



# Disposal of syringes, needles, and lancets used by diabetic patients in Pakistan

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## KEYWORDS

Diabetes mellitus;  
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Insulin pens

## Summary

**Objective:** To assess the use, handling and disposal of insulin injection equipment by diabetic patients in Pakistan.

**Methods:** We conducted a cross-sectional study at diabetic clinics in five tertiary centers in Pakistan. All diabetic patients (type 1/type 2) who were on insulin for more than 1 month, were included. An Urdu (local language)-translated questionnaire was used to collect information on insulin administration equipment, the site and frequency of needle use, insulin syringe/pen/lancet disposal, sharing of needles and knowledge about diseases that are spread by sharing contaminated needles.

**Results:** Of 375 patients, 58% were female. The mean (SD) duration of diabetes was 12.3 (7.3) years, and the duration of insulin use was 4.4 (4.3) years. The majority of the patients used syringes (88.3%) for insulin administration. Additionally, the majority of the patients disposed of used devices (syringes, 92%; pens, 75%; and lancets, 91%) in the household garbage collection bin. About half of the patients ( $n = 185$ ) reported being educated by their physicians about the disposal of sharps. Those who were educated by a physician (adjusted odds ratio (adjOR): 0.36; 95%CI: 0.16–0.81) or could read/write English (adjOR: 0.32; 95%CI: 0.11–0.92) were less likely to dispose of syringes and needles in the household garbage.

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*Conclusion:* The common disposal of sharps in the household garbage has implications for disease transmission. Education on the safe disposal of sharps may improve the disposal practices.

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## Introduction

Pakistan is experiencing a high burden of hepatitis B (HBV) and C (HCV). Prevalence of HBV and HCV among the general population groups in various parts of the country ranges from 20 to 25% [1–3]. In high-risk groups such as injection drug users, the prevalence of HCV is much higher (range 50–90%) [4]. Thus, the large proportion of used injection devices and other sharps would be potentially contaminated with HBV and HCV.

Few studies have documented the disposal of sharps waste at health care facilities in Pakistan [5,6]. There have been concerns about the disposal of injection and other blood-contaminated equipment used in the communities, such as self-administered insulin syringes and lancets. The International Diabetes Federation estimates suggest that there are approximately 7 million diabetics in Pakistan [7]. The exact proportion who use insulin is not known but could be substantial. Furthermore, the patients also need to monitor their blood glucose levels with glucometers and lancets. However, there is no data available on the disposal of syringes, lancets and other sharps that are produced by diabetics in their homes in Pakistan. Most likely, they dispose of their used syringes in the household waste, which may end up in the municipal garbage. Given the high prevalence of HCV/HBV in Pakistan, these disposal practices could potentially put waste handlers, other household members, cleaning personnel, garbage collectors and scavenger boys searching for valuables that can be recycled at the risk of exposure to various blood-borne pathogens [8]. Within the households, children may also obtain used lancets and syringes to play with, which can put them at risk for infection.

Given that diabetics are the major users of injections in the community, this study assessed the use, handling and disposal of insulin injection equipment by diabetic patients in Pakistan.

## Materials and methods

We conducted a cross-sectional survey of diabetic patients taking insulin for more than one

month. The study participants presented at diabetic clinics in one of the following hospitals in the major cities of Pakistan: Shifa International Hospital, Islamabad; Fauji Foundation Hospital, Rawalpindi; Liaquat National Hospital, Karachi; Ittefaq Hospital, Lahore; and Hayatabad Medical Complex, Peshawar. Patients who were hospitalized and started on insulin were excluded from the study. A formal permission was sought from the institutional review boards of all of the participating hospitals.

We enrolled 375 patients who were distributed equally among the five sites. At each diabetic clinic, consecutive patients who presented to the clinic were invited to participate in the study until a desired number of study participants were recruited from each site during the three months of fieldwork. To compensate for the low recruitment at two of the sites, the other three centers enrolled more patients.

