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PROTOCOLS FOR HEALTHCARE WORKERS IN THE FIELD OF ORTHOPEDICS IN COVID-19 PANDEMIC

Orthopaedics

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ABSTRACT

The COVID.19 pandemic has afflicted more than 7.1 million individuals all over the world with global death reaching 4,06,616 by the second week of June 2020, thereby prompting widespread implementation of measures of personal protection against spread, not only in the community but also in the healthcare setup.[1] The susceptibility of the healthcare workers is a crucial link in the spread of the disease. The average number of new cases all over the world is over 1,00,000 per day. Based on collective interpretation of existing recommendations and data, we present General surgical and Orthopedic specific guidelines for precautionary measures that not only prevent the infection with SARS-CoV2 but also decreases incidence of other hospital acquired infections (HAI).

KEYWORDS

Healthcare workers, COVID-19 precautions, Orthopedics

INTRODUCTION

Just like its family members, SARS-CoV-2 is a respiratory pathogen that is potentially transmitted via droplet and contact. What makes the healthcare setting vulnerable to the virus are the various aerosol generating procedures (like nebulized medication administration, diagnostic sputum induction, bronchoscopy, airway suctioning, endotracheal intubation, positive pressure ventilation via face mask, etc.) with multiple HCWs being exposed at the same time in the same room. Droplet infection spreads when the distance between the case and at-risk individual is less than 3 feet. [2] To prevent community spread, droplet and contact precautions come into play, however talking about healthcare facilities, importance to airborne precautions must be given as well. Aerosolized particles (<5 µm particle size) tend to remain infectious over long distances unlike the droplets (5 µm - 10 µm particle size). Due to this special air handling and ventilation become a part of precautionary measures.

Secondly the preparedness of the healthcare workers has a significant role to play in the virus transmission. Breaches in the PPE selection, donning and monitoring their use and inability to maintain infection control (unnecessary touching of surfaces with contaminated gloves) are also to be held responsible for the healthcare facility spread.

GENERAL MEASURES - TRIAGE IN COVID TIMES AND TESTING THE

PATIENT

Since the disease presents with non-specific signs and symptoms, screening should be broadly based on symptoms like fever, dry cough, myalgia and history of contact/ travel to endemic area within last 14 days. Any positive finding should prompt isolation of the patient to the infectious disease triage ward where a more focused assessment can be done like chest radiography, rapid tests, blood tests and specimen collection from the upper respiratory tract. Current tests being used to implement isolation are reverse transcriptase - polymerase chain reaction (RT-PCR) to detect viral antigen. The test's sensitivity is questionable and hence two tests are required to be conducted 24 hours apart and/or addition of chest imaging modality like CT scan, chest X ray is recommended.[3] In dealing with suspected or probable SARS patients in other wards, healthcare workers should maintain a high index of caution with the full standard barrier protection like PPEs in carrying out short-range procedures or examinations (where droplet or contact spread can occur)

VENTILATION GUIDELINES

The spread of COVID-19 in healthcare settings can be majorly attributed to aerosolization of the upper respiratory tract droplets. This directs special attention to ambient settings involving the air circulation in wards, outpatient departments, Intensive care units, operation theatres and isolation rooms.[4][5]These are:

- The ambient temperature should be in the range of 24 degree Celsius to 30 degree Celsius with the ambient relative humidity maintained between 50%-60%.
- optimize intake of fresh air by opening of doors or windows with air replacement supported by exhaust fans and cross ventilation. Circulation of air optimized by ceiling fans and avoiding re-circulation.
- Try to avoid central air conditioning. In situations where centralized AC is inevitable, certain points are to be kept in mind : conditioned air should be delivered by Air Handling Units (AHUs) and run on maximum fresh air as much as possible, ACs should be run at least 2 hours prior and stopped 2 hours after the office time and the filters should be cleaned and sanitized frequently.
- Surface decontamination Should be practiced frequently. Wherever chemical disinfection/sterilization is performed, air quality must be monitored when using products that produce toxic vapors and mists.
- Reusable medical equipment/devices must be thoroughly cleaned prior to disinfection or sterilization.
- Negative pressure in isolation rooms and where patients require aerosolization procedures. The air conditioning of these rooms should not be centralized rather these should have standalone air conditioning provision.
- If negative pressure needs to be created, use 3-5 exhaust fans to drive air out of the room.

