

## Medical Safety in Dental Clinics in Tripoli /Libya: A Cross Sectional Study

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### Abstract

**Introduction:** Dental clinics are important and essential for the health and safety of individuals in the community. A good and appropriate management of medical waste in dental clinics is very important to ensure safety for staff in the clinic.

**Objectives:** Evaluating the level of practicing safety in dental clinics and identifying a possible relationship between the medical waste management and practicing the occupational safety in dental clinics in Tripoli/ Libya.

**Methods:** A cross-sectional study was conducted on 201 respondents: dentists, nurses, and assistants dentist chosen from 67 clinics out of 135 clinics. A questionnaire was used to three sections.

**Results:** 97.5% of respondents always use the gloves during working, 49.32% use protective masks, 52.2% took immunization against hepatitis B, 19.6% sterilizes sharp needles and other sharp waste before disposal. 52.7% take medical history of each patient. 39.8% were separating contaminated blood from non-contaminated waste and 82.1% disposal liquid waste such as blood and saliva through the sewage network. However, there were no statistically significant differences between gender dental staff in safety practices ( $t = 1.095$ ,  $p = 0.275$ ) and no statistically significant relation between medical waste management and safety practices ( $r = 0.125$ ;  $p = 0.076 > 0.05$ ) in the dental clinics.

**Conclusions:** The results of this study showed that the level of safety procedure considered was not sufficient to maintain the safety of workers and patients. Therefore, it is necessary to re-assess safety protocols by authorities and intervene quickly by introducing spread awareness of health and safety in dental clinics and in forcing regulations.

**Keywords:** Medical, Safety, Dental, Clinics, Tripoli, Libya

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### I. Introduction

Dental clinics are important and essential for the health and safety of individuals in the community and they are indispensable for the provision of medical and therapeutic services for the diagnosis of oral diseases, gum and teeth. As important as the other health centers, good and appropriate management of medical waste in dental clinics is very important to ensure safety for staff in the clinic.<sup>[1]</sup>

All health care systems should be designed to provide a practice environment that promotes patient safety. The World Health Organization (WHO) defines patient safety as “the reduction of risk of unnecessary harm associated with healthcare to an acceptable minimum.

The most important challenge in the field of patient safety is prevention of harm, particularly avoidable harm, to patients during treatment and care.<sup>[2]</sup> Dental practices must be in compliance with federal laws that help protect patients from preventable injuries and potential dangers such as the transmission of disease.<sup>[3,4]</sup>

In the modern dental practice, safety concerns must be paramount to avoid injury and litigation. The principle of “do no harm” must also apply to patient for injury prevention. Similarly, dentists must be vigilant in wearing personal protective equipment to ensure their own personal safety and thus remain healthy and active in their profession.<sup>[5]</sup> Lack of knowledge, fear of contracting the infection during the course of treating HIV

infected patients for example, resistance of support staff, and perceived lack of clinical skills act as barriers to treating HIV positive individuals among dentists.<sup>[6]</sup> Training and education programmers for safety and health should apply to all workers.<sup>[7]</sup>

Safe handling of regulated waste is essential. Written procedures will help in this process. Involved personal must be informed of the possible health hazards present and trained in appropriate handling, storage, and disposal methods of special concern are contaminated sharp, such as needles. It is the policy of the ADA that all dentists and their staffs having patient contact should be vaccinated against hepatitis.<sup>[8]</sup>

In Libya, there is a lack national law, regulations and legislation regulating safety in dental clinic. So, there is a need to evaluate the level of safety for workers and patients in dental clinics.

Such research would inform strategies for the prevention of transmit infectious disease contributing to reduce the burden of infectious disease on the individual and the Libyan National Health Service.

### **Objectives of study**

1. To examine the levels of the safety practices in the dental clinics in Tripoli, Libya.
2. To test difference in the safety practices between the male and female dental staff in the dental clinics in Tripoli, Libya.
5. To examine the relationship between medical waste management and the safety practices in the dental clinics in Tripoli, Libya

## **II. Methodology**

A cross sectional descriptive study was used to evaluate the level of safety procedure in dental clinics in Tripoli – Libya (2016). The study population targeted was dentists, assistant dentist and nurses in the field of dental clinics.

