

TB/HIV EXPOSURE AMONG NURSING STUDENTS IN THE CLINICAL PRACTICE ENVIRONMENT

Kgalalelo Mabina

<https://orcid.org/0000-0002-7565-9323>
Department of Health, North West,
South Africa

Kagiso Morulane

<https://orcid.org/0000-0002-1123-7594>
Department of Health, North West,
South Africa

Gomolemo Tong

<https://orcid.org/0000-0002-4058-9636>
Department of Health, North West,
South Africa

Lufuno Makhado

<https://orcid.org/0000-0003-1689-9308>
North-West University,
South Africa
22891935@nwu.ac.za

ABSTRACT

Nurses are faced with challenges regarding inadequate precautionary resources and the lack of support for occupational health practices still experienced in the clinical setting which expose them to the risk of contracting TB and HIV. Hence this study sought to investigate TB/HIV exposure among nursing students in the clinical practice environment. A cross-sectional descriptive design was used in this study. The study sample included nursing students from first to fourth year level from the School of Nursing Sciences at the North-West University who were purposively selected. A high percentage of nursing students reported that they have experienced a situation where they were afraid that they might have been infected with both TB and HIV. Awareness about post-exposure prophylaxis (PEP) was marked among the majority of nursing students. The uptake of PEP differed across junior and senior levels of nursing students. The results revealed that the higher the level of study, the greater the exposure. The lack of sufficient clinical support from nursing staff and preceptors had equally contributed to the exposure of nursing students to both HIV and TB, therefore, more support must be provided to nursing students.

Keywords: TB/HIV; exposure; post-exposure prophylaxis; occupational health; nursing students; clinical support

INTRODUCTION

Nurses, including student nurses, are at the front line of providing healthcare services to people living with the human immunodeficiency virus (HIV) and those infected by tuberculosis (TB). However, challenges regarding inadequate precautionary resources and the lack of support for occupational health practices are still experienced in the clinical setting (Nkoko et al. 2014, 386). Additionally, these challenges expose nurses who work in primary healthcare (PHC) settings to the risk of contracting TB and HIV through airborne microorganisms, blood and other body fluids (Lavoie et al. in Nkoko et al. 2014, 383). Hence this study seeks to investigate the magnitude of the exposure and perspectives of student nurses regarding TB/HIV exposure.

Globally, there are approximately three million HIV exposures among healthcare providers every year estimating to result in 200 to 5 000 HIV infections (Lehmann and Zulu 2005, 42; Marchal, Brouwere, and Kegels 2005, 301; WHO 2006). According to Makhado and Davhana-Maselesele (2016, 1) healthcare providers have a greater risk of exposure to HIV by needle sticks or cuts, and getting blood or other body fluids in their eyes or mouths, and blood or other body fluids on their skin when it is chapped, scraped or affected by skin inflammations. Thus, carrying nursing duties especially among HIV patients may elevate the chances of being exposed, particularly when there is no supervision. In addition, the shortage of nurses in South Africa remains one of the core problems that lead to a lack of direct supervision among nursing students. Henceforth, this calls for increased clinical support for nursing students in the provision of TB/HIV services as well as general services to people living with HIV (PLWH).

Nkoko et al. (2014, 384) revealed that some evident patterns were found which were related to worker characteristics regarding exposure to HIV and TB, and had occurred where nurses with less than six years of experience in care units had more exposure than other nurses with greater seniority in the field. Furthermore, it was emphasised that the healthcare units associated with higher risk of exposure were found to be maternity, casualty, and the male medical wards versus other units for HIV and medical wards for TB. It is also noted by Zelnick and O'Donnell (2005, 163) that nurses deal with serious community and workplace impacts from the HIV/AIDS epidemic, and are reluctant to report any occupational exposure to HIV or to take a short course of antiretroviral post-exposure prophylaxis (PEP) to prevent HIV infection.

According to Makhado and Davhana-Maselesele (2016, 4) nurses were said to be highly exposed to HIV and these exposures have an effect on the way they manage caring for PLWH as they are scared to contract HIV. Furthermore, nurses find it difficult to protect themselves from such exposure because of insufficient precautionary resources in the clinic. Van Dyk (2007, 52) indicated that about half of healthcare workers feared occupational exposure and infection with HIV, while some blamed their employers for their exposure because they lacked sufficient precautionary resources, measures and procedures needed to cope with needle-stick injuries and were not informed about proper universal precautionary measures within their workplace. This is further explained by

Ehlers (2006, 657) that protective clothing might not always be available or adequate in the clinical learning environment. If the quality, and thus the personal protective equipment (PPE) offered, is doubtful, nurses might become less likely to wear or use such PPE, enhancing their chances of getting exposed to or infected with TB/HIV (Ehlers 2006, 657).

