

Straight to the point: considering sharp safety in dentistry

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All members of the clinical dental team face a daily risk of a personal sharp injury. A wide range of sharp instruments are used, some of which are specifically designed to easily pierce the skin and mucosa. The instruments are placed, moved, passed between colleagues, used for treatment, replaced and cleaned, all in relatively confined areas. The clinical dental workplace and the decontamination unit are both therefore sharp-risk

environments. There is a clear risk of a sharp injury and the potential consequences of occupational exposure to blood-borne pathogens are at least inconvenient and at worst, career and even life threatening. However, good sharp safety is not universally understood and practised throughout the dental profession. This paper considers the risk of sharp injury in dentistry and discusses some of the methods used to improve sharp safety.

In this context, a sharp can be defined as any dental instrument that has the potential to cause a penetrating injury to the skin. When contaminated with body fluids, a percutaneous injury is classed as a sharp injury.

An estimated 40,000 sharp injuries are recorded annually across the UK medical profession. The true figure is likely to be much higher, however, as the majority go unreported.¹ The National Centre for Infectious Diseases² estimates a 0.3% risk of HIV transmission following a sharp injury contaminated with HIV-infected blood. Their report

also suggests a 2% risk associated with Hepatitis C and 5% risk from Hepatitis B infected patients (if affected members of the clinical team are not vaccinated).

Health and Safety law applies to risks from sharps injuries. In the UK, the Health and Safety at Work Act 1974,³ put into law a responsibility for employers to protect the health, safety and welfare of their employees and anyone affected by their business. Subsequent legislations, such as the Control of Substances Hazardous to Health Regulations (COSHH) 2002,⁴ have been introduced which require employers to implement measures to prevent the exposure of biological hazards in the workplace. This includes safety-engineered devices and

providing protective equipment to employees (COSHH).

More recently, in 2013, the UK government implemented EU Council Directive 2010/32/EU, the 'Health and Safety (Sharp Instruments in Healthcare) Regulations'⁵ – a legislative framework agreement on prevention of sharps injuries in hospitals and the healthcare sector.

These regulations include specific information regarding using safer sharps (incorporating protection mechanisms) – regulation 5(1)(b):

'The employer must substitute traditional, unprotected medical sharps with a 'safer sharp' where it is reasonably practicable to do so. The term 'safer sharp' means medical sharps that incorporate features or mechanisms to prevent

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or minimise the risk of accidental injury. For example, a range of syringes and needles are now available with a shield or cover that slides or pivots to cover the needle after use.⁷

It also includes information and training that employers must provide for employees.

The information provided to employees must cover:

- The risks from injuries involving medical sharps
- Relevant legal duties on employers and workers
- Good practice in preventing injury
- The benefits and drawbacks of vaccination
- The support available to an injured person from their employer.

The training provided to employees must cover:

- The correct use of safer sharps
- Safe use and disposal of medical sharps
- What to do in the event of a sharps injury.

The regulations apply to all employers, contractors and workers in the healthcare sector. NHS Trusts, independent healthcare businesses, such as dental practices and other employers whose main activity is the management, organisation and provision of healthcare are subject to the regulations.

Sharp injuries within the UK dental profession are recognised as a problem. In 2014, the British Association of Dental Nurses⁶ carried out a survey to which over 1200 dental nurses responded. Eighty-seven percent of the respondents had been working for more than five years. Over half (51%) had had a sharp injury and of these, 60% had had more than one sharp injury. Eleven percent of respondents had had a sharp injury within the previous year. Of note, 41% of injuries incurred by nurses were after use of the sharp but before its disposal and a further 22% was during or after disposal. It is the duty of whoever is using the sharp, to dispose of it as soon as its use is complete, as advised by Safe Management of Healthcare Waste Guidelines.⁷

We can report a simple survey of student dentists and recent dental graduates, undertaken in 2016/2017. The aim was to assess the sharp injury experience among a sample of colleagues in the early years of their clinical careers in dentistry. Participants were foundation dentists from the Thames Valley and Wessex deanery and student dentists in years 3, 4 and 5 at Newcastle University and at the University of Manchester. Participants received an invitation to take part in the anonymous, voluntary, on-line survey, through a variety of social media platforms and university postgraduate mailings

Box 1 Instructions to manage a sharp injury

1. Don't suck the wound to make it bleed
2. Bleed the wound gently under running water
3. Wash with soap and water
4. Dry the wound and protect with a plaster
5. Identify source of contamination for example, patient details
6. Seek urgent medical advice (for example from your Occupational Health Service or Accident and Casualty Service) to assess the risk and take appropriate action. Effective prophylactic medications are available
7. Document and report the incident locally to your employer.

lists. The survey was open to participants for a four-month period.