Data collection approval was provided from Research Ethics Committees of Ministry of the Ministry of Health of Libya. The first investigator collects the data. The study population included of 67 dental clinics, (50% of the total number of clinics), were randomly selected out of 135 dental clinics (privet and public clinics) in Tripoli, 65 privet dental clinics and 2 of largest public dental clinics in Tripoli/ Libya. The public dental clinics have a large category of society and offering them free services. From this population, we selected a convenient sample of respondents who has been found in the clinic in the time that the investigator is present. The study sample was consisted of 201 respondents, which included 67 doctors and 134 assistants doctors and nurses where included in the study. A written consent form explaining the purpose of the research was a signed by the respondents. To maintain confidentiality, questionnaires were made anonymous. The questionnaire was distributing to the sample members on the basis one doctor, two assistant doctors or nurses in each clinic. The questionnaire was derived from other published study dealing with the same topic.<sup>[9]</sup> Questionnaire was distributed in Arabic so there was not any difficulty to understand. If there is any clarification of the questionnaire made by first investigator.

This questionnaire divided into two parts:

**The first part** included demographic information questions like sex of participation, years of experience, and job.

**The second part** of questions designed to assess the level of the safety. This part included 14 questions. The participation was asked if they used gloves, masks, and use single cups. In addition, if there a ventilation system and different types of the sterile in clinics. Also, question related to follow the security and safety procedures when you use x-ray device if it is exist. Moreover, whether the dentist or their working staffs were vaccinated against hepatitis B.

The responses of each respondent to the items of this construct were summed to get the overall, or total, score for her/him on this construct of the research instrument. This construct has 14 items that were weighed normally, i.e., following the normal scale, such that the more safe the practice, the higher the allocated score, and vice versa. As such, theoretically the lowest possible score on this scale is 6 and the highest potential score is 42. The highest theoretical potential score was calculated as follows:

The answer choices corresponding to the lowest level of safety were assigned a safety weight of '1' while the choices complying with no safety were assigned a weight of '0'. The lowest weights for the 14 safety items were summed and the sum was 6.

Afterwards, the researcher categorized the safety practices into three levels: low, moderate, and high, and the interval characterizing each level were calculated as follows:

Interval width = [(The highest potential score – the lowest potential score)]/ (number of categories)

Interval width =  $(42 - 6)/3 \approx 12$

Therefore, the intervals of the total score on this instrument that define each level of safety practices were:

Low: 6 – < 18  
 Moderate: 18 – < 30  
 High: 30 – 42.

**Statistical Analysis**

Statistic analysis was analysis using SPSS software version 23. Descriptive statistics, including percentage, mean, range, and standard deviations, were calculated for all variables. Mean were compared using t-tests and P-value less than 0.05 was considered statistically significant.

**III. Results**

A total of 201 questionnaires were distributed to doctors, assistant doctors, and nurses in dental clinics in Tripoli. The majority of the respondents were females 168 (83.3%) and 33 (16.4%) were male.

114 (56.7%) of the respondents have experience from one year to 5 years. Most of respondents were nurse 107 (53.2%) (Table 1) demonstrate a description of the demographic variables of the sample that provides general background about respondents.

**Table 1: Demographic variable Frequency Distribution**

Demographic variables	Category	Frequency	Percentage (%)
Sex	Male	33	16.4
	Female	168	83.3
	Total	201	100
Experience	Less than one year	21	10.4
	From one year to 5 years	114	56.7
	From 6year to 10years	36	17.9
	From 11year to 20year	27	13.4
	21 year to 30 year	3	1.5
	Total	201	100
Job	Dentists	67	33.3
	Nurses	107	53.2
	Assistant dentist	27	13.4
	Total	201	100

Most of respondents 196 (97.5%) who always wear glove and 99 (49.2%) of respondents who always wear mask (Table 2).

