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A Survey of Intubation of COVID-19 Patients in the Critical Care Units to Assess Adherence to Guidelines and Critical Events Encountered

Akhya kumar kar[1], Ayya Syama Sundar[2]

Author's Affiliation: [1]Assistant Professor, [2]Associate Professor, Department of Anesthesiology and Intensive Care, Nizam's Institute of Medical Sciences, Hyderabad 500082, India.

Corresponding Author: Ayya Syama Sundar, Associate Professor, Department of Anesthesiology and Intensive Care, Nizam's Institute of Medical Sciences, Hyderabad 500082, India.

E-mail: sasyasyama@gmail.com

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Abstract

Background: The Coronavirus disease (COVID-19) pandemic affected the health care personnel with the worse outcome as compared to the general population.Anaesthesiologists,being the first responders in critical care units (ICU) for aerosol-generating procedures like endotracheal intubation are at higher risk of getting infected with the virus.The updated SARS guideline (Severe Acute Respiratory Syndrome) of the 2003 epidemic in Toronto, Canada, is quite instructive for endotracheal intubation. This study was intended with the primary objective to find out the adherence of guidelines among the anaesthesiologists while doing endotracheal intubation and the secondary objective is to assess the incidence of other critical events.

Methods: This survey was conducted in a tertiary care centre among the anaesthesiologists about their first COVID-19 patient intubation,based on a 40-point questionnaire about adherence of guidelines and critical event encountered. All the responses collected in google form which was further evaluated with the help of SPSS-17.

Results: Total of 112 patients intubated in the ICU, out of which 62% were emergency intubation, aerosol boxes used while intubation in 20% cases. Hand hygiene before the procedure was not followed in 25% and no gowns used while doing the procedure was recorded in 34% respondents. Clamping ET tube and use of hydrophobic filter was missed in 15% and 22% cases. The surroundings contaminated in 51% of respondents. Hypoxia, hypotension, arrhythmia, hypertension, cardiac arrest and aspiration during intubation was observed in 58%, 62%, 29%, 21%, 22%, 11% cases respectively.

Conclusion: With the anaesthesiologists getting adapted to the new norms of intubation in COVID days, the adherence to guidelines is suboptimal, and the complication rate was high during the first intubation attempts.

Keywords: Intubation; Survey; SARS Coronavirus.

Introduction

The control of the spread of the infective disease has always been a challenge to health care professionals. While the patient treatment remains a priority but personal care also equally important in such circumstances. The SARS Coronavirus disease (COVID-19) is highly infectious and affected the health care personnel with the worse outcome as compared to the general population. With many health care personnel succumbed to the disease the anaesthesiologists, being the first responders in critical care set-up (ICU) for aerosol-generating procedures like endotracheal

intubation are at higher risk of getting infected with the virus. With the concerns about the direct relationship of viral load with the severity of the disease, utmost priority should be given for, personal protection of the anaesthesiologists.[1] The personal protective equipment (PPE), use of face shield, aerosol boxes for intubation, frequent hand washing, optimal care for sanitization of personal belongings are proposed measures to curtail the spread of the virus.[2] Many recommendations proposed to guide the treating physicians while attempting intubation among which updated SARS guideline (Severe Acute Respiratory Syndrome) of the 2003 epidemic of in Toronto, Canada, is quite instructive.[3] However, the procedures in ICU are of emergency in nature and the intensivist gets very limited time to react on many occasions, making them miss the safety guidelines more often. With the rotatory postings practised in critical care units, the first responder to crisis many times new to the unit or less experienced or working in the unit with some time gap makes them prone to do error. The unsafe practices inside the ICU put both primary responder and the assistants at risk. With the availability of limited data about the critical incidences inside the ICU while intubation we tried to evaluate it through a questionnaire survey. This study was intended with the primary objective to find out the adherence of guidelines among the anaesthesiologists while doing endotracheal intubation and the secondary objective is to assess the incidence of other critical events.

