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Review Article

Position Statement of IACDE for managing dental patients during COVID-19

Paromita Mazumdar, Mamta Kaushik¹, Veeramachaneni Chandrasekhar², Mohan Kumar R. S³, Akansha Rajawat¹

Department of Conservative Dentistry and Endodontics, Guru Nanak Institute of Dental Sciences and Research, Panihati, Kolkata, West Bengal, ¹Department of Conservative Dentistry and Endodontics, Army College of Dental Sciences, Secunderabad, ²Department of Conservative Dentistry and Endodontics, Mallareddy Dental College for Women, Hyderabad, Telangana, ³Department of Conservative Dentistry and Endodontics, Priyadarshini Dental College and Hospital, Pandur, Tamil Nadu, India

Abstract

Coronavirus disease 2019 (COVID-19) has been a major health concern globally ever since it was declared as Pandemic by the World Health Organization in March 2020. Due to the evolving and contagious nature of coronavirus, it continues to remain a threat for dental health-care personnel. As the virus travels from person-to-person via direct contact through droplet inhalation, cough, and sneeze or through contact transmission, it remains infectious even through inanimate surfaces. A seemingly healthy asymptomatic person may have the potential to trigger the spread of this disease. Coronavirus has the capability of spreading through community transmission. There is no specific treatment or vaccine as of now for stopping the spread of COVID-19, hence universal precautions and awareness with mass involvement is required to ward off this pandemic. Dental health-care personnel are at immense risk due to the near proximity with patients and continual exposure to saliva, blood, and other body fluids. Management protocol regarding awareness and preventive measures should be laid down for dental clinic/hospital to contain the outspread of this infectious disease.

Keywords: Coronavirus disease 2019; dental patients; treatment protocol

HISTORY

Coronavirus belongs to the Coronaviridae family and has single-stranded RNA virus.^[1] These viruses are zoonotic (allow transmission from animals to humans).^[2] They include Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV), which was recognized first in 2002 followed by Middle East Respiratory syndrome coronavirus (MERS-CoV) identified later in 2012.^[2] Coronavirus has a similarity to the virus that is present in bats and pangolins.^[3,4] It is closely related to beta corona viruses such as SARS-CoV and MERS-CoV in its genomic sequence.^[1,5] The World Health Organization (WHO) named the disease caused by this virus as coronavirus disease 2019 (COVID-19) and the International Committee on

Taxonomy of Viruses has named this virus as SARS-CoV-2.^[1,6] First case of COVID-19 emerged in late December in the city of Wuhan, Hubei province of China.^[7] The outbreak of this disease was declared by the WHO as a Public Health Emergency of International Concern on January 30, 2020. Later in the month of March, the WHO made the assessment that COVID-19 can be characterized as a pandemic.^[8]

SYMPTOMS AND SPREAD OF CORONAVIRUS DISEASE 2019

The WHO has listed the most common presentations of this disease as fever, dry cough, and myalgia.^[9] The less common symptoms may be pain, sore throat, diarrhoea, conjunctivitis, headache, loss (agusia) or abnormal (dysgeusia) sensation of smell or taste, rash on skin, nausea, discoloration of fingers or toes, and ground-glass opacities on chest X-ray.^[9,10] Serious

Address for correspondence:

Dr. Akansha Rajawat, Department of Conservative Dentistry and Endodontics, Army College of Dental Sciences, Secunderabad, Telangana, India

E-mail: drakansharajawat@gmail.com

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symptoms include shortness of breath or difficulty in breathing, loss of speech or movement, and chest pain.^[9] Most infected patients will have mild to moderate illness and will recover without the need of getting hospitalized.^[9] Patients with mild symptoms only are about 80% and they present with symptoms resembling flu and allergies increasing the count of undiagnosed patients, and then, these cases may act as carriers and can also serve as reservoirs for recurrent infection, even when they are asymptomatic.^[11] When patients are symptomatic, coronavirus is highly transmissible, and the incubation period ranges from 0 to 24 days.^[10,12,13] When present in severe form, this disease has a penchant for males with an average of 56 years with preexisting systemic diseases. Population at higher risk will manifest symptoms of pneumonia or respiratory distress syndrome.^[10]

Transmission routes of COVID-19 can be through:^[14,15]

1. Direct transmission through droplet inhalation transmission, cough, and sneeze or
2. Contact transmission on contact with nasal, oral, and eye mucous membranes.