OUTPATIENT/OFFICE SETTINGS

The outpatient wards can be managed by the adhering strictly to hygienic measures amongst the staff members. Ensure the staff members do not have any symptoms or history of contact/travel withing the last 14 days. Patients with co morbidities like diabetes mellitus, COPD, ESRD, CHF and extremes of ages like elderly people >65 years of age must be isolated on first encounter because they are extremely susceptible to the virus and prone to morbidity associated with it.

The ancillary staff needs to be well educated about the implications of the disease and the preventive measures being adopted. They must be explained the relevance of preliminary targeted history taking regarding age, social habits (smoker/nonsmoker), associated conditions (asthma, DM, etc.), medication history (immunos uppressants, corticosteroids). Basic precautionary measures are to be adopted presuming that every patient who shows up in the OPD is a probable COVID case. The office design should be such that all contact and droplet precautions are maintained without any negligence towards the patient. Following measures can be taken:

- Non-contact thermographic screening can be made mandatory at the reception/entrance. The desk and waiting area should be at a considerable distance with at least 3 feet gap strictly maintained

between the patients in the waiting area. Ensure that the waiting area is well equipped with hand sanitizers with patients having free access to it.

- Assure availability of sufficient necessary supplies for the staff for adherence to Standard Precautions (e.g., hand hygiene products like Alcohol based hand rubs, antiseptic soaps; personal protective equipment; equipment for safe injection practices, for respiratory/ cough etiquettes, etc.).
- Implement mechanisms and policies that promptly alert key facility staff to recognize a potential COVID-19 patient. Educate the staff about visible signs and symptoms of the disease and the red flags and train them in efficiently managing and isolating the patient from rest of the susceptible people into the triage ward.
- Hand hygiene is the key to contact precaution. Avoid unnecessary touching of surfaces in close proximity to the patient
- The staff in the isolation ward should be in PPE at all the times. Hand hygiene is a must before donning the PPE and after removing it. Remove PPE at doorway before leaving patient room or in anteroom
- Make sure the clothing beneath the PPE is not contaminated. This can be ensured by following proper PPE donning methods. Torso should be covered from neck to knees, arms to end of wrists, and then the PPE is to be fastened on the back at neck and waist. The mask should fit snugly below the chin concealing both nostrils and mouth. Seal check the respirator. Non-sterile gloves should be appropriately selected according to one's hands size.
- In the normal ward, in case PPEs are in shortage, all the staff must be wearing protective eye goggles, gloves, surgical gown and show covers to fulfil the minimum precautionary measures during the pandemic.
- Surface decontamination: The basis behind this strategy lies on the microscopic structure of the virus. Coronavirus is an enveloped, single stranded RNA virus. The envelope is what makes it susceptible to agents like chlorine, alcohol, hydroperoxide. The staff should be trained in safe disinfectant preparation, with not too high or too low concentrations which could harm the users or could make the solution ineffective respectively. To clean the surfaces frequently and not to touch the surfaces unnecessarily.

ORTHOPEDICS

Even during the lockdown, considerable amount of orthopedic patients maybe expected. In India, the discrepancy in the doctor-patient ratio is unbridgeable. There is one orthopedic surgeon for every 62,500 people in India.[6] While the roadside trauma cases are not much to be seen causing a somewhat decline in emergency procedures (although they are again on rise probably due to lifting off lockdown in some areas of the nation), however cases like those of traumatic injury, falls in elderly, domestic violence or assault or elective surgeries for degenerative diseases still pour in.

General Concerns:

Due to coronavirus pandemic, most of the elective surgical operations have been either postponed or cancelled. In UK, it has been suggested that stopping the elective surgery has increased the availability of the ventilators for COVID-19 patients. Doctors and nurses from various departments are being deployed in acute medical wards and are being given extra training for their roles in these wards [7]. But the main concern for orthopedic department in this pandemic is regarding the patients requiring urgent services. Most of the countries like Singapore have allowed orthopaedecians to attend urgent and emergency cases like musculoskeletal trauma and tumors. Other than this, surgical cases requiring <23 hrs. of hospital stay have also been allowed. Procedures like arthroscopy, implant removals etc. discharged expediently have low risk of nosocomial COVID 19 exposure. But elective procedures requiring >23 hours of hospital stay has been postponed or cancelled. These cases require continuous medical attendance and due to epidemic, the availability of medical personnel to attend to these cases is difficult. Apart from this, there is significant risk of nosocomial COVID-19 infection if patients are admitted for >23 hours [7]. Apart from this, there is huge concern of spread of infection due to interdepartmental referrals requiring consultations from other departments. In a populous country like India, due to resource disparity, the elective surgery scenario is almost at halt. There is shortage of orthopedic surgeons in India and with the effect of national lockdown, there must be huge number of patients who were not able to reach higher orthopedic centers for elective operations [8]. Also, in a country like India, there is problem of neglected orthopedic trauma as well as treatment from non-certified individuals, quacks which result in suboptimal care and further increases risk of COVID-19 infection[9].