Methods

This questionnaire survey was conducted among anaesthesiologists who work in the critical care unit of COVID-19 care centres. A 40-point questionnaire put forward among the anaesthesiologists who intubated a patient in a critical care unit. (Table 1). The questions were based on whether the recommendations for intubations followed and critical events encountered while doing the procedure during their first attempted endotracheal intubation of a COVID-19 patient. First intubation was chosen because most of the error occurs while the exposure to the situation is new and any intubation in which the safety protocols bypassed is a threat to the operator as well as assistants. Also with the rotatory postings among professionals to limit frequent exposures, the experience of intubating a COVID-19 patient seems to be limited. Endotracheal intubation is a high-risk procedure for generating aerosol was chosen to enquire. All the responses collected in google form which was further evaluated with the help of SPSS17.

At the time the study responses taken India was nearing to 90,000 deaths due to COVID-19. Taking in to account ICU bed strength and many cases of sudden cardiac death and failure to get a bed in ICU we assumed that 20% COVID-19 patients in India were intubated in critical care where proper institutional guidelines being set for procedures inside ICU, with a power of 80% and an alpha error of 0.05, the sample size was calculated to be 105 to derive any meaningful conclusion. However, considering the possibility of improper entries, we sought a minimum of 110 entries.

Table 1: Questionnaire

1.	Designation
2.	Role
3.	Guidance of Experienced personnell
4.	Intubation indication
5.	Whether planned to use barrier protection with aerosol box
6.	Whether Practiced appropriate hand hygiene before procedures
7.	Whether Practiced appropriate hand hygiene After procedures
8.	Whether used face shield/ eye protector before intubation?
9.	Whether used gown before procedure
10.	Whether disposed the gowns and gloves appropriately after the procedure
11.	Used aerosol boxes for intubation
12.	Whether assessed airway before intubation
13.	Number of intubations in COVID patients you have done before attempting this patient
14.	Whether the most experienced person did the intubation.
15.	No of Assistants available while intubation
16.	Which laryngoscope used for intubation
17.	Bougie use while intubation
18.	Muscle relaxation used for intubation
19.	No of attempt for successful intubation
20.	Was there any delay in intubation
21.	Cause for delay in intubation
22.	Was there hypotension before intubation
23.	Arrythmia during intubation
24.	Cardiac Arrest during intubation
25.	Hypotension >20% fall in MAP during intubation
26.	Hypertension during intubation >20% increase in MAP
27.	Was there fall in spo_2>10% during intubation
28.	Before intubation patient was on Which mode of oxygenation
29.	If on HFNO whether it was stopped before intubation
30.	How did u confirm ET tube position
31.	Whether Airway trauma occurred while intubation
32.	Which technique was used for intubation?

33. Small tidal volumes or regular tidal volumes used for bag and mask ventilation?
34. If RSI was planned, was 5 minutes of pre-oxygenation with 100% oxygen done?
35. Whether a filter was used while ventilation or intubation
36. Whether you followed all the institutional guidelines for intubation in COVID patients?
37. Which guideline u missed
38. Whether any aspiration occurred during the procedure?
39. Whether patient surroundings contaminated during intubation
40. Appropriate cleaning and disinfection of equipment environment surfaces done after the procedure?

Results

Total of 112 responses collected and reviewed, out of which 62% were emergency and 25% were semi-emergency intubations. (Fig. 1) A total of 33% responders planned to use aerosol boxes however only 20% of cases aerosol boxes used while intubation. All the respondents used either a face shield or eye protector while doing the procedure. Video laryngoscope was used for intubation in 55% cases, bougie was used in 83% cases and 84% cases paralytic agent used for intubation. Hand hygiene before the procedure was not followed in 25%, however, post-procedure the compliance was 100%. No gowns used while doing the procedure was recorded in 34% of respondents. Clamping ET tube and use of hydrophobic filter were missed in 15% and 22% respectively. In 56% of cases, airway was not assessed before intubation. The surroundings contaminated in 51% of respondents. Intubation delay was faced in 44% of cases, the incidence of hypoxia, hypotension, arrhythmia, hypertension, cardiac arrest and aspiration during intubation was observed in 58%, 62%, 29%, 21%, 22%, 11% cases respectively.

