# Teaching Protocol for Nurses and Lab Technicians about Infection Control Measures for Patients Undergoing Dental Extraction

**Sara Atiaa Mohammed[1], Asmaa Sayed Abd-Almageed[2], Abdal Aziz Baiomy Abdullah[3] & Wafaa Ramadan Ahamed [4]**

[1.] Head nurse in Al – Azhar hospital.

[2.] Assistant Professor of medical surgical Nursing Faculty of Nursing Assiut University, Egypt.

[3.] Assistant Professor of oral and Maxillofacial Surgery Department AL-Azhar University Assiut Branch. , Egypt.

[4.] Assistant Professor of medical surgical Nursing Faculty of Nursing Assiut University, Egypt.

## Abstract

**The aim of the study was** to evaluate the effect of applying teaching protocol for nurses and lab technicians about infection control measures for patients undergoing dental extraction. **Research design:** Quasi experimental (pre \ posttest) research design was utilized. **Setting:** The study was conducted in Faculty of Dentistry at Al-Al-Azhar university outpatients' clinic Assiut Branch. **Subjects**: A convenience sample of all available nurses and lab technicians (36) participating in the study **Tools: Tool I:** Nurses and lab technicians assessment questionnaire, **Tool II:** Observation checklist about dental infection control measures. **Results:** There was high statistical significance difference between knowledge and practice pre and post application of the teaching protocol with p-value equal (<0.001**).**Conclusion:** nurse and lab technician's knowledge and practice improved post implementation of the teaching protocol about infection control measures for patients undergoing dental extraction. **Recommendations:** nurse and lab technician need continues education and in-service training programs to be well organized within thedental part in Al –Azhar hospital**.**

*Keywords: Dental Extraction, Infection Control, Lab technician, Nurses, Teaching & protocol.*

## Introduction

Tooth extraction is the removal of whole tooth or tooth- root under local or general anesthesia with minimal trauma to the investing tissues, so that the wound heals uneventful, and no postoperative prosthetic problems is created. **(Prasad et al, 2019).** Tooth extraction is a surgical procedure that leaves a wound in the mouth that could become infected. Infection can lead to swelling, pain, development of pus, fever, as well as 'dry socket' (where the tooth socket is not filled by a blood clot, and there is severe pain and bad odor). Teeth that are affected by decay or gum disease or painful wisdom teeth are often removed (extracted) by dentists**. (Lodi et al, 2021)**

Infection control is a measure implemented to prevent or reduce the risk of infection among patients, health care providers, contractors and/or visitors**. (Jim Ayukekbong, 2019).** Infection control is an important stage in the structure, work process, and health security for public services offered to the population. Oral health care presents a high risk of contamination due to the production of aerosols, proximity to a patient's face, and interpersonal contact, as well as exposure to saliva, droplets, blood, equipment surfaces, furniture, objects, and clothes **(Da Fonseca et al, 2021)**

Infections could be transmitted during the dental operation through several routes: In direct contact, an individual with infection could transfer the virus to the susceptible host via actions such as a handshake from a contaminated hand or inhalation of a droplet during sneezing of an individual with infection **(Sum et al, 2021)**

Indirect contact consists of an individual with infection transferring the viral content on fomite such as a frequently touched surface in the form of door handles, elevator buttons and via money transactions. When susceptible individuals come in contact with viral contents on their oral, nasal, or eye mucous membranes, or in touching such areas with their contaminated hands. **(Sum et al, 2021)**

The dental healthcare setting can be an important route for transmission of airborne or drop-related infectious diseases, both for the dental team and/or for the patient**.** The transmission of the virus mainly occurs via respiratory droplets. These respiratory droplets are excreted from the oral cavity and pharynx, via speech, coughing and sneezing**. (Volgenant et al, 2021)**

There are practical guidelines recommended for dentists and dental staff by the Centers for Disease Control and Prevention (CDC). Like with other contagious infections, these recommendations include

(hand washing, personal protective equipment (PPE), respiratory hygiene (cough etiquette) , sharps safety and disinfection of the clinic.**(Khader et al, 2020)**

## Significance of the study

In Faculty of Dentistry, at Al-Azhar university outpatient 'clinics at Assiut Branch through year 2019; at that time **(6000)** patients removed their teeth. From the researcher' s clinical experience in Faculty of Dentistry Al-Azhar university at the out patients' clinic **(Faculty of dentistry Al-Azhar university record 2019)**. The researcher observed that nurses and lab technicians have unsatisfactory level of knowledge and practice regarding the application of infection control measures. Therefor the study was conducted to improve the knowledge and practice of nurses and lab technicians about infection control measures application for patients undergoing dental extraction.

### Aims of the study

The present study carried out to evaluate the effect of applying teaching protocol for nurses and lab technicians on their knowledge and practice about infection control measuresfor patients undergoing dental extraction.

### Hypothesis:

Nurses and lab technicians' knowledge and practice was be improved after application of the teaching protocol about infection control measures for patient undergoing dental extraction.

## Subjects and Methods

### Research design

Quasi experimental (pre \ posttest) research design was utilized to conduct this study.

### Setting

The study was conducted in Faculty of Dentistry at Al-Azhar university outpatients' clinic Assiut Branch.

### Subjects

The study was included all available nurses and lab technicians (36) in the faculty of Dentistry Al-Azhar university outpatients' clinic, Assiut Branch.

