

Research Article

Cross-sectional study on accidental occupational exposures amongst urban slum-based private medical practitioners

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ABSTRACT

Background: This cross-sectional, complete enumeration study was conducted in an urban slum to determine the frequency of occupational exposure of private medical practitioners to patient body fluids and the remedial measures adopted following such events and also to examine their high-risk practices, personal protective measures, immunisation and training status in relation to occupational exposures.

Methods: After Institutional Ethics Committee approval, private medical practitioners practising for ≥ 1 year in the locality who gave written informed consent were interviewed in their own clinics using a pre-tested formatted questionnaire.

Results: Of the 108 respondents interviewed, the majority were non-allopathic, male practitioners. The speciality-wise and gender-wise differences in training in occupational exposure were not significant ($p=0.135$). Prior to disposal, 10.18% cut needles while 26.85% disinfected needles with 1% hypochlorite solution ($p=0.0001$). 50.93% never bent or recapped needles ($p=0.0008$). Only 19.44% regularly used gloves while examining patients ($p=0.0039$). 41.66% were completely unimmunised against Hepatitis B ($p=0.004$), while only one female non-allopathic practitioner (0.92%) had taken complete immunisation against tetanus ($p<0.05$). Of the 7.41% respondents who had history of needle stick injuries, only one female non-allopathic practitioner had reported occupational exposure. Those unaware about the need for post-exposure prophylaxis for occupational exposure and that anti-retroviral therapy was part of post-exposure prophylaxis constituted 87.96% and 95.37%, respectively.

Conclusions: Reporting of occupational exposure, complete immunisation against hepatitis B and tetanus and use of personal protection was inadequate. Specialised hands-on training ought to be an integral component of continuing medical education for private medical practitioners.

Keywords: Occupational exposures, Needle stick injuries, Private medical practitioners

INTRODUCTION

The private medical practitioner who provides curative, preventive and referral services is often the first line of contact between the formal health care delivery system and the community. During the course of their medical practice, these private practitioners are exposed to a variety of biological and chemical occupational hazards. The levels of protection against occupational hazards ought to conform to standard guidelines.¹ Inadequate protective measures make them more vulnerable to

occupational exposures and hazardous chemical agents, increasing their risk of contracting many occupational diseases.^{2,3}

Private medical practitioners in urban slums seldom undergo specialised refresher training in universal biosafety precautions once they have graduated and started medical practice. This cross-sectional, complete enumeration study was conducted among urban slum-based private medical practitioners to ascertain the frequency of their occupational exposure to patient body

fluids and the measures adopted by them following such events. Another objective of the present study was to explore their high-risk practices, use of personal protective measures, immunisation against hepatitis B and tetanus, and their training status in relation to occupational exposures.

METHODS

This cross-sectional, complete enumeration study was carried out in an urban slum in Kalwa (approximate geographical coordinates: 19°17'N, 73°22'E) in Thane city, which is located about 30 kilometres from Mumbai, in the State of Maharashtra in Western India. A list of private practitioners in the slum area was obtained from local association of private medical practitioners and collated with information provided by local chemists. After obtaining approval from the Institutional Ethics Committee, prospective respondents were explained about the purpose of the study. All private medical practitioners of either sex, practising for more than one year in the study area, who gave written informed consent to participate in the study, were interviewed using a pre-tested semi-structured questionnaire. Some questions pertaining to disposal of biomedical waste were adapted from a checklist issued by the Government of Gujarat; India.⁴ Interviews were conducted in the clinics of the respective general practitioners at a time which was convenient to them.

