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REVIEW

The psychological impact of sharps injuries sustained by medical students

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Abstract

Much is known and reported about sharps injuries among healthcare workers, but there has been a lack of published evidence regarding the psychological impact of sharps injuries among medical students. The purpose of this narrative review was to discover the psychological impact of sharps injuries within the medical student population. Medical, health and psychology databases were searched for studies written in the English language and published between 1980 and 2021. The review identified six studies conducted in six countries which described the psychological impacts of sharps injuries among medical students as being fear, anxiety, depression and post-traumatic stress disorder. The findings highlight the potential psychological issues created by sharps injuries, and highlights that further research is needed into this topic to aid the education and prevention of this harmful problem.

Key words: Inoculation injury; Medical student; Narrative review; Needlestick; Risk; Safety; Sharps injury

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Introduction

Sharps injuries are a well-known risk in the health and social care sector worldwide, with these types of injuries having many consequences. Sharps contaminated with blood from an infected patient can transmit up to 60 diseases, including hepatitis B or C and human immunodeficiency virus (Collins and Kennedy, 1987; Morgan, 2000; Tarantola et al, 2006). Because of this transmission risk, sharps injuries can cause worry and stress to those who receive them (Health and Safety Executive, 2021). These types of injuries can have a huge psychological impact on the recipient and their families (Royal College of Nursing, 2009).

Medical students are at risk of sharps injuries during clinical practice placements where the use of sharps is an essential part of their clinical skills (Handiyani et al, 2018; Trevino and Arenas, 2020). Having limited experience with handling and using sharps, alongside under-developed skills, are thought to contribute to the risk of sharps injuries (Shiao et al, 2002; Ozer and Bektas, 2012). There is limited evidence regarding the psychological impact of sharps injuries sustained by healthcare students worldwide (Marnejon et al, 2016; Hambridge et al, 2016), in particular evidence relating to medical students.

Background

Sharps injuries have been defined as 'lacerations', 'puncture wounds' (Advisory Committee on Dangerous Pathogens, 1995), 'piercings of the skin' (Hersey and Martin, 1994), 'skin penetrating stab wounds' (Centers for Disease Control and Prevention, 2008), and 'cuts' and 'pricks' (Royal College of Nursing, 2013). Classifications of sharps within the healthcare sector are wide-ranging (Hersey and Martin, 1994), but can include needles (Muralidhar et al, 2010), lancets and scalpels (Pruss-Ustun et al, 2003), broken glass, razors and scissors (Royal College of Nursing, 2013).

The incidence of sharps injuries among medical students worldwide has been reported as being between 11% (Varsou et al, 2009) and 95% (Liyanage et al, 2012). Deisenhammer et al (2006) reported that sharps injuries are most commonly reported in the fourth year (41%), followed by the third (18%) and first year (12%). Numerous devices can cause a sharps injury to medical students, including suture needles (Shen et al, 1999), various other types of needle, an angio-cath, scalpel, used ampoule, shaving blade and test tubes

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(Ghasemzadeh et al, 2015). Sharps injuries sustained by medical students have been reported to occur when suturing, performing a venepuncture (Liyanage et al, 2012) and cleaning trays (Deisenhammer et al, 2006).

There are many proposed causes of why medical students can experience a sharps injury such as distractions, busyness, forgetfulness, restlessness of a patient, excessive fatigue (Ghasemzadeh et al, 2015), a lack of education and knowledge (Varsou et al, 2009), being rushed and having a lack of skill (Sharma et al, 2009). Medical students sustain sharps injuries in a wide variety of locations. These include operating theatres, at a patient's bedside (Sharma et al, 2009), while in the emergency department (Marusic et al, 2017), obstetrics (Liyanage et al, 2012), and on surgical, medical and psychiatry wards (Shen et al, 1999). Worrying evidence suggests that many sharps injuries are not reported by medical students. The prevalence rate for non-reporting ranges worldwide from 40 to 48.34% (Shen et al, 1999; Deisenhammer et al, 2006; Sharma et al, 2009; Varsou et al, 2009; Camacho-Ortiz et al, 2015). There are various reasons why medical students do not report injuries, such as the injury not being one to cause exposure to an infection, the patient not carrying a transmissible infection, the medical student not knowing whom to report the incident to, and the medical student believing it unnecessary to report the injury (Marusic et al, 2017).

Although there is evidence regarding the extent and the type of sharps injuries sustained by medical students, there is a dearth of evidence available in the literature regarding the psychological impact of a sharps injury. Sharps injuries do have psychological effects on healthcare workers and thus an exploration of sharps injuries within medical students is merited.

Method

The purpose of this narrative review was to discover the psychological impact of sharps injuries among medical students. The author searched the following electronic databases: BMJ Journals collection, CINAHL Plus with Full Text (EBSCO), Cochrane Library (Wiley), PubMed, APA PsycArticles, PsycINFO, ScienceDirect, SwetsWise and TRIP (Turning Research into Practice). Other sources of relevant studies were also identified by searching the following 'grey literature' databases: The National Research Register, Clinicaltrials.gov, Google Scholar, Prospero, SCOPUS, Web of Science, Sigle database and ProQuest.

