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## **Incidence of Needlestick and Sharp Injuries Among Health Care Workers in Mauritius**

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**Abstract:** A cross-sectional survey among a random sample of health care workers was carried out to assess the incidence of needlestick and sharp instrument injuries in Mauritius. A questionnaire-based survey involving qualified nurses and medical Laboratory technicians was conducted. Data was analysed using SPSS. Results showed that needle-stick injuries were the most common type of injury sustained by 72% of the nurses. The main cause of injuries was related to disposal of used needles (52.2%). As for medical technicians, cuts with sharp materials were the most commonly encountered type of injury, which occurred predominantly during preparation of slides. The results of this study confirm the need for implementation of a data collection tool and a proper framework to provide support and follow-up to those who sustain sharps injuries.

**Key words:** Sharp injuries, health care workers, Mauritius

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### **INTRODUCTION**

Needle-stick and sharps injuries are also a matter of concern for many African (Adegboye *et al.*, 1994) as well as Asian countries (Guo *et al.*, 1999; Al-Ani *et al.*, 2006). In Mauritius, the rapid development in the medical and para-medical fields have meant that health care sector has known quite an impetus in many spheres. This undeniably has helped towards improving treatment delivery and raising the level of healthcare for the population at large. However up to now, Mauritius does not have any legislation framed for protecting the safety and health of Health Care Workers (HCW) pertaining to needle-stick and other sharps injuries. The Ministry of Health and Quality of Life (MOH and QL) has released a manual containing guidelines on standard precautions and on infection control measures to be adopted by all healthcare workers in the management of patients regardless of their HIV/hepatitis status.

According to the local Health Statistics Annual (CSO, 2002), the number of qualified nurses and midwives in the public sector was 2,812 as at the end of 2002, that is 86 less than at the end of 2001. As at the end of 2002, there was one nurse for every 433 inhabitants. The ratio was one for every 412 inhabitants in 1997 when the number of qualified nurses and midwives was 2,801. The aim of this study was to assess the incidence of needle-stick and sharp injuries among health care workers in Mauritius. The objective of the study was to highlight areas of improvement and prevention of sharp injuries among exposed workers.

### **MATERIALS AND METHODS**

This study was conducted among nurses employed in the public sector and Medical Laboratory Technicians. The sample size was calculated using the Statcalc function of Epi-info software (Version 6) statistical package. The population size of registered nurses was 2,812 as per the Health Statistics Annual (CSO, 2002).

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Data was collected using a pre-validated questionnaire. Questions included type of sharps injuries encountered, as well as frequency. Other questions pertaining to use of protective equipments, awareness, reporting and management were also formed part of the questionnaire. The questionnaire was pre-tested among a random group of health care workers who are more exposed to sharp injuries during their daily work. Any ambiguity in questions set and recommended changes were made to the questionnaire. All the questions were set in the English language. The questionnaire was then re-tested and upon ascertaining its validity the questionnaire was distributed among the participants. The survey was carried out from October to November 2003.

### Data Analysis

The data was analyzed using SPSS for Windows (Version 7.5) statistical package. Chi-square test was carried to determine whether two variables were independent. Differences were considered significant for a two-sided  $p$ -value  $< 0.05$ . Differences in proportion were analyzed using the Yates corrected Chi-square. The incidence of professional exposure was assessed Mantel-Haenzel stratified analysis.

## RESULTS

A total of 93 people participated in the study. One questionnaire was not considered since vital details such as age and sex were not provided. The final sample retained was 92 in all. Of these 37 (40.2%) were men and 55 (59.8%) women. Age ranged from 20-57 years, with a mean of  $30.5 \pm 8.2$  years. Length of service varied from 1-35 years, with a mean of  $8.5 \pm 7.4$  years (Table 1).

The items cut with sharp materials and cut with scalpel were combined to a common item sharp objects. Of the 50 nursing staff interviewed, 36 (72.0%) sustained needle-stick injuries, 8 (16.0%) had injuries with sharp objects, 2 (4.0%) were injured with broken glassware and 4 (8.0%) never encountered any injury (Fig. 1). As for medical Laboratory technicians, sharp objects injuries were most frequently encountered with 22 (52.4%) of cases. 12 (28.6%) had injuries with broken glassware, 5 (11.9%) had needle-stick injuries and 3 (7.1%) of MLT interviewed never sustained any injury (Fig. 2).