### Data collection tool

The collection of data was achieved through using two tools includes the following:

**Tool I: Nurses and lab technicians' assessment questionnaire:**

It was designed and developed by the researcher based on the current national and international literatures it includes two parts:

**Part 1: Demographic data of nurses and lab technicians:**

This part aimed to assess the demographic data of patients undergoing tooth extractions, it included (code, age, gender, marital status, level of education,

years of experience and previous attending training program concerning infection control measures).

**Part 2: Nurses and lab technicians' knowledge questionnaire:**

- This part aimed to assess nurses and lab technicians 'slevel of knowledge regarding infection control measures. It included (53 questions) infection control procedures.

- The questions included; information about infection control measures, hand washing and scrubbing, wearing and removing sterile gloves, masks and gown, disinfection and sterilization solution and/or equipment, principle of wearing personal protective equipment, dealing with sharps and contaminated instruments and disposal of contaminated sharps, needle stick injures.

**Scoring system:** Each right answer was given one score. The total knowledge score was (53 score) categorized as the following: those who was obtained less than 50% was considered having unsatisfactory level of knowledge. While those who obtained from 50% - 70% considered having moderate level of knowledge and more than 70% considered having satisfactory level of knowledge.

**Tool II:Observation checklist on dental infection control measures.**

- This tool was used directly by the researcher to assess level of practice for nurses and lab technicians regarding infection controlmeasures application by using evaluation checklist on dental infection control measures included (97) items : hand washing include (13) items, sharps safety (9) items, personal protective equipment (PPE) wearing mask (8) items, removing mask (6) items, wearing gloves (12) items, removing gloves (8) items, wearing gown (10), removing gown (9) items, wearing Goggles\ face shield (2) items, removing Goggles\ face shield (1) items ,respiratory hygiene (cough etiquette) (3) items, disinfection and sterilization of patient's equipment, devices (9) items and environment (7) items.

- This tool used pre and post application of the teaching protocol.

**Scoring system:**

The score of observation checklist was as the following:

two degree for each step that done correct and one degree for each step done incorrect and zero for step that not done. This system translated in results into adequate and inadequately practice. Scores more than or equal to 60 % was graded as adequate level of practice. Scores less than 60% was graded as inadequate level of practice**.**

**Methods:**
**This study was carried out in three phases:**
**Preparatory phase:**
**Tools development:**
Review of the current past, local and international related literature in the various aspects using books, articles, periodicals and magazines was done.

**Face validity and reliability**
Tools Face validity was done by a panel of five expertise (2 medical staff from dentistry) & (3 nursing staff from the medical - surgical nursing department) who reviewed the tools for clarity, relevancy, comprehensiveness, understanding and applicability. Minor modifications were required, and correction was carried out accordingly. The tool was tested for content validity by 5 experts of medical staff from dentistry andnursing staff from the medical - surgical nursing department. Modifications were done accordingly, and then the tool was designed in its final format and tested for reliability by using internal consistency for the tools measured using internal consistency for the tools measured using cronbach test, the tool proved to be reliable (0.73).

**Ethical considerations:**
Permission to carry out the study was obtained from ethical committee of the faculty of nursing and from the dean of the faculty of dentistry at Al-Azhar university outpatients' clinic Assiut Branch. Before the initial interview, the researcher introduced herself to nurses and lab technicians. Oral agreement for voluntary participation in the study was obtained. Anonymity and confidentiality were assured through coding of the data. Nurses and lab technicians informed that they had the right to refuse to participate and or withdraw from the study without any rational and at any time.

**Teaching protocol for nurses and lab technicians about infection control measures for patients undergoing dental extraction.**
It was developed by the researcher through review the relevant literature. It divided into three parts.
The first part included definition and causes of tooth extraction, methods of infection transmission and hand washing. The second part included personal protective equipment (PPE), sharps safety and respiratory hygiene (cough etiquette). The third part included Disinfection and sterilization of patient's equipment, devices and environment.

**Pilot study**
A Pilot study was conducted and implemented on 10% (2 nurses and 2 lab technicians) in selected setting to evaluate the applicability, clearly, time needed to fil in each tool and modified tools according to the result of the pilot study. No modifications were made to the data collection tools.

So subjects included in the pilot study was included in the study subjects.
**Implementation phase:**
An initial interview: the researcher introduced herself to initiate line of communication, explained the nature and purpose of the study for nurses and lab technicians.
Demographic data of nurses and lab technicians was obtained **(Tool I) part 1.**
Nurses and lab technicians' knowledge questionnaires (pretest) were distributed on nurses and lab technicians **(Tool I) part 2**.
Observation checklist (pretest) was observed by researcher to assess nurses and lab technician's practice regarding the application of infection control measures **(Tool II**)
Teaching protocol content was developed based on the analysis of the data obtained in the pretest which representing the subject's needs. Teaching protocol content covered three sessions. Number of nurses and lab technicians in each session are ranged from 10 to 15. The study was conducted in the morning shift. The researcher explained knowledge about infection control in one session then the researcher applied the practical part about infection control in the other two sessions.
Each session time ranged from 20 to 30 minutes plus 10 minutes for discussion and feedback. The session ended by a summary of its content and feedback from the nurses and lab technicians. The contents of each session were as follow.
**First session**: This session was started by introducing the researcher herself to nurses and lab technicians telling them the aim of the meeting, orient nurses and lab technicians regarding infection control measures. Content of this session included: definition and causes of tooth extraction, methods of infection transmission , hand washing, personal protective equipment (PPE), sharp safety, respiratory hygiene (cough etiquette), disinfection and sterilization of patient's equipment, devices and environment. This session ended by a summary of its content and feedback from nurses and lab technicians.
The researcher arranged with the nurses and lab technicians the time and place for application of the infection control measures included: hand washing, personal protective equipment (PPE), respiratory hygiene (cough etiquette), disinfection and sterilization of patient's equipment, devices and environment.
**Second session:** included application of parts of practice regarding infection control measures includes: hand washing and personal protective equipment (PPE), sharp safety and respiratory hygiene (cough etiquette). The researcher applied infection control measures then nurses and lab

technicians applied infection control measures. This session ended by a summary of its content and feedback from nurses and lab technicians.