A total of 164 participants responded to the survey. Almost a third (51) reported already having had a sharp injury within their clinical careers and of these, just less than a half (23) had had a sharp injury within the previous year. Half of the respondents (83) knew of at least one sharp injury reported by a colleague from their own clinical team, within this period. Needlestick injuries (32%) were the most commonly reported sharp injury, with 19% of these occurring while using a re-sheathable needle system. Dental burs (26%) and matrix bands (24%) were also frequently reported as the source of the injury. Twelve percent of respondents admitted to not reporting a sharp injury.

Approximately 20% of respondents did not feel confident in managing a sharp injury, with over 12% not having received training in over a year and 3% reported to have never received any sharp safety training. Although the majority of respondents felt their sharp safety training was either adequate (71%) or excellent (22%), 7% still felt inadequately trained. This indicates that not only is training very varied but also inadequately refreshed, resulting in reduced confidence among new graduates.

Advice regarding the management of a sharp injury is contained in Box 1.

The risk of sharp injuries to the dental team has been long recognised and we can report the outcomes of incident reporting at the University Dental Hospital of Manchester, over a twelve-year period (Table 1). The method for incident reporting a sharp injury was improved and simplified twice, in 2008 and 2011 and the increased number of injuries reported each year reflects these changes. Rather than more incidents occurring, it became easier for student and staff members to report the incidents.

To consider which clinical procedures may be most likely to result in a sharp injury, the results for each year reveal around two thirds of injuries occurred in restorative dentistry clinics,

Table 1 The number of sharp incidents reported per year, at the University Dental Hospital of Manchester

Year	Number of incidents reported
2005-6	22
2006-7	12
2007-8	19
2008-9	27
2009-10	24
2010-11	29
2011-12	38
2012-13	33
2013-14	31
2014-15	34
2015-16	36
2016-17	19
2017-18	23

although it is recognised that proportionally more patients are treated and a wider range of instruments are used for treatments in these clinics. One fifth of injuries occurred in oral surgery clinics.

A feature of the incident reporting system is the personal narrative that can be added. These highlight the factors that can lead to a sharp injury (Box 2).

To manage the issue of sharp injuries and partly in response to these incident reports, a novel Risk Assessment Tool for Sharps (RATS) has been developed and used at University Dental Hospital of Manchester. The approach is to pro-actively assess the risk of a sharp injury occurring in advance, rather than recording those sharp injuries that are reported, after the event. The RATS method is based on a simple examination of the clinical environment and recording the presence of any of the six known highest risks for a sharp injury.

Box 2 Comments taken from sharp injury incident reports

'While attempting to give patient a second dose of LA, I managed to stab myself with the needle.'

'The dental student received a needle stick to their right forearm from a Cavitron scaler.'

'I pricked my left index finger through my gloves with a size 10 K file.'

'When searching for an instrument on the tray, I scratched my arm on a bur in the fast hand piece.'

'I lent down to pick something up and cut my head on the exposed scaler tip above my right eyebrow.'

'I received a dirty sharps injury to my right thumb. I was assisting during adjustment of an orthodontic appliance. The wire was retained within the cutting instrument after it had been used to trim a small wire within the patient's mouth. The wire perforated my glove and my thumb, which in turn drew blood.'

'Scraped forearm on denture bur when it was in hand piece sat in bracket table. Bur had been used to modify dentures after they had been in the patient's mouth. Stopped using bur after it scraped me, told nurse and tutor.'

'Two nurses have sustained sharps injuries, breaking the skin, with clean instruments not packaged safely, penetrating through the outer packaging.'

'Superficial skin wound from scaler tip to post graduate endodontic student.'

'Bur in fast handpiece in bracket table slot, hit into left arm, above the elbow.'

'Clearing up instruments after the patient had left after receiving dental treatment, I pricked the upper palm of my right hand slightly with the needle following a local anaesthetic. The cover that protects the needle slipped down and caught me. I removed my gloves and although I saw no blood I began to milk the wound under warm water and once dried it was then I noticed a small pin prick that slightly bled.'

'Using sonic scaler, turned round and cut elbow on the tip.'

1. Re-sheathing or re-sheathed needles
2. Bur packs left open
3. Bur left in the hand piece in the bracket table slot
4. Unprotected or unnecessary sharps such as matrix bands and endodontic files left on worktops or bracket tables after use
5. Untidy bracket table
6. Ultrasonic scaler tip left in the handpiece in the bracket table slot.

The RATS method has not yet been validated. The relative risk associated with each of the six risks has not yet been quantified and other factors such as experience of the clinical team are also likely to have an effect. However, the RATS method is a useful clinical audit tool and is a way for any member of the clinical team to identify a potential problem and act to reduce the risk immediately. To adopt this system does not require a lot of time

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Each clinical area is rapidly examined for the six sharps risks and the total number of risks is recorded:

three or more risks identified = high risk of sharp injury, one or two risks identified = medium risk of sharp injury, 0 risks identified = low risk of sharp injury.

or effort. With practice, the use of the RATS system can be a simple method to identify risks before, during and after treatment and for dental team members to immediately address the risks identified.