PROBLEM STATEMENT

An undergraduate nursing degree or diploma offered around the country in different institutions of higher learning covers only the basic management of TB and HIV while speciality courses are only offered post a junior degree or diploma. Such speciality courses include but are not limited to nurse-initiated management of antiretroviral treatment (NIMART) training and TB management courses. Furthermore there is limited supervision from professional nurses and clinical preceptors in clinical practise for students, and the Department of Health is falling short in terms of provision of safe and conducive infrastructure and precautionary materials to reduce the exposure of nursing students to the dual burden of TB and HIV. This continues to pose an increased health risk of junior nursing students as they rely solely on their basic knowledge of TB/HIV. There is an evidently severe inability to fill in the gap between what they are taught in class and what is being practiced in the clinical learning or practice setting.

According to Pisal et al. (2007), nursing students had the most regular contact with patients specifically during testing of glucose levels, and the monitoring of haemoglobin and other vital signs. It is for this reason that this study sought to investigate the level of exposure to TB/HIV among nursing students in their clinical practice or learning environment.

RESEARCH PURPOSE

The purpose of the study was to determine and to describe TB/HIV exposure among nursing students in the clinical practice environment. In order to achieve the purpose of this study the following were the research objectives:

- a. determining the level of TB/HIV exposure among nursing students in the clinical learning environment;
- b. describing the uptake of PEP among nursing students;
- c. determining factors that influence nursing students' exposure to TB/HIV;
- d. describing the knowledge of nursing students regarding precautionary measures towards TB/HIV;
- e. determining the effects of TB/HIV exposure; and
- f. describing the clinical support received during the clinical learning or practice placement.

RESEARCH DESIGN AND METHODS

Research Design

A non-experimental, cross-sectional descriptive study was conducted among nursing students at the North-West University (NWU). A non-experimental design is used in studies in which researchers wish to construct a picture of a phenomenon (variable), to explore events, people, or situations as they naturally occur, or to test relationship and differences among variables (LoBiondo-Wood and Haber 2014, 200). The cross-sectional descriptive design was used by the researcher in order to determine and to describe TB/HIV exposure among nursing students in the clinical practice environment at one point in time.

Setting

The study was conducted in the NWU School of Nursing Sciences. The NWU has three campuses at Potchefstroom, Mafikeng and Vanderbijlpark. The NWU is situated in the North West and is the only university within the province.

Population and Sampling

The population of this study was nursing students from first- to fourth-year level of study and there are 252 nursing students in total. Purposive sampling was used to sample 151 students, and included first year ($n = 46$), second year ($n = 36$), third year ($n = 26$), and fourth year ($n = 44$). Recruitment of students was done through class presentation regarding the research, and students who were interested were informed to contact the researcher to collect the informed consent form to sign and were then provided with a self-administered questionnaire to complete. All nursing students were eligible to participate in the study as they had been exposed to a clinical learning or practice environment.

Data Collection

A self-administered questionnaire was used to collect the data. The questionnaire consisted of four sections which incorporated the demographic characteristics of nursing students, information on HIV exposure, uptake of PEP, TB exposure, impact of being exposed to TB/HIV, and perspectives of students regarding exposure, PEP, and clinical support (including precautionary resources). The self-administered questionnaire was adapted from Makhado and Davhana-Maselesele (2016, 4) to suit nursing students as it was developed for nurses caring for PLWH. It had been found valid, and a reliability test yielded a Cronbach's alpha of .79 which indicated that the instrument had a moderately strong reliability.

The self-administered questionnaires were handed out to the participants who were at the nursing building during the second week of November 2016. This was done after information about the study was provided to nursing students and they were required to provide and sign a written consent form to participate in the study. The nursing students were requested to complete the questionnaire on their own and to return the completed questionnaire to the researchers. One hundred and fifty one questionnaires were distributed and all were returned completed fully.

Data Analysis

The statistical package for social sciences (SPSS) version 23 was used to assemble, clean and analyse the collected data. This study was purely descriptive in nature, thus frequencies and percentages of demographic characteristics, level of exposure to TB/HIV, uptake of PEP, impact of being exposed to TB/HIV and perspectives of nursing students regarding exposure, PEP and clinical support were tabulated according to the level of study.

Ethical Considerations

Ethical clearance of the study was granted by the NWU ethics committee and the permission to conduct a study by the School of Nursing Sciences. The participants were informed that the study was of minimal risk. Participation in the study was fully voluntary. Written informed consent was granted by the nursing students. Anonymity and confidentiality were ensured throughout the study.

RESULTS

Among the 151 questionnaires analysed, the majority of nursing students were between the ages of 18 to 30 (see Table 1). All nursing students who participated in the study were African, with first-, third- and fourth-year levels dominated by female nursing students ($n = 29$, 63%; $n = 14$, 53.8%; $n = 26$, 59.1% respectively), and only the second-year level was dominated by male nursing students ($n = 20$, 55.6%).

