

State of the Globe: Protecting Health-Care Workers from Aerosolized Infections

After 26 months from the onset of COVID-19 pandemic and withstanding three or four waves of COVID-19, the world is now settling to the new preventive norms against COVID-19. Still, many important questions pertaining to the physician choices in dealing with patients with respiratory infections remain unanswered. One such question is regarding resuscitation the patients with transmissible respiratory infections such as SARS-CoV, influenza, plague, and novel respiratory viruses. The World Health Organization (WHO) has warned that it can be dangerous to think that COVID-19 pandemic is over. The WHO also believes that new COVID-19 variants that are fully resistant to current vaccines are likely to emerge as the pandemic drags on.^[1] Continued research on physician protection during aerosol-generating procedures is therefore the need of the hour. Ayyan *et al.* have authored a study in this issue that investigates the effectiveness of a resuscitation coverall in reducing aerosol transmission during the cardiopulmonary resuscitation (CPR) and intubation practices using a simulated exercise.^[2]

Some authors believe that COVID-19 has shifted the balance of CPR and as a result, many of the prevalent CPR practices have now been dropped to safeguard the health-care workers from unwanted exposure to COVID-19.^[3,4]

The study by Ayyan *et al.* highlights this important area of research in the management of transmissible respiratory illnesses.^[2] We recommend more of such innovative research using simulation exercises as well as real patient scenarios. This will help physicians to be better prepared for future waves of COVID-19 variants as well as other novel respiratory pathogens.

Tracheal intubation is needed for respiratory support in many COVID-19 patients but it is recommended only in the Emergency Department settings. For COVID-19 patients having out-of-hospital cardiac arrest, endotracheal intubation is not advisable without adequate experience, protection, and support.^[3]

Interestingly, a quantitative evaluation study of aerosol generation showed that elective intubation was associated with minimal generation of aerosols.^[5] Compared to intubation, extubation generates 15-folds greater aerosols than during intubation but still 35 folds less than volitional cough. Even the extubation was below the threshold for designation as high-risk procedure for aerosol generation.^[5] This study was done using a real-time optical particle sizer in real patient scenarios.^[5] The results of this study are contrary to the general

belief in the physician community that intubation is a very high-risk procedure.

The term “aerosol” is also used by different specialties and researchers in different senses and therefore needs clarification. Aerosol includes all particle sizes from large droplets to suspended particles.^[6] The viral load of the droplets is proportional to the third power of the particle diameter.^[6] The viruses are less likely to survive in smaller particles due to the effects of evaporation and the larger droplets are more likely to reach alveoli after breaking down into smaller particles in the airways.^[6] The traditional view of aerosols is that most respiratory infections are transmitted through droplets (>5 μ) in size. Also, if the infection transmission is seen only in people with close proximity to the cases, that is also indirect evidence for droplet-based transmission.^[7] Airborne transmission is seen with organisms that can survive desiccation resulting in particle size <5 μ , for example, tuberculosis.^[7] Airborne particles can remain suspended in a room forever unless there is a movement of air out of the room. Respirators are recommended for protection against airborne transmissible agents while surgical masks are sufficient against most other respiratory pathogens.^[7]

CPR is one of the high-aerosol-generating processes and therefore guidelines needed modification after the COVID-19 pandemic.^[4] CPR should be started after proper donning of personal protective equipment (PPE) irrespective of the setting, prehospital or in-hospital. The recommended PPE includes double pair of gloves, N95 respirator, fluid-resistant gown, and a face shield.^[4] In out-of-hospital cardiac arrests where COVID-19 status is unknown, the patient’s face and nose should be covered with a cloth and hands-only CPR should be given after donning proper PPE.^[4] Defibrillation may take precedence over chest compressions while the team is getting ready with PPE. After donning of PPE, hands-only CPR should be started leaving the oxygen mask on the face of the patient if he/she was already receiving oxygen therapy when cardiac arrest occurred. Among airway procedures, aerosol generation is highest during bag and mask ventilation followed by supraglottic devices and least by cuffed endotracheal intubation.^[4] Intubation should ideally be done by an expert to avoid reattempts and the chest compressions should be briefly paused while attempting the airway. Intubation/plastic boxes as used by Ayyan *et al.* are also recommended wherever available.^[2,4] Video endoscope improves the first attempt success rate of intubation. The number of people in the resuscitation team should also be restricted to minimum essential. Cardiac arrest patients in prone position should first

be rolled into supine position using log roll technique before CPR is started except when the patient has advanced airway placed already, in which case, the chest compression is started in a prone position.^[4]

To conclude, continued research in safeguarding physicians from potential respiratory infection transmission during patient care, CPR, intubation is of paramount importance both in-patient and physician context. Also, the general belief that elective intubation is a high risk procedure for respiratory infection transmission needs to be revisited and rectified.

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