

Guidelines for Safe Routine Dental Practice During the COVID-19 Pandemic

Perspectives from the Dental Training Department, Ministry of Health, Bahrain

ABSTRACT

The Dental Postgraduate Training Department at the Ministry of Health, Bahrain, is committed to raising the standards of care provided to our patients through postgraduate education, and the provision of evidence-based guidance for dental professionals.

We believe that this set of guidelines will prepare the dental professionals to resume and continue their routine dental procedures in primary care dental clinics during the pandemic.

The purpose of developing these guidelines is to ensure the provision of best practices in safe environment for the dental health care professionals and the patient.

Keywords

Dental practice, COVID-19, Restoration of services

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INTRODUCTION

The purpose of developing these guidelines is to ensure the provision of best practices in safe environment for the dental health care professionals and the patient. It is a credit to our profession that we were able to work collaboratively and constructively to reach to a consensus on this issue. We sincerely hope that there is equality in strictly adhering to this guideline, to ensure the delivery of dental treatment resuming routine dental health services. Bahrain has reported more than 15,000 cases of COVID-19 by June 2020 and it is on the rise. Dentists have been identified to be at high risk of infection and transmission due to the nature of their practice.^[1] Hence, the Ministry of Health in Bahrain temporarily suspended all aerosol generating and invasive dental procedures from March 2020, and only emergency and aerosol free dental procedures were available to address dental emergencies. Recently countries across the world, including Bahrain, are working on a roadmap to support reopening and safe functioning of their dental practices. The priority now remains safety, and this guide provides a framework for dental teams to ensure a risk assessment based strategy for safe treatment of patients at their practice level. In this document we propose that the dental practices across the World adhere to these guidelines to integrate safe and effective return to practice. As well as these guidelines will ensure safe and effective practice monitoring in the future, if a similar pandemic arises in the future in a safe environment and prevent further cross infection amongst the professionals and patients.

We hope that these guidelines will form a basis for further training of dental professionals and staff, which helps in effective practice monitoring. There is great deal of concern among dentists and dental practices regarding the transmission of various microbial diseases, due to close contact between the dentist and the patient. The recent pandemic of COVID-19 has created greater concern, and strict infection control guidelines must be in place before

TRANSMISSION ROUTES OF COVID-19 AND SIMILAR VIRAL INFECTIONS IN DENTAL PRACTICES:

The figure illustrates the possible transmission route of COVID-19 in dental practices. This can be applied to other previously reported infections like SARS (Severe Acute Respiratory Syndrome) and MERS (Middle Eastern Respiratory Syndrome) as well. The incubation period of most of these reported viral infections is reported to be around 2-14 days.^[2] This longer asymptomatic incubation period leads to transmission of the infection, which is often unnoticed. [\(Figure 1\)](#)^[3]

INFECTION CONTROL IN DENTAL PRACTICES:

The goal of a successful infection control program is to break the chain of infection [\(Figure 2\)](#)^[3,4] by consistently practicing protocols which would prevent the infectious agent moving from one host to another and preventing cross infection.

The infection control program should include:

- Rapid identification and source control of symptomatic patients (masking and separation)
- Strict adherence to respiratory and hand hygiene practices
- Training staff on correct use of PPE (Personal protective equipment)
- Rigorous environmental cleaning and disinfection of surfaces and equipment.

STANDARD OR UNIVERSAL PRECAUTIONS APPLIED AT THREE LEVELS:

Standard or Universal precautions are a set of infection control practices used to prevent transmission of diseases that can be acquired by contact with blood, body fluids, non-intact skin (including rashes), and mucous membranes.^[4] These measures are to be used when providing care to all individuals, whether or not they appear infectious or symptomatic. These guidelines emphasize the use of standard precautions in three levels as shown in [Figure 3](#).

Level 1: Pre-treatment Precautions:

Visual Triage:

Visual triage includes the use of a checklist to perform initial screening of patients. This form given in [Table 1](#) is developed by the National Taskforce for Combating the Coronavirus (COVID-19) in Bahrain, to evaluate the risk of exposure. This must be done prior to entry of the patient into the dental clinic, possibly in the waiting area. This has to be undertaken by trained dental staff that follow strict infection control guidelines involving the use of Personal protective equipment.

