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A CROSS-SECTIONAL STUDY ON PREVALENCE AND FACTORS ASSOCIATED WITH BODY FLUIDS EXPOSURE AMONG NURSING STUDENTS OF BISHOP STUART UNIVERSITY

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A CROSS-SECTIONAL STUDY ON PREVALENCE AND FACTORS ASSOCIATED WITH BODY FLUIDS EXPOSURE AMONG NURSING STUDENTS OF BISHOP STUART UNIVERSITY.

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Page | 1 **ABSTRACT.**

Background:

Purpose: The purpose of this study was to determine the prevalence and factors associated with body fluid exposure among nursing students.

Method:

A cross-sectional study design that employed a quantitative method of data collection was used. This design took a short time and no intervention was done after data collection. A total of 107 participants were selected by simple random sampling technique and data obtained was analyzed by SPSS version 20.

Results:

One hundred eight nursing students consented to participate in the study and all completed questionnaires making it 100% response. The majority of the respondents (90.7%) had ever been exposed to body fluids with 55.1% having been exposed to blood .49.0% of the respondents were exposed to body fluids over 3 times during their clinical practicum. The overall findings from the study revealed a significant relationship between the level of education, availability and use of PPEs, annual IPC training, availability of PPEs, and number of patients with exposure body among nursing students.

Conclusion:

The study highlighted a large percentage (90.7%) of the nursing students to have been exposed to body fluids with most of them having been exposed to blood and had more than 3 exposures to body fluids during their clinical practice.

Recommendation:

Institutional administrators should also ensure that students are provided with support supervision and continuous medical education to empower them on proper waste disposal and infectious disease control/management.

Keywords: *Body fluids, Nursing students, Bishop Stuart University*

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BACKGROUND.

According to the Rentokil specialist Hygiene, 2024, Body fluids are liquids originating from inside the bodies of living humans and play a vital role within a person's body. In humans, body fluid can be classified into two major types according to location that is intracellular fluid and extracellular fluid (Biology Online, 2024). According to the Comfort Diagnostic Center, 2024, The extracellular fluid is the body fluid located outside the cell(s). It accounts for around 26% of the total body water composition in humans (Biology Online, 2024). Interstitial fluid, intravascular fluid (blood plasma), lymph, and trans-cellular fluid make up extracellular fluid. The intracellular fluid is the body fluid located within the cell(s), in humans' intracellular fluid makes up to 67% of

the total body water composition. Examples of body fluids are as follows; amniotic fluid, aqueous humor, bile, blood plasma, breast milk, cerebrospinal fluid, exudates, lymph, saliva, pus, semen, sputum, urine, tears, sweat, vomit, synovial fluid, sebum, pus, mucus pleural fluid, peritoneal fluid etc. The vital roles of body fluids include facilitating the transportation of oxygen and nutrients throughout the body, helping regulate body temperature, and maintaining an efficient metabolism of the body.

Worldwide occupational exposure to body fluids among health care workers (HCWs) and nursing students is about 35 million. In sub-Saharan Africa, the estimated pooled 12-month prevalence of body fluid exposure among nursing students was found to be 48.0%. As a consequence of continuous bodily fluid exposures, 66,000 HBV, 16,000 HCV, and 1,000 HIV infections occur among medical and nursing students each year in the

whole world. In Uganda most studies about body fluid exposure have been done among health care workers thus very little information is known about nursing students. In a study conducted in Guru Regional Referral Hospital and St. Mary's Hospital Lacor, in northern Uganda among nurses revealed that 46% of respondents were found to have been exposed to potentially infectious body fluids. Needle stick injuries are the commonest route of exposure, with a prevalence of 27.7%, followed by mucosal exposure 19.1%, contact with broken skin (5.5%), and lastly by a cut with sharp objects (5.1%) [Akpuh, N et al, 2020]

Exposure to body fluids is a daily risk faced by nursing students during their clinical practice. [Ogoina D et al, 2014].

Approximately 60 pathogens can be transmitted through occupational exposures, including viruses, bacteria, parasites, and yeasts, and hepatitis B (HBV), hepatitis C (HCV) and human immunodeficiency (HIV) viruses account for the majority of cases worldwide.

