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Editorial
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Navigating complexity: future-proofing anaesthesia for patient safety

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Medical error is a well-recognised contributor to patient harm worldwide and is increasingly acknowledged as a major cause of preventable morbidity and mortality. In the United States, it is estimated to be among the leading causes of death.[1] Hogan *et al.* reported that 3.6% of in-hospital deaths were avoidable and attributed to medical error.[2] Defined as "the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim",[3] medical error can result in a spectrum of outcomes, ranging from near misses to patient injury or death.

Anaesthesiologists practise in highly complex, time-critical environments where rapid and high-stakes decisions are frequently required. We care for patients across the entire lifespan, from neonates to the elderly, and in diverse clinical settings, including the operating theatre, labour ward, emergency department, and intensive care unit. Each anaesthetic encounter is unique, even for the same surgical procedure, because of variations in patient characteristics, comorbidities, and surgical context. For this reason, comparing the practice of anaesthesia to aviation is misleading. The unpredictability and urgency of decision-making in anaesthesia extend well beyond the protocol-driven systems typical of aviation.

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Many medical errors do not arise from ignorance or negligence. Instead, they often are the results of human and system limitations. These include fatigue, cognitive overload, skill-based mistakes, and poorly designed workflows.[3] Human factors science plays a crucial role in addressing these challenges. The discipline of human factors focuses on designing systems and environments that "make it easier for clinicians to make the right decisions and more difficult for them to make the wrong ones".[4] It recognises that clinician performance is strongly affected by the broader systems in which clinicians operate.

Healthcare can be described as a complex adaptive system composed of interdependent components functioning at multiple levels. One useful framework for understanding these levels is to consider the "micro", "meso", and "macro" dimensions of care.[4] At the micro level, individual clinical tasks, such as endotracheal intubation will depend on the clinician's skills, physical and mental condition, cognitive state, and access to appropriate equipment. At the meso level, operating theatre staff must coordinate their efforts effectively by relying on shared communication, mutual support, and aligned mental models in order to achieve common goals. At the macro level, institutional policies, workforce arrangements, and national clinical guidelines influence how care is structured and provided. All these levels are interconnected, and weaknesses in any one layer can lead to negative consequences across the entire system. Therefore, embedding human factor principles at each of these levels is critical to improving safety and performance.

Improvement efforts in patient safety should extend beyond compliance with protocols. The efforts should ensure that planned care occurs reliably. In this issue, Iskandar *et al.* explore how the use of ultrasound in central neuraxial blockade can improve success rates. They note that several barriers hinder the adoption of this technology, including financial limitations and cultural resistance to change. Addressing these challenges is essential to delivering consistent, high-quality care to all patients.

This edition of MyJA features several case reports that further illustrate the complexity and high stakes of anaesthetic practice. Mohd Najid *et al.* describe the management of a breathless pregnant patient with non-Hodgkin lymphoma who presented with symptoms of an anterior mediastinal mass, Mohd Nor *et al.* report an unexpected case of suxamethonium apnoea in a previously healthy young parturient and Zainal Abidin *et al.* report a challenging tracheal tumour resection performed under cardiopulmonary bypass. These cases highlight the physiological and technical challenges of our work, and exemplify the value of teamwork, planning, and sound judgement in delivering good outcomes to our patients.

In their review for this issue, Palari *et al.* examine the growing influence of medicolegal concerns on anaesthesia practice in Malaysia. The rising incidence of litigation has contributed to a cultural shift away from learning and root cause analysis. Increasingly, the focus has moved towards assigning blame and issuing financial compensation. While it remains essential to protect patients from preventable harm, it is equally important to support the wellbeing and professional integrity of anaesthesiologists. Achieving this balance requires a collective effort at every level of the healthcare system.

In the Letter to the Editor, Tiong, an aspiring anaesthesiologist, offers a poignant reminder of the value of mindfulness in our clinical work. His reflection serves as a timely reminder for compassion and reflection. Professor Kevin Fong, a consultant anaesthesiologist and Professor of Innovation and Engagement in Medicine at University College London, echoed a similar sentiment in his plenary lecture titled *"Risky Business"* at the recent 2025 ANZCA Annual Scientific Meeting. He reminded the audience, that: "We should be kind to those in harm's way." As we strive to improve patient safety, we must not lose sight of what anaesthesiologists are already doing right. Each day, we navigate uncertainty and manage clinical risk with care and competence. More often than not, we accept a smaller risk to prevent a much greater one.

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