Pre-procedural Mouth rinses:

Aerosols are liquid or solid particles of less than 50 micrometers in diameter that stay suspended in the air for extended periods. Spatter are airborne particles larger than 50 mm in diameter that are too heavy to become suspended in the air for longer periods. This has a tendency to settle on surfaces ^[4,5] Many dental procedures, such as use of the ultrasonic scalers, slow- and high-speed hand pieces, and 3-way syringes, generate aerosol and spatter. There is evidence that dental aerosol can reach a distance of 1 through 3 meters from its source, causing contamination of distant surfaces. In contrast, spatter reaches shorter distances and settles quickly, which makes dental aerosol a greater concern for oral health care personnel (OHCP), when it comes to airborne contamination ^[4,5,6-12] Pre-procedural mouth rinses with chlorhexidine, which is readily available in all Primary care dental clinics, has been shown to significantly reduce the number of colony forming units (CFU) ^[13] The patient should rinse for a minimum of 30 seconds. ^[13] Hence these guidelines advice the use of chlorhexidine as a pre-procedural mouth rinse for all patients before commencing dental treatment.

Water-line disinfection:

Dental unit waterlines are 3–4 m flexible, narrow tube made of plastic material. The surface of the tube enhances the biofilm formation. During the course of usage, the biofilm-coated untreated dental unit waterlines allows the microorganism to disperse through the water network and poses a risk to the dentist, dental team, and patients to pathogens. ^[7] These guidelines suggest any of the combination of below mentioned techniques to prevent contamination through the waterlines.

- Flush waterlines with water for 3-5 minutes every morning before receiving your patient and the at end of the day.
- Flush hand pieces and waterlines for 20 to 30 seconds between patient appointments.
- Independent bottle water systems
- Anti-retraction devices to prevent backflow.

Additionally, dentists can choose the below mentioned techniques to further enhance disinfection of the water lines considering the current pandemic situation.

- Chemical treatment of water using Ethylenediaminetetraacetic acid, sodium hypochlorite, chlorhexidine gluconate, povidine iodine, ethanol, peroxide, phenol, and glutaraldehyde, that are tested in clinical trials ^[5,7]
- The use of 10% sodium hypochlorite for 10 minutes flushing of the waterline has been recommended. ^[7] However corrosive effects have been reported. So chemical treatment has to be used with caution.

Level 2: Precautions during treatment:**Hand hygiene:**

The appropriate protocol should be adhered by both the patient and the dentist before commencing any procedure as shown in [Figure 4](#). ^[14]

Personal Protective Equipment (PPE):

Minimum level 3 surgical mask should be used^[15] N-95 to be used as a precaution when performing any aerosol generating procedure, or any procedure on a suspected or positive case of COVID-19 or CLI. The appropriate PPE to be used by OHCP is shown in [Table 2](#).

Importance of using Level 3 surgical mask:

Masks are generally classified into 3 types: low (ASTM Level 1), moderate (ASTM level 2), and high barrier (ASTM Level 3) according to The American Society of Testing and Materials (ASTM).^[13] The classification by ASTM is presented in [Table 3](#) with their suggestions for use. According to a study by The Centre for Evidence-Based Medicine, University of Oxford, there is no direct evidence on the utility of N-95 masks for prevention of transmission against COVID-19. However surgical masks level 3 performed similar to respirator masks for prevention against other viral infections.^[16] Hence these guidelines suggest the use of N-95 masks as a precaution when performing any aerosol generating procedure, or any procedure on a suspected or positive case of COVID-19 or CLI.