Table 1: Demographic characteristics

	Level of study			
	1 st (n = 46)	2 nd (n = 36)	3 rd (n = 26)	4 th (n = 44)
Age				
18–30	46 (100.0)	36 (100.0)	25 (96.2)	44 (100.0)
40–60			1 (3.8)	
Gender				
Male	17 (37.0)	20 (55.6)	12 (46.2)	18 (40.9)
Female	29 (63.0)	16 (44.4)	14 (53.8)	26 (59.1)

TB/HIV EXPOSURE

This section is subdivided into HIV exposure and TB exposure.

Levels of HIV Exposure among Nursing Students

As indicated in Table 2, the majority of nursing students reported to have been in a situation where they were afraid they were infected with HIV, thus first year (n = 13, 28.3%), second year (n = 20, 55.6%), third year (n = 19, 73.1%), and fourth year (n = 34, 77.3%). Among those that had been in such a situation, most of them reported that this had happened once: first year (n = 12, 26.1%), second year (n = 16, 44.4%), third year (n = 9, 34.6%), and fourth year (n = 16, 36.4%). The results also revealed that other nursing students had been in such a situation twice: first year (n = 1, 2.2%), second year (n = 2, 5.6%), third year (n = 6, 23.1%), and fourth year (n = 15, 34.1%). Lastly, was those who had been in the situation for five or more times, being only the second year (n = 2, 5.6%) and third year (n = 4, 15.4%).

Sources of Exposure to HIV

Needle prick was reported to be the most noticeable source of exposure to HIV among the second year (n = 11, 55%), third year (n = 9, 47.4%) and fourth year (n = 16, 47%) students, with the first-year level (n = 4, 30.8%) students reporting needle prick as the least source of exposure. Blood splash was reported to be a moderate sources of exposure to HIV among the first year (n = 8, 61.5%), second year (n = 6, 30%) and fourth year (n = 11, 32.4%) students, and to be the most noticeable exposure among the third year (n = 10, 52.6%) students. Body fluids was revealed to be the least source of exposure to HIV among the first year (n = 1, 7.7%), second year (n = 3, 15%), and fourth year (n = 7, 20.6%) students reporting it to be a moderate source of exposure to HIV. (See Table 2.)

Table 2: Level of HIV exposure and uptake of PEP among nursing students

	Level of study			
	1 st (n = 46)	2 nd (n = 36)	3 rd (n = 26)	4 th (n = 44)
Have you ever been in a situation at work where you were afraid you had been infected with HIV?				
Yes	13 (28.3)	20 (55.6)	19 (73.1)	34 (77.3)
No	33 (71.7)	16 (44.4)	7 (26.9)	10 (22.7)
Type of exposure to HIV				
Needle prick	4 (30.8)	11 (55)	9 (47.4)	16 (47.0)
Blood splash	8 (61.5)	6 (30)	10 (52.6)	11 (32.4)
Other body fluids splash	1 (7.7)	3 (15)		7 (20.6)
How many times did that happen in the duration of the student course?				
Never happened	33 (71.7)	16 (44.4)	7 (26.9)	12 (27.3)
Happened once	12 (26.1)	16 (44.4)	9 (34.6)	16 (36.4)
Happened twice	1 (2.2)	2 (5.6)	6 (23.1)	15 (34.1)
Happened five times or more		2 (5.6)	4 (15.4)	1 (2.3)
Do you know PEP?				
Yes	29 (63.0)	29 (80.6)	25 (96.2)	44 (100.0)
No	17 (37.0)	7 (19.4)	1 (3.8)	
Is PEP available in the unit or facility?				
Yes	28 (60.9)	27 (75.0)	20(76.9)	37(84.1)
No	10 (21.7)	9 (25.0)	4(15.4)	5(11.4)
Not sure	8 (17.4)	–	2(7.7)	2(4.5)
Have you ever sought PEP?				
Yes, every time I needed it	–	5 (25.0)	11 (57.9)	19 (55.9)
Yes, sometime when I needed it	1 (7.7)	2 (10.0)	6 (31.7)	14 (41.2)
No, I never sought it	12 (92.3)	13 (65.0)	2 (10.4)	1 (2.9)
When you sought PEP last time did you get it?				
Yes		6 (85.7)	7 (41.2)	20 (60.6)
No	1 (100.0)	1 (14.3)	10 (58.8)	13 (39.4)
If you never sought PEP, did not seek it the last time you needed it or sought it but somehow did not get it, what was the main reason for that?				
Did not need it	33 (71.7)	20 (66.7)	7 (36.8)	16 (66.7)
Did not have enough information about PEP	6 (13.0)	5 (16.7)	2 (10.5)	1 (4.2)
Did not want to take HIV test	1 (2.2)		2 (10.5)	2 (8.3)
PEP was not available	3 (6.5)	2 (6.7)	1 (5.3)	