For the purpose of this study, "exposure" was defined as a percutaneous injury (e.g., needle stick or cut with a sharp object), contact of mucous membranes, or contact of skin (especially when the exposed skin is chapped, abraded, or afflicted with dermatitis or the contact is prolonged or involving an extensive area) with blood or other body fluids to which universal precautions apply.⁵ The term "occupational exposure" was used to connote reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties.⁶ Immunisation against hepatitis B was deemed "complete" if the full basic course of immunisation 0,1 and 6 months and boosters were taken every 5 years and the last booster taken within 5 years.⁷ The term "complete" immunisation against tetanus was used to imply that the respondents had taken three primary doses of tetanus toxoid at least four weeks apart, followed by booster doses at 18 months, 5 years, 10 years and 16 years or had received a booster dose within the previous 5 years where no additional dose of tetanus toxoid is recommended.⁸ Categorical data were presented as frequencies and continuous data as Mean \pm standard deviation (SD). EpiInfo Version 7.0 (public domain software package from Centers for Disease Control and Prevention, Atlanta, GA, USA) was used for calculating Chi Square test (with Mantel-Haenszel correction where applicable) and Odds Ratio (OR).

RESULTS

Of the 108 private medical practitioners interviewed, 21 (19.44%) were females (mean age = 35.47 \pm 5.03 years; mean years of practice = 9.8 \pm 3.62 years) and 87 (86.25%) were males (mean age = 39.94 \pm 8.09 years; mean years of practice = 12.27 \pm 6.24 years). 17(15.74%) were allopathic practitioners while 91 (84.25%) were non-allopathic practitioners (Table 1).

Table 1: Socio-demographic profile of respondents.

Parameter	A (n = 17)	NA (n = 91)	Percent	
Gender	Female	1	20	19.44
	Male	16	71	80.55
Age (years)	≤ 30	2	14	14.81
	31-40	10	42	48.14
	41-50	4	27	28.70
	51-60	1	7	07.40
	≥ 61	0	1	09.25
Years of medical practice	≤ 10	8	41	45.37
	11-20	7	45	48.14
	≥ 21	2	5	06.48

A = Allopathic medical practitioner; NA = Non-allopathic medical practitioner

The difference between allopathic and non-allopathic practitioners in relation to training in prevention and treatment of occupational exposure was not statistically significant (Table 2).

A statistically significant ($p = 0.0003$, OR = 0.0615) majority (62.96%) of respondents disposed off sharps in puncture proof containers as per Bio-Medical Waste (BMW) Management Guidelines.⁹ A significant number ($p = 0.0008$, OR = 6.02) did not bend or re-cap needles before disposal. Prior to disposal, 26.85% disinfected syringes with hypochlorite solution ($p = 0.0001$, OR = 0.182). 17.59% disinfected spills with hypochlorite solution before cleaning ($p=0.038$, OR = 0.4392), while 37.03% used absorbent before disinfection ($p = 0.008$, OR = 0.2769). While examining patients, 17 (15.74%) regularly used face masks while 21 (19.44%) regularly used gloves. The differences in use of face mask and gloves while examining patients were significant at $p = 0.004$ (OR = 0.188) and $p = 0.0039$ (OR = 0.286), respectively (Table 2).

Eleven (10.18%) were completely immunised against hepatitis B ($p = 0.004$, OR = 0.179) while only one (0.92%) female non-allopathic practitioner had taken complete immunisation against tetanus. Of the eight (7.41%) practitioners who had revealed history of occupational exposures to blood and body fluids, only one female non-allopathic practitioner had reported the event (Table 2).

78 (72.22%) did not know the local treatment of the wound. 95 (87.96%) respondents were not aware about the need for post-exposure prophylaxis (PEP) in case of an exposure to patient body fluids. Only 4.63% knew that

anti-retroviral therapy (ART) is a component of PEP (significant at $p=0.000001$). Only two respondents (1.85%) knew that ART has to be started within 2 hours of exposure (significant at $p=0.037$).

Table 2: Specialty and gender-wise distribution of responses to questionnaire.