Most of nurses involved in the survey have sustained between one and ten sharps injuries (80.0%). It was found that 8.0% of respondents encountered between eleven and twenty sharps injuries and 4.0% have sustained more than twenty sharps injuries since working in the health care sector.

Table 1: Characteristics of study population

Parameters	No. (%)
<b>Gender</b>	
Male	37 (40.2)
Female	55 (59.8)
<b>Age (years)</b>	
Mean $\pm$ SD	30.5 $\pm$ 8.2
Median	29.5
Range	20-57
<b>Occupation</b>	
Nursing officer	50 (54.3)
Medical lab technician	42 (45.7)
<b>Length of service (years)</b>	
Mean $\pm$ SD	8.5 $\pm$ 7.4
Median	8
Range	1-35

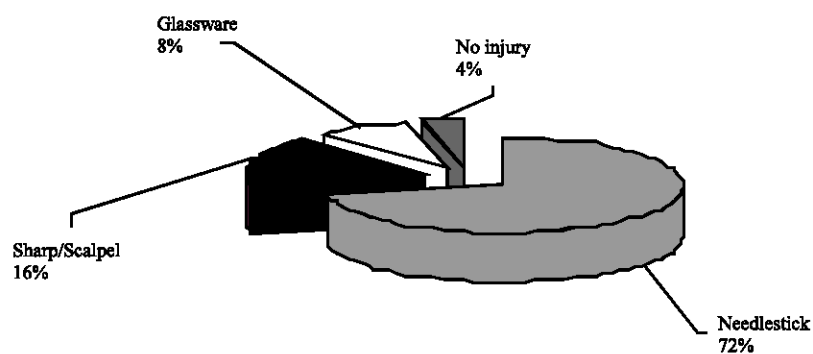


Fig. 1: Types of injuries sustained by nursing staff

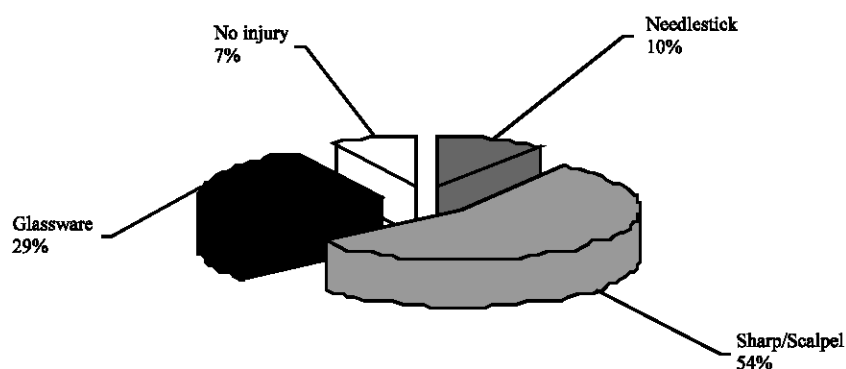


Fig. 2: Types of injuries sustained by medical Laboratory technicians

A similar trend was noted for medical technicians. 88.0% have sustained between one and ten sharps injuries, while 2.4% have been injured between eleven and twenty times. 4.0% encountered more than twenty sharps injuries (Fig. 3).

#### Procedures Associated with Sharps Injuries

For procedures associated with needle-stick injuries in nursing staff, it was noted that most injuries occurred while disposing used needles. Of the 46 who sustained sharps injuries, 43 (93.5%) responded. A total of 24 (55.8%) nursing staff injured themselves while disposing needles, 3 (7.0%) encountered needle-prick injuries while recapping, 8 (18.6%) while cleaning or washing equipments, 6 (14.0%) when transferring fluids from syringe to container and 2 (4.7%) while preparing tray.

For medical Laboratory technicians, 38 (97.4%) subjects responded to the question. 3 (7.9%) persons encountered injuries while transferring fluids to containers while 2 (5.3%) persons injured themselves when recapping needles. 8 (21.1%) Laboratory workers had injuries while washing equipments (Table 2). The item, which accounted for the highest number of injuries, was slide preparation with 24 (63.2%) persons injured in that process. Only 1 (2.6%) Laboratory technician got injured while disposing needles.

