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Original Research Article

The pattern of sharp injuries and its associated factors among healthcare workers in Gambella town, Southwest Ethiopia

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ABSTRACT

Background: The objective of the study was to assess the pattern of needle stick and sharp injuries and associated factors among healthcare workers in Gambella Town, Southwest Ethiopia.
Methods: Institutional-based cross-sectional study was conducted from 05 March to 20 April 2019. A total of 368 healthcare workers were recruited using a systematic random sampling procedure. The data were entered into Epi info 7 and exported to statistical package for the social sciences (SPSS) version 21 for analysis. P≤0.20 was used to select variables from bivariable logistic analysis to multivariable logistic analysis. P value of ≤0.05 with 95% confidence level was used to identify variables that were associated with needle stick and sharp injuries.
Results: The prevalence of needle stick and sharp injuries among healthcare workers in Gambella town was 113 (32.2%) 95% CI (27.43, 36.97) with mean age of 30.35±7.73. Work experience >10 years [AOR=2.24, 95% CI: (1.13, 4.43)], absence of training on occupational health and safety [AOR=4.89, 95% CI: (2.21, 10.84)], working more than 48 hours/week [AOR=3.44, 95% CI: (1.76, 6.74)], dissatisfaction with their work [AOR=3.76, 95% CI: (2.12, 6.69)], having low risk perception [AOR=5.82, 95% CI: (2.59, 13.07)], and having moderate risk perception [AOR=3.44, 95% CI: (1.83, 6.49)] were significantly associated with needle stick and sharp injuries.
Conclusions: There was high prevalence of needle stick and sharp injuries among healthcare workers in Gambella town. Lack of training, low-risk perception, dissatisfaction with the working environment, long working hours, and long working experience were associated with needle stick and sharp injuries.

Keywords: Needle stick and sharp injury, Healthcare workers, Gambella, Ethiopia

INTRODUCTION

Needle stick and sharps injuries (NSSIs) refers to medical or laboratory equipment (needles, shredded intravenous cannulation devices, broken glass fragments, lancets, pipettes or ampules, and injectors) that can cause skin penetration injury.[1] It is the most serious occupational hazards among health care workers (HCWs) and more than 20 dangerous blood-borne pathogens are transmitted by contaminated needles, mainly, hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV).[2-4]

Center for Disease Control (CDC) estimates, health workers reported 385,000 NSSIs yearly.[5] An estimated 600,000-800,000, 100,000, and 500,000 needle sticks and other percutaneous injuries are also reported annually among the US, UK, and Germany HCWs, respectively.[6-8] The World Health Organization (WHO) also estimated the global burden of disease from occupational exposure to be 40% of the hepatitis B and C infections and 2.5% of the HIV infections among HCWs due to exposures at work and HCWs experience 2 million needle stick injuries (NSIs) per year that consequence in infections with hepatitis B and C and HIV.[9] The fraction of infections with

HCV, HBV, and HIV in HCWs attributable to occupational exposure to percutaneous injuries fraction reaches 39%, 37%, and 4.4% respectively.[10] On the other hand, it has been shown that 50% or more of the NSSIs was not reported.[5] In addition to the aforementioned communicable disease, HCWs also experience severe emotional distress, fear, anxiety which leads them to occupational and behavioral changes due to NSSIs.[8,11,12]

Certain work activities such as handling trash, blood sampling, administering injections, recapping and disposing of needles, and during the transfer of body fluid from a syringe to a specimen container are major activities causing NSIs.[13] Health workers working in operating, delivery and emergency rooms and laboratories have an increased risk of exposure. Cleaners, waste collectors, and others whose duties involve handling blood-contaminated items are also at risk.[14]

Previously conducted studies in Ethiopia indicate that the prevalence of HCWs' exposure to NSSIs ranges from 13.2% to 55.1%. An earlier study conducted in Bahir Dar hospitals reports a high prevalence of sharps injuries among HCWs 42.8%.[15]

Even though studies have been done to some part of Ethiopia but, the problem still high. There are no studies done in the Gambella region to assess the burden of needle stick and sharp injuries. Therefore, the main aim of this study was to assess the prevalence and associated factors of NSSIs among HCWs in Gambella Town, Southwest Ethiopia.

