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Original Research Article

A study on safe injection practices among healthcare professionals in a tertiary care hospital in Delhi

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ABSTRACT

Background: As per available estimates, around three billion injections are administered annually in India and out of these, 1.89 billion are being unsafe. The present study was undertaken to observe and assess injection practices among Healthcare Professionals (HCP) in a tertiary care hospital.
Methods: This was a cross-sectional, descriptive study conducted among doctors and nurses of purposively selected five departments in a government tertiary care hospital in Delhi. Primary data was collected using Self-administered questionnaire (SAQ) technique for which WHO Tool C Questionnaire was suitably modified, pre-tested and administered to HCP. Number of participants were 250 (131 doctors and 119 nurses). Injection practices were also observed in HCP and a total of 126 observations (60 in doctors & 66 in nurses) were made. Collected data was analyzed using Microsoft Excel & SPSS.
Results: Though overall injection practices of the HCP were satisfactory but unsafe practices with respect to use of unclean surface for injection preparation (35%), not maintaining proper hand hygiene (33%) and not segregating bio medical waste at source by (22.3%) HCP were observed.
Conclusions: Though **c**ompliance to best international injection practices in many areas were observed still unsafe practices were observed. Guidelines on Injection safety, Post Exposure Prophylaxis (PEP), judicious use of injections and reporting of adverse events/ sentinel events/near miss events to be prepared by the hospital at the earliest. It must be ensured that these guidelines are complied with by the HCP.

Keywords: Injection, Practices, Healthcare professionals, World Health Organization

INTRODUCTION

World Health Organization (WHO) define safe injection as the one which does not harm the recipient, does not expose the provider to avoidable risk, and does not result in waste that is dangerous for the community.[1]

WHO has estimated that about 16 billion injections are administered each year in developing and transitional countries.[2] The estimated number of injections per person per year is 3.4 (range 1.7–11.3) in these developing and transitional countries. Proportion of unsafe injections is estimated to be 39% (range 1.2–75%).[3] In some areas of the WHO South East Asian region (which includes India) the estimate for unsafe injection is as high as 75%.[3] It has been estimated that in India around three billion injections are administered annually and of them 1.89 billion being unsafe.[4]

In developing countries, injection is regarded as a powerful tool to heal disease.[5] Patients are pleased and may feel that they have obtained the best care when they are administered injections. Health workers get financial and status rewards by using injections. Hence a mutually reinforcing cycle exists between the patient and the injection provider which is responsible for frequent use of injections.[6]

Unsafe injections can lead to morbidity and even to death. It may lead to avoidable risks to patients, to health care providers and to the community. Each year, hundreds of thousands of health care workers are estimated to be at risk for infections like Hepatitis B and C and the human immunodeficiency virus (HIV) due to unnecessary and avoidable accidents from needle stick injuries (NSI) and mucosal exposures.[7] It has been estimated that unsafe injections lead to 40% cases of hepatitis C, 32% of hepatitis B, and 5% of human immunodeficiency virus (HIV) infections each year. The risk of transmission of infection in an unsafe injection from an infected patient to the HCP following an NSI are: -Hepatitis B- 3-10%; Hepatitis C- 3%; HIV- 0.3%.[8] Complications such as injection abscesses and nerve damage may also occur following unsafe injections. Unsafe injections are also been responsible for outbreaks of viral hepatitis like the outbreak reported of Hepatitis B in 2009 in Gujarat.[9] This was investigated and 40% of all positive cases (n=856) gave history of receiving therapeutic injections in the past 1.5 to 6 months. It is estimated that every year around 13 lac deaths (3 lacs in India) are caused by unsafe injection practices among medical practices.[10]

In view of scarcity of studies in India on safe injection practices among HCP in tertiary care hospitals, this study was proposed and was undertaken.

METHODS

Study design and setting

This study was a descriptive, cross sectional study conducted in a government tertiary care hospital, New Delhi from December, 2017 to March, 2018.

