Injection Safety Awareness and Knowledge among Healthcare Professionals in a Tertiary Care Hospital in Delhi

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Abstract

Background: In some areas of the WHO South East Asian region (which includes India) the estimate for unsafe injection is as high as 75%. Safety of the patients, healthcare professionals (HCP) and the community are ensured by adequate knowledge of HCP of injection safety. The present study was undertaken to assess injection safety knowledge among HCP in a tertiary care hospital.

Objective: To assess knowledge and safety awareness of injection among HCP.

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. Knowledge of HCP was assessed using self-administered questionnaire (SAQ) based on modified and pre-tested WHO tool C on injection safety. Number of participants were 250 (131 doctors and 119 nurses). Collected data was analyzed using Microsoft excel & Statistical Package for the Social Sciences (SPSS version 23).

Results: Overall 16.8% of HCP had correct knowledge regarding WHO definition of injection safety. Knowledge was found to be good among HCP on correct injection techniques. Awareness of study participants on Universal precautions was not satisfactory as only 53.2% HCP had correct knowledge.

Conclusion: The study findings identified many gaps in the existing knowledge among HCP on injection safety. These gaps need to be filled by having separate injection safety guidelines, regular trainings of HCP, seminars and workshops on injection safety topic.

Keywords: Injection safety, Knowledge, HCP, NSI, WHO

Introduction

World Health Organization (WHO) defines 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. 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%).1 In some areas of the WHO South East Asian region (which includes India) the estimate for unsafe injection is as high as 75%.1 It has been estimated that in India around three billion injections are administered annually and of them 1.89 billion being unsafe.1 These nearly sixty three percent of injections were found unsafe both in public and private healthcare settings by IPEN study in 2003-20044.

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Unsafe injections can lead to morbidity and even to death. It may lead to avoidable risks to patients, to HCP and to the community. Doctors, nurses, healthcare waste management personnel and other healthcare workers (HCWs) encounter work-related hazards associated with their clinical and laboratory activities in the hospital. Each year, hundreds of thousands of HCP 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. It has been estimated that unsafe injections lead to 40% (2 million) cases of new hepatitis C, 32% (21 million) of new hepatitis B, and 5% (260000) of 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%. Complications such as injection abscesses and nerve damage may also occur following unsafe injections.

Any safe practice is dependent on the level of knowledge and injection safety is not an exception, with this perspective, this study was proposed and was undertaken. The study findings identified many gaps in the existing knowledge among HCP on injection safety.

Materials and Methods

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

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, Pediatric (including immunization services in outpatient department), Gynecology and Obstetrics and Emergency.

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

After obtaining written informed consent from the participants, they were interviewed in the form of Self-administered questionnaire (SAQ). WHO tool C was modified to prepare this SAQ. This modified tool was pretested in a large hospital in Delhi. Primary data on the knowledge of injection safety was collected using this SAQ from all the 250 study participants.

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 gave consent were not included in the study.

Results

In the present study 250 participants (131 doctors and 119 nurses) filled and returned the SAQ. Out of these 250 HCP, 137 (54.8%) were in the age range of 25-29 years; 153 (61.2%) HCP were females; 89 (35.6%) HCP had work experience up to 1-5 years; 192 (76.8%) HCP were fully immunized against hepatitis B and 48.8% HCP had received training on injection safety in last 2 years (Table 1).

| Characteristics          | Number | %   |
|--------------------------|--------|-----|
| Age in years             |        |     |
| 20-24 years              | 58     | 23.2|
| 25-29 years              | 137    | 54.8|
| 30-34 years              | 49     | 19.6|
| 35-39 years              | 6      | 2.4 |
| Years of experience      |        |     |
| <1 Year                  | 77     | 30.8|
| 1-5 Years                | 89     | 35.6|
| 6-10 Years               | 66     | 26.4|
| 11-15 Years              | 14     | 5.6 |
| 16-20 Years              | 4      | 1.6 |
| Attended training/seminar on injection safety | Duration of training varied from 1.5 hours to 3 days | 122 | 48.8 |

For assessment of knowledge of injection safety, a pretested SAQ was used. This pretested questionnaire was distributed among all the HCP in the selected five departments after taking their consent. The questions were related to assessing their knowledge on injection safety. Although a total of 17 questions were there to assess their knowledge on injection safety. Analysis of collected data of most important questions asked in the SAQ is being presented in a compiled form in Table 2.