The acts of coughing or sneezing by an infected or suspected COVID-19 patient can render SARS-CoV-2 airborne transmission, infecting individuals in immediate contact within 6 feet of radius approximately.^[14] Research has shown the existence of SARS-CoV-2 in saliva and faeces of affected patients, as the virus coheres to angiotensin-converting enzyme 2 receptors in salivary glands where they are in high number and hence SARS-CoV-2 is present in secretory saliva.^[16-19] There lies a potential for transmission of COVID-19 via aerosol, fomites or the fecal-oral route contributing to nosocomial infections.^[14]

UPCOMING CHALLENGES IN DENTISTRY DUE TO CORONAVIRUS DISEASE 2019

Due to the unknown virus origin and evolving nature of COVID-19, it becomes a challenge to treat dental patients. Furthermore, as there exists no specific treatment or vaccine for containment of COVID-19, development of safe and effective counter measures can help contain this disease.^[20] In a publication by New York Times, a schematic figure depicted that dentists are at highest risk of being exposed and affected by COVID-19.^[21] Dental health-care personnel may be exposed to suspected or known sources of coronavirus that can cause COVID-19 during various dental procedures.^[22] These procedures may include aerosol generation, close proximity of operator to the patient, and handling of sharps. Risk may also be attributed to verbal interaction with patients and kin at close range. As the comprehension of COVID-19 is evolving, dental clinics, hospitals, and teaching institutions should be better

equipped to identify and treat a patient with suspected or confirmed COVID-19 infection.

MANAGEMENT PROTOCOL OF PATIENTS IN DENTAL CLINIC/ HOSPITAL

Instruments such as hand piece, ultrasonic scalers or surgical instruments, and air-water syringes create spray that contains large particle droplets of water, blood, saliva, debris, and microorganisms. This spatter travels a distance and then settles either on the floor, nearby operatory surfaces, on staff or on the patient himself/herself and remains for a variable period of time.^[23] Hence, proper protocol for managing dental patients during COVID-19 pandemic becomes necessary.

Teledentistry and triaging

- Identify suspected or possible COVID-19 patients over teleconferencing.
- Specific questions to be asked over the phone, that include whether there was any exposure to a person with known or suspected COVID-19 patient, detailed travel history, especially to an area of high-COVID density and current symptoms of febrile respiratory illness such as cough and fever.^[24]
- Delay appointments of patients with common cold-like symptoms if possible. In case of a positive response to any of these questions, patients should be advised isolation and should be asked to consult a primary care physician by phone or other suitable non-contact platforms.^[25]
- Dental treatment can be triaged as emergency, urgent, and elective. Based on the assessment of the emergency questionnaire [Table 1],^[13] clinicians can gauge the severity of the dental condition and make an informed decision to either provide or defer dental care. Dental conditions with respective approaches are mentioned in Table 2.^[26,27]
- Dental triage should focus on three as: advice, analgesia, and antimicrobials (where appropriate).^[26]
- Elective dental treatment should be suspended until regular dental services are restored.
- In case of a negative response to the above asked questions patients with emergency dental conditions should be treated with following protocol.

Dental clinic or hospital setup

- Awareness posters at the entrance and in strategic places (e.g., waiting areas, elevators, and cafeterias), on source of the transmission of COVID-19 along with respiratory hygiene, cough etiquette, and hand hygiene should be posted.^[28] Instructions should include how to use tissues to cover nose and mouth when coughing or sneezing, to dispose of tissues and

contaminated items in waste receptacles, and how and when to perform hand hygiene.^[28]

- Record the temperature of every staff and patient as a routine procedure. Patient's medical history and history of contact or travel should be inquired before they enter the operatory setup.^[28]
- Restrict the number of people accompanying the patient. Allow no more than two patients in a well-ventilated waiting area, 6 feet apart.^[26] Maintain a distance of at least 3 feet in the first entry zone.
- Use of masks for every individual entering a dental

Table 1: Emergency assessment questionnaire

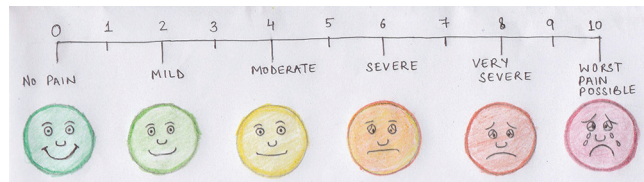
Emergency assessment questionnaire (assess patient response and wherever appropriate please tick)

Q1. Do you have pain?