Was afraid to go through the process	3 (6.5)	3 (10.0)	7 (36.8)	5 (20.8)
Do the clinical preceptors, lecturers and nurses offer you enough HIV-related support in the clinical practice?				
Yes	22 (47.8)	9 (25.0)	9 (34.6)	11 (25.0)
Sometimes	18 (39.1)	21 (58.3)	17 (65.4)	25 (56.8)
No	6 (13.0)	6 (16.7)		8 (18.2)
Type of HIV-related support received				
Orientation	17 (42.5)	15 (46.9)	7 (26.9)	13 (36.1)
Coaching	6 (15.0)	5 (15.6)	1 (3.8)	9 (25.0)
Supervision	17 (42.5)	12 (37.5)	18 (69.2)	14 (38.9)

PEP Knowledge and Uptake

Table 2 also indicate the nursing students who knew what PEP is, thus the first year (n = 29, 63%), second year (n = 29, 80.6%), third year (n = 25, 96.2), and fourth year (n = 44, 100%). It was also evident that not all nursing students were aware of the availability of PEP in the units they were working in, though the majority reported to be aware of it, thus the first year (n = 28, 60.9%), second year (n = 27, 75.0%), third year (n = 20, 76.9%), and fourth year (n = 37, 84.1%) students knew about the availability of PEP in the PHC facilities. Those who reported to receiving PEP every time they needed it were the second year (n = 5, 25%), third year (n = 11, 57.9%), and fourth year (n = 19, 55.9%) students, and those who never sought it were the first year (n = 12, 92.3%), second year (n = 13, 65%), third year (n = 2, 10.4%), and fourth year (n = 1, 2.9%) students.

Level of TB Exposure among Nursing Students

As indicated in Table 3, the results showed that there were students that had been in a situation where they were afraid they had been infected with TB, thus the first year (n = 19, 41.3%), second year (n = 30, 83.3%), third year (n = 13, 50.0%), and fourth year (n = 35, 79.5%). This revealed that mainly the second-year students were highly exposed compared to other groups.

Table 3: Level of TB exposure and sources of exposure

	Level of study			
	1 st	2 nd	3 rd	4 th
Have you ever been in a situation where you felt you had been exposed to TB?				
Yes	19 (41.3)	30 (83.3)	13 (50.0)	35 (79.5)
No	27 (58.7)	6 (16.7)	13 (50.0)	9 (20.5)
Type of exposure to TB				
Coughing	9 (47.4)	8 (26.7)	4 (28.6)	15 (42.9)
TB ward	10 (52.6)	19 (63.3)	8 (57.1)	16 (45.7)
Admission ward		3 (10.0)	2 (14.3)	4 (11.4)
How many times did this happen?				
Never	2 (10.5)	1 (3.2)		3 (8.3)
Once	9 (47.3)	12 (38.7)	5 (35.7)	15 (41.7)
Twice	4 (21.1)	8 (25.8)	2 (14.3)	9 (25.0)
Three times or more	4 (21.1)	10 (32.3)	7 (50.0)	9 (25.0)
Was there any protective clothing available in the unit?				
Yes	43 (93.5)	27 (75.0)	19 (73.1)	32 (72.7)
No	3 (6.5)	9 (25.0)	7 (26.9)	12 (27.3)
Have you ever been given information about infection control?				
Yes	37 (80.4)	34 (94.4)	21 (80.8)	36 (81.8)
No	9 (19.6)	2 (5.6)	5 (19.2)	8 (18.2)
Do you know about the Occupational Health and Safety Act?				
Yes	27 (58.7)	29 (80.6)	23 (88.5)	29 (65.9)
No	19 (41.3)	7 (19.4)	3 (11.5)	15 (34.1)
Do you know about occupational risks and hazards?				
Yes	34 (73.9)	35 (97.2)	25 (96.2)	39 (88.6)
No	12 (26.1)	1 (2.8)	1 (3.8)	5 (11.4)

Source of Exposure to TB

As indicated in Table 3, the results revealed that TB was thought to have been spread through coughing during vital signs monitoring and consultations among the first year (n = 9, 47.4%), second year (n = 8, 26.7%), third year (n = 4, 28.6%), and fourth year (n = 15, 42.9%) students. This was followed by direct exposure in the TB ward among the first year (n = 10, 52.6%), second year (n = 19, 63.3%), third year (n = 8, 57.1%), and fourth year (n = 16, 45.7%) students. The source of exposure varied across the levels of study.