Parameters	Allopathic (n = 17)		Non-Allopathic (n = 91)		χ^2 test value †	p value	Odds Ratio
	M (n = 16)	F (n = 1)	M (n = 71)	F (n = 20)			
1 Training in occupational exposure	14	1	24	11	2.23	0.135	0.5816
2 Disposes off sharps in puncture-proof containers	15	1	33	19	12.97	0.0003 #	0.0615
3 Never bends or recaps needles	5	0	46	4	11.18	0.0008 #	6.02
4 Disinfects syringes before disposal	8	1	9	11	14.63	0.0001 #	0.182
5 Spill disinfection by 5% hypochlorite	8	1	5	5	18.01	0.038 #	0.4392
6 Uses absorbent before pouring hypochlorite on spills	8	1	19	12	7.01	0.008 #	0.2769
7 Uses face mask while examining patients	2	1	7	7	8.2	0.004 #	0.188
8 Uses gloves while examining patients	2	1	11	7	4.28	0.0039 #	0.286
9 Completed Hepatitis-B Immunisation	12	1	33	17	8.08	0.004 #	0.179
10 Has had history of occupational exposure	5	0	2	1	0.289	0.590	1.75
11 Knows local treatment for exposure	7	0	15	8	1.28	0.257	0.55
12 Knows that ART is required for PEP	9	0	3	1	0.009	0.923	3.2

Statistically significant; † χ^2 test with Mantel-Haenszel correction (where applicable); M = Male; F = Female; PEP = Post-exposure prophylaxis; ART = Anti-retroviral treatment

DISCUSSION

The respondents were predominantly male non-allopathic practitioners with a mean practice of 12.27 years.

Training

53.70% of the 108 respondents were not trained in prevention and treatment of occupational exposure. The speciality-wise and gender-wise differences in training in occupational exposure were not significant. Knowledge deficit could be the reason behind improper disposal, increased occupational exposure and reluctance towards

prompt treatment of an exposure event. Krishnan et al 10 have reported that educational intervention increased the knowledge of healthcare workers about prevention and management of occupational exposures and that face-to-face training was more effective than other educational interventions.

Biomedical waste disposal

Though more than 50% of the practitioners disposed off sharps in puncture proof containers, the frequency of pre-disposal needle cutting was a mere 10.18%. Talaat et al¹¹ have reported that 64% Egyptian healthcare workers disposed off uncut needles (with their sharp tips open) in

containers that were not puncture-proof or these uncut needles would be recapped before disposal. Both these actions would increase risk of needle stick injuries. In the present study, the low frequency (26.85%) of pre-disposal disinfection of needles increases the potential risk of transmission of blood-borne diseases. The difference in disposal of sharps in puncture proof containers and chemical disinfection of the syringe before disposal between allopathic and non-allopathic practitioners was statistically significant ($p = 0.0003$, OR = 0.0615). There is an urgent need for specialised hands-on training for private medical practitioners in preventing and managing events of occupational exposure to patient body fluids and disposal of BMW. Disposal of BMW is legally mandatory in India.⁹ These trainings ought to be taken up as crucial components of continuing medical education programmes for private practitioners.

Spill management

Only 19% disinfected spills with 5% hypochlorite before cleaning. The difference between allopathic and non-allopathic practitioners was statistically highly significant ($p = 0.0038$, OR = 0.4392). Though only 16.66% used gloves for disinfection of spills, the difference was not significant.

Personal protection

Only 19.44% of both allopathic and non-allopathic practitioners mandatorily used gloves while examining patients and the difference between the two in this case was not statistically significant. In other words, more than 80% of the respondents used bare hands while examining patients, exposing them to occupational transmission of diseases.

Immunisation

The extent of incomplete immunisation and total non-immunisation against Hepatitis B was 58.24% and 41.66%, respectively. 95.37% respondents were incompletely vaccinated against tetanus while one (0.92%) was completely vaccinated. This again underlines the need for creating awareness among private practitioners. The difference between allopathic and non-allopathic practitioners in complete hepatitis B immunisation was not significant. Immunisation against hepatitis B and tetanus and awareness programs can be conducted at convenient times, in collaboration with local associations of private practitioners.

High-risk behavior

53% practitioners admitted to recapping or bending needles which is known to increase incidence of needle stump injuries. The difference in the practice of bending or recapping needles between allopathic and non-allopathic practitioners was not statistically significant. In a study among healthcare workers in Nigeria, the practice

of recapping needles was higher amongst doctors, as compared to that of nurses.¹² Non-disposal of used needles in puncture-proof containers or needle cutting creates favourable situation for re-capping needles.