METHODS

Study design, area and period

Institutional based cross-sectional study was employed from 05 March to 20 April 2019 in Gambella town, Southwest Ethiopia. Gambella town is the capital city of Gambella regional state located 777 kilometers away from Addis Ababa, the capital city of Ethiopia. It has a hot and dry climate located in 527 meters above sea level. The town has two public general hospitals and 4 health centers with 8 private clinics. According to data from the Gambella regional health office, a total of 1121 different HCWs were related to needle stick and sharp injuries.

Study population, inclusion and exclusion criteria

All health professionals working in Gambella town administration were source population and the study participants who were working in Gambella town health institutions at least for one year were study participants of the study.

All HCWs who were engaged in the direct day to day care of patients and those who have direct contact with needle stick and other sharp objects in the selected health facilities were included in the study. Health care students who are working with internships were excluded from the study.

Sample size determination and sampling technique

The sample size was determined using a single population proportion formula and considering that the prevalence of needle stick injury 31% from a similar study conducted in Gondar town, 95% level of confidence, and 5% margin of error. Therefore, the sample size was determined as 329. By assuming a 10% non-response rate, the final sample size was decided as 362.[16]

A list of HCWs was taken from Gambella regional health office and a total of 1121 health workers were served in the town in different health areas. The samples were selected by using a systematic random sampling technique by calculating the interval K as 1121/362=4. By using the lottery method one out four was selected and every 4th health professional has participated in the study.

Operational definitions

NSSIs

It is defined as any cut or prick to the HCWs by a needle or any other sharp objects like hypodermic needles or syringes, razors, glass, lancet or surgical instrument that has been contaminated with blood or other body fluid.[18]

HCWs

They are defined as those health workers working in the health institution and have contact with syringes, needles, and other sharp materials by the virtue of their duties. This group includes physicians, health officers, and all types of nurses, anaesthetists, laboratory technicians, midwives, and cleaners.[19]

Risk perception

HCWs' perceived risk or opinion about acquiring occupational injury (such as NSSIs) or exposure to blood/body fluids while on duty.[20]

Data collection tools and procedure

The data were collected using a structured and pre-tested anonymous self-administered questionnaire adapted from previous related works of literature.[15-17] The questionnaire contains socio-demographic, behavioral, environmental, and NSSIs variables. Health care professionals were filled each question by taking enough and any missing of filling the question were checked immediately when brought from the participants otherwise it was considered as non-respondent. The training was given for data collectors and a supervisor for one day by the principal investigator before the data collection period. The questionnaire was pre-tested to identify potential problem areas, unanticipated interpretations, and cultural objections in 18

respondents having similar characteristics with the study subjects in Abobo Catholic health centre 36 kilometers away from Gambella. Based on the pretest results, the questionnaire was additionally adjusted contextually and administered to the whole samples of healthcare workers. The data was finally collected using four clinical nurses and public health officer as a supervisor.

Data quality assurance

The questionnaire was prepared originally in English and translated to Amharic and back to English to keep the consistency of the questions. Training of data collectors and the supervisor was given one day before the data collection period and pre-testing of the questionnaire was made to ensure the quality of data. Counter checking of daily filled questionnaires was made by the supervisor and the principal investigator. Besides, eliciting the completed questionnaires daily to ensure completeness and consistency of the information collected was done by the principal investigator.

Study variables

The occurrence of NSSIs in the past 12 months among HCWs was the dependent variable of this study. Socio-demographic parts of the independent variables include; Age, sex, job category, level of education, monthly salary, work experience, and behavioral factors contains recapping of needles, risk perception, awareness of diseases transmitted by needle stick and sharps injury, job satisfaction, reporting pattern of NSSI and use of personal protective equipment (PPE).

Besides, working environment related independent variables include; occupational health safety training, length of working hours per week, the existence of safety guidelines, shift work, availability of sharps containers (safety boxes), and working department.

Data processing and analysis

Data were entered using Epi Info 7 statistical software and then exported to statistical package for social sciences (SPSS) version 21 for further analysis. Descriptive statistics were presented using statistical parameters including; percentages, means, tables, and standard deviations. Bi-variable logistic analysis was used primarily to check which variables have an association with the dependent variable (NSSIs) and then entered into multiple logistic regressions for controlling the possible effect of confounders with the cutting point of $p \leq 0.20$. Finally, the variables which had a significant association with needle stick and sharp injuries were identified based on a 95% confidence interval and a p value of ≤ 0.05. The strength of the association between the independent variables and the outcome variable was shown using crude and adjusted odds ratios (OR) to fit into the final regression model.

