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**Cross-sectional survey of a sample of UK primary care dental professionals' experiences of sharps injuries and perception of access to occupational health support.**

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## Abstract

**Background:** The 2013 Sharps Regulations were introduced to minimise the risk of sharps injuries and BBV transmission throughout healthcare. Occupational health (OH) services are pivotal for helping employers implement these regulations. Despite this, no research has been conducted on the prevalence of sharps injuries, underreporting of injuries or access to OH among primary care dental professionals in the UK since 2013. **Aim:** To estimate the prevalence of sharps injuries, the level of underreporting and of self-reported access to an OH service both for the care of sharps injuries and for general health and wellbeing. **Method:** A cross-sectional survey was administered at the 2017 British Dental Association (BDA) Conference and Exhibition in Manchester, and at the 2017 BDA Scottish Conference and Exhibition in Glasgow. The survey covered questions relating to sharps injuries and OH support. Statistical analyses were conducted using SPSS Version 22 (IBM Corp., 2013). **Results:** 796 delegates participated, of whom 166 (20.8%) had experienced a sharps injury in the past year and 58 (35%) did not report the incident. 190 (23.9%) participants reported no, or uncertain, access to OH support. Most respondents' practices had a sharps safety policy (771; 96.9%), but fewer (611; 76.8%) had received training on the prevention of sharps injuries and neither policy nor training were associated with incident reporting. **Conclusion:** Despite the introduction of the sharps regulations, sharps injuries and underreporting of injuries remain prevalent among those practising in primary dental care. Our results also suggest that there are significant shortfalls in OH support, at a time when changes to guidance on health clearance and management of infected health care workers, in addition to sharps injury management, increase the need for such services.

## **Introduction**

Healthcare workers (HCWs) are at risk of occupational transmission of blood borne viruses (BBVs) following a needlestick injury or mucocutaneous exposure.<sup>1-3</sup> The estimated risks of transmission from a patient to healthcare worker following an occupational percutaneous exposure to a source patient who is HBV, HCV or HIV positive are 30%, 3% and 0.3% respectively.<sup>4</sup> There are no national surveillance systems in place for monitoring the incidence of sharps injuries occurring through the delivery of dental care. Even if there were such a system, the data would likely be incomplete given the consistent under-reporting of sharps injuries.<sup>1, 5</sup> The current surveillance systems in England, Wales and N. Ireland collate information on significant occupational exposures, i.e. those where the source patient is either known or thought to be infected with HIV, Hepatitis B and/or Hepatitis C. These represent a small proportion of all exposures to blood and body fluids. Significant occupational exposures reported by dental staff make up just under 10% of all reports, with sharps injuries accounting for the majority.<sup>6</sup>

In order to protect HCWs and patients, the European Union (EU) published a Directive (2010/32/EU) to minimise the risk of sharps injuries and BBV transmission in hospitals and healthcare settings. All requirements in the directive were later incorporated into the UK Health and Safety (Sharp Instruments in Healthcare) Regulations 2013,<sup>7</sup> which form the cornerstone for the prevention of BBV transmission between patients and HCWs. These regulations set out legal requirements for employers to promote the safe use and disposal of sharps. These include substitution of suitable 'safer sharps devices' (SSDs) where it is reasonably practicable to do so, staff training in relation to the risks from sharps, and interventions to prevent injuries and their consequences. The latter includes provision of access to medical advice for the immediate management and follow up of a sharps injury.<sup>7</sup>

Occupational health (OH) services can provide pivotal support to employers attempting to meet the legislative requirements of the Sharps Regulations, though medical advice and treatment for an employee injured by a sharp can also be obtained from Accident and Emergency (A&E) or GP practices, particularly when staff work out of hours or on premises where there is not an OH service available. In addition, current UK policies to prevent and manage the transmission of BBVs from

infected HCWs to patients rely on OH services. They perform pre-employment health clearance checks for new entrants to the NHS, those entering roles which require EPPs and those who have been at any risk of acquiring a BBV (e.g. through working in a healthcare setting overseas).<sup>8</sup> OH services also provide ongoing specialist management of HIV- or HBV-infected HCWs who have been cleared to perform EPPs (viral load testing on a predefined frequency to ensure that their viral load remains sufficiently suppressed).<sup>9</sup> There is however, no statutory requirement in the UK for employers to provide blanket access to OH services, and while many large healthcare providers have their own OHS, or contract services from provider companies, smaller providers, such as primary care dental practices may seek advice or buy in OH services on an *ad hoc* basis.

