

# Quality trends in healthcare and their impact on anesthesiology

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## Abstract

The new approach of a patient-centred, appropriate and timely care that was at the heart of the Institute of Medicine (IOM) initiative is changing the face of the healthcare industry in general and, in particular, of anesthesiology as a speciality. The drivers of this change are better quality and decreased healthcare costs, since despite a large expenditure for healthcare, the quality of care has not changed tremendously. Metrics have been identified, derived from the cybernetic model first described by the quality “parent”. Donabedian and each of those metrics have both advantages as well as disadvantages. Ultimately the outcome measures are the ones that CMS will hold hospitals accountable for financially as well as from a safety standpoint. The culture of safety and quality as well as methodologies to improve that culture will shape the future of quality of care and improve outcomes and patient satisfaction.

**Keywords:** quality dimension, quality metrics, outcome measures, financial incentives, MIPS (merit based incentive payment systems), MACRA (Medicare Access and Chip Reauthorization Act)

Received: 13 January 2017 / Accepted: 27 March 2017

**Rom J Anaesth Int Care 2017; 24: 47-52**

## Introduction

In the United States, the healthcare industry is undergoing major changes, the most significant drivers being the combination of rising costs and aging population that requires access to a variety of healthcare resources as well as rapid technological advancements to treat their comorbidities. At the same time, the gap between rising healthcare costs and better quality of care only continues to widen. By 2050, it is expected that 82 million baby boomers over 65 years will require healthcare access, while the number over 82 years of age will quadruple, according to a report by the Council of States Government. [1] Coupled with those trends, there are emerging market forces, such as costlier treatments, change in lifestyle, and a tendency to see a decline in rural hospitals while large urban centres

claim a larger market share which are directly affecting both market share and population health.

Physician treatment decisions still represent the most important drivers of change, but an emerging trend particularly of large private sector employers, are increasingly a driving force. [2] Large employers that shifted from fee-for-service to capitation through managed care organizations saw large savings and no quality of care change, thereby intensifying competition, even more so when starting to aggregate their purchasing power and actually bypass managed care organizations. At the core of the change and the driver of future trends is the fact that employers not only have the opportunity to price compare healthcare services among multiple institutions but also to compare the fundamental added value derived from those services (i.e. improved health and productivity of their workforce).

A number of trends have been identified that will be paramount in shaping healthcare over the next decade [3].

1. CMS (Centre for Medicare and Medicaid) regulations and mandates that are affecting physician revenues. In that context, the value based purchasing programs (VPP) are already in place and as a

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consequence physicians are starting to feel the penalty phase of CMS quality reporting.

CMS has published the Quality Payment Program as part of deploying Medicare Access and CHIP reauthorization Act of 2015 (MACRA). In essence, it requires healthcare institutions to start collecting reportable data for 2017 that will translate in payment adjustments starting January 1, 2019. For the year 2019 that payment adjustment will be a  $\pm 4\%$ , in 2020 it will reach a  $\pm 5\%$ , and will continue to grow 2% points for the next 2 years reaching by 2022 a  $\pm 9\%$ . The financial pressure on any healthcare institution is presumably becoming an important factor in both organizational behavior change and a patient satisfaction assessment tool.

2. Technological advancements that are modifying population behaviors. Products such as the wearable tracking devices that monitor anything from calorie consumption to physical activity and sleep patterns are influencing health and lifestyle choices, ultimately contributing to behavior modification. These devices are a positive addition to monitoring perioperative prehabilitation (increase nutritional support, increase in exercise). In addition, an abundance of technology is now focused on eliciting patient interest and participation in their own episodes of care through online surveys and social media networking sites for information exchange on available healthcare providers and their areas of expertise and qualification. What still lags behind is the use of social media to directly link providers and patients in an interactive communication system that has the potential to completely change the traditional patient-physician relationship. Telemedicine is the best example of the impact on that relationship by technology. Lastly, data security in order to protect from HIPAA violations has been at the forefront of implementation for many healthcare institutions, compounding the influence of technology on healthcare quality.

