

Quality, safety, and outcomes in anaesthesia: what's to be done? An international perspective

C. J. Peden^{1,*}, M. Campbell³ and G. Aggarwal²

¹Department of Anesthesiology, USC Center for Health System Innovation, Keck School of Medicine, University of Southern California, Los Angeles, CA, USA, ²Department of Anaesthesia, Royal Surrey County Hospital, Guildford, Surrey, UK and ³Department of Anaesthesia, Royal Free Hospital, London, UK

*Corresponding author. E-mail carol.peden@med.usc.edu

Abstract

This article reviews some of the key topics and challenges in quality, safety, and the measurement and improvement of outcomes in anaesthesia. The topics were selected based on the perspective of an individual with quality and safety expertise and recent experience of the specialty in both the UK and USA. The review does not seek to be exhaustive or systematic, but to highlight current areas of concern and potential solutions. The topic is subdivided into sections where the system of health care is viewed from different levels. These levels are as follows: the microsystem or patient and individual clinician perspective; the meso or hospital perspective; and the macro or government and policy perspective. Topics covered include medication safety, changes in approaches to patient safety, payment reform, longer term measurement of outcomes, large-scale improvement programmes, the ageing population, and burnout. The article begins with a section on the success of the specialty of anaesthesia in improving the quality, safety, and outcomes for our patients, and ends with a look to future developments, including greater use of technology and patient engagement.

Key words: anaesthesia, general; patient safety; quality improvement

Reflections and celebrations

In the 25 yr since the gaining of the Charter to form the Royal College of Anaesthetists (RCoA) in March 1992, the specialty has come a long way. In the previous 25 yr, there had been incredible innovations in anaesthesia, such as the introduction of enflurane, isoflurane, propofol, the laryngeal mask airway, and pulse oximetry. The breakthroughs and developments from 1992 to 2017, although perhaps not so dramatic as those that occurred between 1948 and 1992, reflect the maturity of anaesthesia as a specialty. Work is focused on continuous improvement, a better understanding of patient outcomes, and delivery of the highest quality of care through education and training, research, audit, incident reporting, and the setting of standards.

Although there are still many challenges that the specialty must meet, some of which are discussed in this article, on the

25th anniversary of the RCoA it is important to pause, reflect, and celebrate how much has been achieved as a profession. The death rate from anaesthesia alone, while once feared, is now extremely low;¹ 0.06% for general anaesthesia deaths reported in the 5th National Audit Project (NAP5). There are now standards and systems in place for continuous quality improvement.²

The year of the Charter of the RCoA, 1992, was a challenging year in the UK; the Irish Republican Army (IRA) were active, the Manchester city centre bombing occurred, and the Chancellor announced a reduction of interest rates for the first time in 4 yr to 8.8%! In the world of anaesthesia, the publication of the 1991/1992 NCEPOD report, which then stood for the National Confidential Enquiry into Perioperative Deaths,³ highlighted concerns that have preoccupied the specialty for the last 25 yr;

the lack of dedicated emergency theatres, adequate postoperative recovery and intensive care bed provision, insufficient staff and inappropriate night-time operating by unsupervised junior and locum doctors, inadequate preparation of emergency patients, excessive fluid administration, inadequate use of non-invasive monitoring before and during induction of anaesthesia, and continued issues with some surgeons performing operations with which they were not familiar (Table 1). In many of these areas, significant improvements have been made, such as the provision of dedicated emergency theatres⁴ and the use of monitoring during induction. In others, such as intensive care bed provision, the UK still faces challenges⁵ and lags behind many other developed countries.