Very few cross-sectional studies assessing sharps injuries have focused solely on dental professionals, and those that exist were undertaken before the introduction of the Sharps Regulations in 2013.<sup>10-13</sup> This study, therefore, aimed to estimate i) the number of sharps injuries experienced in the previous year, ii) the level of under-reporting and iii) self-reported access to OH (for immediate care following a sharps injury and for general health and wellbeing).

## **Methods**

### **Study design**

A cross-sectional survey was administered at the 2017 British Dental Association (BDA) Conference and Exhibition, which took place on the 25<sup>th</sup> and 27<sup>th</sup> of May 2017 in Manchester and the 2017 BDA Scottish Dental Conference and Exhibition on 1<sup>st</sup> of September 2017 in Glasgow.

### **Study population and recruitment**

The study population comprised all UK clinical dental professionals who were attending the 2017 BDA Conferences in Manchester and Glasgow. The two conferences were attended by a total of just under 2700 dental professionals (BDA,

personal communication, 2017). The inclusion criteria for this study were any primary care clinical dental professionals who were working in the UK.

The researchers set up a stand at both conferences and collected anonymous, non-identifying responses using an online survey tool. Delegates were invited to participate as they passed the researchers' stand. Before inviting a delegate to participate, survey assistants ensured that the delegate met the inclusion criteria by asking some preceding filter questions, in particular if they currently worked in primary care dentistry. An opportunistic sampling approach was adopted, as participation in the research was voluntary. A sample size calculation identified 337 responses as the minimum required to detect significant differences in proportion.

### **Ethical considerations**

Ethical approval was granted by the University of Glasgow, College of Medical Veterinary & Life Sciences Ethics Committee (Project No: 200160085). Informed consent was achieved through a question on the first screen of the survey.

### **Survey design**

The survey was developed following a literature search<sup>5, 14-17</sup> and the initial draft survey was piloted to assess length and clarity of the tool. The survey was designed to ensure that it took no more than five minutes to complete.

The survey contained questions relating to:

- Demographic variables, such as location of employment (Scotland, England, Wales or Northern Ireland), the structure of their practice (NHS funded, private or mixed) and their professional role within primary dental care
- Experience of sharps injuries in the past 12 months (prevalence of sharps injuries)
- Reporting practices for staff who experienced a sharps injury
- Reasons in relation to the non-reporting of a sharps injury
- Where medical advice was sought following their injury

- Access to an occupational health service
- Training on the prevention and management of sharps injuries within the workplace
- Presence of a sharps safety policies in their UK primary dental care practice

## **Data analysis**

All statistical analyses were conducted using SPSS Version 22 (IBM Corp., 2013). Descriptive statistics were presented as frequencies, proportions and percentages, as appropriate. Categorical questionnaire responses were cross-tabulated to explore associations, and chi-squared/Fisher's exact tests were used to test hypotheses. A p-value of below 0.05 was used to define significance. Self-reported access to OH service was cross-tabulated with clinical role, geographical area of practice and dental practice structure.

## **Results**

The total number of respondents was 811. Of these, 15 were excluded as they did not perform a clinical role, resulting in a final sample of 796. The total number of conference delegates was 2698 [2311 (86%) dental practitioners; 268 (9.9%) dental nurses; 122 (4.5%) hygienist/therapist]. Thus, the sample represents 28% of the target population. The exact proportion of the conference delegates who worked in primary care was unknown.

## **Demographics**

Table 1 describes the general demographics of the survey respondents. The majority were dental practitioners (n=647; 81.3%), followed by dental nurses (n=112; 14.1%). Most respondents (n=591; 85%) practised in England, followed by Scotland (n=138; 17.3%), Wales (n=53; 6.7%), and Northern Ireland (n=14; 1.8%). Most respondents worked in practices which were either NHS only (n=345; 43.3%) or mostly NHS (n=195; 24.5%).

