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Knowledge regarding infection control procedures among dental students at the International University for Science and Technology, Syria

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Abstract: The purpose of this study was to evaluate the level of awareness and knowledge of infection control procedures among dental students at the International University for Science and Technology, Syria. The study comprised of 121 subjects of 3rd ,4th, and 5th year dental students. A questionnaire was developed which included 10 questions related to dental instruments' storage, handling the dental chair, Personal Protective Equipment's, and knowledge about the sterilization technique. This questionnaire was distributed among the dental students to be directly answered. The collected data were demonstrated after descriptive statistics. More efforts are still needed to increase the level of awareness to infection control procedures among students due to the rising risk of infection transmission at dental clinics.

Keywords: Infection control, Sterilization procedures, Dental students, Student research

المعرفة بإجراءات مكافحة العدوى لدى طلاب كلية طب الأسنان في الجامعة الدولية للعلوم والتكنولوجيا، سوريا

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كلية طب الأسنان || الجامعة الدولية للعلوم والتكنولوجيا || سوريا

المستخلص: الغرض من هذه الدراسة هو تقييم مستوى الوعي والمعرفة بإجراءات مكافحة العدوى لدى طلاب كلية طب الأسنان في الجامعة الدولية الخاصة للعلوم والتكنولوجيا، سوريا .شملت الدراسة 121 طالباً من كلية طب الأسنان في السنوات الثالثة والرابعة والخامسة .تم تطوير استبيان تضمن 10 أسئلة تتعلق بتخزين أدوات طب الأسنان، والتعامل مع كرسي الأسنان، ومعدات الحماية الشخصية، والمعرفة حول تقنية التعقيم .تم توزيع هذا الاستبيان على طلاب كلية طب الأسنان للرد عليها مباشرة .تم عرض البيانات التي تم جمعها بعد إنجاز الإحصاء الوصفي. لا تزال هناك حاجة إلى مزيد من الجهود لزيادة مستوى الوعي بإجراءات مكافحة العدوى بين الطلاب بسبب ارتفاع مخاطر انتقال العدوى في عيادات طب الأسنان.

الكلمات المفتاحية: مكافحة الانتان، إجراءات التعقيم، طلاب طب الأسنان، بحث طلابي.

Introduction

According to the World Health Organization (WHO), infection prevention and control (IPC) is a scientific approach and practical solution designed to prevent harm caused by infection to patients and

health workers (Damani N, 2011). It is based on the science of infectious diseases, epidemiology, social sciences, and healthcare system.

Dental profession requires direct contact with tissues and oral fluids including blood and saliva by the dental team. These tissues and fluids may contain many types of bacteria and viruses that can cause diseases such as mycobacterium tuberculosis, Hepatitis B and Hepatitis C viruses, Human Immunodeficiency Virus (HIV), mumps, influenza, and rubella (Laheji AM et al. 2012). The risk of infection transmission is not only limited to patients but also the dental team with all its members including the dentist, assistants, nurses, laboratory technicians, and even janitors, since infection may be transmitted from patient to patient, patient to dental team, or dental team to patient (Araujo MW & Andreana S. 2002, Junevicius J et al. 2004).

It is a well-established fact that the key to infection control (IC) is to treat all patients as potentially infectious in order to prevent disease transmission (Smith AJ et al. 2001, Yadav BK et al. 2017).

Implementing infection control precautions is essential to ensure a safe working environment. Among such precautions are personal protective equipment, hand hygiene, waste management, sterilization, and most importantly, immunization. Despite the considerable emphasis placed on standardized infection control procedures, it appears that few dentists have adhered to these procedures in their clinical practice.

Even in dental schools, future dentists have not always properly adhered to these procedures (Kazi MM & Saxena R 2012, Gordon et al. 2001). Dental education can play an important role in the training of dentists, helping them to adopt adequate knowledge and attitudes related to infection control measures. The aim of this work was to analyze the knowledge, attitudes, and practice regarding some infection control measures among dental students in the International University for Science and Technology (IUST) in Damascus, Syria.

