ORIGINAL ARTICLE

Injection safety practices in a main referral hospital in northeastern Nigeria

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Abstract

Background: No adherence of safe injection policies remains a major challenge, and, worldwide, annually, it leads to 21 million new hepatitis B cases and 260,000 HIV infection cases. This descriptive observational survey was conducted to determine the level of adherence to universal precaution for safe injection practices in the hospital.

Materials and Methods: The study units were selected using a simple random sampling of injection services provider/phlebotomist in 27 units/wards of the hospital. The study instruments were observation checklist and interviewer administered questionnaires. EPI info (version 3.5.2) software was used for data entry and generation of descriptive statistics was done with units of analysis (units/wards) on injection safety practices of health workers, availability of logistics and supplies, and disposal methods.

Results: Only 33.3% of the units (95% CI, 16-54) had non-sharps infectious healthcare waste of any type inside containers specific for non-sharps infectious waste and 17 (77.3%) of the observed therapeutic injections were prepared on a clean, dedicated table or tray, where contamination of the equipment with blood, body fluids, or dirty swabs was unlikely. Absence of recapping of needles was observed in 11 (50.0%) units giving therapeutic injections. Only 7.4% of units surveyed had separate waste containers for infectious non-sharps.

Conclusions: This study depicts poor knowledge and a practice of injection safety, inadequate injection safety supplies, and non-compliance to injection safety policy and guidelines.

Key words: Injection waste management, safe injections practices, tertiary health care facility

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Introduction

From their designs in the 1800s by Pravaz and Woods, the syringe and needle have evolved from being an essential drug delivery technology to a risk of transmitting infectious diseases and of illicit drugs use.[1] Safe injection practice is defined as injection that does not harm the recipient, does not expose the healthcare provider to any avoidable risk, and does not result in waste which is dangerous to other people.[2] According to estimates produced for the 2003 Global Burden of Disease Study, unsafe injections are responsible every year worldwide for 21 million new hepatitis B cases (HBV), 2 million hepatitis C infections (HCV), and 260,000 HIV infections.[3] Review of HBV and HBC outbreaks that occurred in a variety of healthcare settings in the United States (US) showed that, from 1998 to 2009, there were 51 outbreaks involving the notification of more than 75,000 potentially exposed patients and identification of 620 who became infected with HBV or HBC.[4] The majority of these outbreaks resulted from unsafe injection practices and lapses in basic infection practices, including failure to maintain aseptic technique when preparing or administering parenteral medications.[5] This portend that, even in wealthy countries such as the US, the challenge of consistently providing safe care is not

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always met, as evidenced by increasing reports of outbreaks associated with unsafe injection practices and related breakdown in basic infection control.[4]

The Federal Ministry of Health (FMOH) in Nigeria has introduced the National policy on injection safety and healthcare waste management.[6] Injection safety practices among health workers are still poor. Studies from China show 16% unsafe injections.[7] Furthermore, poor injection safety practices have been reported in both therapeutic and immunization service delivery.[7-9] Tertiary (teaching) hospitals not only provide these services but are also centers for training of healthcare cadres who would in turn practice at other levels of healthcare provision, but most assessment of injection safety practice was done at district, primary healthcare facilities, and general hospitals. The objective of the study was to assess injection safety practices in a tertiary institution and, based on the findings, suggest recommendations for improving safer injection practices.

Materials and Methods

The study was conducted in a tertiary health institutions, the University of Maiduguri Teaching Hospital (UMTH), in northeastern Nigeria from March to April 2011. It is a tertiary referral hospital and a centre where all categories of health professionals are trained. It comprises of all clinical departments, clinics, laboratory, and diagnostics network and, in 2010, a total of 146,261 clients/patients (including vaccinations and family planning) were attended to in the hospital.[10] This assessment was conducted in all units/wards that administer injections, intravenous infusions, and phlebotomy.

Study type

It was a descriptive cross-sectional operational survey of injection safety practices with simple random sampling of injection services provider/phlebotomist in all units/wards. The researchers trained eight research assistants on the administration of the data collection tool before the commencement of the assessment and also supervised the research assistants (RAs) during the assessment phase of the survey. The work was a part of the activity of the established infection control committee of the institution.

