



## TRACHEOSTOMY CANCELLATION REASONS IN CRITICALLY ILL PATIENTS: A FIVE-YEAR RETROSPECTIVE STUDY

Talal AlKhatib<sup>1\*</sup>, Anees A. Sindi<sup>2</sup>, Bhaa Maher Simbawa<sup>3</sup> and Sultan Hudaib Aljaid<sup>3</sup>

<sup>1</sup>Department of Otolaryngology-Head Neck Surgery, Faculty of Medicine,  
King Abdulaziz University, Jeddah, Saudi Arabia

<sup>2</sup>Department of Anesthesia and Critical Care, King Abdulaziz University, Jeddah, Saudi Arabia

<sup>3</sup>University of Jeddah, Jeddah, Saudi Arabia

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### ABSTRACT

Tracheostomy is one of the most common procedures performed in intensive care units (ICUs). The cancellation of a tracheostomy delays a patient's discharge from the ICU, which results in further expenses and prevents the admission of a new patient requiring treatment in the ICU. The aim of the current study was to investigate the reasons for tracheostomy cancellation in patients at King Abdulaziz University Hospital. We used a retrospective study design, and reviewed the records of patients with cancelled tracheostomy procedures between 2010 and 2015. The common causes of cancellations were operating room (OR)-related (43.85%), patient-related (10.52%), surgeon-related (5.26%), and anesthesia-related (4.48%). With regard to OR-related cases, one of the reasons was that urgent emergency cases were prioritized over tracheostomy procedures. The most common patient-related reason was a low hemoglobin level (less than 10g/gL). The procedure was sometimes cancelled by the surgeon, and sometimes it was cancelled because the patient required other services such as hematological or neurological assessments.

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### INTRODUCTION

Tracheostomy is one of the most frequent planned emergency surgical procedures in critically ill patients and patients in intensive care units (ICUs). Indications include prolonged intubation and facilitating pulmonary toilet. Performing a tracheostomy can facilitate rapid recovery and discharge from the ICU<sup>(1)</sup>. The cancellation of a tracheostomy procedure delays a patient's discharge from the ICU, resulting in increased expenses, and prevents the admission of a new patient requiring treatment in the ICU. There are various reasons for tracheostomy cancellation, including patient-related, surgeon-related, operating room (OR)-related, and anesthesia-related reasons. The aim of the current study was to identify the reasons for tracheostomy cancellation in a tertiary care center.

### METHODOLOGY

This retrospective study reviewed the causes of cancellation of tracheostomy procedures between 2010 and 2015 at King Abdulaziz University Hospital (KAUH). The data were derived from electronic operation records. The patients' hospital medical records were reviewed for additional information. The variables analyzed included age, gender,

cancellation date, the planned date of the procedure, and reasons for cancellation. The reasons for cancellation were classified as surgeon-related, patient-related, OR-related, and anesthesia-related. Ethical approval for the study was obtained from the Research Ethics Committee of KAUH.

### RESULTS

We reviewed the records relating to 124 cancelled tracheostomy procedures booked on the emergency list from 2010–2015. There were 67 (52.7%) male patients and 57 (47.3%) female patients. In these 124 cases, there were 128 reasons for cancellation (some patients had more than one reason for cancellation). Fourteen cancellations were excluded because the reason for cancellation was not clarified, 33 (28.63%) were patient-related, 11 (9.64%) were surgeon-related, 5 (4.48%) were anesthesia-related, and 65 (57%) were OR-related. OR-related reasons were the most common cause of cancellations, and these cancellations were mainly due to the fact that urgent emergency cases were prioritized over planned tracheostomies (43.85%). The next most common reasons were patient-related, and such cases were mainly due to a low hemoglobin (Hb) level (10.52%). These were followed by surgeon-related reasons, which were mainly due to cancellation by the surgeon (5.26%). The need for referral to

other services (such as hematology or neurology) to prepare the patient for general anesthesia was the main cause among the anesthesia-related reasons (4.48%). The lack of availability of OR time accounted for 6.14% of the reasons, and the lack of an available surgeon at the scheduled time of the procedure accounted for 4.38%. A low platelet count accounted for 4.38% of the reasons, and a change in clinical status accounted for 3.50%. The patient's relative refusing to sign the consent form accounted for 3.50% of the reasons, and a lack of patient consent accounted for 2.63%. High international normalization ratio (INR) levels accounted for 1.75% of the reasons, hypothermia accounted for 1.75%, and hemodynamic instability accounted for 0.87%. The patient requiring further investigations accounted for 0.87% of the reasons, the patient being on ASA and clopidogrel accounted for 0.87%, and the patient being on inotropic support accounted for 0.87%. Active sepsis accounted for 0.87% of the reasons, and lack of an available blood donation accounted for 0.87%.

