Nurse Education Today 35 (2015) 1175–1180

Contents lists available at ScienceDirect

Nurse Education Today

journal homepage: www.elsevier.com/nedt

Nursing students' knowledge and practices of standard precautions: A Jordanian web-based survey☆

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ARTICLE INFO

Article history:
Accepted 14 May 2015

Keywords:
Infection control compliance
Infection control guidelines
Standard precautions
Infection control practices
Standard precautions knowledge
Web-based survey

SUMMARY

Background: The main purpose of this web-based survey was to evaluate Jordanian nursing students' knowledge and practice of standard precautions.
Methods: A cross-sectional, descriptive design was used. Six public and four private Jordanian universities were invited to participate in the study. Approximately, seventeen hundred nursing students in the participating universities were invited via the students' portal on the university electronic system. For schools without an electronic system, students received invitations sent to their personal commercial email.
Results: The final sample size was 594 students; 65.3% were female with mean age of 21.2 years (SD = 2.6). The majority of the sample was 3rd year students (42.8%) who had no previous experience working as nurses (66.8%). The mean total knowledge score was 13.8 (SD = 3.3) out of 18. On average, 79.9% of the knowledge questions were answered correctly. The mean total practice score was 67.4 (SD = 9.9) out of 80. There was no significant statistical relationship between students' total knowledge and total practice scores ($r = 0.09$, $p = 0.032$).
Conclusion: Jordanian nursing educators are challenged to introduce different teaching modalities to effectively translate theoretical infection control knowledge into safe practices.

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Introduction

Nursing and healthcare students are at high risk for blood-borne pathogens and sharp instrument injuries during their clinical placement, which puts them at risk for infection (Smith et al., 2006a,b; Smith and Leggat, 2005; Talas, 2009). The high risk for students may be the result of limited clinical experience in standard precautions (Askarian et al., 2004), a shortage of protective supplies available for students (Askarian et al., 2007), and insufficient training in performing high-risk medical procedures (Askarian et al., 2007). Nursing students may become a source of cross-infection if they do not comply with standard infection control practices (Danzmann et al., 2013; Lin et al., 2007; Loh et al., 2000; Treakle et al., 2009).

Standard precautions (SPs) have been established to protect healthcare workers from infection and prevent the transmission of infection (Siegel et al., 2007). The practice of SPs involve application of the basic principle of infection control such as handwashing, using of personal protective equipment (PPE) such as gloves, masks, gowns and eyewear to prevent contact with potentially infectious materials, and safe handling of sharps (WHO, 2004). According to Centers for Disease Control and Prevention [CDC] (2014), PSs are the minimum infection prevention practices that should be applied to all patient care, regardless of suspected or confirmed infection status of the patient, in any setting where healthcare is delivered.

Healthcare students need to acquire the appropriate knowledge and skills of standard precautions before their initial hospital training (Siegel et al., 2007; Tavolacci et al., 2008). Pre-graduation training plays a crucial role in promoting compliance to SPs practices. Further, undergraduate clinician training serve as a key environment where knowledge acquisition on SPs should occur (Mitchell et al., 2014). Along with staff education and training, the CDC prioritizes the assessment of knowledge and adherence to infection control guidelines to prevent and control healthcare-associated infections (HCAIs) (Siegel et al., 2007). The CDC (2014) asserted that education on the basic principles and practices for preventing the spread of infections should be provided to all heath care professionals. Further, the CDC (2014) stressed that Education and training should be conducted on a regular basis (e.g., annually) to maintain competency. At the same time, new updates on infection control guidelines are to be included in any educational and training programs.

Different studies have indicated that high level of knowledge of SPs was a significant predictor of better compliance with SPs practices (Hinkin and Cutter, 2014; Mitchell et al., 2014; Sax et al., 2005). The evaluation of infection control knowledge among healthcare student plays a crucial role in any process aimed to enhance the educational

☆ The authors report no conflicts of interest relevant to this article.

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http://dx.doi.org/10.1016/j.nedt.2015.05.011
0260-6917/Published by Elsevier Ltd.

strategies and consequently the enhancing the compliance with infection control practices (D'Alessandro et al., 2014). While knowledge and understanding of SPs are important in maintaining high standards of SPs practice, there are other important factors that need to be considered and examined (Hinkin and Cutter, 2014).

Although different studies have examined healthcare workers' knowledge and practices of standard precautions (Bryce et al., 2007; Easton et al., 2007; Sax et al., 2005), few studies have targeted nursing students (Al-Hussami and Darawad, 2013; Darawad and Al-Hussami, 2013; Labrague et al., 2012; Tavolacci et al., 2008). Although studies have been conducted in Jordan to evaluate healthcare professionals' and students' infection control knowledge and practices (Al-Dwairi, 2007; Al-Hussami and Darawad, 2013; Al-Rawajfah, 2014; Al-Rawajfah et al., 2013; Qudeimat et al., 2006), none of these studies has used web-based methods for data collection. Therefore, the primary purpose of this web-based survey was to evaluate Jordanian nursing students' knowledge and practice of standard precautions.