Information gained from the incident reports show that introduction of a safety needle

injection system immediately altered needle stick injuries from the most common to the least common of the six reported causes of sharp injury. Similarly, introducing a pre-tied matrix band, to be used in preference to the Siqveland or Tofflemire matrix band systems, has notably reduced the frequency of sharp injuries related to the need to tie or untie the metal band, before and after each.

As part of the reflection on the lessons learned from the incident reports and of the outcomes of clinical audits undertaken using the RATS method, the six common causes for sharp injuries have been discussed and simple advice is offered to all members of the clinical team.

Dental burs are usually presented in a bur pack with the sharp end upwards, within containers with removable lids. These bur packs are often placed on the bracket table, within easy reach of the dentist. The open bur pack is a clear sharp risk but can be simply managed by only opening the lid when a bur is being removed or replaced and keeping the lid closed on the bur pack at all other times.

Handpieces with burs and ultrasonic or sonic-powered dental hygiene instruments are commonly replaced into the slot on the bracket table whenever not immediately required, during and after a procedure. This leads to sharp injuries to the hand, the arm and the leg. To avoid this risk, a hand piece containing the bur or scaler tip should never be put into the slot but rather be rapidly detached from the coupling and placed safely on the bracket table until required again. Furthermore, the habit of inverting the handpiece or scaler instrument within the slot not only maintains the risk of sharp injury to the leg, but also risks contamination from an unclean area of the work surface.

A small effort to maintain a tidy bracket table reduces the risk of sharp injury occurring when instruments, such as matrix bands and endodontic files, are left on the bracket table during a procedure. It is the shared responsibility of the dentist and the dental nurse to maintain a tidy and safe clinical environment.

The consistent occurrence of sharp injuries in a university teaching hospital and in dental practices, affecting all clinical members of the dental profession, strongly suggest that the problem is multifactorial and reducing sharp incidents is a significant challenge for the dental profession. Improvements in equipment and technology, such as the ready availability of sharp safety bins and safety needle injection systems, have been effective.

The use of a new product, such as a safety needle injection system, requires a level of understanding and for the techniques to be learned and actually implemented. Without this, sharp injuries can persist, as demonstrated

by our survey of foundation dentists and student dentists.

Education of all members of the dental team occurs throughout our careers, through a range of methods, such as didactic teaching during our undergraduate years and continuing professional development. However, when education is delivered to support the introduction of improved safety systems, dramatic improve-

ments can be demonstrated. This is supported by the paper by Zakrzewska *et al.*,⁸ which highlighted the 'vitaly important role of education in the effective implementation of the change to safety syringes'. They used the unit of number of needle stick injuries per 1,000,000 hours worked per year. Education contributed to the reduction from 11.8 to 0.

require induction training, which will include sharp safety training. This is a requirement that is stated in the recommendations within the HTM01–05 document. More rigorous guidance on sharps injury training and use of safer sharps as a requirement would be beneficial.

Lack of awareness of the scale of the problem and learning from others' incidents: reflective learning from reported incidents and clinical

act, but a habit.' To adopt the quotation to this context emphasises that, despite working with sharp instruments in a sharp-risk environment, the dental team can achieve and maintain levels of excellence by habitually using sharp safe methods.

'It is likely that the main reason for failure to adopt sharp safe methods routinely is related to all members of the dental team accepting repeatedly unsafe habits and behaviours.'

However, education alone clearly does not lead to adoption of sharp safe habits in daily clinical practice. It is worth considering some of the perceived barriers to this and methods used to improve the situation.

Using new versions of equipment, such as safety needles: these are now readily available and proven to reduce the risk of sharp injuries. The cost associated with using these single use items is marginal compared to the financial implications of a sharp injury occurring. Introducing a proven method to reduce risk is required by law.

Lack of regulation to 'force' clinical teams to act in a sharp safe manner: the current regulations can, in part, be interpreted so that individuals can continue to use unsafe habits in the clinical environment and perhaps need to be addressed in any future updated guidelines.

Lack of education and training: all members of the dental team who train in a university teaching hospital or who join a dental practice

audits are useful educational methods. Sharing of experiences and learning associated with sharp injuries, such as the twelve-year sharp incidence reporting data and the use of the RATS method from the University Dental Hospital of Manchester, provide information to raise awareness in other dental teams and lead to reflection of their own clinical behaviours. Effective local incident reporting processes will allow increased numbers of incidents to be reported, shared and safety lessons learned within the clinical team. The incident reporting method should be immediately available, be simple to use, contain a personal narrative section and be handled by a member of staff with responsibility for risk management, who will feed back to the affected colleague and to the wider dental team.

It is therefore likely that the main reason for failure to adopt sharp safe methods routinely is related to all members of the dental team accepting repeatedly unsafe habits and behaviours. The dental team may, of course, be as small as one dentist and one dental nurse, working together regularly. If sharp safe habits are not expected of each team member, the risk of a sharp injury increases.

A quotation attributed to Aristotle: 'We are what we repeatedly do. Excellence then is not an

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