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Original Research Article

To Assess the Safe Administration of Injections among Nurses in a Secondary Setting, Uganda

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Abstract: Injection safety is important in the prevention of medication errors, infection, needle injuries, and discomfort to patients. The purpose of this study is to assess the steps in the safe administration of injections in a secondary setting in Uganda. A cross-sectional study design was the methodology adopted. Collected data with a non-participatory observational checklist, constructed using WHO - Revised Injection Safety assessment tool C. Permission from the Institutional Board and individual oral consent from nurses was obtained. Seventy-five procedures (intravenous, intradermal, intramuscular, and subcutaneous) were observed in four steps: prevention of infection, safety measures to prevent errors, promoting patient safety and comfort, and prevention of needle-stick injuries. Data were analyzed using descriptive analysis. The intravenous injection was the most common procedure observed in this study. Nurses had moderate scores in the safe administration of injections. There was statistical significance seen between certain selected variables and steps of safe administration.

Keywords: Injection safety, Routes of injection, Prevention of infection, Safe administration of injections, Patients' safety and comfort, Prevention of needle-stick injuries.

INTRODUCTION

Injections are a widely used procedure globally. More than 95 % of the injections are therapeutic and 5 % are for preventive purposes in vaccination and family planning. It is believed that most of the therapeutic injections in low and middle-income country are not needed (Hutin *et al*., 2003). Injections that are given safely do not create any harm or injury to the patient, health personnel or society (Simonsen *et al.*, 1999).

The goal of the safe administration of injections is to prevent infection , reduce medication errors, provide comfort and safety, and prevent needle stick injuries (Doyle & McCutcheon, 2015). Unsafe injections have led to 3 million bacterial infections and blood-borne infections including 34, 0000 HIV infections, 15 million Hepatitis B, and one million Hepatitis C infections. . In 2008, unsafe injections accounted for 7 % of bacteremia, 14% of HIV infections, 25% of HBV, and 8 % of HCV which causes long–term damage *(Bower et al.*, 2015).

Interruption is one of the factors contributing to medication errors. Other major contributors to mediations errors include increased job stress related to workload, lack of equipment, limited time, and being unable to continue without disturbance (Bower *et al*., 2015). Personal and systems factors contributed to medication errors among palliative nurses (Heneka *et al*., 2019). Medication error rates (19-27 %) have been predicted using direct observational studies. They influence both patients and nurses in a negative form (*Medication Errors Observed in 36 Health Care Facilities Clinical Pharmacy and Pharmacology JAMA Internal Medicine JAMA Network*, n.d.) Westbrook 2010). Even a small percentage of errors can lead to dangerous results for patients and for a nurse's professional life (Gladstone, 1995; Jones & Treiber,

2010). In order to avoid medication errors and follow safety it is wise to follow the principles of medication administration's 5 rights – right patient, right medicine, right route, right time, and right dose (Dimond, 2003).

Needle stick injury (NSI) is common, encountered by the provider. About 30 different infectious diseases can be transmitted by NSI among which the chances of acquiring hepatitis B infection are much higher than other infections. Unfortunately, in developing countries, fewer numbers of healthcare workers are vaccinated against hepatitis B, and recapping needles is a common cause of needle stick injuries while working in a stressful work environment even among doctors (Khurram *et al.*, 2011). Finger wounds related to instruments were seen among Cambodian nurses (Kanagasabai *et al*., 2020).A study conducted at mission hospitals in Nigeria showed that there is a gap identified between needle stick injuries (58.2%) and protocol on post-prophylactic drugs (0.6%) (Omorogbe *et al.*, 2012).

The administration of medicines is only part of the nurse's role, but it is a very important one. Handled correctly, medicines can make a significant contribution to improving patients' health; however, handled badly, they can do a lot of harm (Alexis & Caldwell, 2013). Administering medication is a high-risk procedure that nurses carry out every day. Medication errors are a major problem in medication administration and is very common. A system approach can be used to reduce these medication errors (Anderson & Webster, 2001). There is a need for strengthening the medication competency among nurses (Sulosaari *et al*., 2011).