Risk Stratification for Dental procedures:

The classification by the FGDP (Faculty of General Dental Practice, UK) helps in stratification of risk of the dental procedure being undertaken, based on which, further selection and degree of infection control should be aimed. ([Table 4](#))^[17] The guide is not an exhaustive list and only includes a few examples. Both low risk and high risk procedures should only be performed with appropriate level of infection control as discussed in detail above. If an AGP (aerosol generating procedure) is performed in a suspected patient, appointment interval should be lengthened. And every effort should be made to minimize overlapping dental appointments. The minimum suggested fallow time is 15 to 30 minutes.^[17]

Sequence for putting on and removing PPE:

The CDC guidelines for donning and doffing PPE should be strictly followed as shown in [Figure 5](#) and [Figure 6](#).^[18]

Use of aerosol reducing devices:

These guidelines propose the use of any of the below mentioned techniques to reduce the amount of aerosol generated during AGP's, if it is necessary to be performed to avoid prescription misuse.

1. **Prevent contaminated aerosols from escaping the mouth** - Using rubber dam during AGPs will reduce the contamination of the aerosols with oral microbial organisms.^[8] Saliva ejectors reduce the aerosols escaping the mouth^[7,8]
2. **Prevent contaminated aerosols from escaping the immediate operating site**- Aerosols coming out of the mouth are removed with local exhaust ventilation such as high-volume evacuation systems.^[10]
3. **General ventilation**- Methods such as avoiding the use of fans that can recirculate the air, to keep windows open at the dental operatory room and use of exhaust fans have been suggested.^[10]

Level 3: Post treatment Precautions:

After providing dental treatment for a patient it is imperative that correct procedures and protocols are followed to protect staff and all subsequent patients.

These guidelines recommend that:

- Patient should leave the operatory immediately and clean their hands outside the surgery
- Mask should not be removed by the dentist immediately, if an AGP was performed. Strictly adhere to the guidelines for doffing outside the dental operatory in the designated doffing area.
- Sterilization and disinfection protocols for the instruments and the whole operatory should be strictly followed and monitored regularly.

- Surfaces that cannot be properly pre-cleaned and disinfected must be protected with single use, disposable, barrier material such as plastic or fluid resistant paper. Barriers should be changed between patients.
- Disposable items are single use only items and must be disposed appropriately.

Waste Management:

Waste in the dental practice should be separated according to its category (medical or non-medical) at the point of generation. Bags and containers for medical waste should be appropriately color coded and labelled as biohazard or medical waste. Standard precautions mentioned above must be used when handling medical waste bags and containers. Medical waste bags and containers must not be overfilled and must not be compacted by hand. Medical waste and hazardous chemical waste (which includes some chemicals and mercury used in dental practice) must never be disposed of at local refuse tips that use compaction of an open landfill. Medical waste and sharps containers must be stored securely before collection by licensed waste contractors for final disposal using approved technologies by licensed/accredited contractors. Extracted teeth once cleaned of visible blood, debris, adherent soft tissues and saliva may be given to the patient. Alternatively, they can be wrapped in paper towel or placed in a disposable cup and covered with setting plaster before disposal in the general waste. The guidelines for waste management that is followed in the Ministry of Health in Bahrain is presented in [Figure 7](#).

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Author contributions

Author 1,2,3: Contributed to conception, design, data acquisition and interpretation, drafted and critically revised the manuscript

Author 1,2: Contributed to conception, design, data acquisition and interpretation, performed all statistical analyses, drafted and critically revised the manuscript

Author 1,2,3: Contributed to conception, design, and critically revised the manuscript

All authors gave their final approval and agree to be accountable for all aspects of the work.

Compliance with Ethical Standards

Conflict of Interest: Gowri Sivaramakrishnan declares that she has no conflict of interest. Muneera Alsobaiei declares that she has no conflict of interest. Fatema ALSulaiti declares that he has no conflict of interest.

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FIGURE LEGENDS:

Figure 1: Transmission of COVID-19 and similar viruses.