Selection of injection services providers and supervisors

The sampling frame for this operation survey was the line list of all the units/wards in the hospital and the line list of staff in each of the units/wards who are directly responsible to administer injectable and phlebotomy. On the day of data collection, one injection provider/phlebotomist were randomly selected from the duty roster of staff on duty using simple random sampling technique and table of random numbers particularly, where there is more than one person responsible to administer injections or conduct phlebotomy in a given unit/ward. In addition, the in-charge (supervisor of injection provider) of the ward/unit also administered a section of the survey instrument. A total of 27 units/wards and 64 personal participated in the study with unit of analysis being the units/wards as opposed to participants in order to provide unit/ward specific information to unit managers for rational intervention to improve unit/ward performance. The visit was conducted in the morning hours when the in-charge were also available at their respective duty posts.

The survey instrument

The instrument used was adapted from the revised injection safety assessment tool for the assessment of injection safety and the safety of phlebotomy, lancet procedures, intravenous injections and infusions (Tool C-Revised).[11] Tool C-Revised is designed to enable determination of the extent to which injections, phlebotomies, lancet procedures, intravenous injections, and infusions are consistent with national safety standards; this was however adapted to be relevant to the respective units/wards applied. Furthermore, as the study area is a tertiary institution, where more advanced procedures are conducted routinely, it was only those procedures stated in the instruments that were observed/assessed.

The tool is a semi-structured interviewer administered questionnaire with observation check-list after affirming to consent read by the study assistant.

Data analysis

Data collected was entered and descriptive statistics generated using EPI Info-version 3.5.2 data base. The unit is of analysis were the selected operational areas of the hospital and not individual respondents. Hence, wards, clinics, and laboratory constitute the unit of analysis. Frequencies and confidence intervals were generated with the same database.

Results

The total number of areas visited for the survey was 27, of which, the highest proportion of 59.3% included wards followed by laboratories and clinics. Accident and emergency was 14.8% each, as depicted in Table 1. The RAs observed the procedures conducted by personnel in the units/wards visited. Therapeutic injection accounted for 34.4% of the procedures observed, followed by phlebotomy and intravenous injection with 23.4% and 20.3%, respectively [Table 2].

Observations and practices reflecting risk to the patient

As shown in Table 3, 22 (81.5%) of the units visited had no loose disposable injection equipment outside of its packaging; however, only 33.3% of the units (95% CI, 16-54) had non-sharps infectious healthcare waste of any

Table 1: Distribution of units/wards visited for the study

Unit/Ward	No	%
Wards selected	16	59.3
Clinics/Accident and emergency	4	14.8
Anesthesia/Intensive care	2	7.4
Laboratories	4	14.8
Kidney centre	1	3.7
Total	27	100.0

Table 2: Procedures observed in the units/wards

Procedure	No	%
Vaccination sessions	2	3.1
Therapeutic injection	22	34.4
Intravenous injection	13	20.3
Intravenous infusion	12	18.8
Phlebotomy	15	23.4
Total	64	100.0

type inside of containers specific for non-sharps infectious waste. Running water and soap for cleansing hands was available in 24 (88.9%) units. Two (100%) and 17 (77.3%) of the observed vaccination and therapeutic injections, respectively, were prepared on a clean, dedicated table or tray where contamination of the equipment with blood, body fluids, or dirty swabs was unlikely. Twelve (92.3%) of the units prepared the skin at the puncture site (for phlebotomy, intravenous injections and infusions) using CHG 2%, povidone-iodine or alcohol.

Interview of the providers showed that only 50% of the units had no stock-outs of puncture-resistant sharps containers during the entire last 6 months, and there exists no procedure for placing an emergency order for injection devices.

The proportion of units in which the provider interviewed had received training on injection safety within the last 2 years was 81.5% (95% CI, 61.9-93.7), while only 50% of the immediate supervisor of the provider interviewed showed the data collector "injection safety" policy or guidelines [Table 3].