**[Table 1. Summary of demographics of survey respondents (N=796)]**

**Prevalence of sharps injuries and reporting behaviour**

Responses indicated that 166 (20.8%) of the participants had experienced at least one sharps injury in the past year. No association was found between clinical role and the number of sharps injuries experienced ( $p=0.307$ ) (Figure 1). Of those who had experienced a sharps injury, 58 (35%) did not report their injury and 83 (50%) sought medical advice for the immediate management of their injury (Table 2). Reporting of sharps injuries or seeking medical advice were not significantly associated with clinical role, but a higher proportion of dental practitioners did not report their injury ( $n=46$ ; 36.5%) compared with dental nurses ( $n=6$ ; 20%). Similarly a higher proportion of dental nurses ( $n=20$ ; 66.7%) than dental practitioners ( $n=58$ ; 46%) sought medical advice to manage their injury (Table 2).

**[Figure 1 Number of sharps injuries experienced in the past year, by clinical role (N=796)]**

**[Table 2. Cross-tabulation of clinical role with reporting of sharps injuries and the seeking of medical advice (N=166)]**

Most commonly cited reasons for not reporting were related to perception of risk and in particular their own assessment of an injury as low risk (Table 3).

**[Table 3. Reasons for not reporting sharps injuries (N=58)]**

**Access to medical advice following injury**

Of those who sought medical advice to manage the injury, the highest proportion attended OHS ( $n=63$ ; 76.8%), followed by Accident & Emergency (A&E) departments (13; 15.9%). For follow up BBV testing, 60 (73.2%) used OHS and 9 (11%) visited their General Medical Practitioner. Of the 630 respondents who had not experienced a sharps injury, most ( $n=500$ ; 79.4%) reported that they would seek advice from an OH service, 70 (11.1%) would visit A&E, but 35 (5.6%) reported that they would not seek advice at all.



Those who reported no access (n=116) or were unsure of access (n=74) were less likely to report their injury (32.7%) or seek medical advice (22.7%) (Table 4).

**[Table 4. Cross-tabulation of self-reported access to occupational health service with clinical role, area of the UK where respondent practises and structure of dental practice (N=796)]**

### **Sharps safety policy**

Most participants reported that their practice had a sharps safety policy (n=771; 96.9%), but a lower percentage had received training on the prevention of sharps injuries (n=611; 76.8%). Neither provision of a policy nor training had an association with reporting (Table 5).

**[Table 5 Cross tabulation of sharps safety policy and training on the prevention of sharps injuries with reporting of injuries and seeking medical advice regarding injuries. (N=796)]**

### **Access to occupational health services**

Of 796 respondents, 190 (23.9%) reported that they were unsure or had no access to an OH service (Table 4). A higher proportion of dental practitioners (486; 75.1%) and dental nurses (97; 86.6%) reported access to an OH service compared with dental therapists/hygienists (23; 66.2%). A significant geographic association was also noted, with greater OH service access in Northern Ireland (13; 92.9%), Wales (48; 90.6%) and Scotland (113; 81.9%) compared with England (432; 73.1%). Access was reported to be greatest for those who worked in NHS practice only (n=154; 79%) compared to private only (n=40; 60.6%) (Table 4).

**[Table 4. Cross-tabulation of self reported access to an occupational health service with clinical role, area of the UK where respondent practises and structure of dental practice (N=796)]**

## **Discussion**

As outlined in the introduction, to the best of our knowledge no other studies have assessed the prevalence of sharps injuries among clinical dental staff following introduction of the Sharps Regulations within the UK in 2013. The data reported in this paper provide important insight into the impact of the Sharps Regulations. The study provides not only an estimate of the prevalence of injuries but also the level of under-reporting. We found that the prevalence of sharps injuries among our sample was 20.8%, with an under-reporting rate of 35%. Given the importance of occupational health support to reduce the risk of BBV transmission in healthcare, we also assessed self-reported access to appropriate medical services for the study participants and identified that 25% either had no access or were unsure of their access to such support.