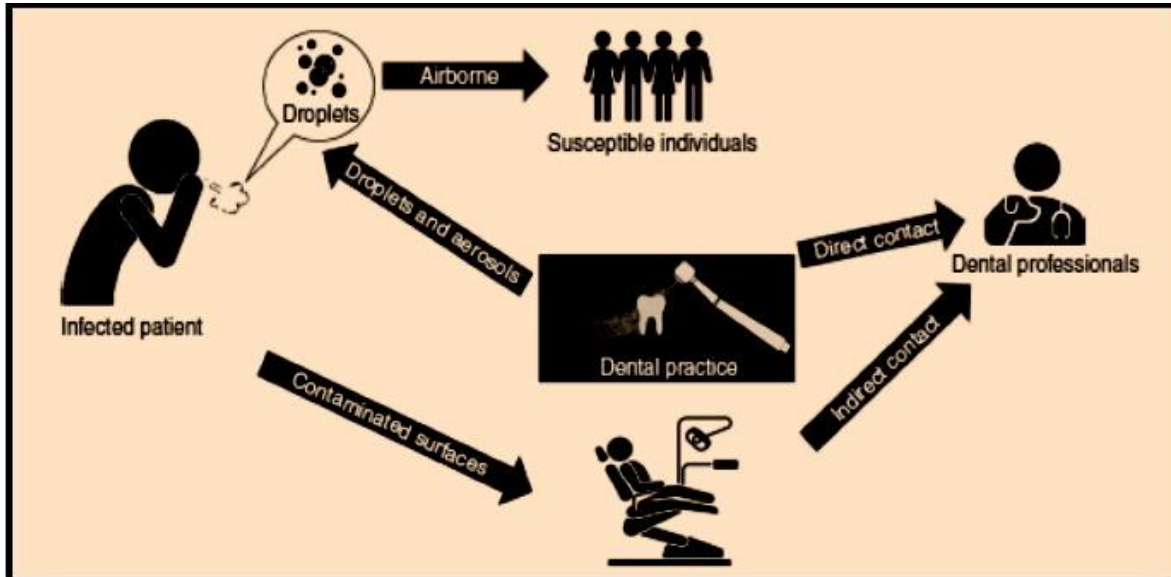


Figure 2: Chain of infection.

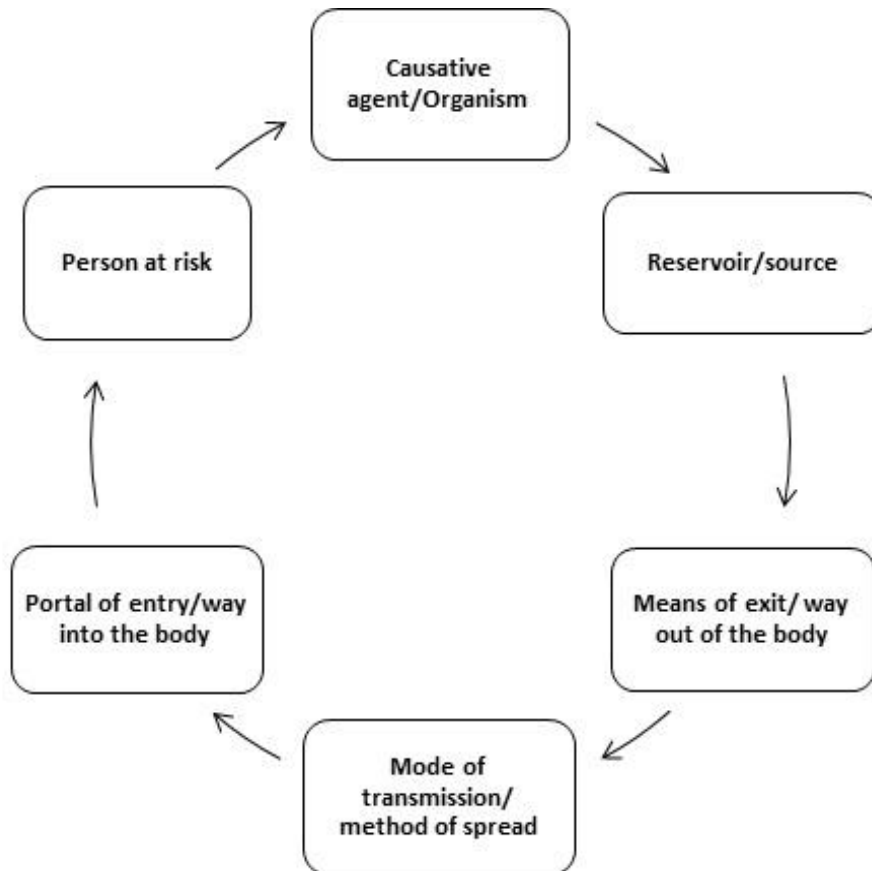


Figure 3: Standard precautions applied at three levels.

