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Review Article

Dentistry Section

Dental Practice in the Era of nCOVID-19 Pandemic

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ABSTRACT

The recent outbreak of nCOVID-19 pandemic has shaken the world. Dentists are at a great risk of contracting and transmitting this fatal disease. However, as health care personnel, this is our duty to treat patients especially in emergency situations when treatment is inevitable. Equipping ourselves with adequate knowledge and safety measures will not only protect us, but our patients as well. The routes of transmission of nCOVID-19 include direct and indirect contact with the infected person. Dental operatory offers plethora of opportunities for transmission because of the nature of the work done so it is important that clinical management should begin even before the patient enters the dental clinic. Dentist should be aware of the disinfection protocols and proper use of barrier techniques and Personal Protective Equipment (PPE) and about the disposal of the waste generated.

Keywords: Aerosols, Corona pandemic, Dentists, Dental clinics, Novel coronavirus, Personal protective equipment

INTRODUCTION

Epidemics have plagued mankind since ages. Time and again new epidemics keep on surfacing wiping out thousands of human beings and teaching us the new lessons in science and technology. Be it plague, influenza, SARS, Ebola, MERS, India has managed to control few and evade others. However, the prevention of such outbreaks cannot be ensured and the recent outbreak of corona virus in Wuhan, China and its spread globally, emphasise the same. Popularly called as novel-Corona Virus Disease (nCOVID-19) is infectious in nature and caused by the virus strain "Severe Acute Respiratory Syndrome Corona virus 2" (SARS-CoV-2). It is a new strain of corona viruses and has not been previously identified in humans [1].

According to WHO (World Health Organisation), infection from corona virus can range from common cold to severe respiratory infections. These include Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV). The recent outbreak is third in the series of corona virus infections. SARS outbreak in China, 2002 and MERS outbreak in Saudi Arabia, 2012 being the first and second outbreaks, respectively [1,2]. This series has been declared as pandemic by World Health Organisation (WHO) on 11th March 2020 [3]. WHO stated it as first pandemic caused by corona virus. In the present review article, authors have discussed about nCOVID, its routes of transmission in dental clinic and preparation of dental set-ups for patient management. All this has been framed within the confines of guidelines of various medical and dental professional bodies.

How nCOVID-19 Spreads?

It is spreading fast and has a high transmission rate. The common routes of transmission are direct and contact. In direct transmission it can spread through infected person's cough, sneeze and nasopharyngeal secretions and in contact by touching orofacial area and other contaminated inanimate objects [4]. Other routes are orofacial and eye exposure [5]. nCOVID-19 can also be transmitted directly or indirectly through saliva [6]. The transmission can happen from a symptomatic patient as well as from asymptomatic patients/carriers [7]. Asymptomatic patients and patients in their incubation period also act as carriers. Hence, they can also transmit infection to the healthy population and pose a challenge from public health perspective. Identifying and diagnosing such carriers is very important and challenging. There is varied information about the incubation period of novel coronavirus. Studies say that asymptomatic incubation period for nCOVID-19 infected person can be as long as 1-14 days or 1-24 days [8-10]. The most commonly reported incubation period is 1-14 days. According to Centers for Disease Control (CDC), nCOVID-19 can spread by [11]:

1. Person-to-person spread

Through close contact with infected person (within about 6 feet).

Respiratory droplets from an infected person when he coughs or sneezes can spread the virus to other persons who may inhale it.

When a person is most symptomatic, he is most contagious and can spread virus [12].

Some spread might be possible before a person show symptoms.

2. Spread from contact with contaminated surfaces or objects

Touching contaminated surfaces or objects that have virus on it and then touching orofacial area can also make a person corona positive. This is however not the main route of transmission of virus.

Dentists/Dental Set-ups are at High Risk

Medical and allied professionals including dentists are at high risk to nCOVID-19 infection as they are in more close contact with patients during treatment. Occupation Safety and Health Administration (OSHA) in 2020 categorised dentists treating patients in high/very high risk category [13]. Not only the dentist but the supporting staff and even patients are at high risk. This can be attributed to specificities of procedures which involve [14-18]:

1. Face-to-face communication with patients,
2. Frequent exposure to saliva, blood, and other body fluids,
3. Constant generation of aerosols,
4. Close contact with the patient (unable to maintain safe distance of 1 meter) due to treatment requirements,
5. Handling of instruments especially sharps, impressions etc.,
6. Time involved in treating patients (which is usually 20 to 30 minutes ensuring transmission).

