 BBF exposures were reported by health care workers to occupational medicine departments in 61 hospitals. Nurses and nursing students accounted for 4,587 (60%) of exposures, followed by nurses' aides and clinicians. Most (77.6%) of the reports were related to needlestick injury (NSI). In addition, we examined BBF exposure trends over time by analyzing data from 18 hospitals (29.5%) with data available for the time period of 1995 to 1998. These were assessed in nurses, who have the highest and most consistent reporting rate. We noted that the BBF-exposure incidence rate for all BBF exposures in nurses decreased from 10.8 to 7.7 per 100 nurses per year between 1995 and 1998 ( $P < .001$ ), whereas the NSI rate decreased 8.9 per 100 nurses per year in 1995 to 6.3 in 1998 ( $P < .001$ ). The percentage of NSIs that resulted from noncompliance with universal precautions also decreased significantly ( $P = .04$ ). Widespread improvements in procedures and engineering controls were implemented in the Northern France network before and during the study period. Significant reductions were observed in reports of BBF exposures and NSIs, particularly in nurses. These findings are similar to those in other countries and reflect the overall improvement in the management of occupational risk of BBF in health care workers.

Tarantola AP, Rachline AC, Konto C, Houze S, Lariven S, Fichelle A, Ammar D, Sabah-Mondan C, Vrillon H, Bouchaud O, Pitard F, Bouvet E; Group d'Etude des Risques d'Exposition des Soignants aux agents infectieux. Occupational malaria following needlestick injury [letter]. *Emerging Infectious Diseases* 2004;10:1878-80.

Venier AG, Vincent A, l'Heriteau F, Floret N, Senechal H, Abiteboul D, Reyreaud E, Coignard B, Parneix P. (Southwestern France Infection Control Coordinating Center, France.) Surveillance of occupational blood and body fluid exposures among French healthcare workers in 2004. *Infection Control and Hospital Epidemiology* 2007;28:1196-201.

**ABSTRACT-** Objective: To estimate the incidence rate of reported occupational blood and body fluid exposures among French healthcare workers (HCWs). Design: Prospective national follow-up of HCWs from January 1 to December 31, 2004. Setting: University hospitals, hospitals, clinics, local medical centers, and specialized psychiatric centers were included in the study on a voluntary basis. Participants: At participating medical centers, every reported blood and body fluid exposure was documented by the occupational practitioner in charge of the exposed HCW by use of an anonymous, standardized questionnaire. Results: A total of 375 medical centers (15% of French medical centers, accounting for 29% of hospital beds) reported 13,041 blood and body fluid exposures; of these, 9,396 (72.0%) were needlestick injuries. Blood and body fluid exposures were avoidable in 39.1% of cases (5,091 of 13,020), and 52.2% of percutaneous injuries (4,986 of 9,552) were avoidable (5.9% due to needle recapping). Of 10,656 percutaneous injuries, 22.6% occurred during an injection, 17.9% during blood sampling, and 16.6% during surgery. Of 2,065 splashes, 22.6% occurred during nursing activities, 19.1% during surgery, 14.1% during placement or removal of an intravenous line, and 12.0% during manipulation of a tracheotomy tube. The incidence rates of exposures were 8.9 per 100 hospital beds (95% confidence interval [CI], 8.7-9.0 exposures), 2.2 per 100 full-time equivalent physicians (95% CI, 2.4-2.6 exposures), and 7.0 per 100 full-time equivalent nurses (95% CI, 6.8-7.2 exposures). Human immunodeficiency virus serological status was unknown for 2,789 (21.4%) of 13,041 patients who were the source of the blood and body fluid exposures. Conclusion: National surveillance networks for blood and body fluid exposures help to better document their characteristics and risk factors and can enhance prevention at participating medical centers.

Vincent A, Cohen M, Bernet C, Parneix P, L'Heriteau F, Branger B, Talon D, Hommel C, Abiteboul D, Coignard B. Les accidents d'exposition au sang chez les sages-femmes dans les maternites francaises: resultats de la surveillance nationale en 2003. [Accidental exposure to blood by midwives in French maternity units: results of the national surveillance 2003]. *Journal de Gynecologie, Obstetrique et Biologie de la Reproduction* 2006;35:247-56.

**ABSTRACT-** Objective: Midwives appear to be the health care workers exposed to the highest rates of bloodborne injury. In this paper - based on a national survey - we describe the bloodborne injuries occurring in this profession. Material and method: During the year 2003, 241 hospitals took part in a national survey of bloodborne injuries.

Employees registered anonymous standardized reports of bloodborne events with the Occupational Medicine Unit. The data were processed by the coordination center for the fight against nosocomial infections (C. CLIN) which is in charge of the national analysis of all the events reported in this database. Results: 169 of the 6973 bloodborne events reported during 2003 (2.4%), were signed by midwives or midwife students. The first three most frequent accidents reported were: ocular projections during childbirth, pricks when repairing episiotomy, pricks or cuts when handling soiled instruments. Conclusion: Improving knowledge of risk as well as promotion of protection/prevention measures well adapted to this profession should be helpful in optimizing future attitudes.

Warnet S, Peyret M. [Accidental exposure to blood and biological fluids][French] *Revue de l' Infirmiere* 2006;125:13-23.  
[no abstract available]

Yazdanpanah Y, De Carli G, Miguères B et al. [Risk factors for hepatitis C virus transmission to Health Care Workers after occupational exposure: a European case-control study]. *La Revue d'Epidémiologie et de Santé Publique* 2006;54:Spec-1S31.  
ABSTRACT- Background: Factors that influence the risk for HCV infection after occupational exposure to hepatitis C virus (HCV) have not yet been determined. The objective of this study was to assess potential risk factors for Hepatitis C seroconversion after occupational exposure to HCV. Methods: We conducted a European matched case-control study from 01/01/1991 through 31/12/ 2002. Cases were Health Care Workers (HCWs) who were HCV seronegative at the time of exposure, sustained a documented exposure to HCV, and present documented HCV seroconversion temporally associated with the exposure. Control-HCWs had a documented exposure to HCV, were HCV seronegative at the time of exposure, and remained so at least 6 months later. Controls were matched to cases for the center and the time period of the exposure occurrence. Results: 60 cases and 204 controls were included. All cases were exposed to HCV-infected materials through percutaneous injuries. Those for whom information was available (61.6%) were exposed to viremic source patients. Multivariate conditional logistic regression analysis, in which HCV viral load was not introduced because of missing values, identified needle placed in the source patient's vein or artery (Odds Ratio [OR]=100.1; 95% Confidence Interval [CI]=7.3-1365.7), deep injury (OR=155.2; 95%CI=7.1-3417.2), and HCW's gender (M vs. F: OR=3.1; 95%CI=1.0-10.0) as risk factors for HCV infection. In univariate unmatched analysis the risk of HCV transmission was increased 11-fold (CI95%=1.1-114.1) in HCWs exposed to sources with a viral load >6 log<sub>10</sub> copies/mL when compared to sources with a HCV viral load <4 log<sub>10</sub> copies/mL. Conclusion: The risk of HCV transmission after percutaneous exposure increases with a larger volume of blood, and a higher titer of HCV in the source patient's blood. The role of HCW's gender need to be further investigated. The results of this study have important implications for counselling and follow-up of HCWs after exposure.

#### **GERMANY:**

Fritzsche FR, Dietel M, Weichert W, Buckendahl AC. Cut-resistant protective gloves in pathology--effective and cost-effective. *Virchows Arch* 2008;452(3):313-8.

ABSTRACT - Cutting injuries and needle-stitch injuries constitute a potentially fatal danger to both pathologists and autopsy personnel. We evaluated such injuries in a large German institute of pathology from 2002 to 2007 and analysed the effect of the introduction of cut-resistant gloves on the incidence of these injuries. In the observation period, 64 injuries (48 cutting injuries and 16 needle-stitch injuries) were noted in the injury report books. Most injuries were located at the non-dominant hand, preferentially at the index finger and the thumb. Around one fifth of the injuries were at the side of handedness. The average number of injuries per month was 1.22 for the 50 months prior to the introduction of cut-resistant gloves, more than seven times higher than after their introduction (0.158; 19 months;  $p < 0.001$ ). Considering the medical and administrative costs of such injuries, cut-resistant protective gloves are an effective and cost-effective completion of personal occupational safety measures in surgical pathology and autopsy. We strongly recommend the use of such gloves, especially for autopsy personnel.

Hofmann F, Kralj N, Beie M. [Needle stick injuries in health care -- frequency, causes and preventive strategies] [German] *Gesundheitswesen* 2002;64:259-66.

Jarke J. Accident compensation and occupationally acquired HIV infection in German health care workers. *Eurosurveillance* 1999; 4:37-8.

ABSTRACT: Two hundred and eighty-six occupational transmissions of HIV had been reported worldwide by the end of 1997 (1). A third of these cases (95), usually associated with seroconversion after a specific occupational exposure, were classified as definite occupationally acquired infections. The remaining infections (191) were classified as possibly occupationally acquired. Three of the 95 definite (2,3) and 22 of the 191 possible occupationally acquired HIV infections occurred in German health care workers (1).

Kubitschke A, Bader C, Tillmann HL, Manns MP, Kuhn S, Wedemeyer H. [Injuries from needles contaminated with hepatitis C virus: how high is the risk of seroconversion for medical personnel really?][in German] *Der Internist (Berlin)* 2007;48:1165-72.

ABSTRACT- The risk of infection after injury with a needle contaminated with hepatitis C virus (HCV) is thought to be about 3%, but this assumption is mainly based on studies published in the 1990's, which were limited by small sample sizes and insensitive HCV-RNA assays. We therefore investigated needle injuries at the Hannover Medical School over a period of 6 years and performed a systematic review of the literature identifying 22 studies with a total of 6,956 injuries with HCV contaminated needles. Between 2000 and 2005, 1,431 occupational injuries were reported at our institution and two-thirds were needle injuries. Index patients were known to be HCV infected in 166 cases but there were no cases of HCV seroconversion during follow-up. Analysis of published data showed seroconversion rates of 0-10.3% with a mean of 0.75% (52/6,956). The risk of acute HCV infection was lower in Europe with 0.42% compared to Eastern Asia with 1.5% of cases where an HCV viremia was reported during follow-up. In summary, the risk of acquiring an HCV infection after a needlestick injury is lower than frequently reported. Worldwide differences in HCV seroconversion rates suggest that genetic factors might provide some level of natural resistance against HCV. Future studies should

address not only the frequency of acute hepatitis but also factors associated with a higher risk of becoming HCV infected.

Kubitschke A, Bahr MJ, Aslan N, Bader C, Tillmann HL, Sarrazin C, Greten T, Wiegand J, Manns MP, Wedemeyer H. Induction of hepatitis C virus (HCV)-specific T cells by needle stick injury in the absence of HCV-viraemia. *European Journal of Clinical Investigation* 2007;37:54-64.

**ABSTRACT-** Background: The risk of hepatitis C virus (HCV) infection after occupational exposure is low with seroconversion rates between 0 and 5%. However, factors associated with natural resistance against HCV after needle stick injury are poorly defined. HCV-specific T-cell responses have been described in cross-sectional studies of exposed HCV-seronegative individuals. Materials and methods: In this study, we prospectively followed 10 healthcare professionals who experienced an injury with an HCV-contaminated needle. Blood samples were taken on the day or the day after the event and at different time points during follow-up for up to 32 months. HCV-specific T-cell responses were investigated directly ex vivo and in T-cell lines. Results: None of the individuals became positive for HCV-RNA in serum tested with the highly sensitive transcription-mediated amplification (TMA)-assay or in peripheral blood mononuclear cells (PBMC). All of them remained anti-HCV negative throughout follow-up. At the time of injury, HCV-specific CD4+ T-cell responses were already detectable in two individuals and became detectable thereafter in three additional persons. Transient HCV-specific CD8+ T-cell responses developed in two HLA-A2 positive patients, which became negative until the most recent follow-up after 5 and 17 months, respectively. Conclusion: We demonstrate the development of HCV-specific T cells in HCV-exposed individuals after needle stick injury indicating subinfectious exposure to HCV. T-cell immunity against HCV may contribute to the low prevalence of HCV in medical healthcare professionals in Western countries.

Langgartner J, Audebert F, Schölmerich J, Glück T. Dengue virus infection transmitted by needle stick injury [case report]. *Journal of Infection* 2002;44:269-70.  
[no abstract]

Oszwald M, Probst C, Bader C, Krettek C. [Accidental abdominal needlestick injury incurred while discarding a disposal container.] [in German] *Der Unfallchirurg* Apr 5 [Epub ahead of print]

**ABSTRACT-** Needlestick injuries routinely occur in everyday clinical practice. Adequate instruction of employees in health care and correct prophylaxis against exposure could conspicuously reduce the incidence. Successful prevention of chronic infectious diseases comprises strict vaccination plans and substantial knowledge of post-exposure prophylaxis. The introduction of self-securing cannulas and injection instruments represents an important technological advance.