Ethics approval and consent to participate

The ethical approval was obtained from the University of Gondar, college of medicine and health sciences, the school of medicine ethical review committee and supporting letter was taken from Gambella regional health office. Then, verbal consent was obtained from all study participants, and confidentiality was kept. Those health care workers who refuse to participate in the study were given a full right to withdraw from the study. Each respondent was informed about the objective of the study identifiers like names was avoided from the questioner to keep the confidentiality of the participants.

RESULTS

Socio-demographic characteristics of participants

Out of 362 HCWS, 351 participated in this study, resulting in a response rate of 96.96% with a mean age of 30.35 (standard deviation±7.73). Almost half of 166 (47.2%) of the participants were nurse health professionals. More than half 213 (60.7%) of the participants were in the age group of 18-29 years and 141 (41%) of them were first degree and above. Also, more than half of 202 (57.5%) of the participants had working experience of fewer than five years (Table 1).

Behavioral and environmental characteristics

Absence of work guidelines at the workplace was reported by 124 (35.2%) of the HCWs and only 95 (27%) of the respondents had received training on occupational health and safety (OHS). The majority of 319 (91%) of the respondents reported that they had never been provided a written protocol for reporting NSSIs in their organization. Almost all of the participants 336 (95.7%) had awareness regarding disease transmission through NSSIs and more than half 211 (60%) of the HCWs reported their injury occurred during their respective managements. The most common reasons for non-reporting were lack of awareness about reporting procedure 123 (35.0%) and only 117 (33.4%) of the respondents reported that they never recapped needles after use. Almost all of the study participants 322 (91.7%) used at least one type of PPE (Table 2).

Almost half 52 (47.2%) of the source of injury for participants were from syringe needle and only 3 (2.7%) of the source of injury was from scissors. Syringe needles (47.2%), followed by intravenous cannula (catheter) (12.3%) were the most common pieces of equipment involved in NSSIs. A majority of the injuries occurred during injection (24%), followed by assembling sharps after use (15%). The highest percentage of the NSSIs occurred on Monday (36%), followed by on Friday (22 %), and the most common time of injury was in the morning (46.2%) followed by afternoon (25.5%) (Table 3).

Table 1: Socio-demographic characteristics of healthcare workers in Gambella Town, Southwest Ethiopia, 2019.

Variables	Frequencies (n=351)	
	Number	Percentage (%)
Sex		
Male	184	52.4
Female	167	47.6
Age group		
18-29	213	60.7
30-39	80	22.8
40-55	58	16.5
Educational level		
Primary school	44	12.2
Secondary school	38	10.2
Technical and vocational school	7	1.5
College diploma	121	35.1
First degree and above	141	41.0
Marital status		
Married	140	40.1
Single	180	51.1
Divorced	18	5.2
Widowed	6	1.7
Separated	7	1.9
Religion		
Orthodox	182	51.8
Protestant	83	23.7
Muslims	74	21.1
Catholic	12	3.4
Job category		
Housekeepers/cleaners	75	21.4
Nurse	166	47.2
Midwifery	38	10.8
Health officer	22	6.3
Laboratory technologist	31	8.8
Anesthetist	3	0.9
Physician	16	4.6
Work experience in years		
<5	202	57.5
5-10	80	22.4
>10	69	20.1
Monthly income(salary)		
1500-2500	80	22.7
2501-3750	111	31.5
3751-5500	92	26.2
5501 and above	68	19.4

Table 2: Behavioral and environmental characteristics of study participants in Gambell town, Southwest, Ethiopia, 2019 (n=351).

Variables	Frequency	Percentage (%)
Recapping of needles after use		
Yes	234	66.6
No	117	33.4
If so, how do you recap the needles (n=234)?		
With one hand	168	71.8
With two hands	66	28.2

Continued.

