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Factors associated with needlestick and sharp injuries among hospital nurses: A cross-sectional questionnaire survey

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ABSTRACT

Background: The current status of needlestick or sharp injuries of hospital nurses and factors associated with the injuries have not been systematically examined with representative registered nurse samples in South Korea.
Objective: To examine the incidence to needlestick or sharp injuries and identify the factors associated with such injuries among hospital nurses in South Korea.
Design, settings and participants: A cross-sectional survey of hospital nurses in South Korea. Data were collected from 3079 registered nurses in 60 acute hospitals in South Korea by a stratified random sampling method based on the region and number of beds.
Methods: The dependent variable was the occurrence of needlestick or sharp injuries in the last year, and the independent variables were protective equipment, nurse characteristics, and hospital characteristics. This study employed logistic regression analysis with generalized estimating equation clustering by hospital to identify the factors associated with needlestick or sharp injuries.
Results: The majority (70.4%) of the hospital nurses had experienced needlestick or sharp injuries in the previous year. The non-use of safety containers for disposal of sharps and needles, less working experience as a registered nurse, poor work environments in regards to staffing and resource adequacy, and high emotional exhaustion significantly increased risk for needlestick or sharp injuries. Working in perioperative units also significantly increased the risk for such injuries but working in intensive care units, psychiatry, and obstetrics wards showed a significantly lower risk than medical–surgical wards.
Conclusions: The occurrence of needlestick or sharp injuries of registered nurses was associated with organizational characteristics as well as protective equipment and nurse characteristics. Hospitals can prevent or reduce such injuries by establishing better work environments in terms of staffing and resource adequacy, minimizing emotional exhaustion, and retaining more experienced nurses. All hospitals should make safety-engineered equipment available to registered nurses. Hospitals as well as specific units showing higher risk for needlestick and sharp injuries should implement organizational strategies to prevent such injuries. It is also necessary to establish a monitoring system of needlestick and sharp injuries at a hospital level and a reporting system at the national level in South Korea.

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What is already known about the topic?

- Needlestick or sharp injuries (NSIs), which are mostly preventable, are one of the major occupational injuries experienced by registered nurses (RNs) working in hospitals.
- Major potential problems induced by NSIs are infectious diseases such as hepatitis B, hepatitis C, and HIV.

What this paper adds

- The majority (70.4%) of Korean hospital nurses had experienced NSIs in the previous year.
- NSIs of RNs were associated with organizational characteristics as well as protective equipment and nurse characteristics.
- NSIs were significantly associated with routine use of safety containers for disposal of sharps and needles, certain specialties, working years as an RN, emotional exhaustion, and work environment.

1. Introduction

Needlestick and sharp injuries (NSIs), which are mostly preventable, are one of the major occupational injuries experienced by registered nurses (RNs) in hospitals. Major potential problems induced by NSIs are infectious diseases such as hepatitis B, hepatitis C, and HIV, which are transmitted through blood pathogens from contaminated needles or sharp devices (Clarke et al., 2002a). According to the World Health Organization (WHO), NSIs accounted for about 40% of hepatitis B and C infections and 2.5% of HIV infections in healthcare workers worldwide (World Health Organization, 2002). In addition to the potential risk for infectious diseases, NSIs incur direct costs required for laboratory tests, including tests for HIV antibodies, hepatitis B serology, and a baseline test for anti-hepatitis C, as well as any treatment for these conditions (Lee et al., 2005). There are also the costs associated with post-exposure prophylaxis for RNs along with the economic loss of hospitals brought on by absences from work (Lee et al., 2005). The estimated annual costs for tests and treatments for NSIs varied from $6.1 million in France to $118–591 million in the United States (US) (Saia et al., 2010).

In an extensive review of studies (Hanrahan and Reutter, 1997), the occurrence of NSIs was related to three major factors: engineering factors such as the design of sharps and barrier devices, organizational factors such as the availability of supplies and reporting policies, and behavioral factors such as recapping and disposal-related issues. In accordance with the review, two WHO reports addressed risk factors, including the lack of engineering controls to ensure safer needle devices, inadequate hospital staffing, and recapping of needles after use (Prüss-Üstün et al., 2003; World Health Organization, 2003).

According to the International Healthcare Worker Safety Center, in the US injections and drawing venous blood accounted for 23.6% and 11.5% of NSIs, respectively (Perry et al., 2009). A review of literature from the US, United Kingdom, Germany, France, Italy, and Spain found that injections and intravenous-related tasks account for a significant proportion of NSIs, and recommended safety-engineered needle devices for these tasks (Saia et al., 2010). The US General Accounting Office estimates that safety-engineered needle devices could prevent 29% of NSIs in the US (United States General Accounting Office, 2000).

Earlier studies identified organizational characteristics as a risk for NSIs. In magnet hospitals with adequate staffing and an appropriate work environment, the incidence of NSIs was significantly lower than that seen in non-magnet hospitals (Aiken et al., 1997). RNs who work in hospitals with a poor organizational climate or less adequate resources and nurse leadership (Clarke et al., 2002a,b) had a greater likelihood of needlestick injuries. More recently, RNs in hospitals with the most favorable working environments were found to be about 20–34% less likely to experience NSIs (Clarke, 2007). RNs working on patient care units with lower staffing rates and higher levels of emotional exhaustion related to their jobs also had significantly higher likelihoods of NSIs (Clarke et al., 2002a,b). The association of staffing levels with NSIs among Chinese RNs has also been reported (Smith et al., 2004).

In South Korea, however, the comprehensive NSI status of RNs is unknown because each hospital monitors and manages its surveillance system for NSIs internally without reporting these data to any national system. Only a few published studies from one or two hospitals have revealed the incidence of NSIs in South Korea, and the results are varied: 64.5% (Kim et al., 2005), 79.7% (Smith et al., 2006a), and 83% (Kim, 1996) in the previous year. These rates were higher than those of RNs working in other countries (Clarke, 2007; Clarke et al., 2007; Royal Collage of Nursing, 2008; Smith et al., 2006b,c); however, the ability to estimate the number of overall NSIs among Korean hospital nurses is limited. Therefore, a need exists to assess the level of NSI incidence among RNs in South Korea using representative samples. Further, factors associated with NSIs in South Korea have not been systematically examined with representative RNs samples; this action should be a primary step towards developing hospital-specific programs for NSI prevention. Thus, the aims of this study were to assess the incidence to NSIs among hospital nurses and to identify factors associated with NSIs using nationwide random samples in South Korea.

2. Methods

2.1. Design and participants

This study employed a cross-sectional survey design. The participants were composed of 3079 bedside RNs from 60 hospitals in all 7 metropolitan cities and all 9 provinces in South Korea. The RNs were selected using a two-phase stratified cluster sampling method. First, out of all 295 hospitals with 100 or more beds located in South Korea, 65 hospitals were randomly selected by stratified sample based on region (Seoul, other metropolitan areas, and provinces) and number of beds (100–399, 400–699, 700–799, and 1000 or above). Out of 65 hospitals, 5 declined to participate in the study. As the number of RNs varied by number of beds and types of units, the participants were selected by the following criteria: (a) in case of hospitals