Loczenski B. [Problems from general practice--solutions for general practice: preventing needlestick injuries] [in German] *Pflege Zeitschrift* 2007;60:434-6.

Wagner D, de With K, Huzly D, Hufert F, Weidmann M, Breisinger S, Eppinger S, Kern WV, Bauer TM. Nosocomial acquisition of dengue. *Emerging Infectious Diseases* 2004; 10:1872-3.

**ABSTRACT:** Recent transmission of dengue viruses has increased in tropical and subtropical areas and in industrialized countries because of international travel. We describe a case of nosocomial transmission of dengue virus in Germany by a needlestick injury. Diagnosis was made by TaqMan reverse transcriptionpolymerase chain reaction when serologic studies were negative.

Wicker S, Cinatl J, Berger A, Doerr HW, Gottschalk R, Rabenau HF. Determination of risk of infection with blood-borne pathogens following a needlestick injury in hospital workers. *Ann Occup Hyg* 2008; published online July 29, 2008.

**ABSTRACT – Objectives:** Our paper measures the prevalence of hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) in patients at the University Hospital of Frankfurt/Main, and correlates the prevalence with risk factors for exposure to and infection of healthcare workers (HCWs). Individual risk assessments were calculated for exposed HCWs. **Methods:** Survey of patients admitted to a German University Hospital. Markers for HBV, HCV and HIV were studied and evaluated statistically. Data on needlestick injuries (NSIs) among HCWs were correlated with the prevalence of infectious patients. **Results:** The HBV, HCV and HIV prevalence among patients at the University Hospital were 5.3% (n = 709/13 358), 5.8% (n = 1167/20 163) and 4.1% (n = 552/13 381), respectively. Our results indicate that the prevalence of blood-borne infections in patients was about nine times higher for HBV, approximately 15 times higher for HCV and approximately 82 times higher for HIV than in the overall German population. The highest risk of acquiring a blood-borne infection via NSI was found in the department of internal medicine due to increased prevalence of blood-borne pathogens in patients under treatment. **Conclusions:** While accidental NSIs were most frequent in surgery, the nominal risk of blood-borne virus infection was greatest in the field of internal medicine. The study underlines the importance of HBV vaccinations and access to HIV-post-exposure prophylaxis for HCWs as well as the use of anti-needlestick devices.

Wicker S, Jung J, Allwinn R, Gottschalk R, Rabenau HF. Prevalence and prevention of needlestick injuries among health care workers in a German university hospital. *International Archives of Occupational and Environmental Health* 2007;81:347-54.

**ABSTRACT- Objective:** Health care workers (HCWs) are exposed to bloodborne pathogens, especially hepatitis B (HBV), hepatitis C (HCV), and human immunodeficiency virus (HIV) through job-related risk factors like needlestick, stab, scratch, cut, or other bloody injuries. Needlestick injuries can be prevented by safer devices. **Methods:** The purpose of this study was to investigate the frequency and causes of needlestick injuries in a German university hospital. Data were obtained by an anonymous, self-reporting questionnaire. We calculated the share of reported needlestick injuries, which could have been prevented by using safety devices. **Results:** 31.4% (n = 226) of participant HCWs had sustained at least one needlestick injury in the last 12 months. A wide variation in the number of reported needlestick injuries was evident across disciplines, ranging from 46.9% (n = 91/194) among medical staff in surgery and

18.7% (n = 53/283) among HCWs in pediatrics. Of all occupational groups, physicians have the highest risk to experience needlestick injuries (55.1%-n = 129/234). Evaluating the kind of activity under which the needlestick injury occurred, on average 34% (n = 191/561) of all needlestick injuries could have been avoided by the use of safety devices. Taking all medical disciplines and procedures into consideration, safety devices are available for 35.1% (n = 197/561) of needlestick injuries sustained. However, there was a significant difference across various medical disciplines in the share of needlestick injuries which might have been avoidable: Pediatrics (83.7%), gynecology (83.7%), anesthesia (59.3%), dermatology (33.3%), and surgery (11.9%). In our study, only 13.2% (n = 74/561) of needlestick injuries could have been prevented by organizational measures. Conclusion: There is a high rate of needlestick injuries in the daily routine of a hospital. The rate of such injuries depends on the medical discipline. Implementation of safety devices will lead to an improvement in medical staff's health and safety.

Wicker S, Nürnberger F, Schulze JB, Rabenau HF. Needlestick injuries among German medical students: time to take a different approach? *Med Educ* 2008;42(7):742-5.  
ABSTRACT: Medical students are at risk of occupational exposure to blood-borne viruses following needlestick injuries (NSIs) during medical school. The reporting of NSIs is an important step in the prevention of further injuries and in the initiation of early prophylaxis or treatment. The objective of this study was to describe the mechanisms whereby medical students experience occupational percutaneous blood exposure through NSIs and to discuss rational strategies for prevention. Methods: Incidents of exposure to blood-borne pathogens among medical students at a large German university were analysed. Year 6 medical students completed a written survey immediately before the clinical part of their training began, describing incidents that had occurred during the previous 5 years. Results In our study, 58.8% (183/311) of participating medical students recalled at least one NSI that had occurred during their studies. Overall, 284 NSIs were reported via an anonymous questionnaire. Discussion: Occupational exposure to blood is a common problem among medical students. Efforts are required to ensure greater awareness of the risks associated with blood-borne pathogens among German medical students. Proper training in percutaneous procedures and how to act in the event of injury should be given in order to reduce the number of injuries.

Wittmann A, Hofmann F, Kralj N. Needle stick injuries -- risk from blood contact in dialysis. *Journal of Renal Care* 2007;33:70-3.  
ABSTRACT- This paper will examine the experience of Needle Stick Injuries (NSI) in Germany. There is evidence that these experiences have relevance for the whole of Europe. The protective measures described in this paper are important for the safety of all health care workers. This paper will describe incidents of NSI with reference to sero-conversion after the incident. The protection of health care workers is of prime importance and this paper will discuss the most successful methods of protection. The paper will examine briefly the cost of these protective measures.

Wittmann A, Zylka-Menhorn V. Health and Safety in the Workplace: Safety Instruments Obligatory for Clinics and Doctors' Offices. *German Medical Journal [Deutsches Ärzteblatt]* 2007;104(10):A-624.

SUMMARY- As of August 2006, [German] healthcare employees must be better protected from needlestick injuries. For with the amendment to the Technical Rules for Biological Agents – TRBA 250 (Technischer Regel für Biologische Arbeitsstoffe – TRBA 250), the use of so-called safety instruments for specific fields of work – mostly unnoticed by the majority of people – has been made mandatory. A current legal opinion now makes it clear that the new TRBA 250 turns the “should-regulation” into a “must regulation”. It also emphasizes that safety instruments are not only obligatory in hospitals, but in doctors’ offices as well. Should a doctor or employer fail to abide by this regulation, they could face monetary fines or even imprisonment for up to three years in the event of an injury and/or claim.

### **GREECE:**

Pournaras S, Tsakris A, Mandraveli K, Faitatzidou A, Douboyas J, Tourkantonis A. Reported needlestick and sharp injuries among health care workers in a Greek general hospital. *Occupational Medicine (Oxford, England)* 1999;49:423-6.

ABSTRACT- Between July 1990 and June 1996, 284 exposures to infectious material were reported by 247 health care workers (HCWs) at AHEPA University Hospital, Thessaloniki, Greece, representing an overall rate of 2.4% reported injuries per 100 HCWs/year. Nurses reported the highest rates of incidents (3.0%) and in all but one working group women exhibited higher injury rates per year than male HCWs. Young workers (21-30 years old) were primarily affected in incidents ( $P < 0.001$ ). Needles were the most common implement causing injury (60.6%) and resheathing of used needles as well as garbage collection were common causes of injury. None of the HCWs seroconverted in exposures where immune status to blood-borne pathogens was estimated. Efforts by the infection control committee need to be more intense, in order to increase the rate of reported staff injuries. This will facilitate identification of unsafe practices and provide more adequate preventive measures.

Falagas EM, Karydis I, Kostogiannou I. Percutaneous Exposure Incidents of the Health Care Personnel in a Newly Founded Tertiary Hospital: A Prospective Study. *PLoS ONE* 2007; 2(2):e194. (Published online 2007 February 7.)

ABSTRACT- Background: Percutaneous exposure incidents (PEIs) and blood splashes on the skin of health care workers are a major concern, since they expose susceptible employees to the risk of infectious diseases. We undertook this study in order to estimate the overall incidence of such injuries in a newly founded tertiary hospital, and to evaluate possible changes in their incidence over time. Methodology/Principal Findings: We prospectively studied the PEIs and blood splashes on the skin of employees in a newly founded (October 2000) tertiary hospital in Athens, Greece, while a vaccination program against hepatitis B virus, as well as educational activities for avoidance of injuries, were taking place. The study period ranged from October 1, 2002 to February 28, 2005. Serologic studies for hepatitis B (HBV) and C virus (HCV) as well as human immunodeficiency virus (HIV) were performed in all injured employees and the source patients, when known. High-titer immunoglobulin (250 IU anti-HBs intramuscularly) and HBV vaccination were given to non-vaccinated or previously vaccinated but serologically non-responders after exposure. Statistical analysis of the data was performed using Mc Nemar's and Fisher's tests. 60 needlestick, 11 sharp injuries, and two

splashes leading to exposure of the skin or mucosa to blood were reported during the study period in 71 nurses and two members of the cleaning staff. The overall incidence (percutaneous injuries and splashes) per 100 full-time employment-years (100 FTEYs) for high-risk personnel (nursing, medical, and cleaning staff) was 3.48, whereas the incidence of percutaneous injuries (needlestick and sharp injuries) alone per 100 FTEYs was 3.38. A higher incidence of injuries was noted during the first than in the second half of the study period (4.67 versus 2.29 per 100 FTEYs,  $p=0.005$ ). No source patient was found positive for HCV or HIV. The use of high-titer immunoglobulin after adjustment for the incidence of injuries was higher in the first than in the second half of the study period, although the difference was not statistically significant [9/49 (18.37%) vs 1/24 (4.17%),  $p=0.15$ ]. Conclusions: Our data show that nurses are the healthcare worker group that reports most of PEIs. Doctors did not report such injuries during the study period in our setting. However, the possibility of even relatively frequent PEIs in doctors cannot be excluded. This is due to underreporting of such events that has been previously described for physicians and surgeons. A decrease of the incidence of PEIs occurred during the operation of this newly founded hospital.

#### **HUNGARY:**

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

#### **IRELAND:**

Gaffney K, Murphy M, Mulcahy F. Phlebotomy practices/needles stick injuries/hepatitis B status/among interns in a Dublin hospital. *Irish Medical Journal* 1992;85:102-4.  
ABSTRACT- Needlestick injury is the most important risk event for human immunodeficiency virus (HIV) and hepatitis B Virus (HBV) transmission to health-care workers. We examined phlebotomy practices, the frequency of needle stick injuries, the reporting of such injuries and hepatitis B status among interns in St James's Hospital during a six month period. This study took the form of a questionnaire. The response rate was 100%. 72% had at least one needlestick injury during this time period, 23% had injuries from known HIV sero-positive or hepatitis B surface antigen positive patients, less than 5% of all injuries were reported and only 41% of interns were definitely hepatitis B immune. The majority (77%) resheated needles by hand.

#### **ITALY:**

Albertoni F, Ippolito G, Petrosillo N, Sommella L, Di Nardo V, Ricci C, Franco E, Perucci CA, Rapiti E, Zullo G. Needlestick injury in hospital personnel: a multicenter survey from central Italy. The Latium Hepatitis B Prevention Group. *Infection Control and Hospital Epidemiology* 1992;13:540-4.  
ABSTRACT- Objectives: To assess the rate of needlestick injury in hospital personnel in an Italian region. To identify risk factors potentially amendable to correction. Design: Hospital workers undergoing hepatitis B prevaccination testing in 1985 through 1986 were interviewed regarding needlestick injury in the previous year, job category, area of work, years of employment, and other pertinent information. Setting: Of the 98 public hospitals of the Latium region, 68 participated in the survey: 32 of 55 with less than 200

beds, 20 of 25 with 200 to 300 beds, 11 of 13 with 400 to 900 beds, and all of the 5 with more than 1,000 beds. Participants: All healthcare workers providing direct patient care or environmental services as well as student nurses were invited by the hospital directors to undergo hepatitis B prevaccination testing and vaccination, if eligible. Results: Of 30,226 hospital workers of the 68 participating hospitals, 20,055 were interviewed (66.3%): 47.7% of the 7,172 doctors, 71% of the 14,157 nurses, 55.9% of the 2,513 technicians, and 71.9% of the 6,384 ancillary workers. Needlestick injury was recalled by 29.3%; the rates were 54.9%, 35.3%, 33.8%, 26.5%, 18.7%, and 14.7% in surgeons, registered and unskilled nurses, physicians, ancillary workers, and technicians, respectively. The recalled injury rate was 39.7% and 34.0% in surgical and intensive care areas; in infectious diseases, it was 16.7%. Rates were lower in hospitals with 200 to 300 beds (25.6%). The needlestick injury rate declined from 32% in those with less than 5 years of employment to 28% in those with more than 20 years ( $p$  less than .01). Prevalence of HBV infection was higher in student nurses and young workers recalling a needlestick exposure (14.3% and 15.8%, respectively), versus 10.1% and 12.8% in those not exposed ( $p$  less than .01 and less than .05, respectively). Conclusions: Parenteral exposure to blood-borne infectious agents is a relevant risk among healthcare workers in our region, particularly in defined job categories and hospital areas (surgeons, nurses, surgical, and intensive care areas). Immunization and educational efforts should be made along with better designs of devices to reduce the risk of infection.

