BJA

British Journal of Anaesthesia, 121 (1): 66–75 (2018)

doi: 10.1016/j.bja.2018.04.013
Advance Access Publication Date: 18 May 2018
Respiration and Airway

RESPIRATION AND AIRWAY

Airway management in paediatric anaesthesia in Europe—insights from APRICOT (Anaesthesia Practice In Children Observational Trial): a prospective multicentre observational study in 261 hospitals in Europe

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This article is accompanied by an editorial: Best practice recommendations for difficult airway management in children – is it time for an update? by King & Jagannathan, *Br J Anesth* 2018:121:4–7, doi: 10.1016/j.bja.2018.04.022.

Abstract

Background: Critical respiratory events are common in children in the peri-anaesthetic period and are caused by airway and ventilation management difficulties. We aimed to analyse current European paediatric airway management practices and identify the incidence and potential consequences of difficult airway management.
Methods: We performed a secondary analysis of airway and ventilation management details of the European multicentre observational trial (Anaesthesia PRactice in Children Observational Trial, APRICOT) of children from birth to 15 yr of age. The primary endpoint was the incidence of difficult airway management. Secondary endpoints were the associations between difficult airway management, known pre-existing respiratory risk factors, and the occurrence of critical respiratory events.
Results: Details for 31 024 anaesthetic procedures were available for analysis. Three or more tracheal intubation attempts were necessary in 120 children (0.9%) and in 40 children (0.4%) for supraglottic airways insertions. The incidence (95% confidence interval) for failed tracheal intubation and failed supraglottic airway insertions was 8/10 000 (0.08%; 0.03–0.13%) and 8.2/10 000 (0.08%; 0.03–0.14%) children, respectively. Difficulties in securing the airway increased the risk for a critical respiratory event for tracheal tube (2.1; 1.3–3.4) and supraglottic airway (4.3; 1.9–9.9) placement. History of pre-existing respiratory risk factors was significantly associated with critical respiratory events independently of the airway device used.

Editorial decision: April 13, 2018; **Accepted:** April 13, 2018

Conclusions: Airway management practices vary widely across Europe. Multiple airway device insertion attempts and pre-existing respiratory risk factors increase the likelihood of critical respiratory events in children and require further stratification during preoperative assessment and planning. This study highlights areas where education, research, and training may improve perioperative care.
Clinical trial registration: NCT01878760.

Keywords: airway; anaesthesia; children; morbidity

Editor's key points

- Critical respiratory events are common in children in the perianaesthetic period, but the incidence and potential consequences of difficult airway management are not clear.
- Analysis of >31 000 anaesthetic procedures provided the incidence of difficult airway management.
- Multiple airway device insertion attempts and pre-existing respiratory risk factors increase the likelihood of critical respiratory events in children.

Difficulties in airway management in children are frequently encountered and continue to be a leading cause of perioperative morbidity and mortality. These problems are more common in young children who are more prone to hypoxaemia[1,2] because of a decrease in their functional residual capacity.[3] Poor oxygenation and ventilation and failure of tracheal intubation are responsible for up to 25% of perioperative cardiac arrests in children.[4] Even when admitted to specialised hospitals, children with a compromised or impaired airway may suffer severe complications in up to 1:50 patients, with a subsequent mortality exceeding 30%.[5]

Over the past decades, improvements in ventilation in paediatric anaesthesia have been limited by the choice of airway devices and use of ventilators poorly suited to the small child's respiratory physiology.[6] Current evidence-based lung-protective ventilation strategies which are promoted in adult anaesthesia[7,8] may be beneficial in children.[6] However, the impact of ventilation strategies on the occurrence of respiratory critical events remain unclear.

Recently, a large multicentre European observational study, Anaesthesia PRactice in Children Observational Trial (APRICOT), reported a high incidence of critical respiratory events, and identified young age, medical history, presence of airway hypersensitivity, and medical condition (ASA physical status) as independent risk factors for their occurrence.[9] This study provided detailed information on airway management and modes of ventilation across the different age groups, in 33 countries and 261 institutions. Considering that the choice of paediatric airway management remains highly individualised and is dictated by personal preference and local resources,[5,10] characterisation of current practices in Europe is of utmost importance to harmonise clinical practice and potentially improve patient outcome.

Therefore, the aim of the present study is to characterise paediatric airway management strategies across Europe and to analyse the relationship between critical respiratory events, choice of airway technique and equipment, associated co-morbidity, existing clinical experience, inpatient or outpatient settings, and urgency of the procedure. The primary endpoint was the incidence of difficult airway management. Secondary endpoints were the potential associations between difficult airway management, presence of known pre-existing respiratory risk factors, and occurrence of critical respiratory events.

Methods

This study is registered with ClinicalTrials.gov, number NCT01878760.

Study design

Detailed study design and data collection for the APRICOT study were previously published.[10] In summary, the APRICOT study prospectively collected perioperative data that described the anaesthesia management of consecutive children aged from birth to age 15 yr during a consecutive 2-week period between April 1, 2014 and January 31, 2015. All participating centres applied for formal ethics approval or a waiver, as appropriate, as ethics requirements varied between centres and countries.

Setting

Before data collection, a local investigator provided details of their hospital's paediatric anaesthesia activity, perioperative care facilities, estimated annual number of procedures, and the number of certified or dedicated paediatric anaesthesiologists.

Participants

All patients undergoing an inpatient or outpatient diagnostic or surgical procedure, whether elective, urgent, or emergency, in-hours or out-of-hours, under sedation or general anaesthesia, with or without regional analgesia were eligible for inclusion. Children who underwent awake regional anaesthesia only were excluded from further analysis. Children were followed for up to 60 min after anaesthesia or sedation in the post anaesthesia recovery unit, and the child's status at discharge or at 30 days was recorded. Children were excluded if they were admitted directly to the operating room with their tracheas already intubated, or anaesthesia procedures were performed in the neonatal or paediatric ICU.

Variables

Details on patient history, type of procedure, and the experience of the anaesthetic team in charge were recorded. The choice of anaesthesia and airway management including