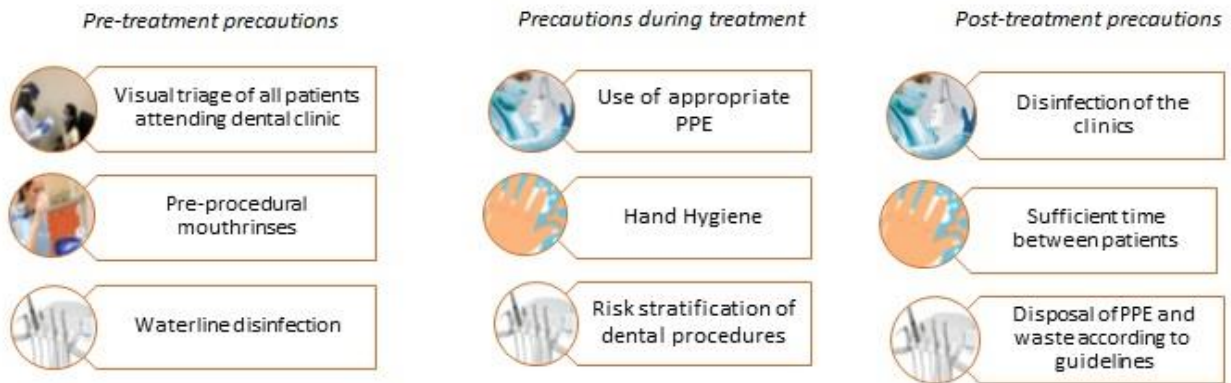


Figure 4: Handwashing protocol

How to Handwash?

WASH HANDS WHEN VISIBLY SOILED! OTHERWISE, USE HANDRUB

⌚ Duration of the entire procedure: 40-60 seconds

0



Wet hands with water;

1



Apply enough soap to cover all hand surfaces;

2



Rub hands palm to palm;

3



Right palm over left dorsum with interlaced fingers and vice versa;

4



Palm to palm with fingers interlaced;

5



Backs of fingers to opposing palms with fingers interlocked;

6



Rotational rubbing of left thumb clasped in right palm and vice versa;

7



Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;

8



Rinse hands with water;

9



Dry hands thoroughly with a single use towel;

10



Use towel to turn off faucet;

11



Your hands are now safe.



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Patient Safety

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SAVE LIVES

Clean Your Hands

How to Handrub?

RUB HANDS FOR HAND HYGIENE! WASH HANDS WHEN VISIBLY SOILED

⌚ Duration of the entire procedure: 20-30 seconds

1a



Apply a palmful of the product in a cupped hand, covering all surfaces;

1b



Rub hands palm to palm;

2



Rub hands palm to palm;

3



Right palm over left dorsum with interlaced fingers and vice versa;

4



Palm to palm with fingers interlaced;

5



Backs of fingers to opposing palms with fingers interlocked;

6



Rotational rubbing of left thumb clasped in right palm and vice versa;

7



Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;

8



Once dry, your hands are safe.



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Clean Your Hands

Figure 5: Sequence of putting on PPE

SEQUENCE FOR PUTTING ON PERSONAL PROTECTIVE EQUIPMENT (PPE)

The type of PPE used will vary based on the level of precautions required, such as standard and contact, droplet or airborne infection isolation precautions. The procedure for putting on and removing PPE should be tailored to the specific type of PPE.