Table 3: Assessment of items reflecting risks to patients at operational unit level

Item/Facility Observation	No.	%	95% CI
Absence of disposable injection equipment outside of packaging inside the unit	22	81.5	61.9-93.7
Units disposing non-sharps infectious waste in appropriate and specific containers	9	33.3	16.5-54.0
Units with running water and soap for cleansing hands	24	88.9	70.8-97.6
Injection Practices			
Units adhering to specific universal precaution for the preparation of injections			
Vaccinations sessions	2	100.0	100.0
Therapeutic	17	77.3	54.6-92.2
Phlebotomy Practices			
Units using CHG 2%, povidone-iodine, or alcohol before skin puncture for phlebotomy	12	92.3	64.0-99.8
Intravenous Injections and Infusions			
Units using CHG 2%, povidone-iodine, or alcohol before skin puncture for an I.V. procedure	12	92.3	64.0-99.8
Interview of the Provider			
Units with no stock-outs of puncture-resistant sharps containers in the past 6 months	12	50.0	29.1-70.9
Units whose staff interviewed had injection safety training within the last 2 years	22	81.5	61.9-93.7
Interview of the immediate supervisor of the provider			
Units whose supervisor interviewed had a copy of "injection safety" policy or guidelines	12	50.0	29.1-70.9
Units with a procedure for placing an emergency order for injection devices	12	50.0	29.1-70.9

CI=Confidance interval

Observations and practices reflecting risk to the provider

It was observed, as shown in Table 4, that about 74.1% (95% CI, 53.7-88.9) of the units surveyed had no overflowing or pierced sharps containers of any type in any of its area, but one or more puncture-resistant safety container/s "in stock" was only observed in only 29.6% (95% CI, 13.8-50.2) of the units. Invariably, the practice of the absence of recapping of needles and immediate disposal of the used needle/syringe in an appropriate sharps container after administering therapeutic injections were observed in 11 (50.0%) and 12 (57.1%) of the units respectively. In only 4 (33.3%) of the units observed, immediately disposed of non-sharps infectious waste in a container specific for non-sharps infectious waste after phlebotomy procedure was noted. Counseling and support were offered if providers reported sharps injuries among 65.4% (95% CI, 44.3-82.8) and only 7.4% (95% CI, 0.9-24.3) had 3 or more doses of hepatitis B vaccinations among the injection providers. Healthcare waste disposal policy or guidelines was available for viewing in 12 (48.0%) of the units [Table 4].

Observations and practices reflecting risk to the community

As depicted in Table 5, invariably all the units surveyed had less than one quarter units having separate waste containers for infectious non-sharps waste in each injection area, completely closed sharp containers stored in a locked area away from public access while awaiting final destruction. Final disposal for sharps waste generated by the facility was

not by closed burning in a medium or high temperature incinerator/furnace, dumping in a secure pit, or transport off-site for treatment.

Ethical consideration

The study was approved by the Ethical Committee of the UMTH.

Prior to the completion, each participant was informed on the objective of the study, participation was voluntary, and participants had the option to opt out or continue with the interview at any point of the data collection process. The consent of all participants was sought and entered appropriately in the space provided on the questionnaire.

Table 4: Indicators reflecting risk to the provider at operational unit level

Indicator	No.	%	95% CI
Facility Observation			
Units with no overflowing or pierced sharps containers	20	74.1	53.7-88.9
Units with one or more puncture-resistant safety container/s "in stock"	8	29.6	13.8-50.2
Injection Practices			
Units whose staff do not recap used needles after a procedure	11	50.0	28.2-71.8
Units whose staff disposed used needles in sharp waste container	12	57.1	34.0-78.2
Phlebotomy Practices			
Units whose staff disposed non-sharp waste in appropriate container	4	33.3	9.9-65.1
Intravenous Injections and Infusions Practices			
Units whose staff wore a new pair of gloves for each I.V. injection	10	83.3	51.6-97.9
Interview of the Provider			
Units providing support and counseling service for staff reporting sharps injuries	17	65.4	44.3-82.8
Units whose staff had 3 or more doses of hepatitis B vaccinations	2	7.4	0.9-24.3
Interview of the Immediate Supervisor of the Provider			
Units with copies of healthcare waste disposal policy or guidelines	12	48.0	27.8-68.7
Units whose staff that handle healthcare waste used "heavy gloves"	11	45.8	25.6-67.2

CI=Confidance interval

Table 5: Indicators reflecting risk to the community

Items	No	%	95% CI
Facility Observation			
Units with separate containers for non-sharp infectious waste	2	7.4	0.9-24.3
Units with completely closed sharps containers	7	25.9	11.1-46.3
Units whose sharps containers awaiting final destruction are inaccessible to the public	6	22.2	8.6-42.3
Units in which there were no used sharps on the ground	22	81.5	61.9-93.7
Availability of appropriate equipment or sites for final disposal for sharps waste	0	0	0