Study participants

From the study hospital five departments where injection procedures were frequently practiced were selected Study participants included: -doctors (both Junior Residents (JR's) and Senior Residents (SR's)) and nurses working in the purposively selected five departments i.e. Medicine, Surgery, Pediatrics (including immunization services in outpatient department), Gynecology and Obstetrics and Emergency.

Sample size

The sample size for the present study was calculated by using the formula $(1.96)^2pq/ d^2$, with allowable error of 6%. This came out to be 249 and total number of HCP who participated in this study were 250 (131 doctors and 119 nurses).

Methods of data collection

After obtaining written informed consent from the HCP, they were interviewed in the form of Self-administered questionnaire (SAQ). WHO tool C was used for SAQ with modification. The modified tool was pretested in large hospital in Delhi. Primary data was collected using SAQ technique from all the 250 HCP. Moreover, 126 observations (60 in doctors and 66 in nurses) of injection administration were made for assessing the practices.

Method of data analysis

The collected primary data was analyzed using Microsoft Excel and Statistical Package for the Social Sciences (SPSS version 23).

Ethics

The protocol for this study was reviewed and Institutional ethical clearance obtained. For collecting data from the study hospital, written permission was obtained from competent authority. Those participants who did not give consent were not included in the study.

RESULTS

The final results were arrived at with the help of analysis of SAQ and Observation of injection practices as described below.

Self-administered questionnaire (SAQ)

Primary data collected from all the 250 HCP (131 doctors and 119 nurses) in the form of SAQ. This data was analyzed and the responses received are presented in Table 1.

More than three-fifth HCP stated that injection safety guidelines were available with them but researcher could not find separate guidelines on injection safety in the hospital. The hospital was covering the topic of injection safety under infection control guidelines only. More than one tenth HCP stated in SAQ that they rub injection site after administering intramuscular injections. Around 4% HCP stated in SAQ that they recap the needle after injection administration.

Observation of injection practices

In total, 126 injection practices were observed i.e. half of the HCP were observed for injection practices. 60 of these injection practices were performed by doctors and 66 were performed by nurses. In total 80 (63.5%) therapeutic injections, 26 (20.6%) vaccination injections and 20 (15.9%) phlebotomies were observed. During

Observation of injection practices, no loose disposable injection equipment's were found inside the facility. One syringe and one needle were routinely used for one patient and no attempt was made to sterilize the injection equipment.

Table 1: Analysis of responses received from participants on the questions pertaining to their injection practices (SAQ).

S.no.	Practices inquired from participants using SAQ	Total study participants were 250	
		Yes (%)	No (%)
1	Availability of Injection safety guidelines at their workplace	67.6	32.4
2	Availability of Bio Medical waste disposal guidelines at their workplace	96.8	3.2
3	Taking consent before administering injection	72.8	27.2
4	Cleaning the needle with cotton/ alcohol swab before giving injection	6.8	93.2
5	Rubbing of injection site after giving intramuscular injection	14.4	85.6
6	Correct identification of colour coded categories for BMW management	87.6	12.4
7	Use of needle destroyer or a hub cutter for disposing the used needles	96.8	3.2
8	Recap the needle after injection administration	4	96
9	Bend the needle before its final disposal	10.4	89.6
10	Remove the needle from injection before its final disposal	5.2	94.8

Table 2: Details of observations made as per type and route of administration of injections.