The questionnaire was developed in English and then translated into the local language ‘‘Urdu’’. The questionnaire was pre-tested by interviewing 10 patients and revised to clarify any ambiguity before the start of the study. Patients who were unable to read/write Urdu were interviewed by an interviewer, who was a physician and study investigator, while the rest of the patients were asked to fill out the questionnaires themselves. Questions such as duration of diabetes, type of insulin the patient was taking and duration of insulin intake were filled out by the interviewer, while the rest of the questions were filled out by the patient. Questions included the type of insulin administration equipment used (syringe or pen device), insulin injection site, frequency of needle change, disposal of insulin syringes, or pens, needles and lancets, knowledge about sharing needles and diseases that could be spread by sharing a contaminated needle. The following options were used in the questionnaire for the disposal of equipment: ‘‘household garbage collection bin’’, ‘‘needle cutter box’’, ‘‘syringe disposal box’’ and ‘‘some other way’’. We also inquired about whether patients were willing to collect used syringes in specifically designed disposal boxes and dispose of them in the hospital with the hospital waste.

## Statistical analysis

Data analysis was performed in SPSS and SAS 9.2. We calculated the proportion of each variable and also compared the disposal practices based on education, the duration of injection use and previous knowledge about disposal. Where appropriate, a Chi-square/Fisher's exact test was used to compare the association between two variables. We also performed a multivariable logistic regression analysis to assess the association of various covariates with sharps disposal in the household garbage.

## Results

Of 375 patients who were available for analysis, there were more females (58.1%) than males (41.9%). The mean (SD) age was 50.6 (14.1) years [range: 7–82 years]. The mean (SD) duration of diabetes was 12.3 (7.3) years, while the duration of insulin use was 4.4 (4.3) years (Table 1).

Majority of the patients used syringes (88.3%) for insulin administration, while fewer patients used pen devices (11.7%) (Table 1). On average (SD), a single needle was used in a syringe 5.4 (3.7) times, while a single needle was used in a pen 3.8 (4.25) times. Regardless of the injection device used, majority of the patients (syringes, 92%; pens, 75%; and lancets, 91%) disposed of used devices in the household garbage collection bin. Few patients reported using a sharps disposal box to dispose of used devices (syringes, 5%; pens, 13%; lancets, 5%). Additionally, a low number of patients (3.4%) reported having shared needles with other household members.

We also inquired about the patients' knowledge regarding spread of diseases by sharing contaminated needles. Overall, 16% (50/318) of patients knew of hepatitis transmission through the sharing of used needles; 7% (21/318) knew of HIV, and 6% (20/318) knew of both HIV and hepatitis. Knowledge about the transmission of hepatitis and/or HIV varied based on literacy level, with 22% (16/74) of those who could not read/write Urdu having knowledge about the transmission of hepatitis/HIV through sharing previously used needles compared to 26% (45/173) of those who could read/write Urdu and 40% (26/75) of those who could read/write English.

Disposal practices also differed based on literacy level, with 91% (72/79) of those who could not read/write reported disposing of syringes and pen devices in the household garbage compared to 93% (188/203) who could read/write Urdu and 80%

(61/76) who could read/write English ( $P=0.007$ ) (Tables 2 and 3). Similar patterns were observed for syringes, pen devices and lancets alone. Those who knew that sharing needles could transmit hepatitis/HIV were less likely to dispose of syringe/pen devices in the household garbage (84% (76/91) vs. 92% (206/225);  $P=0.05$ ). Similar patterns were observed for individual devices (Tables 2 and 3). Approximately half of the patients (49.7%;  $n=185$ ) reported that they had been educated by their physicians about the disposal of used syringes, lancets and needles. Those educated by physicians were less likely to dispose of used devices in the household garbage bin, although the difference was not significant (Tables 2 and 3).