Routes of Spread in Dental Clinic [19]

There are 4 basic routes of spreading harmful microorganisms in a dental surgery:

1. **Blood borne route-** Through the blood of an infected patient (hepatitis B and C viruses, HIV virus), viruses can spread to healthy patients which cause serious health and life threatening diseases.

2. **Saliva droplet route-** Through a droplet/aerosol, emitted by an infected patient and containing particles of saliva, secretions from the gum, periodontium and teeth. Dental procedures involving use of high speed hand pieces and ultrasonic scalers results in aerosolisation of saliva along with water from dental units. In addition coughing during the procedure, sudden gag reflex and talking can also throw saliva droplets in the environment.
3. **Direct contact while examining, treating or communicating (at a close distance) with an infected patient** and by instruments used on such patients.
4. **Water droplet route-** Water droplet aerosols emitted from hand pieces of a dental unit. The micro organisms present in the unit reservoir or the biofilms present can be potential source of transmission. The droplet aerosol here is from water already present in Dental Unit Waterlines (DUWL) unit or air syringe. It might not be contaminated with saliva but microbes will be present in it.

The aerosolisation of patient's saliva (is rich in microbes) during scaling and other procedures involving use of rotary instruments poses a serious health risk. These infected aerosols persist in environment for few hours and can be dangerous to next patient due for treatment [20-25]. A systematic review demonstrated that ventilation also has an effect on the risk of infection via infectious aerosols [26].

According to National Institutes of Health (NIH), viable virus causing nCOVID-19 can be found in aerosols for upto 3 hours of aerosolisation, 4 hours on copper, 24 hours on cardboards and 2 to 3 days on plastic and stainless steel [27]. Moreover, dental office can expose patients and accompanying relatives to cross contamination. Also, dentist may become potential carrier of the infection.

Following Infection Prevention and Control (IPC) strategies must be considered to prevent or limit transmission in healthcare settings [28]:

1. Ensuring triage, early recognition, and source control (isolating patients with suspected nCoV infection);
2. Applying standard precautions for all patients;
3. Implementing empiric additional precautions (droplet, contact and airborne precautions) for suspected cases of nCoV infection;
4. Implementing administrative controls;
5. Using environmental and engineering controls.

Clinic Preparation [29-32]

Guidelines for clinic preparation are:

Before patients arrive

Train and prepare your staff:

- The supporting staff should know the correct method of putting and taking off PPE safely. [Annexure 1]
- They should be able to identify and recognize symptoms like fever, headaches, sore throat, cough and shortness of breath related to corona virus infection.
- Train staff to triage patient based on emergency. They should also separate sick patients from healthy patients in separate room.
- Hand hygiene and cough etiquette should be encouraged and emphasised among staff members and even patients [Annexure 2, 3].
- Sick or symptomatic staff member should be immediately send home. Guide and help them to take appropriate action.

Prepare the clinic:

- Assess and restock all the supplies.
- Check the ventilation of the dental clinic.
- Provide dustbins for waste disposal (like tissues with oral and nasal secretions) of patients waiting in operatory.
- Display information about COVID symptoms, hand cough etiquettes and other relevant issues.
- Display contact details of local health department.
- Make a temporary separate area in waiting room for patients with respiratory and other corona positive symptoms.

Communicate with patients:

- Be in constant touch with the patient and enquire about any possible symptoms during reminder calls.
- Reschedule and delay non-urgent appointments.
- Educate patients about different preventive measures. Post signs related to these in your clinics. These may be at the entrance or waiting area where patient can easily notice and read them.