**Third session:** included application of practical parts regarding infection control measures includes Disinfection and sterilization of patient's equipment, devices and environment. It started by summery about what has discussed in a previous session and objectives of the new session. The researcher demonstrates the practical part of infection control measures then nurses and lab technicians redemonstrate after the researcher. This session ended by a summary of its content and feedback from nurses and lab technicians.

One year for implementing thesis (Six months for data collection from September 2021 until March 2022  and two months for data analysis.

**Evaluation phase:**

Nurses and lab technicians 's knowledge and practice was evaluated after two weeks using (**Tool 1**) part 2 and (**Tool 2**) the post test.

**The statistical design:**

The data obtained had reviewed, prepared for computer entry, coded, analyzed, and tabulated. Quasi experimental (pre \ posttest) statistics (frequencies and percentages, mean and standard deviation) were done using computer program (SPSS) version (22). Chi-square and one-way-ANOVA test used in relationship between nurses and lab technician's knowledge and practice about infection control measures for patients undergoing dental extraction. It's considered significant when P-value less than (0.05).

**Limitation of the study:**

It was difficult in meeting the nurses and lab technicians at the same shift at the same time.
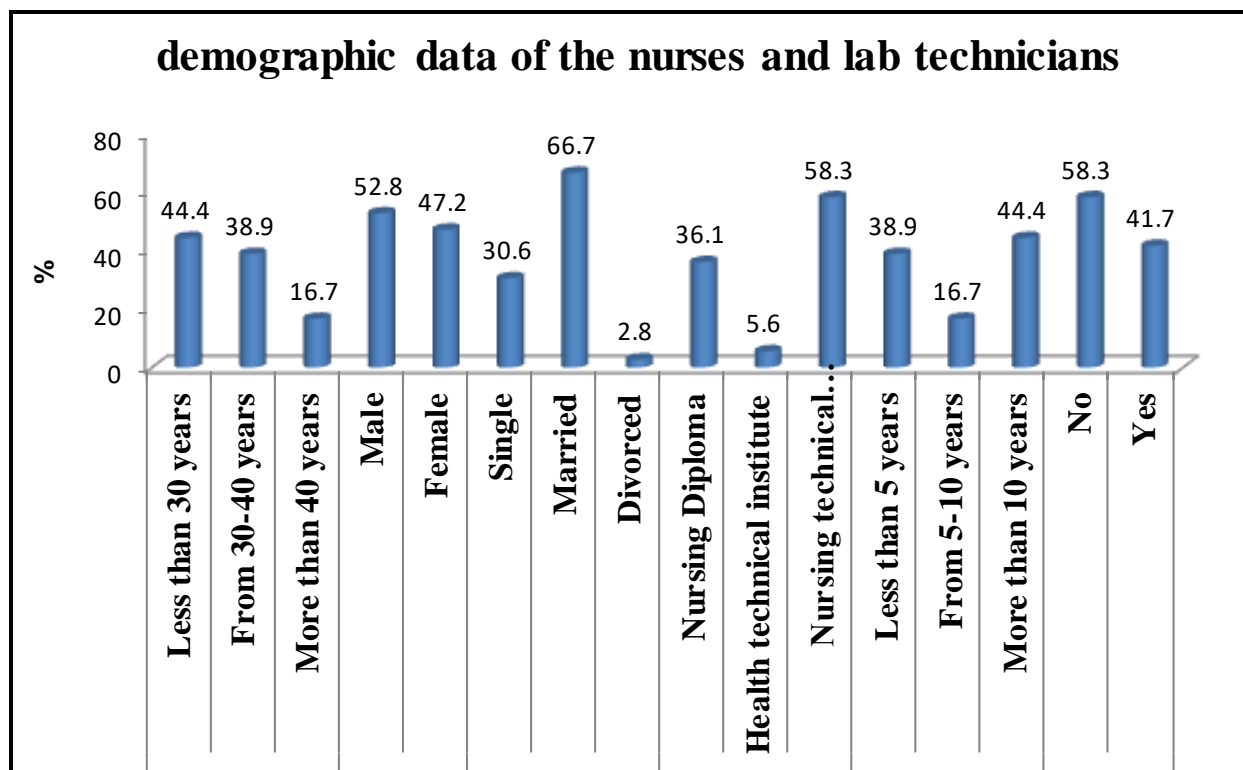
**Results**



**Fig (1): Distribution of demographic data for nurses and lab technicians.**

**Table (2):** **Comparison between nurses and lab technician's total knowledge level regarding infection control measures for patients undergoing dental extraction (pre- post application of the teaching protocol) (n=36)**

| | Pre | | Post | | P. value |
|---|---|---|---|---|---|
| | No | % | No | % | |
| **Knowledge level about infection control** | | | | | |
| Poor | 1 | 2.8 | 0 | 0.0 | |
| Satisfactory | 19 | 52.8 | 1 | 2.8 | <0.001** |
| Good | 16 | 44.4 | 35 | 97.2 | |
| **Mean±SD** | 40.0±4.33 | | 50.78±3.69 | | <0.001** |