Yes ☐ No ☐

If yes, when did the pain start? _____

Q2. Mark level of pain on a scale of 0-10



Q3. Do you have bleeding or swollen gums?

Yes ☐ No ☐

Q4. If yes, when did you notice it? _____

Did you fall or experience any trauma?

Yes ☐ No ☐

Q5. Do you have any inconvenience while opening your mouth or while swallowing?

Yes ☐ No ☐

Please specify _____

Q6. Do you have fever, cough or muscle pain?

Yes ☐ No ☐

Please specify _____

If yes,

☐ Do you have any recent history of travel?

☐ Did you recently participate in any gathering/meetings?

☐ Did you come in contact with COVID-19 positive patient or any person with similar symptoms?

clinic/hospital should be made mandatory.

- Respiratory hygiene such as covering the nose and mouth with a tissue or cloth before sneezing and coughing should be followed by the patients.^[29]
- Sanitizers (alcohol based hand rub [ABHR]; with >60% ethanol or 70% isopropanol^[30]) should be available at the entrance.
- Staff should be trained in cleaning, sterilization, and disinfection procedures.
- Ultrasonic cleaners and B (vacuum type; wrapped/unwrapped, solid/hollow items) or N (non-vacuum; unwrapped solid items) type of autoclaves are advocated.
- Surface barriers should be used to safeguard areas that are hard to clean (e.g., switches on dental chairs) and should be changed between patients.^[31]
- Clinical surfaces that are not barrier protected should be cleaned and disinfected with an Environmental Protection Agency (EPA)-registered hospital disinfectant (Isopropyl alcohol, 0.5%–1% sodium hypochlorite) after each patient.^[26,31]
- Dental instruments or equipment that can be used again should be cleaned, disinfected, or sterilized duly before using on another patient. To check the effectiveness of sterilization procedure chemical, mechanical, and biological monitors can be used.^[31]
- Fumigation in clinic/hospital should be done on a daily basis with the use of Ultraviolet (UV) disinfection.^[26,27] Natural and mechanical ventilation should be encouraged.
- Staff members having symptoms of respiratory infection should distance him/her and stay at home.
- Clean and disinfect public areas frequently, including door handles, chairs, and bathrooms.

Patient evaluation and treatment

- Dental services should be limited to patients with

Table 2: Dental conditions with respective approaches during COVID-19

	Emergency	Urgent	Elective
Conditions	<ul style="list-style-type: none"> Uncontrolled bleeding Diffuse intra oral or extra oral swelling, that obstructs airway Trauma involving face or facial bones 	<ul style="list-style-type: none"> Symptomatic irreversible pulpitis Acute apical abscess Apical periodontitis Pain from pericoronitis Post-operative pain or complication Sharp object wedged in soft tissues or between teeth Sharp cuspal edges or fractured teeth or carious degenerated teeth causing trauma to soft tissues Trauma that resulted in enamel fracture Mobile teeth Mouth ulcers Trauma from orthodontic appliances 	<ul style="list-style-type: none"> Dislodged restoration Generalized sensitivity Asymptomatic ongoing non-surgical endodontic treatment Asymptomatic dental injury involving enamel & dentin Prosthetic & Cosmetic procedures Previously appointed patients for orthodontic treatment
Approach	Attend immediately with Personal Protective Equipment (PPE).	Pharmacological management if possible & reschedule at a later date. In case of no relief, physical appointment as emergency care with PPE for operator & assisting staff.	Defer the dental treatment until pandemic resolves.

emergency dental conditions during the pandemic.^[23]

Elective dental procedures and routine dental check-ups should be deferred. Atraumatic restorative techniques or minimally invasive procedures with the help of hand instruments wherever possible should be carried out.^[27]