Materials and methods

A self-designed questionnaire that contains ten questions related to infection control and its different practices in terms of instruments' handling before and after placement into the sterilizer, methods of serialization used, personal protective equipment, methods of surface disinfection, and instrument handling was used in this study. During the annual students' summit at the faculty of dentistry at IUST, the questionnaires were distributed and directly filled by the researcher according to the oral answers obtained by the dental students.

The questionnaire form included the following categories:

1- Gender
2- Academic year
3- Storage method for instruments used in the clinics

4- Steps taken after using dental instruments
5- Handling the dental chair after finishing of treatment
6- Scenario of reaction in case of accidental instruments' fall on the floor
7- Whether the spittoon is cleaned after treatment
8- Whether protective eyewear is used during treatment
9- Knowledge about the working mechanism of the sterilizer
10- Importance of wearing a medical gown in the dental clinic and its contribution in infection control

Statistical analysis

Data obtained from the questionnaires were gathered and statistically analyzed using SPSS IBM Version 12 software. Descriptive statistics and frequencies of cases were demonstrated. Bar graphs were used to express some percentages and pie charts were also used to express other percentages.

Results

A total of 121 final questionnaires were collected, of which, 65.5% were females and 34.4% were males (Fig.1).

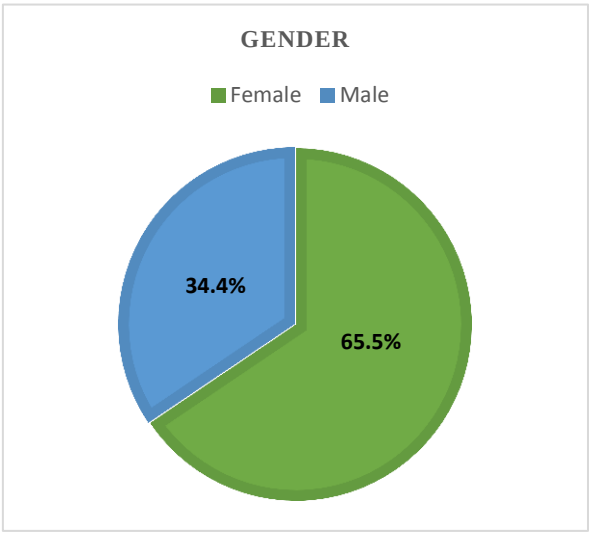

Fig (1): Distribution of students according to gender.

Of all participating students, 11.5% were third-year students, 45.1% fourth-year students, and 43.4% fifth-year students (Fig.2).

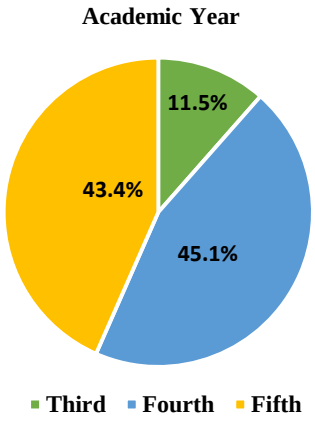

Fig (2): Distribution of students according to the academic year.

Regarding the instruments' packaging, 83.6% of students claimed that they used a sterilized pouch, 18% used a metal container, and 4.9% used a plastic container in order to prepare the instruments for insertion in the sterilizer (Fig.3).