Prepare the waiting area:

- Place staff at the entrance to ask patients about their symptoms.
- Ask patients to fill the questionnaires (screening and assessment of true emergency, [Annexure 4,5]). Only emergency dental treatment should be provided.
- Measure and record the temperature of all patients using non-contact forehead thermometer or with cameras having infrared thermal sensors. (defer elective dental treatment in patients with fever >100.40F=380C and/or respiratory disease for atleast 2 weeks).
- Based on screening (questionnaire and thermal) and assessment of true emergency, decide which patient should be treated and which should be referred to government hospital or any designated hospital. Ask staff and other patients to maintain safe 1 meter distance.
- Provide symptomatic patients with tissues or facemasks to cover mouth and nose.
- Separate patients with symptoms. Either provide separate spaces in waiting areas or ask sick patients to wait outside in their own conveyance/cars if they are medically able.
- Provide supplies-tissues, alcohol based hand rub, soap at sink and trash cans.
- Place chairs 3-6 feet apart, when possible.
- Remove or clean regularly all toys, materials or other communal objects from the waiting area.
- Limit non-patient visitors.
- Donot overcrowd the clinic and keep strict appointment schedule.
- Paste hand cough etiquette and hand hygiene instructions.

Dental treatment in this hour of crisis

According to CDC's guidelines (March 10, 2020), non-emergency or elective dental procedures in patients who have signs or symptoms of respiratory illness should be postponed [33]. Only emergency dental care which seems to be clinically urgent should be provided. The decision should be based on clinical judgment, dental symptoms of the patient and should be made on a case-by-case basis.

ADA (American Dental Association) has also developed guidelines for emergency and non-emergency care (March 18, 2020) [34]. Dental emergencies are potentially life threatening and require immediate treatment. These include uncontrolled bleeding; cellulitis or a diffuse soft tissue bacterial infection with intraoral or extraoral swelling, fracture of oro-facial area that potentially compromises the patient's airway. Extensive caries or defective restorations, pulpal involvement of infected tooth, ulceration due to orthodontic appliances causing pain should also be treated as dental emergency. They should be treated as minimally as possible.

Examples of emergency dental care includes [34]:

- Emergency access opening in pulpally involved teeth causing severe dental pain.
- Management of dry socket or surgical postoperative osteitis.
- Infection involving third molars like pericoronitis associated with severe pain,
- Abscess drainage associated with localised pain and swelling.
- Fractured tooth causing severe pain or soft tissue trauma.
- Avulsed or luxated tooth.
- Redoing temporary restoration in situations where it is lost or broken and causing gingival irritation.

Decision on treating patients [35]: If the patient has no symptoms (cough, fever, difficulty in breathing etc.,), does not give any positive travel history or contact with infected person past 14 days, provide emergency care following proper protocol and PPE in place. As per the current guidelines, all dental procedures are suspended except the emergency ones. They may be asymptomatic carriers and due to shortage of PPE kits, only emergency dental care is to be done

- If the patient has any positive history of travel or contact with infected person past 14 days but no symptoms, provide emergency care.
- If patient has fever, other positive symptoms or any other positive history in the past 14 days, suspects him to be infected with COVID-19, ask the patients to self-quarantine for 14 days at home and refer to local health care department. Clean and disinfect the triage area as soon as possible.
- However, if the patient has fever which seems to be strongly associated with dental diagnosis and other symptoms are negative then treat the patient with adequate protocol and PPE in place.
- If the patient is from red zone (living or working) refer to nearby or affiliated government/medical hospital to prevent spread and for thorough check-up for COVID 19 infection.

In addition to this, it is very important to follow local guidelines also. For example DCI (Dental Council of India), IDA (Indian Dental Association) and their local and state branches have been issuing guidelines and advisories time to time. It is imperative to think globally but act accordingly keeping in mind the local conditions as well.