3. Financial viability, defined as the ability of the healthcare institution to sustain operations and maintain an operating margin of at least 2%, represents a major factor affecting the quality of healthcare, since it is heavily dependent on patient satisfaction surveys, quality scores, new CMS mandates, and has to deal with both industry personnel shortages as well as market predictions that assign the industry a higher risk due to slow growth and weak performance [3].

4. Tolerating risk in the value purchasing world is the trend expressed by the participation in bundled payments. Bundled payments are payments that are received for a patient episode of care regardless of how many providers were involved. The change to bundled payments had multiple consequences for healthcare delivery. First, if hospitals perform poorly in the risk programs (currently 3 metrics that describe

hospital risk as: hospital acquired conditions rate, high readmissions rate and value based purchasing) they will incur a penalty (5.5% in 2015). Second, hospitals that perform poorly and have decreased Medicare payments are publically listed.

5. Increase in population management is defined as the proactive application of strategies and interventions to defined cohorts of individuals across the continuum of healthcare delivery in an effort to maintain or improve the health of the individuals in the cohort with the lowest possible cost. The application of that is well reflected in the anesthesia specialty specific measure #137 and #404, preventive care and screening for high blood pressure and documented follow up (137) and smoking abstinence preoperatively (404).

6. Outcomes focus will continue to shape the quality of care. An article in *Modern Healthcare* [4] reveals that the focus on outcome measures has resulted in a decrease of 17% in mortality with a net result of less 50 000 deaths between 2010 and 2013. The largest decrease is a part of the surgical infection prevention initiative, namely the decrease in central sterile bloodstream infection prevention (CLABSI) by 49% from 2010-2013. As important, readmission by all causes 30 day rate decreased from a plateau of 19.5% in 2010 to a 17.5% in 2014 [5]. For anesthesiology this has translated into a slew of new MIPS that are specialty specific and geared toward outcome.

7. Increased collaboration and major mergers among payers are starting to represent a major driver for healthcare delivery change. It is likely that with 11,000 baby boomers aging daily into Medicare and the healthcare cost per person rising, the need for new strategies is becoming more apparent than ever.

Lastly, with healthcare plan rates increasing, employers have essentially begun shifting costs to employees with out of pocket expenses now a larger portion of the episode of care cost. Patients are becoming more informed and a trend of choosing a healthcare institution based on its status as a centre of excellence for a certain procedure accentuates the competitive environment, making healthcare outcomes an utmost priority.

### **Quality of care – a continuum with attributes**

Historically, Avedis Donabedian was the first to view quality as a cybernetic model, as a continuum that has an input which will become an improved outcome through a healthcare process [6].

While quality is most often viewed as a continuum, it is best described as a dimension and measured by quantifying its attributes. The dimension of quality is defined as the degree to which healthcare services for

an individual or population increase the likelihood of desired health outcomes and is consistent with current professional knowledge [7]. The Institute of Medicine (IOM) describes attributes of the dimension of quality, the most important being appropriateness, timeliness and safety. Defining attributes helps identify characteristics that can be measured through indicators. The indicators in turn need to have certain fundamental characteristics such as transparency and reliability which can lend themselves to being evidence-based and measurable, so they have the potential to be improvable. And while striving to achieve these characteristics in indicators, one has to also take into account potential pitfalls. For example, our current approaches to analysis of certain indicators have limited sensitivity and specificity. One of the best such examples are mortality and morbidity indicators, which not only depend on willingness to report them but also not all morbidity/mortality is anesthesia related therefore being of limited value in quality analysis.

Three types of quality indicators were derived from the Donabedian cybernetic model: structural (such examples include physician certifications or number of functioning anesthesia machines/equipment), process and outcome. The process indicators are in turn divided into descriptive (i.e. unplanned ICU overnight stay), prescriptive (prophylactic antibiotic selection) and proscriptive (medication error) [6].