*Chi square test for qualitative data between the two groups  or More*

*- Independent T-test  quantitative data between the two groups*

*\*\*Significant level at P value < 0.01*

**Table (3):** **Comparison between nurses and lab technician's level of performance pre and post applying of teaching protocol about infection control measures for patients undergoing dental extraction.(n=36)**

| | Max Score | Pre | | Post | | P.value |
|---|---|---|---|---|---|---|
| | | No | % | No | % | |
| **Level of Performance** | | | | | | |
| Inadequate | <60% | 31 | 86.1 | 1 | 2.8 | **<0.001**  |
| Adequate | ≥60% | 5 | 13.9 | 35 | 97.2 | |
| **Mean±SD** | 194 | **104.17±13.12** | | **152.83±17.3** | | **<0.001**  |

*-Chi square test for qualitative data between the two groups or More*

*- Independent T-test quantitative data between the two groups*

 *\*\*Significant level at P value < 0.01*

**Table (4):** **Relation between nurses and lab technician's level of performance with demographic data pre and post applicationof  the teaching protocol  about infection control measures for patients undergoing dental extraction.**

| | | Level of performance | |
|---|---|---|---|
| | **N** | **Before Education** | **After education** |
| | | **Mean ±SD** | **Mean ±SD** |
| **Age group** | | | |
| Less than 30 years | 16 | 104.94±13.38 | 157.94±12 |
| From 30-40 years | 14 | 103.07±11.26 | 150.93±13.46 |
| More than 40 years | 6 | 104.67±18.23 | 143.67±31.58 |
| **P. value** | | **0.927** | **0.201** |
| **Gender** | | | |
| Male | 19 | 102.26±12.04 | 142.79±17.39 |
| Female | 17 | 106.29±14.29 | 164.06±7.79 |
| **P. value** | | **0.365** | **<0.001**  |
| **Marital status** | | | |
| Single | 11 | 105.45±15.68 | 160±10.94 |
| Married | 24 | 103±12.02 | 150.17±19.02 |
| Divorced | 1 | 118±0 | 138±0 |
| **P. value** | | **0.508** | **0.206** |
| **Education** | | | |
| Nursing Diploma | 13 | 108±18.12 | 152.92±25.13 |
| Health technical institute | 2 | 112±21.21 | 160±22.63 |
| Nursing technical institute | 21 | 101.05±7.46 | 152.1±10.65 |
| **P. value** | | **0.227** | **0.834** |

| | N | Level of performance | |
|---|---|---|---|
| | | Before Education | After education |
| | | Mean ±SD | Mean ±SD |
| **Years of experience** | | | |
| Less than 5 years | 14 | 105.57±14.22 | 160.64±9.77 |
| From 5-10 years | 6 | 94.5±7.29 | 143.5±7.61 |
| More than 10 years | 16 | 106.56±12.78 | 149.5±22.2 |
| **P. value** | | **0.138** | **0.071** |
| **Attendance training Program** | | | |
| No | 21 | 104.86±13.59 | 152.1±14.53 |
| Yes | 15 | 103.2±12.83 | 153.87±21.09 |
| **P. value** | | **0.714** | **0.767** |

*- Independent T-test quantitative data between the two groups*
*- One-way Anova T-test quantitative data between the Three groups or more*
*\*\*Significant level at P value < 0.01*

**Table (5): Correlation Co-efficient between performance level and knowledge level about infection control pre and post applying of the teaching protocol about infection control measures for patients undergoing dental extraction**

| Correlations | Knowledge about Infection Control | |
|---|---|---|
| **Level of performance** | r | P |
| Before teaching protocol | 0.509 | 0.002** |
| After teaching protocol | 0.413 | 0.012* |

*\* Statistically Significant correlation at P. value <0.05*
*\*\* Statistically Significant correlation at P. value <0.01*

**Fig (1):** Shows the highest percentage of studied nurses and lab technician their ages less than 30 years. As regard gender, marital status and level of education more than half of them were male, married and had nursing technical institute. Regarding years of experience and attendance training program, the highest percentage of their year of experience was more than 10 years and not attendance training program.

**Table (2):** Reflects that reflects that there was high statistical significance difference between total of knowledge level pre and post application of teaching protocol with p-value (<0.001**)

**Table (3):** Reflects that there was high statistical significance difference between nurses and lab technicians 's level of performance (pre and post) application of the teaching protocol about infection control measures for patients undergoing dental extraction with p-value (<0.001**).

**Table (4):** Shows that there are no relation between nurses and lab technician's practice level about infection control measures for patients undergoing dental extraction with demographic data pre and post applying of the teaching protocol except (gender) post- test with p-value (<0.001**).

**Table (5):** Reveals that there was positive correlation co-efficient between performance on dental infection control measures and knowledge about infection control pre and post application of the teaching protocol. There was high correlation co-efficient between performance of the dental infection control measures and knowledge about infection control measures pre and post teaching protocol for patients undergoing dental extraction with p- value (0.002** ,0.012* ) respectively.

**Discussion**
Infection control in dentistry is an ever-growing perturbation. Dental patients are high-risk patients regarding to their potential to transmit as well as to acquire an infectious disease. An equal concern has been exhibited for cross-contamination and disease transmission from patient to patient **(Upendran, et al, 2021)**

The present study clarifies that the highest percentage (forty four percent) of studied nurses and lab technician their ages was less than thirty years old. As regard gender, marital status and level of education more than half of them were male, married and had nursing technical institute diploma. Regarding years of experience and attendance training program, the highest percentage of them had more than ten years of experience and did not attend any training program about infection control regarding tooth extraction.

