Original Article

COMPARISON OF SHARP INJURY AMONG DIFFERENT OPERATION THEATRES AND AWARENESS ABOUT OCCUPATIONAL HEALTH AND SAFETY IN A GOVERNMENT HOSPITAL, LAHORE, PAKISTAN.

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ABSTRACT:

Background: *Despite their seriousness as a medical event, needle stick injuries have been neglected: most go unreported The needle sticks have been recognized as occupational hazards, their prevention has become the subject of regulations in an effort to reduce and eliminate this preventable event.*

Methods: *An observational study was conducted at a government hospital, Lahore, Pakistan from 15th February 2012 to 15th April 2012. Surgeons, nurses and operation theatre assistants (OTAs) working in different operation theatres were included as participants in the study. Demographic data, most frequent sharp injury and awareness about occupational health and safety were recorded on a predesigned questionnaire. It comprised of 13 questions in which 5 were related to demographic data of respondents, 4 were related to the experience of sharp injury and 2 questions were related to the awareness about the management protocol. The questionnaire was distributed in four operation theatres of government hospital Lahore, i.e. Emergency operation theatre, General operation theatre, Gynae operation theatre & Orthopaedic operation theatre.*

Results: *Data was collected from 70 Operation theatre personnels (OTPs) including 30 males and 40 females. The most common sharp injury was needle stick injury (57%). The rate of sharp injury was high in Emergency operation theatre. The awareness amongst Operation theatre assistants was much lower in all the operation theatres. Most respondents replaced the gloves after sharp injury (60%).The Operation theatre personnels of General operation theatre replace both gloves and the instrument (13%).*

Conclusion: *The needle stick injury is still a common problem and remain significantly under-reported. The major cause of sharp injury in operation theatre is needle. There is a need to organise seminars or conduct workshops for the awareness about universal precautions for the use of sharp instruments in the operation theatre and occupational health and safety.*

Key words: Sharp injury, occupational health and safety, needle prick injury.

INTRODUCTION

Operation theatre personnel (OTPs), especially those directly involved in surgical procedures are at increased risk for transmission of blood-borne infections through the sharps injury. The operating room environment is unique because of the carefully orchestrated team approach to surgical care. Operating theatre is the hospital environment with the greatest concentration of sharp instruments.Object or device capable of inflicting a penetrating injury includes needles, scalpel blades, wires, trocars, auto lancets, stitch cutters and broken glassware. Any injury that results in piercing of the skin by a needle or other sharp object or device is termed as sharp injury.

Needle stick injuries (NSI) are wounds caused by sharps such as hypodermic needles, blood collection needles, IV cannulas or needles used to connect parts of IV delivery systems. The causes include various factors like type and design of needle, recapping activity, handling/transferring specimens, collision between health care workers , during clean-up and washing of instruments, manipulating needles in patient line related work, passing/handling devices or failure to dispose of the needle in puncture proof containers [1].Surgeons, scrub nurses, and operation theatre assistants (OTAs) work very closely together handling the same instruments in a confined space. Consequently; surgeons and scrub personnel are injured in similar way with similar equipment and not infrequently by each other. The OTAs are injured during the transfer and manual washing procedure of surgical instruments particularly the scalpel handle, scissors and needle holder to wash-basin. Thus, the chance of percutaneous injuries from contaminated sharp objects, which can lead to blood borne disease transmission, is greatly enhance [2]. Occupational blood borne transmission of more than 50 different pathogens has been reported [3]. The scrub nurses in emergency situations, do not take off the blades and needles from their holders which can cause major injuries to the OTAs. A team approach to safety in the operation room is critical if injury rates are to be reduced.