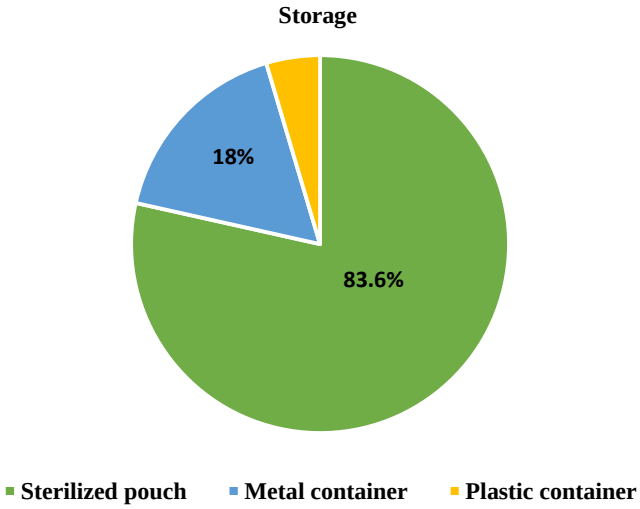

Fig (3): Methods chosen by students for instruments' packaging

Regarding the steps taken after using dental instruments in the clinics, 10.7% of students claimed that they first wrap the instruments then place them in sterilizer, 10.7% rinse the instruments with water then place in sterilizer, 4.9% rinse the instruments with soap and water then place in sterilizer, 32% rinse the instruments with water, dry them, then place in sterilizer, 0.8% place the instruments directly in sterilizer after finishing the clinical work, and finally, 47.5% rinse the instruments with soap and water, dry, then place in sterilizer (Fig.4)

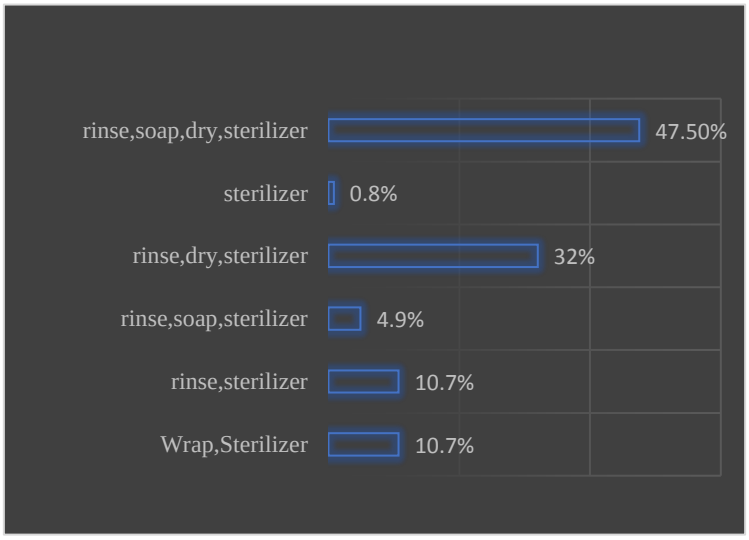

Fig (4): Steps taken after using dental instruments by students

The results related to handling the dental chair after finishing of treatment showed that 39.3% of the students take the nylon wrap off the chair, then leave, 18.9% take the nylon wrap off, spray the dental chair with alcohol, then leave, 7.4% take the nylon wrap off, spray the dental chair with a Dettol ™ solution, then leave, 37.7% take the nylon wrap off, spray the dental chair with other surface disinfectants (not identified), then leave, 1.6% of the students just leave the work place without any procedure, 0.8% just spray alcohol on the dental chair, then leave, 0.8% just spray the dental chair with Dettol ™, then leave, and finally, 1.6% just spray other surface disinfectant on the dental chair (not identified), then leave (Fig.5)