- Patient's detailed medical history should be confirmed on entrance, in the working setup along with COVID-19 screening questionnaire.
- In suspected or confirmed COVID-19 patients requiring emergency/urgent dental treatment such as pain or swelling, pharmacological management by prescribing analgesics and antibiotics is an alternative. This gives symptomatic relief to the patient and time to dental personnel for delivering dental care using standard measures to contain the spread of infection.^[13]
- Where emergency dental treatment is mandatory, and the patient is suspected or is COVID-19 positive, airborne Infection Isolation Rooms should be made available. These rooms are for the isolation of such patients that are regulated at negative pressure in relation to the surrounding areas.^[29]
- Staff or visitors entering the room should use N95 respirator.^[29]
- Use of personal protective equipment, (PPE-face masks, gloves, protective eyewear, protective clothing, and face shields) is highly recommended in patients with confirmed or possible COVID-19. Along with the use of PPE and hand hygiene follow the standard, contact, and air-borne precautions.^[32]
- PPE should be worn during all the dental procedures where contact with saliva or blood is likely to be expected.^[33]
- Patients should be scrubbed extraorally with isopropyl alcohol prior to any dental procedure.^[26]
- Preprocedural antimicrobial mouth wash with 0.2% povidone-iodine can decrease the viral load.^[14,34] As an alternative 0.5%–1% hydrogen peroxide (15 mL for 30 s), mouth rinse may be advocated.^[26,35] Chlorhexidine mouth rinse is found to be ineffective against Sars-CoV-2.^[14]
- Use of disposable (single-use) devices such as mouth mirror, syringes, and blood pressure cuff to prevent cross contamination is encouraged.^[13]
- Extraoral dental radiographs, such as OPG and CBCT, are appropriate alternatives during the outbreak of COVID-19 to avoid gag or cough reflex that can take place with intraoral radiographs. In case of use of intraoral radiography sensors need to be double barriered.^[36]
- If aerosol-generating procedures are required for emergency treatment, application of four-handed dentistry along with high-evacuation suction and rubber dam can reduce droplet production, spatter, and aerosols.^[23,26,27]
- Use of rubber dams with high evacuation suction should be made obligatory in clinics/hospitals for every

patient that undergoes dental treatment.^[13]

- Limit the use of aerosol-generating procedures^[26] and devices such as ultrasonic and high-speed hand pieces whenever possible.
- Prefer using a chemo-mechanical method of caries removal with the help of hand instruments.
- Anti-retraction valves in high-speed dental hand pieces can aspirate and oust fluid debris during the dental procedures. Therefore, anti-retraction dental hand pieces with anti-retractive valves should be used to prevent cross-infection.^[14,27,37]
- Use of disposable items with proper biomedical waste management protocol (including syringes, mouth mirrors, and blood pressure cuffs) is highly recommended.^[13]
- Collect all hand instruments immediately rinse them in running water and dip it into appropriate disinfectant for 30 min or as per the manufacturer guidelines. All water outlets, hand piece, 3 in 1 syringes, dental unit water lines should be flushed for 30–40 s with the disinfectant solution after every patient.^[26]

Universal precautions

- These are minutest prevention practices that apply to all patient care, whether in suspected or confirmed cases wherever health care is delivered. The implementations of these practices are designed to protect the health-care provider and prevent the patients from spreading infections.^[33]

Universal precautions include:

1. Hand hygiene, respiratory hygiene and cough etiquette to be meticulously followed.^[33]
2. Avoid aerosol generating procedures whenever possible.^[26,27] Practice non- aerosol generating procedures.^[27]
3. If aerosol generating procedures are necessary - Application of four-handed dentistry along with high evacuation suction and rubber dam can reduce droplet, spatter and aerosol production.^[13,23,26]
4. Use of PPE during all treatment procedures.^[33]
5. Sharps safety - Consider sharp items (e.g., burs, scalers, needles) as likely pathogenic when contaminated with patient's saliva and blood.^[33]
6. Safe injection practices – This will help prevent cross-contamination. (i.e., aseptic technique for parenteral medications).^[33]
7. Cleaning, disinfection and sterilization of instruments and devices along with disinfection of environmental surfaces.^[33]
 - Floor mopping with low level disinfectant – only wet mopping with 1% Sodium hypochlorite or Environmental Protection Agency (EPA) approved agents.^[26]