#### Body Part Mostly Involved in Injuries

The part of the body most commonly involved concerning needle-stick, sharps or glassware injuries was the fingers and the hand with 84 (91.3%) personnel out of 92. There was only one

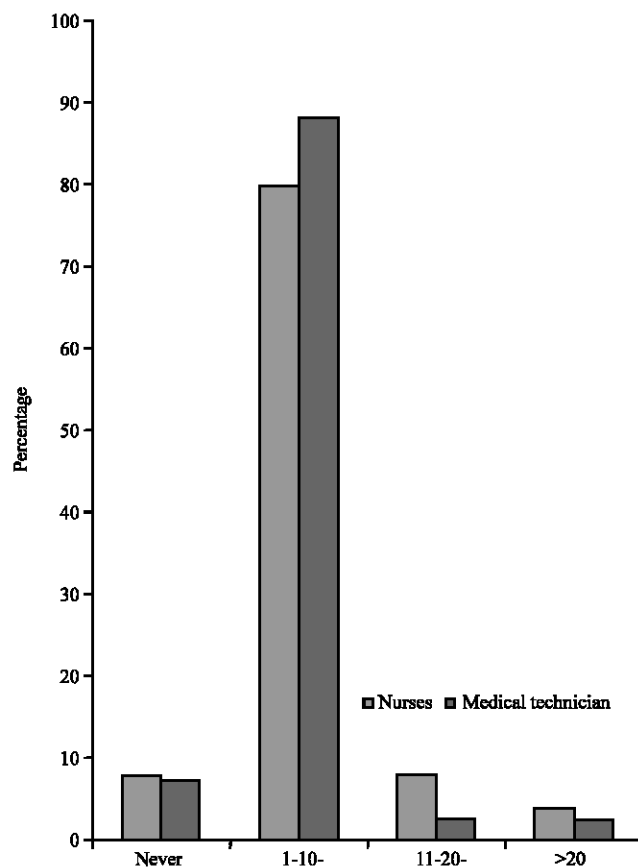


Fig. 3: Number of sharps injuries sustained

Table 2: Procedure involved at time of sharps injury

Procedures involved	Nurses		Medical technicians	
	No.	%	No.	%
During transfer of fluid	6	14.0	3	7.9
During recapping	3	7.0	2	5.3
During disposal	24	55.8	1	2.6
During slide/tray preparation	2	4.7	24	63.2
During cleaning/washing equipments	8	18.6	8	21.1
Non-respondents	7	14.0	4	9.5
Total	50	100.0	42	100.0

reported case where the face was the most commonly involved body-part in injuries. Injuries to the foot and other body parts were not encountered (Table 3). Of the 7 persons who never sustained needle-stick or sharps injuries, 2 reported to have had finger/hand injuries while carrying out other procedures not mentioned in the questionnaire. No further details were given concerning these procedures.

Of the 84 who injured their hands/fingers, it was found that 41 (48.8%) of them were accounted for by needle-stick injuries, while 30 (35.7%) injured themselves with sharps. A total of 13 (15.5%) HCW sustained injury to the hand with broken glassware.

Table 3: Number of respondents sustaining sharps injuries to specific body-parts

	Fingers/Hand	Face	Foot/Other	No. of sharps injury	Total
Frequency	84.0	1.0	0.0	7.0	92.0
Percentage	91.3	1.1	0.0	7.6	100.0

Chi-square test was performed to test whether the type of injury encountered was independent of the part of the body involved. The results showed a significant association ( $p < 0.05$ ) between the type of injury sustained and the body-part involved.

MLT and nursing officers were considered separately. Chi-square value obtained was 23.958 for nurses and 31.362 for MLT.

### Reporting of Needle-Stick/Sharp Injury

Present findings showed that reporting of sharp injuries by health care workers were a regular feature among the injured staff. It was evident that of the 50 nursing staff, 38 notified their injury to their seniors (in this case the ward managers). Out of the nursing staff who have had a sharp injury, 13 had needed first aid treatment. However it was also found that the remaining nursing staff who had a sharp injury did not report the case and went for first aid directly.

A similar trend was also noted among the Laboratory technicians. Thirty two reported any encountered injury to their seniors and 11 required first aid treatment. On the other hand, 10 did not report any incident, in which 9 of them applied first aid.

### Segregation and Disposal of Needles

Of the sample studied, 74 (80.4%) segregate needles from syringe prior to disposal. While only 6 (6.5%) disposed the syringe and needle as a whole that is without taking the needle out. The response rate was 87.0%.