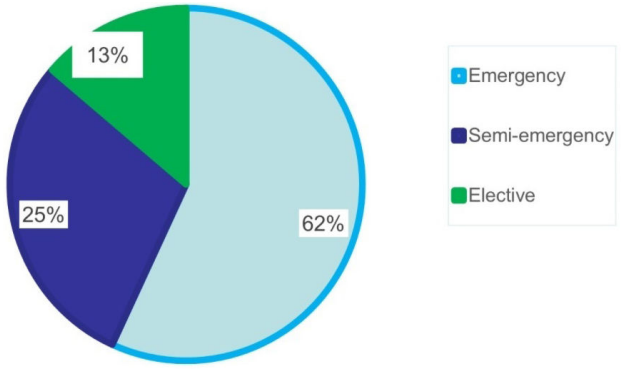

Fig. 1: Type of intubations.

Discussion

The SARS guidelines are useful recommendations for managing the airway of COVID-19 infected patients. But the emergency in ICU warrants immediate attention to the deteriorating patients which make it difficult for the primary caregivers to follow the guidelines and safety protocols. Our study results were consistent with the finding that emergency intubation was 62% were almost equal incidence of non-use of aerosol boxes and although in 33% cases it was planned to use but finally used in only 20% cases because of various other reasons. Aerosol boxes are introduced at the start of the pandemic by a Taiwanese doctor with a plan to reduce the aerosol exposure to the health care person however it seems from our study that, the acceptance of the same is sub-optimal.[2] The personal protection equipment (PPE) seems to be acceptable but additional protection of disposable gowns during intubation was lacking in 34% cases making the primary caregiver as well as the assistants at risk. Use of a hydrophobic filter and Clamping of ET tube before intubation and opening after attaching to the ventilator circuit was followed to reduce the threat of releasing aerosol. This was missed in some cases which need to be addressed. One of the major threat of COVID-19 transmission was through surface transmission, to prevent it necessitates proper infection control measures to be followed in ICU, however proper hand hygiene was not followed in 25% cases making the risk of cross-contamination of patients as well as equipment inside the ICU. During intubation as high as 51% of respondents believed the surrounding got contaminated during intubation.

Video laryngoscope is highly recommended for intubation but not done so in half of the cases probably related to the availability of suitable gadgets. Also in 56% cases, airway assessment was not done before intubation, and approximately 30% cases pre-oxygenation for 5 minute was not done, probably due to emergency situation, which puts the anaesthesiologists at risk of encountering more incidences un-anticipated difficult airway and complication. Total of 44% of respondents observed that there was a delay in intubation while managing the airway and 50% of the time it was attributed to positioning-related issues. The ICU beds are always a concern while managing difficult airway because of the height, closely placed to the wall, and sometimes the negative chambers in some beds consume additional time to position the patient properly for intubation. Apart from the critical events encountered related to

airway haemodynamic compromise occurred in a significant number of patients with sudden cardiac arrest in more than 22% cases. In a study conducted in Wuhan of China, the incidence of cardiac arrest while intubation was found to be <10%. The high incidence in our study was probably attributed to the first intubation of the intensivist in COVID care unit.[4] So guidance of experienced anaesthesiologist carries much importance for doing safe procedures in critical care units. With the worse outcome in COVID-19 related patients requiring intubation and ventilator support,[5] Many patients managed in high flows or non-invasive ventilation (NIV) support and mechanical ventilation delayed till very late stage making patients prone for complication during intubation. High flow nasal oxygen therapy (HFNOT) is a threat to produce aerosol generation, but only 3% of patients were on HFNOT during airway intervention in our respondents, it was not further evaluated. A total of 83% of patients were on NIV with continuous positive airway pressure (CPAP). The incidence of hypoxia was 58–73% and hypotension was 10–33% in the study conducted in China,[4] whereas the hypoxia incidence was almost similar (58%), hypotension incidence was much higher (62%) in our survey group. The high incidence of adverse events during probably attributed to the removal of the mask depriving the patients of oxygen, failure to provide pre-oxygenation, use of intravenous anaesthetic agents and delay in intubation due to various issues.

The limitation of our study includes, each institution has different guidelines and set protocols which was not considered while collecting data. Patients condition and associated comorbidity with the patients not taken into account. With the survey conducted about the first experience of intubations, more recent attempts and their outcome can be enquired in future studies.

Conclusion

With the anaesthesiologists getting adapted to the new norms of intubation in COVID days, guideline adherence for intubating these patients is suboptimal. The complication and unsafe practices incidence are high during the first intubation for which due precautions should be taken to prevent adverse events in critical care units.

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