Perioperative Concerns:

COVID-19 spreads due to droplet infection or contaminated surface contact . In orthopedic surgery, there is increased risk of infection spread due to aerosol generating procedures (AGPs) like Intubation, Cardiopulmonary resuscitation, manual ventilation may increase the risk of spread. Also, during procedures like pulse lavage, use of instruments (drills) causes mechanical disruption of blood and causes aerosol formation which increases risk of infection propagation[10]. The risk of spread is mainly through symptomatic patients but asymptomatic patients can also spread infection. The risk is decreased if there is a distance of >1m from infected individual . Face masks are important in preventing the transmission of virus through droplets. Surgical masks can be helpful in preventing the spread as it was seen that 85% of personnel in close contact with COVID 19 patient wearing surgical masks did not get infected [11]. Some studies have suggested that surgical mask and N95 mask may have similar protective power in outpatient or low risk encounters but if involved in aerosol generating procedures, N95 masks are needed as recommended by WHO.

INTRAOPERATIVE CONSIDERATIONS

If patient is COVID-19 positive or is a suspect, there should be minimum people involved with the surgery and surgery should be done in negative pressure ORs. If negative pressure ORs not available, positive pressure should be turned off and HEPA filtration system with frequent air changes should be employed [12]. While preparing for operative surgery, certain things need to be considered. Before entry into OR, proper protection equipment including scrub suit, surgical shoes, surgical hood, face shield and mask (N95 recommended) is required.

Utmost importance should be given to proper hand hygiene. When in OR, positioning of patient should be done while wearing additional surgical hood, non-sterile surgical gloves and mask, preferably in prone position to reduce viral transmission through respiratory droplets.[13]

Non-sterile mask and gloves should be discarded before scrubbing which should be followed by donning of sterile gowns and gloves. Saw Drill and electrocautery usage is associated with generation of aerosols therefore, use should be minimized. Usage of catgut suture to control bleeders instead of electrocautery or using electrocautery at low power setting can be employed with liberal use of suction devices. Even power saws and power drills can be covered with transparent disposable sterile coverings. To reduce post-op visits, various things can be kept in mind like usage of absorbable sutures, use of splint rather than plaster.

Usage of transparent film dressings can also reduce patient contact while managing wound as it can facilitate contact-less examination of wound [14]. After completion of surgery, sterile gown and followed by proper hand washing which is again repeated after sequential removal of PPE.

POSTOPERATIVE CONSIDERATIONS

A positive COVID-19 patient should be admitted to isolation ward and measures should be taken to reduce the need for repeated contact. Massey et al. suggested that monitors and machines for IV drug administration should be placed outside the patient's room[12].

Personnel taking care of the patient should be compartmentalized efficiently as (i) Inpatient team for ward visits, interdepartmental calls, (ii) Outpatient team for urgent post-op visits, (iii) surgical team. Avoid contact amongst these teams.

Post operative physical therapy should be suspended according to all international societies and tele health services should be employed.

Outpatient Considerations: Face to face visits should be minimized and should only be limited to urgent cases and selected post-op care e.g. wound check, healing related complications, suture removal etc. All patients should wear face masks and no companion should be allowed except cases who are non-ambulatory or disabled. Doctors should take proper precautions (PPE, N95 or surgical masks) and maintain hand hygiene. Telemedicine should be encouraged along with use of video calling platforms as well as home phone consultations.

DISCUSSION

During the COVID-19 pandemic, many healthcare professionals including medics and paramedics, esp. related with surgical and orthopedic field are getting affected and majority of them are unaccounted for. The measures for efficient preparedness of healthcare workers need to be discussed now, more than ever. The precautionary measures to be followed by the surgeons, residents and ancillary staff should involve interdis ciplinary knowledge of surgical precautions as well as preventive medicine. This article discusses recommendations to prevent the SARS- CoV2 spread in non-emergency outpatient settings which thereby helps decrease the imminent risk to the community.

Relevance of hand hygiene and personal protective equipment is highlighted. Then there are emergency cases where the general assessment including COVID-19 testing should be immediately commenced. Certain cases cannot be delayed for 24 hours and require urgent care, in those cases a negative patient is also considered a Covid suspect and aforementioned operative precautions are taken. The appropriation of elective surgery is decided by various factors like supply of equipment, personnel availability and interdepartmental decision.

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