Type of injections	Route of injection administration	Name of the departments									
		Emergency n=26		**Gynecology & Obstetrics n=24**		**Medicine n=24**		**Pediatrics n=28**		**Surgery n=24**	
		Doctor	Nurse	Doctor	Nurse	Doctor	Nurse	Doctor	Nurse	Doctor	Nurse
Therapeutic injections	Intramuscular	2	2	2	2	2	2	2	2	2	2
	Subcutaneous	2	2	2	2	2	2	2	2	2	2
	Intravenous injection	2	2	2	2	2	2	2	2	2	2
	Intravenous infusion	2	2	2	2	2	2	2	2	2	2
Vaccination injections	Intramuscular	2	2	2	2	2	2	2	2	2	2
	Intradermal	0	2	Not Practiced		Not Practiced		0	2	Not Practiced	
	Subcutaneous	Not Practiced		Not Practiced		Not Practiced		0	2	Not Practiced	
Phlebotomies		2	2	2	2	2	2	2	2	2	2
		12	14	12	12	12	12	12	16	12	12
Total		26		24		24		28		24	

The details of observations made in HCP as per the type and route of administration is presented in Table 2.

HCP were observed from the time they started preparing the injections and till the time of its biomedical segregation, these observations of injection practices are presented in Table 3.

Around one third of the injections were not prepared on clean worktable or tray and around one third of the HCP were not performing hand wash before administering injections. More than four fifth of the HCP were not using clean barriers to protect fingers while breaking glass ampoules and hence, predisposing them for injuries.

Just above one tenth of the HCP were rubbing the injection site after administering intramuscular injections.

During the past one year around one-fifth of the total HCP reported to having suffered accidental Needle Stick Injuries (NSI). Nurses sustained more accidental NSI (29.4% of nurses) as compared to doctors (10.7% of doctors). Around three fifth of the study participants who sustained NSI were required to undertake PEP. None of the wards or immunization OPD in the study hospital were having guidelines on PEP displayed. Nearly around one tenth HCP stated that they had undergone injury by sterile needles several times and they just cleaned the injured area with spirit swab.

Table 3: Observations of injection practices among the study participants.

S.No.	Injection practices observed	Total observations made	Practices observed to be followed (in numbers)	Percentage of injection practices observed to be followed (in %)
Practices observed prior to injection administration				
1.	Preparation of Injections on a Clean Worktable or Tray	126	82	65
2.	Hand hygiene	126	85	67.1
3.	Gloves used prior to beginning of injection session (gloves were not changed in between the session)	126	94	74.6
4.	Consent taken before administering injection	126	72	57.1
5.	Cleaning of patient skin before injection	126	121	96
Practices observed during injection administration				
6.	Removing of needles from the cap of multidose vials	20	12	60
7.	Use of clean barriers to protect fingers when breaking glass ampoules	40	5	12.5
Practices observed after injection administration				
8.	Recapping of needles after injection administration	126	5	4
9.	Rubbing after administering intramuscular injection	40	5	12.5
10.	Biomedical waste segregation at source	126	98	77.7

DISCUSSION

Overall injection sessions observed in the HCP were found to be satisfactory. All injections observed involved disposable syringes without reuse which is highly recommended.

The site where injections are being prepared is very important since it may harbour the source of infection from the blood or other body fluids, soiled linen, cotton or other materials. In the present study in 65% observations, injections were prepared on clean working tray. In contrast, in a study by Sahu, Gandhi in Chhattisgarh only 33.6% injections were prepared on clean working tray.[11] In another study by Mehta DR, Pillai, et al in a tertiary care teaching hospital they found that working tray was clean in 84.20% observations of total injections given and hence better infection prevention as compared to present study.[12]

In the present study 67.1% study participants were observed washing their hands before administration of injection sessions. This practice was found to be much better than observations in various other studies like when compared with study done by Sahu, Gandhi in Chhattisgarh where they found that 70.3% study participants did not washed their hands.[11] In another study by Rehan et al, 95.4% unsafe practices with respect to not washing hands were found.[13] In another study by Paul et al. conducted in nurses in Kolkata about 12.5% study subjects washed their hands with soap and water before administering injection.[14]

In the present study 74.6% of study participants were observed to wear gloves before starting injection sessions and the gloves were not changed in between for each patient. In an interventional study in Nigeria by Enwere and Diwe, they found that all doctors and laboratory scientists always used gloves compared to 94.8% (91/96) nurses while handling patients or material.[15] In another study by Paul et al conducted in nurses in a tertiary care hospital of Kolkata it was found that only 3.7% nurses wore sterile gloves before starting injection administration.[14]

