

## Reported Sharp Instrument Injuries in College of Dentistry, King Saud University, Riyadh, Saudi Arabia

Sakher Al Qahtani<sup>1\*</sup>, T Alanazi<sup>2</sup>, A Altamimi<sup>3</sup>, M Alqahtani<sup>2</sup> and S Albaker<sup>2</sup>

<sup>1</sup>Assistant Professor, Department of Pediatric Dentistry and Orthodontics, College of Dentistry, King Saud University, Saudi Arabia

<sup>2</sup>General Dentist, Ministry of Health, Saudi Arabia

<sup>3</sup>Private Practice, Saudi Arabia

**\*Corresponding Author:** Sakher Al Qahtani, Assistant Professor, Department of Pediatric Dentistry and Orthodontics, College of Dentistry, King Saud University, Saudi Arabia.

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### Abstract

**Objectives:** To investigate the pattern and incidence of sharp instrument injuries (SII) in the Dental Hospital of both Boys' and Girls' University Campuses (BUC and GUC) at King Saud University, Riyadh, Saudi Arabia, in terms of: number of reports, location of the injuries, type of instruments causing injuries and their contamination.

**Materials and Methods:** This was a retrospective study of archived incident reports of SII sustained between May 2010 - 2015 at College of Dentistry (BUC and GUC). A tick-box format data collection sheet was designed. Researchers looked at each report individually and filled in the data-sheets.

**Results:** There were 101 incident reports of SII from 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup> year dental undergraduate students (N: 29, 40, and 9 respectively), 14 interns, 2 demonstrators and 7 dental assistants.

Contaminated instruments were reported in 61% cases with 51% of injuries associated with local anesthesia needles and 23% due to rotary burs. GUC reported more SII ( $p < 0.05$ ) but the trend of reporting is increasing in both campuses. All reported injuries were self-inflicted. The most alarming result was that medical history was not obtained prior to the incident in 88.1% of reported cases.

**Conclusion:** It is crucial to develop an effective strategy to monitor and manage sharp instrument injuries among healthcare workers in general based on the characterization of occupational exposure and the knowledge of the factors associated with it.

Early training with practical demonstrations on how to handle/dispose of sharp instruments in the undergraduate dental courses should be emphasized and evaluated.

**Keywords:** Sharp Instrument Injuries; Healthcare Workers; King Saud University

### Introduction

Healthcare Workers (HCW) make up nearly 12% of the working population, which is 35 million worldwide. The major occupational hazard they face is the Sharp Instrument Injuries (SII). These injuries, although preventable, cause two million injuries each year among

HCWs [1], exposing them to over twenty pathogens of which the most serious and potentially life threatening are Hepatitis B virus (HBV), Hepatitis C virus (HCV) and Human Immunodeficiency virus (HIV) [2], all of which have serious consequences, including long-term illness, disability and death [3].

According to a WHO study, the annual estimated proportions of HCW exposed to blood-borne pathogens globally were 2.6% for HCV (16,000 cases), 5.9% for HBV (66,000 cases) and 0.5% for HIV (1000 cases) resulting in 2.5% of HIV and 40% of HBV and HCV cases among HCWs worldwide [4].

The average risk of transmission of HIV to a health care worker after percutaneous exposure of HIV-infected blood has been estimated as 3 to 4 in 1000 [5-7], while the chance of contracting HBV after an accidental HBV infected needle stick is one in 20 [2]. The chances of contracting HCV after an HCV contaminated accidental needle stick average 3.5 in 100 [8].

In Dentistry, sharp instrument injuries is a common problem [9-19]. This is due to the nature of dental work in part and to the inadequate compliance with infection control measures and guidelines [13,15,16]. Dentists work in a limited-access with restricted-visibility field and frequently using sharp instruments, these factors increase the chances of sharp instrument injuries in the Dental setting.

Most of the sharp instrument injuries are preventable and can be avoided by applying safety and prevention measures and following the guidelines [20,21]. However, 12 - 40% of Dental students in the UK have had experienced one or more sharp instrument injuries within their course [22] compared with 48% - 58% of dentists in Saudi Arabia [23,24].