In the past, percutaneous injuries and muco-cutaneous exposures were considered to be an accepted occupational hazard for the surgeons. Although the potential for injury, exposure, and contraction of blood-borne diseases was well

known, there was little attempt to reduce the risk of such events. When HIV was discovered in 1981, surgical personnel began to pay greater attention to health care worker safety in the operating rooms. In 1983, CDC recommended "caution" when handling body fluids from patients suspected of having AIDS. From 1987 the Communicable Disease Control recommended "Universal Precautions" which stated that blood and body fluid precautions be used with all patients. It was at this time that the CDC made their first recommendations for use of appropriate barrier protection and against re-sheathing contaminated needles. One-third of devices that cause injuries come in contact with the patient after the injury to the health care worker, so there is also risk of disease transmission from surgeon to patient. Most, if not all, surgeons have encountered blood on their hands or fingers at the conclusion of a procedure without awareness of suffering an injury or the occurrence of a breach of the glove barrier by any other method (glove puncture, tear, or failure). It is obvious to most practitioners that glove failure is common.

The practice of wearing two pairs of gloves offers a high degree of protection from this common event. Initial intra-operative glove perforation occurs at an average of 49 minutes into a procedure and is not detected by the surgeons in as many as 83% of cases [4]. Double gloving reduces risk of exposure to patient blood when the outer glove is punctured. The volume of blood on a solid suture needle is reduced when passing through two glove layers, thereby reducing microbial load in the event of a contaminated percutaneous injury. Because of the occult nature of intra-operative glove failures, double gloving may prevent prolonged occult hand contact with patient blood [5].

The neutral zone has been defined as "a previously agreed upon location on the field where sharp are placed from which the surgeon or scrub staff can retrieve them, so that hand-to-hand passing of sharps is limited." In a 1994 report, CDC indicated that use of blunt suture needles reduced percutaneous injuries from 1.9:1,000 for curved suture to 0:1,000 for blunt needles [6]. Accidents and self-wounding instances with sharp instruments can be avoided by following these measures: "do not recap needles, use needleless systems when possible, use cautery and stapling devices where possible, and pas sharp instruments in metal trays during operative procedure". It was reviewed in the report that 249 glove tears and 70 sharp injuries and reported that only 6% of injuries occurred during instrument passage. These data suggested that even if no touch technique reduced sharps injuries during instrument passages between scrub nurse and surgeon, this benefit would only avoid a small percentage of total sharp injuries during operations. Benefits of HandFree Techniques (HFT) have been assessed by a randomized prospective study,which demonstrated no reduction of incidence of glove perforation with use of hands free technique compared with control during 156 caesarean sections [7]. Straight suture needles pose the greatest risk-per-needle of sharps injury to the OTPs, yet as many as 59% of suture needle injuries occur during procedure [8]. To decrease this risk of needle-stick injury to the surgeon, use of blunt suture needles has been proposed and studied. There is a large body of literature that supports recommendation of routine use of double gloves during operations after an appropriate period of adaptation. The use of hands free technique is recommended by several leading professional organizations and by many hospitals as a safety measure to reduce sharp injuries during operations. There is compelling published evidence to support routine use of blunt suture needles to minimize sharp injuries during closure of fascia and muscle. With more experience, these needles may be found to be safe and useful in the suture other type of tissue.

MATERIALS AND METHODS

Surgeons, nurses and operation theatre assistants working in operation theatres of a government hospital in Lahore was included in the study. It was an observational study design. The duration of study was two months from 15th February 2012 till 15th April 2012. A list of all personnels with previous history of sharp injury was prepared. Out of 344 identified personnel with sharp injury history, 70 respondents were selected by simple random sampling technique by using table of random number [9]. A self - administered questionnaire was used for data collection. The questionnaire was based on close ended questions and comprised of 13 questions in which 5 questions related to demographic data of respondent, 6 was on past experience of any sharp injuries and 2 was about awareness . It was distributed in different operation theatres of a government hospital Lahore, i.e. Emergency operation theatre, General operation theatre, Gynae operation theatre & Orthopaedic operation theatre. Data was analysed using Statistical Package for the Social Sciences (SPSS) version16. Categorical variables were presented as percentages. There were 30 male, 40 female and 15 were surgeon, 29 were nurses and 26 were OTAs. Sixteen were from general operation theatre, 19 were from Emergency operation theatre, 25 were from Gynae operation theatre and 10 were from orthopaedicoperation theatre. In this study no ethical issues was involved.Fifty-one were in age category between 30-50 as (73%). Twenty-five respondents were from Gynae Operation theatre (36%).