Variables	Frequency	Percentage (%)
Risk perception of needle stick and sharp injuries		
Low risk	45	12.8
Moderate risk	79	22.5
High risk	227	64.7
Awareness of diseases transmission via NSSI		
Yes	336	95.7
No	15	4.3
Do you think needle or sharp injuries are avoidable?		
Yes	182	51.9
No	169	48.1
Do you use personal protective equipment?		
Yes	322	91.7
No	29	8.3
Was the safety box available in your workplace?		
Yes	222	63.2
No	129	36.8
Did you face any needle/sharp injuries in the past 12 months during your work activities?		
Yes	113	32.2
No	238	67.8
At what time of your work do you face the injury?		
Morning	162	46.2
Afternoon	69	19.6
Night	120	34.2
Did you get medical care after you injured?		
Yes	109	31.0
No	242	69.0
Did you report your injury to the concerned body?		
Yes	211	60.1
No	140	39.9
Why did you not report the condition?		
Thinking ‘not important’	138	39.4
Lack of awareness about reporting	123	35.0
Fear of stigma	90	25.6
Were safety guidelines in your working place?		
Yes	227	64.8
No	124	35.2
Was there a reporting protocol of injuries in your organization?		
Yes	319	90.8
No	32	9.2
Ever had training on occupational health safety?		
Yes	95	27.0
No	256	73.0
Are you satisfied with your job?		
Yes	123	35.1
No	228	64.9
Are you satisfied with your working environment?		
Yes	247	70.4
No	104	29.6

Table 3: Distribution of causes of NSSIs among health care workers in Gambella Town, Southwest Ethiopia, 2019.

Types of item caused the injury	Number	Percentage (%)
Syringe needle	52	47.2
The intravenous cannula (catheter)	14	12.3
Scalpel blade	10	8.5
Suture needle	9	7.5
Glass item	7	6.6
Blade	7	6.6
Lancet	6	4.7
Butterfly needle	5	3.9
Scissor	3	2.7
Activities performed during the injury		
Recapping	14	12.0
Operating needle cap	9	8.0
Injection	24	21.0
Drawing blood	13	12.0
Assembling waste	15	13.0
Operating	14	12.0
Securing IV	12	11.0
Catheterizing	9	8.0
Other	3	3.0

Table 4: Factors associated with NSSIs among health care workers in Gambella Town, southwest Ethiopia, 2019.

Variables	Yes	No	COR (95%CI)	AOR (95%CI)
Working experience (years)				
<5	58	144	1	1
5-10	23	57	0.94 (0.51, 1.7)	0.58 (0.29, 1.18)
>10	32	37	2.31 (1.31, 4.07)**	2.24 (1.13, 4.43)***
Ever had training on OHS				
No	100	156	4.54 (2.3, 8.95)*	4.89 (2.21, 10.84)*
Yes	13	82	1	1
The average number of hours worked per week				
<48	19	106	1	1
>48	94	132	4.52 (2.5, 8.15)*	3.44 (1.76, 6.74)*
Risk perception				
Low	24	21	4.48 (2.28, 8.82)*	5.82 (2.59, 13.07)*
Moderate	42	37	4.31 (2.47, 7.53)*	3.44 (1.83, 6.49)*
High	47	180	1	1
Working environment satisfaction				
No	56	48	4.11 (2.51, 6.75)*	3.76 (2.12, 6.69)*
Yes	57	190	1	1

OHS: occupational health and safety, NSSIs: needle stick and sharps injuries, *p<0.05, **p<0.01, ***p<0.001

Factors associated with NSSIs among HCWs

After entering all variables with p value of ≤0.20 from bi-variable logistic regression to multivariable logistic regression analysis, work experience, lack of training on occupational health and safety (OHS), high workload, lack of perception of risk and dissatisfaction with the working environment were significantly associated with NSSIs.

HCWs with >10 years of work experience were more 2.24 times more likely to expose NSSIs as compared to those with experience of (<5 years) [AOR=2.24, 95% CI: (1.13, 4.43)]. HCWs who had never taken any training on OHS were 4.89 times more likely to report NSSI than those who had taken training on OHS [AOR=4.89, 95% CI: (2.21, 10.84)]. Similarly, the odds of developing NSSIs among health workers who worked more than 48 hours/week was 3.44 times more likely than those who had worked 64 hours/week [AOR=3.44, 95% CI: (1.76, 6.74)]. Similarly, having low-risk perception [AOR=5.82, 95% CI: (2.59, 13.07)] and moderate risk perception [AOR=3.44, 95% CI: (1.83, 6.49)] were significantly raised the odds of NSSIs occurrence as compared to those HCWs who had a high-risk perception for NSSIs. Besides, HCWs who

dissatisfied with their work environment reported 3.76 times more NSSIs than those who were satisfied with their working environment [AOR=3.76, 95% CI: (2.12, 6.69)] (Table 4).