Emergency/Urgent dental treatment during COVID-19 pandemic

- Perform procedure in adequately ventilated room. (It is defined as a room which has minimum of 6 to 12 air changes/hour if mechanically ventilated and at least 160/sec if naturally ventilation). Air conditioners (commercial split/centralised/window) should be avoided unless they are equipped with High Efficiency Particulate Air (HEPA) filters. Also, as they lead to re-circulation of same air in the room, chances of infection would be more.
- Carry out emergency treatment in a single room. Separate clinical areas should be used for non-aerosol and aerosol generating procedures.
- Cover the surfaces not easy to clean with barriers.
- Limit persons present in the room. Minimum working staff should be there in the operatory
- Thorough disinfection of all the surfaces with 60%-70% alcohol or 1% sodium hypochlorite.
- If possible give pharmacological management in the form of antibiotics and analgesics (recommend acetaminophen for analgesia and not ibuprofen).
- Proper hand wash before and after contact with person (my 5 moments of hand hygiene approach for Dental Health Care Worker (DHCW), [Annexure 2]).
- Use PPE to protect skin and mucosa (use particulate respirators as main route is droplet).
- Use 4 handed technique.
- Pre-procedural mouth rinse with 0.2% povidone-iodine or 1% hydrogen peroxide to decrease the viral load.
- DHCWs should refrain from touching eyes, nose, mouth with potentially contaminated gloves or bare hands.
- Use designated portable X-ray equipment and/or other designated diagnostic equipment. Avoid moving and transporting patients out of their room or area unless necessary. Pre-decided route of transport should be used, if required. The patient should use a medical mask.
- Use disposable devices wherever possible.
- Pre-treat, clean, sterilise and properly store the reusable instruments and items.
- Avoid procedures which induce cough or increase saliva secretion like intraoral X-rays. Extraoral imaging like panoramic radiographs or Cone Beam Computed Tomography (CBCT) should be used (when intraoral imaging is mandatory, sensors should have double barriers to prevent perforation and cross-contamination). It is recommended during pandemic only just to prevent cross-infection
- Use rubber dam to minimise splatter generation.
- Use high volume saliva ejectors.
- Avoid procedures that generate aerosol like ultrasonic instruments, high speed hand pieces and three way syringes during pandemic only (Emergency pulp exposure can be done through chemomechanical caries removal under rubber dam isolation & high volume saliva ejectors) Use anti-retraction hand pieces to prevent cross-infection. Try to postpone suspected patients at the end of the day to prevent cross-contamination.
- Use hand instruments where possible.
- In case of trauma, patients ask for chest X-ray to exclude suspected infection.
- Use absorbable sutures wherever required.
- For soft tissue wound management, rinse wound slowly and use saliva ejectors to avoid spraying.

Personal Protective Equipment (PPE) [35-41]

It is any wearable equipment that protects one from exposure to or contact with infectious agents. It includes [36]:

- Goggles/face shield (Both to be used, fitting goggles with a soft tissue seal)
- Triple layer surgical mask
- N95 respirator during routine dental procedures
- FFP3-Standard mask should be used during treatment of COVID19 positive patients.
- Surgical gloves
- Disposable coverall/gown with hood /waterproof lining (to be changed daily).
- Coverall/gown outer; maybe improvised but will need to be changed after each patient
- Shoe covers

The Ministry of Health and Family Welfare (Government of India) has released specifications of PPE kit [Annexure 6] [37].

Indications for using PPE kit for Dental Health Care Provider (DHCP):

- Staff working in pre-screening area should wear surgical mask, cap and gloves.
- Staff working in triage area should wear N95 mask and gloves.
- Staff in the clinical area should always be wearing 3 ply masks,

suitable head caps and shoe covers at all times. Protective eye wear and face shield are also recommended.

- Staff working in non-aerosol and aerosol generating areas while treating patients should wear all PPE and use N95 or high level respirators in place of surgical masks.
- It is important to note that sanitary staff is also at moderate risk and should wear N95 mask and gloves.

It is important to note that PPEs are not alternative to basic preventive public health measures such as hand hygiene, respiratory etiquettes which must be followed at all times by everyone.

Examples where PPE kit can be used [38]:

- Gloves should be used in situations involving possible contact with blood or body fluids, mucous membranes, non-intact skin (e.g., exposed skin that is chapped, abraded, or with dermatitis).
- Protective clothing should be used in procedures or activities involving contact with blood or body fluids.
- Mouth, nose, and eye protection during procedures involving generation of splashes of blood or other body fluids.

The fabric to be used for PPE should pass 'Synthetic Blood Penetration Resistance Test' (ISO 16603). The material which passes 'Resistance to penetration by biologically contaminated solid particles (ISO 22612:2005) test can be used to manufacture coveralls. The seams should be taped properly to prevent entry of fluid/droplets/aerosol entry. The tests which can be performed in Indian laboratories are as per WHO Disease Commodity Package should be conducted.

Cost and Reuse

Also, according to WHO, the current stock of PPE (especially medical masks and respirators) is insufficient to handle the current situation. Soon the supply of gowns and goggles will also become insufficient [39]. The strategies to optimise PPE use includes: minimising the need, ensuring rationale and appropriate use, supply chain coordination.