**Singh, et al, (2020)** who conducted a study titled with "knowledge, attitude, and practice regarding

sterilization among interns and health-care staffs in a medical college in Muzaffarpur (Bihar)" reported that forty percent of subjects of belonged to age group of twenty years to thirty years old, while **Sukhlecha et al (2020)** were agreeing with the current study result as they found that sixty percent of subjects in the age group of 21 years to 30 years old. Also, in a study conducted by **Sethi et al (2019), who** reported that more than eighty percent of participants were in the age group of 21 years to 40 years old.

**Sabolaet al, (2020)** were disagreeing with the present study results regarding nurses age and level of education, while they agree regarding the nurse's marital status and years of experience as they reported that" More than forty five percent of the studied subjects were 30-<40 years old. In relation to the educational level, more than two thirds of nurses have diploma education, and about one third of them had moderate education. Concerning the marital status, all studied nurses were married. In addition, the majority of them have experience of more than ten years".

**Julius et al (2021)** revealed that the majority of the participants in their study had more than 10 years of work experience. Similarly, a study done by **Adebimpe (2018)** found out that most of the respondents had worked for over 10 years which agree with our study results regarding year of experience.

**As regards to the knowledge level of studied nurses** about infection control measures regarding tooth extraction, the current study showed that there was a high statistical significance difference between pre and post application of teaching protocol regarding nurses and lab technician knowledge about hand washing, safe sharp disposal, different types of sterilization, infection transmission methods and mask disposal.

From the researcher's point of view, The deficit of knowledge could be due to the inadequacy of infection control educational materials during their years of work .The results can be accepted as nurses and lab technicians were provided with educational sessions regarding the previous mentioned items and printed copy of illustrated Arabic booklet were given to participants containing knowledge regarding infection control measures that should be done in the dental setting regarding tooth extraction.

Different studies demonstrated disagreement with the present study regarding nurses' level of knowledge as **Sabolaet al, (2020)**, who reported that the present result revealed that more than three fourths of dental nurses had good level of knowledge. Also, this result was consistent with **Abdel-Rasoul et al., (2017)** who revealed that the majority of nurses had good level of knowledge about infection control measure.

Moreover, **Abuduxike et al (2021) & Alharbi et al**

**(2019)** were also disagreeing with the present study results as they demonstrated that" over two third of the study participants had good knowledge about infection control standard precautions.

Additionally, **Abdallah (2019)** disagree with present study finding and reported that most of nursing staff showed poor level of knowledge about infection control. Also, **El-Maghawry & El-Hawy (2019)** find that assessment of the nurses' knowledge revealed that majority of nurses had inadequate knowledge before applying health education program.

Pre-educational protocol results illustrated that nurses and lab technician's level of practice regarding infection control measures in the dental setting, showed that more than three quarters of nurses had inadequate level regarding the application of the infection control measures. Unfortunately, they lack basic practice as hand washing and respiratory hygiene, cough etiquette and wearing protective equipment. Besides, their inadequate practice about aseptic technique and management of sharps. Even, they lake basic practice as disinfecting and cleaning environment, sterilization, and disinfection of patient- care item and devices.

From the researchers' points of view, these results can be explained by their excessive workload, inadequate specific knowledge, and excessive administrative duties. Really those nurses need periodical educational and training programs on the application of infection control measures in their practices.

No doubt that those nurses have potential to spread microorganisms that may lead to infection due to the greatest contact with patient. The most important mechanism of spread of healthcare - associated infections (HAIs) is via the contaminated of nurse's hands. Those nurses should oblige to wash hands before and after touch of patient, before donning sterile gloves for any procedure, after removing gloves and after contact with body fluidsof any person. **(Wei et al , 2021)** & **(Santos et al ,2018)**

Hand hygiene practice is one of the most vital components in the practice of the dental infection control process and is considered the single most important activity performed to reduce the risk of transmitting microorganisms from dental workers to patient **(Mahasneh et al, 2020)**.

Finding of the present study is similar to a study conducted in Saudi Arabia by **AlAhdal et al, (2019)**in which they reported that the majority of the nurses perform hand hygiene before and after contacting patients. Also, in Pakistan, **Ch et al (2019)** reported that more than two thirds of nurses wash their hands before and after treatment.

Dental nurse personal protective equipment (PPE) can include gloves, eye protection, disposable aprons, and

face masks. PPE should not be worn outside of the practice and items that are not single use should be washed according to the manufacturer's instructions at the highest possible temperature **(Bauchner et al, 2020).**

The current study findings illustrated that the majority of nurses had inadequate level of practice during wearing the personal protective equipment pre-teaching protocol. The researcher observed that those nurses not put on or remove personal protective equipment safely and use the disposed decontaminated one another patient. Those nurses need to train how to use the personal protective equipment when caring for patients and showed change it immediately after use and before contact with another patient. They have to pay attention that medical gloves must be discarded in proper place and after single patient use.

It is recommended to wear gloves when coming in contact with the patient to prevent the contamination of hands, which also helps in reducing the spread of microorganisms from the hands of dentists and/or dental assistants to the patients during dental procedures and surgeries. The current study revealed that there were statistical significance differences between pre and post application of the teaching protocol in relation to wearing and removing gloves in dental setting.