Outcomes of Exposure to TB/HIV

The results shown in Table 4 project that some of the first-year (n = 2, 4.3%), second-year (n = 13, 36.1%), third-year (n = 4, 15.4%), and fourth-year level (n = 13, 30.2%) nursing students felt angry with themselves after exposure to HIV. It was also evident that others felt anxious about the exposure, the first year (n = 17, 37%), second year (n = 18, 50%), third year (n = 15, 57.7%), and fourth year (n = 29, 65.9%) students. Other students were fearful of infected patients, thus the first year (n = 9, 19.6%), second year (n = 8, 22.2%), third year (n = 8, 30.8%), and fourth year (n = 17, 38.6%). It was also revealed that the first year (n = 2, 4.3%), second year (n = 7, 19.4%), third year (n = 5, 20%), and fourth year (n = 9, 20.5%) nursing students felt angry with themselves after being exposed to TB, and that the first year (n = 17, 37%), second year (n = 19, 52.8%), third year (n = 13, 50%), and fourth year (n = 17, 38.6%) students were anxious after the exposure to TB.

Factors Influencing Exposure to TB

Factors included clinical support and availability of precautionary resources as interpreted below.

Clinical Support

The majority of the nursing students, thus the first year (n = 33, 71.7%), second year (n = 24, 66.7%), third year (n = 12, 46.2%), and fourth year (n = 30, 68.2%) students, reported to have had demonstrations, orientation sessions and clinical teaching regarding infection control. Those who reported to have had information about occupational health and safety included the first year (n = 29, 63%), second year (n = 25, 69.4), third year (n = 16, 61.5%), and fourth year (n = 28, 63.6%) students.

Availability of Precautionary Resources

Precautionary resources or the availability of protective clothing was highly endorsed by the majority of the first year (n = 29, 64.4%), second year (n = 21, 60%), third year (n = 17, 65.4%), and fourth year (n = 29, 65.9%) students as to be in place within the PHC facilities.

Table 4: Outcomes of TB/HIV exposure and availability of precautionary resources

		Level of study			
		1 st	2 nd	3 rd	4 th
How did you feel after being exposed to HIV?					
I felt angry with the patient	Yes	1 (2.2)	5 (13.9)	2 (7.7)	7 (16.3)
I felt angry with myself	Yes	2 (4.3)	13 (36.1)	4 (15.4)	13 (30.2)
I was anxious afterwards	Yes	17 (37.0)	18 (50.0)	15 (57.7)	29 (65.9)
I was fearful of infected patients	Yes	9 (19.6)	8 (22.2)	8 (30.8)	17 (38.6)
How did you feel after being exposed to TB?					
I felt angry with the patient	Yes	3 (6.5)	7 (19.4)	2 (7.7)	11 (25.0)
I felt angry with myself	Yes	2 (4.3)	7 (19.4)	5 (20.0)	9 (20.5)
I was anxious afterwards	Yes	17 (37.0)	19 (52.8)	13 (50.0)	17 (38.6)
I was fearful of infected patients	Yes	16 (34.8)	17 (47.2)	6 (23.1)	18 (40.9)
Have you received demonstrations, orientation sessions, or clinical teaching during your clinical placement regarding:					
Infection control	Yes	33 (71.7)	24 (66.7)	12 (46.2)	30 (68.2)
Occupational health and safety	Yes	29 (63.0)	25 (69.4)	16 (61.5)	28 (63.6)
Facility arrangements	Yes	33 (71.7)	21 (58.3)	11 (42.3)	27 (61.4)
Procedures	Yes	35 (76.1)	23 (63.9)	14 (53.8)	24 (54.5)
Is the health facility well equipped with protective or precautionary resources?					
Strongly agree		12 (26.7)	2 (5.7)	3 (11.5)	5 (11.4)
Agree		29 (64.4)	21 (60.0)	17 (65.4)	29 (65.9)
Disagree		1 (2.2)	4 (11.4)	2 (7.7)	6 (13.6)
Are these protective or precautionary resources available in the facility?					
Gowns	Yes	37 (80.4)	20 (55.6)	18 (69.2)	34 (77.3)
Gloves	Yes	44 (95.7)	35 (97.2)	25 (96.2)	39 (88.6)
Goggles	Yes	13 (28.3)	4 (11.1)	5 (19.2)	15 (34.1)
Boots	Yes	11 (23.9)	3 (8.3)	2 (7.7)	16 (36.4)
Sharps containers	Yes	44 (95.7)	33 (91.7)	24 (92.3)	42 (95.5)
Masks	Yes	44 (95.7)	34 (94.4)	24 (92.3)	35 (79.5)
Are there enough protective materials to support you in the clinical practice when dealing with TB/HIV patients?					
	Yes	37 (80.4)	20 (55.5)	16 (64.0)	21 (47.7)
	No	9 (19.6)	16 (44.5)	9 (36.0)	23 (52.3)