- 1. GOWN**
 - Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back
 - Fasten in back of neck and waist

- 2. MASK OR RESPIRATOR**
 - Secure ties or elastic bands at middle of head and neck
 - Fit flexible band to nose bridge
 - Fit snug to face and below chin
 - Fit-check respirator

- 3. GOGGLES OR FACE SHIELD**
 - Place over face and eyes and adjust to fit

- 4. GLOVES**
 - Extend to cover wrist of isolation gown

USE SAFE WORK PRACTICES TO PROTECT YOURSELF AND LIMIT THE SPREAD OF CONTAMINATION

- Keep hands away from face
- Limit surfaces touched
- Change gloves when torn or heavily contaminated
- Perform hand hygiene



Figure 6: Sequence to safely remove PPE

| HOW TO SAFELY REMOVE PERSONAL PROTECTIVE EQUIPMENT (PPE) EXAMPLE 2 | HOW TO SAFELY REMOVE PERSONAL PROTECTIVE EQUIPMENT (PPE) EXAMPLE 1 |
|--|--|
| <p>Here is another way to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. Remove all PPE before exiting the patient room except a respirator, if worn. Remove the respirator after leaving the patient room and closing the door. Remove PPE in the following sequence:</p> | <p>There are a variety of ways to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. Here is one example. Remove all PPE before exiting the patient room except a respirator, if worn. Remove the respirator after leaving the patient room and closing the door. Remove PPE in the following sequence:</p> |
| <p>1. GOWN AND GLOVES</p> <ul style="list-style-type: none"> Gown front and sleeves and the outside of gloves are contaminated! If your hands get contaminated during gown or glove removal, immediately wash your hands or use an alcohol-based hand sanitizer Grasp the gown in the front and pull away from your body so that the ties break, touching outside of gown only with gloved hands While removing the gown, hold or roll the gown inside-out into a bundle As you are removing the gown, peel off your gloves at the same time, only touching the inside of the gloves and gown with your bare hands. Place the gown and gloves into a waste container | <p>1. GLOVES</p> <ul style="list-style-type: none"> Outside of gloves are contaminated! If your hands get contaminated during glove removal, immediately wash your hands or use an alcohol-based hand sanitizer Using a gloved hand, grasp the palm area of the other gloved hand and peel off first glove Hold removed glove in gloved hand Slide fingers of ungloved hand under remaining glove at wrist and peel off second glove over first glove Discard gloves in a waste container |
| <p>2. GOGGLES OR FACE SHIELD</p> <ul style="list-style-type: none"> Outside of goggles or face shield are contaminated! If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer Remove goggles or face shield from the back by lifting head band or ear pieces If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in a waste container | <p>2. GOGGLES OR FACE SHIELD</p> <ul style="list-style-type: none"> Outside of goggles or face shield are contaminated! If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer Remove goggles or face shield from the back by lifting head band or ear pieces If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in a waste container |
| <p>3. MASK OR RESPIRATOR</p> <ul style="list-style-type: none"> Front of mask/respirator is contaminated — DO NOT TOUCH! If your hands get contaminated during mask/respirator removal, immediately wash your hands or use an alcohol-based hand sanitizer Grasp bottom ties or elastics of the mask/respirator, then the ones at the top, and remove without touching the front Discard in a waste container | <p>3. GOWN</p> <ul style="list-style-type: none"> Gown front and sleeves are contaminated! If your hands get contaminated during gown removal, immediately wash your hands or use an alcohol-based hand sanitizer Unfasten gown ties, taking care that sleeves don't contact your body when reaching for ties Pull gown away from neck and shoulders, touching inside of gown only Turn gown inside out Fold or roll into a bundle and discard in a waste container |
| <p>4. WASH HANDS OR USE AN ALCOHOL-BASED HAND SANITIZER IMMEDIATELY AFTER REMOVING ALL PPE</p> | <p>4. MASK OR RESPIRATOR</p> <ul style="list-style-type: none"> Front of mask/respirator is contaminated — DO NOT TOUCH! If your hands get contaminated during mask/respirator removal, immediately wash your hands or use an alcohol-based hand sanitizer Grasp bottom ties or elastics of the mask/respirator, then the ones at the top, and remove without touching the front Discard in a waste container |
| <p>5. WASH HANDS OR USE AN ALCOHOL-BASED HAND SANITIZER IMMEDIATELY AFTER REMOVING ALL PPE</p> | <p>5. WASH HANDS OR USE AN ALCOHOL-BASED HAND SANITIZER IMMEDIATELY AFTER REMOVING ALL PPE</p> |
| <p>PERFORM HAND HYGIENE BETWEEN STEPS IF HANDS BECOME CONTAMINATED AND IMMEDIATELY AFTER REMOVING ALL PPE</p> | <p>PERFORM HAND HYGIENE BETWEEN STEPS IF HANDS BECOME CONTAMINATED AND IMMEDIATELY AFTER REMOVING ALL PPE</p> |