Unfortunately **Dodamani et al, (2021)** were disagreeing with our study results as they reported that "all participants reported using disposable gloves while doing surgical procedures. Almost all the participants reported using certain types of gloves for the protection which shows awareness regarding usage of personal protective barriers among them"

Regarding face mask, the current study revealed that there were statistical significance differences between pre and post application of the teaching protocol in relation to wearing and removing face mask in dental setting. **Rossettie et al (2020)** were in the same line with the current study result as they reported that dental health workers should use surgical masks that are impermeable and efficient in protection from microorganisms.

The current study revealed that there were statistical significance differences between pre and post application of the teaching protocol in relation to wearing and removing gown in dental setting. According to **Meisha, (2021)** who reported that It was encouraging to observe that all of our study participants wore a disposable gown.

While head nurses responsible to assure the availability of PPE and those nurses were well trained to correctly put it on and remove. The use of personal protective equipment usually requires special expertise in selecting the appropriate equipment or

clothing; select the proper size for each staff member and assuring proper fit. Also, **Khalil et al (2019)** supported the current study result and revealed that nurses had unsatisfactory practice regarding personal protective equipment and application of the infection control measures due to lack of up- to date training on the principles of standard precautions and lack of management support.

Conversely, **Soyam & Khaks (2019)** not supported the present study finding and revealed that practices of wearing personal protective equipment were better. They emphasized that provision of personal protective equipment was reported significantly among more nursing staff that have worked in the health sector for longer periods and were very aware of the universal precautions.

In the current study, the majority of nurses showed inadequate practice level of respiratory hygiene and cough etiquette items pre- educational protocol. They do not cover nose and mouth with a disposable tissue when sneezing or coughing, not wear mask for patient with symptoms of respiratory infection and not discard masks and contaminated tissues in appropriate place. This result agree with **Gemmae et al (2019)**, who revealed that health care workers were viewed as not following protocol to respiratory hygiene and cough etiquette because they thought risk was ever-present.

The current study showed that there were statistical significance differences between pre and post application of the teaching protocol in relation to performance of sharp disposal safety. **Rani (2019)** in her study was agreeing with our study results as she revealed that there was a statistical improvement in knowledge and attitudes of nursing students regarding sharp disposal and prevention of needle stick injuries among nursing students. Structured teaching protocol was helpful in improving knowledge and attitude among students regarding prevention of needle stick injuries.

The current study results, clarify that there was a statistical significance difference between pre and post application of teaching protocol in relation to performance of sterilization and disinfection of patient- care dental items and devices.

Patient-care items should be categorized and sterilized or disinfected depending on the potential risk for infection associated with their use. **Mahasneh et al, (2020)** reported that "the majority of participants always perform disinfection and sterilization, the overall practice of infection-control measures among the participants is very good. Educational programs and training strategies should be implemented to maximize and enhance the compliance of the dental care providers with the infection-control guidelines."

Any instrument or piece of equipment that is to be reused requires reprocessing/cleaning, disinfection and/or sterilization. The system is based on instruments and items for patient care which showed be categorized into into critical, semi-critical and non-critical, according to the degree of risk for infection involved in the use of the items. Disinfection is a process that inactivates non sporing infectious agents, using either thermal (moist or dry heat) or chemical means. Items need to be cleaned before being disinfected. Sterilization destroys all microorganisms on the surface of an instrument or device, to prevent disease transmission associated with the use of that an instrument or device (**Rutala & Weber, 2019**)

The current study results clarify that there was a statistical significance difference between pre and post application of the teaching protocol in relation to environmental infection prevention and control in dental setting.

(**Pacific Public Health Pacific Public Health, 2021**) reported that routine and effective cleaning and disinfection of surfaces, items and equipment is an essential activity that protects clients/patients/residents, staff and visitors from infection. Because of the increased risks and consequences of infection transmission in this setting, the approach and intensity of cleaning required differs from that of non-health care settings.

Also, (**College of Alberta Dental Assistants, 2021**) reported that "dental settings should have policies that include the criteria to be used when choosing surfaces, finishes, furnishings and equipment for client/patient/resident care areas. These policies should ensure that all surfaces, finishes, furnishings, and equipment meet infection prevention and control requirements for cleaning and disinfection".

The current study results revealed that there was a positive correlation co-efficient between performance on dental infection control measures and knowledge about infection control pre and post the teaching protocolimplementation which mean if nurses knowledge improve , practices will also improved

From the researcher's point of view, it was an acceptable result as gaining knowledge about infection control in dental setting will increase the nurses awareness about cross infection, the correct way to perform every procedure, the ability of nurses to perform and compliance to infection control measures and standard precautions as (hand washing, personal protective equipment using, sharp objects disposal, cleaning and sterilization of environment and patient care devices) increased also.

(**Rosen et al**, **2018**); recommended that educational programs should be organized according to the needs of nurses with continuous evaluation and adopting proper checklists for work monitoring to enhance

patient and staff knowledge; lead to reduced errors process, reducing overall risks, eventually resulting in effective patient care.

(**Clement, 2021**) stressed that education and training are twocomponents of staff development that occur after an employees' indoctrination. The staff knowledge level and capabilities are a major factor in determining the number of staff required to carry out unit goals. The better trained and more competent the staff, the fewer staff required, which in turn saves the organization money and rise reproductively.

It had been recommended that in service training and workshop should be planned by the administrators to update nurse's knowledge and attain full compliance towards their practice.