- Portable air cleaning system with High-efficiency particulate air filters (HEPA) and Ultraviolet (UV) light may be used.^[38] In case HEPA filters are unavailable – use of mechanical ventilation by fan or exhaust.^[26]

-Fumigation in clinic/hospital should be done periodically.^[26]

- 8 Dental prostheses, impressions, orthodontic appliances and other prosthodontic materials should be disinfected with an EPA-registered hospital disinfectant as soon as after removal from patient's mouth.^[39]

Hand hygiene

Hand hygiene guidelines were given by the WHO in 2009, and they are important for prevention and spread of infection. Dental personnel should avoid touching their mouth, eyes, and nose.^[14,39] Use ABHRs, when hands are not visibly stained (saliva or blood) or running water is not available. Otherwise use soap and water for washing hands. Hand hygiene must be performed for at least 20 seconds.^[14,23,26,40]

1. Before patient examination
2. Before dental procedures
3. If gloves are torn or compromised during the procedure
4. After removing gloves
5. After touching the patient
6. After touching surroundings or equipment that is not disinfected.

Personal protective equipment

- These are apparel designed to protect health-care personnel from infectious microorganisms or agents. They prevent the spread of infections in the clinic/hospital. PPE includes face masks, gloves, face shields, protective eye wear, and protective clothing (e.g., reusable or disposable gown).^[33]
- Gloves should be donned whenever there is potential contact with body fluids, mucous membranes, blood, non-intact skin or contaminated instrument, or equipment.^[33]
- Wear PPE during all the dental procedures where contact with saliva or blood is likely to be expected.^[33] Wear mouth, eye, and nose protection during procedures that generate spatter or splashes of body fluids or blood.^[33] PPE should be removed before leaving the clinic/hospital to avoid the spread of infection.^[33]
- During dental procedure, including examination of patients and N95 respirator, should be donned. Respirators should mandatorily be CDC (Center for disease control) or NIOSH (National Institute for Occupational Safety and Health) certified. To prolong the life of N95 higher-level respirator, a surgical mask may be put over it which can be changed after every patient. Disposable masks/respirators can be discarded after

several hours of use.^[41] If a respirator is not available, use a combination of a surgical mask and a full-face shield.

- Use FFP3– Standard mask during the treatment of COVID-19-positive patients.^[26]
- Eye protection includes face shields and goggles. These protect the mucous membranes in eyes from body fluids and blood. If infected eye protection makes contact with the eyes, microorganisms in fluid can enter the body through the mucous membranes. Reusable eye protection must be cleaned and disinfected prior to reuse. Disposable eye protection should be discarded after every use.^[33]
- Clothing includes gowns, aprons, head covering, and shoe covers. Autoclavable full-sleeve surgical gowns or disposable surgical gowns are recommended for dental procedures. Gowns should be discarded if heavily soiled with body fluids or punctured and in between patients.^[33]
- The sequence for donning PPE is gown, mask/respirator, face shields or goggles, and gloves. The sequence for doffing PPE is gloves, goggles/face shield, gown, and mask/respirator.^[13]

Cleaning and disinfection of environmental surfaces

- Cleaning with water, soap, and mechanical action (brushing or scrubbing) removes dirt, debris, and organic matter such as blood and body fluids, but does not kill microorganisms.^[42,43] Direct contact of disinfectant can impede the surface of organic matter and inactivate the germicidal properties or mode of action of several disinfectants. Disinfectant concentration and contact time are critical for effective surface disinfection. Cleaning should start from the least soiled to the most soiled surfaces and from the higher to lower levels so that debris/dirt may fall on the floor and is cleaned in the last. Soiled cloths should be reprocessed after each use and daily cleaning should start with fresh cloths. Equipment used for COVID-19 suspected/positive patients should be color coded and separated from other equipments.^[42]
- Chemical disinfectant should be applied after cleaning to kill remaining microorganisms. Following disinfectants can be used in reduction of coronavirus on environmental surfaces.^[35]
 1. Ethanol 70%–90%
 2. Chlorine-based products (e.g., hypochlorite) at
 - a. 0.1%(1000 ppm) for general environmental disinfection or
 - b. 0.5% (5000 ppm) for blood and body fluids large spills.
 3. Hydrogen peroxide >0.5%.
- To clean and disinfect the dental operatory after a patient without COVID-19, wait for 15 min after the completion of dental procedure to allow droplets to sufficiently fall from the air and then should be disinfected properly.^[23,44]