The technique of recruiting conference delegates as a study population was highly effective, and mirrored previous successful studies.<sup>18</sup> The method generated a large sample size, in contrast to postal studies, which have yielded relatively low response rates despite significant effort (and not insignificant cost).<sup>12, 19</sup> Our final sample was double the minimum number required to detect a difference in proportion, highlighting the effectiveness of our recruitment strategy. Additionally, our recruitment technique allowed for informal interactions with participants, which provided useful contextual information. Cross-sectional surveys are, however, sensitive to various sources of bias<sup>20</sup> and this study was no exception. Those represented in our results were conference attendees, who had paid a significant sum to attend an educational event and this means they may express more interest in dental research and may also represent practices with a higher level of adherence to, and knowledge of pertinent legislation. Thus, care should be taken when extrapolating the results to all of those working in primary dental care in the UK. The proportions from Wales and Northern Ireland were smaller than from England and Scotland and dentists were better represented than other dental care professionals. However, collecting responses from two areas of the UK may have helped to mitigate some of this representative bias. As the survey responses were anonymous, it was not possible to de-duplicate the data to identify respondents who may have participated in both Glasgow and Manchester, with the potential for some duplicate responses within the sample. However, as the survey tool was identical on both occasions and administered within a short time-scale, it is likely individuals would

have self-identified if they have participated previously, and the researchers believe this probably not a significant issue. Non-response bias may also have affected the results of this study, as those who had a particular interest in having access to an OH service or who had experienced a sharps injury may have been more likely to participate. Furthermore, the main outcomes of this study were measured by self-report (e.g. experience of sharps injuries in the past year), which are sensitive to recall bias. Additionally, respondents who reported that they did not have access to OH services may have had access but not been aware of this service, though in practical terms the effect is the same. Thus, further research and assessment of OH service coverage nationally is required.

Various studies have highlighted the risk of sharps injuries among dental professionals,<sup>10-13</sup> with some suggesting that there is a greater risk in dental clinics compared with hospitals.<sup>11</sup> The majority of dentists will experience a sharps injury during their professional career<sup>10</sup> and the Sharps Regulations were created to prevent most of these through a combination of training, safer working practices and safety engineered devices. Our results indicate that despite the introduction of the Sharps Regulations, sharps injuries continue to be an issue, as a fifth of respondents had experienced at least one in the past year. This is higher than reported in a previous cross-sectional postal study in Scotland, conducted in 2011 by Leavy et al<sup>12</sup> before the introduction of the Sharps Regulations in 2013. This may reflect an increase in injuries reported as per the new legislative requirement for an employee to report all injuries, rather than an increase in injuries *per se*. However, both studies reported an underreporting rate of 35%, suggesting that the legislative changes have had little impact on this measure. This is an important result, as it suggests that more needs to be done to encourage the reporting of injuries, thereby facilitating our understanding of sharps injury epidemiology among primary care dentists.

A culture of under-reporting of sharps injuries is common throughout healthcare, a feature which frequently affects official statistics and the capability of employers to plan and assess the effectiveness of interventions to reduce risk.<sup>5, 17, 21, 22</sup> In the present study, the main reasons for not reporting injuries were related to self-perception of risk and operational issues, such as lack of time and excessive paperwork. These findings are commonly reiterated throughout the literature,<sup>5, 16, 17,</sup>

<sup>22-24</sup> and often explained in the context of the Health Belief Model (HBM),<sup>15</sup> a psychosocial tool which is used to explain health-related behaviour in the context of perception of risk.<sup>25</sup> For example, previous research suggests that individuals will only report their injury if they perceive the risk of BBV transmission as high and therefore the benefits of reporting the injury outweigh the effort of going through the reporting process, BBV testing and medical assessment.<sup>15, 26</sup> Significant differences in these perceptions have been noted between clinical roles, particularly among more senior healthcare workers such as doctors, who may view their time as more valuable and therefore the benefits of reporting as less.<sup>14-16, 21, 24</sup> Basing such decisions on the healthcare worker's own risk assessment of a situation is problematic, as there is the possibility it is incorrectly related to the lifestyle, gender or nationality of the source patient.<sup>21</sup> In reality, HCWs do not have the skills to risk assess effectively and it has been shown consistently that the risk of BBV transmission is underestimated or inaccurate.<sup>21, 23, 27, 28</sup> A consistent approach towards the management of sharps injuries and the implementation of policy is fundamental for ensuring the equitable treatment of the source of exposure (i.e. patients) and maintenance of HCW safety. Improving reporting rates among HCWs is challenging, but improving awareness of the risks of BBV transmission through training may have an impact. Furthermore, additional benefit would be gained from streamlining the reporting process as far as possible to have the minimum impact on the HCW workload.