Seventy four percent of the nurses interviewed disposed of used syringes in plastic bottles. The remaining discarded used syringe in special disposal containers. For medical technicians, 37 (88.1%) disposed of used syringes in disposal containers while 2 (4.8%) disposed in ordinary plastic bottles. 3 (7.1%) medical technicians disposed of used needles in special auto-claves.

Chi-squared test was carried out to know whether segregation of needles from syringe were dependent on the disposal method available to the worker, such as plastic bottles or special boxes. Considering  $p < 0.05$  as significant, no significance was established between the two items. Segregation was irrespective of the disposal item available.

Pertaining to the labeling of disposal boxes, it was found that, of the 41 MLT who responded, 31.7% do not label. On the other hand, out of the 48 nurses who answered, 16.7% do not label the disposal containers.

### Recapping among Sample Population

It was noted that among the Medical Laboratory technicians who recapped, only 24% carried single-handed recapping. On the other hand, all the nurses who recapped did so using both hands in that process (Fig. 4).

### Compliance with Standard Precautions

During procedures like intravenous, sub-cutaneous and intra-muscular injections involving patients, it is noted that 45 (93.8%) nurses wear latex gloves as a means of protection.

Pertaining to the insertion/removal of catheters-a procedure relevant to nurses only-it is found that 87.5% wear hand protection during such procedure. The same was noted with respect to the suturing of patients.

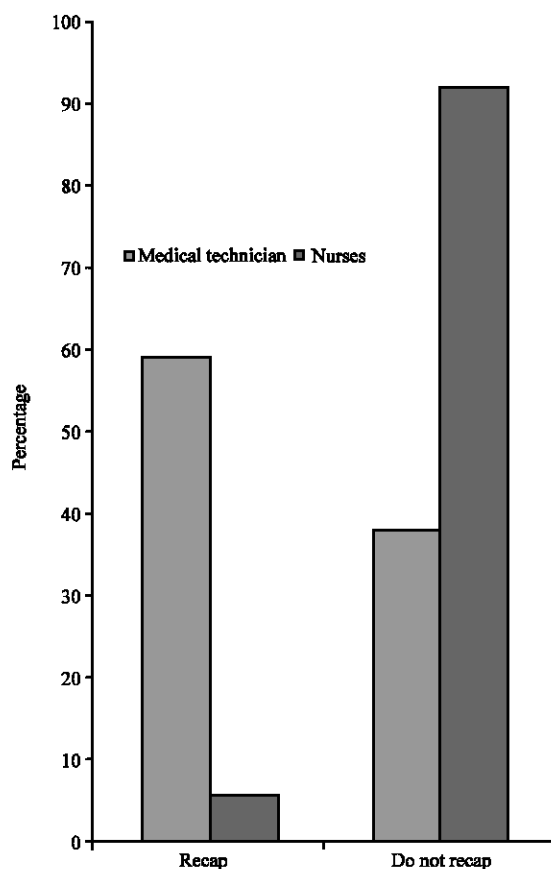


Fig. 4: Rate of recapping among health care workers

Table 4: Percentage of nurses and Medical Laboratory Technicians wearing gloves for specific procedures

Procedure	Nurses		Medical Technicians	
	No.	%	No.	%
Injections	45	93.8	N/A	-
Inserting/removing catheters	42	87.5	N/A	-
Doing/undoing suture	42	87.5	N/A	-
Handling vials	27	56.3	38	90.5
Finger-pricks	34	70.8	N/A	-
Preparing solutions	23	47.9	36	85.7
Insertion of canulae	41	85.4	N/A	-

N/A: Not Applicable

For the handling of vials, gloves are worn by 27 (56.3%) nurses. Concerning MLT, it was noted that 38 (90.5%) wear hand protection.

For data pertaining to hand-protection worn during procedures involving finger-pricks, it was found that 16 (32.0%) nurses do not wear gloves when carrying out such task.

With regards to gloving while preparing solutions in the Laboratory (Table 4), the following was noted: 27 (54.0%) nursing officers do not wear any hand-protection. For medical technicians, 36 (85.7%) protected their hands.

For procedures involving insertion and removal of canulae, 41 (85.4 %) nurses wear latex gloves.

### **Awareness of the Risk Associated with Needle-Stick/Sharp Material Injuries**

All the participants interviewed were aware of the risks associated with a needle-stick/sharp material injury. However, the common blood-borne pathogens HIV and hepatitis (B and C) were cited by 69.6 and 67.4% of participants, respectively.