Medical and nursing students develop their skills by performing procedures in which they need to handle cutting and piercing objects with possible accidental contact with body fluids Souza-Borges, F. R. F. D., et al 2013. In some studies, It was reported that medical and nursing students (Park, J et al, 2012) have higher risks of suffering occupational exposures than graduate professionals. Several factors can contribute to this greater vulnerability among students, such as lack of experience, skills, or knowledge about how to handle certain instruments; anxiety; tiredness; lack of tutorial support; lack of care of oneself or other professionals, among others (Souza-Borges F et al, 2013).

Common means of exposure to blood and body fluids in health care sectors happen to be needle stick and sharp injuries then glove breakage, and skin contact with potentially infectious body fluids were also discovered. In light of this evidence, worldwide estimates indicate that 1 in 10 practicing students experience a sharp injury every year risk of accidental exposure to blood and body fluids is linked to activities like taking blood samples, giving injections, recapping already used needles, surgery, delivery, giving emergency care, cleaning up transportation of waste products and instrument processing procedures.

Exposure to body fluids is a daily risk faced by nursing students during their clinical practice while engaging in routine clinical activities in health facilities, nursing students are at risk of health occupationally acquired infections via blood and body fluid exposure, In response to this health problem, BF exposures have been prevented by engaging in serious prevention efforts, including training of health workers, routine immunization, post-exposure prophylaxis, improved waste segregation, and the use of standard protective equipment to prevent body fluids.

Nursing students are a group of medical students who are undergoing medical training under a nursing professional and they are always on the frontline and spend much more time with patients in hospitals. Because of this, they have increased the chances of body fluid exposure from patients since their level of knowledge of body fluid exposure protection is still low.

Therefore, this study will determine the prevalence and assess the factors associated with body fluid exposure among nursing students at Bishop Stuart University.

METHODS.

Study design.

A cross-sectional study that employed a quantitative method of data collection was used. This design took a short time and no intervention was done after data collection.

Study Setting.

The study was at Bishop Stuart University located in Mbarara City, kamukuzi division. BSU Ruharo campus (nursing campus) is located along the Mbarara–Bushenyi highway Bishop Stuart University Ruharo campus is a Christian University that has different courses and they include; Bachelor degree in Nursing science, Bachelor's degree in Nursing Completion, Diploma in Nursing Science, Diploma in Nursing Extension and diploma in nursing extension. Per Academic year, BSU has a population of 250 students. Bishop Stuart University has only one intake in January.

Study Population.

The study was conducted among nursing students in Bishop Stuart University Ruharo campus who were available during the period of data collection until when the required sample size was reached

Sample Size Determination.

The sample size was calculated using Taro Yamne's (1970) formula which states that $n = \frac{N}{1+N(e)^2}$

n= sample population

N=Total number of nursing students in clinical years.

e= Desired margin of error (0.05)²

Thus
$$\frac{147}{1 + 147 (0.05)^2}$$

= 108 Respondents were selected for the study.

Eligibility Criteria.

All nursing students at BSU in their clinical years were eligible to participate in this study

Inclusion criteria.

Nursing students in clinical years that were available and willing to take part in the research study.

Exclusion Criteria.

The nursing students who were not in clinical years and those who were critically ill

Sampling Procedure.

A simple random sampling method was used to choose participants, the researcher chummed papers of the same size, color, and shape into a box and participants who met the inclusion criteria were allowed to pick papers and those who picked YES were included in the study. Those who picked NO were excluded from the study.

Reliability of the Research Instrument.

Pretesting was done before it was used. This was to establish the consistency of the research instrument and to find out how predictable and accurate the instrument was to answer the research question. The pretest was done on 10 students of BNS 4 from Mbarara University of Science and Technology (MUST)

Validity of the Instrument

The study instrument was validated by checking for clarity, consistency, coherence with the conceptual framework and objectives of the study, and statement of the problem by the research supervisor. The content validity index (CVI) was also used in addition to the researchers' assessment. That is, the total numbers of valid items divided by the total number of items.

$$CVI = \frac{\text{Number of relevant items}}{\text{Total number of items in the questionnaire}}$$

According to Kothari (2011), the research instrument is considered valid if the CVI is above 0.60. Since the overall CVI is 0.7 the research instrument is considered valid for the data collection.

