

Safety Measures for Operating Team and Operation Theater During the Current Scenario of COVID-19

Shameen Shoaib^{1*}, Syed Wahajuddin¹, Sobia Majeed¹, Sobia Naseem Siddiqui², Afsheen Shoaib³, Fauzia Hashmi⁴, Muhammad Jamaluddin¹, Syed Khurram Fareed²

¹Abbasi Shaheed Hospital, Karachi, Pakistan.

²Dow University of Health Sciences, Karachi, Pakistan.

³Darul Sehat Hospital, Karachi, Pakistan.

⁴Jinnah Postgraduate Medical Centre, Karachi, Pakistan.

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Abstract: The COVID-19 has become a major threat to Pakistan and worldwide, and has become a significant issue for global health, economy and societies. This rapid spread was occurred from Wuhan, China to most of the part of the world. To elaborate the concept and recommendations regarding the safety precautions in operation theater (O.T) and inside associated team during the current scenario of COVID-19. Many research and review articles were studied to collect information about Covid-19 and strategies published in various journals using the search engine, PubMed and Medline. The COVID-19 has significantly changed all aspects of daily life around the world since very start of this year 2020. SARS-CoV-2 (COVID-19), a novel corona virus, has been infected many healthcare workers. In this perspective, hospitals need a strategy to manage their resources, staff and supplies so that patients receive optimal treatment. A decision tree algorithm was developed that defined the recommendations for safety measures in operation theater and operating procedures, these include identifying and developing an isolation room, administrative measures such as transformations in working flow and procedures, introducing personal protective equipment for the employees and formulating anesthetic clinical guidelines. These control actions are essential to enhance the excellence of care provided to COVID-19 patients and to minimize the risk of spread to other patients or staff. The operating room is a dynamic environment with numerous staff like anesthesiologists, physicians, nurses, O.T attendants and technicians; however, we agree that the containment steps are important in order to improve the standard of treatment provided to COVID-19 patients and to minimize the chance of viral spread to patients other than COVID-19 and hospital staff.

Key Words: Safety measures, operation theater, Covid-19.

Corresponding Author: Department of Surgery, Abbasi Shaheed Hospital, Karachi, Pakistan. Cell: 0335 2493696. Email: shameenshoaib@yahoo.com

INTRODUCTION

In the city of China, Wuhan in December 2019, the novel corona virus SARS-CoV-2 (COVID-19) was detected, after that outbreak of COVID-19 emerged and spread rapidly all over the world [1]. It was soon discovered that a novel coronavirus was responsible, so the novel (new) corona virus was designated as the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2, 2019-nCoV) due to its high homology (~80%) to SARS-CoV, which caused acute respiratory distress syndrome (ARDS) and high mortality during 2002–2003 [2]. The SARS-CoV-2 was considered zoonotic transmission via the sea food commercial sector in Wuhan, China. The disease caused by this virus was called Coronavirus disease 19 (COVID-19) and a pandemic was declared by the World Health Organization (WHO). The WHO declared public health emergency worldwide on 30 January 2020, as a consequence of severe acute respiratory syndrome Coronavirus-2 (SARS-CoV-2) [3]. More than 750, 000 cases have exceeded the capacity across 170 countries on 30 March 2020, with more than 36, 000 reported deaths. Till May 2020, there have been 5, 716, 766 cases around the world, of which 352, 965 deaths have been reported and in Pakistan 59, 151 cases and 1, 225 deaths have occurred, with number of cases on rise every day [4].

Respiratory droplets, contact, fomites and with virus contaminated environment are the likely modes of transmission. Acute respiratory distress syndrome (ARDS) is the outrageous sequel of this disease in severe condition that requires mechanical ventilation. WHO described collective preventive measures for everyone but they are precise and specific for medical personnel as they are front line warriors for treating COVID-19 patients [5].



The concept of this current review is to recommend the precautionary measures in operation theater during the pandemic of COVID 19 situation and also execute the appropriate use of personal protective equipments (PPEs) while ongoing emergency operating procedures. Although the prevalence of COVID-19 suggests that it is spread by droplets, while several literatures support aerosol spread [6, 7]. The Aim of this article to explain measures, discuss these goals including defining and enforcing Operating Room Isolation, improvements in the work ethics, guidance of staff, and provision of clinical guiding principles for anesthetic management.

METHODOLOGY

Literature study carried out on different articles and review articles to collect information about Covid-19 and surgeries published in various journals using the search engine, PubMed and Medline. Keywords searched include: COVID 19, SARS-CoV 2, pandemic and safety measures for operating team members. The basic objective of this article is to provide the best care of patient from COVID-19 and to minimize the chance of spread to healthcare workers and patients other than COVID-19.

The Hospital Administration Role

During COVID-19 pandemic several strategies and guiding principles are being established by hospital during all aerosol-generating procedures. Use of PPE which included wearing caps, masks of N95, cover for the pupils, water proof gowns and gloves in COVID-19 suspected cases in accordance with the PPE use guidelines [8, 9]. The training of healthcare workers employed in possible high-risk areas was given to the powerful air purifying respirator. Staff monitoring and temperature recording were required twice a day. Operating group members were typically addressed to learn about the use of powerful air purifying respirator and infection control workflow.