Concerning hepatitis B vaccination among health care workers, of 41 nurses who responded, 7 were not vaccinated against hepatitis B virus. All the medical technicians who participated were vaccinated against hepatitis B virus.

## **DISCUSSION**

This study found that nurses sustained higher needle-stick injuries (72.0%) as opposed to medical Laboratory technicians (11.9%). This correlates with the findings of Whitby and McLaws (2002) whereby, of needle-stick injuries reported, most were sustained in nursing staff (66.2%) followed by other medical staff (16.8%). This can be explained by the fact that nurses are among the work group with the highest use of hypodermic syringe whereas; medical Laboratory technicians do not deal with syringes as often in their day-to-day working activities. Trim and Elliot (2003) stated that there is general consensus that nurses are most at risk of a sharps injury, with up to 50% of all sharps injuries sustained being sustained by this group.

Injuries with scalpel and other sharp materials were second most common injury encountered by nurses (16%) whereas this was the predominating type of injury sustained by medical Laboratory officers (54%). Among the main tasks of medical technicians are the preparation of slides for examination, the cutting and the staining of tissue specimens, whereas these are not among the duties of a nurse. This could account for the relatively lower incidence of cut injuries among nurses.

It was also found that the type of injury encountered was dependent on the procedures being carried. Most sharps injuries sustained by medical technicians were related with slide preparation procedures while for nurses, most were injured when disposing of used needles. Making medical technicians more aware of the association between sharps injuries during slide preparation procedures can help reduce the occurrence of sharps injuries with respect to such procedure. This could be achieved through re-enforcement of specific modules in their training and also through awareness campaigns at their work place in general.

Adegboye *et al.* (1994) have reported that needle handling or disposal of used needles accounted for 23% of NSI. In a CDCP (2000) report, improperly disposed sharps accounted for 10% of total percutaneous injuries, while disposal-related causes accounted for 12% of NSI. Newsom and Kiwanuka (2002) have reported that most NSI occurred when patients moved during procedures, when HCW re-sheathed needles, or during suturing (each reported by 55 HCW-30% of those responding). These findings differ from those reported by O'connell and Hayes (2003) whereby HCW were more at risk immediately after a procedure (31.3%) followed by during a procedure (21.7%). Present study found that the main cause of NSI in nursing staff was related to disposal of used needles (52.2%). This could be explained by the fact that prior to disposal, the vast majority of nurses (95.8% of respondents) segregate needle from syringe and this clearly put them at a higher risk of sustaining sharps injuries, especially needle-stick injuries. Improper disposal containers could also be a contributing factor to sharps injuries. Thirty seven out of 50 (74%) nurses dispose of used needles in plastic bottles. These plastic bottles are obviously not designed to safely accommodate needles. Moreover, the neck of the bottle is of inappropriate size to allow freely for the passage of a whole syringe and its needle. As a result HCW tend to disassemble the needle prior to disposal so as to allow for more space in the bottle. This also explains the high rate of needle segregation (80.4%) from syringe prior to disposal. More than a hazard to the nurse, improper disposal containers can also cause injuries to support staff such as ward attendants and cleaners. Memish *et al.* (2002) have reported 57% of injuries to be disposal-related activities.



Given the serious consequences of sharps injuries and the limited effectiveness of post-exposure therapies, it is crucial that measures to prevent sharps injuries from occurring be found. Initial efforts should focus on altering the behaviour of health care workers. Subsequent efforts to prevent sharps injuries include the introduction of protective barriers, the engineering of non-invasive procedures and the implementation of administrative controls.

The first efforts aiming to reduce sharps injuries should center on efforts to eliminate completely the practice of recapping through education. This study showed that a small but non-negligible proportion of nurses (6%) continue to practice double-handed re-shielding of used needles. The situation is more alarming with medical Laboratory technicians whereby 59.5% were practicing re-sheathing of used needles. Such practices are in total disagreement with CDC recommendations (2000) stating that used needles should not be recapped.

In areas where activities necessitate recapping, alternative methods are suggested, such as the one-handed scoop method of recapping. A means to lay more emphasis on safe practices could be through the setting up or re-enforcement of specific module in MLT course dealing with this aspect. This is equally valid for nursing courses.