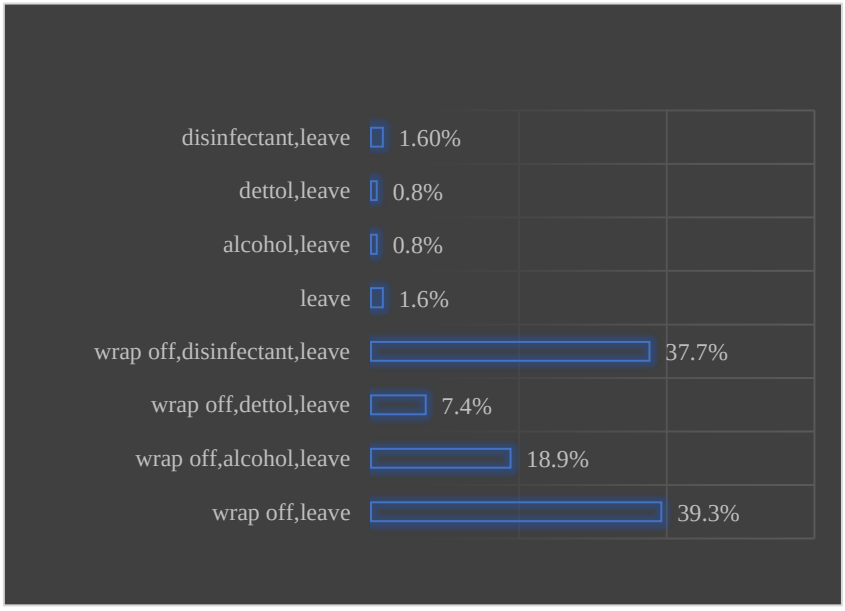

Fig (5): Handling the dental chair after finishing of treatment

Giving the scenario of students' reaction in case of dental instrument(s) fall on the floor in the middle of a treatment, the results of this study showed that 1.6% of students claimed that they would rapidly grab the instrument(s) and place it directly on the tray again, 45.1% would leave the instrument(s)

on the floor until complete finish of treatment, 32% would grab the instrument(s) and directly throw it/them in the sink, 8.2% would grab the instrument(s), spray it/them with alcohol, then place again on the tray, and finally, 15.6% of students claimed they would grab the instrument(s), spray it/them with surface disinfectant, then place it/them on the instrument tray again (Fig.6)

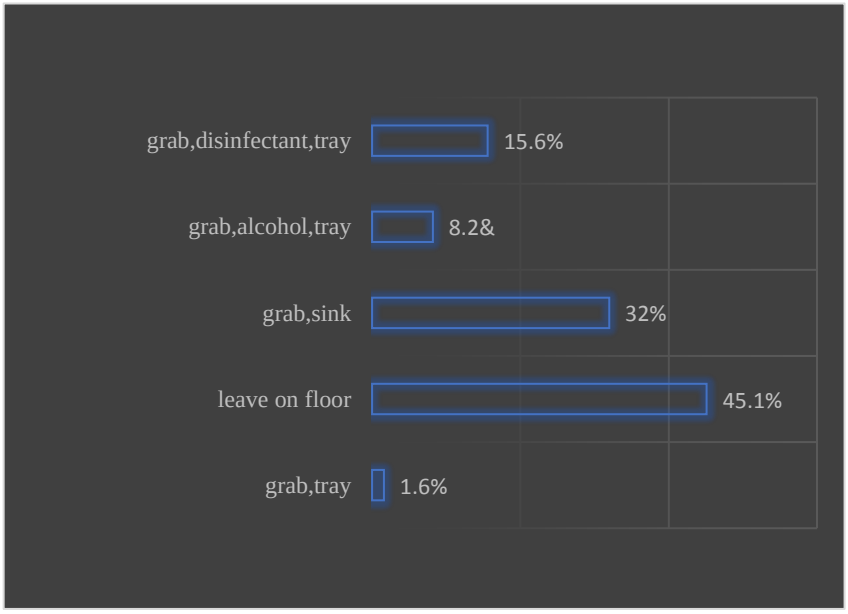

Fig (6): Scenario of reaction after dental instruments falls on the floor

Whether the spittoon is cleaned after treatment, and how, had been demonstrated in the results showing that 6.6% of students do no clean the spittoon at all after finishing treatment procedures, 34.4% claimed they clean the spittoon only with water, 16.4% clean only with alcohol (spray), 21.3% clean only with soap and water using a special brush, 4.9% clean only with alcohol using a special brush, 18% clean only using surface disinfectant with a special brush, and 9% clean with other kinds of disinfectants (not identified) (Fig.7)