Due to their high costs they should be used judiciously. Certain items in the PPE kit can be reused after disinfection like face shields, protective googles and coveralls. According to the AIIMS guidelines face shields and goggles can be decontaminated using 0.5 percent sodium hypochlorite solution and 70 per cent alcohol. Coveralls and N95 masks can be decontaminated using doubling dilution of 11 percent hydrogen peroxide vapour in a sealed room [40].

Surgical Masks, shoe cover, gloves and head cap, if separate should be disposed off after every patient. If the mask is damaged, soiled or if breathing through the mask becomes difficult, it should be replaced with a new one (while doing a single patient also).

3. After Patients are Assessed/treated

- After patients leave, clean frequently touched surfaces using Environmental Protection Agency (EPA)- registered disinfectants-counters, beds, seating.
- Patients with respiratory symptoms should be given appropriate home care instructions. They should be followed-up through emails or phones.
- Health department should be informed about suspected patients.
- Disinfect all surfaces once every half day. In case of suspected patients-disinfect all surfaces immediately after the patient has left with sodium hypochlorite.
- Provide homecare instructions to patients with respiratory symptoms. Consider telehealth options like virtual visits with dentist through communication technology like videoconferencing, messages, mobile apps for follow-up.
- Promote patients for e-payments.
- Dentist and supporting staff should change PPE gear and dispose it properly before returning home. Vice-versa should be done for personal clothing. Shoes should be removed in designated corner of house; clothes washed separately and take shower immediately prior to any contact with any family members.

Fumigation of clinic should be done daily [41]. All windows and ventilators should be closed and electrical equipments switched off. The methods used are:

- **Potassium permanganate method:** For every 1000 cubic feet, 450 gm of Potassium permanganate (KMnO4) add to 500 mL of formaldehyde (40% solution). Place this solution in 5 to 8 different locations in the clinic in heat resistant bowls. Auto boiling and fumes will be generated. Leave the room and seal it for at least 48 hours. After the fumigation process, neutralise with ammonia solution.
- **Electric boiler fumigation method:** Add 500 mL of formaldehyde (40% solution) to 1000 mL of water in an electric boiler (for every 100 cubic feet). Switch on the boiler, leave the room and close the door. After 45 minutes, switch-off the boiler without entering in to the room (Switch-off the main from outside).

How to disinfect?

Disinfection and waste management (2019 Novel Coronavirus Prevention and Management Preparedness Document AIIMS, New Delhi February 5, 2020) [42].

Disinfect equipment and surfaces exposed to infected environment. Ethyl alcohol or isopropyl alcohol (60%-90%, v/v) is often used to disinfect small surfaces (rubber stoppers of multiple-dose medication vials, and thermometers) and occasionally external surfaces of equipment (stethoscopes and ventilators).

Barrier protection of difficult to clean surfaces and equipment is useful, especially if these surfaces are likely to be contaminated with splatter or frequently touched while providing dental care. Impervious-backed paper, plastic or fluid-resistant covers should be used. They should be discarded and replaced after every patient with gloved hands. Hand hygiene should be performed after discarding.

Spill management:

- Wear gloves and other PPE while managing spills.
- Use an absorbent material to remove organic matter present in spill.
- 1% and 10% hypochlorite can be used for small and large spills), respectively.

Workers who dispose of PPE and other infectious waste must also be trained and provided with appropriate PPE. Waste is treated as infectious waste and segregated in yellow bags.

Ethical Dilemma

In such emergency situation, ethical dilemma exists as to whether we should provide emergency treatment to the patient or safeguard our life. As a health care professional and in accordance with Hippocratic Oath, it is our duty to safeguard the patient and provide basic minimum emergency care in such hour of crises. But while doing so, it is necessary to take adequate precautionary measures like maintaining safe distance, screening and triage and PPEs and hand hygiene.

CONCLUSION(S)

As a health care worker, it is imperative for the dentists to be prepared to handle such situations. In the present scenario of nCOVID-19 pandemic, one should assess and reschedule patients where possible. Telescreening and teledentistry should be promoted. Emergency dental care can be identified and done with proper barrier techniques and other safety measures. Knowing the health department of the

area can be helpful in reporting any suspected case or called for any emergency situation. Keep yourself and your staff safe and updated.

