Biomedical waste management in dentistry during COVID-19 pandemic: What the guidelines recommend?

ABSTRACT

In the current coronavirus disease 2019 pandemic, dentists, auxiliaries as well as patients undergoing dental procedures are at high risk of cross-infection. Many patients who are asymptomatic may be carriers. For this reason, it is suggested that all patients visiting a dental office must be treated with due precautions. Ample amount of data is available which is mainly focusing on infection prevention and asepsis protocol for dental set ups with little emphasis on biomedical waste (BMW) management which is equally important in curbing the spread of the disease to health-care workers and general population. This article highlights the updated guidelines of BMW management to be followed in various dental set ups to prevent this spread to health-care workers dealing with the disposal of waste generated while treating patients in dental care.

Keywords: Biomedical waste management, dentistry, nosocomial infection, waste disposal

INTRODUCTION

The risk of infection with coronavirus disease 2019 (COVID-19) has been found higher for people in close contact of a confirmed case of COVID-19, health-care workers, family members, or people living in or recently been to an area with ongoing spread of COVID-19. Considering the transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) globally and utilization of personal protective equipment (PPEs) by medical personnel as well as general public led to excessive biomedical waste (BMW) generation which has become a new major threat to humans and the environment. Improper handling of hospital waste might aggravate the spread of SARS-CoV-2 to medical staff and people who handle waste.[1]

Proper BMW management in accordance to the stipulated rule was one of the neglected aspects of health care for years, especially in developing countries like India. In addition to the BMW Management Rules, 2016 by Government of India, Ministry of Environment, Forest and Climate Change which prescribed simple categories (color coded) for segregation of different BMWs, an amendment in 2018 also came into force with the aim to improve the compliance to the rules.[2]

Amidst the COVID-19 pandemic, the scenario might worsen as evidenced by some initial experiences, with piles of PPE accumulating in the hospital.[3] Infection control practices and vigilance while disposing the waste generated in various hospitals during this pandemic are of utmost important to prevent its spread to community.

With the advent of the coronavirus infection, the health-care waste management authorities have carefully evaluated the situation and certain modifications have been incorporated

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to be implemented. As dental procedures involve higher incidences of aerosol production and constant contact with saliva, the transmission in a dental setup is highly likely. Thus, repeated trainings and reinforcement of updates and guidelines regarding infection control and BMW management are a must in the present scenario to actively deal with the increased risk of infection, spread of disease by cross infection in the workplace and consequently in the society. This article highlights the updated guidelines of BMW management to be followed in various dental centers to prevent this spread to health-care workers dealing with the disposal of waste generated while treating patients in dental care.

**BIOMEDICAL WASTE MANAGEMENT IN TERTIARY CARE CENTER**

In the current COVID-19 pandemic, dentists, auxiliaries as well as patients undergoing dental procedures are at high risk of cross-infection. Most dental procedures require close contact with the patient’s oral cavity, saliva, blood, and respiratory tract secretions. Saliva is rich in COVID-19 viral load. Many patients who are asymptomatic may be carriers. For this reason, it is suggested that all patients visiting a dental office must be treated with due precautions. Dental hospital should have separate screening area, triage area, waiting area, and dental operatory for performing the procedures of various specialties. As our hospital is one of the highest referral dental centers, hospital is divided on floors according to various specializations. All categories of waste are generated on all the floors, namely autoclavable, incinerable, sharps, liquid waste, and general waste. There should be red, yellow, blue, and white BMW bins for all. Red and yellow bins should be lined with color-coded liners.

Following standard operating protocol has been designed by using the current data available from the guidelines and advisories issued from time to time by various agencies including World Health organization, Center for Disease Control (CDC), Indian Council for Medical Research, Dental Council of India, and Indian dental association.