Argentero PA, Zotti CM, Abbona F, Mamo C, Castella A, Vallino A, Luzzi B, De Carli G. [Regional surveillance of occupational percutaneous and mucocutaneous exposure to blood-borne pathogens in health care workers: strategies for prevention] [in Italian] *Medicina del Lavoro* 2007;98:145-55.

**ABSTRACT-** Background: Several studies have investigated both the frequency and modality of occurrence of occupational exposure of health-care workers to blood-borne pathogens. At the moment no complete epidemiological data are available covering the hospitals of an entire Region. Objectives and methods: To describe the characteristics of mucocutaneous and percutaneous exposure to body fluids of the healthcare workers in 47 out of the 56 public hospitals (90% of a total 15,000 beds, 28,000 health-care workers full time equivalent) in Piedmont, Northern Italy (4.5 million inhabitants) over a three-year period (1999-2002), using SIROH (Studio Italiano Rischio Occupazionale da HIV) model to collect the data. Results and conclusions: 5174 percutaneous injuries (12.7/100 beds) and 1724 mucocutaneous exposure (4.1/100 beds) were recorded. Surveillance data were similar to those collected in other multi-hospital studies. The variability of rates between hospitals was high, most likely due to the amount of underreporting. The categories most at risk of percutaneous and mucocutaneous exposure were, respectively, surgeons (9.3/100 surgeons) and midwives (2.9/100 midwives). Needles (syringe, winged steel, suture) were the medical devices most frequently involved in percutaneous injuries, 60% of which occurred after the use of such devices. Eighty-three per cent of healthcare workers had been HBV-vaccinated versus only 45% of cleaning staff. After percutaneous injuries with exposure to an HIV positive source only 40% of those exposed received post-exposure prophylaxis; in the case of mucocutaneous exposure the rate was 11%. We recorded 2 seroconversions following occupational exposure to an HCV positive source (risk of seroconversion: 0,2%). In order to implement preventive programmes the use of

safety devices, an increase in the number of HBV-vaccinated contract workers, the use of chemoprophylaxis for HIV exposure, and the use of protective equipment are deemed necessary.

De Carli G, Puro V, Binkin NJ, Ippolito G. Risk of human immunodeficiency virus infection for emergency department workers. Italian Study Group on Occupational Risk of HIV Infection. *Journal of Emergency Medicine* 1994;12:737-44.

ABSTRACT: To evaluate the risk of human immunodeficiency virus (HIV) exposure among emergency department workers (EDWs) and their ability to identify HIV-infected patients, a seroprevalence study was performed in March 1991 in the emergency departments (EDs) of six Italian urban hospitals. At each visit, patients aged 18-65 years were asked to undergo fingerstick blood sampling for anonymous, unlinked HIV testing performed on blood adsorbed filter paper collection cards. Demographic characteristics, known or suspected HIV risk factors, and occupational exposures reported by the EDWs during the patient's visit were recorded. On 9,457 consecutive visits, 9,005 samples (95%) were tested and 65 (0.7%) were HIV positive. ED staff failed to identify 59% of HIV-infected patients. The rate of occupational exposures was 0.13/100 visits. As it is impossible to predict the HIV status of patients attending EDs, adherence to universal precautions and the development of safer devices should be utilized to minimize the risk of blood-borne infections in EDWs.

De Carli G, Puro V, Petrosillo N, Finzi G, Ferraresi I, Daglio M, et al. Studio Italiano Rischio Occupazionale da HIV (SIROH) Group. Side effects of HAART: decreasing and changing occupational exposure to HIV-infected patients. *Journal of Biological Regulators & Homeostatic Agents* 2001;15:235-7.

ABSTRACT- To investigate percutaneous exposures to HIV in the highly active antiretroviral therapy (HAART) era, we performed an analysis of all percutaneous exposures reported from January 1994 to December 1998 in 18 Italian acute-care hospitals. Frequency and rate per 100 prevalent AIDS cases of HIV exposures decreased by 40% (from 4.3% to 2.6%, and from 1.0% to 0.6%, respectively;  $p < 0.001$ ), which were mainly those related to the insertion/manipulation of peripheral vascular access devices (from 7.2% to 4.8%;  $p = 0.05$ ). We conclude that the benefits of HAART have changed the complexity of care required and therefore, the number and type of procedures performed on HIV patients that place the HCW at risk of injury.

Franco A, Aprea L, Faella FS, Felaco FM, Manzillo E, Martucci F, et al. Clinical case of seroconversion for syphilis following a needlestick injury: why not take a prophylaxis? *Le Infezioni in Medicina* 2007;15:187-90.

ABSTRACT- A 47-year-old woman was pricked accidentally with a needle previously used for a neurosyphilitic man. At day 0 she had no positive laboratory results for the infection, while the source, at day 1, had TPHA positive, but no post-exposure prophylaxis (PEP) against syphilis was prescribed. The subject missed the day 30 follow-up, and underwent our visit at day 90, when she showed no clinical signs, but she seroconverted (VDRL = positive 1/2; TPHA = positive 1/320; FTA-Abs IgG and IgM = present). She started antibiotic therapy, and currently her serological status is VDRL = positive 1/2, TPHA = positive 1/160, FTA-Abs IgM = negative.

Ippolito G, De Carli G, Puro V, Petrosillo N, Arici C, Bertucci R, et al. Device-specific risk of needlestick injury in Italian health care workers. *Journal of the American Medical Association* 1994;272:607-10.

**ABSTRACT-** Objectives: To identify the types of medical devices causing needlestick injuries among Italian health care workers, to document the device-specific injury rates and time trends for different hollow-bore needles, and to compare injury rates from these devices with those reported in the United States. Design: Longitudinal survey. Settings: Twelve Italian acute care public hospitals. Methods: Data were obtained from a multihospital surveillance database on the number of total injuries reported in each device category. Hospitals provided the corresponding number of devices used annually for each needle type. Main outcome measure: Number of needlestick injuries by type of hollow-bore needle per 100,000 devices used per year. Results: A total of 2524 injuries from hollow-bore needles were reported. Disposable syringes/hypodermic needles accounted for 59.3% of injuries, followed by winged steel needles (33.1%), intravenous catheter stylets (5.4%), and vacuum-tube phlebotomy needles (2.2%). Intravenous catheter stylets had the highest needlestick injury rate (15.7/100,000 devices used), and disposable syringes had the lowest needlestick injury rate (3.8/100,000). In contrast to the other devices, the injury rate from winged steel needles increased from 6.2 per 100,000 in 1990 to 13.9 per 100,000 in 1992. Conclusions: The device-specific needlestick injury rates in Italy are similar to those reported in the United States, suggesting similar exposure experience in two countries. However, in contrast to the United States, needleless intravenous access is standard practice in Italy and thus eliminates one potential risk to Italian health workers. Implementation of safer equipment, such as shielded or retracting needles, and continuing training programs are needed to further reduce the hazards that health care workers face.

Ippolito G, Petrosillo N, Puro V, Arici C, Jagger J. The risk of occupational exposure to blood and body fluids for health care workers in the dialysis setting. Italian Multicenter Study on Nosocomial and Occupational Risk of Infections in Dialysis. *Nephron* 1995; 70:180-4.

**ABSTRACT-** In 1991, to assess the risk of occupational exposure to blood or other body fluids in health-care workers (HCWs) working in the dialysis setting, properly trained interviewers used standardized questionnaires asking the 583 HCWs employed in 19 Italian dialysis units to recall exposures sustained in the previous year. On a total of 208,498 dialyses performed in the previous year, 105 (5 per 10,000 dialyses) needlesticks, and 579 (28 per 10,000 dialyses) skin/mucous membrane contaminations were recalled. Recapping injuries were recalled in 38 cases (1.8 per 10,000 dialyses), but 67 needlestick injuries (4.1 per 10,000 dialyses) occurred during other circumstances ( $p = 0.006$ ). The highest rate of skin/mucous membrane contaminations were recalled during the dialysis patient care, but more than one third of exposures occurred in other circumstances (break in blood circuit, disposal, contamination with blood-soiled equipment). To minimize the risk of occupational exposure to blood efforts must continue to increase compliance with Universal Precautions; moreover, needle designs incorporating safety features to prevent sticks are needed.

Ippolito G, Puro V, De Carli G, Studio Italiano Rischio Occupazionale da HIV (SIROH) group. Surveillance of occupational exposure to bloodborne pathogens in health care workers: the Italian national programme. *Eurosurveillance* 1999; 4:33-6.

**ABSTRACT-** Health care workers (HCWs) face a serious risk of acquiring bloodborne infections, in particular hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV), all of which are associated with significant morbidity and mortality. In 1986 the coordinating centre of the Italian Study on Occupational Risk of HIV Infection (Studio Italiano Rischio Occupazionale da HIV, SIROH) began a multicentre prospective study to estimate the risk of transmission of HIV and other bloodborne pathogens to HCWs following an occupational exposure to blood and other body materials, and to identify high risk devices, procedures, and jobs in the health care setting. The coordinating centre has managed the Italian registry of antiretroviral post exposure prophylaxis in order to monitor the use of and the short term toxicity of zidovudine (ZDV) since 1990, and, since 1995, of antiretroviral combination prophylaxis. This paper describes the SIROH and presents results that illustrate its potential.

Ippolito G, Puro V, De Carli G, Italian Study Group on Occupational Risk of HIV Infection. Rates of HIV exposure among midwives and surgeons in comparison with other health care occupations. [Abstract] *Infection Control and Hospital Epidemiology* 1994;15:345.

Ippolito G, Puro V, De Carli G. The risk of occupational human immunodeficiency virus infection in health care workers. Italian Multicenter Study. The Italian Study Group on Occupational Risk of HIV infection. *Archives of Internal Medicine* 1993;153:1451-8.

**ABSTRACT-** Background: More than 50 cases of occupationally acquired human immunodeficiency virus (HIV) infection in health care workers (HCWs) have been reported worldwide. Determinants of injuries and of infection are important to investigate to design effective prevention programs. Methods: In Italy, 29 acute-care public hospitals were enrolled in a multicenter study between 1986 and 1990. At each facility, all HCWs were enrolled who reported percutaneous, mucous-membrane, or nonintact- skin exposure to the body fluids and tissues to which universal precautions apply from an HIV-infected patient. Data were collected at the time of the incident on clinical status of the HIV-infected source, circumstance and type of exposure, and use of infection control precautions. The HCWs were followed up clinically and serologically for HIV infection at 1, 3, 6, and 12 months. Results: A total of 1592 HIV exposures were reported in 1534 HCWs; most exposures (67%) occurred in nurses, followed by physicians and surgeons (17.5%). Needlesticks were the most common source of exposure (58.4%), followed by nonintact-skin and mucous-membrane contamination (22.7% and 11.2%, respectively) and cuts (7.7%). At the time of exposure, 77.5% of the HCWs knew or suspected that the source patient was HIV infected. Two seroconversions were observed among a total of 1488 HCWs followed up for at least 6 months: one occurred in a student nurse who had been stuck with a needle used for an HIV antibody-negative, p24 HIV antigen-positive drug addict; the other was in a nurse who experienced mucous-membrane contamination with a large quantity of blood from an HIV-positive hemophilic patient. The seroconversion rate was 0.10% after percutaneous exposure (1/1003; 95% confidence interval, 0.006% to 0.55%) and 0.63% after mucous-membrane contamination (1/158;

95% confidence interval, 0.018% to 3.47%). Conclusions: The study demonstrates a small but real risk of HIV infection after percutaneous and mucous-membrane exposure to blood of HIV infected patients and that transmission can occur during the "window period" of infection. Furthermore, exposures to HIV are not infrequent, and many exposures could be prevented with the use of barrier precautions, appropriate behaviors, and safer devices and techniques.

Ippolito G, Puro V, Petrosillo N, De Carli G, Micheloni G, Magliano E. Simultaneous infection with HIV and hepatitis C virus following occupational conjunctival blood exposure [letter]. *Journal of the American Medical Association* 1998;280:28.

Ippolito G, Salvi A, Sebastiani M, David S, De Carli G, Puro V. Occupational HIV infection following a stylet injury [Letter]. *Journal of Acquired Immune Deficiency Syndrome* 1994;7:208-10.

Mele A, Ippolito G, Craxi A, Coppola RC, Petrosillo N, Piazza M, Puro V, et al. Risk management of HBsAg or anti-HCV positive healthcare workers in hospital. *Digestive & Liver Disease* 2001;33:795-802.