The percentage of Dentists with a history of Sharp Instrument Injuries in Saudi Arabia is concerning, especially that the number of patients with potential infectious diseases is high. From 1984 through to 2012, there were 18762 cases with HIV infection diagnosed; 5348 (29%) cases were amongst Saudi citizens and 13414 (71%) cases were amongst expatriates. The number of HbV infections diagnosed between 2005 and 2011 was 32408 cases, whereas the number of HcV infections diagnosed in the same timeframe was 18410 cases [25].

The aim of this study was to investigate the pattern and incidence of sharp instrument injuries in the Dental Hospital of both Boys' and Girls' University Campuses (BUC and GUC) at King Saud University, Riyadh, Saudi Arabia, in terms of: number of cases, type of sharp instruments causing the injuries, location of the injuries, contamination of instruments and weather Medical History of the patient was taken before the injury or not. Moreover, identification of the associated risk factors and compare incidents between groups and establish a database.

### Research Methodology

This was a retrospective audit of all archived incident reports of sharp instrument injuries sustained by dental student and staff over the period between May 2010 and May 2015 at college of Dentistry, King Saud University, Riyadh, Saudi Arabia.

The data collection sheet had a tick-box format, with sections for demographic items, the type of instrument causing the injury, whether the instrument was used/contaminated, how the injury occurred.

### Statistical analyses

The data obtained was analyzed with SPSS software, version 23 (SPSS Inc, Chicago, IL, USA). Data are given as counts as well as percentages for categorical variables. Chi square test was used for nominal variables and Student's t-test (two-tailed) were used to determine the significance of difference between two numeric variables. One-way analysis of variance was applied to determine the relationship between incidents of sharp instrument injuries and level of experience. Level of statistical significance was chosen to be 5%.

**Results**

There were 101 incident reports of sharp instrument injuries between May 2010 and 2015.

There was a statistical significant difference between BUC (N: 39) and GUC (N: 62) in reporting sharp instrument injuries. For those who reported that they had a needle stick injury, 39 were before use, 26 during use and 36 between steps in a multistep procedure (Table 1). Contamination with blood reported injuries counted for 9.9% of cases, contamination with other bodily fluids were in 12.8% while injuries with uncontaminated sharp objects were in 77.3% of cases (Table 2).

Time of Injury	Campus		Total
	BUC	GUC	
Before use	13	26	39
During use	9	17	26
Between steps in a multi-step procedure	17	19	36
Total	39	62	101

**Table 1:** Number of reported sharp instrument injuries during the session in Boys University Campus (BUC) and the Girls University Campus (GUC).

Contamination	Campus				Total
	BUC		GUC		
	Male	Female	Male	Female	
Uncontaminated	33	2	1	42	78
Contaminated with blood	1	0	0	9	10
Contaminated with other bodily fluids	3	0	0	10	13
Total	37	2	1	51	101

**Table 2:** Contamination status of the sharp instrument in reported injuries in Boys University Campus (BUC) and the Girls University Campus (GUC).

The sharp instruments involved in the reports were Local Anesthesia needles (51.5%) followed by rotary burs (22.8%) then irrigation needles (2%), suturing needle (2%), scalpel (2%), electro cautery device (1.9%) and other miscellaneous sharp instruments were reported in 17.8% of cases (Table 3).

Sharp Instrument	Campus		Total
	BUC	GUC	
Local Anaesthesia needle	19	33	52
Rotary bur	10	14	24
Irrigation needle	1	1	2
Suturing needle	0	2	2
Scalpel	2	0	2
Electro cautery	0	1	1
Other (Miscellaneous)	7	11	18
Total	39	62	101

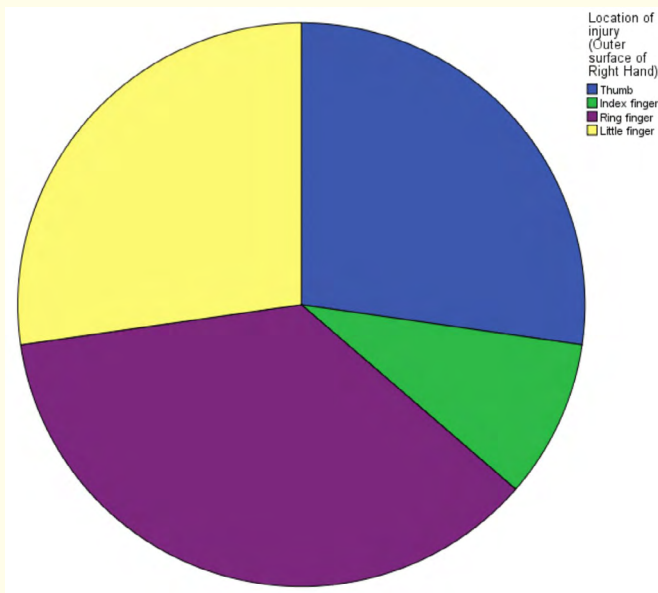
**Table 3:** Type of sharp instrument involved in reported injuries in Boys University Campus (BUC) and the Girls University Campus (GUC).

