



# Nursing students' knowledge, attitude and practices of infection prevention and control guidelines at a tertiary institution in the Western Cape: A cross sectional study



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## ABSTRACT

**Background:** Nurses in sub-Saharan Africa are particularly at a higher risk of acquiring nosocomial infections, considering the increased prevalence of infectious diseases. It is therefore imperative that these nurses have a sound knowledge and understanding of infection prevention procedures.

**Objective:** The main objective of this study was to describe the knowledge, attitudes and practices concerning infection prevention and control precautions among nursing students in a resource limited setting.

**Method:** A cross sectional study design was employed. A self-administered questionnaire concerning infection prevention and control guidelines were made available to students enrolled in a mainstream programme for completion of an undergraduate nursing degree.

**Setting and Participants:** A total of 301 students at second, third and final years of study from a tertiary institution in the Western Cape were invited to participate.

**Results:** The final cohort comprised of 301 students with the majority between the ages of 17–26 (88.2%), with a mean age of  $23 \pm 4.7$  (SD) years and the dominant gender being female (83.4%). According to the classification system used in this study, the majority of the students were overall evaluated as having good level of knowledge (47.4%) and poor attitude (41.7%) scores, with little difference in practice scores observed between different years of study. There was a positive correlation found between students' total attitude and total practice scores ( $r = 0.48$   $p < 0.01$ ). Results showed that significant associations between gender and knowledge ( $p < 0.05$ ), attitudes ( $p < 0.05$ ) and practice ( $p < 0.05$ ) exists. There was also a significant association between province and those who repeated a year with total knowledge scores ( $p < 0.05$ ).

**Conclusion:** Based on the results of this study, it is recommended that interactive infection control courses that promote critical thinking are implemented at undergraduate level along with more stringent forms of assessments focusing on infection prevention and control, during clinical training.

## 1. Background

Healthcare workers are at constant occupational risk of acquiring nosocomial infections as they perform their daily clinical duties. They are often faced with the risk of being exposed to blood borne pathogens such as hepatitis B, hepatitis C and HIV from needle stick injuries. They are also in contact with blood and human secretions that are significantly hazardous, especially in an era where there is a high prevalence of HIV in sub-Saharan Africa (Sadoh et al., 2006).

To minimise and prevent healthcare workers being exposed to infectious disease, the Centre for Disease Control (CDC) recommended a series of procedures termed 'standard precautions' (CDC, 1996).

Standard precautions are applicable when working with all patients, irrespective of whether the disease status of the patient is known or unknown in any environment. These guidelines include hand washing, personal protective equipment practices, respiratory hygiene, cough etiquette, safe handling of suspected contaminated equipment or surfaces as well as safe injection practice (CDC, 1996; Franklin, 2009; Siegel et al., 2007). In 2007, the CDC published guidelines termed 'transmission-based precautions' to supplement standard precautions, especially when exposed to highly contagious diseases. Transmission-based precautions were implemented when the modes of transmission were not entirely hindered by using standard precautions and included contact, droplet and airborne precautionary measures (CDC, 1996;

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Siegel et al., 2007).

Although infection prevention and control (IPC) strategies have been well established over the years, healthcare workers have shown to adopt precautionary measures depending on their level of knowledge and perception of risk of acquiring an infectious disease (Cheung et al., 2015). According to documented literature, from the time of graduation, healthcare professionals have adequate knowledge to employ safe patient-care practices and adhere to infection prevention and control guidelines (Mitchell et al., 2014). However, despite having knowledge of IPC guidelines, health care professionals are still closely associated with the transmission of nosocomial infections (Kamunge et al., 2015).

Nursing students are exposed to the hospital environment during their clinical placement and are compelled to provide care to patients irrespective of their disease status (Cheung et al., 2015; Ojulong et al., 2013). Dante et al. (2014) reported from a 15 year case-control study that 239 cases of injury exposures had occurred among 2514 nursing students (3.15 incidence/100,000 clinical training days). From these injury exposures, approximately 187 nursing students had reported having direct contact with bodily fluids. The limited clinical experience of novice nurses concerning standard precautions, their lack of knowledge of personal protective equipment use, as well as inadequate training in clinical procedures are contributory factors to their increased risk to occupationally acquired infections (Al-Rawajfah and Tubaishat, 2015).