The Agency for Healthcare Research and Quality has found only 2 indicators to be truly anesthesia related and those are death rate associated with procedures involving anesthesia and rate of preventable adverse events [8]. To further complicate the choice of best indicators are barriers such as lack of consensus and definitions across systems and countries. For example, mortality can be measured in three ways, death within 48 hours, death rate associated with procedures involving anesthesia or death within 30 days of surgery.

In the US, the use of process indicators still dominates, while outcome measures are emerging. The process indicators while growing in number are still mostly overall represented by proscriptive indications (i.e. do or do not do something a certain way). They define targets that have to be reached to ensure quality of care in anesthesia and are valid improvement tools, but only if a causal link can be established to outcomes.

At the other end of the spectrum, the outcome indicators seem to represent the gold standard. They do have pitfalls of their own, such the danger of being over-interpreted and thus leading to dangerous behaviors or misuse. While outcome indicators are now the focus, the debate between whether process or outcome indicators best deliver improved outcomes remains [9]. At the core of the debate is the fundamental axiom that in order to achieve stable and consis-

tent growth in healthcare you need adequate measures. While outcome indicators are high level, clinical and financial targets, the process indicators represent specific steps that lead to a successful outcome. They are evidence-based and try on that base to systematize improvement efforts. Ultimately, only by implementing and tracking the right measures will an outcome improve. More importantly, the author considers that only tracking process measures exposes system failures and attempts to decrease variation.

The author mentions that a good avenue to such improvement is represented by the Lean six sigma process analyses. This methodology is represented by a combination of the lean approach, thus named due to the elimination of any waste in any process production and six sigma that actually aims to decrease variance in any process.

The use of the new Lean/Six Sigma (LSS) methodologies enhances quality through behavioral/cultural change. Those three methodologies are, continuous quality improvement, lean methodology, or six sigma methodologies. The value map stream design exposes both waste and sources of variation. Process indicators are the building blocks to achieve improved outcome indicators. They open the door to more in-depth analysis through root cause analysis techniques. The problem remains that without adequate infrastructure, process indicators cannot yet be used on a larger scale in consistency improvement. Most organizations, due to the lack of technological infrastructure, will choose outcome indicators since they are the ones reported to CMS. They are the ultimate goal to measure quality of care, since they represent patients' expectations (to pass through the healthcare continuum and achieve desired outcomes) as well as those of employers and payers. The Leapfrog group (an association of multiple large employers that spearheaded quality of care initiatives) is seeking centers of excellence for specific surgical procedures in order to achieve best outcomes for their employees. Walmart and Lowe both have contracts with four centers of orthopedic excellence that guarantees their employees full coverage of both procedures and all travel expenses. The end points of such desired outcome measures are decreased length of stay, decreased readmission, decreased mortality and morbidity.

### **Anesthesia Quality Institute and ASA QCDR measures**

Specifically for anesthesiology, The Anesthesia Institute for Quality has developed a Qualified Clinical Data Registry (ASA QCDR) that is a repository of current measures [10]. Those include:

1. Corneal injury diagnosed in the postoperative recovery room after anesthesia care
2. Nausea/vomiting prevention
3. Perioperative cardiac arrest
4. Perioperative mortality rate
5. Assessment of perioperative pain
6. Postoperative recovery room reintubation rate
7. Perioperative aspirin use in patients with coronary drug eluting stents
8. Coronary artery bypass postoperative renal failure, stroke and prolonged intubation
9. Rate of postoperative stroke or death in asymptomatic patients undergoing asymptomatic carotid endarterectomy
10. Rate of small or moderate non-ruptured aortic aneurysms undergoing endovascular repair (EVAR) that die in the hospital
11. Total knee replacement venous thromboembolic and cardiovascular risk evaluation
12. Unplanned hospital admission or transfer
13. Day of surgery cancellation rate

Those measures join the already established physician quality reporting system measures (PQRS) that tie negative incentive payments of large payer systems to voluntary reporting of 9 measures out of a pool of validated indicators.