Figure 7: Medical waste segregation chart



TABLES;

Table 1: Visual triage checklist before commencing any dental procedure:

Demographic data of the patient:

| A. Exposure Risk | Score |
|--|--------------|
| Contact with a confirmed case of COVID19 or CLI* in the last 14days prior to symptoms onset OR Lived or worked in a facility known to be experiencing an outbreak of COVID-19 or CLI* in the last 14days prior to onset of symptoms | 3 |
| B. Clinical signs and symptoms | |
| Fever or recent history of fever | 4 |
| Cough (new or worsening) | 4 |
| Shortness of breath (new or worsening) | 4 |
| Headache, sore throat or rhinorrhea | 1 |
| Nausea, vomiting and/or diarrhea | 1 |
| Chronic renal failure, Chronic heart disease, immunocompromised patient | 1 |
| Total score A+B | |

If score of ≥ 4 (high risk category), assess the need for any pharmacological intervention to help with the chief complaint, isolate patient, ask to wear a mask, inform physician for assessment and call 444. If the score is less than 4(low risk category), proceed with dental treatment following the guidelines mentioned.

*COVID like illness

Table 2: Appropriate use of PPE:

| Setting and people | Surgical mask* | N-95 mask # | Eye goggles/face shield | Gown | Gloves |
|-----------------------------------|----------------|-------------|-------------------------|------|--------|
| Reception and waiting area | | | | | |
| Receptionist | ✓ | | ✓ | | |
| Visitor | ✓ | | | | |
| Clinic area | | | | | |
| Dentist | ✓ | ✓ | ✓ | ✓ | ✓ |
| Dental assistant | ✓ | ✓ | ✓ | ✓ | ✓ |
| Other areas | | | | | |
| During Sterilization | ✓ | | ✓ | ✓ | ✓ |
| Cleaning and sorting | ✓ | | ✓ | ✓ | ✓ |

Table 3: Mask level and indications:

| Mask level | Suggested Procedure by ASTM |
|---------------------------------------|---|
| Level 1 masks (ASTM low barrier) | low amounts of blood, fluid, spray and/or aerosol exposure. Common clinical examples include patient exams, operatory cleaning, impressions, lab trimming and orthodontic work. |
| Level 2 masks (ASTM moderate barrier) | procedures where moderate to light amounts of fluid, spray and/or aerosols are produced. Suitable for restoratives, prophylaxis, sealants, limited oral surgery and endodontic work |
| Level 3 masks (ASTM high barrier) | procedures with moderate to heavy amounts of blood, fluid, spray and/or aerosol exposure. High barrier protection is needed for procedures such as implant placement, crown preparation, and periodontal or complex oral surgery. |

Table 4: Risk Stratification of dental procedures:

| Procedures | Lower risk aerosol exposure | High risk of aerosol exposure |
|-------------|---|--|
| Instruments | <p>Hand scaling instruments Extraction Forceps/ Elevators 3 in 1 (air-only/water-only) Slow speed /electric handpiece (i.e. < 60 000 rpm) Prophylaxis with pumice (using slow-speed handpiece/ prophy cup) Diathermy Denture/ortho adjusting using slow speed handpiece Surgical and Implant Handpieces</p> | <p>Ultrasonic scaler (including piezo) High speed air rotor /electric handpiece (i.e. > 60 000 rpm) Piezo surgical Handpiece Air polishers 3 in 1 (air and water together)</p> |
| Procedures | <p>Dental Procedures that may produce splatter but are unlikely to produce aerosol particles < 5 µm (including use of powered low velocity instruments)</p> | <p>Dental Procedures that will produce aerosol particles < 5 µm includes use of Powered high velocity instruments that emit or require aerated water or irrigants for coolant</p> |