ABSTRACT- Recommendations are made for controlling the transmission of the hepatitis B and hepatitis C viruses from healthcare workers to patients. These recommendations were based both on the literature and on experts' opinions, obtained during a Consensus Conference. The quality of the published information and of the experts' opinions was classified into 6 levels, based on the source of the information. The recommendations can be summarised as follows: all healthcare workers must undergo hepatitis B virus vaccination and adopt the standard measures for infection control in hospitals; healthcare workers who directly perform invasive procedures must undergo serological testing and the evaluation of markers of viral infection. Those found to be positive for: 1) HBsAg and HBeAg, 2) HBsAg and hepatitis B virus DNA, or 3) anti-hepatitis C virus and hepatitis C virus RNA must abstain from directly performing invasive procedures; no other limitations in their activities are necessary. Infected healthcare workers are urged to inform their patients of their infectious status, although this is left to the discretion of the healthcare worker; whose privacy is guaranteed by law. If exposure to hepatitis B virus occurs, the healthcare worker must undergo prophylaxis with specific immunoglobulins, in addition to vaccination.

Pan A, Signorini L, Magri S, De Carli G. Scalp needlestick injury during fine-needle aspiration cytologic evaluation without needle manipulation: William Tell in the laboratory, not quite. [Letter] *Infection Control and Hospital Epidemiology* 2006;27:996.

Petrosillo N, Puro V, De Carli G, Ippolito G. SIROH Group: Studio Italiano Rischio Occupazionale da HIV. Risks faced by laboratory workers in the AIDS era. *Journal of Biological Regulators and Homeostatic Agents* 2001;15:243-8.

ABSTRACT- Laboratory workers are at occupational risk of exposure to microorganisms that cause a wide variety of diseases, from inapparent to life-threatening ones. Principal routes of transmission include percutaneous and permucosal inoculation (comprising clinical inapparent cutaneous or mucosal exposure to blood or blood products), inhalation,

and ingestion. The appearance of the Acquired Immunodeficiency Syndrome (AIDS) epidemic and the first reports of occupational Human Immunodeficiency Virus (HIV) infections in health care workers resulted in high anxiety among laboratory workers. Indeed, 21% of worldwide documented cases of occupational HIV infection occurred among laboratory workers. Research laboratories pose the highest risk of infection. Safe methods for managing infectious agents ("containment") in the laboratory setting include laboratory practice and technique, safety equipment, and facility design. Infection control in the laboratory setting should take into account adherence to guidelines (biosafety levels), education and training, and the development of safety products designed to reduce the risk of exposure.

Petrosillo N, Puro V, De Carli G, Ippolito G. Occupational exposure in healthcare workers: an Italian study of occupational risk of HIV and other blood-borne viral infections. *British Journal of Infection Control* 2001;2:15-17.

ABSTRACT- From January 1994 to December 1999, 44 hospitals were enrolled in the Studio Italiano Rischio Occupazionale da HIV (SIROH), an Italian hospital network established in 1986 to study, monitor and prevent the risk of occupational transmission of blood-borne pathogens in the healthcare setting. During the study period, 21,118 percutaneous exposure and 6,400 mucocutaneous exposures were reported. Nurses were the most exposed (57%), and had the highest combined (percutaneous and mucocutaneous) exposure rates in all working areas, ranging from 15.1 per 100 full-time equivalent positions in general surgery to 9.5% in medical specialities. Among percutaneous exposures, 66.2% involved a hollow-bore (HB) needle device. Device-specific exposure rates per 100,000 devices used for disposable syringes, winged steel needles, vacuum tube phlebotomy sets, and IV catheters (90% of involved HB devices) were higher for those devices with a more complicated design. Twelve cases of occupational infection were detected; the seroconversion rates following percutaneous and mucocutaneous exposures to HIV, HCV and HBV were all <0.5%. No cases of infection followed non-intact skin exposure. Our study shows that the implementation of standardised program by a network of acute care hospitals provides us with the ability to address many important questions concerning the safety of HCWs.

Petrosillo N, Puro V, Ippolito G. Prevalence of hepatitis C antibodies in health-care workers. Italian Study Group on Blood-borne Occupational Risk in Dialysis [Letter] *Lancet* 1994;344:339-40.

Petrosillo N, Puro V, Ippolito G, Di Nardo V, Albertoni F, Chiaretti B, et al. Hepatitis B virus, hepatitis C virus and human immunodeficiency virus infection in health care workers: a multiple regression analysis of risk factors. *Journal of Hospital Infection* 1995;30:273-81.

ABSTRACT- A seroprevalence survey of hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV), was conducted using serum samples obtained from 5813 health care workers (HCWs) in five public hospitals in the Latium region of Italy, during the 1985 vaccination campaign against HBV. The seroprevalences of HBV, HCV and HIV were 23.3% [95% confidence interval (CI) = 22.3-24.4%], 2% (95% CI = 1.6- 2.4%) and 0.07% (95% CI = 0.001-0.13%), respectively. In a logistic

regression model, sex, increasing age, all job categories vs. physicians, dental treatment in the previous six months, and needlestick injury during the previous year were significantly associated with HBV. Conversely, no occupational and community risk factors, but only history of blood transfusion were significantly associated with HCV. Nevertheless, the documented risk of HCV as well as of HIV transmission through percutaneous and mucocutaneous exposure to blood and body fluids should lead to continued efforts to minimize risks of infection by enhancing the compliance of HCWs with vaccination against HBV and adherence to infection control measures, and by introducing safer devices and techniques.

Petrosillo N, Puro V, Jagger J, Ippolito G. The risks of occupational exposure and infection by human immunodeficiency virus, hepatitis B virus, and hepatitis C virus in the dialysis setting. Italian Multicenter Study on Nosocomial and Occupational Risk of Infections in Dialysis. *American Journal of Infection Control* 1995;23:278-85.

ABSTRACT- Background: The dialysis setting has been recognized as a high-risk environment for transmission to both patients and health care personnel of blood-borne infections, such as hepatitis B virus, hepatitis C virus, and HIV. Methods: A seroprevalence survey of HIV, hepatitis B virus, and hepatitis C virus infection among 1002 patients and a subsequent 1-year surveillance study of percutaneous injuries and skin and mucous membrane contaminations were carried out among 527 health care workers in nine Italian dialysis units. The risks of occupational acquisition of HIV, hepatitis B virus, and hepatitis C virus infections among health care workers were calculated according to a deterministic model. Results: HIV antibody, hepatitis B surface antigen, and hepatitis C antibody prevalences among patients were 0.1%, 5.1%, and 39.4%, respectively. A total of 67 percutaneous injuries, 29 mucous membrane contaminations, and 271 skin contaminations were reported by health care workers. The risk of acquiring infection was calculated to be 4000 and 8000 times lower for HIV than for hepatitis B and C, respectively. Conclusions: The risks of infection with HIV, hepatitis B, and hepatitis C for health care workers at dialysis units differ greatly and depend on the demographic profile and medical history of patients undergoing dialysis. To minimize the risk of exposure to HIV and other blood-borne pathogens, efforts must continue to increase compliance with universal precautions. Needle designs incorporating safety features and improvements in dialysis equipment design are also needed to avoid potential exposure.

Puro V, De Carli G, Petrosillo N, Ippolito G. Risk of exposure to bloodborne infection for Italian healthcare workers, by job category and work area. *Studio Italiano Rischio Occupazionale da HIV Group. Infection Control and Hospital Epidemiology* 2001;22:206-10.

ABSTRACT- Objective: To analyze the rate of occupational exposure to blood and body fluids from all sources and specifically from human immunodeficiency virus (HIV)-infected sources among hospital workers, by job category and work area. Design: Multicenter prospective study. Occupational exposure data (numerator) and full-time equivalents ([FTEs] denominator) were collected over a 5-year period (1994-1998) and analyzed. Setting: 18 Italian urban acute-care hospitals with infectious disease units. Results: A total of 10,988 percutaneous and 3,361 mucocutaneous exposures were

reported. The highest rate of percutaneous exposure per 100 FTEs was observed among general surgery (11%) and general medicine (10.6%) nurses, the lowest among infectious diseases (1.1%) and laboratory (1%) physicians. The highest rates of mucocutaneous exposure were observed among midwives (5.3%) and dialysis nurses (4.7%), the lowest among pathologists (0%). Inadequate sharps disposal and the prevalence of sharps in the working unit influence the risk to housekeepers. The highest combined HIV exposure rates were observed among nurses (7.8%) and physicians (1.9%) working in infectious disease units. The highest rates of high-risk percutaneous exposures per 100 FTE were again observed in nurses regardless of work area, but this risk was higher in medical areas than in surgery (odds ratio, 2.1; 95% confidence interval, 1.9-2.5;  $P < .0001$ ). Conclusion: Exposure risk is related to job tasks, as well as to the type and complexity of care provided in different areas, whereas HIV exposure risk mainly relates to the prevalence of HIV-infected patients in a specific area. The number of accident-prone procedures, especially those involving the use of hollow-bore needles, performed by job category influence the rate of exposure with high risk of infection. Job- and area-specific exposure rates permit monitoring of the effectiveness of targeted interventions and control measures over time.

Puro V, De Carli G, Scognamiglio P, Porcasi R, Ippolito G. Studio Italiano Rischio Occupazionale HIV. Risk of HIV and other blood-borne infections in the cardiac setting: patient-to-provider and provider-to-patient transmission. *Annals of the New York Academy of Sciences* 2001;946:291-309.

ABSTRACT- Health care workers (HCWs) face a well-recognized risk of acquiring blood-borne pathogens in their workplace, in particular hepatitis B and C viruses (HBV/HCV) and human immunodeficiency virus (HIV). Additionally, infected HCWs performing invasive exposure-prone procedures, including in the cardiac setting, represent a potential risk for patients. An increasing number of infected persons could need specific cardiac diagnostic procedures and surgical treatment in the future, regardless of their sex or age. The risk of acquiring HIV, HCV, HBV infection after a single at-risk exposure averages 0.5%, and 1-2%, and 4-30%, respectively. The frequency of percutaneous exposure ranges from 1 to 15 per 100 surgical interventions, with cardiothoracic surgery reporting the highest rates of exposures; mucocutaneous contamination by blood-splash occurs in 50% of cardiothoracic operations. In the Italian Surveillance (SIROH), a total of 987 percutaneous and 255 mucocutaneous exposures were reported in the cardiac setting; most occurred in cardiology units (46%), and in cardiovascular surgery (44%). Overall, 257 source patients were anti-HCV+, 54 HBsAg+, and 14 HIV+. No seroconversions were observed. In the literature, 14 outbreaks were reported documenting transmission of HBV from 12 infected HCWs to 107 patients, and 2 cases of HCV to 6 patients, during cardiothoracic surgery, especially related to sternotomy and its suturing. The transmission rate was estimated to be 5% to 13% for HBV, and 0.36% to 2.25% for HCV. Strategies in risk reduction include adequate surveillance, education, effective sharps disposal, personal protective equipment, safety devices, and innovative technology-based intraoperative procedures.

Puro V, Ippolito G. Safety butterfly needles for blood drawing [Letter]. *Infection Control and Hospital Epidemiology* 1998;19:299.

Puro V, Petrosillo N, Ippolito G. Risk of hepatitis C seroconversion after occupational exposures in health care workers. *American Journal of Infection Control* 1995;23:273-7  
ABSTRACT- Background: To determine the incidence of hepatitis C virus (HCV) seroconversion, health care workers reporting an occupational exposure with blood or other risk-prone body materials from a patient known to be seropositive for HCV antibody were enrolled. Methods: HCV seroconversion within 6 months of a reported exposure was assessed by second-generation enzyme immunoassay and immunoblot assay. Results: From January 1992 through December 1993, 331 (51%) hollow-bore needlesticks, 105 (16.5%) suture needle or sharp object injuries, 85 (13%) mucous membrane contaminations, and 125 (19.5%) skin contaminations were reported. Four HCV seroconversions were observed after hollow-bore needlesticks (1.2%; 95% CI 0.3% to 3.0%); no seroconversions occurred after other routes of exposure. Blood-filled needlesticks and source patient coinfection with HIV appeared to be associated with a higher risk of seroconversion. Conclusions: The risk of HCV seroconversion after occupational exposure appears to be low but is not negligible. Aggressive implementation of universal precautions is important for preventing risk-prone exposure, but safer devices are also needed.

Puro V, Petrosillo N, Ippolito G, Aloisi MS, Boumis E, Rava L. Occupational hepatitis C virus infection in Italian health care workers. *Italian Study Group on Occupational Risk of Bloodborne Infections. American Journal of Public Health* 1995;85:1272-5.  
ABSTRACT: The risk of exposed health care workers in 16 Italian hospitals becoming infected with hepatitis C virus was assessed through two serosurveys at a 1-year interval and at followup. Prevalence, which was 2.2%, was significantly associated with previous acute hepatitis, blood transfusions, housekeeping, and older age (> 46 years) but not with occupational risk factors. After 1 year, 2622 (87%) of the 3006 seronegative health care workers were retested, and 3 (0.1%), who did not acknowledge occupational or community risk factors, seroconverted. Additionally, 133 (97 needlesticks) out of 370 reported occupational exposures were to hepatitis C virus; one pricked nurse seroconverted (0.75%). Although the risk is not negligible, hepatitis C virus infection does not seem to be easily occupationally transmitted.