DISCUSSION

The research findings revealed that the higher the level of study the higher the risk of exposure to HIV as it increased the risk with the level of study. As a result there were low risks in the first and second year levels compared to the third and fourth year levels of study. This is in contradiction to the statement made by Nkoko et al. (2014, 384) which indicated that less experienced nurses were found to be more exposed to HIV and TB than those with greater experience in the field. Nursing students at different levels of study are severely prone to exposure as they are in the frontline of healthcare provision, for example during the monitoring of vital signs, which is mainly unmonitored by professional nurses or preceptors. This was evidenced by a higher number of nursing students who had been in a situation at a clinical learning environment where they felt they were infected by both TB and HIV. This was also emphasised by Makhado and Davhana-Maselesele (2016, 4) that the majority of nurses caring for PLWH had been exposed to HIV.

The results revealed that TB wards had the highest level of exposure as compared to other wards where coughing or spitting occurred, and the study also revealed high rates of knowledge about infection control among nursing students. It is also inexpensive to control infection and the spread of TB than it is for HIV, for example one needs to open windows which allow for a well-ventilated environment with fresh air and sunrays that are known to prevent the spread of TB bacterium. Sia and Wieland (2011, 358) revealed that a TB-infected patient should be admitted to a room that has enough windows, as a form of management of the condition.

In addition, the majority of second-year students appeared to be more knowledgeable about infection control and occupational health and safety as compared to students on other levels. However, this could be owing to the fact that the second-year students had an opportunity to attend information sessions on occupational health and safety and also workshops on infection prevention and control in their first semester of 2016. The importance of knowledge of occupational health and safety, and infection prevention and control should be promoted, strengthened and emphasised among nursing students. Makhado and Davhana-Maselesele (2016, 3) emphasised that it is of paramount importance for nurses to have adequate knowledge on how they can protect themselves.

The main sources of exposure to HIV remained the needle prick, blood splash and open contact with other body fluids. This could be owing to the lack of knowledge regarding universal precautionary measures, however, most exposed nursing students are senior students who should have this kind of knowledge and who should be able to protect themselves from HIV exposure. Researchers have found that the fourth-year level students had reported a high percentage of exposure to all the types of exposure, namely needle prick, blood splash and other body fluids, and the number of times they have been exposed was also higher than in all the other levels. The findings were in line with the findings of Delobelle et al. (2009, 1066) that revealed that seven in 10 nurses reported previous needle-stick injuries. However, the researchers found these results to

be in contradiction with the statement made by Nkoko et al. (2014, 384) that patterns regarding exposure to TB/HIV were found related to worker characteristics occurred where nurses with less than six years of experience in a department had more exposure than those with greater seniority in the field. This revealed that the level of exposure to TB/HIV can be reduced through training and workshops and not merely by the level of experience of the nurses.

A high percentage of students reported that they are aware of what PEP was, but there was still a slight percentage that claimed not to have information about PEP and those that were not sure whether it was available or not. The researchers deduced from the results that the lack of knowledge and uncertainty about the availability of PEP come from ignorance of students because as indicated, a higher percentage of nursing students reported that they were aware of the existence and availability of PEP. Delobelle et al. (2009, 1066) also reported that PEP was not available in all healthcare facilities. It is mandatory and necessary for nursing students to have sufficient knowledge about PEP and other preventive therapies as there is the potential of being exposed to infectious diseases at any given time during their engagement in a care-giving role. Sabane, Dixit and Durge (2011, 29) indicated that ignorance in this area of work can have a disastrous outcome on the health of nurses. Yassi et al. (2016, 2) also emphasise that adherence to routine immunisations and getting preventive therapies as well as immediate application of safe procedures for cleaning up blood and body fluid spills can reduce and prevent exposure to HIV, and that consistent practice of respiratory etiquette can reduce exposure to TB.

A small number of students reported that there was very limited clinical support in their clinical environment. Mabuda (2008, 22) indicated that student nurses reported that the college tutors were only seen in the clinical area when they came to evaluate them, but that they regarded their tutors as a source of support and guidance to improve clinical competence. They were, however, left to rely on professional nurses who also could not offer the necessary guidance, clinical teaching and supervision. This inability to offer the necessary learning support among professional nurses in the facilities was found to be due to heavy workloads and shortage of staff even though the Nursing Act (South Africa 2005) continuously empower professional nurses and midwives to assist, guide and support nursing students throughout their training.