Data Collection Procedure.

Before collecting the data, the researcher obtained a letter of introduction from the head of the department and took it to the dean faculty of nursing and health sciences, Bishop Stuart University for permission. The study was explained to the participant before and any questions raised were answered and informed consent was obtained.

After this questionnaire were provided to the right participants.

Data Collection Tools.

The study employed self-administered semi-structured questionnaires for data collection. The questionnaire was developed from the literature.

The first part consisted of 6 Questions that collected data on the socio-demographic details of participants.

The second section consisted of 3 –questions that elicited information on the prevalence of body fluid exposure, the Third section consisted of 11–questions that gathered information on factors associated with body fluid exposures

Data Management.

Data collected was entered into Microsoft Excel and stored in one folder protected with a strong password on the laptop and was only accessed with the consent of the principal Researcher.

Also, at the end of each day, data collection tools were checked by the researcher for completeness to ensure no mistakes or any area left blank, and in case any were found, the tool would be corrected immediately before losing contact with the respondents and before leaving the study.

The data obtained was also stored in notebooks, computers, and a flash disk as a backup copy.

Data Analysis.

Data was entered into Excel and exported to SPSS, coded, and analyzed. On univariate analysis, frequency tables were generated. In bivariate analysis, the chi-square tool was used to determine the significant association between independent and dependent variables. A p-value of ≤ 0.05 was significant.

Ethical Consideration.

Following the approval of the research proposal at the departmental level, the researcher informed the class presidents of the respective classes about the nature of the study. A written informed consent was obtained from the participants and their confidentiality was observed throughout the study period. No names were used, respondents voluntarily chose to participate in the study, and they were free to withdraw at any time, without aftereffects.

PRESENTATION OF THE STUDY FINDINGS.

This chapter presents the findings, interpretation, and analysis of the data collected from the researcher-

administered questionnaires. Descriptive statistics such as percentages and frequencies were used to present data. Bivariate analysis with a chi-square test and p-value was performed to investigate the association between prevalence and factors associated with body fluid exposure among nursing students. Study findings were presented following the study objectives.

Demographic characteristics of respondents.

One hundred eight nursing students consented to participate in the study and all completed questionnaires making it a 100% response

Table 1: Showing socio-demographics.

Variable	Category	N (%)
Age	18-22 years	8(7.4)
	23-26 years	39(36.1)
	27-30 years	17(15.7)
	Above 30 years	44(40.7)
Gender	Male	34(31.5)
	Female	74(68.5)
Religion	Anglican	57(52.8)
	Catholic	33(30.6)
	Muslim	8(7.4)
	Pentecost	7(6.5)
	seventh day Adventist	3(2.8)
Program of study.	DNS	6(5.6)
	DNE	18(16.7)
	BNS	40(37.0)
	BNC	44(40.7)
Year of Study	1st year	26(24.1)
	2 nd year	22(20.4)
	3rd year	42(38.9)
	4 th year	18(16.7)
Marital status	Single	58(53.7)
	Married	50(46.3)

The study results indicated that the majority of the respondents were above 30 years (40.7%), doing nursing completion (40.7%), females (68.5%), being in the third year (38.9%), single (53.7%) and Anglicans (52.8%)

Prevalence of body fluid exposure among nursing students.

To ascertain the prevalence of body fluid exposure among nursing students, respondents were asked specific questions about whether they had been exposed to body fluids during their practicum placement what type of body fluids where they were exposed to, and how often they were exposed.

Table 2 shows the prevalence of body fluid exposure among nursing students.