General Care and Intra-Operative Precautions

The largest viral load of SARS-CoV-2 is in sputum and upper airway secretions, the virus causing COVID-19 [10]. So, the mode of transmission of SARS-CoV-2 is by droplet in nature and not by airborne. Consequently, compliance with droplet precautions and best practices in health, hygienic and sound infection management are indicated. The Centers for Disease Control (CDC) and prevention recommends that airborne isolation areas be reserved for aerosol generating procedure [11]. The standard distance should be predefined from isolation ward to the operating room and moreover isolated elevator must be implemented and least contacts to each other [12]. The whole team responsible for management of emergency case should wear a fitted N95 respirator mask along with droplet PPE (gown, gloves, and eye protection). Standard protocols should be adopted with all patients who are hospitalized. Those patients who match the criteria of SARS-CoV-2 infection were referred to infectious disease specialists. A recent study by Van Doremalen *et al.*, , has found that SARS-CoV-2 may last for as little as 72 hours on plastic and steel surfaces such as elevators button, with the help of a notion that for the transfer of COVID patients one specified and isolated route should be adopted and used [13]. Staff should be instructed to prevent unnecessary journeys to other destinations, and temperatures of every worker should be measured twice daily with digital thermometers and reported to the administrative staff [14].

Operating Room

With regard to operation theatres, reduction of negative pressure environment to limit the spread of viral particles was suggested in every study [15, 16]. An air circulation of high-frequency (25/hr) can significantly reduce the viral load in theatres [8]. For suspected cases of COVID-19, small O.T complex should be designed in a way to enclose three special O.T for surgery. The risk of contamination of other O.T rooms and other patients was minimized by isolation from the main O.T room compound and Elective surgeries of non-COVID-19 patients should be performed in the main theatre. Integrated HEPA filter is fitted in each operation theater room for ventilation purpose and movements to in and out of theatre should be limited with all doors locked to the theatre during the procedure, leaving one possible route through the scrub room for entry / exit. Until starting surgery, all medications and equipment should be prepared to restrict personnel movement in and out of the O.T room [8]. To limit the contact and potential contamination of the trolley, anesthetic medicines should be placed on a tray. In any case, hand washing and glove change are needed than additional supplies from the trolley have to be accessed [12]. In order to decrease the risk of contamination and machines that are difficult to disinfect should be covered by transparent plastic wrap [8].



Anesthesia

Routine monitoring and the cleaning of anesthetic devices as well as efficient respirator systems are included. Relevant areas for the donning and doffing of PPE should be organized and established in a proper way. Whenever possible, anesthetic blockages are to be preferred to prevent airway handling. To prevent aerosol leakage, endotracheal tubes of intubated patients obscured with clamps [8, 12]. Reduce aerosol production by the diligent use of electro cautery and continuous suction, during laparoscopy filter should be used to deflate the pneumoperitoneum [9, 15, 17].

The number of these staff and their working hours must be as short as possible to minimize patient contact and spread of infection. If intubation is required, rapid sequence intubation is preferable. Mask ventilation and aerosolisation must be avoided. Staff should be equipped with FFP filters during laryngoscopy and intubation, fiberoptic intubations must be avoided if possible [18]. HEPA filter must be used in breathing circuit [connected with patient, between expiratory limb and anesthesia machine circuit and for the protection of gas sampling tube [8, 19].

Personal Protective Equipment (PPE)

A substantial program was implemented for the use of the PPE. Of the 13 published articles, all recommended the use of eye protection in the form of goggles or a face shield and a filtered face respirator (N95) [15-20]. Double gloves during intubation and/or surgery is recommended in five out of thirteen studies. In order to establish a common algorithm for PPE use in an intervention environment, the hospital management and medical school members have assembled an intervention framework (operating room, intervention suites & endoscopy) for PPE task force [8, 21, 22, 23, 24].

Virus are transmitted by aerosol generating procedures, so therefore intubation and extubation should be attempted with N95 respirators and face shields in both cases of symptomatic and asymptomatic patients. The face shield will cover the N95 against contamination so it can be reuse again. Two pair of gloves should be used and the outer pair should be removed when contaminated [25, 26]. After doffing PPE, the first pair of gloves should be removed, followed by the surgical suit, shoe covers, cap and goggles. By the help of ear laces, the face mask should be removed so that external side is not affected. It is appropriate to remove the second pair of gloves in the last [19].

All personnel must take a full body shower before switching to clean scrubs, after exit from the theatre. The names of all involved participating staff members should be registered, for easy tracing. After surgery it takes longer to decontaminate, so that the turn-around period is increased [8, 12, 21].

Postoperative Safety Measures

The anesthetic breathing circuit and soda lime canister should be abandoned after the surgery to reduce the minimal possibility of circuit contamination and all instruments must send for sterilization and decontamination after surgery. Quaternary ammonium chloride disinfectant wipes are used to clean surfaces in all medical equipment. Operation Theater should be cleaned with 1000ppm sodium hypochlorite and disinfect by vaporization of hydrogen peroxide or ultraviolet C radiation after surgeries [27-29].

CONCLUSION

A pandemic preparation involves taking into account the various levels of the controls' hierarchy and different phases of the pandemic. The new SARS-CoV-2 coronavirus pandemic threatens health workers. Recommendations and institutional guidelines for planning and using PPE correctly help to minimize the discomfort and risk of contamination by the team while ensuring patient safety. The operating room is a dynamic environment with numerous stakeholders like anesthesiologists, physicians, nurses, O.T attendants and technicians; aligning the interests and concerns of all parties may be a challenge. However, we agree that these containment steps are important in order to improve the standard of treatment provided to COVID-19 patients and to minimize the chance of viral spread to patients other than COVID-19 and hospital staff.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

HUMAN AND ANIMAL RIGHTS

Not applicable.



CONSENT FOR PUBLICATION

Not applicable.

AVAILABILITY OF DATA AND MATERIALS

None.

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CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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