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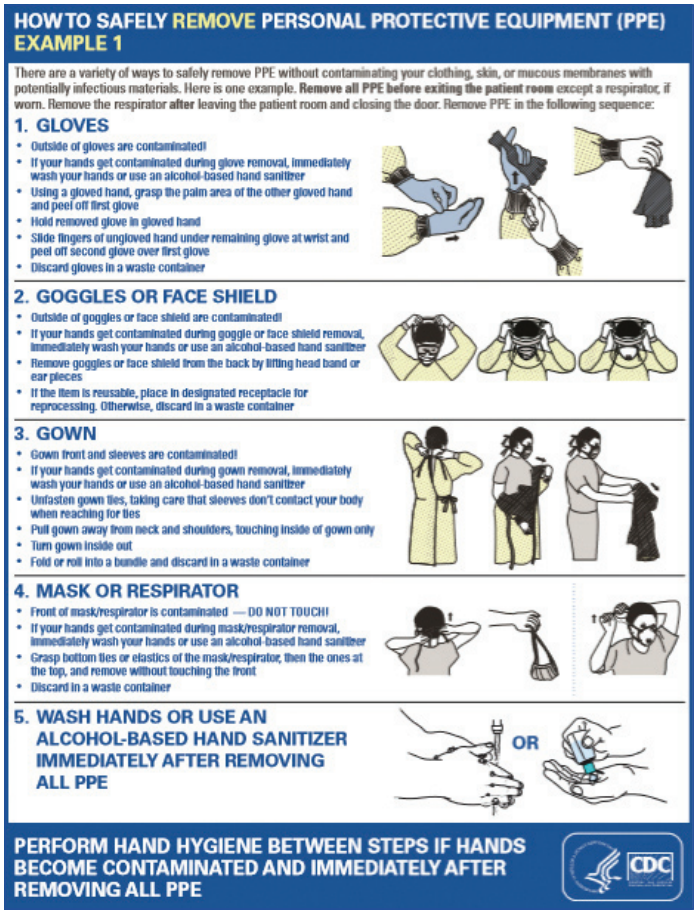
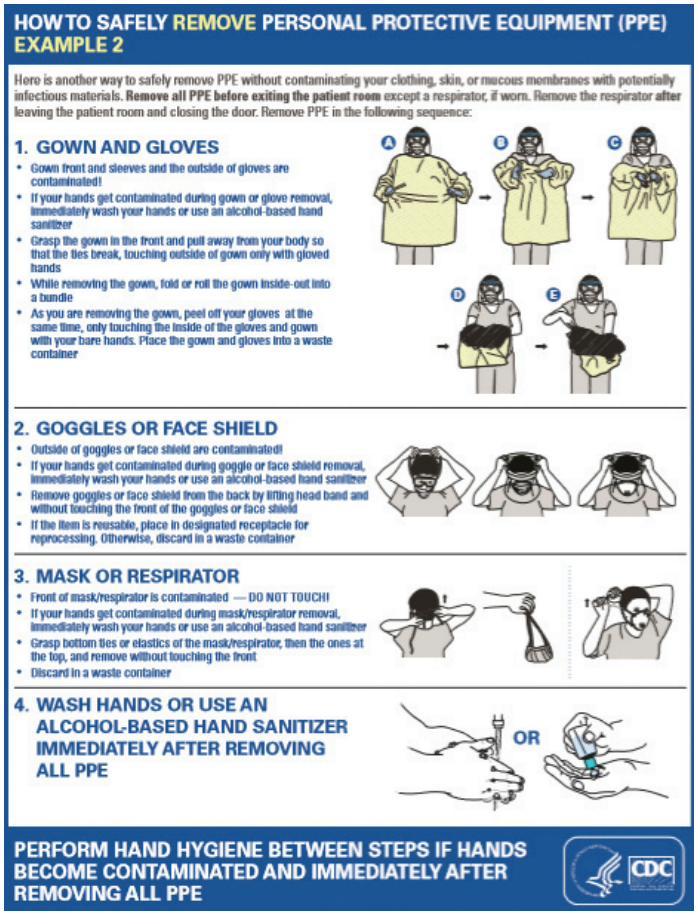
Annexures

1. Sequence for putting Personal Protective Equipment (PPE)





Annexure 2.

