The disposal of used sharps by diabetic patients living at home

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The disposal of sharps generated in the community has been identified as an area of public health and environmental health concern. While there is a large amount of literature on sharps disposal practices in healthcare settings, the sharps disposal practices of diabetic patients living at home has been poorly documented. This study describes the sharps disposal practices of diabetic patients in South Staffordshire, an English health district. A randomly selected sample of 1,348 adult (aged ≥ 16 years) diabetic patients were obtained from the district population-based diabetes register. A self-administered questionnaire was posted to the sample. Non-responders received up to two reminders. A response rate of 91% was achieved.

Household containers were used by: 34.1% of respondents for syringes; 35.1% for lancets; and 27.6% for needles. Sharps boxes were the least used method of sharps disposal. Many respondents indicated that they had received only verbal information on how to dispose of their sharps. Those who recalled receiving information were more likely to dispose of their sharps safely. The results of this study suggest that sharps are disposed of in the most convenient manner, into the household waste. This contributes to environmental pollution and places people at risk of physical and psychological trauma.

Keywords: sharps disposal; diabetes; postal survey; register.

Introduction

Diabetes mellitus is a common chronic disease whose management may require regular blood tests and insulin injections. As a result thousands of used sharps and bloodstained materials are generated daily by diabetic patients and require disposal. Sharps discarded in an unsafe manner in the community cause concern as they potentially place people at risk of injury and infection from blood-borne pathogens such as HIV and viral hepatitis (Macalino et al. 1998). Diabetes UK guidelines recommend that household containers which can be sealed be used as receptacles for sharps and that they should be disposed of in the household waste when full (Diabetes UK, 2001). Similar advice is given for the disposal of needle-clipping devices when full. These guidelines conflict with advice provided by the Environment Agency and local authorities and are technically illegal.

The epidemiology of sharps generated in healthcare settings has been well documented (London Waste Regulation Authority, 1994; Beltrami et al. 2000; Department of Health (England), 2001) there is however comparatively little literature available on the disposal of sharps by diabetics living at home. Only two previously published British studies were identified, neither of these were population-based and both lacked methodological rigour as
they selected biased samples, surveyed small numbers and did not indicate in which year the published survey was carried out (Alexander et al. 1987; Bain and Graham 1998).

Using a population-based diabetes register we wished to evaluate how a random sample of diabetic patients disposed of their sharps and whether they could recall receiving any information regarding sharps disposal.

**Methods**

This report forms part of a larger study carried out in South Staffordshire health district, which is situated in the West Midlands region of the UK. The district contains urban, semi-urban and rural areas and serves an estimated population of 590,000 people living within a wide range of socioeconomic circumstances (South Staffordshire Health Authority, 2000). A population-based register of people with diabetes was used as the sampling frame for this study. Inclusion on the register is voluntary and requires written informed consent. Patients from 90% (86 out of 96) of the general practices in the South Staffordshire health district are on the register and may therefore be considered as representative of known diabetics. Using data from the register the overall prevalence of diabetes in South Staffordshire was estimated to be 1.96% (range 1.74 – 2.69%) at the time the study commenced in November 2000. A random sample of 1,348 adult (aged ≥ 16 years) diabetics was drawn from the register and sent a previously piloted self-administered questionnaire and an invitation letter. Non-responders received up to two postal reminders.

Responses to three questions relating to sharps disposal and collection are presented. These are: (i) ‘How do you dispose of your needles, syringes, lancets and blood-stained material?’, (ii) ‘When you started taking insulin or testing your blood were you given advice about how to dispose of needles, lancets and blood stained material?’ and (iii) ‘Are you satisfied with your present method of disposal?’ Each question had two or more answers that were pre-coded. In this study sharps were defined as lancets, needles or syringes (with or without needles attached), and disposal of sharps loose or in any type of household container was considered to be an unsafe disposal method. Data analysis was performed using chi-square with Yates’ correction and odds ratios (OR) with 95% confidence intervals (CI).

**Results**

When comparing the diabetic patients surveyed with those on the register, both groups were similar with regard to age, sex and social characteristics. Of the questionnaires mailed 90.7% (1223 out of 1348) were returned. After excluding 22 returned questionnaires which indicated that the addressee had died, moved or was not eligible for the study (as they claimed they were not diabetic), 1201 out of 1326 (90.6%) questionnaires were analysed. The mean age of responders and non-responders differed significantly with the average age of responders being greater than that of non-responders (64 years vs. 57 years, \( P < 0.0001 \)).