## Conclusion

Teaching protocol for nurses and lab technicians about infection control measures for patients undergoing dental extraction achieve it's objective by improving level of knowledge and practice for nurses and lab technicians with p. value with p equal (<0.001). Hypothesis of study were achieved by improving Nurses and lab technicians' knowledge and practice after application of the teaching protocol about infection control measures for patient undergoing dental extraction.

## Recommendations:

1. Continued nursing education and in-service training programs should be well organized within dental Al -Azhar hospital and equipped with the necessary educational facilities and materials needed to upgrade the knowledge and skills of practicing nurses and lab technician, which will be reflected on patient's outcome and service provided in the outpatient's clinics.

2. Adequate educational booklets and audiovisual aids facilities should be available in the dental hospital for providing quality care.

3. Periodic monitoring of nurses and lab technician's knowledge and practice to evaluate their level and identifying their needs regarding the application of infection control measures for patients undergoing dental extraction.

4. Activating the role of infection control team to monitor and correct performance of the nurses and lab technicians in dental clinics and labs**.**

## Reference:

▪ **Abdallah S. ( 2019):** Effect of management program on nursing staff leading role and compliance to follow safety measures at intensive care units. Doctoral Thesis. Tanta University, Faculty of Nursing..

▪ **Abdel-Rasoula, G., Al Bahnasya, R. A, Mohameda, O.A, Abdel-Azizb, A.M, Mouradb, W.S, & Youssef, M.F.(2017):** Effect of an educational health program on the knowledge, attitudes and practices of healthcare workers with respect to nosocomial infections in the National Liver Institute.Menoufia Medical Journal, 29: 984–90

▪ **Abuduxike, G.; AcarVaizoglu, S.; Asut, O.; & Cali, S.(2021):** An Assessment of the Knowledge, Attitude, and Practice Toward Standard Precautions Among Health Workers From a Hospital in Northern Cyprus. Safety and Health at Work, 12, 66-73, doi:https://doi.org/10.1016/j.shaw.2020.09.003.

▪ **Adebimpe, W. (2018):** Knowledge, Attitude, and Practice of Use of Safety Precautions Among Health Care Workers in a Nigerian Tertiary Hospital, 1 Year After the Ebola Virus Disease Epidemic. Annals of global health, 82(5), 897–902. https://doi.org/10.1016/j.aogh.2018.07.004

▪ **AlAhdal A, Aljehani W, Ali G, & Bayoumi A. ( 2019):** Knowledge, attitude and practice of infection control measures in private dental clinics in Jeddah, Saudi Arabia. *Int J Dent Oral Health*.;5(1):1–6.

▪ **Alharbi, G.; Shono, N.; Alballaa, L.; & Aloufi, A. (2019):** Knowledge, attitude and compliance of infection control guidelines among dental faculty members and students in KSU. BMC oral health, 19, 7, doi:10.1186/s12903-018-0706-0.

▪ **Bauchner H, Fontanarosa PB, & Livingston EH.(2020):** Conserving Supply of Personal Protective Equipment—A Call for Ideas. *JAMA*. 323(19):1911. doi:10.1001/jama.2020.4770

▪ **Ch AN, Usman N, Kiran S, Zahra T, Khalid H, & Akhtar MU.( 2019):** Cross infection control in dental institutions. *Pak Oral Dent J*.;38(4):419–422.

▪ **Clement I (2021):** Management of Nursing Services and Education, Elseiver Company, 3rd ed., ch.2 p.181.

▪ **College of Alberta Dental Assistants (2021):** Infection Prevention and Control Guidelines. Available at: https://abrda.ca/wp-content/uploads/2021/11/IPC_resource_draft-watermark.pdf

▪ **Da Fonseca, E., Pereira-Junior, E., Palmier, A., & Abreu, M. (2021).** A description of infection control structure in primary dental health care, Brazil. BioMed Research International, 2021. vol. 17, article e 2094, vol. 2019, 9 pages, 2019.

▪ **Dodamani AS, Jadhav HC, Khairnar MR, & Naik RG (2021):** Dental professionals' knowledge and behavior towards utilization of gloves: a cross-sectional survey, J PREV MED HYG, 61: E636-

E641.                                    DOI:10.15167/2421-4248/jpmh2020.61.4.1291

▪ **El-Maghawry HA & El-Hawy LL. (2019):** Effect of training educational program on nurses' performance as regarding infection control procedures and endoscopies reprocessing techniques in GIT endoscopy unite. Egyptian Journal of Occupational Medicine.; 43(1): 57-73.

▪ **Faculty of dentistyAlzhar university record, 2019.**

▪ **Gemmae M, Etchin A, McDannold S, Eagan A, Findley K, Gifford A, Gupta K & Keith McInnes D.( 2019):** Health care workers' perceptions and reported use of respiratory protective equipment: A qualitative analysis. American Journal of Infection Control.; 47 (10): 1162- 1166

▪ **Jim Ayukekbong, (2019).** Infection prevention and control Guide for Health care, p(30)**.**

▪ **Julius O.M., Salamat O.A., Bukola T.M., Joshua O.O., & Deborah F.O. (2021):** Factors Influencing Standard Precaution Practices Among Nurses in Lagos State University Teaching Hospital, Ikeja, Lagos State, Nigeria. African Journal of Health, Nursing and Midwifery 4(5), 14-25. DOI: 10.52589/AJHNMIX3L8VO0.

▪ **Khader, Y., Al Nsour, M., Al-Batayneh, O. B., Saadeh, R., Bashier, H., Alfaqih, M., & Al-Azzam, S. (2020).**Dentists' awareness, perception, and attitude regarding COVID-19 and infection control: cross-sectional study among Jordanian dentists. JMIR public health and surveillance, 6(2), e18798.