Accidental exposure

The rate of occupational exposure as given by respondents was 7.41% which is lower than that reported by other studies. This could be due to recall bias or reluctance to admit exposure. Talaat et al¹¹ have reported 35.6% needle-stick injuries amongst Egyptian healthcare workers over a three-month period. In the present study, the difference in the frequency of accidental occupational exposure between allopathic and non-allopathic practitioners was not significant. According to Simonsen et al¹³ febrile, ill and infected people receive 10-100 times more injections as compared to healthy people and consequently, the true probability of contamination of syringes is higher than the average prevalence of the pathogen in the population. In the present study, only one event of occupational exposure was reported and only 30.56% knew that prompt preventive treatment was required. Elmiyeh et al¹⁴ have reported a "culture of silence" in context of occupational exposures, although 80% of respondents were aware that occupational exposures should be notified, only 51% of those affected had reported all needle-stick injuries. A New Zealand-based study¹⁵ has revealed 33% under-reporting of needle-stick injuries. The difference in the response towards prompt treatment of those exposures between allopathic and non-allopathic practitioners in this study was statistically insignificant. Only 12.14% practitioners knew that PEP was needed and the knowledge was 4.63% about ART being a part of it and it was down to 1.85% about the knowledge that PEP needs to be taken within 2 hours of exposure. In a study¹⁶ conducted in the United Kingdom, 20% of healthcare workers did not initiate PEP despite having been exposed to an HIV positive patient. Roland et al¹⁷ have reported that 91.2% Rhode Island healthcare workers presented within 24 hours of occupational exposure while 98.2% presented within 72 hours.

Post-exposure prophylaxis

Only 4.63% knew that anti-retroviral therapy (ART) is a component of PEP ($p = 0.923$, OR = 3.2). Only two respondents (1.85%) knew that ART has to be started within 2 hours of exposure ($p = 0.037$). The difference between allopathic and non-allopathic practitioners in knowledge of PEP regimen for occupational exposure was not statistically significant. Janjua et al¹⁸ concluded that the level of knowledge was a major determinant in adherence to universal precautions at first level care facilities in Pakistan. In a Canadian study,¹⁹ the perception of a physician towards risk of contracting HIV was found to determine his behaviour in preventing an occupational exposure. This highlights the importance of

specialised training of practitioners in prevention and management of occupational exposure.

The present study has identified the level of training deficit which could result in improper disposal of BMW, high-risk behaviour that amplifies risk of occupational exposure and non-reporting of exposure events that could preclude prompt treatment. Continuing medical education (CME) is a mandatory pre-condition for five-yearly renewal of medical licence in the State of Maharashtra, India.²⁰ However, current CME programs comprise didactic lectures and need to be replaced by hands-on training. Face-to-face training has been found to be more effective than other educational interventions.¹⁰ Institution-based health care personnel have access to 24-hour emergency telephonic hotlines for reporting occupational exposures. However, such facilities are not yet available for urban slum-based private medical practitioners in India. A campaign approach, analogous to the "Stopsticks Campaign"²¹ may help address the problems identified in this study.

CONCLUSION

Reporting of occupational exposure, complete immunisation against hepatitis B and tetanus and use of personal protection was inadequate. Specialised hands-on training ought to be an integral component of continuing medical education for private medical practitioners.

