Subject Area:

Tracheostomy in COVID-19-infected patients

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Abstract

Purpose
To evaluate the modifications in the indications and technique of tracheostomy for prolonged-intubated COVID-19-infected patients.

Methodology
Commissioned by the Ministry of Health in Egypt, different guidelines for tracheostomy for COVID-19 patients were revised. A guideline was adopted and modified to meet the equipment provided by facilities assigned to contain the current pandemic. The understanding of staff and the applicability of the new guidelines were evaluated using a mini-summative quiz answered by 117 tracheostomy team members in facilities around Grand Cairo, Egypt.

Results
The percentages of consistent answers for questions 1–6 were 94, 90.60, 89.70, 95.70, 61.50, and 93.20%, respectively. A total of 86 (73.5%) individuals achieved score more than 80%. Moreover, 41 (35%) individuals achieved perfect score.

Conclusion
The novel guidelines are well understood and applicable. Remarks that emerged regarding diathermy use should be taken in consideration. Continuous assessment of these guidelines is needed as the pandemic goes on altering its manner and our strategies along with it.

Keywords: COVID-19, guidelines, tracheostomy

INTRODUCTION

As the novel COVID-19 pandemic continues to spread, more patients will need hospitalization. Some publications estimate that 5–20% of hospitalized patients are admitted to ICU, and up to 88% of them need mechanical ventilation [1–3].

Prolonged mechanical ventilation requires tracheostomy, which offers a sealed system for respiratory support. Tracheostomized patients are usually not or reducibly sedated with the advantage of less intensive nursing care, and this may reduce ventilation time. It is usually scheduled after 7–10 days of invasive mechanical ventilation in ordinary conditions [4]. The usual debate between percutaneous tracheostomy (PT) and surgical tracheostomy (ST) is settled in favor of the latter in the COVID era.

PT is relatively contraindicated in high positive end-expiratory pressure or fraction of inspired oxygen requirement, marked obesity, coagulopathy, and hemodynamic instability [5]. All the previous conditions are most likely to be associated with COVID-19-infected patients [1]. Adding to these contraindications, PT may require bronchoscopy and serial dilations during tracheal entry, which will increase the chance of aerosolization risks compared with ST [6].

The previous lesson of PT versus ST was learnt during the SARS outbreak [7]. Therefore, it is not unwise to explore more lessons to formulate guidelines for tracheostomy that would meet our needs and equipment, together with other published guidelines at the beginning of the novel pandemic and chose what is best in our condition.

These guidelines are not complete without the personnel who understand and implement them. Summative assessment is the

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process that measures the extent to which the most important outcomes at the end of the instruction have been reached [8]. So, we tried by using a summative quiz to measure the extent to which the tracheostomy teams understand and implement the novel guidelines.

**METHODOLOGY**

Commissioned by the Ministry of Health, the guidelines were revised; the ‘ENT-UK tracheostomy during the COVID pandemic’ guideline was chosen being the most dedicated, comprehensive yet simplified one [9]. After being modified to our needs, it was distributed as a part of the ministry booklet ‘Management Guidelines for Covid-19 Patients with Special Medical Conditions. Egypt, April 2020; pp.: 58–61’ to the isolation facilities (Figs. 1–6).

After being approved by our local Ethical committee and confirming consistency with all local laws and the principles of Declaration of Helsinki, A mini-summative quiz was formulated of six multiple choice questions with three choices each (Fig. 7). Questions reflect the novel items in the guideline that is to be emphasized.

The subjects targeted by this quiz were the otolaryngologists and anesthesiologists among the tracheostomy teams designated in the isolation facilities among the area of Grand Cairo (Cairo, Giza, and Qalyubiyya).

A total of 117 team members (specialty and facility were not specified) were able to answer our mini quiz despite their busy schedule in the isolation facilities. The participants were instructed to choose only one consistent answer for each question.

The results of the quiz were tabulated and statistically analyzed.

**RESULTS**

Results for the quiz answers are summarized and tabulated (Fig. 8). The percentages of consistent answers were calculated (Table 1).