Anaesthetists have always been leaders in patient safety, perhaps because of the immediacy that an error can bring. Hospital care is still hazardous for patients,^{6,7} but anaesthesia for ASA physical status I and II patients undergoing day case surgery is one of the safest and reliable procedures that a patient can have. A population study by Li and colleagues⁸ of anaesthesia-related deaths in the USA between 1999 and 2005 showed a death rate related to anaesthesia of 8 per million hospital surgical discharges, taking deaths directly related to anaesthesia into the ultra-safe zone, a term used in the definition of system safety.⁹ As a specialty, anaesthesia has relentlessly driven up standards by seeking out harm, studying and understanding it, and implementing change to improve. However, improvements in perioperative safety have been greatest in the developed world, and although outcomes have improved overall worldwide, there is a need for greater application of evidence-based practice in the developing world.¹⁰

The RCoA has actively driven standards up with a pursuit of excellence and a quest to make care better for patients. Confidential enquiries, such as NCEPOD¹¹ and the Maternal Morbidity and Mortality reviews,¹² have examined themes, found areas for improvement, and then delivered better care through education, training, and constant review. The RCoA is leading the way in accreditation of departments, and programmes for excellence, such as Anaesthesia Clinical Services Accreditation (ACSA).¹³ The National Audit Projects (NAP)¹⁴ and now the Sprint National Anaesthesia Projects (SNAP)¹⁵ have generated information on large numbers of patients, giving further truly evidence-based insight into deficits in care and the incidence of problems.

The specialty of anaesthesia and intensive care medicine has 'changed the conversation' in the care of sick patients. Not that long ago, a prolonged stay in the intensive care unit (ICU) might well lead to a complication, such as a central line infection.¹⁶ Now this is so unusual, after focused safety

programmes,¹⁶⁻¹⁷ that we count days between infections as the incidence rate in high-performing units is too low to calculate.^{17,18} Data from safety programmes, such as the Scottish Patient Safety programme and the South West of England Quality and Patient Safety programmes,^{18,19} show that it is possible across large populations and large numbers of hospitals to go for weeks and months without a central line infection occurring. Internationally, anaesthetists are pioneers and leaders of the patient safety movement.²⁰ However, after the celebration of what has been achieved must come reflection on what is to be done now and in the future to improve safety, quality, and outcomes continuously.

System thinking

As a means of providing structure to this topic, an approach was organized by thinking of the many influences on health care as a system, including political and economic drivers at a macro level, the interactions of multiple small units at a meso-system level (for example, in a hospital), and the patient-centric building blocks of clinical care, the microsystem. A microsystem can be defined by the interactions of a set of providers, support workers, and a population of patients in a defined location.²¹ The challenges to delivering high-quality care for excellent patient outcomes are different depending on the level of the system worked in, but they all interact and significantly influence each other (Fig. 1). The topics discussed in each section are illustrations of challenges and solutions at each level; they are not exhaustive, but have been highlighted by recent international expert consensus.²² The topic of measurement for improvement was covered in a recent *British Journal of Anaesthesia* editorial²³ and so will not be discussed further, but the other issues raised by the expert group are discussed in this article.

Micro-system challenges and potential solutions

The micro level is where interactions occur directly with patients. For example, a high-profile challenge for anaesthesia is medication safety. A recent major study by Nanji and colleagues²⁴ found that 1 in 20 perioperative medication administrations, and every second operation, resulted in a medication error, an adverse drug event (ADE), or both. Fifty-one of the 153 medication errors detected led to a 'preventable' ADE; for example, giving penicillin to a patient with a known penicillin allergy, or administering a large remifentanyl bolus, resulting in bradycardia and hypotension. More than one-third of the errors led to

Table 1 Then and now: recurring themes in resource allocation and recommendations for perioperative practice since the 1990s^{3,4}

Resource allocation	Medical practice recommendations
Twenty-four-hour access to fully staffed operating theatres	Pathways to facilitate the delivery of optimal emergency surgery
Twenty-four-hour access to pathology and radiology reporting services	Safe and structured handover of care
Critical care beds provision	Pathways for the care of unscheduled surgical patients and timely management of sepsis
Adequate staffing, with consultant-led care and supervision of juniors	Multidisciplinary reviews of processes and patient outcomes (morbidity and mortality meetings)

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