**Recommendations for screening area**

- A separate area should be dedicated for screening of patients coming for dental problems
- Current medical history and past history particularly pertaining to symptoms of Severe Acute Respiratory Illness (fever AND cough and/or shortness of breath) or all symptomatic influenza-like illness (fever, cough, sore throat, and runny nose) must be analyzed
- This screening should be done by a team with full PPE, including gown, head cap, gloves, goggles, face shield, and shoe cover maintaining a physical distance between the dentist and patient
- Any positive responses to either of the questions should raise concern, and care should be postponed for 3 weeks except in dental emergencies
- Sampling is also undertaken at our hospital in case patients show any symptoms of COVID-19 and patients requiring any emergency surgeries in case of traumatic injuries
- The samples taken should be labeled properly with patient details and marked as COVID-19 and sent to laboratory as soon as possible. In case, any sample is wasted while taking it should be disposed in yellow bag and labeled accordingly
- The team wearing the PPE should follow the doffing protocol according to the CDC guidelines and segregate the components of PPE according to the BMW, 2016 rules as mentioned in Table 1.

**Recommendations for triage area**

- A team of dentists and other paramedical staff obtain screening details about dental history and try to manage problems with advice and analgesics and local measures
- Comprehend dental treatment according to the urgency of the required treatment and the risk and benefit associated with each treatment
- Appointment should be given to patients requiring urgent treatment whose history, problems, and procedures are already identified to some extent through previous screening and triage. At this point also, BMW management rules, 2016 should be followed by the dentist and paramedical staff, as mentioned in Table 1.

**Recommendations for waiting area**

- Display visual alerts at the entrance of the facility and in strategic areas (e.g., waiting areas or elevators) about respiratory hygiene, cough etiquette, social distancing, and disposal of contaminated items in trash cans
- Install glass or plastic barrier at the reception desk, preferably with a two-way speaker system
- Ensure availability of sufficient three-layer masks and sanitizers and paper tissue at the registration desk, as well as nearby hand hygiene stations
- Distant waiting chairs, preferably a meter apart
- All areas to be free of all fomite such as magazines, toys, TV remotes, or similar articles
- Cashless/contactless payment methods are preferred
- A bin with lid should be available at triage where patients can discard used paper tissues.

**Recommendations for dental operatory**

- Practice nonaerosol-generating procedures
- Use of rubber dam is encouraged
Table 1: Biomedical wastes categories and their segregation, collection, treatment, processing and disposal options which is in accordance to biomedical waste management Rules, 2016[5].

| Category | Type of waste | Type of bag or container | Treatment and disposal options |
|----------|---------------|--------------------------|-------------------------------|
| Yellow   | (a) Human anatomical waste: Extracted teeth, gingival tissues excised during gingival and periodontal surgeries, odontomes, and supernumerary teeth | Yellow coloured nonchlorinated plastic bags | Incineration or plasma pyrolysis or deep burial |
|         | (b) Soiled waste: Items contaminated with blood and saliva | | |
|         | Disposable Coveralls, surgical gowns, N-95 mask, surgical masks, head cap, shoe cover which constitute the PPE currently being used | | |
|         | (c) Microbiology, biotechnology and other clinical laboratory waste: COVID-19 testing swabs | Autoclave safe plastic bags or containers | |
| Red      | Contaminated waste (recyclable) | Red coloured nonchlorinated plastic bags or containers | | |
|         | (a) Wastes generated from disposable items such as gloves, plastic syringes Goggles, face shields | | |
| White    | Waste sharps including metals: Needles, syringes with fixed needles, needles from needle tip cutter or burner, scalpels, blades, or any other contaminated sharp object that may cause puncture and cuts | Puncture proof, leak proof, tamper proof containers | | |
| Blue     | (a) Glassware: Broken or discarded and contaminated glass like anesthetic solutions vials | Cardboard boxes with blue colored marking | | |
|         | (b) Metallic body implants | | |