The correct knowledge of safe injection as per WHO definition was present in 16.8% of the HCP. This is a matter of concern as HCP should be aware of all the components of injection safety. Awareness of HCP on Universal precautions was not satisfactory as only around half of them could respond correctly on this aspect. Knowledge of HCP on the diseases transmitted by unsafe injection was excellent for HIV and HBV (99.6%) and was good for HCV (79.6%). Around three fifth of the study participants knew how to administer injection in case of small cut on hand. Knowledge on post exposure prophylaxis (PEP) and personal protective equipment’s (PEP) was found to be satisfactory averaging around 70-75%. More than three fifth HCP were not aware of complications caused by unsafe injection practices apart from blood borne infections. Knowledge on the steps to be followed in case of Needle Stick Injuries was not satisfactory (53.2%). Less than three fifth (56%) of the study participants were found to be having knowledge on the safe disposal of...
injection related bio medical waste. This lack of knowledge can lead to higher infections and chances of higher needle stick injuries in the HCP themselves, in the patients and in the community also.

Around one-fifth of the respondents replied that they had NSI during the previous one-year period and they all reported their injuries to the concerned authority. Hospital had adequate facilities for investigating such injuries, proper provision of PEP and recording of such injuries.

Similar findings were found in the study by Kulkarni RS et al." among nurses in a tertiary care teaching hospital of Marathwada region of Maharashtra where 75.7% participants were not aware about concept of injection safety. In the present study, the study participants had excellent knowledge about risk of transmission of pathogens like for HIV and HBV (99.6 %) and good knowledge for HCV 79.6%. In the national level study by IPEN among nurses in a tertiary care teaching hospital of Maharashtra where 75.7% participants were not aware about concept of injection safety.

Table 2. Knowledge of study participants (n=250) on different aspects of injection safety

| S. No. | Question asked in the SAQ | Number of participants whose responses was correct and complete | % of participants who gave answers correctly and completely |
|-------|---------------------------|---------------------------------------------------------------|----------------------------------------------------------|
| 1.    | What do you understand by Injection safety? | 42 | 16.8 |
| 2.    | What do you mean by “Universal Precautions”? | 132 | 52.8 |
| 3.    | Can you name the diseases that are transmitted to health workers and patients by unsafe injections? • HIV & HBV • HCV | 249 | 99.6 |
| 4.    | What other complications apart from transmission of blood borne diseases can happen by unsafe injections? | 74 | 29.6 |
| 5.    | Will you give/ administer an injection in case of existing small cut on your hand? Yes/ No If yes, then how will you administer the injection? | 153 | 61.2 |
| 6.    | What are the personal protective equipment’s? Kindly enumerate them | 185 | 74 |
| 7.    | What do you understand by needle stick injuries? | 181 | 72.4 |
| 8.    | What do you understand by sharps injury? | 174 | 69.6 |
| 9.    | What do you understand by Post Exposure Prophylaxis? | 178 | 71.2 |
| 10.   | What to do in case of accidental needle stick injury? | 133 | 53.2 |
| 11.   | Safe disposal of injection related bio medical waste | 140 | 56 |

In one of the questions in the SAQ the HCP were asked as regards the procedure of correct injection techniques in the form of precautions to be taken before, during and after administering different types of injections. This was asked as an open question and responses received were compared with the Guide to good prescribing, practical manual, WHO. Those respondents who mentioned the correct techniques were having complete knowledge and all those respondents who either gave partially correct responses or incomplete responses were considered to be having no knowledge. HCP especially doctors were having more knowledge of intravenous injections 89.3%, intravenous infusions 90.8% and phlebotomies 93.1%. HCP who were having more knowledge on therapeutic injections 89.9% were nurses. Knowledge on injections for vaccination was almost equal in doctors (87.8%) and nursing officers (87.4%), details are in Figure 1.

Discussion

In the present study around one fifth (16.8%) of HCP had complete knowledge of the concept of injection safety as per WHO definition. Similar findings were found in the study by Kulkarni RS et al." among nurses in a tertiary care teaching hospital of Marathwada region of Maharashtra where 75.7% participants were not aware about concept of injection safety. In the present study, the study participants had excellent knowledge about risk of transmission of pathogens like for HIV and HBV (99.6 %) and good knowledge for HCV 79.6%. In the national level study by IPEN among nurses in a tertiary care teaching hospital of Maharashtra where 75.7% participants were not aware about concept of injection safety.