In developing countries, studies relating to blood-borne pathogens consistently report high incidence of occupational injuries, the inadequate rates of pre-exposure HIV testing, lack of vaccinations against Hepatitis B and respiratory infections as well as poor preventative infrastructure (Rothe et al., 2013). Several cross-sectional surveys conducted among health science students and healthcare workers in Africa have also shown majority of this population to have poor knowledge, attitude and practice concerning infection control measures (Ojulong et al., 2013; Van der Berg and Daniels, 2013).

Kamulegeya et al. (2013) conducted a study that investigated the knowledge and practices concerning IPC guidelines among health science students in Uganda. Results revealed that students had overall poor knowledge, with only 30% achieving a score above average. Furthermore, a lack of compliance relating to the use of personal protective equipment such as masks was reported, with 62.1% of students indicating they rarely wore masks and 32.4% indicating they never wore masks when interacting with patients. The common reasons conveyed by students who failed to adhere to IPC guidelines, was due to inadequate provision of protective barriers and facilities (Kamulegeya et al., 2013). A similar study conducted by Van der Berg and Daniels (2013) substantiates results of the Uganda based study, by reporting a low level of knowledge (mean score of 65%) among nursing students enrolled at a higher education institution in South Africa. It was reported that personal protective equipment practices was poor with a total of 42.6% of students stating that based on just observation of the patient, they sometimes, seldom or never wore personal protective equipment (Van der Berg and Daniels, 2013). Overall, results of these studies demonstrate the need of an enabling environment and regular knowledge updates for students to improve compliance with IPC measures (Kamulegeya et al., 2013).

Research has shown that positive and negative attitudes of clinical staff affect compliance towards IPC policies (Ward, 2014; Stein et al., 2003). It is therefore important to consider the motivational and psychosocial aspects concerning practice of IPC guidelines. The present study aims to address three key areas namely; knowledge and practices, as well as attitudes among student nurses in relation to both standard and transmission based precautions.

## 2. Methodology

### 2.1. Study Design, Sample and Setting

This was a cross-sectional, descriptive study that evaluated the knowledge, attitudes and practices concerning standard and transmission-based infection prevention and control procedures among undergraduate nursing students. The population of interest included all students from second to fourth year enrolled in the mainstream programme to complete a bachelor's degree in nursing at a higher education institution in the Western Cape. These groups of students were selected as they had acquired adequate exposure to infection control practices and had worked within a clinical setting. For this reason, first year students were excluded. Most nursing programmes offered in the Western Cape have integrated IPC guidelines into different modules over the entire duration of their nursing degree.

### 2.2. Sampling Strategy

The target population was a total of 607 nursing students enrolled for the academic year 2017. A sample size calculation using Epi-Info 7 statistical software yielded a sample of 268 students factoring in a 20% non-response rate and assuming 65% knowledge, 5% level of significance and precision of 7% (assumptions based on a previous study by Van der Berg and Daniels, 2013). Considering the different number of registered students at every level of study, a stratified sample with probability proportional to size of the strata was used to obtain a fair representation of the target population. The required sample of 268 students needed to comprise of 94 (37%) second year students, 99 (35%) third year students and 75 (28%) fourth year students. Due to low attendance rates, the investigator opted to use simple convenience sampling that included all participants present during lectures. The total number of students enrolled at each level of study was more or less equally split into two classes. Therefore, a total of six classes were sampled and all participants who agreed to participate were included in the study ( $N = 301$ ).

### 2.3. Ethical Considerations

The study protocol was approved by the Health Research Ethics Committees of the home university of authors (Protocol reference: S16/10/213) and the participating university (Protocol reference: BM16/3/32). Participation in this study was entirely voluntary and participants were free to decline involvement or withdraw at any point in time without prejudice. Following informed consent, students were immediately handed a questionnaire to complete in class.

### 2.4. Study Instrument

All participants were required to complete a self-administered, questionnaire. This study was the first to use a questionnaire designed by Najeeb and Taneepanichsakul (2008) that has been adapted for use in South Africa, following permission from the primary author. Face validity of the questionnaire was assessed by two nursing experts at a different institution from where the research was being conducted, i.e. to determine if the questions were clear and provided valid information. Minor changes were required after assessing the validity of the questionnaire. The questionnaire was also piloted using a convenience sample of enrolled, second year student nurses at the institution ( $N = 20$ ), who confirmed the clarity of questions and that completion of the survey took approximately 15 min. Student feedback from the pilot study indicated that the survey was suitable for use.

The questionnaire comprised of 4 parts relating to demographic details as well as knowledge, attitude and practice questions concerning IPC guidelines. According to reliability analysis, a few questions from the questionnaire (Part 2: questions 3, 4, 7, 12 and 13; Part 3: questions

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