RESULTS

Seventy operation theatre personnels agreed to participate in this study giving a response rate of 100%. Table No 1shows the demographic characteristics of the respondents by age, sex, job category and working place. Majority were female respondents (n=40, 57%) and they were nurses by occupation. (n=29, 41.4%)

Table 1: Demographic features

In Table 2 and in Table 3shows the number of sharp injuries, object by which they were pricked, severity of prick, and the bleeding from the site of injury. The most common site of injury was hands (98.6%). Twenty five respondents incurred sharp injury between 4-10 times (36%), while twenty one respondents incurred sharp injury between 1-3 times (30%). Ten respondents had sharp injury more than 10 times (14%). Most respondent were OTAs (37%). Fourteen respondents had no idea about the number of sharp injury. Majority of the respondents agreed that they incurred injury from needle

(n=41, 57%), while some respondents agreed that they had incurred injury from both needle and blade (n=22, 30%). Thirty, out of 70 agreed that severity of prick was mild (56%). Forty-five agreed that bleeding from the site of injury was mild (64%). The rate of sharp injury between 4-10was high in the Orthopedic operation theatre (60%), while the number of sharp injury in Emergency operation theatre was many times (21%). The sharp injuries by needle were high in Orthopedic operation theatre (80%), while in Gynae operation theatre the sharp injury by needle was 60%. Many respondents had fully forgotten the number of injuries, which they incurred. The sharp injury by blade was not very high in Gynae operation theatre (12%), while the sharp injuries by both (blade & needle) in General operation theatre was high (50%). The severity of prick was high in General operation theatre (19%) while the severity of prick was mild in Orthopedic operation theatre (70%) and in Gynae operation theatre was 68%. No case of bleeding from the site of injury from General operation theatre. Bleeding from the site of injury was mild in Gynae operation theatre (80%).

Table 2: Rate of sharp injury and awareness in operation theatres combined.

In table 2, the awareness about sharps policy management protocol, which included what action, they took after sharp injury and were they aware about the local sharp injury policy and procedure. Forty out of 70 replaced their gloves after sharp injury (57%) and 38 were partially aware about the local sharp policy and procedure (54%). Fifteen were unaware, who were mainly OTAs (21%). The OTPs of Orthopedic operation theatre (70%) replaced gloves after the sharp injury. It is same in both General OT and in Gynae OT (56%) while only 13% in Gynae OT replace sharp instrument after injury. The 47% of NOT replaced both sharp instrument and the gloves. The OTPs (31%) of MOT and the OTPs (24%) of Gynae OT are fully aware with the local sharp policy and the procedure. The OTPs (70%) were partially aware from the knowledge about the local sharp policy and the procedure. The unawareness of local sharp policy and the procedure was high in MOT (44%) and in NOT (21%).

Table 3: Comparison of different operation theatre

In current study, surgeon s stated that they had knowledge about the Universal Precautions but still they had encountered sharp injury in their practice. This study shows that major reason behind the sharp injury is not proper knowledge about local sharp policy and procedure.

DISCUSSION

Needle stick injuries of HCWs is an important occupational hazard leading to infections with blood borne pathogens like Hepatitis B Virus, Hepatits CVirus or HIV [10]. Surgeons, scrub nurses, and OTAs work together very closely handling the same instruments in a confined space. It is important to improve the knowledge about the prevalence and reasons for such injuries in order to find ways to prevent them. In current study the prevalence of needle prick among OTPs was 57%, which was higher than the prevalence reported by Lee and Hassim in 2005 [11]. However the estimates in the current study was lower than the estimate reported by Maqbool in 2002 [12], which was reported to be 74%. The prevalence in Nepal was 74% [13], which is higher than the current prevalence rate. In the current study the estimates are higher than estimated by Hofranipour in Iran 39.4% [14]. In current study prevalence was highest in staff nurses and OTPs. This can be explained by the fact that nurses are in direct contact with sharp instruments, which are used during surgical procedures and OTAs are usually unaware about the local sharp policy and procedures of handling sharps. The present study depicted that there was no significant association between gender with needle stick and sharp injury. Similar results have also been reported by Hadadi et al [15]. The following NSIs incidence rates: Taiwan = 50.5%; Uganda=25.3% [16] and Australia = 13.9% [17]. Medical students had the following NSIs incidence rates: Iran = 73.4% [18], USA =30-33%[6], UAE = 23.0% [19] and Germany = 12-41% [20].