**Table 2: Distributions of dentists, assistant dentist and nurse to use of personal protective measures**

Personal protective measures	Repeatedly of use				
	Always No(%)	Most of the time No(%)	Some time No(%)	Rarely No(%)	Never No(%)
Using gloves	196(97.5)	2(1.0)	3(1.5)	0(00.0)	0(00.0)
Using masks	99(49.2)	34(16.9)	48(23.9)	12(6.0)	8(4.0)

105(52.2%) of respondents reported that they have the HBV vaccination comparing with 96(47.8%) of respondents who do not have HBV vaccination. On the other hand, when the respondents asked” do you have any diseases or sickness syndromes according to your opinion relating to your work as a nurse for dentist?” 188(93.5%) answered no and 13 (6.5%) answered yes. 40 (19.9%) of respondents who sterilize the sharp instrument such as needles, injections and others after putting them in the plastic boxes and containers before getting rid of them, while 161(80.1%) represents respondents who don’t do that. 154(81.6%) of respondents have the workers who trained on the right and secure handling at emergency cases with spill of the natural liquids. 40 (19.9%) of respondents who answered yes while 161(80.1%) answered no. 154(81.6%) of respondents have the workers who were trained on the proper procedures and secure handling at emergency cases with spill of the natural liquids (Table 3).

**Table 3: The frequency and percentages for answers on questions related to personal and clinic safety measures**

	Frequency	(%)
<b>There is a ventilation system in the clinics?</b>		
Yes	183	91.0%
No	18	9.0%
<b>Do you follow the security and safety procedures when you use x-ray device if it is exist in the clinic?</b>		
Yes	48	23.9%
No	85	42.3%
Not exist	68	33.8%
<b>What is the type of the sterilization that is used in the clinic?</b>		
Dry	114	56.7%
Wet	74	36.8%
Both	13	6.5%
<b>Have you had taken the HBV Vaccination?</b>		
Yes	105	52.2%
No	96	47.8%
<b>Do you have any diseases or sickness syndromes – according to you opinion relating to your work as a nurse for dentist?</b>		
Yes	13	6.5%
No	188	93.5%
<b>Do you sterilize the sharp instrument such as needles, injections, and other after putting them in the plastic boxes and containers before getting rid of them?</b>		
Yes	40	19.9%
No	161	80.1%
<b>Are the workers trained on the right and secure handling at emergency cases with spill of the natural liquids such as blood and body liquids? In a way that provides safety for all?</b>		
Yes	164	81.6%
No	37	18.4%

Explain the patient safety, and which shows that 178(88.5%) of respondents provide patients with plastic cups during the treatment, 196(97.5%) replaces the plastic cups directly after treatment, 106(52.7%) takes the sickness history of the patient, and 191(95.0%) sterilizes all hand instruments always (Table 4).

**Table 4: The frequency and percentages for answers on questions related to patient safety**

Questions	Repeatedly of use				
	Always No (%)	Most of the time No (%)	Some time No (%)	Rarely No (%)	Never No (%)
Do you provide the patient with plastic cups during the treatment?	178 (88.5)	19 (9.5)	4 (2.0)	0 (00.0)	0 (00.0)
Do you replace the plastic cups directly after you finish the treatment of the patient?	196 (97.5)	5 (2.5)	0 (00.0)	0 (00.0)	0 (00.0)
Do you take the medical history for each patient?	106 (52.7)	25 (12.4)	11 (5.5)	12 (6.0)	47 (23.4)
Do you sterilize all hand instruments?	191 (95.0)	8 (4.0)	1 (0.5)	0 (00.0)	1 (0.5)

Also the result shows the percentage of sterilize laundry dental chair, the highest percentage of 179(89.0%) was reported (after each patient), and 16(8.0%) represented (daily). The lowest, 5 (2.5 %) was reported monthly and 1(0.5%) was reported never clean it (Table 5).

This study assessed the levels of safety practices between male and female dental staff in the dental clinics in Tripoli, Libya.

The levels of safety practices of the sample male and female dental medical staff in the dental clinics in Tripoli (Libya) were all moderate or high. No respondent had low levels of safety practices.

**Table 5: The Frequency and percentages for answers on questions related to the answers of questions related to patient safety**

Questions	Repeatedly of use				
	After each patient	Daily	Weekly	Monthly	I never clean it
I sterilize the laundry dental chair	179(89.0)%	16(8.0)%	0(00.0)%	5(2.5)%	1(0.5)%

The overwhelming majority of the entire dental medical staff (93.5%;  $n = 201$ ) has high levels of safety practices. Only 6.5% of the sample dental medical staff has moderate levels of safety practices.

The vast majority of the 33 male dental staff (87.9%;  $n = 33$ ) has high levels of safety practices. Only 12.1% of these 33 dental staff has moderate levels of safety practices.

