

EDITORIAL

CON: laryngeal masks must not be used for surgery in the prone position

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This article is part of a Pro and Con debate and is accompanied by the following articles:

- Kranke P. Penny wise, pound foolish? Trade-offs when using the laryngeal mask airway for spine surgery in the prone position. *Eur J Anaesthesiol* 2014; 31:249–252.
- Hinkelbein J. PRO: laryngeal masks can be used for surgery in the prone position. *Eur J Anaesthesiol* 2014; 31:253–255.
- Olsen KS, Petersen JT, Pedersen NA, Røvsing L. Self-positioning followed by induction of anaesthesia and insertion of a laryngeal mask airway versus endotracheal intubation and subsequent positioning for spinal surgery in the prone position. *Eur J Anaesthesiol* 2014; 31:259–265.
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First, do no harm!¹ For our profession, this means that our most important concern must be patient safety. In a world with limited resources, the quest for safety is in constant conflict with the demand for efficiency. Ultimately, it is a trade-off of production pressure against safety. This conflict has a distinct problem: whereas production can be measured quite easily, safety only becomes visible in its absence.

The study by Olsen *et al.*² in this issue showed that induction of anaesthesia in the prone compared with the supine position may shorten induction time by a mean of a few minutes. While such a time gain is of highly questionable relevance, because airway management is more difficult in the prone than in the supine position, the potential risk associated with this technique increases considerably. In the event of an airway problem,

any delay in returning patients into the supine position becomes critical. If an adverse airway event occurred, it might not be easy to defend this approach in court. ‘Was the only reason for inducing the patient in the prone position the saving of a few minutes?’ will probably be the crucial question that will have to be addressed. The Federal Court of Germany, the highest court in civil rights, has always emphasised that in conflicting demands between economic considerations and due diligence, priority must always be given to due diligence. Thus, the question we have to ask ourselves is ‘Are we convinced that such an approach is safe?’ and ‘Does production pressure justify reducing the margin of safety?’

Production pressure has an important influence on performance, as there is often a drift towards failure as defences erode in the face of pressure. This phenomenon is the basis for the emerging research on resilience, namely how organisations manage to maintain their quality of performance even in the face of threat – the ability to absorb disturbances, disruptions and change.³ This is one of the core principles of the so-called, ‘High Reliability Organisations’ (HROs), that have a wide margin of safety despite huge performance pressures and threats.⁴ Examples are military aircraft carriers or large fire-fighter squadrons. Resilience engineering proactively looks for generic patterns that can serve as lessons for transformation before failures occur.³ The use of resilience engineering tools enables organisations to balance the competing demands of safety and production pressures.

The accident of the space shuttle ‘Columbia’ on 1 February 2003 provides an example of the importance of resilience engineering. During lift-off, the space shuttle was hit by foam and damaged so badly that it exploded during re-entry into the atmosphere. The investigation that followed detected several critical points before the accident occurred, when opportunities to change the course of events away from failure were missed.⁵ These were as follows:

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- (1) Changing the classification of the known 'foam events' from in-flight anomalies to maintenance issues (and by doing so downgrading the risk potential of these events to acceptable risks).
- (2) Regarding absence of past failure as an indicator of absence of future risk.
- (3) Missing opportunities to learn from similar events in previous space shuttle missions.
- (4) A drift towards failure as defences eroded in the face of production pressure.

Eric Hollnagel, a specialist in resilience engineering, commented on the Columbia accident: 'If anything is unreasonable, it is the requirement to be both efficient and thorough at the same time – or rather to be thorough when with hindsight it was wrong to be efficient.'⁶

Ultimately, critical analysis of the various aspects associated with the space shuttle accident clearly shows how production pressure can erode safety by facilitating failure.

What can our specialty learn from the spacecraft tragedy? And how should we apply that lesson to the publication under discussion? Airway management is still a major critical issue in anaesthesia, the so-called 'cannot ventilate, cannot intubate' situation being the worst case scenario. We have spent enormous resources developing sophisticated airway devices. We have developed algorithms and drill ourselves in the management of these situations by using manikins and simulators. We struggle for the safest approach and extensively discuss questions like the feasibility of administering a muscle relaxant before effective mask ventilation is established.⁷ We have subspecialty organisations that exclusively deal with airway management. Despite all this progress, we still occasionally face devastating airway problems. In that context, Olsen *et al.*² propose an approach that predictably reduces the margin of safety of without providing corresponding advantages – unless one considers saving of a few minutes induction time an adequate justification for reduced patient safety.

This study by Olsen *et al.*² is a perfect example of the trade-off between production pressure and safety. In my opinion, these colleagues walk the same path as NASA did before that tragic 'Columbia' accident happened:

- (1) Shifting the boundaries of safety towards those of risk.
- (2) Interpreting absence of failure as indicators of absence of risk and presence of safety.
- (3) Eroding defences in the face of production pressure.

This is a well known phenomenon in a variety of industries: the so-called phenomenon of 'migration of boundaries'⁸ or 'normalisation of deviance'. If a system is faced

with pressures like economic pressure, highly motivated workers in such a system tend to disregard accepted and sometimes even implemented safety barriers. In aviation for example, an industry with very good safety records, extensive studies of crews' deviations from procedures showed that intentional non-compliance represented 55% of all errors.⁹

Non-compliance due to economic pressures has already been described in healthcare. In a private hospital that was close to bankruptcy, the anaesthesiologist reused the same syringe of propofol for consecutive patients with the sole motive of saving money for the hospital.⁹ This kind of violation represents the adaptation of professionals to conflicting demands of safety and economic pressure. Violations may save time and, therefore, seem to improve the performance of that system. If senior management fails to correct such behaviour, the employees feel authorised to proceed in that manner and over time adapt their behaviour to the new (self-set) rules, so-called 'borderline tolerated conditions of use'.¹⁰ By this mechanism, the whole system migrates to the boundaries of safety until an accident occurs, which then forces a recalibration of the system. 'Borderline tolerated conditions of use' are first seen as a benefit and not as risk. Because they appear to enhance performance, they are often tolerated or even demanded by senior management.

Inducing general anaesthesia in the prone position to gain only a few minutes of process time is an example of such 'migration of boundaries' due to economic pressures.

It is important to note that the power of that study is far too low to prove the safety of Olsen's approach. As Altman and Bland¹¹ appropriately stated: 'Absence of evidence is not evidence of absence'.

Intubation in the prone position may become necessary on an emergency basis when the endotracheal tube becomes dislodged in the prone position¹² or in the context of airway management of rare accidents.¹³ But I strongly caution against reducing the safety margin of airway management in elective situations for merely (questionable) economic advantages! We must resist the trap of blindly following production pressure and putting safety second. Anaesthesia has always been the medical specialty which put patient safety first.¹⁴ We must not sacrifice the principle of safety simply for a mere gain of 3 min process time. First do no harm!

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