- Wet mopping with freshly prepared 1% sodium hypochlorite (with contact time of 10 min) through separate mops for clinical setting from inner to outer area (unidirectional mopping technique) should be followed.^[26,27] After mopping wash the mop with clean water, disinfect with 1% sodium hypochlorite and then leave for sun-drying.^[27]
- EPA only recommends the use of the surface disinfectants against the virus that causes COVID-19.^[23]
- Dental chair along with auxiliary parts within 3 feet of distance should be cleaned and sterilized using cotton/gauge piece with 1% sodium hypochlorite from inner to outer surface and should be then left for drying.^[27]
- Fumigation is done on the daily basis in clinical or high contact areas and biweekly in nonclinical or low contact areas.^[26] It should be followed as depicted in Figure 1.^[26]
- Routine application of disinfectants to environmental surfaces indoors by spraying or fumigation is not recommended for COVID-19. This may cause adverse health effects on workers where these methods have been used.^[45,46] Spraying in these areas may miss surfaces shielded by objects or surfaces with intricate designs. Disinfectants should be applied using a cloth or wipe soaked in disinfectant.^[42] The use of UV light irradiation should be considered along with air flow circulation.^[23]
- **Use of UV light:** UV light has germicidal effect and can efficiently inactivate viruses of different strains.^[47] Coronavirus that causes SARS virus is shown to be inactivated by UV light at 254 nm, but it may be hazardous to eyes and skin.^[48,49] Microorganisms be it bacteria or viruses are of a micrometer or smaller dimensions; far-UVC can penetrate as well as inactivate them.^[50] As coronaviruses have similar genomic size, it is likely that far-UVC light will show comparable inactivation efficiency against other human coronaviruses.^[49,51]
- **Air flow circulation:** Directional air flow should be used to clear contaminated aerosols, spatter, or mists from the dental setting.^[26] Air must be drawn into the room from the outside. It should flow from less contaminated (staff work area) to more contaminated area (treatment area) and from there to the external environment either

through fans/exhaust or through HEPA filters.^[26] HEPA filters and use of UV irradiation target on decontamination of air.^[38,52] HEPA filters decrease the concentration of pathogens and contain the spread of infectious airborne diseases.^[38] In case, HEPA filters are unavailable, use of natural ventilation, or mechanical ventilation by fan or exhaust in such a case can remove mists or aerosols generated during treatment procedures.^[26]

CONCLUSION

Adherence to clinical management protocol in dental clinic/hospital is necessary to block virus transmission which will further contain and prevent the spread of COVID-19 from patient to dental health-care provider or vice-versa, also from patient to patient. Management protocol including proper prescreening of patients along with the use of hand and respiratory hygiene, antimicrobial mouth rinse of patients, wearing PPE, use of rubber dam with high evacuation suction and anti-retraction hand piece need to be incorporated in dental practice. Thus, it is important to make informed clinical decisions and educate the public to prevent panic while promoting the health and well-being of patients during these challenging times. Dental Health Care Personnel should also be aware of the local health authority protocol or testing laboratories for COVID-19 and report any patient with relevant history for further requisite medical care.

Disclaimer

It is to be noted that this protocol is formulated based on the currently available data and is likely to change over time with the further evidence and evolution of the disease.

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Conflicts of interest

There are no conflicts of interest.

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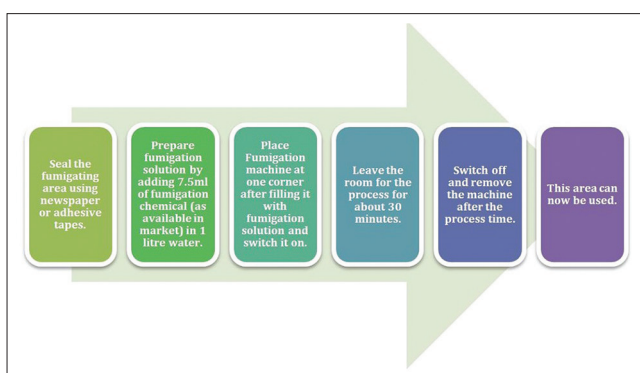


Figure 1: Fumigation procedure

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