**Sharps disposal methods**

As shown in table 1, the sharps most frequently disposed of loose into the household waste were lancets (29.5%). Almost one-quarter (24.3%) of all syringes were disposed of directly into the household waste as were 11.5% of needles. More than one-third of respondents disposed of their lancets (35.1%) or syringes (34.1%) in household containers. Over one-quarter (27.1%) of needles were disposed of in a similar manner. Examples of household containers used for the
**Table 1.** Methods of disposal used by diabetic patients

<table>
<thead>
<tr>
<th>Sharp's instrument</th>
<th>Loose (n)</th>
<th>Bleach bottle or other household container</th>
<th>Safe-clip (n)</th>
<th>Sharps box (n)</th>
<th>Fire (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lancets (n = 721)</td>
<td>213 (29.5, 26.2 – 33.0)</td>
<td>253 (35.1, 31.6 – 38.7)</td>
<td>131 (18.2, 15.4 – 21.2)</td>
<td>87 (12.1, 9.8 – 14.7)</td>
<td>37 (5.1, 3.6 – 7.0)</td>
</tr>
<tr>
<td>Needles (n = 532)</td>
<td>61 (11.5, 8.9 – 14.5)</td>
<td>147 (27.6, 23.9 – 31.6)</td>
<td>234 (44.0, 39.7 – 48.3)</td>
<td>72 (13.5, 10.7 – 16.7)</td>
<td>18 (3.4, 2.0 – 5.3)</td>
</tr>
<tr>
<td>Syringes (n = 214)</td>
<td>52 (24.3, 18.7 – 30.6)</td>
<td>73 (34.1, 27.8 – 40.9)</td>
<td>22 (10.3, 6.6 – 15.2)</td>
<td>51 (23.8, 18.3 – 30.1)</td>
<td>16 (7.5, 4.3 – 11.9)</td>
</tr>
<tr>
<td>Blood-stained material (n = 364)</td>
<td>173 (47.5, 42.3 – 52.8)</td>
<td>108 (29.7, 25.0 – 34.7)</td>
<td>16 (4.4, 2.5 – 7.0)</td>
<td>35 (9.6, 6.8 – 13.1)</td>
<td>32 (8.8, 6.1 – 12.2)</td>
</tr>
</tbody>
</table>

*Some respondents did not answer all the questions.*
disposal of sharps included: empty beer cans, glass jam jars, envelopes, soap packets and milk containers. Almost half (44.0%) of those responding to this question used a ‘safe-clip’ (needle-clipping device) to dispose of their needles. Use of sharps boxes was generally the least common (Table 1) method of sharps disposal. A small number of respondents indicated that they burnt their used sharps.

Recall receiving advice on sharps disposal methods

There were 619 respondents who answered this question, and of these 400 out of 619 (64.6%) recalled receiving advice on how to dispose of their sharps. Table 2 shows that those who did not recall receiving advice were more likely to dispose of their sharps in an unsafe manner compared to those who recalled receiving advice. Most (94.8%, 379 out of 400) of the respondents reported that they had received verbal advice only. This was significantly greater than the proportion (3.8%, \( P < 0.00001 \)) who received only written advice, and the proportion (1.53%, \( P < 0.00001 \)) who recalled receiving both written and verbal advice.

Satisfaction with current sharps disposal method

There were 691 responses to this question and 82.2% (568 out of 691) of respondents indicated that they were satisfied with their method of disposal. Of the 568 who were satisfied with their
method of disposal most disposed of their lancets and syringes in household containers (34% and 32% respectively) or loose in household rubbish (24% and 21% respectively). Needles were disposed of mainly by safe clip (45%) or into bleach bottles or other household containers (27%). Among the 123 who were not satisfied with their method of disposal most disposed of their lancets loose into household waste (47%) or used a household container (41%). Needles were disposed of in a safe clip device (40%) or used bleach bottles or other household container (37%). Syringes were most commonly disposed of in household containers (46%) or loose into the household waste (37%). Diabetic patients were more likely to be satisfied with their disposal method if they recalled receiving advice on how to dispose of their sharps (68% vs. 43%, OR = 2.79, 95% CI = 1.86 – 4.15).