Modified as per waste generated from dental health care facilities

- For examination only, wear a triple layer surgical mask and protective eyewear/face shield and gloves
- Wear N95 face masks, protective eyewear/face shields and gloves along with coverall for high risk and very high-risk procedures
- After the patient leaves the treatment room, the Assistant will collect all hand instruments immediately; rinse them in running water to remove organic matter and as per standard sterilization protocol
- All 3 in 1 syringe, water outlets, hand piece water pipelines, etc., should be flushed with the disinfectant solution for 30–40 s
- Remove water containers and wash them thoroughly and disinfect with 1% sodium hypochlorite using clean cotton/gauge piece and then fill with fresh 0.01% sodium hypochlorite solution and attach back to the dental chair
- Then, disinfect the dental chair along with all the auxiliary parts within 3 feet of distance using 1% sodium hypochlorite and clean and sterilized cotton/gauge piece using inner to outer surface approach and leave for drying. New cotton/gauge piece should be used for every surface. The areas are as follows:
  a. Patient sitting area and armrests
  b. Dental chair extensions, including water outlets, suction pipe, hand piece connector, 3 in 1 syringe, etc.,
  c. Dental light and handle
  d. Hand washing area slab and tap nozzle
  e. Clinic walls around the dental chair and switchboards
  f. Hand washing area slab and tap nozzle.
- Hand pieces should be cleaned using a hand piece cleaning solution to remove debris, followed by packing in the autoclave pouches for autoclaving. Record to be maintained for the same
- The waste generated after the procedure should be segregated according to BMW management Rules 2016, as mentioned in Table 1
- Doffing area should be equipped with red and yellow bins for the disposal of components of PPE Kit.

**Recommendations for fumigation of operatory**

It is used as “No-touch surface disinfection” and not for disinfection of air after a large area has been contaminated. The commercially available hydrogen peroxide is 11% (w/v) solution which is stabilized by 0.01% of silver nitrate. A 20% working solution should be prepared. The volume of working solution required for fogging is approximately 1000 ml per 1000 cubic feet. After the procedure has been completed in the operatory (in case of no negative pressure), exit the room and close the operatory for half hour for the aerosols/droplets to settle down. Perform the 2 Step surface
cleaning followed by fogging. The fogging time is usually 45 min followed by contact time/dwell time of 1 h. After opening of room, fans should be switched on for aeration. Wet surfaces can be dried/cleaned by using a sterile cloth or clean cloth (other surfaces).

According to Central Pollution Control Board (CPCB) guidelines in view of coronavirus pandemic, following specific guidelines for the management of waste generated during diagnostics and treatment of COVID-19 suspected/confirmed patients, are required to be followed by all the stakeholders including isolation wards, quarantine centers, sample collection centers, laboratories, Urban Local Bodies and Common biomedical waste treatment facility (CBWTF), in addition to existing practices under BMW Management Rules, 2016.

These guidelines are based on current knowledge on COVID-19 and existing practices in management of infectious waste generated in hospitals while treating viral and other contagious diseases like HIV, H1N1, etc.

**STEPS TO BE FOLLOWED BY DENTAL HEALTH-CARE FACILITIES**

- Keep separate color coded bins/bags/containers in dental operatory where the treatment shall be carried out and maintain proper segregation of waste as per BMWM Rules, 2016 as amended and CPCB guidelines for the implementation of BMW management rules
- Double-layered bags (using two bags) should be used for the collection of waste to ensure adequate strength and no-leaks
- Collect and store BMW separately prior to handing over the same CBWTF. Use a dedicated collection bin labelled as “COVID-19” to store COVID-19 waste of suspected patients and keep separately in the temporary storage room before handing over to authorized staff of CBWTF
- General waste not having contamination should be disposed as solid waste as per SWM Rules, 2016
- Maintain separate record of waste generated from operatory involved in screening and treatment of suspected COVID-19 patients
- The inner and outer surface of containers/bins/trolleys used for storage of COVID-19 waste should be disinfected with 1% sodium hypochlorite solution daily
- Report opening of dental hospitals to State Pollution Control Boards (SPCBs) and respective CBWTF located in the area
- Depute dedicated sanitation workers separately for BMW and general solid waste so that waste can be collected and transferred timely to temporary waste storage area
- Collect used PPEs such as goggles, face-shield, splash proof apron, plastic coverall, Hazmet suit, and nitrile gloves into red bag
- Collect used masks (including triple layer mask, N95 mask, etc.), head cover/cap, shoe-cover, disposable linen gown, nonplastic or semi-plastic coverall in yellow bags.