CI=Confidance interval

Discussion

This was an operational study of injection safety practices in the various units in a tertiary institution. It therefore did not consider sample size of personnel. The absolute observance of strict injection safety practice must be what is aimed to be achieved in any healthcare setting as any deviation could lead to catastrophic outcomes. Anything less than 100% compliance infection control guidelines and aseptic technique contributes to the risk of transmission of blood borne viruses resulting in infections.[5]

Although injection providers had good knowledge of injection safety, a high percentage was not complying with recommended guideline of infection control and aseptic techniques. This is similar to the findings in Romania with 47% of nurses indicated no specific area for preparation of injectable drugs and vaccines with the risk of contamination with blood and compromising injection safety to patients, clients, and healthcare provider.[12] Unsafe therapeutic injection practices findings are also similar to the one reported from China.[7] In addition to increasing the potential for patient infections, unsafe injection practices put providers themselves at the risk of needle stick injuries.[4]

Recapping of needles that is one of the practices that contributes to needles stick injury[13] was commonly practiced by the respondents. Puncture-proof sharp containers were not readily available and sharps were also not disposed of in appropriate containers after injections. It is reported that the safe containment of injection-related waste depends on improvements in the disposal systems for medical waste and international standards must be established for the placement, puncture resistance, fluid resistance, sealing mechanisms, and transportability of sharps-disposal containers.[14] Recapping of needles after use was very common and conformed to the earlier findings from studies on needle stick injuries, which is invariably an important cause of needle stick injury.[13] Full immunization coverage with at least three doses of hepatitis B vaccine among respondents was abysmal (7.4%), which is lower than studies from other parts of Africa and the Middle East.[15-17] This is quite surprising given the fact that hepatitis B vaccine is readily and freely available in the hospital for the past 2 years. This might be due to the lack of adequate mobilization and counseling of the health workers and failure of the hospital infection control committee to periodically monitor the utilization of the vaccine by health workers in each of the clinical units.

Although injection safety policy document has been passed in the country; this should be backed by provision of adequate resources for its implementation as these are found to be inadequate in the work environment. Moreover, the most recent on the job training for health workers on injection safety by hospital management was in July 2009, for two-thirds of the hospital staff.[18] It is important to note that funds should be appropriated not only for the procurement of equipment's but also for improving the technical competence of health service providers and systematic documentation of occupational related injuries and nosocomial infections to provide an avenue for evidence-based approach to infection control in the hospital setting. Hence, such additional expenditures should not be viewed as increasing cost, but rather as insurance to protect each nation's investment in its healthcare workforce.[14] Furthermore, although the hospital have the infection control committee, the committee is inactive to provide the necessary coordination and oversight function for hospital infection prevention and control evidence by the lack of documentation of occupational related injuries/infections and nosocomial infections.

The facility waste is not collected in appropriate containers and disposed of according to standard waste management guidelines. This is similar to the findings of studies[19] in which almost all healthcare institutions surveyed did not sort their waste and dispose every kind of waste generated into dumpsites without pre-treatment, leading to an unhealthy and hazardous environment around the health institutions, affecting patients and staff. These sites are also not protected, thereby posing hazards to scavengers who are at risk of injury from sharps and direct contact with infectious materials.[20]

The pattern of unsafe practices might in part be attributable to the fact that nearly one-fifth of the respondents had no on-the-job training on current injection policy and guidelines, which is consistent with the findings on needs assessment among some African countries.[21-23]

Conclusion

Safe injection practices guidelines and procedures are generally adhered to in terms of safety for the patient/client, health worker, and the environment. However, there exist gaps and challenges in some unit/wards regarding the availability of loose disposable injection equipment separately for sharp and non-sharp infectious healthcare waste, regular running water and soap for cleansing hands, and non-adherence to universal precaution that will reduce the likelihood of contamination of injection materials by few staff members. Moreover, there are units that do not provide support and counseling service for staff reporting sharps injuries and poor utilization of hepatitis B vaccine among service providers. Hence, there is a need for investment in sustained continuing medical education (CME) and in making available logistics and support supervision to ensure that health workers adhere to standard guidelines and practices.

CME could be used to strengthen both technical and institutional capacity since it will reinforce injection safety practices by health workers, while at the same enhance commitment and oversight functions of the unit/wards supervisors to ensure availability of needed materials and compliance with standard guidelines and practices.

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