The distribution of those amongst students and staff and contamination are presented in table 4. Most injuries happened by students in their 4<sup>th</sup> undergraduate year by uncontaminated instruments.

Professional Level	Campus		Total
	BUC	GUC	
3 <sup>rd</sup> year dental students	16	13	29
4 <sup>th</sup> year dental students	17	23	40
5 <sup>th</sup> year dental students	3	6	9
Interns	3	11	14
Demonstrators	0	2	2
Dental Assistants	0	7	7
Total	39	62	101

**Table 4:** Professional level of individuals reported sharp instrument injuries in Boys University Campus (BUC) and the Girls University Campus (GUC).

Most injuries happened in the inner side of the left thumb, followed by the inner surface of the right thumb then the inner right side of the right hand (Figures 1-4).



**Figure 1:** Location of sharp instrument injury (Outer surface of Right Hand).

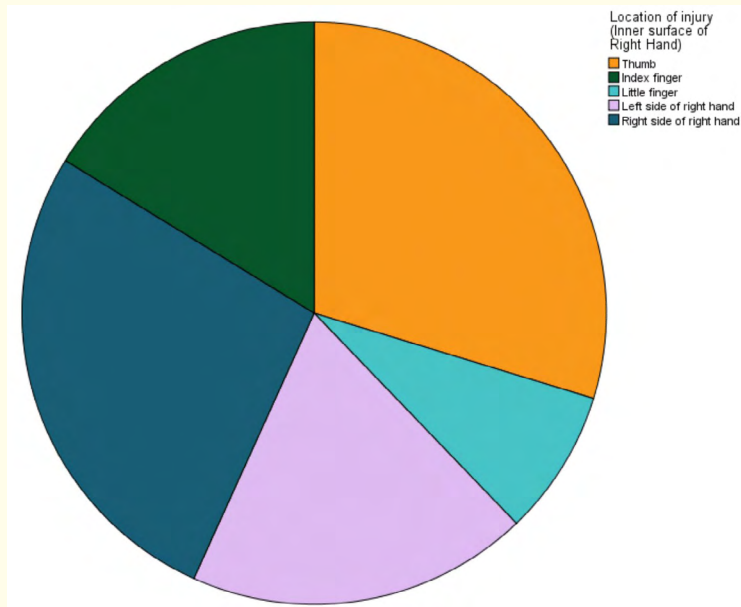


Figure 2: Location of sharp instrument injury (Inner surface of Right Hand).

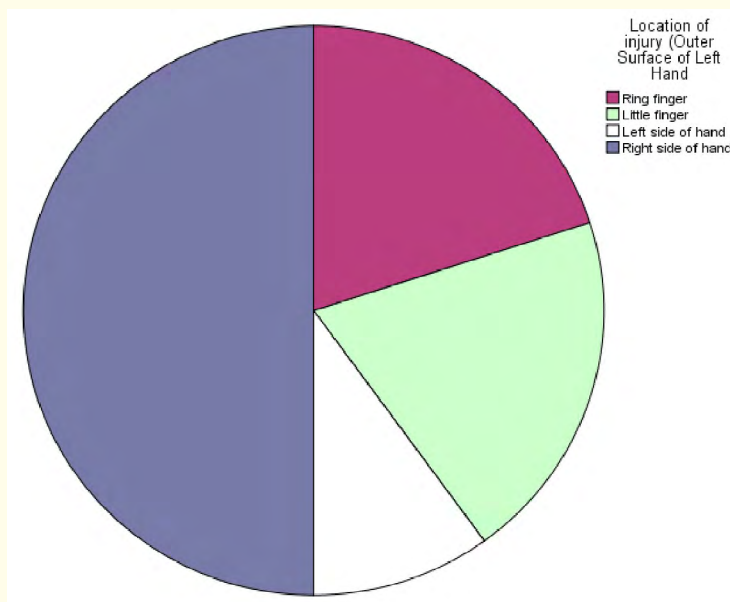


Figure 3: Location of sharp instrument injury (Outer surface of Left Hand).