Based on a multivariable logistic regression model for an association with literacy level, knowledge about hepatitis/HIV and education by a physician revealed that those who were educated by a physician (adjusted odds ratio (adjOR): 0.36; 95%CI: 0.16–0.81) or could read/write English (adjOR: 0.32; 95%CI: 0.11–0.92) were less likely to dispose of syringes and needles in the household garbage. Those who reported having knowledge of the transmission of hepatitis/HIV through sharing syringes/needles were also less likely to dispose of sharps in the household garbage, but the association was not significant (adjOR: 0.52; 95%CI: 0.24–1.13) (Table 3).

In the analysis of disposal practices based on the duration of insulin use, of the patients who used insulin for less than 5 years ( $n=56$ ), only 4 (7.1%) syringe users and 2 (3.6%) pen device users used syringe disposal boxes and cutters; of the patients who used insulin for more than 5 years ( $n=245$ ), 16 (6.5%) syringe users and 4 (1.6%) pen users used disposal boxes and cutters. This difference was not significant.

When the participants were asked if they would be willing to dispose of their used equipment in sharps disposal boxes, 87% of the patients agreed to dispose of their equipment in the sharps disposal boxes; however, only 34% agreed to pay money to buy the sharps boxes.

## Discussion

In this study, we found that majority of the participants inappropriately disposed of syringes, needles and lancets in the household garbage collection bins despite the fact that almost half of the patients were educated about the proper disposal of sharps devices. Those patients who were literate in English, were knowledgeable about the

**Table 1** Participant profile and injection equipment use.

	Male <i>n</i> = 157 (41.9%)	Female <i>n</i> = 218 (58.1%)	Total <i>n</i> = 375
Age			
Mean ( $\pm$ SD)	52.3 (14.8)	49.4 (13.4)	50.6 (14.1)
Range	7–80 years	10–82 years	7–82 years
Education	( <i>n</i> = 148)	( <i>n</i> = 212)	( <i>n</i> = 360)
Uneducated	22 (1.8%)	58 (27.3%)	80 (22.2%)
Can read/write Urdu	75 (50.6%)	129 (60.8%)	204 (56.6%)
Can read/write English	51 (34.4%)	25 (11.7%)	76 (21.1%)
Duration of diabetes (years)			
Mean ( $\pm$ SD)	12.2 (7.0)	12.4 (7.6)	12.3 (7.3)
Range	0.2–35	0.8–52	0.2–52
Duration of insulin use (years)			
Mean ( $\pm$ SD)	4.0 (3.4)	4.7 (4.8)	4.4 (4.3)
Range	0.1–15	0.2–26	0.1–26
Type of insulin used			
Premixed	114 (72.6%)	66 (76.0%)	280 (74.7%)
Basal only	19 (12.1%)	27 (12.4%)	46 (12.3%)
Basal bolus	12 (7.6%)	10 (4.6%)	22 (5.9%)
Bolus only	10 (6.4%)	15 (6.9%)	25 (6.7%)
Others	2 (1.3%)	0	2 (0.5%)
Insulin injection equipment			
Injection and vial	129 (82.2%)	202 (92.7%)	331 (88.3%)
Pen	28 (17.8%)	16 (7.3%)	44 (11.7%)
Injection provider			
Patient him/herself	119 (75.8%)	158 (72.5%)	278 (74.2%)
Close relative	33 (21%)	54 (24.8%)	87 (23.2%)
Healthcare professional	5 (2.8%)	6 (2.8%)	10 (2.7)
Injection site			
Abdomen	51 (32.5%)	65 (29.8%)	116 (30.9%)
Thighs	14 (8.9%)	20 (9.2%)	34 (9.1%)
Arms	19 (12.1%)	63 (28.9%)	82 (21.9%)
Other	2 (1.3%)	3 (1.4%)	5 (1.4%)
Varying positions	71 (45.1%)	67 (30.9%)	138 (36.8%)
Number of times a needle was used			
Mean ( $\pm$ SD)	5.6 (3.9)	5.1 (3.6)	5.3 (3.7)
Range	1–30	1–20	1–30

transmission of hepatitis/HIV through sharing needles or were educated by physicians were less likely to dispose of their used sharps devices in the household garbage.