The keywords used to aid the retrieval of relevant articles from the databases were: 'medical', 'student', 'sharp', 'injury', 'needlestick', 'inoculation', 'needle prick', 'accidents', 'incidents', 'occupational injury', 'biological exposure incident', 'percutaneous exposure', 'blood borne infection', 'psychological', 'mental health' and 'psychiatric'. Boolean operators and truncations were used.

The search, completed between April and June 2021, was limited to publications written in the English language published between 1980 and 2021. The process of the narrative review followed four stages:

1. Using search terms to search relevant databases
2. In the results list produced, the titles and abstracts were screened. Those deemed relevant were saved as a file
3. The full texts of the relevant articles were retrieved, read and relevant data extracted
4. The extracted data were then scrutinised and grouped into relevant sections.

Results

The included studies were published between 2007 and 2017. All were published in English and originated from Japan, Mexico, Pakistan, South Africa, USA and the UK. The literature review identified the psychological impacts of sharps injuries on medical students.

Anxiety and stress

Camacho-Ortiz et al (2015) conducted a survey in Mexico where medical students reported on a scale of 1 to 10 the degree of anxiety they felt after the accident, using 1 to report no anxiety and 10 to report feeling very anxious. Out of the respondents, 26 (17.21%) reported

10 as their level of anxiety after the incident and 11 respondents (7.28%) reported a score of 1. The mean level of anxiety among the injured medical students was found to be 6.06 (standard deviation ±2.90).

Rossouw et al (2017) conducted a survey and an examination of incident records in South Africa. The majority of students found the incident to be very stressful, with a median stress level estimated to be 8 out of a possible 10 (interquartile range 5–9), while a fifth (21.2% *n*=172) of the participants rated the sharps injury as the most stressful event possible. Additionally, 31% of medical students believed the incident had worsened their existing anxiety. A contributing factor to the stress was a lack of support from clinical staff in the department at the time of the incident. Saleem et al (2010) conducted a survey in Pakistan investigating the emotional repercussions following a needlestick injury among medical students and reported that 40% (*n*=72) of students in the survey felt anxious.

Depression

Wada et al (2007) conducted a survey of medical students in Japan. Analysis showed that there was a significant association of depressive symptoms with the event of a needlestick injury, men (corrected odds ratio, 2.98; 95% confidence interval, 1.16–3.70) and women (corrected odds ratio, 2.93; 95% confidence interval, 1.02–3.70). Their analysis suggested that a history of a needlestick injury was significantly associated with depressive symptoms. However, as it was not possible to determine when the medical students developed the depressive symptoms, it was not possible to conclude causality between a needlestick injury and the onset of depressive symptoms. Meanwhile, Rossouw et al (2017) reported that 31% of medical students believed the sharps injury incident had worsened their existing depression.

Post-traumatic stress disorder

Naghavi et al (2013) conducted a survey in the UK among trainee doctors. Out of 80 trainee doctors with experience of a needlestick injury, 77 completed the Impact of Events scale-6 screening test. Applying the cut-off level at a score of 10, which is considered to have the best overall efficiency (sensitivity 0.86, specificity 0.88, positive predictive value 0.71 and overall efficiency 0.87), 12% (9 of 77) were considered to be positive for post-traumatic stress disorder (95% confidence interval: 6–21). There were five respondents who had their most recent needlestick injury in the past 4 weeks and had a post-traumatic stress disorder score under 10, meaning, according to the criteria from the Diagnostic and Statistical Manual of Mental Disorders 4th edition, the respondents did not have post-traumatic stress disorder or a misdiagnosis of acute stress reaction. The study found that 12% of trainee doctors who had experienced at least one needlestick injury during their training reported symptoms consistent with post-traumatic stress disorder. Considering that the prevalence of post-traumatic stress disorder in the general population is 3%, trainee doctors who incur a needlestick injury are 4.28 times more likely to report symptoms of post-traumatic stress disorder (95% confidence interval: 2.16–8.47).

Other emotions experienced

Merlin et al (2011) conducted a survey in the USA where 17 medical students who were stuck by a sharp object or splashed by blood or bodily fluids**,** were asked about their injury. Emotions expressed were embarrassment (9/17), feeling scared (9/17), feeling that it negatively impacted on their life (5/17) and feeling less confident in their abilities (2/17). As a part of the survey, one student reflected on feeling isolated: 'Everyone found out … I felt socially isolated after my incident…I still feel humiliated'. Saleem et al (2010) reported that following a needlestick injury, medical students reported feeling fear (33%, *n*=60) and anger (21%, *n*=38). The fear was related to contracting infections, while the anger was directed at themselves for not being careful enough when using the sharp.