Discussion

This is the largest community-based study that has examined how diabetics dispose of their sharps. Previously published studies from the UK and North America have described small numbers of diabetics attending hospital clinics, thereby limiting their generalizability to other populations (Alexander et al. 1987; Gambardella et al. 1989; Berkowitz et al. 1996; Bain and Graham 1998). The very high return rate for questionnaires and the representativeness of our sample suggest that our results are likely to reflect the practices of our diabetic population and may apply to other parts of the UK. However, the response to a number of questions was low particularly those relating to needle and syringe disposal. This is presumably because not all diabetic patients inject insulin.

It is estimated that at the time of this study approximately 2.5 million sharps were generated annually by diabetic patients living at home in the South Staffordshire health district. More than half of the diabetic patients surveyed disposed of their sharps either loose or in household containers. This practice is unsafe and places the diabetic, members of their household and the general public, as well as those occupationally exposed, at risk of infection and physical and psychological trauma. This is of particular concern in areas where household waste is still collected in black plastic bags rather than large rigid containers known as wheeled (or ‘wheelie’) bins. Another unsafe practice was the disposal of used sharps by burning. Needles and lancets cannot be incinerated by domestic fires and the fumes released by plastic syringes during this process may be toxic especially if carried out in a closed environment.

Unsafely disposed of sharps may indicate that appropriate disposal techniques are not adequately communicated, are misunderstood or ignored. The importance of effective communication between healthcare professionals and patients has been widely recognized in recent years as improving patient outcome and compliance (Stewart 1995). However, it is acknowledged that the information provided may be forgotten, ignored or misunderstood. This is particularly so where large volumes of information are provided and where the information is given verbally rather than in writing (McPherson et al. 2001). This is supported by our results which suggest that the majority of patients recalled receiving only verbal information. Those that did not recall receiving advice were more likely to dispose of their sharps in an unsafe manner. These might be major contributing factors to the high proportion of sharps being placed loose in the household waste or in inappropriate containers. One approach to addressing these problems would be to supplement verbal information with written information and to provide this information opportunistically as well as during formal reviews. In addition to this a
short video or computer-based illustration of appropriate disposal techniques could prove useful.

In their current guidelines Diabetes UK recommend the use of opaque hard plastic containers as receptacles for sharps (Diabetes UK, 2001). When full these are to be sealed and disposed of in the household waste. Although a number of our respondents appear to follow these recommendations they conflict with advice provided by local authorities, are technically illegal and need updating for several reasons. Firstly, they do not consider people’s concerns regarding the disposal of these materials with other household waste. Secondly, these containers are eventually deposited in landfill sites where compacting of waste occurs and recommended household containers may not withstand the compacting process (Turnberg and Lowen, 1994). Thirdly, there are hazards associated with using household containers that are potentially recyclable as receptacles for sharps. Anecdotal reports indicate that glass bottles containing sharps are being deposited in bottle banks and are appearing in recycling centres.

Although needle-stick injuries in the community outside the healthcare setting have been reported (Turnberg and Lowen, 1994; Philipp, 1993), the risk of injury and then infection is lower than that seen in the healthcare setting (Liss et al. 1990; Springer et al. 1999). The majority of diabetic patients are not sources of serious infections such as Hepatitis B virus (HBV), Hepatitis C virus (HCV) or HIV infection (Cattaneo et al. 1996). Nevertheless, the psychological impact of an accidental needlestick injury with a discarded instrument should not be underestimated.

Internationally, (Macalino et al. 1998) and in some parts of the UK these problems have been addressed by providing diabetic patients with sharps boxes which are then disposed of by the local council following collection from a designated collection point or from the patient’s home. With the increasing number of diabetic patients this approach could prove costly and is an area that deserves further research particularly around the issues of cost, risk reduction and evaluation of the intervention.

**Conclusion**

The poor disposal practices identified give cause for concern as they suggest lack of motivation or that advice given is incorrect, ignored or misunderstood. They may also reflect poor communication between the diabetic and the healthcare team. As a result of our findings we are currently examining options for sharps disposal by diabetics living at home that will aim to significantly reduce the proportion of diabetics placing loose sharps in the household waste or using inappropriate containers for disposal. Part of the programme will include educational interventions for diabetic patients, their carers and healthcare workers, and the monitoring and evaluation of its impact. However, there still remains a need for the development of uniform national guidelines on the disposal of sharps for diabetic patients living at home.

**Acknowledgements**

The authors thank respondents to the survey, the health professionals who contribute to the diabetes register and colleagues who read and commented on different drafts. The authors also acknowledge the contribution of Jill Hill, Louise Payne and Wendy Jeffcott. The helpful comments of an anonymous reviewer are also gratefully acknowledged.
References