The inappropriate disposal of sharps waste has implications for needle stick injuries to household members, children and waste handlers. Many studies have reported needle stick injuries, which mainly occurred in children, janitorial staff and other community members, that resulted from the inappropriate disposal of needles in the community [9–11]. The high rate of sharps disposal in the household garbage by diabetics in our study could expose household members, children and garbage handlers to a risk of injuries and transmission of blood-borne pathogens. Although the transmission of blood-borne pathogens is well known with sharps

injuries in healthcare settings [12], there is also a potential risk for transmission that is associated with sharps injuries in a community setting [13]. The risk of transmission in the community might be higher in Pakistan, where the prevalence of HBV/HCV is higher than in many other countries [1–3, 14]. Thus, efforts are needed to educate patients about the safe disposal of used sharps in the community.

The results of the present study are consistent with a few studies that investigated sharps disposal by diabetics [15, 16]. In studies from Europe, approximately one quarter to one half of the diabetics disposed of their used injection devices in the household garbage [15–17], while this proportion was higher in a study from India where approximately 84% of the respondent reported that

**Table 2** Device disposal practices stratified by literacy level, knowledge about the transmission of blood-borne pathogens (BBP) by needle sharing and education.

Literacy level Disposal practices	Cannot read/write <i>n</i> (%)	Reads/writes Urdu <i>n</i> (%)	Reads/writes English <i>n</i> (%)	<i>P</i> <sub>exact</sub> <sup>a</sup>
Disposal of syringes				0.0145
Household garbage	69 (92%)	175 (93.1%)	44 (84.6%)	
Sharps/needle cutter box	2 (2.7%)	12 (6.4%)	7 (13.5%)	
Others	4 (5.3%)	1 (0.5%)	1 (1.9%)	
Disposal of lancets				0.33
Household garbage	54 (91.5%)	172 (93%)	60 (85.7%)	
Sharps/needle cutter box	4 (6.8%)	11 (6%)	9 (12.9%)	
Others	1 (1.7%)	2 (1.1%)	1 (1.4%)	
Disposal of pen needles				0.86
Household garbage	3 (75%)	10 (83.3%)	16 (69.6%)	
Sharps/needle cutter box	1 (25%)	1 (8.3%)	5 (21.7%)	
Others	0 (0)	1 (8.3%)	2 (8.7%)	
Disposal of syringes/pen needles				0.007
Household garbage	72 (91.1%)	188 (92.6%)	61 (80.3%)	
Sharps/needle cutter box	3 (3.8%)	13 (6.4%)	12 (15.8%)	
Others	4 (5.1%)	2 (1%)	3 (4%)	
BBP transmission by sharing needles	No	Yes		
Disposal of syringes				0.0028
Household garbage	182 (93.8%)	68 (86.1%)		
Sharps/needle cutter box	12 (6.2%)	6 (7.6%)		
Others	0 (0)	5 (6.3%)		
Disposal of lancets				0.1216
Household garbage	182 (92.9)	72 (86.8%)		
Sharps/needle cutter box	13 (6.6)	9 (10.8%)		
Others	1 (0.5)	2 (2.4%)		
Disposal of pen needles				0.1683
Household garbage	22 (78.6%)	7 (63.6%)		
Sharps/needle cutter box	3 (10.7%)	4 (36.4%)		
Others	3 (10.7%)	0 (0)		
Disposal of syringes/pen needles				0.0504
Household garbage	206 (91.6%)	76 (83.5%)		
Sharps/needle cutter box	16 (7.1%)	10 (11%)		
Others	3 (1.3%)	5 (5.5%)		
Education by a physician on sharps disposal	No ( <i>n</i> = 187; 50.3%)	Yes ( <i>n</i> = 185; 49.7%)		
Disposal of syringes				0.2846
Household garbage	156 (94%)	144 (89.4%)		
Sharps/needle cutter box	7 (4.2%)	14 (8.7%)		
Others	3 (1.8%)	3 (1.9%)		
Disposal of lancets				0.027
Household garbage	158 (95.2%)	140 (88.1%)		
Sharps/needle cutter box	6 (3.6%)	17 (10.7%)		
Others	2 (1.2%)	2 (1.3%)		
Disposal of pen needles				0.369
Household garbage	16 (84.2%)	14 (70%)		
Sharps/needle cutter box	3 (15.8%)	3 (15%)		
Others	0 (0)	3 (15%)		
Disposal of syringes/pen needles				0.0958
Household garbage	175 (93.6%)	159 (86.9%)		
Sharps/needle cutter box	9 (4.8%)	18 (9.8%)		
Others	3 (1.6%)	6 (3.3%)		

