

## Sharps disposal practices among diabetic patients using insulin

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Insulin-dependent diabetic patients are not educated on safe sharps disposal methods, so leading to unsafe disposal of needles. Appropriate education on the correct disposal of sharps should be an integral part of their diabetic counseling. Doctors, nurses and pharmacists should all take responsibility for educating and reinforcing information about correct sharps disposal methods. Patients should be advised to either discard sharps into puncture-resistant containers placed into their household refuse, or return

them in secure containers for disposal by the dispensing institutions. Patients should also be educated regarding health risks associated with used needles. The South African Metabolic and Endocrine (SEMDSA) Guidelines and the South African Standard Treatment Guidelines (STG) should also give clear guidance on the safe disposal of needles.

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Diabetes is conservatively estimated to occur in 4 million South Africans.<sup>1</sup> All type 1, and up to 40% of type 2, diabetic patients require insulin therapy.<sup>1</sup> With so many patients using insulin, much medical waste is generated daily in the form of used needles and syringes.

Used sharps are a biomedical hazard as incorrect disposal could lead to needle-stick injuries (NSIs),<sup>2</sup> posing the risk of contracting human immunodeficiency virus (HIV), hepatitis B or C and other blood-borne diseases.<sup>2</sup> An individual not protected by prior hepatitis vaccination who sustains an NSI from a needle used by an individual testing positive for hepatitis B surface antigen has a 6 - 30% chance of infection by the virus.<sup>2</sup> The risk of HIV infection following one percutaneous exposure to HIV-infected blood is estimated to be 0.3%.<sup>2</sup> South Africa has a high prevalence of HIV<sup>3</sup> and, with many diabetic patients likely to have HIV or other transmittable infections, safe sharps disposal practices are essential.

South Africa's constitution states: 'Everyone has the right to an environment that is not harmful to their health and well-being.'<sup>4</sup> Sharps disposal is a problem in South Africa because of accidental NSI to garbage removers or other persons handling domestic waste.<sup>5</sup> The 2009 Health Care Waste Summit<sup>6</sup> recognised the problems with sharps disposal in South Africa. The safe disposal of needles and lancets used by insulin-dependent diabetic patients is not only a problem in South Africa; in 1989, 109 NSIs were formally reported by garbage collectors in the Atlanta metropolitan area,<sup>2</sup> and other studies in Atlanta and European countries have highlighted the problem of incorrect sharps disposal practices by patients at home.<sup>2,7</sup>

In 1998, Macalino *et al.* investigated community-based programmes for safe disposal of used needles in the USA, Canada and Australia;<sup>8</sup> these included using puncture-resistant containers such as hot-chocolate or coffee containers with a secure lid and discarding these in the household rubbish. Other safe disposal methods included using community drop-boxes where used sharps could be deposited, and the use of sharps containers sent for safe biohazard disposal at community sites, hospitals and pharmacies.

In 1990, the American Diabetes Association, and in 2002 Diabetes UK, issued recommendations that all needles and lancets used by diabetic patients be placed into a puncture-resistant container before

discarding into household waste.<sup>2</sup> The South African Metabolic and Endocrine (SEMDSA) Guidelines<sup>9</sup> and the South African Standard Treatment Guidelines (STG)<sup>10</sup> do not provide recommendations on the safe disposal of used needles and stylets. Many studies highlight the need for healthcare workers to provide the necessary skills and education to diabetic patients for safe disposal of needles.<sup>2,5,11</sup>

We investigated current methods of sharps disposal by diabetic patients attending Wentworth Hospital (WWH)'s outpatient department, to compare these practices with the education received by patients about correct sharps disposal, and to make recommendations regarding the safe disposal of sharps by diabetic patients.

### Methods

Wentworth Hospital is a district-level hospital in Durban that sees almost 12 000 outpatients per month. The hospital pharmacy dispenses monthly just under 5 000 insulin pensets, each with a needle, to patients. There is no record of any sharps being returned to the hospital for disposal.

The study included insulin-dependent diabetic patients over the age of 18 years attending WWH OPD who consented to participate. In consultation with a biostatistician, a sample of 132 diabetic patients using insulin was chosen. The sample size was based on the assumption that the population prevalence of incorrect needle disposal was 90% and was calculated to give a precision level of 5%. To ensure representation of all the racial groups treated at WWH, the sample was stratified into 45 Indian, 44 black, 36 coloured and 7 white patients. It was assumed that patients present in a random order to OPD, so convenience consecutive sampling from the OPD bench was used to collect data from diabetic patients using insulin. The study took place from October to December 2010. Questionnaires on current practices regarding insulin needle disposal and on education received regarding sharps disposal were administered to each participant by the principal investigator. Data were entered onto an Excel spreadsheet and the SPSS computer software package used to analyse the data. Factors associated with correct disposal methods were analysed using Pearson's chi square tests. A *p*-value <0.05 was considered to be statistically significant.