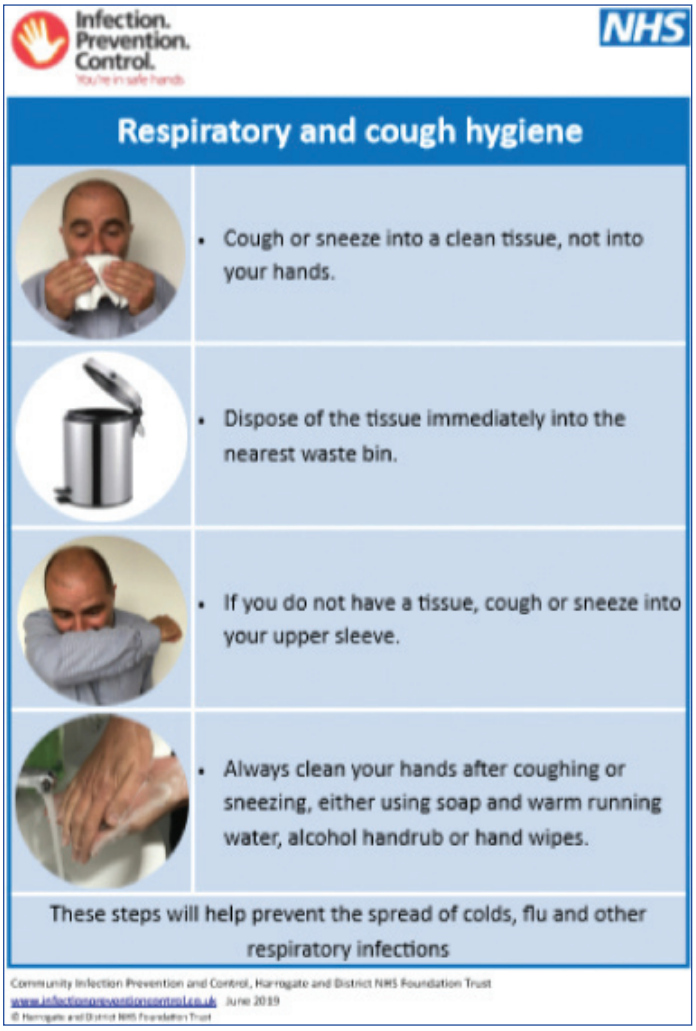
WHO's My 5 Moments for Hand Hygiene

1. Before touching a patient.
2. Before any clean or aseptic procedure is performed.
3. After exposure to body fluid.
4. After touching a patient.
5. After touching a patient's surroundings.

- Hand hygiene includes cleansing hands either with an Alcohol-Based Hand Rub (ABHR) or with soap and water.
- Alcohol-based hand rubs are preferred if hands are not visibly soiled.
- Wash hands with soap and water when they are visibly soiled.

Annexure 3.

Respiratory and cough hygiene



Annexure 4

COVID 19 Screening Questions* [43]

COVID-19 Screening Questions

Date: _____

Name (last name, first name):_____

Date of Birth (mmddyy): _____

Yes	No	COVID19 Screening Questions
		In the past 14 days, have you or any household member traveled to international area (China, Iran, Italy, Japan, South Korea, and any European country) or anywhere else? If so, please note location:
		In the past 14 days, have you or any household member had any contact with a known COVID-19 patient?
		Have you or any household member have a history of exposure to COVID19 biologic material?
		Have you had any history of fever in the last 14 days?
		Have you had any respiratory illness such as cough or difficulty breathing in the last 14 days?
		Urgent Dental Need Question Do you have uncontrolled dental or oral pain, infection, swelling or bleeding or trauma to your mouth?

Annexure 5.

True Dental Emergency Assessment Questionnaire*

Assessment of a True Emergency
(Circle Patient's Response wherever appropriate)

1) Are you in pain?

Yes or **No**

2) What is your level of pain on a scale of 0-10?

3) When did the pain begin?

_____

4) Do you have a dental abscess (Are your gums and/or face swollen?)

Yes or **No**

- When did you first notice the swelling?

_____

5) Do you have a fever?

Yes or **No**

6) Are you having any trouble swallowing?

Yes or **No**

7) Are you having any trouble opening your mouth?

Yes or **No**

8) Did you experience any trauma?