The use of unsafe injections has reduced from 1.35 to 0.6 % across the globe. In sub-Saharan Africa, it is 0.04-0.05% unsafe injections on average per year (Pépin *et al*., 2013). Uganda accounted for an average of 0.9 injection per person per year. 85% of the outpatient visits resulted in injection for curative purposes (Simonsen *et al*., 1999). However, a WHO report stated that unsafe injection are reported in the entire world and reuse of syringes and needles are reported in Sub –Saharan countries (*Injection Safety*, n.d.). So there is need to assess the safe administration of injections to help strengthen safe infection practices in clinical nursing. A study done in a secondary setting affiliated with Mulago Hospital, Kampala, Uganda in the medical wards to assess the practices. The study ward admits patients with endocrine, neurological and gastrointestinal issues. The objectives of this study were: i) to assess the safe administration of injections ii) to assess the relationship between selected demographic data and steps of administration of injections.

METHOD

Uganda is in East Africa. It has a 5-tier health system with Village Health Centre (VHT), Health Centre II, Health Centre III, Health Centre IV and Hospitals. Hospitals and major health centres are mostly located in the Kampala, the capital city. This study was done secondary setting attached to national referral tertiary care hospital. Institutional Review Board permission was obtained from Mulago Hospital and individual consent was obtained from the nurses before observations were done.

Data was collected using purposive sampling in a cross-sectional design over 3 weeks in a medical ward. An on-participatory observational checklist was used, prepared from WHO - Revised Injection Safety Assessment Tool C (World Health Organization, 2008). The checklist had two sections. The first section included demographic data like age, education, experience of nurses and type of injection observed. The second section had four divisions in common for all types of injections. The steps were prevention of infection, safe administration of the injection, patient safety and comfort and prevention of needle stick injuries. Prevention of infection had 11 questions and safety administration had 13 questions each in all categories – Intravenous (IV), Intramuscular (IM), Intra dermal (ID),and Sub cutaneous (SC). However, the number of questions differ in second section for the third and fourth steps such as in promoting patient safety and comfort and prevention of needle stick injuries depending on the type of injection. In promoting safety and comfort step -IV had 10 questions, IM had nine questions, ID had 11 questions and sub cutaneous had 10 questions since the procedural steps were different. In prevention of needle -stick injury session the first six questions were the same for all type of injections followed by four questions only similar for ID and SC however in IM the last 3 questions which was different from others.

Each day after the observation, the data was entered into a Microsoft Excel document. Each correct answer considered as 1 point, while wrong or and not applicable responses were considered as 0 points. Correct answer means that the step of injection procedure carried out as in the checklist and wrong means they did not perform correctly or not applicable. The minimum score was 0 points, and the maximum score was "1". Depending upon the score, the steps were grouped as good, moderate and poor. Score received above 58 is considered good, moderate score is between 39-58 and less than 39 is poor.

Data were analysed using the Statistical Package for the Social Sciences (SPSS) program for Windows (version 22.0). Descriptive statistical methods employed for of nurses' demographic characteristics and items scores on safe administration of injection (average, standard deviation, percentage), and Pearson Chi-square. A probability level of 0.05 or less was used to indicate statistical significance.

