with bleeding would help identify which of these products is superior in efficacy. If there is a logistical advantage in terms of time to deliver one product into the bleeding patient, then this will become apparent in a properly conducted RCT and we should not assume that one product is superior. A recent feasibility study has shown that it is possible to deliver cryoprecipitate within 90 min in 85% of study participants in the setting of haemorrhage in trauma.12 Authorship of the study by Rahe-Meyer and colleagues1 also includes employees of CSL Behring and it was funded by CSL Behring. Designers of future studies will hopefully be able to convince the suppliers of these two different products that a clinical trial comparing the efficacies of these two products is important for patient care.

Perhaps counterintuitively, this study informs us that the use of fibrinogen concentrate increased the use of blood products in the bleeding patient undergoing elective aortic surgery. A puzzling question is the mechanism by which fibrinogen concentrate led to increased blood product use. The study raises several other remaining questions, including the most appropriate clinical scenario in which fibrinogen replacement may be efficacious, whether cryoprecipitate may be a superior source of fibrinogen, and what the threshold for treatment and the proper dose should be. The study’s results should not only caution those clinicians who have adopted off-label use of fibrinogen concentrate, but also invite a re-examination of the evidence in those countries where it is already approved.

Acknowledgement
The author gratefully acknowledges Dr Sunny Dzik for his critical review of this manuscript.

References

Oxygen supplementation during prolonged tracheal intubation should be the standard of care

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In a previous issue of the BJA, Steiner and colleagues compared deep insufflation of oxygen during laryngoscopy to standard practice direct laryngoscopy without oxygen insufflation during nasotracheal intubation in children.1 They demonstrated the superiority of two different oxygen insufflation methods. One method consisted of laryngoscopy with the Truview PCD video-laryngoscope and the other provided deep insufflation of oxygen via a tracheal tube attached to the side of a standard laryngoscope. These deep insufflation methods enabled the delivery of supplemental oxygen in close proximity to the glottic opening. The administration of supplemental oxygen was able to preserve normoxemia, for a longer period of time than standard laryngoscopy without oxygen supplementation in these paralyzed patients. This was effectively illustrated by the authors’ use of classic Kaplan-Meier survival curves, to demonstrate times to achieve a 1% oxygen desaturation in the three different
techniques (Figure 4 of the paper). This graph should appear in every textbook on paediatric anaesthesia for years to come. Although their study population did not include infants less than one yr of age, it is a reasonable extrapolation that this unstudied cohort would also benefit from oxygen supplementation. There are only few potential downsides to the provision of oxygen supplementation during laryngoscopy: potential obstruction of the laryngoscopist’s view of the glottis, depending on the specific technique chosen, and gastric insufflation, but this is an unlikely risk given the short period of insufflation and the relatively low flow rates used.

Tracheal intubation related hypoxemia is an important cause of morbidity and mortality in children. Because of the high oxygen consumption in small children, and relatively decreased functional residual capacity while anaesthetised, severe hypoxemia can occur quickly during laryngoscopy and delayed intervention may lead to cardiac arrest. Furthermore, teaching a trainee how to perform direct laryngoscopy in a small baby, will often lead to a prolonged tracheal intubation attempt. The ensuring rapid hypoxemia creates a time pressure and a stressful condition for the learner, which may lessen the possibility of successful tracheal intubation. As Steiner and colleagues have demonstrated, and we have confirmed in our clinical experience, passive oxygen insufflation increases the hypoxemia-free time during intubation and results in a more relaxed, less hurried, and less traumatic intubation by trainees.

In the past, many paediatric anaesthetists used a specially manufactured Miller 1 laryngoscope blade, with an integrated side port that allowed oxygen supplementation. This device was valuable for preventing oxygen desaturation in spontaneously breathing infants, that might rapidly develop oxygen desaturation during a prolonged intubation attempt. But until the study by Steiner and colleagues, and the innovation of new videolaryngoscopic devices, oxygen insufflation during intubation in paralyzed children had not been carefully studied.

In a similar recent study that confirmed these results, pharyngeal oxygen insufflation via an AirTraq laryngoscope (AirTraq, Prodol Meditec S.A., Vizcaya, Spain) delayed onset of hypoxemia in apneic infants and small children. We recently reported our multicentre data on 1,018 difficult paediatric tracheal intubations and found that hypoxemia was the most common adverse event, occurring in 8% of patients with anticipated difficult intubations and 15% of unanticipated intubations. It resulted in cardiac arrest in 15% and 17% of these patients, respectively. The inclusion of oxygen insufflation in patients such as these may prevent the occurrence of cardiac arrest as a result of hypoxemia. That study also demonstrated that more than one tracheal intubation attempt was associated with an increased risk of airway complications, such as hypoxemia, airway trauma and cardiac arrest, and the incidence of complications rose linearly with the number of intubation attempts. As the occurrence of hypoxemia will usually result in an interruption to the laryngoscopic attempt, the use of oxygen insufflation may reduce complications related to repeated attempts.

Different methods for provision of supplemental oxygen during laryngoscopy have been described. Although it makes intuitive sense that administering oxygen during tracheal intubation may mitigate intubation related hypoxemia, there are only a few studies that have examined this specific problem; the most effective methods to reduce intubation related hypoxemia remain unclear. Others have used high flow nasal cannula in an attempt to achieve similar goals. Data have been mixed with this approach and mainly studied in adults with comorbidities. Whether high flow nasal cannula alone may be sufficient during attempts at tracheal intubation in children requires further investigation.

Just as pilots have learned to navigate planes to safe and successful landings with near perfection, so should anaesthetists regard these same goals with tracheal intubation. Morbidity or mortality during intubation attempts, even in the sickest or tiniest infants, should be a “never event”. Each individual intubation attempt on every patient is a critically important procedure that cannot be regarded lightly, for experience has shown that severe complications inevitably occur. Therefore, we believe that oxygen supplementation should be used on all expectedly difficult or prolonged intubation attempts in children. The benefit-to-risk ratio is too great to ignore. We commend the authors for their work and encourage further study to evaluate additional approaches to successfully deliver oxygen during intubation attempts. In addition, we implore the medical device industry to continue to innovate and design equipment to allow deep oxygen insufflation during laryngoscopy in every sized patient, until complications during tracheal intubation have become optimally low.

Declaration of interest


References