**DUTIES OF COMMON BIOMEDICAL WASTE TREATMENT FACILITY (CBWTF)**

- Report to SPCBs about receiving of waste from dental centers involved in the treatment of suspected or confirmed COVID-19 patients
- Operator of CBWTF shall ensure regular sanitization of workers involved in handling and collection of BMW
- Workers shall be provided with adequate PPEs including three layer masks, splash proof aprons/gowns, nitrile gloves, gum boots, and safety goggles
- Use dedicated vehicle to collect COVID-19 waste. Vehicle should be sanitized with sodium hypochlorite or any appropriate chemical disinfectant after every trip
- COVID-19 waste should be disposed-off immediately upon receipt at facility. In case it is required to treat and dispose more quantity of BMW generated from COVID-19 treatment, CBWTF may operate their facilities for extra hours, by giving information to SPCBs
- Operator of CBWTF shall maintain separate record for collection, treatment, and disposal of COVID-19 waste
- Do not allow any worker showing symptoms of illness to work at the facility. May provide adequate leave to such workers and by protecting their salary.

**DUTIES OF STATE POLLUTION CONTROL BOARD**

- Shall maintain the records of dental hospitals involved in the treatment of suspected/confirmed COVID-19 patients as recording of other COVID-19 hospitals treatment wards/quarantine centers/quarantines homes in respective States
- Ensure proper collection and disposal of BMW as per BMW Rules, 2016
- Allow CBWTFs to operate for extra hours as per requirement
- In case of generation of large volume of yellow color coded (incinerable) COVID-19 waste, permit HW incinerators at existing TSDFs to incinerate the same by ensuring separate arrangement for handling and waste feeding.
MANAGEMENT OF WASTEWATER FROM HEALTH CARE FACILITIES[4,8]

As per the information available at CDC, the risk of transmission of virus that causes COVID-19 through sewerage systems is thought to be low. Transmission to operators may be possible during treatment of sewage treatment plants (STPs), however there is no evidence to date that this has occurred. Therefore, following guidance recommended for health care facilities (HCFs) and the operators of STPs;

- Responsible agencies are HCFs/operators of terminal STPs (PHED/Jal Board/etc.)
- HCFs and the agencies operating STPs should continue to ensure disinfection of treated wastewater as per prevailing practices to inactivate coronaviruses
- Operators of Effluent Treatment Plants/STPs attached with discharge from HCFs should adopt standard operational practices, practice basic hygiene precautions, and wear PPE prescribed for operation of STPs. PPEs should include Goggles, face mask, liquid repellant coveralls, waterproof gloves and Rubber boots
- During the period of COVID-19 pandemic, utilization of treated wastewater in utilities within HCFs may be avoided.

CONCLUSION

In the current scenario of outspreading pandemic of COVID-19 globally, BMW management should be a shared teamwork with committed government backing, good BMW practices followed by both health-care workers and HCFs, continuous monitoring of BMW practices, and strong legislature. It is our fundamental right to live in the clean and safe environment. The pillar of BMW management is segregation of waste at source and waste reduction. The current CPCB guidelines revised in 2020 are an improvement over earlier rules of BMW, 2016 in terms of improved segregation, transportation, and disposal methods, to decrease environmental pollution and ensure the safety of the staff, patients, and public.

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