RESULTS AND DISCUSSION

Table 1: Demographic data of the Nurses (n= 75)

Variable	Classification	Frequency	Percentage
Age	20-30 yr	8	10.70%
	30-40 yr	22	29.30%
	40-50 yr	30	40%
	Above 50 yr	15	20%
Education	Diploma	38	50.70%
	B.Sc.N	30	40%
	M.Sc.N	7	9.30%
Experience	1- 3 yr	8	10.70%
	3-6 yr	30	40%
	6-10 yr	22	29.30%

Table 1 revealed that 40 % of the nurses in the age bracket between 40 to 50 years of age, which is similar to the study done in Cambodia where the average age was 38.4 ±11.7 years (Kanagasabai *et al*., 2020). Half had a Diploma in Nursing (50%) with 3-6 years of experience. Most of them as moved up from Enrolled nurses to current level. Around 46 % of the injections administered by the nurses were Intravenous as was true in a New Zealand study (Westbrook *et al*., 2011a). The total percentage among nurses who followed the steps was 90.7 % moderate in all major steps of injection administration in prevention of infections, safe medication administration, promoting safety and comfort during injection and safe disposal of syringes, and prevention of needle stick injuries.

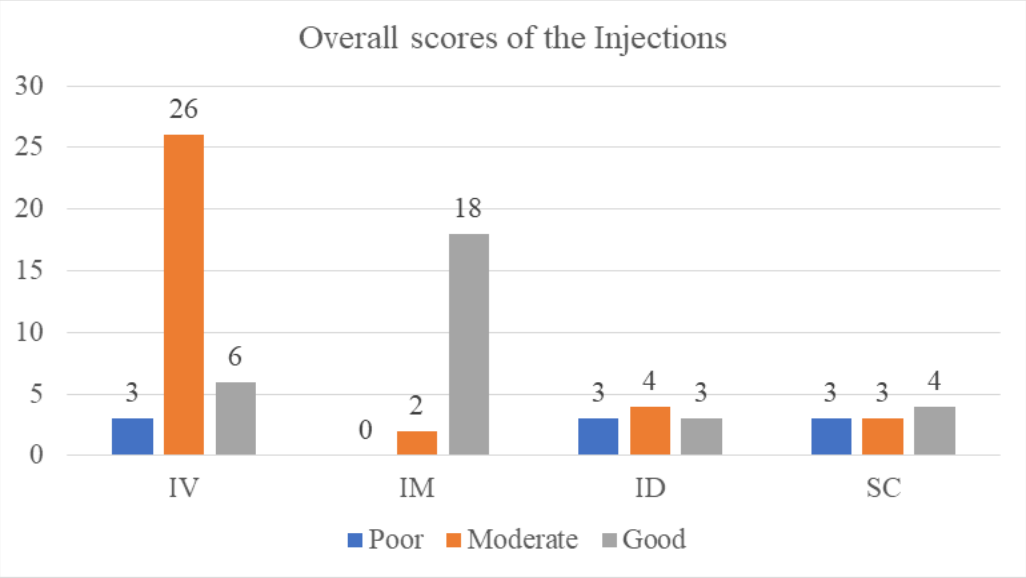

Figure 1: The overall scores of injections (n=75)

Fig 1 shows out of 35 IV procedures, observed, 26 had moderate score. IV injections was one of the most common injections done at the Hospital. Previous studies have noticed that error rates are higher in IV injections (Westbrook *et al*., 2011a). During the first 6 years of nurses experience the severity of medication errors decline by 10.1% in each successive years of experience (Westbrook *et al*., 2011b). It was observed that the severe errors rates in UK and Germany have been due to poor mathematical knowledge during bolus and reconstitution of drugs among the nurses (Gladstone, 1995; Taxis, 2003).

Out of 20, 18 Intramuscular injections scored good score. This shows that the nurses are skilled at the steps in administering IM injections when compared to a study done at Solvenia where the nurses knowledge and practice was limited (Fekonja, 2021).

Table 2: Descriptive statistics of the four steps of injection administration (n=75)

	Step 1	Step 2	Step 3	Step 4	Total
Mean	8.89	9.91	7.19	20.4	46.39
Median	9	10	7	20	48
SD	1.681	2.157	1.353	4.113	5.304
Minimum Score	2	4	3	7	32
Maximum Score	11	13	11	28	57
Step 1	Prevention of infection				
Step 2	Safe administration of injection				
Step 3	Promoting patient safety and comfort				
Step 4	Prevention of needle stick injuries				

Table 2 signifies that the mean and median are not equal for each step of the safe administration of the injection. The minimum score is 2 and the maximum score is 57.