### Results

The ages of the study population ranged from 18 to 86 years (mean 58.3 years); most had type 2 diabetes; 29% were male and 71% were female; 4 (3%) were younger than 25 years, 3 (2.2%) were 25 - 39 years old, 64 (48%) were 40 - 59 years old, and 62 (46.2%) were >60 years old. Nine patients had received no formal education; 31 had only attended primary school, 84 attended secondary school, and 8 had tertiary education.

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Each month, 850 needles were generated by the 132 patients. Needles were re-used 2 - 20 times by patients; 117 (88%) patients disposed of used needles directly into their household rubbish bins, 8 (6%) flushed used needles down the toilet into the sewage system, and 4 (3%) used other methods such as burying the needles (Fig. 1). Only 3 (2.2%) patients returned their needles in puncture-resistant containers to the hospital for disposal. No associations were found between race, gender, education levels and correct disposal of used sharps. Forty-six (35%) patients were aware of the potential health risks associated with injury caused by the incorrect disposal of used needles.

Of the participants, 91% (120/132) had received diabetic education and counselling regarding insulin use, storage and administration; 68% (89) rated the diabetic education as good, 22.7% rated it average, and 9.7% as poor. Despite the positive response to the education provided on use and storage of insulin, only 5 (3.8%) patients stated that they had received education and counselling regarding correct methods of sharps disposal. All 3 patients who were correctly disposing of their needles had been educated about how to do so.

There was a highly significant association between education received by patients and correct needle disposal methods ( $p < 0.001$ ). Of the 5 who were educated in disposal, 60% correctly disposed of the needles whereas, of the 127 who were not educated in disposal, none correctly disposed of the needles.

## Discussion

The race groups recruited for the study are representative of the patient population with diabetes seen at WWH. The data show that over 97% of the study population discarded their sharps inappropriately. The lack of association between race, gender or education levels and correct needle disposal practices was surprising, as those with a higher level of education could be expected to be better educated about their disease and recognise the hazardous nature and need for safe disposal of their medical waste.

No recent studies were found on safe disposal of sharps by diabetic patients. However, our findings are consistent with studies in the early 1990s in Europe and the USA,<sup>2</sup> highlighting the fact that needle disposal is a global problem in the developed and developing world.

The large number of patients who dispose of their needles incorrectly is of concern. The National Environmental Management Act of 1998 states that the duty of care principle requires the generator of hazardous waste, under all circumstances, to carry the responsibility of the ultimate fate of the generated waste.<sup>4</sup> Patients, healthcare workers or healthcare facilities could be liable for costs associated with treating garbage collectors who can prove that they were infected from contaminated needles. This serious issue requires urgent attention from health professionals, who have a responsibility to provide information to patients about safe disposal of needles.

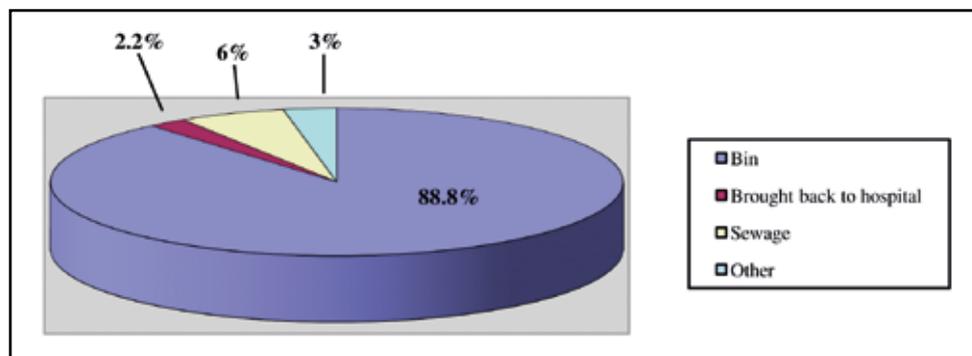


Fig. 1. Sharps disposal methods among the study population.

Deficiencies in diabetic education and counselling provided to diabetic patients have been highlighted. Emphasis is placed on knowledge regarding storage and administration of insulin, but very little counselling is provided on correct sharps disposal. Less than 4% (5/132) of our patients had received any counselling about correct sharps disposal practices. It is disappointing to note that since 2009, when disposal of needles and other hazardous material was identified as a serious issue at the Health Care Summit,<sup>6</sup> more emphasis has not been placed on safe needle disposal.

Despite much work on needle-free products for the administration of insulin, progress has been slow and inconsistent,<sup>12</sup> and no significant needle-free alternative method of insulin administration is available. As needles will continue to be part of diabetic care by all patients requiring insulin for some time to come in South Africa and other countries, their safe disposal must therefore form an integral part of diabetic education.

Although this study's numbers are small and the results must be treated with caution, they suggest that appropriate education and knowledge on sharps disposal is the most important determining factor in correct disposal methods.

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