OH services has an increasingly important role in the prevention of BBVs in healthcare. To the best of our knowledge, this is the first study which aims to assess access to OH services for primary care health professionals in the UK. We found that despite a requirement for employers to have robust arrangements in place that will allow employees to access treatment following a sharps injury in a timely manner, one quarter of respondents either reported that they had no access or were unsure of their access to OH services. This access was related to clinical role, area of the UK where the respondent practised and structure of the dental practice. A smaller proportion of dental therapists/hygienists had access to an OH service, perhaps because many are self-employed and work across several practices but further research would be required to confirm this.<sup>29</sup> Access to an OH service also varied geographically, with a higher proportion of dental professionals working in the

devolved nations having access compared with England. The reason for this difference across the UK is unclear, but all regions are facing significant financial pressures, which may impact on decisions related to the prioritisation of services.<sup>30</sup> An association was also found between self-reported access OH service and structure of the dental practice, with a much lower proportion of respondents who were working in private dental practices reporting having an OH service they could access. This suggests that those employed in the NHS are more likely to have access directly, provided by employer or contracted. Our research has given an insight into self-reported access to OHS services, but future studies are required to estimate more accurately OHS access in the UK and inform specific areas for improvement.

OH are pivotal to support employers with implementation of the Sharps Directive (2010/32/EU), under which employers have a legal obligation to assess risk and provide appropriate information and training to protect employees from exposure to BBVs.<sup>7</sup> Arguably, OHS are best placed to manage sharps injuries, providing continuity of care from the immediate risk assessment to the follow up and beyond if BBV seroconversion occurs. While there is no legislative requirement for employers to provide access to OHS, international bodies, such as the World Health Organisation ([http://www.who.int/occupational\\_health/globstrategy/en/](http://www.who.int/occupational_health/globstrategy/en/)) and the International Labour Organisation (<http://www.ilo.org/global/lang--en/index.htm>) in their published Convention No. 161, have emphasized their importance in order to protect workers from sharps and other harms. The importance of an OH service for dental professionals has recently been recognised in Scotland, where the Chief Dental Officer has announced an NHS funded new occupational health service for dentists and dental practice staff, which launched on 1<sup>st</sup> of June 2018 ([http://www.sehd.scot.nhs.uk/pca/PCA2018\(D\)07.pdf](http://www.sehd.scot.nhs.uk/pca/PCA2018(D)07.pdf)).

## **Conclusions**

This research suggests that despite the introduction of the Sharps Regulations in 2013, sharps injuries and underreporting are still prevalent in primary care dentistry. When compared with research conducted prior to the Sharps Regulations,

underreporting rates remain unchanged. Awareness of the risk of BBV transmission from sharps injuries among dental professionals needs to be improved, to incentivise the reporting of injuries, and to improve our understanding of the epidemiology of sharps injuries to inform appropriate interventions. Our results also suggest that there are perceived shortfalls in OH service support for primary care dentistry, which need to be investigated further to accurately assess if the perceived gap in access is a true reflection and has an impact on the health and wellbeing of dental professionals. In addition to sharps injury management, this is particularly important given recent changes to guidance on health clearance and management of infected health care workers. It is encouraging that the importance of OH for primary care dentists has been recognised in Scotland, with the recent roll out of an NHS funded OH service. Hopefully a similar attitude will be adopted elsewhere, leading to the provision of an efficient OH service for all primary care dental professionals in the UK.

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**Table 1. Summary of demographics of survey respondents (N=796)**

\*NHS defined as the provision of NHS funded treatment either within general dental practice.