The question with the most consistent answers was no. 4 (95.7%), whereas the question with least ones was no. 5 (61.5%). The average of consistent answers was 87%.

The frequency of scores was calculated (Table 2). A total of 41 (35%) participants achieved full mark, 45 (38.5%) participants got 5/6 score, 27 (23%) participants got 4/6 score, and only four (3.5%) participants got 3/6 score. No participants achieved less than 3/6 score.

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<tr>
<th>Revised by</th>
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<th>Affiliation</th>
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**Figure 1:** Cover page for the guidelines booklet distributed in the isolation facilities.

**Figure 2:** Names and affiliations of the revising committee commissioned by the Ministry of Health to prepare the guidelines booklet, page: 1.
got score below 3/6. Overall, 86 participants (73.5%) achieved score above 80%.

**Discussion**

As the novel pandemic continues to spread, the rate of hospitalization, ICU admission, and mechanical ventilation is expected to increase. Subsequently, tracheostomy rate is expected to increase as well. Being an aerosol-generating procedure, tracheostomy harbors great hazard of infection transmission to the performing team. So, guidelines for tracheostomy needed an update to cope with the new situation.
Figure 5: Procedure steps with special modifications to avoid aerosolization, page: 60.

Figure 6: Postoperative care for tracheostomy tube, page: 61.
Revising the literature for similar situations in the past, scanty research was found addressing tracheostomy during SARS outbreak in the beginning of the millennium [10–12]. Depending on them while exploring the way cautiously, new guidelines are being published consecutively. The main two questions needed to be answered in the new guidelines are: when and how to perform tracheostomy to COVID-19-positive patients?

The answer of the first question ranged from not to do it at all until the patient is negative [13,14]. Some European medical communities adopted a local policy of about 14 days before tracheostomy [15], whereas others did not answer the question, leaving the decision to the team to make in every case individually [9,16]. We found that the latter is the best, and adopted it in our chosen guideline, as the decision depends on many variables including the patient him/herself and the burden on the equipment and personnel in the isolation facility.

Regarding the second question, almost all guidelines agreed upon certain parameters regarding usage of full personal protective equipment, paralysis of patient to avoid cough, and full apnea upon opening the trachea [6,9,13–17] while performing ST. Some guidelines advocated PT as an alternative to ST [6,15,16], but we discarded this option owing to the reasons mentioned before and to meet with our local expertise and resources.

After updating and distributing the new guidelines in a very short notice to the performing teams, evaluation of the understanding and implementation of these guidelines was necessary. A summative quiz was formulated to measure the extent of understanding and evaluate the implementation of the updated guidelines.

Results for the quiz were encouraging. Overall, 73.5% achieved score above 80%, with 35% achieving full mark. Regarding individual questions, the question with most consistent answers was no. 4 (95.7%). The consistent answer to this question was statement ‘c’ (Fig. 6), which mentioned a condemned practice in both old and new guidelines which should be excepted. This reflected the awareness of the participants about what has changed and what has not in the new updates.

However, the question with the least consistent answers was no. 5 (61.5%); the consistent answer to this question was statement ‘b’ (Fig. 6), which discourage the use of diathermy during surgery to prevent viral transmission via vapor plumes. By revising the answer of question 5 with a random sample, many have stated that they often had to use diathermy either mono or bipolar to control troublesome wound ooze that was incontrollable by compression or ligation. They referred to the anticoagulation therapy given to many patients as a part of their treatment protocol in the isolation facilities. The ones who gave nonconsistent answers in the sample recorded their awareness with the new guidelines regarding diathermy use, but they preferred to give answer from the ground, with the actual performance done.
CONCLUSION
The novel guidelines are well understood and applicable. Remarks about diathermy use should be taken in consideration. A proposed addition to guidelines is to use low-power diathermy under the umbrella of powerful suction to eliminate vapor plumes as much as possible. Continuous assessment of these guidelines is needed as the pandemic goes on altering its manner and our strategies along with it.

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Nil.

Conflicts of interest
There are no conflicts of interest.

REFERENCES