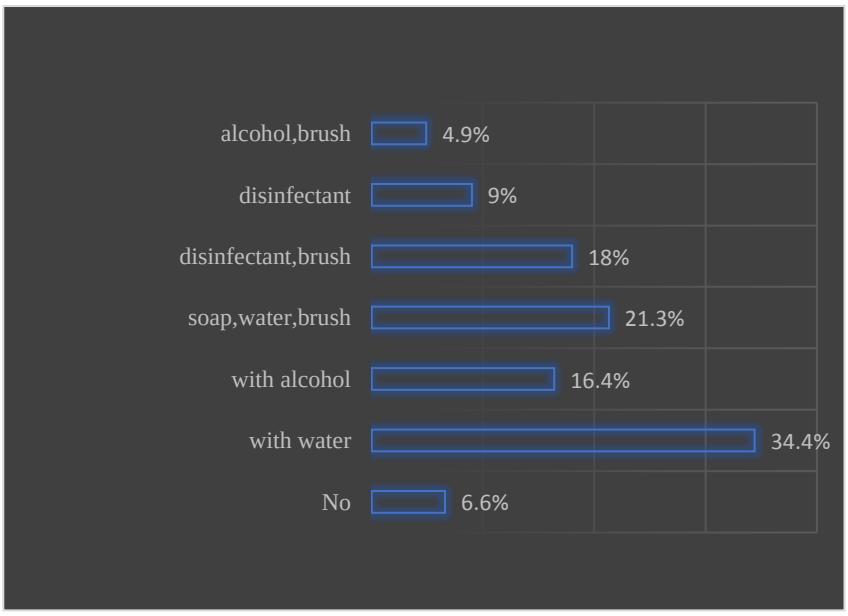

Fig (7): Whether the spittoon is cleaned after treatment

The results of this study showed that 28.7% of students do not use protective eyewear during treatments, 13.1% always use it, 25.4% use it, but not always, 0.8% use it only at the beginning of the treatment then take it off, 23.8% use it only during specific treatments (not identified), and 12.3% do not use it because they wear medical glasses and that is enough in their opinion (Fig.8).

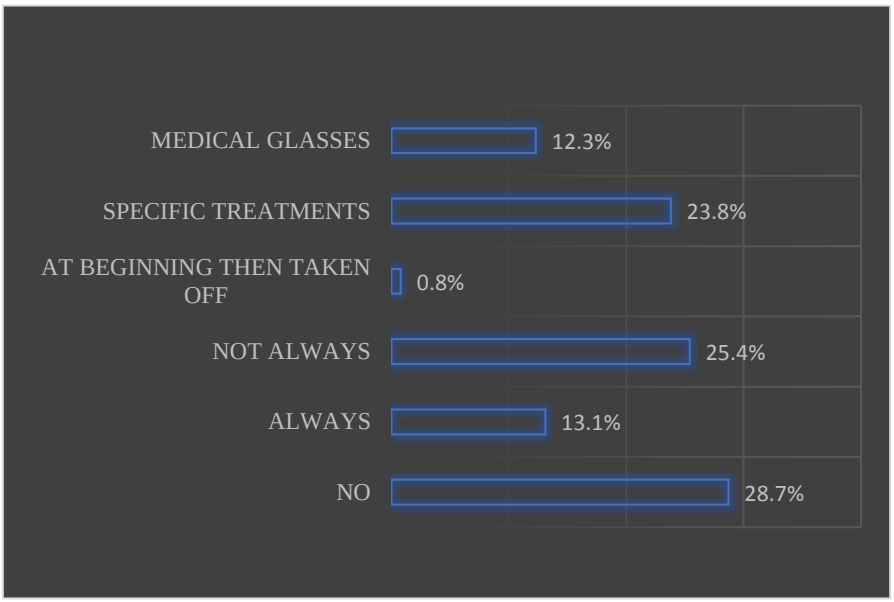

Fig (8): Whether protective eyewear is used during treatment

Regarding the knowledge about the working mechanism of the sterilizers at the faculty, 34.4% of students had no knowledge about the working mechanism, and 65.5% claimed they fully know the working mechanism of the sterilizer (Fig.9).

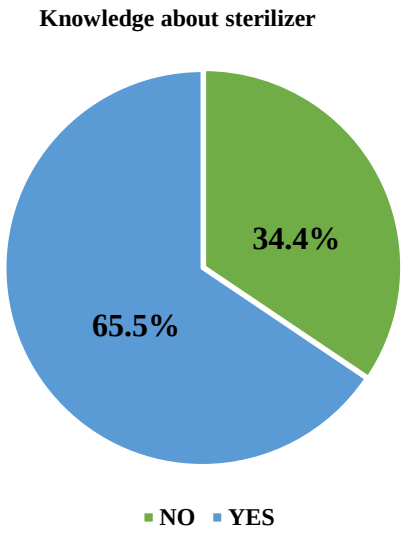

Fig (9): knowledge about sterilizers' working mechanism among students.