Variable	Options	N (%)
Prevalence	Yes	98(90.7)
	No	10(9.3)
Number of times	1 time	10(10.2)
	2 times	28(28.6)
	3 times	12(12.2)
	above 3 times	48(49.0)
Types	Urine	14(14.3)
	Sputum	2(2.0)
	Amniotic fluids	23(23.5)
	Blood	54(55.1)
	wound exudates	5(5.1)

The majority of the respondents (90.7%) had ever been exposed to body fluids with 55.1% having been exposed to blood .49.0% of the respondents were exposed to body fluids over 3 times during their clinical practicum.

Factors associated with body fluid exposure among nursing students.

The factors associated with body fluid were categorized into student-related factors, institutional-related factors, and health facility-related factors.

Table 3: showing factors associated with body fluid exposure among nursing students.

Variable	Options	N (%)
Perception of risk	Low risk	12(11.1)
	Moderate risk	9(8.3)
	High risk	61(56.5)
Use of PPEs	Very high risk	26(24.1)
	Yes	88(81.5)
	No	20(18.5)
How often	all the time	24(27.3)
	most of the time	54(61.4)
	Sometimes	8(9.1)
	Rarely	2 (2.3)
If not, why?	no availability	13(65.0)
	inadequacy to protect	7(35.0)
IPC training	No	28(25.9)
	Yes	80(74.1)
How often	all the time	9(11.4)
	most of the time	15(19.0)
	Sometimes	40(50.6)
	Rarely	15(19.0)
Support supervision	all the time	6(5.6)
	most of the time	16(14.8)
	Sometimes	66(61.1)
	Rarely	20(18.5)
Number of patients		

	(5 -10) patients	36(33.3)
	(10 - 20) patients	44(40.7)
	above 20 patients	24(22.2)
Availability of PPEs	all the time	11(10.4)
	most of the time	13(12.3)
	Sometimes	54(50.9)
	Rarely	25(23.6)
	Never	3(2.8)
PPEs available	Gloves	81(80.2)
	Goggles	5(5.0)
	Facemasks	8(7.9)
	Gown	2(2.0)
	Apron	5(5.0)

The study results indicated that the majority of the respondents were, (56.5%) perceived occupational exposure to body fluids to be at high risk, (81.5%) use appropriate personal protective equipment (PPE) and out of those that use PPEs, 61.4% use them most of the time, the rest don't use appropriate PPEs due to non-availability (65.0%)

To ascertain the institutional factors related to body fluid exposure among nursing students, the respondents were asked whether they have had any infection prevention control (IPC) training in the past 12 months and how often and these were the responses, the majority (74.1%) said

they had an IPC training and more than a half of the respondents (50.6%) said they sometimes have an IPC training,(61.1%) sometimes had support supervision from clinical instructors onward, 55.9% rated the working environment in health facilities as fair and 40.7% attend to an average of (10 – 20) patients a day. Gloves being the most available (80.2%) (Table 3)

Association between Prevalence and socio-demographics.

Table 4 shows association between prevalence and socio-demographics.

Variable	Options	Have you ever been exposed to body fluids?		Chi-square	Df	P value
		Yes	No			
Age	18-22	8(8.2)	0(0.0)	3.004	3	0.697
	23-26	38(38.8)	6(60.0)			
	27-30	15(15.3)	2(20.0)			
Gender	Above 30	37(37.0)	2(20.0)	3.9971	4	0.7734
	Male	30(30.6)	4(40.0)			
	Female	68(69.4)	6(60.0)			

Religion	Anglican	52(53.1)	5(50.0)	9.938	4	0.763
	Catholic	31(31.6)	2(20.0)			
	Muslim	8(8.2)	0(0.0)			
	Pentecost	4(4.1)	3(30.0)			
	SDA	5(30.0)	2(20.0)			
education level	DNS	5(5.1)	1(10.0)	2.129	3	0.043*
	DNE	16(16.3)	2(20.0)			
	BNS	35(35.7)	5(50.0)			
	BNC	42(42.9)	2(20.0)			
year of study	1 st year	23(23.7)	3(30.0)	8.99	3	0.029*
	2 nd year	19(19.6)	3(30.0)			
	3 rd year	42(43.3)	0(0.0)			
	4 th year	13(13.4)	(40.0)			
Marital status	Single	53(54.1)	5(50.0)	4.3790	4	0.9087
	Married	45(45.9)	5(50.0)			
	Divorced	0(0.0)	0(0.0)			
	Windowed	0(0.0)	0(0.0)			

The overall findings from the study revealed a significant relationship between level of education $X^2(df=3) = 2.129$, p value=0.043, year of study $X^2(df=3) = 8.99$, p -value =0.029 with exposure to body fluids.