▪ **Khalil NS, Atia A, Moustafa MF & Soliman H. (2019):** Emergency nurses' knowledge and practice regarding preparedness of disaster management at a university hospital. Egypt. Nursing & Healthcare International Journal.; 3(3): 000192.

▪ **Lodi, G., Azzi, L., Varoni, E. M., Pentenero, M., Del Fabbro, M., Carrassi, A., & Manfredi, M. (2021):** Antibiotics to prevent complications following tooth extractions. Cochrane Database of Systematic Reviews, (2).

▪ **Mahasneh, A., Alakhras, M., Khabour, O., Al-Sa'di, A., & Al-Mousa, D. (2020):** Practices of Infection Control Among Dental Care Providers: A Cross Sectional Study. Clinical, Cosmetic and Investigational Dentistry, Volume 12, 281–289. https://doi.org/10.2147/ccide.s261171.

▪ **Meisha D. (2021):** Comparison of Compliance with Infection Control Practices among Dental Students in Saudi Arabia before and During the COVID-19 Pandemic. Risk management and healthcare policy, 14, 3625–3633.https://doi.org/10.2147/RMHP.S318031

▪ **Pacific Public Health Pacific Public Health (2021):** Infection Prevention and Control Guidelines

Surveillance Network Surveillance Network Region Pacific Western Organization World Health. available at: https://reliefweb.int/sites/reliefweb.int/files/resources/Infection Prevention Control Guidelines 2021.p

▪ **Prasad, T., Sujatha, G., Priya, R., &Ramasamy, M. (2019):** Knowledge, attitude, and practice of senior dental students toward management of complications in exodontia. Indian Journal of Dental Research, 30(5), 794.

▪ **Rani, E (2019):** Effectiveness of Structured Teaching Programme on Knowledge and Attitude regarding Prevention of Needle Stick Injuries among Nursing Students in a Selected Nursing College at Coimbatore. Masters thesis, PSG College of Nursing, Coimbatore.

▪ **Rosen, M., DiazGranados, D., Dietz, A., Benishek, L. , Thompson, D., Pronovost, P., & Weaver, S. (2018):** Teamwork in healthcare: Key discoveries enabling safer, high-quality care. The American psychologist, 73(4), 433–450. https://doi.org/10.1037/amp0000298

▪ **Rossettie S, Perry C, Mohammed Pourghaed M, & Mimi Zumwalt M.(2020):** Effectiveness of manufactured surgical masks, respirators, and home-made masks in prevention of respiratory infection due to airborne microorganisms. The Southwest Respiratory and Critical Care Chronicles;8(34):11–26

▪ **Rutala WA & Weber DJ.( 2019):** Best practices for disinfection of noncritical environmental surfaces and equipment in health care facilities: A bundle approach. American Journal of Infection Control; 47: A96-A105.

▪ **Sabola NE, Sharbash AM, & ElNagarSA (2020):** Infection Control Knowledge and Practices of Dental Clinic Nurses at Rural Health Units, International Journal of Novel Research in Healthcare and Nursing, Vol. 7, Issue 3, pp: (378-389), Available at: www.noveltyjournals.com

▪ **Santos-Junior, A., Ferreira, A., Frota, O., Rigotti, M., Barcelos, L., de Sousa, A. & Furlan, M. (2018):** Effectiveness of surface cleaning and disinfection in a Brazilian healthcare facility. *The open nursing journal*, *12*, 36.

▪ **Sethi AK, Samal R, Lahiri B, Das A, Kumar G, & Behera S. (2019):** Awareness, attitude and practice regarding disinfection and handling of extracted teeth among the students in a dental college in India. J IntSoc Prevent Communit Dent;8:488-94.

▪ **Singh S, Alok A, Sah V K, Kishor A, Raj A, & Piyush K (2020):** "Knowledge, Attitude, and Practice Regarding Sterilization Among Interns and Health-Care Staffs in A Medical College in Muzaffarpur (Bihar)": An Original Research, J Res Adv Dent;10:2:160-164.

▪ **Soyam G & Khaks G. (2019):** Knowledge, attitude and practices of universal precautions among health care workers in rural hospital Delhi. 6 (6):7-9.

▪ **Sukhlecha AG, Vaya S, Parmar GG, & Chavda KD. (2020):** Knowledge, attitude, and practice regarding sterilization among health-care staff in a tertiary hospital of western India. Int J Med Sci Public Health;4:1377-1382.

▪ **Sum, Z., & Ow, C. (2021):** Community pharmacy response to infection control during COVID-19. A cross-sectional survey. Research in Social and Administrative Pharmacy, 17(1), 1845-1852.

▪ **Upendran A, Gupta R, & Geiger Z. (2021):** Dental Infection Control, Treasure Island (FL): Stat Pearls Publishing; Available from: https://www.ncbi.nlm.nih.gov/books/NBK470356/.

▪ **Volgenant, C., Persoon, I. F., de Ruijter, R. A., & de Soet, J. (2021):** Infection control in dental health care during and after the SARS-CoV-2 outbreak. *Oral Diseases*, *27*, 674-683.

▪ **Wei, J., Guo, S., Long, E., Zhang, L., Shu, B., & Guo, L. (2021):** Why does the spread of COVID-19 vary greatly in different countries? Revealing the efficacy of face masks in epidemic prevention. *Epidemiology & Infection*,