Yes or **No**

- Please describe the trauma

Annexure 6- PPE Specifications

Personal Protection Equipment (PPE) -Specifications

(for Contact & Airborne precautions)

1. PPE Kit

1.1 Gloves

- Nitrile
- Non-sterile
- Powder free
- Outer gloves preferably reach mid-forearm (minimum 280 mm total length)
- Different sizes (6.5 & 7)
- Quality compliant with the below standards, or equivalent:
  a. EU standard directive 93/42/EEC Class I, EN 455
  b. EU standard directive 89/686/EEC Category Ill, EN 374
  c. ANSI/SEA 105-2011
  d. ASTM D6319-10

1.2 Coverall (medium and large)*

- Impermeable to blood and body fluids
- Single use
- Avoid culturally unacceptable colors e.g. black
- Light colors are preferable to better detect possible contamination
- Thumb/finger loops to anchor sleeves in place
- Quality compliant with following standard
  a. Meets or exceeds ISO 16603 class 3 exposure pressure, or equivalent

1.3 Goggles

- With transparent glasses, zero power, well fitting, covered from all sides with elastic band/or adjustable holder.
- Good seal with the skin of the face
- Flexible frame to easily fit all face contours without too much pressure
- Covers the eyes and the surrounding areas and accommodates for prescription glasses
- Fog and scratch resistant
- Adjustable band to secure firmly so as not to become loose during clinical activity
- Indirect venting to reduce fogging
- May be re-usable (provided appropriate arrangements for decontamination are in place) or disposable
- Quality compliant with the below standards, or equivalent:
  a. EU standard directive 86/686/EEC, EN 166/2002
  b. ANSI/SEA Z87.1-2010

1.4. N-95 Masks
- Shape that will not collapse easily
- High filtration efficiency
- Good breathability, with expiratory valve
- Quality compliant with standards for medical N95 respirator:
  a. NIOSH N95, EN 149 FFP2, or equivalent
- Fluid resistance: minimum 80 mmHg pressure based on ASTM F1862, ISO 22609, or equivalent
- Quality compliant with standards for particulate respirator that can be worn with full- face shield

1.5. Shoe Covers
- Made up of the same fabric as of coverall
- Should cover the entire shoe and reach above ankles

1.6. Face Shield
- Made of clear plastic and provides good visibility to both the wearer and the patient
- Adjustable band to attach firmly around the head and fit snuggly against the forehead
- Fog resistant (preferable)
- Completely covers the sides and length of the face
- May be re-usable (made of material which can be cleaned and disinfected) or disposable
- Quality compliant with the below standards, or equivalent:
  a. EU standard directive 86/686/EEC, EN 166/2002
  b. ANSI/SEA Z87.1-2010

3. Triple Layer Medical Mask
- Three layered medical mask of non-woven material with nose piece, having filter efficiency of 99% for 3 micron particle size.
  a. ISI specifications or equivalent

4. Gloves
- Nitrile
- Non-sterile
- Powder free
- Outer gloves preferably reach mid-forearm (minimum 280mm total length)
- Different sizes (6.5 & 7)
- Quality compliant with the below standards, or equivalent:
  1. EU standard directive 93/42/EEC Class I, EN 455
  2. EU standard directive 89/686/EEC Category III, EN 374
  3. ANSI/SEA 105-2011
  4. ASTM D6319-10

5. **Body Bags - Specifications**

1) Impermeable
2) Leak proof
3) Air sealed
4) Double sealed
5) Disposable
6) Opaque
7) White
8) U shape with Zip
9) 4/6 grips
10) Size: 2.2 x 1.2 Mts
11) Standards:
    a) ISO 16602:2007
    b) ISO 16603:2004
    c) IS016604:2004
    d) ISO/DIS 22611:2003

All items to be supplied need to be accompanied with certificate of analysis from national/ international organizations/labs indicating conformity to standards

All items: Expiry 5 years

PPE should match the route of transmission	When to use in a patient being treated as COVID +ve	What is it?
Contact precautions	> 2m away from patient	Gloves Apron
Droplet precautions	Within 2m of patient	Gloves Apron Fluid resistant surgical mask +/- Eye protection* (risk assess)
Airborne precautions**	Aerosol generating procedure	Gloves Fluid repellent long sleeved gown Eye protection* FFP3 mask