Puro V, Petrosillo N, Ippolito G, Jagger J. Hepatitis C virus infection in healthcare workers [Letter]. *Infection Control and Hospital Epidemiology* 1995;16:324-26.

Vaqlia A, Nicolin R, Puro V, Ippolito G, Bettini C, de Lalla F. Needlestick hepatitis C virus seroconversion in a surgeon [Letter]. *Lancet* 1990;336:1315-16.

**POLAND:**

Bilski B. Needlestick injuries in nurses--the Poznan study. *International Journal of Occupational Medicine & Environmental Health* 2005;18:251-4.  
ABSTRACT- Objectives: Needlestick injuries in healthcare workers are common. They are one of the main ways of transmitting large numbers of pathogenic micro-organisms in healthcare institutions. The aim of this study was to estimate the incidence and circumstances of needlestick injuries in a selected population of nurses from the city of

Poznań and the Wielkopolskie province. Materials and methods: A questionnaire was filled in by 232 active nurses with secondary education, studying externally at the Medical University in Poznań. The sample was representative of nursing specialisations and workplaces of nurses in Poznań and the Wielkopolskie province. It comprised of nurses aged 22-51 years (mean, 35 years) and with work experience of 2-31 years (mean, 13 years). The workplaces of the study group were fairly diverse, but the great majority of nurses were employed in inpatient care, working in shifts (166 people). Results: The probability of needlestick injuries per year equals 28.0%. Accidents of this kind were most common among nurses working in surgical wards, operating rooms, emergency medical care, GP surgeries and dialysis units. There were significant differences in the incidence of needlestick injuries between GP surgeries (statistically more common) on the one hand, and surgical wards, non-surgical wards and operating rooms on the other. Moreover, accidents in operating rooms and surgical wards were significantly more common compared to non-surgical wards. Instruments contaminated with infectious material accounted for 73.8% of the injuries in the study group of nurses. They were usually injection needles. Injuries from sterile needles, clean scalpels and contaminated scalpels were much less common. In the vast majority of cases, injuries were self-inflicted, and much less frequently caused by patients or colleagues. Most of these accidents happened during an attempt to remove a needle from a syringe, and much less while trying to place a used needle in a full medical waste container. In almost half of the cases (44.9%), the accidents occurred between the second and the fourth hour of the shift, which was probably due to a typically heavy workload during those hours, particularly on a morning shift. In the great majority of cases (84%), the nurses were wearing protective gloves at the time of accidents. Conclusions: The probability of a needlestick injury in the study group per year was 28.0%. Accidents of this kind were most common in nurses working in dialysis units, emergency medical care, GP surgeries, surgical wards, and operating rooms. Occupational sharps injuries were most often caused by a contaminated injection. The injuries were self-inflicted in the vast majority of cases. The most common cause of injuries from needles was an improper handling of syringes and needles after injections (removing a needle from a syringe or placing the needle in a full container for medical waste).

Chlabicz S. [The healthcare worker as a source of hepatitis C virus infection][Polish] *Polski Merkurusz Lekarski* 2005;19:225-8.

ABSTRACT- The paper discusses risks associated with the possibility of transmission of hepatitis C virus (HCV) infection from an infected healthcare worker to a patient. Reports describing infections where a healthcare worker was the source of HCV infection to patients are summarized and guidelines concerning approach to infected healthcare workers in other countries are presented. Surgeons performing exposure-prone procedures are almost the only source of infection to patients, provided that universal precautions are respected. Exposure prone procedures occur most commonly during gynaecologic, orthopedic, thoracic operations. At present routine testing of all healthcare workers for HCV infection is not justified. Some experts recommend screening for HCV infection surgeons performing exposure-prone-procedures. Although the present risk of HCV transmission from a HCV infected (HCV-RNA positive) healthcare worker to a patient is small, estimated to be about 1/7000 surgical procedures, some countries

recommend that healthcare workers infected with HCV should be restricted from undertaking exposure prone procedures.

Ganczak M. [Safe equipment to prevent injuries in medical staff] [Article in Polish] *Medycyna Pracy* 2007;58:13-17.

ABSTRACT- Sharp injuries continue to pose a significant risk for the transmission of blood-borne pathogens from the patient to health care workers. Appropriate use of safe devices can significantly reduce such risk. On the basis of a literature review, information is provided about active and passive safety features of medical equipment, and the crucial elements needed for the proper evaluation of a safe device are discussed. Examples of safety equipment are presented. Barriers to the use of these new products are addressed. The user-based system approach for the selection and implementation of safety devices is also described.

Ganczak M, Barss P. Nosocomial HIV infection: epidemiology and prevention - A global perspective. *AIDS Reviews* 2008;10:47-61.

ABSTRACT- Because, globally, HIV is transmitted mainly by sexual practices and intravenous drug use and because of a long asymptomatic period, healthcare-associated HIV transmission receives little attention even though an estimated 5.4% of global HIV infections result from contaminated injections alone. It is an important personal issue for healthcare workers, especially those who work with unsafe equipment or have insufficient training. They may acquire HIV occupationally or find themselves before courts, facing severe penalties for causing HIV infections. Prevention of blood-borne nosocomial infections such as HIV differs from traditional infection control measures such as hand washing and isolation and requires a multidisciplinary approach. Since there has not been a review of healthcare-associated HIV contrasting circumstances in poor and rich regions of the world, the aim of this article is to review and compare the epidemiology of HIV in healthcare facilities in such settings, followed by a consideration of general approaches to prevention, specific countermeasures, and a synthesis of approaches used in infection control, injury prevention, and occupational safety. These actions concentrated on identifying research on specific modes of healthcare-associated HIV transmission and on methods of prevention. Searches included studies in English and Russian cited in PubMed and citations in Google Scholar in any language. MeSH keywords such as nosocomial, hospital-acquired, iatrogenic, healthcare associated, occupationally acquired infection and HIV were used together with mode of transmission, such as "HIV and hemodialysis". References of relevant articles were also reviewed. The evidence indicates that while occasional incidents of healthcare-related HIV infection in high-income countries continue to be reported, the situation in many low-income countries is alarming, with transmission ranging from frequent to endemic. Viral transmission in health facilities occurs by unexpected and unusual as well as more frequent modes. HIV can be transmitted to patients and to donors of blood products by specific vehicles and vectors during blood transfusion, plasma donation, and artificial insemination, by improperly sterilized sharps, by medical equipment during activities such as dialysis and organ transplantation, and by healthcare workers infected by occupational exposure to hazards such as blood-contaminated sharps. Personal, equipment, and environmental factors predispose to acquisition of nosocomial HIV and

all are pertinent for prevention. For infection and injury control, poverty is often an underlying determinant. While sophisticated new tests offer improved HIV detection, increasingly higher marginal costs limit their feasibility in many settings. Modest investment in safer equipment and appropriate integrated training in infection control, injury prevention, and occupational safety should provide greater benefit.

Ganczak M, Milona M, Szych Z. Nurses and occupational exposures to bloodborne viruses in Poland. *Infection Control and Hospital Epidemiology* 2006;27:175-80.  
ABSTRACT- Study objective: To record descriptions of occupational exposures to blood, determine factors predictive of exposure, and identify interventions that might reduce the frequency of exposure. Design: An analytic, cross-sectional survey. Study population: A total of 601 nurses from surgical wards, operating rooms, and emergency departments. Study instrument: An anonymous questionnaire developed by the authors on the basis of previously published guidelines was distributed between January and March 2003. Sampling: Random, with 18 hospitals selected from 2 urban and rural locations. Results: Almost half of respondents reported having had at least 1 puncture injury during the preceding year, 1 in 5 had exposure via mucous membranes, and more than half had worked at least once with a recent abrasion or cut on their hands. The number of injuries was independent of age ( $P=.26$ ), duration of practice ( $P=.21$ ), and workplace setting ( $P=.78$ ). The percentage of nurses without percutaneous exposure during the preceding year was significantly higher in the group that received special HIV/AIDS training than in the group that did not (95% confidence interval, 5.8-24.1%;  $P<.002$ ). The most recent exposure was primarily caused by hollow-bore needles, involved the palm and fingers II-V, was self-inflicted, took place during an elective procedure, and was not reported to the hospital's infection control center by 74% of respondents. The most common reason for not reporting the exposure (38% of cases) was the conviction that the source patient was not infected. Conclusions: Because of the large number of occupational exposures to blood, especially those due to injuries with hollow-bore needles, nurses should adopt more adequate behavioral strategies to prevent the transmission of blood-borne pathogens. Policies for providing adequate education programs tailored to encourage nurses to report all exposures are urgently required.

Ganczak M, Szych Z. Surgical nurses and compliance with personal protective equipment. *Journal of Hospital Infection* 2007;66:346-51.  
ABSTRACT- The study objectives were to evaluate self-reported compliance with personal protective equipment (PPE) use among surgical nurses and factors associated with both compliance and non-compliance. A total of 601 surgical nurses, from 18 randomly selected hospitals (seven urban and 11 rural) in the Pomeranian region of Poland, were surveyed using a confidential questionnaire. The survey indicated that compliance with PPE varied considerably. Compliance was high for glove use (83%), but much lower for protective eyewear (9%). Only 5% of respondents routinely used gloves, masks, protective eyewear and gowns when in contact with potentially infective material. Adherence to PPE use was highest in the municipal hospitals and in the operating rooms. Nurses who had a high or moderate level of fear of acquiring human immunodeficiency virus (HIV) at work were more likely ( $P < 0.005$  and  $P < 0.04$ , respectively) than staff with no fear to be compliant. Significantly higher compliance was found among nurses

with previous training in infection control or experience of caring for an HIV patient; the combined effect of training and experience exceeded that for either alone. The most commonly stated reasons for non-compliance were non-availability of PPE (37%), the conviction that the source patient was not infected (33%) and staff concern that following locally recommended practices actually interfered with providing good patient care (32%). We recommend wider implementation, evaluation and improvement of training in infection control, preferably combined with practical experience with HIV patients and easier access and improved comfort of PPE.

Gańczak M, Wawrzynowicz-Syczewska M. [Risk of the transmission of blood-borne viruses from infected medical personnel to patients] [in Polish] *Polski merkuriusz lekarski* 2005;18:236-40.

**ABSTRACT-** Patients can be infected with hepatitis B or C or HIV as a result of exposure to blood of infected health professionals, especially surgeons. This article reviews the literature on single and multiple cases of such infections. Risk factors for exposure and for infection are summarised. The probability of infection after a single exposure is reviewed. Standard recommendations for prevention on infection from health controversy and this also considered. Experts and regulatory bodies in Poland need to take decisions and prepare written policies on how best to prevent transfer of blood borne viruses from health care workers to patients.

## **RUSSIA**

Gavura VV. [The acquired immunodeficiency syndrome and the occupational aspects of medicine][in Russian] *Terapevticheskiĭ arkhiv* 1994;66(6):81-5.

Hutin YJ, Harpaz R, Drobeniuc J et al. Injections given in healthcare settings as a major source of acute hepatitis B in Moldova. *International Journal of Epidemiology* 1999; 28:782-6.

**ABSTRACT:** Background: Reported rates of acute hepatitis B are high in many former Soviet Union republics and modes of transmission are not well defined. Methods: Two case control studies were undertaken in Moldova to identify risk factors for acute hepatitis B in people aged 2-15 years (children) and  $\geq 15$  years (adults). Serologically confirmed acute hepatitis B cases occurring between 1 January 1994 and 30 August 30 1995, were matched on age, sex, and district of residence to three potential controls who were tested for hepatitis B markers to exclude the immune. Stratified odds ratios (SOR) were calculated using bivariate and multivariate methods. Results: In multivariate analysis, compared with the 175 controls, the 70 adult cases (mean age 25 years, 66% male) were more likely to report receiving injections in the 6 months before illness during a dental visit (SOR = 21; 95% CI: 3.7-120), a hospital visit (SOR = 35; 95% CI: 7.2-170), or a visit to the polyclinic (SOR = 13; 95% CI: 2.4-74). Among children, receiving injections during a hospital visit (SOR = 5.2; 95% CI: 1.2-23) was the only exposure reported significantly more often by the 19 cases (mean age 8 years, 68% male) compared with the 81 controls. Conclusion: These results, along with reported unsafe injection practices in Moldova, suggest that injections are a major source of hepatitis B virus transmission and highlight the importance of proper infection-control procedures in preventing transmission of blood-borne infections.

Shakhgil'dian IV, Khukhlovich PA, Saving EA, Kuzin SN, Anan'ev VA, Sergeeva NA, et al. [Risk of infection with hepatitis B and C viruses of medical workers, patients in the hemodialysis ward, and vaccine prophylaxis of hepatitis B infection in these populations.] [in Russian]. *Voprosy virusologii* 1994;39:226-9.

