Quality Improvement in Anesthesiology — Leveraging Data and Analytics to Optimize Outcomes

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KEYWORDS

- Quality improvement • Performance improvement • PDSA cycle
- Quality dashboard • Anesthesia quality institute

KEY POINTS

- Quality improvement is at the heart of practice of anesthesiology.
- Objective data are critical for any quality improvement initiative; when possible, a combination of process, outcome, and balancing metrics should be evaluated to gauge the value of an intervention.
- Quality improvement is an ongoing process; iterative reevaluation of data is required to maintain interventions, ensure continued effectiveness, and continually improve.
- Dashboards can facilitate rapid analysis of data and drive decision making.
- Large data sets can be useful to establish benchmarks and compare performance against other providers, practices, or institutions.
- Audit and feedback strategies are effective in facilitating positive change.

The importance of delivering safe, high-quality care has been a core tenet of the practice of medicine since the time of Hippocrates; the dictum *primum non nocere* (first do no harm) is a fundamental bioethical principle familiar to all health care providers. The release of 2 landmark publications from the Institute of Medicine, *To Err Is Human*[1] and *Crossing The Quality Chasm*,[2] brought the issues of safety and quality in health care to the public eye in the early 2000s. Decades before the release of these publications, however, anesthesiologists were already at the forefront of the quality and safety movements. From Dr Ellison (Jeep) Pierce's careful log of "anesthesia accidents"[3] to the early adoption of "critical incident analysis",[4] anesthesiologists have long

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recognized the importance of evaluating quality in a discerning way. Anesthesiology was, in fact, the first medical specialty to specifically champion quality and safety: first through the creation of the American Society of Anesthesiologists Committee on Patient Safety and Risk Management in 1983, followed by the creation of the Anesthesia Safety Patient Foundation in 1985 and the Anesthesia Quality Institute in 2009.[3,5,6]

The Institute of Medicine defines health care quality as "the degree to which health-care services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" and it further refines the definition of quality as having 6 properties or domains (**Box 1**).[7] Measuring quality in health care, however, can be a difficult proposition. The essence of the quality improvement movement is to use objective data to evaluate current performance and use this information to have an impact on positive change.

MEASURING DATA IN QUALITY IMPROVEMENT: DEFINING METRICS

A critical aspect of any quality improvement effort is to determine metrics by which success is measured. It is important to identify appropriate metrics to know if an implemented change represents an improvement over existing processes. Three types of metrics are used in quality improvement.

Outcome Measures

Outcome measures evaluate a desired endpoint of a process. In health care, outcomes measures typically evaluate the clinical impact of a particular service or intervention on the overall health and well-being of a patient or population. Alternatively, outcome measures may assess the impact on other stakeholders, such as payers or the community. Examples of outcome measures include perioperative morbidity and mortality, hospital or postanesthesia care unit (PACU) length of stay, or surgical readmission rates. Anesthesia-specific outcome measures may evaluate incidence of perioperative major adverse cardiac events, postoperative pain scores, or rates of postoperative nausea and vomiting. Outcome measures are commonly reported in large, national databases (discussed later). Although outcome measures may seem to represent a gold standard of quality, it is important to recognize that factors beyond a clinician's control may affect outcomes. For example, Hospital A may have a

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Box 1
Institute of Medicine quality domains

- Safety — avoiding actual or potential patient harm
- Patient centeredness — meeting patients' needs and preferences and providing education and support
- Effectiveness — providing care processes and achieving outcomes, as supported by best scientific evidence
- Equity — providing health care of equal quality to those who may differ in characteristics
- Efficiency — maximizing the quality of a comparable unit of health care delivered for a unit of resources used
- Timeliness — obtaining needed care while minimizing delays

Data from Institute of Medicine (US) Committee on Quality of Health Care in America. Crossing the quality chasm: a new health system for the 21st century. Washington, DC: National Academies Press (US); 2001.