## DISCUSSION

In Europe it has been calculated that the median cost of a patient-day in an ICU in the financial year 1999–2000 was £955<sup>(2)</sup>. The median ICU cost per patient-day in Canada was \$1,357 for medical cases and \$1,501 for surgical cases<sup>(3)</sup>. Reported direct costs per ICU day in Europe range from €168 to €2025<sup>(4-6)</sup>. Cancellation of a tracheostomy prolongs a patient's stay in the ICU and affects the hospital's budget. Performing a tracheostomy early can lead to a rapid recovery and discharge from the ICU. In the current retrospective study spanning 5 years, the most common causes of cancellation of tracheostomies in patients at KAUH were investigated.

We categorized tracheostomy procedure cancellation reasons as patient-related, surgeon-related, and OR-related. We found that of the patient-related reasons, the overall most common reason for cancellation was a hemoglobin level below 10g/dL before the operation, which accounted for 10.52% of the total number of reasons. There were no concordant findings detected in the literature. Spence *et al.*<sup>(7)</sup> reported that a patient could safely undergo an operation with a hemoglobin level as low as 6 g/dL.

A platelet count lower than 100,000/ $\mu$ L accounted for 4.38% of the cancellations. One study suggests a patient's platelet level should be corrected when it is lower than 50,000/ $\mu$ L<sup>(8,9)</sup>. Another study showed that for emergency surgery, platelet transfusion is necessary in patients with low platelet levels<sup>(10)</sup>. It has also been reported that undergoing a procedure with a low platelet count was associated with postoperative complications in hepatocellular carcinoma patients<sup>(11)</sup>.

Change in clinical status accounted for 3.50% of cancellation reasons. The changes included patients needing another consultation, or being extubated safely. Successful extubation was defined as extubation or decannulation and site closure with no consequent respiratory symptoms or blood gas deterioration for at least 2 weeks<sup>(12)</sup>.

Preoperative hyponatremia (Na level >135mmol/L) accounted for 1.75% of the reasons for tracheostomy cancellation. O'Donoghue *et al.*<sup>(13)</sup> reported that hyponatremia was associated with an increased mortality rate in surgical ICU patients. Alexander *et al.*<sup>(14)</sup> reported that preoperative hyponatremia was associated with a higher risk of death within 30 days of surgery.

A high INR level accounted for 1.75% of the reasons for tracheostomy cancellation. One study showed that patients were at high risk if their preoperative INR level was between 1.5 and 2.0<sup>(15)</sup>. The patient requiring further investigations prior to tracheostomy insertion accounted for 0.87% of the reasons for tracheostomy cancellation, and the patient being on ASA or clopidogrel accounted for 3.33%. One study showed that the risk of surgical hemorrhage was increased by approximately 20% in patients on aspirin or clopidogrel alone, and 50% in patients on dual antiplatelet therapy<sup>(16)</sup>. Being on inotropic support accounted for 0.87% of the reasons for tracheostomy cancellation, as did active sepsis. Administration of an appropriate intravenous antimicrobial therapy is an important component of the care of patients with severe sepsis, to control the cause<sup>(17)</sup>.

Being unfit for general anesthesia due to being in a high-risk age group, either young or elderly, accounted for 2.63% of the reasons for tracheostomy cancellation. A recent study including 2,900 children showed that patients who underwent procedures under general anesthesia before the age of 3 were at high risk of having mental problems<sup>(18)</sup>. Another study in elderly patients showed that undergoing major surgery with general anesthesia was associated with the development of impairment of memory and concentration<sup>(19)</sup>.

The most common reasons for tracheostomy cancellation were OR-related (57%), and 43.85% of the total reasons for cancellation were accounted for by the fact that urgent emergency cases took priority. A previous study suggests that hospitals should have a dedicated OR for emergency cases only, to improve the quality of OR services by reducing cancellations and facilitating the performance of operations at the scheduled time<sup>(20)</sup>.

The lack of available OR time accounted for 6.14% of the reasons for tracheostomy cancellation in the current study, while in another study including 1773 cases the major reason (65.2% of cases) for cancellation of general surgery was lack of OR time<sup>(21)</sup>. Another study also showed that lack of available OR time was the most common reason for cancellation<sup>(22)</sup>.

Of the total number of reasons for tracheostomy cancellation, 9.64% were due to cancellation by the surgeon. Of the total number, 5.26% were cancelled by the surgeon due to a low hemoglobin level, a low platelet count, or because the patient had cervical scoliosis which led to difficulty in extending the neck in the OR, or the patient developed septic shock. The lack of an available surgeon at the scheduled time of the procedure accounted for 4.38% of the reasons.

Of the total number of reasons for tracheostomy cancellation, 4.48% were anesthesia-related. In a previous study including 526 patients, only 0.3% of the reasons for cancellation were anesthesia-related<sup>(23)</sup>. All 4.48% of the anesthesia-related reasons related to the patient needing to be referred to another department to determine whether they were fit for the procedure, for example, referral for neurological, cardiac, or hematological examinations<sup>(22)</sup>.

## CONCLUSION

In the current study, the main reason for tracheostomy cancellation was that a more urgent case took priority with regard to the use of the OR. The second most common reason was that the patient had a hemoglobin level < 10 g/dL. Future

research should aim to identify complications, if any, associated with operating on patients with Hb levels < 10g/dL.

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