**ABSTRACT-** Markers of hepatitis B (HBsAg, anti-HBs) and C (anti-HCV) were detected in 1990-1992 by enzyme immunoassay in 1581 medical workers, 230 last-year students of medical schools, 269 patients hospitalized at hemoperfusion wards, and 701 blood donors. Hepatitis B markers were detected in medical workers two times more frequently than in donors (HBsAg in 4.7 and 2.2% of these, respectively, anti-HBs in 26.2 and 14.0%), and anti-HCV were found almost three times more frequently (in 3.1 and 1.1%, respectively). The incidence of these markers in students of medical schools was the same as in donors. Hepatitis B markers (HBsAg, anti-HBs) were detected in 39.0% of patients of hemoperfusion departments, HBsAg being present in 11.9%, and antiHCV in 25%. A direct relationship was revealed between the incidence of hepatitis B and C markers and duration of treatment at dialysis centers or length of service at therapeutic institutions. Three vaccinations with Engerix B 944 vaccine were administered to 944 medical workers and 162 medical students and four vaccinations in double doses to 40 patients of hemoperfusion centers who had no hepatitis B markers; a month after immunization anti-HBs in protective titers were detected in 91.4, 93.9, and 76.1% of them, respectively, and a year after vaccination these values were 77.2, 82.5, and 53.3%. No cases of hepatitis B, detection of HBsAg, or postvaccination complications in the vaccines were recorded.

**SPAIN:**

Armadans Gil L, Fernandez Cano MI, Albero Andres I, Angles Mellado ML, Sanchez Garcia JM, Campins Marti M, Vaque Rafart J. [Safety-engineered devices to prevent percutaneous injuries: cost-effectiveness analysis on prevention of high-risk exposure] [Article in Spanish] *Gac Sanit* 2006 Sep-Oct;20(5):374-81.

**CONCLUSIONS:** Savings in sharps injuries care outweigh additional costs of certain engineered sharps injury prevention devices. Cost-effectiveness analysis is useful in assigning priorities; however the risks of SI by every device must be taken into account.

Benitez Rodriguez E, Ruiz Moruno AJ, Cordoba Dona JA, Escolar Pujolar A, Lopez Fernandez FJ. Underreporting of percutaneous exposure accidents in a teaching hospital in Spain. *Clinical Performance and Quality Health Care* 1999;7:88-91.

**ABSTRACT-** The study's objectives were to determine the frequency of biological-risk accidents involving percutaneous exposure and to identify factors associated with underreporting. Two hundred fifty healthcare professionals from inpatient services at high risk for exposure at the Puerta del Mar University Hospital of Cádiz, Spain, participated in the study. A questionnaire was used to measure personal and work variables, the number of accidents suffered and reported in the last year, and the circumstances motivating the reporting or nonreporting. Two hundred thirty-two persons (92.8%) completed the questionnaire. The accident rate was 12 per 100,000 hours worked. Physicians were the most frequent accident victims (rate 22/100,000 hours). The general surgery and emergency services had higher rates than other services (rates 19.82 and

14.17, respectively). Sixty-six percent of the accidents were not reported to the register. The main predictors of the underreporting were length of professional service greater than 19 years, working in the surgery service, and the perception that the accidents did not involve health risk. The true accident rate was higher than that reflected in the Accident Register. Underreporting was high. The main variables associated with underreporting were length of professional service, work area or department, and perception of risk from the accident.

Gallardo Lopez MT, Masa Calles J, Fernandez-Crehuet Navajas R, de Irala Estevez J, Martinez de la Concha D, Diaz Molina C. Factors associated with accidents caused by percutaneous exposure in nursing staff at a tertiary level hospital [in Spanish]. *Revista española de salud pública* 1997;71:369-81.

**ABSTRACT-** Background: Accidents resulting from percutaneous exposure account for approximately one third of all accidents suffered at work by health workers in hospitals. Their importance lies in the illnesses caused by pathogens that can be transmitted in this way (hepatitis B, hepatitis C, HIV virus). The aims are to describe accidents of this type notified in a tertiary level hospital, identify factors associated with these accidents in nursing staff and build a predictive model for the individual risk of having an accident. Methods: A descriptive study of a retrospective cohort made up of all the people who notified having suffered an accident between 1-1-93 and 30-6-96. A study of cases and controls in nursing staff during the period 1-1-95 to 30-6-96, analysed through multiple logistical regression. Results: The cumulative incidence of cases of accidents in one year was 0.078 for male and female nurses. In 57.3% of cases, disposable or pre-loaded syringes were involved. The cumulative incidence of cases in one year was greater for intravenous catheterisation (8.5% per 100,000). The risk of having an accident, adjusted on account of confusing variables, was greater for female and male nurses (OR = 3.22; I.C.95% = 1.96-5.27), or workers in the Haemodialysis Unit (OR = 35.21; I.C.95% = 3.74-331.16) and for those employed on a temporary contract (OR = 4.50; I.C.95% = 2.24-9.04). Conclusions: Accidents resulting from percutaneous exposure at this hospital are more frequent among nursing staff and are basically caused by any type of hollow needles. Factors associated with these accidents were identified, allowing specific prevention programmes to be targeted at those workers at greater risk. The model obtained is valid to estimate the degree of individual accident probability for the subjects studied.

Hernandez Navarrete MJ, Campins Marti M, Martinez Sanchez EV, Ramos Perez F, Garcia de Codes Ilario A, Arribas Llorente JL; Grupo de Trabajo EPINETAC. [Occupational exposures to blood and biological material in healthcare workers. EPINETAC Project 1996-2000] [in Spanish] *Medicina Clinica* (Barcelona). 2004;122:81-6.

**ABSTRACT-** Background and objective: The bloodborne injury is the most frequent risk in healthcare workers. Among them, the hollow-bore needlesticks are the most associated with the risk of acquire a bloodborne infection. In this study, occupational percutaneous injuries and risk factors associated to hollow-bore needlesticks registered in a national multicenter surveillance system are described. Patients and method: Prospective and analytical study of percutaneous injuries registered in the surveillance system

EPINETAC (Exposure Prevention Information Network) in Spain between 1996-2000. A descriptive analysis of the variables related to the exposed healthcare worker, the exposure and their mechanism and the source patient is performed. The incidence rates were calculated by 100 occupied beds and by job category. A multivariable analysis is performed in order to know the risk factors most associated to hollow-bore needle. Results: 16,374 percutaneous injuries has been registered, which 87% are hollow-bore needlesticks. The incidence rate has been 11.8 expositions per 100 occupied beds. Midwives are the most risky workers (9 injuries per 100 occupied beds). The risk factors most associated to hollow-bore needlesticks are the following: job category of midwife (OR = 7.5 95% CI, 4.1-13.7) and student nurse (OR = 2.1; 95% CI, 1.2-3.7), recapping (OR = 28.8; 95% CI, 16.5-50.6), working in venipuncture room (OR = 3.3; 95% CI, 1.2-9.5) or in the dialysis unit (OR = 2.5; 95% CI, 1.4-4.3). Conclusions: The incidence of occupational percutaneous injuries in Spain is similar to those described in other countries using comparable surveillance systems. The risk of hollow-bore needlestick is directly related to job category, work experience, work area and the activities that the healthcare worker does.

Monge V, Mato G, Mariano A, Fernandez C, Fereres J (GERABTAS Working Group). Epidemiology of biological-exposure incidents among Spanish healthcare workers. *Infection Control and Hospital Epidemiology* 2001;22:776–80.

ABSTRACT- Objective: To determine the frequency and the epidemiological characteristics of biological-exposure incidents occurring among healthcare personnel. Design: Prospective surveillance study. Setting: Participating Spanish primary-care and specialty centers from January 1994 to December 1997. Participants: 70 centers in 1994, 87 in 1995, 97 in 1996, and 104 in 1997. Methods: Absolute and relative frequencies were calculated for several variables (position held, area of care, type of injuring object, activity, etc) and for the different categories of each variable. Results: There were 20,235 registered incidents. Annual incidence rates were as follows: 1994, 51 per 1,000; 1995, 58 per 1,000; 1996, 54 per 1,000; and 1997, 59 per 1,000. Mean age of accident victims was as follows: 1994, 35.68 (standard deviation [SD], 16.26); 1995, 33.6 (SD, 11.9); 1996, 38.2 (SD, 17.27); and 1997, 36.7 (SD, 16.33) years. Of the 20,235 incidents, 15,860 (80.7%) occurred to women; 50% (9,833) accidents were among nursing staff. The type of incident most frequently reported was percutaneous injury (81.1%). The highest frequency of accidents was seen in medical and surgical areas (28% and 25.6%, respectively). Blood and blood products were the most commonly involved material (87.6%). Administration of intramuscular or intravenous medication was the activity associated with the highest accident rate (20.3%). The most frequent immediate action in response was rinsing and disinfecting (65.6%). Conclusions: The incident registry was highly stable in terms of incidence rates over the observation period and served to highlight the large number of incidents recorded each year. The potential implications of the results are the need to explore reasons for increased exposures in certain areas, with the aim of focusing prevention efforts, and, similarly, to establish the factors associated with diminished incidence rates to model successful measures.

Romea S, Alkiza ME, Ramon JM, Oromi J. Risk for occupational transmission of HIV infection among health care workers. *European Journal of Epidemiology* 1995;11:225-9.

**ABSTRACT-** The aim of this study was to evaluate the HIV seroconversion rate associated with different types of occupational exposures in health care workers. A longitudinal study was conducted from January 1986 to October 1992 in a teaching hospital in Spain, where HIV infection is prevalent among patients. Each health care worker was asked to complete a questionnaire regarding age, sex, staff category, type of exposure, other exposures, type of exposure, body fluid, infected material and HIV status of source patient. These health care workers were then followed up at 6 weeks, 3 months, 6 months and 12 months with repeated test for HIV antibody. Four hundred twenty three reports of occupational exposure were analysed. Nursing was the profession with more exposures (42.8%). Ninety five percent of total exposures were percutaneous, 4% mucous membrane contacts and 1% skin contacts, 88.3% were described as blood contact and 71.8% had resulted from needlestick and suture needles. Exposures from HIV-positive patients comprised 23.2% of occupational exposures. There was a significant difference in the length of follow-up in physicians ( $p=0.00009$ ) and nurses ( $p=0.00001$ ), when we compared HIV-positive patients with patients in whom the HIV status was unknown or negative. The HIV seroconversion rate was 0.00%. We consider that the risk of acquiring HIV infection via contact with a patient is low, but not zero. Well documented cases of seroconversion have been published. Because it is often impossible to know a patient's infection status, health care workers should follow for routine the universal precautions for all patients when there is a possibility of exposure to blood or other body fluid. Equally important is the development of new techniques to minimize the risk of exposures to blood.

Serra C, Torres M, Campins M. Occupational risk of hepatitis C virus infection after accidental exposure. *Medicina Clinica* 1998;111:645-9.

**ABSTRACT-** Background: The objective of the study was to quantify the risk of infection by hepatitis C virus (HCV) in health care workers (HCWs) after accidental exposure. Subjects and methods: The study was carried out in Catalonia (Spain) and included data from 22 hospitals. All reported cases of accidental exposure to blood or other biological fluids contaminated by HCV were included, which occurred between January 1993 and June 1995 to HCW with a negative HCV serology at the time of exposure, and with a follow-up of at least six months. Results: The hospitals reported a mean of 1.7 exposures per 100 beds per year. Ninety one percent of exposures were needlestick injuries or cuts. Three cases of HCV seroconversion were detected among a total of 443 exposures, with a risk of seroconversion of 0.7% (95% confidence interval [CI]: 0.14-1.9%). Details of clinical and serological data of infected HCWs are included. In all of them the source patient was coinfecting with HIV. Overall, in 106 (25.2%) exposures the patient source was infected by HCV and HIV, with a risk of seroconversion associated with coinfecting of 2.8% (95% CI:0.59-8.05%). None of the HCWs exposed only to HCV seroconverted. Conclusions: The risk of HCV infection after accidental exposure to infected biological material is below 1%. This risk significantly increases for simultaneous exposures to HCV and HIV.

Serra C, Torres M, Campins M, Catalan Group for the Study of the Occupational Risk of HCV Infection in Hospitals. Occupational risk of hepatitis C virus infection after accidental exposure. [letter] *Journal of Hepatology* 1997;27:1139.

Valls V, Lozano MS, Yanez R et al. Use of safety devices and the prevention of percutaneous injuries among healthcare workers. *Infection Control and Hospital Epidemiology* 2007;28:1352-60.