Until HCW acknowledge the importance of reporting sharps injuries incidents, the size of the problem cannot be accurately determined (Falagas *et al.*, 2007).

It is recommended that all at risk HCWs be immunised against hepatitis B (O'connell and Hayes, 2003). This study found that almost 8% of HCW, all of which being nursing officers, were not immune to hepatitis B, which is nearly similar to that found in hospital based studies, namely in Ireland where actually 8.8% of sharps injury recipients were not immune to hepatitis B according to O'connell and Hayes (2003). It would be expected that such front line staff who are at high risk of sharps injuries would be hepatitis B immune. A notable feature about those non-immune personnel however is that, except in one case, the nurses all possessed more than ten years experience. Since, 1997, the Ministry of Health and Quality of Life has made it mandatory for all HCW to be vaccinated against hepatitis B. Such measures are certainly noteworthy but it would be salutary to check the hepatitis B immunity status of all HCW indistinctly and undertake the proper framing for those who do not develop immunity after an initial vaccination programme.

On a short-term basis, following occupational exposure, every reasonable effort should be made to ascertain the risk of infection (if any) of the source patient. If the injured person is not immune to hepatitis B, the source patient should be tested as a matter of urgency for hepatitis B surface antigen.

Up to now, there is no vaccine against HIV/AIDS and hepatitis C. HCW are therefore deemed to take the utmost precautions while dealing with any patients since it would be impracticable at this present stage to undertake HIV and hepatitis C testing as standard for all patients.

An interesting trend has been found in the wearing of gloves by nurses pertaining to different procedures. For at-risk procedures involving penetration of skin or mucous membrane in patients, the majority of nursing officers wear latex gloves (average = 85%). However, in procedures where they do not deal with patients (e.g., handling vials) a higher proportion of nurses obviate the wearing of gloves (average = 46.5%). One possible explanation could be that, being aware of blood-borne pathogens; nursing officers take the necessary precautions when dealing with patients. On the other hand, for procedures where there is little or no risk of acquiring blood-borne pathogens, they do not consider it as vital to wear gloves. Further education and training may be required to reinforce the usage of gloves to comply with infection control precautions.

Health care workers need to be given further training and education so that they become more aware of the risks of accidents during handling and disposal of sharps. A proper network should also be set up to provide for regular checking of the immunity status of health care workers.

## REFERENCES

- Adegboye, A.A., B. Moss, F. Soyinka and K. Kreiss, 1994. The epidemiology of needlestick and sharp instrument accidents in a Nigerian hospital. *Infect. Cont. Hosp. Epidemiol.*, 15: 27-31.
- Al-Ansi, S.A., D. Mohan and A.J. Platt, 2006. Hand surgery on patients who are high risk for blood viruses. *J. Hand. Surg.*, 31: 426-431.
- CDCP-Centers for Disease Control and Prevention, 2000. Needlestick injuries involving winged steel needles. US Department of Health and Human Services.
- CSO, 2002. Annual Health Statistics. Central Statistics Office, Mauritius.
- Falagas, M.E., I. Karydis and I. Kostogiannou, 2007. Percutaneous exposure of incidents of the health care personnel in a newly founded tertiary hospital: A prospective study. *PloS ONE.*, 7: 194.
- Guo, Y.L., J. Shiao and Y.K. Chuang, 1999. Needlestick and sharps injuries among health-care workers in Taiwan. *Epidemiol. Infect.*, 122: 259-265.
- Memish, Z.A., M. Almuneef and J. Dillon, 2002. Epidemiology of needlestick and sharps injuries in a tertiary care center in Saudi Arabia. *Am. J. Inf. Cont.*, 30: 234-241.
- Newsom, D.H. and J.P. Kiwanuka, 2002. Needle-stick injuries in a Ugandan Teaching Hospital. *Ann. Trop. Med. Parasitol.*, 6: 517-522.
- O'connell, T. and B. Hayes, 2003. Occupational sharps injuries in a Dublin Teaching Hospital. *Irish. Med. J.*, 6: 143-145.
- Trim, J.C. and T.S.J. Elliot, 2003. A review of sharps injuries and preventive strategies. *J. Hosp. Inf.*, 53: 237-242.
- Whitby, R.M. and M.L. Mclaws, 2002. Hollow-bore needlestick injuries in a tertiary teaching hospital: Epidemiology, education and engineering. *Med. J. Aust.*, 177: 418-422.