Table 5 shows the Association between prevalence and factors.

Variable	Options.	Have you ever been exposed to any bodily fluids during your clinical practice?		Chi-square value	Df	P value
		Yes	No			
Perception of occupational risk	No risk	0(0.0)	0(0.0)	3.9976	5	0.9642
	Low risk	10(10.2)	30(30.0)			
	Moderate risk	9(9.2)	0(0.0)			
	High risk	58(59.2)	3(30.0)			
	Very high risk	(21.4)	4(40.0)			
appropriate use of PPEs	Yes	78(79.6)	10(100.0)	2.505	1	0.014*
	No	20(20.4)	0(0.0)			
if yes, how often	all the time	20(25.0)	4(50.0)	2.852	3	0.0641
	most of the time	50(62.5)	4(50.0)			
	sometimes	8(10.0)	0(0.0)			
	Rarely	2(2.5)	0(0.0)			
If not, why	Non availability	13(65.0)	13(65.0)	2.908	4	0.803
	Difficulty using them	0(0.0)	0(0.0)			
	Inadequacy to protect	0(0.0)	0(0.0)			
	Mess-up makeup	0(0.0)	0(0.0)			
	Inadequate knowledge	7(35.0)	7(35.0)			
	Negligence	0(0.0)	0(0.0)			
Annual I (IPC) training	No	24(24.5)	4(40.0)	1.137	1	0.0286*
	Yes	74(75.5)	6(60.0)			
Rating of working environment	Excellent	0(0.0)	2(20.0)	2.5672	3	0.709
	Good	31(33.7)	4(40.0)			
	Fair	53(57.3)	4(40.0)			
	Poor	8(8.0)	8(7.8)			
Number of patients attending to the end of a day	below 5 patients	4(4.1)	0(0.0)	11.22	3	0.011*
	(5-10) patients	28(28.6)	8(80.0)			
	(10 - 20) patients	42(42.9)	2(20.0)			
	above 20 patients	24(24.5)	0(0.0)			
	all the time	11(11.5)	0(0.0)			

Availability of PPEs in the units	most of the time	9(9.4)	4(40.0)	8.704	4	0.049*
	Sometimes	50(52.1)	4(40.0)			
	Rarely	23(24.0)	2(20.0)			
	Never	3(3.1)	0(0.0)			

The overall findings from the study revealed a significant relationship between daily use of PPEs $\chi^2(df=1)2.505$, p -value =0.014, often use of PPEs $\chi^2(df=3)2.852$, p value=0.041, annual IPC training $\chi^2(df=1)1.137$, p value=0.0286, availability of PPEs in the units $\chi^2(df=4)8.704$, p value=0.049, number of patients seen each day $\chi^2(df=3)11.221$, p value=0.011 with exposure body among nursing students.(Table 5)

DISCUSSION.

Prevalence of body fluid exposure among nursing students.

Overall, (90.7 %) of the nursing students in the study had ever been exposed to body fluids and this could have been due to the negligence and inexperience among nursing students and low practice of standard precautions against exposure to body fluids.,

A higher prevalence of body fluid exposure was reported in other numerous studies such as 76 % in South Africa Cape Town (Myers, D J et al,2016).

The current study's proportion of body fluid exposure is also accordant with a study done by Giziew. A et al., (2020) in Ethiopia where 76% of the nursing students practicing at Gondar University Hospital have ever had a body fluid exposure.

However, this proportion doubles the reported prevalence of body fluid exposure in a systematic review of studies by Farsi et al (2012) conducted in 8 different hospitals in Tarhan` where a weighted mean prevalence of body fluid exposure was reported as 11.3 % (range 4.3 % to 17.4 %). The disparity in the proportion of students who experience body fluid exposure across countries may be explained by differences in the study setting, tools used to measure the levels of body fluid exposure, and differences in the years of study and practice onwards plus the programming of study are some of the contributing factors to body fluid exposure. The difference could also be attributed to heterogeneity and publication bias in the review.