**ABSTRACT-** Objective: To study the effectiveness of safety devices intended to prevent percutaneous injuries. Design. Quasi-experimental trial with before-and-after intervention evaluation. Setting: A 350-bed general hospital that has had an ongoing educational program for the prevention of percutaneous injuries since January 2002. Methods: In October 2005, we implemented a program for the use of engineered devices to prevent percutaneous injury in the emergency department and half of the hospital wards during the following procedures: intravascular catheterization, vacuum phlebotomy, blood-gas sampling, finger-stick blood sampling, and intramuscular and subcutaneous injections. The nurses in the wards that participated in the intervention received a 3-hour course on occupationally acquired bloodborne infections, and they had a 2-hour "hands-on" training session with the devices. We studied the percutaneous injury rate and the direct cost during the preintervention period (October 2004 through March 2005) and the intervention period (October 2005 through March 2006). Results: We observed a 93% reduction in the relative risk of percutaneous injuries in areas where safety devices were used (14 vs 1 percutaneous injury). Specifically, rates decreased from 18.3 injuries (95% confidence interval [CI], 5.9-43.2 injuries) to 0 injuries per 100,000 patients in the emergency department ( $P=0.002$ ) and from 44.0 injuries (95% CI, 20.1-83.6 injuries) to 5.2 injuries (95% CI, 0.1-28.8 injuries) per 100,000 patient-days in hospital wards ( $P=0.007$ ). In the control wards of the hospital (i.e., those where the intervention was not implemented), rates remained stable. The direct cost increase was euro0.558 (US\$0.753) per patient in the emergency department and euro0.636 (US\$0.858) per patient-day in the hospital wards. Conclusion: Proper use of engineered devices to prevent percutaneous injury is a highly effective measure to prevent these injuries among healthcare workers. However, education and training are the keys to achieving the greatest preventative effect.

#### **SWEDEN:**

Lymer UB, Schutz AA, Isaksson B. A descriptive study of blood exposure incidents among healthcare workers in a university hospital in Sweden. *Journal of Hospital Infection* 1997;35:223-35.

**ABSTRACT-** In an attempt to document blood exposure incidents and compliance with recommended serological investigations, universal precautions and incident reporting routines, data was collected from occupational injury reports during a two-year period. In addition, a sample of healthcare workers (HCWs) answered a questionnaire about blood tests and work routines. In a third part of the study some HCWs were asked about the type and actual frequency of incidents, together with the number of reported incidents during the two-year study period. Of a total of 473 reported occupational blood exposures, the majority came from nurses and the minority from physicians. Most reported incidents occurred on hospital wards. The most common incidents were needlestick injuries, and 35% occurred when the needle was recapped. Medical laboratory technicians (MLT) reported significantly more mucocutaneous incidents than other professionals ( $P < 0.01$ ). In 10% of the incidents, the patient had a known blood-borne infection. Serological investigations post-exposure varied among professional groups, and 35% were not tested.

No seroconversion was shown in the HCWs tested. In the third part of the study, respondents recalled 1180 incidents, although only 9% of these had been reported. The majority occurred in operating theatres, and in connection with anaesthesia. There was a significant difference ( $P < 0.001$ ) between the different professional groups with regard to the frequency of incident reporting. Physicians reported only 3% and MLTs 36% of the incidents. Eighty-one percent believed that the accident could have been avoided. Despite knowledge of universal precautions, professionals continue to behave in a risky manner, which can result in blood exposure incidents.

#### **SWITZERLAND:**

Luthi JC, Dubois-Arber F, Iten A, Maziero A, Colombo C, Jost J, Francioli P. The occurrence of percutaneous injuries to health care workers: a cross sectional survey in seven Swiss hospitals. *Schweizerische Medizinische Wochenschrift* 1998;128:536-43.

**ABSTRACT- Objectives:** In 1995, a cross sectional survey was conducted in 7 Swiss hospitals to estimate the incidence of percutaneous injuries among nurses, surgeons, anesthetists and domestic personnel, and to describe the circumstances of these injuries and the reporting process within the hospital. **Methods:** An anonymous questionnaire was distributed and filled out on-site in the case of nursing staff and domestic personnel, and was sent by post to physicians (anesthetists and surgeons). Participants were asked to report in detail on percutaneous injuries of the last workday and the last working month (nurses and physicians), and of the last month and the last year for domestic personnel. The overall response rate was 72%, representing a total of 3116 health care workers. **Results:** The annual incidence rates of percutaneous injury with material contaminated with blood or other biological fluids were calculated by type of worker for the two available units of time. For nurses, the incidence was 0.49 and 2.23, for surgeons 4.28 and 11.05, for anesthetists 2.11 and 3.14, and for domestic personnel 0.11 and 0.17 respectively. Most of the injuries occurred in a "normal" situation (no emergency, no stress, no fatigue) and were described as avoidable. Compliance with universal precautions was not optimal and declaration rates within the hospital rather low (nurses 39.7%, physicians 3.4%, domestic personnel 87.9%). **Conclusions:** Percutaneous injuries with blood-contaminated material are frequent in health care workers, and are not always adequately assessed because of under-reporting of accidents within the hospital. This may result in underestimation of current occupational exposure of health care workers to HIV and other blood-borne viruses.

Meyer-Wyss B, Erdin D, Prisdner S, Stalder GA. Needlestick injuries in hospital personnel and the risk of hepatitis-B infection [in German]. *Schweizerische Medizinische Wochenschrift* 1992;122:646-8.

**ABSTRACT-** The risk of employees of the University Hospital of Basel acquiring virus hepatitis B following needle stick injuries (NSI) was evaluated prospectively. Over four years, 555 NSI were reported, resulting in a mean incidence of 48 NSI/1000 persons working/year. Of the injured, 455 (82%) had previously been vaccinated against hepatitis B, 32 (6%) were HBsAg and/or anti-HBc positive, and only 65 (12%) were at risk for HBV infection. The origin of 365 (66%) of the needles implicated in the NSI was identified, and of these 15 (4%) had been contaminated with HBsAg-positive blood. None of the 555 persons with NSI developed hepatitis. We conclude that the risk of HBV

infection following NSI is low at our institution, but general measures need to be enforced to reduce the incidence of NSI in view of the potential risk that other infectious diseases may be transmitted by NSI.

### **THE NETHERLANDS:**

Berger CM, Leentvaar-Kuijpers A, Van Doornum GJ, Coutinho RA. [Accidental exposure to blood and the risk of transmission of virus infections for various occupational groups in Amsterdam, 1986-1996][in Dutch]. *Nederlands Tijdschrift voor Geneeskunde* 1998;142:2312-4.

ABSTRACT- Since 1986 the number of parenteral exposures to potentially infectious blood reported to the Amsterdam Public Health Service increases every year. The number of needlestick accidents increased significantly from 64 in 1986 to 166 in 1996 whereas the number of other exposures decreased from 59 to 44 in these years. The increase was mainly seen in nonhospital based (para)medics. A possible explanation of this increase is greater awareness of the potential infection risk with HIV, hepatitis B or C virus leading to a tendency to report more readily. This assumption is in contradiction with results of studies in hospital-based personnel where a decrease is observed as a result of educational programmes. Other explanations are a higher frequency of use of sharp instruments and (or) an increase in the workload. Out of a total of 1886 needlestick accidents in 1986-1996 one woman became HIV positive; she was deliberately infected by her ex-partner who injected her with blood of an AIDS patient, and one person contracted an hepatitis C virus infection: a policeman wounded by a needle used by a drug addict.

de Graaf R, Houweling H, van Zessen G. Occupational risk of HIV infection among western health care professionals posted in AIDS endemic areas. *AIDS Care* 1998;10:441-52.

SUMMARY- By the end of 1995, a total of 79 occupationally acquired HIV cases had been documented worldwide among health care workers. As part of a larger study on the sexual and occupational risks of HIV among Dutch expatriates, 99 medical professionals (48 physicians and 51 nurses, midwives, or anesthesia assistants) who had worked in AIDS-endemic areas were identified. 96% of physicians and 92% of nurses had last worked in sub-Saharan Africa--typically in rural areas or refugee camps. When tested upon return to the Netherlands, none of these health care professionals was HIV-infected. However, 71% of physicians and 51% of nurses experienced at least one percutaneous exposure (mean number, 2.0 and 1.9, respectively) during an average stay abroad of 2.3 and 1.2 years, respectively. 235 of the 337 accidents described involved solid needles. Given an estimated HIV prevalence in the patient population of 19%, an HIV transmission per accident of 0.3%, and 1.9 percutaneous exposures per year, the occupational HIV risk per health worker per year in countries with high HIV prevalence can be estimated as 0.11%. Most injuries occurred during routine acts and tended to be self-inflicted as a result of negligent needle disposal, recapping errors, cleaning materials for reuse, carelessness due to fatigue, or rushing. Accidents with solid needles were significantly more likely to occur if more procedures were performed, the stay abroad was longer, co-workers were local, and management consisted of local personnel. Worry about occupational exposure to HIV was reported to occur sometimes in 68% of

physicians and nurses, regularly in 12%, and often in 6%. HIV prevention programs for health workers should address not only how to prevent occupational exposure, but also how to prepare for the emotional responses to exposure and the consequences this may have for sexual behavior.

**TURKEY** – see Middle East/North Africa bibliography.

**UNITED KINGDOM:**

Adams D, Elliott TS. Impact of safety needle devices on occupationally acquired needlestick injuries: a four-year prospective study. *Journal of Hospital Infection* 2006;64:50-5.

ABSTRACT- A four-year prospective study was undertaken at the University Hospital Birmingham National Health Service Foundation Trust to evaluate the effect of the introduction of a range of safety hypodermic needle devices on the number of reported needlestick injuries (NSIs). Data on the number of reported NSIs for four clinical areas began in 2001. Following an enhanced sharps awareness strategy in 2002, the number of NSIs reduced from 16.9/100,000 devices used in 2001 to 13.9/100,000 devices (P=0.813). In 2003, when only standard training was provided, the number of NSIs increased to 20/100,000 devices. However, the subsequent introduction of three safety needle devices with concomitant training resulted in a significant reduction in the number of reported NSIs to 6/100,000 devices in 2004 (P=0.045). User satisfaction and acceptance of the safety needles was also very favourable. These results suggest that when safety needle devices are introduced into the clinical setting and appropriate training is given, a significant reduction in the number of occupationally acquired NSIs may ensue.

Atenstaedt RL, Payne S, Roberts RJ, Russell IT, Russell D, Edwards RT. National Public Health Service for Wales, UK. Needle-stick injuries in primary care in Wales. *Journal of Public Health (Oxford, England)* 2007;29:434-40.

BACKGROUND: Accidental needle-stick injuries (NSIs) are a hazard for health-care workers and for the general public. OBJECTIVES: To estimate the presentation rate of NSIs to general medical practices, their relation to practice characteristics, and review practice policies for managing NSIs. METHOD: Descriptive study using logistic regression analysis. RESULTS: Annual rates of 2.73 (95% CI 2.08, 3.50) occupational NSIs per 100 clinical practice staff and 2.14 (95% CI 1.39, 3.13) non-occupational NSIs per 100,000 practice population were recorded. Stepwise logistic regressions showed that chance of a practice reporting at least one occupational NSI in previous five years was best predicted by being a single-handed practice (decreased odds). In contrast, the chance of a practice reporting at least one non-occupational NSI was best predicted by being a rural practice (increased odds). About one in five practices possessed no written policy on managing NSIs. Stepwise logistic regressions showed that the chance of a practice owning a NSI policy was best predicted by being located in an LHB area with a coastline (increased odds). CONCLUSION: NSIs are an important public health issue in Wales. We have tried to address the lack of guidance by developing new guidelines in Wales.

Boyle M. Blood borne infections: Protection for midwives. *Practicing Midwife* 2000;3:48-50.

Casey AL, Elliott TS. The usability and acceptability of a needleless connector system. *British Journal of Nursing* 2007;16:267-71.

**ABSTRACT-** Needleless connectors were introduced into clinical practice to reduce the rate of needlestick injuries to healthcare workers (HCWs). There have, however, been limited reports of user acceptability of these devices. The usability and acceptability of the Clearlink needleless connector (Baxter Healthcare, UK) was therefore completed by HCWs at University Hospital Birmingham NHS Foundation Trust following a 12-month clinical evaluation. Seventy percent (28/40) of HCWs reported that they would prefer to use Clearlink needleless connectors rather than conventional luer caps, 15% (6/40) would use either, and only 15% (6/40) preferred to use luer caps. In total, 85% of HCWs reported that Clearlink was acceptable to use in the clinical situation. The results demonstrate that comprehensive training and technical support both before and after new device implementation were essential to ensure a smooth transition.

Cullen BL, Genasi F, Symington I et al. Potential for reported needlestick injury prevention among healthcare workers through safety device usage and improvement of guideline adherence: expert panel assessment. *Journal of Hospital Infection* 2006; 63:445-51.