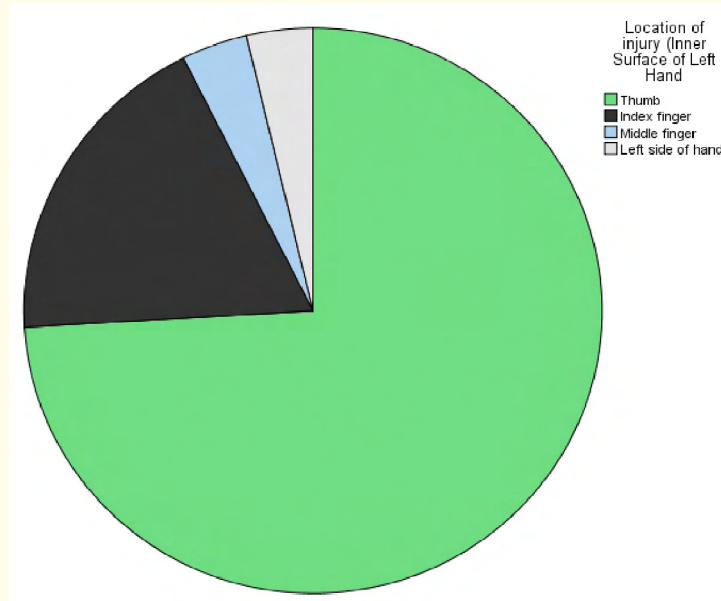


Figure 4: Location of sharp instrument injury (Inner surface of Left Hand).

Most injuries happened in the morning session (76%) in both campuses (Figures 5).

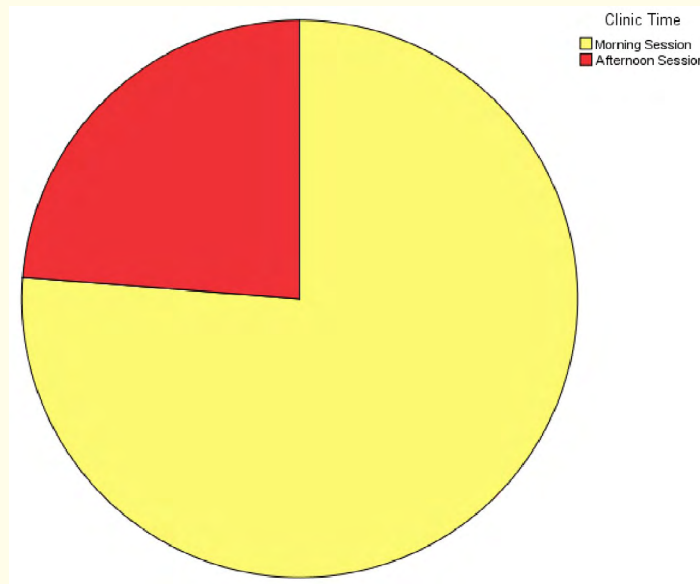


Figure 5: Clinic Time at which the sharp instrument injury happened.

Most of reports happened in 2011 (27.7%) while the least was in 2012 (19.8%). Although there was not any statistical significance differences between the years, there was a trend of increasing reported cases (20.8 % in 2013 and 31.7% in 2014) (Figure 6).