In fourth 74.1% of the prescribers thought that transmission of blood borne viruses like hepatitis and HIV could take place because of unsafe injection. Similar results to the present study were obtained in a study conducted in Cambodia where ninety percent of prescribers and injection providers were aware that HBV, HCV, and HIV were transmitted through unsafe injection practices. Various other studies done in different geographical locations indicates a wide variation in the knowledge of diseases transmitted by unsafe injections among HCP. To cite a few, in a study by Omorogbe VE et al." among nursing staff of mission hospitals in Benin City, Nigeria they found knowledge of the specific hazards and infections associated with unsafe injection practices as 86.2% HIV/AIDS, 55.3% HBV, and 38.3% HCV. In another study done by Onyemocho A et al." among health workers in a Nigerian prison they found that 65.9% respondents knew about HIV/AIDS, Hepatitis B, & C which could be transmitted through unsafe infections, in one of the Indian studies by Paul B et al." in Kolkata, West Bengal, it was found that 81.3% knew that HIV/AIDS and
71.3% knew that Hepatitis B could be transmitted through unsafe injections.

Figure 1. Knowledge of correct routes of injection administration among study participants

In the present study, more than two third study participants (76.4%) gave correct response about color code for waste sharp management. This knowledge on waste sharp management was found to be less when compared with study findings by Kulkarni RS et al. where majority of respondents (92.8%) gave correct answer about colour code for sharp waste disposal. Knowledge on use of colour-coded bags according to bio medical waste guidelines was 65.8% in a study by Garapati S, Peethala S done in Godavari district of Andhra Pradesh which can be compared with the knowledge of 76.4% in present study.

In a study done by Paul B et al. in Kolkata, West Bengal, 87.5% nurses knew how to protect themselves in case of cut or injury on hands before administering injections. This awareness was slightly more in Kolkata than in present study participants, where 79.8% nurses had correctly answered that band aid and glove should be worn while there was small cut or injury on their hands before administering injections.

Conclusion

The study findings identified many gaps in the existing knowledge among HCP on injection safety. These gaps need to be filled by having separate injection safety guidelines, regular trainings of HCP, seminars and workshops on injection safety topic. Though trainings on clinical practices were being conducted by the study hospital but only around half of the HCP were trained on the topic of Injection safety. This topic of injection safety was part of infection prevention and control trainings. Clarity on correct definition of injection safety specially the biomedical waste management or prevention of harm to the community will result in best practices and reduce the chances of errors.

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Conflict of Interest: None

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Appendix

Q1. What do you understand by Injection safety?.
Q2. Have you attended any seminar/training on Injection Safety in last 2 years?.
   • Yes
   • No

If Yes
   1. What was the duration of the training......
   2. Which injection safety areas were covered?
      • Clinical practice,
      • Waste management,
      • Infection control,
      • Any other area- please specify

Q3. What all precautions do you take before, during and after administering injections (Please answer as per the
    injections being administered/given by you).
   • Therapeutic/Vaccination injections
   • Intravenous Infusion
   • Phlebotomy

| S.No | Route of administration | Precautions | Remarks |
|------|-------------------------|-------------|---------|
| 1.   | Intramuscular           |             |         |
| 2.   | Sub-cutaneous           |             |         |
| 3.   | Intravenous             |             |         |
| 4.   | Intradermal             |             |         |

Q4. What do you mean by “Universal Precautions”?
Q5. What do you mean by unsafe injections?
Q6. Can you name the diseases that are transmitted to health workers and patients by unsafe injections?
Q7. What other complications apart from transmission of blood borne diseases can happen by unsafe injections?
Q8. Will you give/ administer an injection in case of existing small cut on your hand? Yes/ No
   • If yes, then how will you administer the injection?

Q9. What are the personal protective equipment’s? Kindly enumerate them
Q10. What all types of injuries can happen to health care staff by unsafe injection practices?
Q11. What do you understand by needle stick injuries?
Q12. What do you understand by sharps injury?
Q13. What do you understand by Post Exposure Prophylaxis?
Q14. What to do in case of accidental needle stick injury?
Q15. Post Exposure Prophylaxis should be taken within how much time (in hours or days) of accidental Needle stick injury?

| S. No. | Status of Source patient | PEP to be taken within how much time (in hours or days) |
|--------|--------------------------|------------------------------------------------------|
| 1.     | HIV positive             |                                                     |
| 2.     | Hepatitis B positive     |                                                     |
| 3.     | Hepatitis C positive     |                                                     |

Q16. How do you manage the bio medical waste generated during injection practices?
Q17. In which colour coded bags would you dispose:
   • Soiled Waste: -Items contaminated with blood and blood-soaked cotton swabs
   • Expired or discarded medicines
   • Syringes without needles
   • Gloves
   • Glassware-broken or discarded and contaminated glass including medicine vials and Ampoules except those contaminated with cytotoxic waste
   • Waste Sharps including metals like Needle, Syringes with fixed needles, blades, discarded and contaminated metal sharps.