The overwhelming majority of the female dental staff (94.6%;  $n = 168$ ) demonstrates high levels of safety practices. Merely 5.4% of these 168 dental staff possesses moderate levels of occupational safety practices.

In this respect, the study results indicate that while the percentage of male dental staff exhibiting moderate level of safety practices is a bit higher than double that of the female dental care staff (12.1% vs. 5.4%), the percentage of female dental staff having high level of safety practices is higher than that of the male dental staff (94.6% vs. 87.9%). This result suggests higher level of safety practices among the female than the male dental staff (Table 6).

**Table 6: Sex and safety practices**

Gender	Safety Level	
	Moderate (%)	High (%)
Male	4(12.1)	29(87.9)
Female	9(5.4)	159(94.6)
Total	13(6.5)	188(93.5)

The results reveal that the mean total score on the safety practices construct of the research instrument is  $35.18 \pm 3.39$  for the male dental staff and  $34.57 \pm 2.83$  for the female dental staff, which are very close. There is no statistically significant difference in the safety practices between the male and female dental staff in the dental clinics in Tripoli (Libya) ( $t = 1.095, p = 0.275$ ).

#### Relationship between medical waste management and the safety practices

There is no statistically significant relationship between medical waste management and the safety practices in the dental clinics in Tripoli, Libya ( $r = 0.125; p = 0.076 > 0.05$ )

### IV. Discussion

This research was conducted after the 17 February revolution and the health services were affected by the latest armed conflict in Libya. However, dental waste managements in Libya has no appropriate health and safety requirements and there is a lack management of MW organization even before Libyan revolution.

The present study surveyed 67 dental clinics out of 135 clinics chosen randomly to examine the levels of the safety practices in dental clinics in Tripoli – Libya. The majority of the study sample was females (83.3%). While (53.2%) were run by nurses work type. Associated with respondent experience, the result indicates that (56.7%) of the respondents have experiences from 1 year to 5 years

#### Safety Practices

There are many reasons behind dental health care workers wearing operating personal protective tools. The reasons are as followings to prevent transmission of infection from the operator’s hands to the patients; to prevent contact of blood, saliva with the operator’s hands, to maintain the safety of workers, to limit cross contamination, dental health care workers must wear operating personal protective tools.

Our finding revealed that 97.5% of respondents reported always wear gloves, 49.32% reported that the wear facemask. This finding indicates the good knowledge of implementing the basic required safety measures. Moreover, the need for more awareness about wears facemask.

The Libyans situation seems to be moderate in comparison with some other countries. For example, in Saudi Arabia across sectional carried on 132 dental units, all the studied dentists revealed that all respondents always used gloves for every patient during dental treatment, and 90.6% stated that they always wore a facemask during dental treatment according to.<sup>[10]</sup>

And Al-Khatib et al.,<sup>[11]</sup> study was conducted on 97 of 134 dental clinics, they reported that 52 % of dental professionals in Palestine always wear gloves, 36 % represented the wear facemask.

While, surveyed in Kuwait included 215 dentists, 12 oral and dental technicians from the Ministry of Health and 12 final year students from oral and dental hygiene. Their result was 90% of dentists wore gloves, 75% wore masks.<sup>[9]</sup> And in a study done on 120 dental students in India, found about 95% of them wore gloves, and 95.83 wore facemask.<sup>[13]</sup>

There is clearly a similarity between the results of the current study and the results of other studies. The possible explanation for these results is greater awareness of their health and they know the importance of using protective measures to avoid any kind of occupational hazards and infectious diseases. And employees' awareness of safety measures. Avoiding disease spread and protecting professionals and visitors.

Several studies emphasized on the hazard of cross infection through the use of dental instruments and tools. In current study, the finding of 95.5% of respondents were always sterilize all hand instrument, where 56.7% of dental clinics used dry heat for sterilizing dental instrument, 36.8% of dental clinics used wet or steam sterilization and 6.5% used both.