Method

This study utilized a descriptive cross-sectional design. This study used web-based survey as a method of data collection. Web-based surveys are increasingly an acceptable and reliable method of data collection in nursing and health-related research (East et al., 2008; Gordon and McNew, 2008; Jones et al., 2008a,b; Turunen et al., 2013). Research has shown that data collected by web-based surveys are comparable in quality and type with data collected by paper-based surveys (Gordon and McNew, 2008). Furthermore, web-based surveys are associated with several strengths such as speed of data access and decreased data collection and data entry costs (Jones et al., 2008b; Lefever et al., 2006). They are used to target large and geographically scattered populations, collect huge amounts of data in a reasonable amount of time (Fricker and Schonlau, 2002), and can be completed at the participant's convenience (Lefever et al., 2006).

Setting and Sampling

This was a national, multicenter project. The initial invitation for the study was sent to six public and four private universities in different geographic areas in Jordan. In the invitation, universities were asked to give their permission to use the students' portal on the university electronic system in order to send the survey hyperlink to nursing students. Universities that did not employ a student portal in an electronic system were invited to participate by means of a poster, which was placed in the main entrance of the faculty of nursing. The poster contained invitation cards with space for writing an email address. Students were invited to take an invitation card, provide their email address, and return the card to an appointed faculty member or administrative staff member. This procedure was designed to minimize the possibility of non-nursing students' completing the survey. Students who completed the invitation card received an email message containing the survey hyperlink. The web-based survey was designed to be completed by participants one time only to minimize redundant responses. To maximize the response rate, the survey hyperlink was maintained active for one full semester (4 months). The only inclusion criterion for this study was being a nursing student in one of the participating universities. No exclusion criteria were used in the study.

Ethical Considerations

The study protocol was approved by the Institutional Review Board of the home university of the authors. Explanation about the research was given to the participants on the survey face page and in the invitation posters. Participation was completely voluntary. Only those who checked the box "I agree to participate" could enter the survey.

Study Instrument

The survey utilized a tool developed by Chan et al. (2002); permission to use the tool was obtained from the authors. The tool consisted of three parts: Part I collected demographic data, including age, gender, academic level, and other student-related variables; Part II asked about knowledge of standard precautions; and Part III asked about standard precaution practices during clinical course placements.

For Part II, students were asked to respond to 18 items with "True," "False," or "I don't know." The "I don't know" choice was included to decrease the possibility of guessing by students. The total knowledge score ranged from 0 to 18. Correct answers were graded with the number 1; False and "I don't know" responses were graded zero. Out of the 18 items, 4 items were negatively stated to minimize possible biased responses. The answers were validated by one infection control specialist and one infectious disease consultant using the Jordanian Ministry of Health Infection Control Manual (Jordanian Ministry of Health — Department of Communicable Diseases, 2011).

Part III, the practice section, consisted of 16 items related to the use of protective devices, disposal of sharps, disposal of waste, decontamination of spills and used instruments, and prevention of cross-infection from person to person. A 5-point Likert scale was used for this section, with scores ranging from 5 (always) to 1 (never), with total scores ranging from 16 to 80.

According to Chan et al. (2002), the content validity index of 88.6% for the original tool was achieved with an internal consistency coefficient of 0.72. In our study sample, Cronbach's alpha coefficients were 0.87 for the knowledge subscale and 0.84 for the practice subscale.

The original tool was translated into Arabic. The standardized procedure of translation and back translation was followed (Cha et al., 2007). Two independent bilingual Arabic–English healthcare academicians, including the principle investigator, independently translated the original instrument. Back-translation by a bilingual Arabic–English PhD expert was carried out. Each translated versions were evaluated by a meeting of the research team. Any discrepancies between the reviewed versions were discussed by the research team until agreement on final translation was reached. The Arabic version was validated by three doctorally prepared persons whose area of research involved infection control. The final Arabic version was pilot tested and minor modifications were implemented according to recommendation from students' sample.

For this study, total knowledge scores were categorized as follows: <50th percentile (range 0 to 10), "poor"; between 50th and 75th percentiles (range 11 to 14), "satisfactory"; and >75th percentile (range 15 to 18), "excellent." Likewise, total practice scores were categorized as follows: <50th percentile (range 16 to 48), "unsafe practice"; between the 50th and 75th percentiles (range 49 to 64), "weak practice"; and >75th percentile (range 65 to 80), "competent practice." Both the knowledge and practices categories were validated by experts in education and infection control and agreed upon according to categorization and corresponding terms.

Data Analysis

SPSS®-PC Version 20 was used to analyze the data. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were computed to describe students' characteristics and responses. Missing data for the 18 knowledge items ranged from 2.9% to 5.6%; missing data for the 16 practice items ranged from 3.7% to 5.6%. Cases of missing data of 20% or greater in each subscale were excluded from the final analyses; in addition, items missing in more than 10% of the surveys were excluded from the final analyses.

Independent *t*-test was used to compare mean total knowledge and practices scores across different dichotomous variables. Pearson correlation between total knowledge and practices scores was used to test for possible relationships.

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