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REFERENCES

- Centers for Disease Control and Prevention (CDC). National Institute for Occupational Safety and Health. Guidelines for needlestick injury prevention. Available at <http://www.cdc.gov/niosh/docs/2012-123/pdfs/2012-123.pdf> Accessed 24 Sep 2015.
- De Villiers HC, Nel M, Prinsloo E. Occupational exposure to bloodborne viruses amongst medical practitioners in Bloemfontein, South Africa. *SA Fam Pract.* 2007;49(3):14-14c.
- Cardo D, Culver D, Ciesielski C, Srivastava P, Marcus R, Abiteboul D. A Case-Control Study of HIV Seroconversion in Health Care Workers after Percutaneous Exposure. *N Engl J Med.* 1997;337(21):1485-90.
- Government of Gujarat. Biomedical Waste Checklist. <http://www.gujhealth.gov.in/images/pdf/bmw-guidline.pdf> pages 38-41. Accessed 24 Sep 2015.
- United States Department of Labour, Occupational Safety and Health Administration. Available at http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10051 Accessed 24 Sep 2015.
- International Association of Fire Fighters. Available at <http://www.iaff.org/et/jobaid/InfDis>. Accessed 24 Sep 2015.
- Advisory Committee on Immunisation Practices Recommendations for HBV Immunization of Health Care Workers. Available at http://www.hepb.org/professionals/acip_summary_professionals.htm Accessed 24 Sep 2015.
- Serum Institute of India, dosage for Adsorbed Tetanus Vaccine IP. Available at http://www.seruminstitute.com/content/products/product_tetanus_toxoid.htm Accessed 24 Sep 2015.
- Ministry of Environment and Forests, Government of India. Notification 20 July 1998. Section-4 and Schedule-I. Available at <http://envfor.nic.in/legis/hsm/biomed.html> Accessed 24 Sep 2015.
- Krishnan P, Dick F, Murphy E. The impact of educational interventions on primary health care workers' knowledge of occupational exposure to blood or body fluids. *Occup Med.* 2007;57(2):98-103.
- Talaat M, Kandeel A, El-Shoubary W, Bodenschatz C, Khairy I, Oun S. Occupational exposure to needlestick injuries and hepatitis B vaccination coverage among health care workers in Egypt. *Am J Infect Control.* 2003;31(8):469-74.
- Sadoh WE, Fawole A, Sadoh AE, Oladimeji AO, Sotiloye OS. Practice of universal precautions among healthcare workers. *J Natl Med Assoc.* 2006;98(5):722-6.
- Simonsen L, Kane A, Lloyd J, Zaffran M, Kane M. Unsafe injections in the developing world and transmission of blood borne pathogens: A review. *Bull World Health Organ.* 1999;77(10):789-800.
- Elmiyeh B, Whitaker S, James M, Chahal C, Galea A, Alshafi K. Needle-stick injuries in the National Health Service: A culture of silence. *J R Soc Med.* 2004;97:326-7.
- Fullerton M, Gibbons V. Needlestick injuries in a healthcare setting in New Zealand. *N Z Med J.* 2011;124(1335):33-9.
- Zenner D, Tomkins S, Charlett A, Wellings K, Ncube F. HIV prone occupational exposures: epidemiology and factors associated with initiation of post-exposure prophylaxis. *J Epidemiol Community Health.* 2009;63(5):373-8.
- Roland C, Merchant M, Chee K, Liu T, Mayer K. Incidence of Visits for Health Care Worker Blood or Body Fluid Exposures and HIV Postexposure Prophylaxis Provision at Rhode Island Emergency Departments. *J Acquir Immune Defic Syndr.* 2008;47(3): 358-68.
- Janjua NZ, Razaq M, Chandir S, Rozi S, Mahmood B. Poor knowledge - predictor of non-adherence to universal precautions for blood borne pathogens at first level care facilities in Pakistan. *BMC Infect Dis.* 2007;7:81.
- Taylor K, Eakin J, Skinner H, Kelner M, Shapiro M. Physician's perception of personal risk of HIV

infection and AIDS through occupational exposure. *CMAJ.* 1990;143(6):493-500.

20. Maharashtra Medical Council. <http://www.maharashtramedicalcouncil.in/CME/CMENotice/New%20CME%20Guidelines.pdf> Accessed 12 Oct 2015.
21. Centers for Disease Control and Prevention (CDC). National Institute for Occupational Safety and Health. Available at

<http://www.cdc.gov/niosh/stopsticks/> Accessed 12 Oct 2015.

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