It was also reported that there were not enough protective materials in the clinic as one would expect and this equally contributed to the high rate of infection for both HIV and TB. Ehlers (2006, 657), in support of this study's findings, indicated that protective clothing might not always be available or adequate in the clinical learning environment. Furthermore, if the quality of the personal protective clothing or equipment or the protection provided is doubtful, nurses might be less interested in wearing such protective clothing; this may increase the exposure to TB/HIV and enhance their chances of getting infected with TB/HIV. According to Yassi et al. (2016, 2) exposure is generally preventable with proper selection and use of appropriate PPE.

According to Makhado and Davhana-Maselesele (2016, 4) nurses are highly exposed to HIV and this has an effect on their management of PLWH/TB as they are scared to contract TB/HIV. This is seen in the results where students claimed to have been anxious after being exposed to TB/HIV and also being angry with themselves and the patients, which has an effect on the quality of care they provide to people infected with TB/HIV or those with unknown status. Yiu et al. (2010, 38) also provided insight indicating that a knowledge-only based intervention had no significant impact on nursing students regarding the increment of their willingness to treat PLWH, and reducing their fear of contagion and negative emotions from serving PLWH. This shows and highlights the importance of a combination of workshops, training and clinical learning support to students in TB/HIV management and TB/HIV occupational exposure preventive measures. Delobelle et al. (2009, 1061) also highlighted that three out of four nurses reported that they practised universal precautions (76.1%), but fear of occupational HIV transmission and the lack of injection safety were also reported. Participants reported a higher workload because of HIV/AIDS and a lack of training which had a negative impact on their work, and this has the potential to have an impact on their concentration and alertness as well as their ability to practice universal precautionary measures.

PRACTICAL IMPLICATIONS

The results of this study are of great importance to the development and improvement of safety policies and guidelines in health facilities and nursing education institutions with regard to universal precautionary measures for prevention, assistance in the management and control of TB/HIV, the improvement of measures in infection prevention and control, occupational health and safety, and the facilitation of the uptake of PEP and other preventive therapies aimed at curbing occupational exposure to TB/HIV. The results will also assist the NWU School of Nursing Sciences in planning for effective clinical learning support for the nursing students and the clinical learning curriculum.

LIMITATIONS

The findings cannot be generalised to other NWU campuses as only one campus was used for data collection. Time constraints and exams prevented other nursing students to participate in the study.

RECOMMENDATIONS

Recommendations of this study were made with regard to nursing education, clinical practice and future research.

Nursing Education

TB/HIV management is recommended to be included in the nursing curriculum starting from the first-year level as this have the potential to promote nursing students' confidence in providing care and to allay anxiety related to providing care to TB/HIV infected patients and patients with unknown status.

Clinical Practice

The study recommends that organisational provision of precautionary resources or protective clothing among all health services be prioritised and the implementation of universal precautionary measures be promoted and emphasised at all times. PEP induction training should be rendered to students as it forms an integral part of training in infection prevention and control. Infection prevention and control programmes should be promoted, implemented comprehensively and provided to nursing students to promote proper and effective TB/HIV management. Yassi et al. (2016, 2) and the WHO, ILO and UNAIDS (2010, 31) emphasised the importance of strengthening infection control programmes and ensuring a safe working environment for all health workers. This can be achieved through the occupational health, and infection prevention and control collaboration (WHO, ILO, and UNAIDS 2010, 31; Yassi et al. 2016, 2).

Future Research

It is recommended that research be conducted to evaluate occupational post-exposure prophylaxis (OPEP) and infection prevention and control programmes as well as studies based on student nurses to explore their attitudes and experience with regard to OPEP and TB preventive therapies.

CONCLUSION

The main purpose of the study was to determine the exposure to TB/HIV of nursing students in the clinical practice environment. The results revealed that the higher the level of study, the greater the exposure. There was a lack of clinical support from nursing staff and also the preceptors, which is thought to have equally contributed to the exposure of nursing students to both TB and HIV. Most exposures were associated with needle pricks for HIV and working in TB wards where nursing students are unsupervised and unmonitored. It is imperative that constant monitoring and supervision be provided for nursing students in the clinical learning environment and that infection control training and guidelines be offered with the aim of minimising the risk of exposure. In a nutshell, there is a need for more training, workshops and clinical learning support that must be provided for nursing students as a way to curb or reduce the level of exposure to TB/HIV.

ACKNOWLEDGEMENTS

The authors would like to acknowledge and thank all the nursing students who participated in this study.

