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ORIGINAL ARTICLE

Needlestick and sharps injuries among dental healthcare workers at a university hospital



Jang-Jaer Lee^{a,b}, Sang-Heng Kok^{a,b}, Shih-Jung Cheng^{a,b},
Li-Deh Lin^{a,b}, Chun-Pin Lin^{a,b,*}

^a Department of Dentistry, National Taiwan University Hospital, Taipei, Taiwan

^b Department of Dentistry, School of Dentistry, National Taiwan University College of Medicine, Taipei, Taiwan

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Background/Purpose: Needlestick/sharps injuries (NSI) are a major occupational hazard among healthcare workers. Since needles and sharps are commonly used during dental procedures, workers in the dental profession are especially prone to sharps-related injuries. In this study, NSI among workers in the dental department of National Taiwan University Hospital (NTUH) were analyzed to find out the risk factors associated with NSI.

Methods: NSI cases reported by the Department of Dentistry to NTUH from 2009 to 2011 were collected. Correlations between NSI and parameters related to the events were analyzed.

Results: A total of 56 NSI events including 31 occurring during surgical treatment and 25 occurring during cleanup procedure were reported. The annual incidence of NSI was 8.19% among all dental workers. NSI incidences per person-year were 21.28% for interns, 7.50% for residents, 6.77% for nursing staffs, 3.33% for clerks, and 0.85% for attending doctors ($P < 0.001$, chi-square test). NSI events occurred more frequently in the 3-month period from July to September (20 cases), on Wednesday (18 cases) or Friday (14 cases), and at the hours from 11:00 to 14:00 and after 16:00 (39 cases). Dental injection needle (19 cases) was the most common instrument involved in NSI and 9 of these 19 needle injuries occurred during need removal.

Conclusion: NSI events tend to occur in dental personnel (interns) with lesser clinical skill and experience, in the period (from July to September) when new interns and residents join the clinic, on the working days in the middle (Wednesday) and end (Friday) of the week, and at the hours close to lunch break (11:00 to 14:00) and getting off duty (after 16:00). In addition,

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* Corresponding author. School of Dentistry and Graduate Institute of Clinical Dentistry, National Taiwan University and National Taiwan University Hospital, Number 1, Chang-Te Street, Taipei, Taiwan.

E-mail address: pinlin@ntu.edu.tw (C.-P. Lin).

establishment of standard operating procedure for injection needle removal is necessary, because one-third of NSI are needle-related.

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Introduction

Healthcare workers in a hospital, including doctors, nurses, technicians, and assistants, are all susceptible to injuries inflicted by contaminated needles and sharp objects. Serious blood-borne pathogens, such as human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), and *Treponema pallidum*, can be transmitted from these injuries.^{1–3} The reported risks of contracting infections after sustaining pathogen-positive needlestick/sharp injuries (NSI) were 0.3% for HIV,⁴ 6.0%–30.0% for HBV,⁵ and 0%–10.0% for HCV.^{2,6–8} Previous studies showed that in the population of Taiwan the seropositivity rates for HBsAg⁹ and HCV antibody¹⁰ were 15%–21% and 2.5% respectively. In fact, contraction of HBV or HCV from work-related NSI is one of the most common occupational hazards among healthcare workers in Taiwan.^{11–13}

Most studies on the epidemiology of NSI among healthcare workers were focusing on nondental professionals.^{7,14,15} The precise risks of NSI in dental healthcare environment were investigated less frequently.^{3,16,17} The routine use of sharp instruments in dental treatment, the presence of blood and saliva, and the diverse bacterial flora in the oral cavity all contribute to the hazardous nature of the dental workplace for blood-borne infections. Moreover, at a university hospital, dental procedures are frequently executed by students with lower occupational skills, making NSI an even more important issue for hospital dental teams.

Previous studies showed that most cases of NSI are preventable and it can be useful to have detailed information about the circumstances of injuries in order to find preventive measures.¹⁸ Since the characteristics of dental procedures and working environment are quite different from those of other medical specialties, it is mandatory to analyze how and when NSI occurred among dental healthcare workers as we examine the ways to prevent injuries. In the study, we examined NSI events reported during a 3-year period at the Department of Dentistry of a university hospital. Factors related to the injuries were analyzed and preventive measures are proposed accordingly.

Participants and methods

The study analyzed all NSI events reported from the Department of Dentistry at the National Taiwan University Hospital (NTUH) during the 3-year period of 2009 to 2011. NTUH is a tertiary teaching hospital located in Taipei, Taiwan. In the study period, workers at the Department of Dentistry included 79 dentists (39 attending doctors and 40 residents), 85 dental students (45 interns and 40 clerks), and 64 members of nursing staff. At NTUH, dental interns engage in full-time clinical training under the supervision of attending doctors and residents whereas the clinical training for clerks is part-time and auxiliary in nature.

At NTUH, all workers are required to follow the Protocol for Management of Injuries from Contaminated Sharps. According to the protocol, the injury site should first be washed thoroughly with running water, cleansed with povidone-iodine and properly dressed. After first aid treatment, the injured party must immediately report to the Department of Environmental and Occupational Medicine or the Department of Emergency Medicine for risk assessment. If possible, a blood sample from the source patient and his/her consent are obtained to test HBsAg, anti-HCV, anti-HIV microparticle enzyme immune assay (M-EIA) and syphilis (Venereal Disease Research Laboratory (VDRL) and *Treponema Pallidum* Hemagglutination Assay (TPHA)). For the injured party, a blood test for HBsAg, anti-HBs, anti-HCV, anti-HIV (M-EIA), syphilis (VDRL), aspartate transaminase (AST), and alanine transaminase (ALT) is performed. The decision to offer specific prophylactic treatments to the injured party, including hepatitis B immunoglobulin, hepatitis B vaccine, antibiotics, and postexposure prophylaxis for HIV, is determined by the risk assessment of the injury, results of the blood tests, and the immune status of the injured personnel. Regular follow-up of the injured party is required for at least 1 year.

In addition to risk assessment and management, the injured employees are required to report the incidents to the Occupational Safety and Healthy Office within 24 hours by completing the *NTUH Employee Occupational Hazards Report Form for Injury from Contaminated Sharps*. The report form is a questionnaire inquiring about the following information: name, age, sex, profession group, year of job tenure or year of dental course, number of NSI experience, use of gloves, injury type, injury site, injury degree, injury date and time, location of the accident, procedure and instrument involved in the accident, circumstance surrounding the accident, and the cause of the accident. It also requires filling in the seropositivity of the injured party and index patient for major blood-borne infections and follow-up information.

All data were analyzed with the Statistical Package for the Social Sciences' (SPSS for Windows, release 17.0.0. 2009, SPSS Inc, Chicago, Illinois, USA). Descriptive analyses were performed and category variables were analyzed by Chi-square or Fischer's exact test where appropriate. A significance level was set at 0.05 and all of the tests were two-tailed.

Results

In the 3-year period of 2009 to 2011, 56 incidents of NSI from contaminated sources were reported by the Department of Dentistry, NTUH. Thirty-one accidents happened during a surgical procedure and in 25 cases the events occurred in the cleanup process. The overall incidence rate of NSI was 8.19% per person-years.

The ages of the injured parties ranged from 23 to 36 years and the male-to-female ratio was 3:4. Regarding to

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