Regarding the importance of wearing a gown in the dental clinic and its contribution in infection control, 3.3% of students think it does not add any benefit to infection control, 75.4% do believe it is important, 11.5% do not know, and 9.8% of students do not know what a gown is (Fig.10).

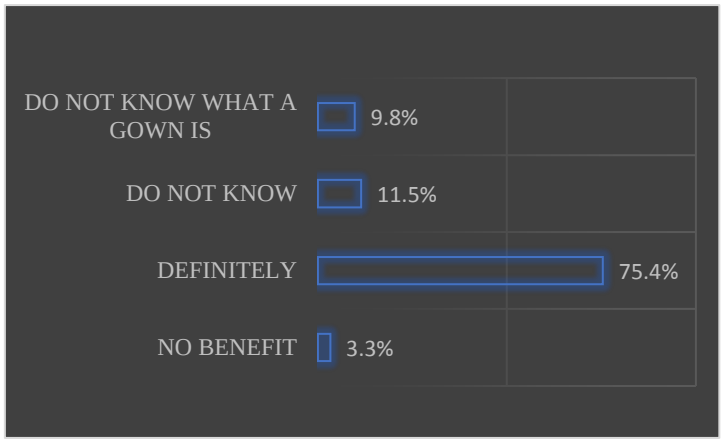

Fig (10): importance of wearing gown during treatment; from students' perspective.

Discussion

During the recent COVID-19 pandemic, the risk of infection has increased drastically. In the medical field, most susceptible people for infectious diseases in working environment are health-care professionals (Di Giuseppe et al. 2007). Dentists are repeatedly exposed to many microorganisms present in blood and saliva. As a consequence, incidence of certain diseases is high among them when compared to general population (Favero M S & Bond WW, 2001). Despite various standardized protocols in infection control, dental undergraduate students sometimes fail to obey the same. More recently, (Girotra et al. 2021) conducted a study aimed to assess the knowledge, attitude, and practice regarding infection control among dental undergraduate students of Mumbai. It was shown that only 40% of the interns, 40% of the final-year students, and 42% of the 3rd-year students had precise knowledge about infection control measures. Twenty-four percent of the interns, 27% of the final-year students, and 25% of the 3rd-year students showed accurate attitude for infection control. Finally, 41% of the interns, 44% of the final-year students, and 39% of the 3rd-year students inculcated right practice in controlling infection.

In general, dental students tend to practice infection control procedures they acquired during their training in dental school. Our study investigated the compliance and practice of some basic infection control procedures among senior dental students of the Faculty of Dentistry, the International University for Science and Technology, Damascus, Syria. Students of the present dental school attend lectures on infection control during the 3rd year of their undergraduate program. Practice guidelines are received in the 4th and 5th years during their clinical training. Moreover, a standard infection control protocol is adopted at the institution, and the clinical faculty pays attention for student adherence to the recommended infection control protocol.

Most of questionnaire papers in this study were related to the fourth- and fifth-year students, which gave the study more credibility due to the fact that those students are more involved in the clinical practice than those at lower years (i.e., 3rd-year students).

The results showed that the most used method for storing instruments by students is a sterilized pouch, which is available for all dental students at the clinics. Here, it seems that the students are committed to the standardized protocol of using the sterilizers offered by the faculty (i.e., the autoclave).

Effective cleaning of instruments is vital to ensure microbial inactivation since retention of organic or inorganic debris may compromise subsequent disinfection or sterilization processes (Freire et al. 2000). Our results showed that most students (47.5%) incorporate the use of soap and water to establish sufficient post-treatment cleaning of instruments, then drying them, and finally place them in the sterilizer, which was the appointed autoclave at the clinic. These findings are considered positive and reflect a good commitment to the simplest basics of infection control procedures. However, since 32% of students claimed they only rinse the used instruments with water and then place them in the sterilizer, more restricted IC instructions should be emphasized.

