

'Patient Safety in Anaesthesia – Have We Made Progress?'

“There are no safe anaesthetic agents, there are no safe anaesthetic procedures. There are only safe anaesthetists.” - Robert Smith, MD

The Evolution of Safety in Anaesthesia:

The word an-aesthesia means 'loss of sensation.' Today this definition has evolved to encompass analgesia, amnesia, unconsciousness, and paralysis. The first recorded modern general anaesthetic took place in 1846 at Massachusetts General Hospital, Boston. Dentist, William Morton, anaesthetised Edward Abbott by encouraging him to inhale diethyl ether prior to his operation to remove a neck tumour. The patient lay silently on the table, blissfully unaware of the barbaric procedure that was about to unfold. Before the advent of modern anaesthesia, the sound of patients thrashing and screaming filled and reverberated around operating theatres. Anaesthesia was a ground-breaking invention, but it wasn't all that safe. Anaesthesia-related mortality was stated 6.4/10,000 in the 1950s¹, down to 0.04-5/10,000 since 2000². Although the exact figure is controversial, there is no doubt that the specialty has made astounding progress in safety over the past decades. Ether has been replaced by safer inhalation agents, and open drop delivery systems have been exchanged for sophisticated vaporisers and monitoring systems. Since the 1950's, anaesthesiology has expanded its vision of safety from reducing direct mortality due to drug errors and airway management, to improving perioperative processes that speed up recovery and enhance the long-term functional, cognitive, and psychological health of patients.

The exciting progress in safety can be largely attributed to advances in technology and managing human factors. A major early example of a technological safety breakthrough was the introduction of the oxygen fail-safe mechanism, designed so that nitrous oxide supply will turn off automatically when oxygen delivery is compromised, preventing nitrous oxide poisoning through hypoxia. Flowmeter knobs have different textures for oxygen, a safety mechanism utilising tactile feedback to supplement visual and cognitive verbal input to minimise user error. This constellation of safety features augments gas administration safety particularly in emergency situations when attention may

be divided. Human factors that have significantly improved patient safety are better communication, teamwork, and simulation training. Discouraging authority gradients has proven fundamental for patient safety by priming Anaesthesiologists to speak up if anything of concern is noted. Open communication in safe spaces has improved patient safety through reporting “near misses” and sharing episodes where a patient has almost come to harm and preventing actual harm from occurring in the future.

The use of cognitive aids has long been embedded in high-risk, highly reliable industries such as aviation and nuclear power³. Anaesthesiology has followed safely in their footsteps. The aviation inspired “safe surgical checklist” paved the way for checklists to be adopted⁴. In 2013, the Anaesthesia Patient Safety Foundation (APSF) developed a “Pre-anaesthetic Induction Patient Safety” checklist. Wetmore et al⁵ compared the performance of anaesthesiologists in a high-pressure operating room using this checklist for pre-anaesthetic induction setup with those not using a checklist. Unsurprisingly, there was a statistically significant improvement in performance when a checklist was used⁵. The Difficult Airway Society released an algorithm for the management of an unanticipated difficult airway in adult patients⁶. Checklists have shown to be both a cognitive aid and an invaluable tool to promote teamwork and communication that might not otherwise occur⁷.

There is no doubt that anaesthesiology has taken a significant step forward in closing the gap to patient safety. However, there remains room for improvement, particularly in the case of look-a-like medication vials. Drug vials with almost identical labels, such as hydralazine hydrochloride and ondansetron, contribute to medication errors⁸. Ampoules contain key information such as drug name, concentration, and expiry date, however, it is in diminutive font that lacks contrast to the label colour. For a drawer to be filled with look-a-like medications creates significant potential for harm. It would seem like a prudent step forward in anaesthetic medication safety if the current ISO standard (ISO 26825) relating to colour coding of labels attached to syringes was extended to manufacturers labelling⁹.

As outlined earlier, technology advances and human factors are a source of improvement in patient safety, paradoxically they also have a role to play in preventing further progress. As BF Skinner once said, “the real problem is not

whether machines think but whether humans do.” Technology is only as good as the people trained to use it and the unpredictability of humans is a variable worth considering. In 2016, The Association of Anaesthetists of Great Britain and Ireland published guidelines¹⁰ on patient monitoring stating that “a measure of neuromuscular blockade...is essential for all stages of anaesthesia when neuromuscular blocking drugs are administered”. Monitoring is required to avoid harm and increase patient safety, especially in recovery. It reduces the risk of unrecognised residual paralysis which is associated with poor patient recovery ranging from discomfort to airway impairment to death. Monitoring technology has been available in various forms since the 1950’s¹¹. Nonetheless, monitoring was only documented in 50% of cases by anaesthesiologists of varying experience¹². This shocking statistic illustrates the level of human resistance to change which may prove to be a speed bump on the road to further progress in patient safety. Change is a relentless phenomenon and, like it or not, the upcoming decade promises a tsunami of change in the realm of patient safety. Future technological advances may include automated systems of anaesthesia delivery, artificial intelligence, and telehealth.

As Robert Smith stated, “there are only safe anaesthetists,” the immense progress in patient safety over the decades is testament to the specialty's dedication to relentlessly drive-up standards by identifying harm, studying it, and implementing change to improve¹³. As safe as anaesthesia procedures appear today, well trained, safe anaesthesiologists are essential to ensure optimal patient safety. It is a fallacy to believe safety standards could be upheld at the current high level without their input. ‘Salus Dum Vigilamus’-safety while we watch- is a most apt motto.

The founding President of APSF, Dr. Ellison “Jeep” Pierce, asserted that improving patient safety is not a one and done process. It is a long game that requires the continual support of research, education, and translation of science to clinical care. It is analogous to running a marathon without a finish line. It is a one-step-at-a-time commitment to a shared struggle. And finally, it is about knowing that you contributed to making the world a better place. Patient safety in anaesthesiology has a proud past but an even more exciting future.

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