<sup>a</sup> Fisher's exact test.

**Table 3** Relationship between literacy level, knowledge of blood-borne pathogen transmission as well as physician education and sharps disposal in household garbage.

Covariates	OR (95%CI)	AdjOR (95%CI)
Literacy level (n = 358)		
Cannot read/write	1.00	1.00
Can read/write English	0.40 (0.15–1.03)	0.32 (0.11–0.92)
Can read/write Urdu	1.22 (0.48–3.11)	1.09 (0.39–3.02)
Education by physician on sharps disposal (n = 370)		
No	1.00	1.00
Yes	0.45 (0.22–0.94)	0.36 (0.16–0.81)
Knowledge on transmission of blood-borne pathogens by sharing syringes/needles (n = 316)		
No	1.00	1.00
Yes	0.47 (0.23–0.97)	0.52 (0.24–1.13)

OR, odds ratio; adjOR, adjusted odds ratio; CI, confidence interval.

they disposed of their sharps in the household garbage [18]. Thus, the situation in our setting is more similar to that in India, where the population characteristics are more comparable to the Pakistani population. In studies in which the effect of advice on sharps disposal was investigated, including studies from India and UK, it was found that those who received advice were more likely to dispose of their sharps in sharp boxes compared to those who did not receive such advice [18,19]. We also found that those who were educated by physicians were less likely to dispose of their sharps in the household garbage, but there were still a large proportion of those who received education (~80%) but still disposes of their sharps in the household garbage.

One possible reason for the smaller impact of education on the safe disposal of sharps could be a lack of ability to apply the knowledge, which has implications for the effectiveness of education and the translation of knowledge into practice. Patients might be aware about the need for the disposal of sharps in a sharps box, but if they are not aware of where to obtain sharps boxes and how to dispose of them, they would not be able to use them. Busy physicians may not have the time or detailed knowledge about the safe disposal of syringes. Health educators/diabetes nurse educators who have knowledge about the safe disposal of sharps based on local sharps disposal regulations may be better suited for educating patients about the safe disposal of sharps along with other measures to promote health and prevent complications related to diabetes. Unfortunately, none of the hospitals that were surveyed in the present study have a registered nurse educator. Nurse educators are used for educating patients about the management of diabetes and preventing complications. This type of system could help in educating patients about diabetes and

the safe disposal of sharps by diabetics in Pakistan.

In summary, the disposal of used injection devices into the household garbage by diabetic patients in Pakistan is very common. Participants with a higher level of literacy, those who were educated by a physician on the disposal of sharps and those with knowledge about blood-borne pathogens were less likely to dispose of sharps in the household garbage. Thus, efforts to educate patients on the appropriate disposal practices could help in enhancing safety from sharps that are generated in the community. The development and testing of educational interventions for the safe disposal of syringes before wider dissemination could improve the chances of success of such interventions.

## Conflict of interest

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*Competing interests:* None declared.