Al-Khatib and Darwish (2006) reported that 83% of dental clinics used dry heat for sterilizing dental instruments.<sup>[14]</sup> And Morris et al., (1996) was distributed questionnaire to all dentists (215) in Kuwait found 94% of the dentists used autoclave for sterilization.<sup>[9]</sup>

While Mosleh,<sup>[9]</sup> reported that 16.8% of dental clinics have autoclaves for sterilize dental instrument, and 83.2% of clinics used dry heat for sterilize. And Al-Rabeah and Mohamed showed only 37.9% of dentists used autoclave for sterilizing hand pieces.<sup>[10]</sup>

Sterilization is exactly what we called the protection of devices and tools from environmental pollution when packaged in appropriate packaging materials to maintain them. Most of the clinics have the knowledge of the importance of using sterilization in order to limit the spread of diseases. The virus and bacteria are transmitted, and they use different types of sterilization devices. Most studies say that sterilization of dry heat at temperatures above 170 degrees is more efficient to eliminate bacteria, viruses and other disease vectors.

What has become a major concern is the cross-infection between dental clinics worker and patient, so HBV Vaccination is considered important in order to limit spread infection. Our findings revealed that only 52.2% of dental clinics worker vaccinated against hepatitis B, and 47.8% did not.

Similarly, this value is the same with to some other developing countries, for example in Palestine,<sup>[11]</sup> reported that 74% were vaccinated against hepatitis B, and Saudi Arabia reported only that 64% of dentists whom employed in the private sector in Riyadh were vaccinated against hepatitis B.<sup>[10]</sup> While 40% of the supporting staff at the clinics had vaccinated in Ajman.<sup>[15]</sup> In Turkey 91.90% and 88% of the participants attributed importance to HBV vaccination.<sup>[16]</sup>

The percentages are different between studies but are considered insufficient to ensure no transmission of disease or infection with the virus. Health professions are considered the most dangerous occupations if not immunized. There should be 100% hepatitis B vaccination coverage of all dentists and dental workers.

Taking a patient's medical history before treatment is important to the safety and non-spread of diseases in dental clinics, in this study recorded that, 52.7% takes the sickness history of the patient.<sup>[11]</sup> found 82% of dentists take medical history before treatment. In addition, Al-Rabeah and Mohamed showed 93.1% of respondents always took a medical history of each patient before treatment.<sup>[10]</sup>

Sterilized before getting rid of sharps instrument including the needles and injections; they are considered as highly hazardous health care waste since they can cause injuries and then transmitted diseases. Proper and appropriate disposal of sharp instruments avoid many accidents and spread of diseases. However, this study disposal of acute substances was inappropriate in most clinics found around 80.1% of respondents who were not sterilization sharps instruments before disposal of them. In Brazil was investigated 14 dentists and 5 dental assistants in Rio de Janeiro found about 60% of dentists were properly disposal sharp waste.<sup>[17]</sup>

Mandatory trained courses should including waste management. As it is crucial for the upgrade of dental waste management implementations, this should be part of a more continuous comprehensive education program for all dental personnel. Our finding reveals that 81.6% of the worker trained on the right and secure handling at emergency cases with spill of the natural liquids such as blood.

Respondents were asked in the present study if they had any symptoms or diseases relating to their work as a worker in dental clinics. The finding reported that 6.5% said "yes". Such situation similar to what found in Palestine<sup>[9]</sup>, which is reported that they suffered from bad temper problem, headaches, low back pain, stress and allergy.

Also, Al-Khatib et al.,<sup>[11]</sup> revealed that the most popular of symptoms or disease were headaches (48%), stress, skin allergy and dizziness. Other less repeated symptoms involving numbness memory loss, low back pain, muscle tremor, visual problems, blood pressure, gastrointestinal problems and insomnia. The possible explanation for all these diseases can be the cause of the number of severe cases, stress, tension, length of work and lack of sufficient number of doctors to rotate.

There was a significant difference among male and female dental staff in the dental clinics in Tripoli-Libya in a part of the study assessed the levels of safety practices. Only (16.4%) male dental staff and (83.6%) female dental staff. The female dental staff was higher level of safety than male dental staff (94.6% vs. 87.9%).

There were few limitations of the study that was conducted is the Tripoli Libyan capital only. Thus, it cannot generalize the results on all cities. Self-administrated data were gathered so is expected that inaccurate bias or inaccuracies bias will occur. The biggest barrier that this study was faces the war and the unstable situation in the Libya.

In conclusions, the results of this study showed that the level of safety procedure considered was not sufficient to maintain the safety of workers and patients. Therefore, it is necessary to re-assess safety protocols by authorities and intervene quickly by introducing spread awareness of health and safety in dental clinics and in forcing regulations.

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