DISCUSSION

The prevalence of NSSIs among HCWs working in Gambella town in the last 12 months was 113 (32.2%) 95% CI (27.43, 36.97) showing that NSSIs are common risks in the study area. This result is in line with studies reported from Ethiopian regional Hospital, Dessie city, Ethiopia 28.3%, Hawassa 35.8%, Gondar 30.8%, German 31.4% and India 35.3%.[8,16,21-24] The proportion of the present study is lower than studies Addis Ababa and 38%.[25,26] Furthermore, the present study was higher than other studies carried out in Turkey 21.6%, Dire Dawa 26.6%, Tigray 25.9%, and Malaysia 23.5%.[27-30] These discrepancies might be due to the number of HCWs working in the facility, different work environments, and availability of resources, study design used, and socio-economic status of the study participants between the study areas.

In the present study, the prevalence of the NSSIs was highest in nurses (47.3%), similar to the results from other several studies in Iran and United States.[11,31] This could be because nurses administer most of the injections and are responsible for intravenous fluid administration and other procedures which require the use of needles and other sharp objects. Also, the insufficient number of nurses and medical devices at workplaces, distraction at work, heavy workload, poor organization, multiple or repeated attempts to complete a procedure, and spending more time in direct patient contact may have increased their vulnerability to such injuries.

Consistent with the findings of other studies Bahir Dar, Iran, Bale, Virginia, and Gondar, syringe needles were the most frequent cause of NSSIs (47.2%).[15,16,32-34] This might be due to their use in every department of the health care facilities. Replacement of the traditional needles with safer needle devices such as needleless sets, safety cannula, self-capping intravenous catheters, self-retracting lancets for blood glucose monitoring, and auto-disposable syringes certainly helps in reducing injuries among HCWS. Besides, syringe needles are the most used types of instruments used by different HCWS that might contribute to the occurrence of NSSIs.

The present study revealed that most of the NSSIs (23.6%) reported during injections, which is similar to Turkey and a literature review has done across the world.[1,12] This may be due to unexpected or sudden movement by the patient during injection or momentary lack of concentration, resulting in injury. Even though HCWs have repeated the procedure hundreds of times, one slip can cause injury with potentially serious consequences.

This study also showed that most of the injuries (40.6%) occurred on Monday which might be related to comparatively high patient flow and heavier workload after the weekend. About 46% of NSSIs occurred in the morning shifts as observed in findings from Iran which may be due to more influx of patients in the morning shift, sometimes causing inattentiveness among HCWs due to workload.[32]

The participants who had no training on OHS were 4.89 times more likely to expose NSSIs as compared to those who underwent training on OHS [AOR=4.89, 95% CI: (2.21, 10.84)] which is in line with the study done in Gondar, Tigray, and Dessie city.[16,21,22,29] Arranging proper training is more practical objective than buying expensive equipment and due to lack of OHS training, HCWs may not be familiar with the different mechanisms of prevention of NSSIs associated with their activities and may, therefore, be at risk for such injuries.

Participants with working experience of >10 years were 2.23 times more likely to develop NSSIs than those having <5 years of experience [AOR: 2.24, 95% CI: (1.13, 4.43). This is similar to a study done by Addis Ababa.[20] So simply having work experience is not enough, training on precautionary behaviors and the use of safety-engineered needles is needed. It is recognized that adverse schedule characteristics such as long work hours significantly increased the risk of NSSIs. On the other side, studies done in Tigray and working experience <5 years is positively associated with the occurrence NSSIs than those who had an experience of 10 years and above.[29]

Furthermore, the present study indicated that working >48 hours/week were 3.44 more likely as compared to those who worked ≤48 hours/week [AOR=3.44, 95% CI: (1.76, 6.74)] which is in line with a study carried out in Dire Dawa, Tigray, Iran and literature review done in Africa.[28,29,32,35] The possible reason for this could be that working excessive hours can result in stress and emotional and physical exhaustion, which are likely to increase the chance of human error and contribute to a tendency towards risky behaviors, such as recapping needles and poor compliance with the precautions.

Long working hours are also an indicator of understaffing, a common phenomenon in underdeveloped countries including Ethiopia. HCWs scheduled for long work hours must be provided with short breaks to refresh themselves.

Limitations

The need of recalling what happens to health care professionals in the last 12 months was a big challenge in the data collection.

CONCLUSION

The finding of this current study showed a high prevalence of NSSIs among HCWs.

The main reason for this was a poor practice of universal precautions, lack of training, low-risk perception, long working hours and experience, absence of the written protocol for reporting needle stick and sharp injuries, recapping needles, and lack of safety instructions.

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