The scrub nurses in emergency situations do not take off the blades and needles from their holders, which cause major injuries to OTAs. A team approach to safety in the operation theatre is critical if injury rates are to be reduced. Twenty four per cent were aware about sharp policy and procedures while 53% were partially aware with the rules and 23% were unaware with the rules of safe procedure.

The injuries which occurred were mainly in the hands due to the rupture or tear of gloves. Most surgeons, if not all, had encountered blood on their hands or fingers at the conclusion of a surgical procedure without being aware of suffering an injury during procedure or the occurrence of a breach of the glove barrier by any other method (glove puncture, tear, or failure). The US Food and Drug Administration permit 2.5% of new unused sterile gloves to fail standardized quality control testing. Using electronic detection of glove barrier failure, one study estimated that surgeons wearing a single pair of gloves would have contact with patient blood for 42 hours for every 100 hours of operating time [21]. There are several reports in the literature, which indicate that better barrier protection might protect the patient from exposure to blood-borne pathogens from members of operating team [22, 23]. The surgeons are also at great risk of sharp injury [24].

Initial intra-operative glove perforation occurs at an average of 49 minutes into a procedure and is not detected by the surgeons in as many as 83% of cases [4]. The practice of wearing double glove during procedure, offers a high degree of protection for both patient and the OTPs. Double gloving reduces the chances of exposure to blood after tear of single glove.

Table 1: Demographic features

	Description	Numbers	Percentage (%)
Sex	Male Female	30 40	43 57
Age	<30 30-50 >50	17 15 2	24 73 3
Job category	Surgeon Nurses OTAs	15 29 26	21 41 37
Working place	MOT NOT Gynae OT BanoMiraj OT	16 19 25 10	23 27 36 14

Table 2: Rate of sharp injury and awareness in operation theatres combined.

Variable	**Description**	**General OT** n(%)	**Emergency OT** n(%)	**GYNAE OT** n (%)	**Orthopaedic OT** n(%)	**Overall Percent** (%)
Number of sharp injury	1-3 4-10 Many times Don,t know	5(31) 6(38) 0(0) 5(31)	5(26) 6(32) 4(21) 4(21)	8(32) 7(28) 5(20) 5(20)	2(20) 6(60) 2(20) 0(0)	29 36 7 7
Object by which they pricked	Needle Blade Both Other	8(50) 0(0) 8(50) 0(0)	10(53) 1(5) 6(32) 2(10)	15(60) 3(12) 7(28) 0(0)	8(80) 1(10) 1(10) 0(0)	59 7 31 2
Severity of prick	Mild Moderate Severe	5(31) 8(50) 3(19)	10(53) 9(47) 0(0)	17(68) 8(32) 0(0)	7(70) 3(30) 0(0)	56 40 4
Bleeding fom the site of injury	None Mild Moderate	0(0) 7(44) 9(56)	4(21) 12(63) 3(16)	3(12) 20(80) 2(8)	3(30) 6(60) 1(10)	14 64 22
Action after sharp injury	Replace gloves Replace sharp instrument Both Nothing	9(56) 2(13) 3(19) 2(11)	9(47) 0(0) 9(47) 1(6)	14(56) 0(0) 8(32) 3(12)	7(70) 0(0) 3(30) 0(0)	55 3 33 9
Knowledge sharp policy managment theatre	Fully aware Partly aware Unaware	5(31) 4(25) 7(44)	4(21) 11(58) 4(21)	6(24) 15(60) 4(16)	2(20) 7(70) 1(10)	24 53 23

Surgical team members should use HFT whenever possible and practical, instead of passing needles and other sharp items hand to hand. Changes in surgical practice to minimize manual manipulation of sharps can have a major impact on these injuries. Creation of a neutral zone on a surgical table (i.e. where instruments are put down and picked up, rather than passed hand to hand) may decrease injuries from sharp instruments [25].