Some studies showed that complete disinfection including the use of disinfectants and plastic wrappers can improve the effectiveness of infection control on the surface of the dental chair unit (Askarian M & Asadian O 2009). In our study, about 37% of students claimed they spray a disinfectant on the dental chair unit after removal of the nylon wrap to provide efficient infection control. However, and surprisingly, about 39% of students only remove the wrap and just leave the treatment session without any further action. Such a result is considered alarming and requires deepening of education among students regarding the importance of using a disinfectant to spray all in-touch surfaces after treatment.

Regarding accidents where a dental instrument falls on the floor during treatment, about half of the students (45%) claimed they just leave it there until the treatment is finished. This can avoid contaminating the sterilized instruments if the fallen instrument, which is no longer sterilized, is placed again on the tray. However, the other half of students claimed they react by firstly grab the instrument and then doing something else (i.e., disinfect, spray by alcohol, etc...) which is considered totally wrong and needs further education and restricted instructions on this level.

In the dental clinic, post-treatment cleaning of spittoon is important to avoid transmission of infection from the retained saliva and blood to janitors or even students who would later use the dental chair. The results of this study showed that most students only use water to clean the spittoon, which is not sufficient to establish satisfying sterilization. Other methods of disinfection were reported by the rest of students, and, surprisingly, about 6% of them do not ever clean the spittoon after finishing their dental treatment. Such results clearly indicate that no unified protocol for cleaning is followed by students at the faculty.

Contamination of the eye with bodily fluid such as blood and saliva usually carry several potential risks to dental team and students, both bacterial and viral. Thus, using protective eyeglasses is considered important during clinical practice especially during treatments that will expose the dentist to droplets or aerosols that can cause infection. This study showed that only 13% of students do use protective eyewear in every single dental treatment. Thus, compliance to the regular use of eyewear was quite low in our study when compared to other studies (Farrier et al. 2006). Such alarming results require more restricted instructions for using the personal protective eyewear in the clinics of the faculty.

Using an autoclave for instrument sterilization is the preferred method due to its safety, rapid and lethal effect of pressurized steam on all microorganisms. Knowledge about the working mechanism of the sterilizer should be common among dental students, which is probably provided as a part of their academic subjects. However, this study revealed that about 34% of students had no knowledge about the working mechanism of the sterilizer. This may be due to the fact that some students consider it unimportant because they do not directly use the sterilizer, and they rather present the instruments to the appointed personnel at the faculty who are responsible for such tasks.

A recent study by (Elagib MFA et al. 2021) highlighted the level of compliance with infection control measures among dental students; and linked this to their knowledge and attitudes regarding infection control measures and proper vaccinations. It was shown that dental students had good knowledge and positive attitudes regarding infection control in general, but showed moderate compliance with the recommended infection control guidelines.

Another study conducted by (Ahtasham H et al. 2022), that aimed to assess the knowledge, attitude and practices of dental students and dentists towards Hepatitis B and C infected patients in their day-to-day practice, had revealed that the participants had a good perception of attitude towards patients with hepatitis. However, the knowledge of the participants regarding the infection was suboptimal indicating the need to revise the undergraduate curriculum and approach to practice also needs to be improved demanding more emphasis on clinical teaching.

Personal protective clothing such as disposable gowns or scrubs is worn as a barrier to prevent transmission of microorganisms between patients and dental health-care workers. Research has shown that aerosol and splatter containing pathogens can contaminate clinical wear, targeting the chest and forearms, and remain for several days. The majority of dental students in our study considered the use of a disposable gown important during treatment. This importance is especially increased when the procedures involve larger amounts of blood aerosol, and greater exposure to spatter (e.g., maxillofacial surgery, dental extractions...).

Conclusion

Adherence to infection control protocols is a shared responsibility between students and supervisors in the clinics of the university.

The level of education regarding infection control procedures in the Faculty of Dentistry at IUST is considered kind of accepted. However, further highlight and focus on some critical points of IC should be presented to students with further awareness as an essential need, and this could be achieved using educational lectures and continuous academic announcements. Furthermore, showing examples of the outcomes of exposure to infection can bring motivation to students to involve infection control procedures as a daily routine in the clinics.

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