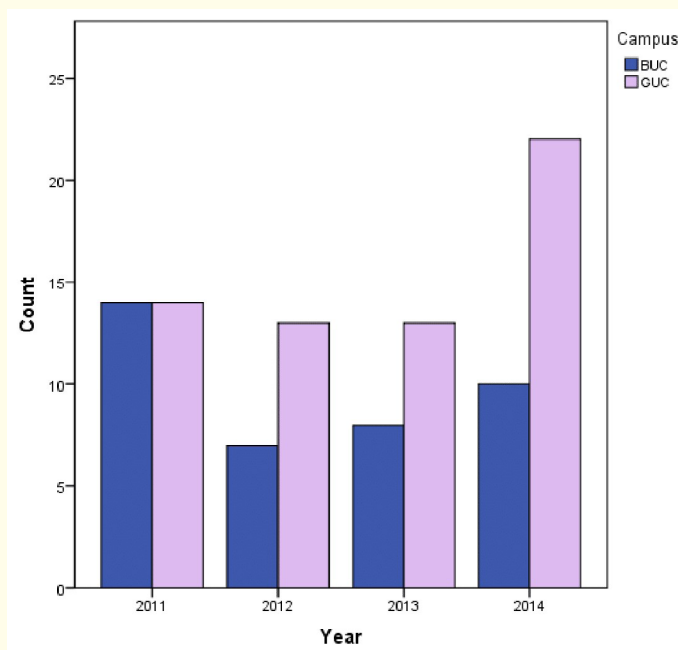


Figure 6: Number of reported sharp instrument injuries in each year in Boys University Campus (BUC) and the Girls University Campus (GUC).

The most alarming result was that medical history was not obtained prior to the incident in 88.1% of reported cases (Figure 7).

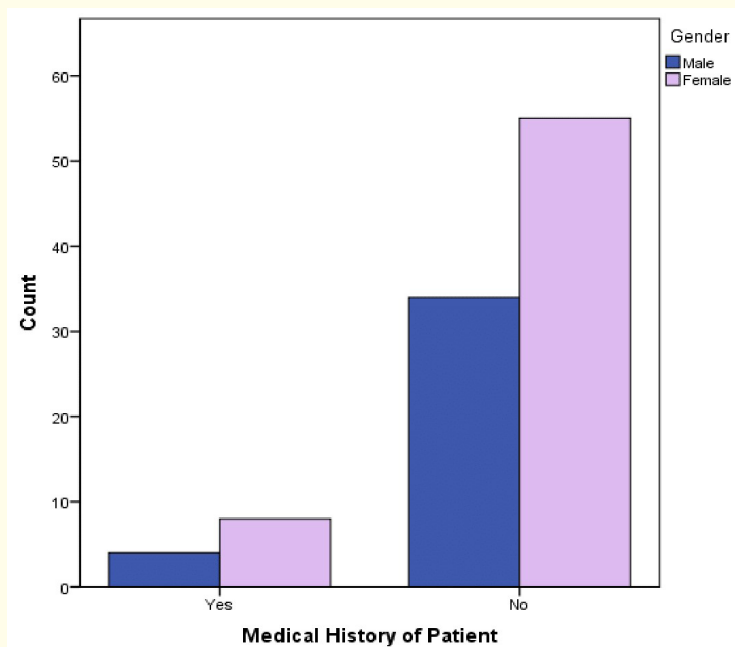


Figure 7: Status of patient's medical history (taken or not) in reported sharp instrument injuries in Boys University Campus (BUC) and the Girls University Campus (GUC).

## Discussion

This study evaluated the prevalence and the characteristics of sharp instrument injuries and the factors associated with this type of accident in the dental hospital of King Saud University, Riyadh, Saudi Arabia, which were in accordance with several studies around the world.

When healthcare students become more involved in patient's investigation procedures and treatment, their risk of exposure to infectious disease increases [5,6], especially Dental students. In Dental schools, the number of patients seen and treated by students coupled with the nature of dental procedures, increase the risk to the students. Routine use of local anesthesia injections, small sharp instruments and working in small restricted area by students with less experience, less hand skills and stressful environment, making sharp instrument injuries tend to occur more in these institutions [10-12,16].

Knowledge and compliance regarding prevention and management of sharps injuries is less than adequate amongst dental students and combining that with the immature experience and skill in performing dental procedures during clinical training puts dental students at high risk of exposure to blood-borne pathogens [26]. Although the chance of being infected by a virus after a single exposure is low, the consequences of an infection to a dental student are serious not only to them but also to others around them [8]. The emotional impact of any exposure can be severe and long lasting, even if a serious infection is not resulted [9].

Sharps injuries are a hidden problem and the vast number go unreported and are virtually undocumented in developing countries, but probably equal or exceed those in the industrialized world [7].

Therefore, health care institutions should not interpret low reporting rate as low injury rate. Injuries recorded through standard occupational reporting systems may underestimate the true injury rate, as much as 10-fold [8].

## Conclusion

It is crucial to develop an effective strategy to monitor and manage sharp instrument injuries among healthcare workers in general based on the characterization of occupational exposure and the knowledge of the factors associated with it.

Early training with practical demonstrations on how to handle/dispose of sharp instruments in the undergraduate dental courses should be emphasized and evaluated.

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