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Predictive factors for percutaneous and mucocutaneous exposure among healthcare workers in a developing country

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Abstract The aim of this study is to determine the risk factors for percutaneous and mucocutaneous exposures in healthcare workers (HCW) in one of the largest centers of a middle income country, Turkey. This study has a retrospective design. HCWs who presented between August 2011 and June 2013, with Occupational Exposures (OEs) (cases) and those without (controls) were included. Demographic information was collected from infection control committee documents. A questionnaire was used to ask the HCWs about their awareness of preventive measures. HCWs who work with intensive work loads such as those found in emergency departments or intensive care units have a higher risk of OEs. Having heavy workloads and hours increases the risk of percutaneous and mucocutaneous exposures. For that reason the most common occupation groups are nurses and cleaning staff who are at risk of OEs. Increasing work experience has reduced the frequency of OEs.

1. Introduction

Healthcare workers (HCWs) are at high risk of infection from hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV), which are transmitted through blood and infected fluids [1]. Transmissions of at least 60 different pathogens by needle-stick injuries (NSIs), sharps injuries, and mucosal exposure have been reported [2]. These blood-borne infections may cause serious consequences including long-term illness, disability, and death.

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In developed countries, sustaining safe injection practices has reduced the risk of NSIs. However, in developing countries there is an increased incidence of occupational exposure (OE) because of low levels of awareness of blood-borne diseases and immunization against them [3].

Because of insufficient data reporting, it is difficult to know the frequency of OEs in developing countries. Also, in these countries very few efforts have been made to raise the awareness of HCWs among hospital managers [4].

In this study, we aimed to determine the time, location, risk factors, and complications in the follow-up process of OE in HCWs in one of the largest centers in a middle income country, Turkey.

2. Methods

This study was carried out among HCWs in Erciyes University Hospital, a 1300 bed, tertiary care hospital, in Kayseri, Turkey. The Staff Health Department of the Infection Control Committee (ICC) has carried out a follow-up and vaccination program and postexposure prophylaxis on a regular basis since 2011. A questionnaire was administered to HCWs about the awareness of preventive measures including HBV vaccination and knowledge about their immune status. The type of exposure such as NSIs, injury caused by sharp objects, or mucosal exposure was recorded. The collected data also included the sex, age, occupation, educational level, primary work site, work experience, immunity status, and awareness of risk factors of those who had experienced an OE that was recorded by the ICC. Serological screening included hepatitis B surface antigen (HBs Ag), antihepatitis B surface antigen antibody (anti-HBs), antihepatitis B core antigen antibody (anti-HBc), anti-HCV, and anti-HIV.

This study has a retrospective design. HCWs who presented between August 2011 and June 2013, with OE (cases) and those without (controls) were included. The HCWs who were admitted at the same time for vaccination or other reasons and had no history of percutaneous and mucocutaneous exposure were selected as controls.

The statistical analysis was performed using SPSS version 15 (Chicago, USA). The Chi-square test was used for categorical variables. The Mann–Whitney *U* test was used to compare differences between two groups. To determine the independent risk factors, multivariate regression analysis was performed for age, sex, occupation, educational level, and the length of work experience. The level of significance was set at $p < 0.05$ for all tests.

3. Results

Erciyes University Hospital has a total of 3962 HCWs and approximately 85 NSIs are reported to the Staff Health Department annually.

A total of 331 HCWs participated in the study. Of these, 166 experienced OE. The OE incidence in our hospital was calculated as 2.18 exposures/person-year.

A questionnaire was administered to HCWs about their OE. According to the questionnaire, 40% of OE occurred in general inpatient departments. Seventy percent of the injuries occurred between 8:00 AM and 4:00 PM. Most of the injuries were NSIs (80%) and the most common injury site of the body was the hand (84%) (Table 1).

Table 2 shows the differences between cases and controls. HCWs who had OE were younger than the controls. OE was more likely to occur in males. The most common occurrence of OE was among nurses (33%) and cleaning staff (26%). The percentage of cleaning staff was lower in the OE group than in the control group ($p < 0.05$). The education level was higher in the control group (83% were graduates). HCWs with no OE had more work experience. Median work experience was 11 months and 72 months in the OE group and controls, respectively ($p < 0.05$). There was no statistically significant difference regarding the primary working site, but injuries mainly occurred in the emergency department and intensive care units.

According to multivariate regression analyses, occupation and length of work experience had statistically significant differences. Compared with doctors, the risk of OE was 12 times higher among housekeepers and nearly four times higher among medical students. The risk of OE was lower among the HCWs who had more work experience ($p = 0.001$) (Table 2).

We compared the serological tests, immunization status, and awareness of the two groups in Table 3. All the controls had knowledge about their immunization status and all of them had anti-HBs positivity. Having a missed dose for hepatitis B immunization was more common in the OE group and this result was statistically significant. Five of the HCWs had HBs Ag positivity and three of them were in the OE group. Two HCWs had anti-HCV positivity in the OE group. None of the HCWs had anti-HIV positivity. The entire control group knew about their immune status; by contrast, only 12.7% of HCWs in the OE group knew their immune status.