REFERENCES

- Delobelle, P., J. L. Rawlinson, S. Ntuli, I. Malatsi, R. Decock, and A. M. Depoorter. 2009. "HIV/AIDS Knowledge, Attitudes, Practices and Perceptions of Rural Nurses in South Africa." *Journal of Advanced Nursing* 65 (5): 1061–73. <https://doi.org/10.1111/j.1365-2648.2009.04973.x>.
- Ehlers, V. J. 2006. "Challenges Nurses Face in Coping with the HIV/AIDS Pandemic in Africa." *International Journal of Nursing Studies* 43 (6): 657–62. <http://dx.doi.org/10.1016/j.ijnurstu.2005.11.009>.
- Lehmann, U., and J. Zulu. 2005. "How Nurses in Cape Town Clinics Experience the HIV Epidemic." *AIDS Bulletin* 14 (1): 7.
- LoBiondo-Wood, G., and J. Haber. 2014. *Nursing Research: Methods and Critical Appraisal for Evidence-Based Practice*. 8th ed. St. Louis: Mosby Elsevier.
- Mabuda, B. T. 2008. "Student Nurses' Experiences during Clinical Practice in the Limpopo Province." *Curationis* 31 (1): 19–27. <https://doi.org/10.4102/curationis.v31i1.901>.
- Makhado, L., and M. Davhana-Maselesele. 2016. "Knowledge and Uptake of Occupational Post-Exposure Prophylaxis amongst Nurses Caring for People Living with HIV." *Curationis* 39 (1): 1–6. <https://doi.org/10.4102/curationis.v39i1.1593>.
- Marchal, B., V. de Brouwere, and G. Kegels. 2005. "Viewpoint: HIV/AIDS and the Health Workforce Crisis: What are the Next Steps?" *Tropical Medicine and International Health* 10 (4): 300–4. <https://doi.org/10.1111/j.1365-3156.2005.01397.x>.
- Nkoko, L., J. Spiegel, A. Rau, S. Parent, and A. Yassi. 2014. "Reducing the Risks to Health Care Workers from Blood and Body Fluid Exposure in a Small Rural Hospital in Thabo-Mofutsanyana, South Africa." *Workplace Health and Safety* 62 (9): 382–8. <https://doi.org/10.3928/21650799-20140815-03>.
- Pisal, H., S. Sutar, J. Sastry, N. Kapadia-Kundu, A. Joshi, M. Joshi, J. Leslie, L. Scotti, K. Bharucha, N. Suryavanshi, M. Phadke, R. Bollinger, and A. V. Shankar. 2007. "Nurses' Health Education Program in India Increases HIV Knowledge and Reduces Fear." *Journal of the Association of Nurses in AIDS Care* 18 (6): 32–43. <http://dx.doi.org/10.1016/j.jana.2007.06.002>.
- Sabane, H. H., R. R. Dixit, and P. M. Durge. 2011. "Impact of Knowledge about Post Exposure Prophylaxis among Nursing Students – A Cross Sectional Study." *Healthline* 2 (1): 27–30.
- Sia, I. G., and M. L. Wieland. 2011. "Current Concepts in the Management of Tuberculosis." *Mayo Clinic Proceedings* 86 (4): 348–61. <https://doi.org/10.4065/mcp.2010.0820>.
- South Africa. 2005. *Nursing Act, 2005 (Act No. 33 of 2005)*. https://www.acts.co.za/nursing-act-2005/3_objects_of_council.

- Van Dyk, A. C. 2007. "Occupational Stress Experienced by Caregivers Working in the HIV/AIDS Field in South Africa." *African Journal of AIDS Research* 6 (1): 49–66. <https://doi.org/10.2989/16085900709490399>.
- WHO (World Health Organization). 2006. *The World Health Report 2002: Reducing Risks, Promoting Healthy Life*. Geneva: WHO.
- WHO, ILO and UNAIDS. 2010. *The Joint WHO-ILO-UNAIDS Policy Guidelines for Improving Health Workers' Access to HIV and TB Prevention, Treatment, Care and Support Services*. Geneva: WHO.
- Yassi, A., M. Zungu, J. M. Spiegel, B. Kistnasamy, K. Lockhart, D. Jones, L. M. O'Hara, L. Nophale, E. A. Bryce, and L. Darwin. 2016. "Protecting Health Workers from Infectious Disease Transmission: An Exploration of a Canadian-South African Partnership of Partnerships." *Globalization and Health* 12: 10. <https://doi.org/10.1186/s12992-016-0145-0>.
- Yiu, J. W., W. W. S. Mak, W. S. Ho, and Y. Y. Chui. 2010. "Effectiveness of a Knowledge-Contact Program in Improving Nursing Students' Attitudes and Emotional Competence in Serving People Living with HIV/AIDS." *Social Science and Medicine* 71 (1): 38–44. <https://doi.org/10.1016/j.socscimed.2010.02.045>.
- Zelnick, J., and M. O'Donnell. 2005. "The Impact of the HIV/AIDS Epidemic on Hospital Nurses in KwaZulu Natal, South Africa: Nurses' Perspectives and Implications for Health Policy." *Journal of Public Health Policy* 26 (2): 163–85. <https://doi.org/10.1057/palgrave.jphp.3200021>.