Table 3: Correlation between overall steps and four steps of injection administration

Total steps	Steps	r value	P value
Overall steps	Prevention of infection	0.423	0.000*
	Safe administration of the injection	0.489	0.000*
	Patient safety and comfort	0.323	0.005*
	Prevention of needle stick injuries	0.754	0.000*
r value inference	.70 to .90 -High positive (negative)correlation		
	.30 to.50 - Low positive correlation		

Correlation is statistical significance since the P value is less than 0.05

Table 3 shows that there is an individual correlation between the overall steps and all four steps of injection administration. Prevention of needle stick injuries showed highly positive correlation with overall steps.

Table 4: Demographic data of the Nurses and the steps of Injection Administration (n=75)

Variable	Steps of Injection Administration	Value	df	P value
Age	Safe administration	20.988	6	0.002*
	Prevention of Needle stick injuries	14.081	6	0.029*
	Prevention of Needle stick injuries IV	9.401	3	0.024*
	Prevention of Needle stick injuries IM	20.407	3	0.000**
Experience	Safe administration	18.076	6	0.006*
	Prevention of Needle stick injuries	22.995	6	0.001*
	Prevention of Needle stick injuries IV	11.467	3	0.009*
	Prevention of Needle stick injuries IM	29.327	6	0.000**
Education	Patient safety and comfort	16.168	4	0.003*
Type of injection	Prevention of Injection	16.494	6	0.011*
	Safe Administration of Injection	37.047	6	0.000**
	Prevention of Patient Safety and comfort	16.81	6	0.010*
	Prevention of Needle Stick Injuries	28.706	6	0.000**
	*** Highly significancant			
	** Significancant			

Table 4 shows that there is statistical significance in the following areas: demographic data like age has statistical significance with safe administration of injection and prevention of needle stick injuries. Age of the nurse and prevention of needle stick injuries in IM is highly significant. This might be due the responsibility that nurses take in professional career and years in developing clinical skills and knowledge gained, would have contributed to overall better scores.

It was found that there was a statistical significance between experience and safe administration of injection in all types, which might be due to experience being a good teacher and the skills acquired from repetition. Experience and prevention of needle stick injuries have significance. At least one needle stick injury was experienced once in 12 months among healthcare workers (67%) in Egypt (Hanafi *et al.*, 2011). Even in a recent study sharp instruments account for finger wounds among nurses (Kanagasabai *et al*., 2020). However, we have to remember that the higher the prevalence of unsafe infections there is a high risk of blood-borne disease (Varghese *et al*., 2003).

This study found that education had significance over the patient s safety and comfort in all types of injections, which demonstrates that with higher education of the nurses, there is increased patient safety and comfort. Nurses' education does influence holistic care in injection safety.

The study revealed that the type of injection influences all four steps prevention of infection, safe administration, patient safety and comfort, and prevention of needle stick injuries. To ensure safety and reduce errors in reconstitution, WHO recommended pre-prepared injections (World Health Organization, 2008).

To reduce overall healthcare costs, serve safety and efficacy along with patient preference regarding the route of medication to improve treatment adherence while administering injections (Jin *et al.*, 2015). Areas for future studies include a)Exploring injection safety among nurses b) Pre and post-test training assessment of nurses' knowledge, attitude, and practices regarding safe administration of injections c) this study can be repeated using a standardized tool in multiple settings d) a qualitative study of the nurses and their practices can be explored.

CONCLUSION

This study reveals that the overall score on safe injection administration among nurses is moderate where most of them received score in-between 39 to 58. There are significance seen between certain selected demographic variables with the steps of safe administration of injections. Nurses are most often the administrators of injections to patients. It is important that they adhere to patient safety at all times. Medication competency and injection safety empowers nurses to create safe environment.

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