The study done by Hauri et al suggested that avoiding needle recapping and other hand manipulation is essential to prevent needle stick injuries.[16] Two handed recapping of the needle should be avoided as it is the most common cause of needle stick injury encountered. In the present study recapping of the needle was found only in 4% observations. Study by IPEN found that recapping was nearly one third 30.8% for plastic syringes and when glass syringes used, it was 16.5%.[4] When present study was compared with study done by Sahu, Gandhi in Chhattisgarh where recapping of needle was found in 33.1%.[11] In another study in Cambodia (Rapid assessment of injection practices in Cambodia, 2002) it was found that 58% injection providers recapped the syringe after use.[17] In another study by Mehta, et al in a

tertiary care teaching hospital they found that recapping of needles was done in 12.2% of injection providers.[12]

In the present study it was observed that in 96% of observations the patient skin was cleaned by alcoholic swab in proper manner from inward to outward circular manner. This is a good practice as it prevents contamination of the injection site from the periphery of the limb. In another study by Mehta, et al in a tertiary care teaching hospital in which out of total injections in 82.90% injections given, skin was cleaned with spirit cotton swab.[12]

Covering of neck of ampoule is recommended in "Guide to Good prescribing" by WHO with a purpose to prevent injury to the hands of health care provider from broken pieces of ampoule in case of mishandling of ampoule.[18] In the present study no gauze piece was covered over neck of the ampoule in 87.5% of the observations where glass ampoule was broken. This practice may prove dangerous as ampoules broken in such fashion could have Micro granules of glass inside the medicine. These if aspirated and injected to patients could have serious implications.

In the present study biomedical waste segregation at source was done as per existing guidelines in 77.7% of observations. In IPEN Study bio medical waste segregation was done only at 6.2% of health facilities at the country level.[4] Hence, this practice has shown remarkable improvement in present study but still requires improvement.

Injection practices were satisfactory among HCP but there is lot of scope for improvement. Good practices like use of 100% standard disposable syringes, no attempt made to sterilize the injection equipment, availability of hand hygiene facilities, availability of colour coded bins and sharp containers for safe biomedical waste disposal, no stock out of injection equipment reported during the last one year, no sharp objects lying in open containers or lying inside or outside area of the hospital, availability of sufficient safety boxes and proper storage and disposal of these safety boxes as per the standard WHO guidelines. On the other hand, this study also documented practices which were not confirming to standard WHO guidelines like non- availability of separate guidelines on the topics of injection safety, judicious use of injections, PEP and reporting of adverse or near miss events. Unsafe injection practices were also observed like not preparing injections on clean workable tray (35%), not removing needles from the cap of multidose vials (40%), doing recapping of needles (4%), not following hand hygiene (33%) and not using clean barriers (87.5%) to protect fingers while breaking glass ampoules in the study hospital.

There was scope of improvement in injection practices which could be implemented by reinforcing good practices in training sessions and conducting surprise ward rounds and supportive supervision. The number of HCP who reported accidental needle stick injuries during previous one year were nearly one-fifth only. These could further be reduced by procuring safety engineered devises, reuse prevention injection equipment's, which are recommended by WHO also. Needle Stick Safety and Prevention Act, 2000 in America mandates the use of safety-engineered medical devices (SEMDs) within United States healthcare facilities to protect HCP and patients from the risk of needle stick injuries.[19] Such legal provisions with strong implementation are lacking in India. Community participation or involvement in the form of their education and improving awareness on safe injection practices is suggested. Regular sessions of interactions with patients and their attendants on safe injection practices to be conducted. Community could be informed on injection safety through IEC material in the form of leaflets, posters, banners, displays and audio-visual messages at patient waiting areas.

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