**ABSTRACT:** A prospective survey was conducted over six months in order to estimate the proportion of reported occupational needlestick injuries sustained by National Health Service (NHS) Scotland staff that could have been prevented through either safety device introduction, improved guideline adherence, guideline revision or a combination of these. This survey involved the administration of a standard proforma to healthcare workers followed by an expert panel assessment. All acute and primary care NHS Scotland trusts, the Scottish Ambulance Service and the Scottish National Blood Transfusion Service were included. Proforma and expert panel assessment data were available for 64% of injuries (952/1497) reported by healthcare staff. These injuries were all percutaneous. The expert panel concluded that: 56% of all injuries and 80% of venepuncture/injection administration injuries would probably/definitely have been prevented through safety device usage, 52% of all injuries and 56% of venepuncture/injection administration injuries would probably/definitely have been prevented through guideline adherence and 72% of all injuries and 88% of venepuncture/injection administration injuries would probably/definitely have been prevented through either intervention. Multi-factorial analysis indicated that injuries sustained through venepuncture/injection administration were significantly more likely to be prevented through safety device usage [adjusted odds ratio (OR) 5.09, 95% confidence intervals (CI) 3.11-8.31 and adjusted OR 2.70, 95% CI 1.64-4.45, respectively], and significantly less likely to be prevented through guideline adherence (adjusted OR 0.26, 95% CI 0.11-0.60 and adjusted OR 0.31, 95% CI 0.12-0.78, respectively). Injuries sustained after completing procedures were significantly more likely to be prevented through safety device usage and guideline adherence. The study's findings support the need for improvements to staff's adherence to needlestick injury guidelines and appropriate implementation of safety devices for venepuncture and injection administration.

Cutter J, Gammon J. Review of standard precautions and sharps management in the community. *British Journal of Community Nursing* 2007;12:54-60.

**ABSTRACT-** Standard precautions are imperative for staff and patient safety and provide a basis for sound infection control practice in all health-care settings. One key element of these precautions relates to the safe handling and management of sharps to prevent occupational acquisition of blood-borne viral infection. Many inoculation injuries could be avoided by following standard precautions whenever contact with blood or body fluids is anticipated. However, evidence suggests that compliance with standard precautions is inadequate. With the modernization of the health service in the UK, community health care is becoming more complex, potentially increasing the risk of inoculation injury to community nurses. Although compliance with standard precautions in hospitals is well documented, there is limited research specific to community nurses. This review examines compliance with standard precautions by community nurses and discusses some strategies aimed at improving compliance with one of the key elements of standard precautions, i.e. sharps management.

Davies CG, Khan MN, Ghauri AS, Ranaboldo CJ. Blood and body fluid splashes during surgery - the need for eye protection and masks. *Annals of the Royal College of Surgeons of England* 2007;89:770-2.

**ABSTRACT-** Introduction: While most surgeons make an effort to avoid needlestick injury, some can pay little attention to reduce the potential route of infection occurring when body fluids splash into the eye. It has been shown that transmission of HIV, hepatitis B or C can occur across any mucous membrane. This study aims to quantify how frequently body fluids splash the mask and lens of wrap around protective glasses thus potentially exposing the surgeon to infection. Patients and methods: A prospective study was carried out by a single surgeon on all cases performed over a 1-year period. Protective mask and glasses were examined before and after operations. Results: A total of 384 operations were performed with 174 (45%) showing blood or body fluid splash on the lens. A high incidence of splashes was found in vascular surgical procedures (79%). All amputations showed splash on the protective lens. Interestingly, 50% of laparoscopic cases resulted in blood or body fluid splash on the protective lens. Conclusions: This study has shown a high incidence (45%) of blood and body fluid splashes found on protective glasses and masks. There was a very high incidence (79%) during vascular surgical procedures. With the prevalence of HIV and hepatitis increasing, it seems prudent to protect oneself against possible routes of transmission.

Elder A, Paterson C. Sharps injuries in UK injury rates, viral transmission efficacy of safety devices. *Occupational Medicine* 2006;56:566-74.

**ABSTRACT-** Aims: To review the literature on sharps injuries and occupational bloodborne virus transmission in health care in the UK and the worldwide evidence for injury prevention of sharps safety devices. Methods: Literature review by online database and Internet resource search. Results: Twenty-four relevant publications were identified regarding UK reported sharps injury rates. UK studies showed as much as a 10-fold difference between injuries reported through standard reporting systems (0.78-5.15 per 100 person-years) and rates estimated from retrospective questionnaires of clinical populations (30-284 per 100 person-years). National surveillance data from England,

Wales and Northern Ireland gives a rate of 1.43 known hepatitis C virus or human immunodeficiency virus (HIV) transmissions to health care workers per annum. When extrapolated, this suggests an approximate rate of 0.009 such viral transmissions per 1000 hospital beds per annum. Risk of infection from sources with no risk factors is extremely small (less than one in one million for HIV transmission based on Scottish data). Thirty-one studies on the efficacy of sharps safety devices showed evidence of a reduction in injuries, with the greatest reductions achieved by blunt suture needles and safety cannulae. Conclusions: Although injuries remain common, confirmed viral transmission in the UK has been relatively rare. The degree of under-reporting of sharps injuries may be as much as 10-fold. Safety-engineered devices are likely to be effective at injury reduction.

Evans B, Duggan W, Baker J, Ramsay M, Abiteboul D. Exposure of healthcare workers in England, Wales, and Northern Ireland to bloodborne viruses between July 1997 and June 2000: analysis of surveillance data. *British Medical Journal* 2001;322:397-8.

SUMMARY- Since July 1997 occupational health departments have been requested to complete a brief form outlining the circumstances of any work related exposure to potentially infectious material from patients who are known to be positive for HIV antibodies or hepatitis C antibodies, or for hepatitis B surface antigens. For exposures to HIV or hepatitis C virus, the follow up at six weeks includes more information about the incident, baseline testing of both the healthcare worker and the source patient, and, for exposure to HIV, details of post-exposure prophylaxis. A total of 813 initial reports were received of exposure of healthcare workers to bloodborne viruses between July 1997 and June 2000: 725 reports of exposure to only one of the bloodborne viruses, 83 to two, and five to all three. After records with missing information were excluded, the most commonly reported exposed groups were nurses and midwives (45% (308/678) of the health professionals exposed) and doctors (38% (255/678)) (table), and percutaneous injuries were the most commonly reported type of exposure (70%).

Gyawali P, Rice PS, Tilzey AJ. Exposure to blood borne viruses and the hepatitis B vaccination status among healthcare workers in inner London. *Occupational and Environmental Medicine* 1998;55:570-2.

ABSTRACT- Occupational exposure to blood borne viruses was examined during one year at a London teaching hospital. A total of 236 incidents occurred of which 83% were related to sharps, 32% were clearly avoidable, and 7% involved an infected source patient. Overall uptake of hepatitis B vaccine was 78% but it was particularly low in paramedical (70%) and domestic staff (45%). Continued effort needs to be applied to improve uptake of hepatitis B vaccine and to maintain high standards of control of infection.

Eye of the Needle. United Kingdom Surveillance of Significant Occupational Exposures to Bloodborne Viruses in Healthcare Workers. London: Health Protection Agency, November 2006.

Krishnan P, Dick F, Murphy E. The impact of educational interventions on primary health care workers' knowledge of occupational exposure to blood or body fluids. *Occupational Medicine (Oxford)* 2007;57:98-103.

ABSTRACT- Aim: To assess the impact of educational interventions on primary health

care workers' knowledge of management of occupational exposure to blood or body fluids. Methods: Cluster-randomized trial of educational interventions in two National Health Service board areas in Scotland. Medical and dental practices were randomized to four groups; Group A, a control group of practices where staff received no intervention, Group B practices where staff received a flow chart regarding the management of blood and body fluid exposures, Group C received an e-mail alert containing the flow chart and Group D practices received an oral presentation of information in the flow chart. Staff knowledge was assessed on one occasion, following the educational intervention, using an anonymous postal questionnaire. Results: Two hundred and fifteen medical and dental practices were approached and 114 practices participated (response rate 53%). A total of 1120 individual questionnaires were returned. Face to face training was the most effective intervention with four of five outcome measures showing better than expected knowledge. Seventy-seven percent of staff identified themselves as at risk of exposure to blood and body fluids. Twenty-one percent of staff believed they were not at risk of exposure to blood-borne viruses although potentially exposed and 16% of exposed staff had not been immunized against hepatitis B. Of the 856 'at risk' staff, 48% had not received training regarding blood-borne viruses. Conclusions: We found greater knowledge regarding management of exposures to blood and body fluids following face to face training than other educational interventions. There is a need for education of at risk primary health care workers.

Matthew IR, Frame JW. Sharps injuries involving a sheathed needle. *British Dental Journal* 1997;183:70-1.

ABSTRACT- Two dental nurses each sustained a sharps injury while attempting to remove the sheathed needle from a used dental local anaesthetic syringe. The needle had been bent inadvertently during use. Neither of the dental nurses were aware that the needle had perforated the side of the sheath during resheathing. This incident emphasises the need for constant vigilance during the disposal of sharps and for the routine avoidance of direct contact with sheathed or unsheathed needles and other sharps after use.

Nash G. Exposure of healthcare workers to bloodborne viruses: only the tip of the iceberg has been measured. [Letter] *British Medical Journal* 2001;323:169.

Nash GF, Goon P. Current attitudes to surgical needlestick injuries. *Annals of the Royal College of Surgeons England* 2000;82(7 Suppl):236-7.  
[no abstract]

Raghavendran S, Bagry HS, Leith S, Budd JM. Needle stick injuries: a comparison of practice and attitudes in two UK District General Hospitals. *Anaesthesia* 2006;61:867-72.  
SUMMARY- Hospital staff are at risk from occupational exposure to blood-borne viruses due to needle stick injuries. Occupational health departments have invested considerable resources in the prevention of these injuries, which can be very distressing to the affected individuals. We surveyed health care workers, i.e. doctors, nurses and operating department practitioners, in the operating theatre and critical care units of two UK hospitals located in the Midlands and Merseyside to compare attitudes and experiences. There were significant deficiencies in several aspects of the safe practice of

universal precautions. These deficiencies were similar in the two hospitals surveyed and may reflect a national trend. We conclude that every individual, department and trust needs to reflect on their practice and address these deficiencies.

Sherwood CS. Needleguard systems: an evaluation. *Journal of the Royal Society of Health* 2007;127:280-6.

**ABSTRACT-** Aims: The National Blood Service is responsible for ensuring that the NHS demand for blood products is met. The use of needles forms a fundamental procedure in the collection of blood. A common engineering control used to minimize needlestick injury is a needleguard. This study investigates the effectiveness of needleguards as a risk reduction measure. Injury rates, performance and the effectiveness of training are also addressed. Methods: The methodology adopted two techniques for collecting data, namely database analysis and questionnaire analysis. In examining the accident database, it was identified that the incidence of needlestick injuries fell when needleguards were introduced in 2001. However, a rise in injuries was observed over the 12 months of 2003. Results: Although the questionnaire showed that staff directly involved in the collection of blood believed that needleguards act to reduce the risk of injury, they also reported difficulties in the operation of the needleguard system. An association was identified between the perceived quality of training and the reported difficulties. It was also identified that training provided by external organizations had the least effect in reducing the operational difficulties. Conclusions: The study concludes that the use of needleguards as a successful control measure requires further investigation and that further research should be carried out to ensure the effectiveness of training in reducing injuries.

Watterson L. Monitoring sharps injuries: EPINet surveillance results. *Nursing Standard* 2004;19(3):33-8.

**ABSTRACT-** Sharps injuries are one of the main types of accident sustained by NHS staff. The RCN's Be Sharp Be Safe campaign was launched in 2001 with the aim of reducing sharps injuries and includes a surveillance project to describe the current pattern of sharps injuries being experienced in participating trusts. This article gives an overview of the results from the second year of the surveillance project and indicates how the data can be used to help improve practice. Nurses emerge as the staff group reporting the highest proportion of injuries recorded in the study period. The most common sharps injury scenario involves nurses giving injections in the patient's room or ward area. Aspects of poor disposal practice and incidents involving the recapping of needles continue to result in injuries and are worthy of further investigation. Analysis of the data by location can highlight specific tasks which could be reviewed to identify safer working practices.

White SM. Needlestick injuries - a testing time. [Editorial] *Nursing in Critical Care* 2008;13:1-2.

Williams S, Gooch C, Cockcroft A. Hepatitis B immunisation and blood exposure incidents among operating department staff. *British Journal of Surgery* 1993;80:714-16.

ABSTRACT- A questionnaire was sent to all 158 staff of the operating department of a London teaching hospital to confirm their hepatitis B immunization status and establish the number of incidents involving exposure to blood during the preceding 4 weeks. Of these personnel, 104 (66 per cent) were known to be immune to hepatitis B either through immunization (97) or previous infection (seven). A further 23 (15 per cent) had completed a course of immunization but their seroconversion had not been checked. There were 26 sharps injuries sustained by 14 (12 per cent) of 119 staff and 240 other exposures to blood. Four of the sharps injuries had been reported. Staff known to be immune were more likely than those with unknown or negative immunity to report incidents (20 versus 0 per cent (95 per cent confidence interval of difference 2-38 per cent)). Doctors sustained more non-sharps exposures to blood than others (47 versus 23 per cent (95 per cent confidence interval of difference 7-40 per cent)). An important minority of operating department staff remains unimmunized against hepatitis B, although exposure to blood is common. Incidents are rarely reported and staff with unknown or negative immunity seem less likely to report than those known to be immune.