The methodological differences between studies and different measurement tools might also be attributed to the difference in the prevalence of body fluid exposure among nursing students in different countries.

In addition, the socio-demographic and economic differences might also contribute to the difference in the prevalence of body fluid exposure among nursing students between this study and the studies from other developing countries.

The noted high prevalence of body fluid exposure to nursing students during their clinical placements may

negatively endanger the nurses' lives and the way they perform their daily nursing duties. The high prevalence may be explained by the factors discussed as follows;

Factors associated with body fluid exposure among nursing students.

This study identified different factors being significantly associated with exposure to body fluids that as Inappropriate use of PPEs ($P=0.0014$) and the poor institutional IPCs policies ($P=0.0286$), availability of PPEs (p -value =0.049), number of patients worked on each day (p -value =0.011) are the independent variables that revealed statistically significant association with exposure to body fluids. In this study, a higher prevalence of body fluid exposure was recorded in nursing students who are in their final years of clinical placement than those who were in their initial years (38.9% and 24.1% respectively). This may be explained by the complexity of the nursing procedures done by these nursing students while in their practicum as those in final years usually carry out procedures that expose them more to the body fluids like assisting in theatre and deliveries in labor suits than their counterparts in initial years are as indicated in prior studies Liu, Y., et al.,2022.

According to this study, inappropriate use of PPEs and poor institutional policies on infection prevention and control were statistically associated with body fluid exposure. More than two-thirds of the participants reported to be using PPEs sometimes and 51.6% reported their institution supporting them on the infection prevention measures

This is possibly because of to unavailability of the PPEs and the lack of the appropriate knowledge on how to use them and why it is important to do so hence the above association on the two factors.

However, it is also possible that the students might feel that the support they receive is not sufficient plus the possibility of them not advocating for enough PPEs.

A high prevalence of body fluid exposure was found in nursing completion students (40.7%), respondents, who worked on (10-20) patients every day (40.7%), and those who were not directly supported by their clinical instructors on the ward (61.1%).

GENERALIZABILITY.

The findings are therefore representative of the body fluid exposure among the said students but may not be generalizable to the entire nursing students' population

since not all of them are available at the same learning hours.

CONCLUSION.

A higher percentage of 90.7% of the nursing students who participated in the study had ever been exposed to body fluids.

Generally, the independent factors noted to be associated with body fluid exposure include the year of study, a program of study, institution policies on infection prevention measures, and the inappropriate use of PPEs.

RECOMMENDATIONS.

To the nursing education.

Institutional administrators should also ensure that students are provided with support supervision and continuous medical education to empower them on proper waste disposal and infectious disease control/management. Furthermore, the institutions should regularly train the nursing students on the various risks of exposure to body fluids and how to protect them.

To the nursing practice.

Enough medical supplies should be provided especially personal protective gear like gloves to protect nursing students from the risk of exposure to body fluids.

To the nursing research.

This study used a cross-sectional study design and employed quantitative measures. We therefore recommend other studies using different study designs on nursing students to reveal more factors associated with body fluid exposure.

More studies should be done to provide a baseline data about the prevalence and factors associated with body fluid exposure among nursing students.

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LIST OF ACRONYMS.

WHO	World Health Organization
MOH	Ministry of Health
BFs	Body Fluids
HCWs	Health Care Workers
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
HIV	Human Immunodeficiency Virus
CDC	Centers for Disease Control and Prevention
BSU	Bishop Stuart University
NIOH	National Institute on Occupational Health

CONFLICT OF INTEREST.

The author declares no conflict of interest.

SOURCE OF FUNDING.

The study was not funded.

KEY DEFINITIONS.

Body fluids, Body fluids are liquids originating from inside the bodies of living humans and play a vital role in a person's body.

Nursing students are a group of medical students who are undergoing medical training under the nursing profession.


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