The need for support

Wada et al (2007) suggested that medical students who have sustained a needlestick injury should be informed of established mental health services, as this may be useful for recognising and treating depression. Naghavi et al (2013) concluded that procedures

should be in place to screen and support medical trainees who develop post-traumatic stress disorder as a result of sharps injuries. Rossouw et al (2017) recommended that countries should introduce trained counsellors who can assist in providing ongoing counselling and support for medical students following a potentially emotionally traumatic event.

Discussion

Evidence suggests that medical students can suffer from anxiety, stress, depression and post-traumatic stress disorder following a sharps injury. A systematic review conducted by Hambridge et al (2016) similarly identified anxiety, stress and depression as psychological effects following a sharps injury within nursing students.

Regarding medical personnel, McDowell (2012) identified that many surgeons experience significant anxiety and fear following a sharps injury. A survey of 186 nurses and 175 doctors revealed that 15.2% of respondents described manifestations of emotional suffering such as anxiety, worry, frustration, panic and extremity numbness after sustaining a sharps injury (Zhang and Yu, 2013). Gershon et al (2000) found that 13% of healthcare workers experienced depression post-exposure to a sharps injury, while Green and Griffiths (2013) identified that 77% (n=13) of healthcare workers showed moderately severe depressive symptoms following a sharps injury involving a needle.

Post-traumatic stress disorder has previously been reported within healthcare workers following a sharps injury. Howsepian (1998) recounts a healthcare worker who was traumatised when they presented with possible seroconversion after a sharps injury from an object used on a patient who was suspected of being positive for human immunodeficiency virus. Similarly, Worthington et al (2006) reported a case study where two healthcare workers acquired disabling, chronic post-traumatic stress disorder following a sharps injury and exposure to blood from a patient infected with human immunodeficiency virus. Green and Griffiths (2013) identified an incidence rate of 24% (n=4) in healthcare workers who, after a sharps injury, met the criteria for post-traumatic stress disorder according to the International Classification of Diseases and Related Health Problems 10th edition (ICD-10) scale. There is little research on post-traumatic stress disorder among nurses after sharps injuries. da Cunha Januário et al (2017) conducted a survey of 445 nursing staff in Brazil to explore exposure to biological material, 60.7% of which was related to a percutaneous injury. The incidence rate of post-traumatic stress disorder was reported as 19.6% (n=12). Post-traumatic stress disorder can last for a long time for healthcare workers following a sharps injury. Howsepian (1998) reported a duration of 1 year, while Worthington et al (2006) found a post-traumatic stress disorder duration of 22 months.

The results of this review suggest that following a sharps injury, medical students can suffer other emotions such as embarrassment, feeling scared, a loss of confidence, and a feeling of isolation. Fear and anger have also been reported. Reis et al (2004) identified a feeling of anger and fear within a population of nursing students after they suffered a sharps injury. Similarly, some healthcare workers within a study conducted by Gershon et al (2000) described anger that lasted for many months after the sharps injury, and even as long as a year.

The studies explored in this review suggest that medical students need psychological support following a sharps injury. Healthcare workers sustaining a sharps injury should be assessed and appropriate expert help provided for their psychological wellbeing (Ongete and Duffy, 2018). Owing to the psychological impact that sharps injuries can have on healthcare workers, Wu et al (2014) suggested that follow-up interventions should include psychosocial support, but the evidence suggests that this is not always happening. Only 61% (Royal College of Nursing, 2009) and 69% (Kable et al, 2011) of nurses were offered adequate support and counselling services post-sharps injury, a similar conclusion to the da Cunha Januário et al (2017) study which reported a lack of follow-up care for employees following a sharps exposure. Gershon et al (2000) stated that following their sharps injury, some healthcare workers were disappointed by the lack of follow up, such as counselling or coordination with their facility. Similarly, Wu et al (2014) reported a theme of ‘disappointment on the working environment’ to describe a lack of support for healthcare workers and the feeling of being isolated and helpless after a sharps injury.

Key points

- Sharps injuries continue to happen to healthcare workers and healthcare students, including medical students.
- Medical students can suffer anxiety, stress, depression and post-traumatic stress disorder following a sharps injury.
- Sharps injuries can cause medical students to feel embarrassment, fear, anger and a loss of confidence.
- Medical students (as well as healthcare workers and other healthcare students) require improved access to psychological support and counselling following a sharps injury.
- Further research into this important issue is required.

It appears that there are potentially enormous psychological issues for medical students following a sharps injury. Only six studies were identified that explored the potential psychological impacts on these students. This is an under-researched area which warrants further inquiry.

Conclusions

This review has highlighted the psychological issues concerning sharps injuries, the impact they can have on the individual and the support and counselling that medical students need after a sharps injury. This process has identified gaps in the understanding of the psychological impact of sharps injuries on medical students and demonstrates that more research is needed into this important matter. Additional research would also further aid education and the assessment and management of risks.

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Conflicts of interest

The author declared that there are no conflicts of interest.

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