Variable	Respondents N (%)
<b>Clinical role</b>	
Dental practitioner	647 (81.3)
Dental nurse	112 (14.1)
Dental therapist/hygienist	37 (4.6)
Total	796 (100)
<b>Area of UK where respondent practises</b>	
England	591 (74.2)
Scotland	138 (17.3)
Wales	53 (6.7)
Northern Ireland	14 (1.8)
Total	796 (100)
<b>Structure of dental practice*</b>	
NHS only	345 (43.3)
Mostly NHS	195 (24.5)
Equal amount NHS and private	113 (14.2)
Mostly private	77 (9.7)
Private only	66 (8.3)
Total	796 (100)

**Table 2. Cross-tabulation of clinical role with reporting of sharps injuries and the seeking of medical advice (N=166)**

	Did you report your sharps injury? N (%)		P-value
	Yes	No	
<b>Clinical role</b>			
Dental nurse	24 (80)	6 (20)	0.054
Dental practitioner	80 (63.5)	46 (36.5)	
Dental therapist/hygienist	4 (40)	6 (60)	
<b>Total (%)</b>	108 (65)	58 (35)	
	Did you seek medical advice for the immediate management of your injury? N (%)		P-value
	Yes	No	
<b>Clinical role</b>			
Dental nurse	20 (66.7)	10 (33.3)	0.127
Dental practitioner	58 (46)	68 (54)	
Dental therapist/hygienist	5 (50)	5 (50)	
<b>Total (%)</b>	82 (49.4)	84 (50.6)	

**Table 3. Reasons for not reporting sharps injuries (N=58)**

Respondents were free to select as many reasons as were relevant to them. A free text box was also available to enter any additional reasons.

Reasons for not reporting	No. of non-reporters (%)
Did not consider patient to be high risk	32 (55.2)
Sterile or clean needle stick	25 (43.1)
Low perception of risk	13 (22.4)
Lack of time	11 (19)
Excessive paperwork	10 (17.2)
Not familiar with reporting process	4 (6.9)
Concern about the consequences of the injury	2 (3.4)
Concerns about confidentiality and professional discrimination	2 (3.4)
Other	1 (1.9)

**Table 4. Cross-tabulation of self-reported access to occupational health service with clinical role, area of the UK where respondent practises and structure of dental practice (N=796)**

	Do you have access to occupational health support? N (%)			P-value
	Yes	No	Unsure	
<b>Clinical role</b>				
Dental practitioner	486 (75.1)	60 (9.3)	101 (15.6)	0.013
Dental nurse	97 (86.6)	7 (6.2)	8 (7.1)	
Dental therapist/hygienist	23 (62.2)	7 (18.9)	7 (18.9)	
<b>Area of the UK where respondent practises</b>				
Scotland	113 (81.9)	5 (3.6)	20 (14.5)	0.001
England	432 (73.1)	65 (11)	94 (15.9)	
Wales	48 (90.6)	3 (5.7)	2 (3.8)	
Northern Ireland	13 (92.9)	1 (7.1)	0	
<b>Structure of dental practice</b>				
NHS only	154 (79)	11 (5.6)	30 (15.4)	0.001
Mostly NHS	267 (77.4)	25 (7.2)	53 (15.4)	
Equal amount NHS and private	89 (78.8)	10 (8.8)	14 (12.4)	
Mostly private	56 (72.7)	12 (15.6)	9 (11.7)	
Private only	40 (60.6)	16 (24.2)	10 (15.2)	
<b>Did you report your sharps injury?</b>				
Yes	92 (85.2)	7 (6.5)	9 (8.3)	0.019
No	39 (67.2)	6 (10.3)	13 (22.4)	
<b>Did you seek advice for the immediate management of your sharps injury?</b>				
Yes	66 (80.5)	9 (11)	7 (8.5)	0.090
No	65 (77.4)	4 (4.8)	15 (17.9)	
<b>Total (%)</b>	606 (76.1)	116 (14.6)	74 (9.3)	

**Table 5. Cross tabulation of sharps safety policy and training on the prevention of sharps injuries with reporting of injuries and seeking medical advice regarding injuries. (N=796)**

	Did you report your sharps injury? N (%)			P-value
	Yes	No	Total	
<b>Does your practice have a sharps safety policy?</b>				
Yes	103 (65.6)	54 (34.4)	771 (96.9)	0.819
No	1 (50)	1 (50)	4 (0.5)	
Unsure	4 (57.1)	3 (43.9)	21 (2.6)	
<b>Have you received training on the prevention of sharps injuries within your work place?</b>				
Yes	79 (63.2)	46 (36.8)	611 (76.8)	0.295
No	25 (67.6)	12 (32.4)	161 (20.2)	
Unsure	4 (100)	0	24 (3)	