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## References

- [1] Bosan A, Ahmad I, Hafiz R, Qureshi H, Bile KM. A review of hepatitis viral infections in Pakistan. *J Pak Med Assoc* 2010;71(12):1045–58.
- [2] Ali SA, Donahue RM, Qureshi H, Vermund SH. Hepatitis B and hepatitis C in Pakistan: prevalence and risk factors. *Int J Infect Dis* 2009;13:9–19.
- [3] Janjua NZ, Hamza HB, Islam M, Tirmizi SF, Siddiqui A, Jafri W, et al. Health care risk factors among women and personal behaviours among men explain the high prevalence of hepatitis C virus infection in Karachi, Pakistan. *J Viral Hepat* 2010;17:317–26.
- [4] Waheed Y, Shafi T, Safi SZ, Qadri I. Hepatitis C virus in Pakistan: a systematic review of prevalence, genotypes and risk factors. *World J Gastroenterol* 2009;15(45):5647–53.

- [5] Janjua NZ. Injection practices and sharp waste disposal by general practitioners of Murree, Pakistan. *J Pak Med Assoc* 2003;53(3):107–11.
- [6] Ahmad K, Raza SA, Janjua NZ, Bin Hamza H, Khan MI. Interventions for improvement in unsafe injection practices in Pakistan. *Int J Infect Dis* 2005;9(4):232–3.
- [7] International Diabetes Federation [homepage on the Internet]. Brussels: Diabetes Atlas; c2010 [cited 2011 July 1]. Diabetes estimates Excel tables [about 1 screen]. Available from: <http://www.idf.org/node/23640>.
- [8] Mujeeb SA. Unsafe injections: a potential source of HCV spread in Pakistan. *J Pak Med Assoc* 2001;51(1):1–3.
- [9] Papenburg J, Blais D, Moore D, Al-Hosni M, Laferrière C, Tapiero B, et al. Pediatric injuries from needles discarded in the community: epidemiology and risk of seroconversion. *Pediatrics* 2008;122(August (2)):e487–92.
- [10] Russell FM, Nash MC. A prospective study of children with community-acquired needlestick injuries in Melbourne. *J Paediatr Child Health* 2002;38(June (3)):322–3.
- [11] Makwana N, Riordan FA. Prospective study of community needlestick injuries. *Arch Dis Child* 2005;90(May (5)):523–4.
- [12] Cardo DM, Culver DH, Ciesielski CA, Srivastava PU, Marcus R, Abiteboul D, et al. A case–control study of HIV seroconversion in health care workers after percutaneous exposure. Centers for Disease Control and Prevention Needlestick Surveillance Group. *N Engl J Med* 1997;337(21):1485–90.
- [13] Haber PS, Young MM, Dorrington L, Jones A, Kaldor J, De Kanzow S, et al. Transmission of hepatitis C virus by needle-stick injury in community settings. *J Gastroenterol Hepatol* 2007;22(November (11)):1882–5.
- [14] Janjua NZ, Khan MI, Mahmood B. Sharp injuries and their determinants among health care workers at first-level care facilities in Sindh Province, Pakistan. *Trop Med Int Health* 2010;15(10):1244–51.
- [15] Olowokure B, Duggal H, Armitage L. The disposal of used sharps by diabetic patients living at home. *Int J Environ Health Res* 2003;13(June (2)):117–23.
- [16] Causse X, D'Alteroche L, Si Ahmed SN, Giraudeau B, Metman EH. Hepatitis C Network of the Centre Region. Disposal of injection material used for the treatment of hepatitis C: comparison with insulin-dependent diabetes and thromboembolism. *Gastroenterol Clin Biol* 2005;29(January (1)):63–8.
- [17] Bouhanick B, Hadjadj S, Weekers L. What do the needles, syringes, lancets and reagent strips of diabetic patients become in the absence of a common attitude? About 1070 questionnaires in diabetic clinics. *Diabetes Metab* 2000;26(4):288–93.
- [18] Singh AP, Chapman RS. Knowledge, attitude and practices (KAP) on disposal of sharp waste, used for home management of type-2 diabetes mellitus, in New Delhi, India. *J Health Res* 2011;25(3):135–40.
- [19] Crawshaw G, Irwin DJ, Button J. Disposal of syringes, needles, and lancets used by diabetic patients in North East Essex. *Commun Dis Public Health* 2002;5(2):134–7.

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