Straight suture needles pose the greatest risk-per-needle of sharps injury to the OTPs, yet as many as 59% of suture needle injuries occur during suturing [8]. In the society the major drawback is that literacy rate is very low. It was observed in this study that many OTAs avoid to give response. The reason behind that they are frightened that no one complaint shall be made against them.

The safety devices need to fulfil the National Institute for Occupational Safety and Health (NIOSH) criteria as a recognized technical standard [26] e.g., safety devices should be easy to activate, intuitive to use, can be activated with one hand, do not hinder the use, have clear awareness of activation, etc.). The rate will be low if we avoid to recap needles, use needleless systems when possible, use cautery and stapling devices when possible, and pass sharp instruments in metal trays during operative procedure.

Table 3: Comparison of different operation theatre

Variable	Description	frequency	Percentage (%)
Number of sharp injury	1-3 4-10 Many times Don,t know	21 25 10 14	30 36 14 20
Object by which they pricked	Needle Blade Both Other	41 5 22 2	57 7 31 3
Severity of prick	Mild Moderate Severe	39 28 3	56 40 4
Bleeding from the site of injury	None Mild moderate	11 45 14	16 64 20
Action after sharp injury	Replace gloves Replace sharp instrument Both Nothing	40 3 21 6	57 4 30 9
Knowledge about local sharp policy and procedure	Fully aware Partly aware Unaware	17 38 15	24 54 21

The failure to report needle stick and sharp injury in our community is very common. Knowledge is not sufficient which must be enhanced by seminar, workshop and talk. These operation theatre personnels expose themselves with unnecessary risk of not reporting thus depriving themselves of the benefit of intervention.

Control Measures

The most effective way of preventing the on transmission of blood-borne pathogens is to prevent exposure to Needle Stick Injury. Primary prevention of Needle stick injuries is achieved through the elimination of unnecessary injections and elimination of unnecessary needles. The needles that retract, sheathe, or blunt immediately after use. Personal protective equipment that barriers
between the worker and the hazard. Examples include, face shields, gloves, eye goggles, masks, and gowns. The policies and training programs aimed to limit exposure to the hazard. Examples include Universal Precautions (see below), allocation of resources demonstrating a commitment to operation theatre personnels safety, a needle stick prevention committee, and exposure control plan, and consistent training. Work practice controls should be employed examples include no re-capping, placing sharps containers at eye level and at arms' reach, checking sharps containers on a schedule and emptying them before they're full, and establishing the means for safe handling and disposing of sharps devices before beginning a procedure.

Universal Precautions

The concept of universal precautions came into being in 1985 as the AIDS epidemic worldwide raised awareness about the occupational hazard of exposure to blood borne pathogens. Universal Precautions is an administrative control measure that calls for the implementation of practices and equipment to protect the OTPs whenever the potential exists for exposure to blood. Every patient is considered to be infected with a blood-borne pathogen. In addition, medical treatment of emergency patients and provision of first aid do not provide any opportunity for testing prior to treatment [27].

CONCLUSION

The availability and compliance to adopting safety-engineered devices will help in the reduction of sharp injury and risk of blood-borne infections including HIV/AIDS. Timely reporting of occupational exposures to an employee health service is required to ensure appropriate counseling, facilitate prophylaxis or early treatment, and establish legal prerequisites for OTPs compensation. Creating awareness among staff through seminars, courses and posters were considered to the most important to reduce the rate of sharp injury and the proper and sufficient devices should be introduced to prevent injury sharps. Current study also shed light on the fact that, surgeon stated that they had knowledge about the Universal Precautions but still they had encountered sharp injury in their practice. From this study, it shows that major reason behind sharp injury is not proper knowledge about local sharp policy and procedure. The rate will be low if we avoid to recap needles, use needleless systems when possible, use cautery and stapling devices when possible, and pass sharp instruments in metal trays during operative procedure.

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