Current PQRS reporting includes:

1. Beta blockade administration perioperatively
2. Prevention of central venous catheter infections
3. Osteoarthritis function and pain assessment
4. Medication reconciliation
5. Pain assessment and follow up
6. Perioperative temperature management
7. Tobacco screening and cessation
8. Patient centred surgical risk assessment and risk communication
9. Postoperative transfer of care

All measures are aimed at improving the quality of care, but the focus is on certain high risk ones such as medication reconciliation or prevention of central venous catheter infections.

For anesthesiology specifically, medication errors represent a serious problem. Multiple studies in the US, Australia and Denmark (which has a national registry of reportable adverse events) have shown that medication errors represent a larger source of adverse events than problems such as inability to intubate. In Denmark, for example, out of 24 reported anesthesia-related deaths, eight were consequences of medication error, while four were due to inability to intubate, which is a doubling of the rate [11]. Causes for anesthesia related medication errors included mislabeled or closely colored coded drugs, defective or erroneously programmed infusion pumps, wrong route of administration

(i.e., i.v. vs intrathecal), lack of or poor knowledge of a particular drug or pertinent drug interaction.

### Use of Lean six sigma methodologies in healthcare

In the US there are healthcare institutions spearheading the effort to incorporate the LSS techniques in order to decrease medication errors that are either near misses or full blown adverse events. Such institutions have completely re-engineered their healthcare system based on the LSS methodologies not only for medication error prevention, but also to improve patient access and streamline processes for greater patient satisfaction (Mayo Clinic in Rochester, Virginia Mason in Seattle).

The American Society for Quality has conducted a study of 77 hospitals in US that deployed the LSS techniques, which provided an excellent benchmark to other hospitals that were considering the application of such techniques [12]. It showed that 53% of the hospitals provided some level of deployment (42% deployed six sigma and 37% deployed lean six sigma). The study generated information about the reluctance of healthcare organizations to more extensively deploy either technique citing lack of resources, lack of enough information or leadership buy in or lack of knowledge. Interestingly, one in ten participants in the study did not know or understand what the methods are despite having been alerted to what the study would cover. The major areas that lent themselves to application of these methods included the need for operating rooms streamlined throughput, cost containment and need for better quality. Local institutions chose different methods depending on what they thought would be most successful given their resources, conditions, etc. The areas targeted were those of high cost/revenue, those in need of optimization of both cost/revenue as well as throughput, namely operating rooms (66% of hospitals), emergency room (72% of hospitals) and inpatient length of stay (59%). The study concluded that when deployed 95% success was achieved with respect to operating rooms with the most important conclusion being that the success required a very small investment (median of \$25,000-\$96,000).

Why apply such methodologies? According to the American Journal of Business 55% of medical errors are preventable. They cost 17 billion dollars annually with 17.8% of the GDP spent on healthcare. Top causes of medical errors include miscommunication, system and culture failure, equipment failure, lack of employee expertise and poor infrastructure [13]. With that focus in mind, healthcare organizations have made a concerted shift in culture change by adopting any of the three LSS methodologies.

1. Continuous quality improvement takes an organizational and systems perspective, is aligned with the organization's strategic goals and is ultimately the most effective approach. There are five guiding cultural principles: personal challenge, never good enough, go to the source to understand a process, respect and teamwork. The disadvantages are related to length of time needed to build the culture (incremental improvement), and the top down approach, thereby not engaging employees directly, which makes it best employed as a long-term approach

2. The lean methodology is equally effective in producing results in patient safety initiatives, produces more immediate results and comes from the bottom up (employees directly engaged). This methodology is the least often used, and was imported from the Toyota production line. The company has initially used it for the purpose of having as few interruptions in the work flow as possible. The ultimate goal is to deliver on time for the customer. In the healthcare industry the focus is on the elimination of nonvalue for the patients, the only value being to undergo surgery for improvement of health. The top causes of added nonvalue time are related to transport of patients, excessive motion, over-processing, wait and not having one point scheduling. When it comes to operating rooms, those are realities that produce waste daily and should be addressed.

3. The last methodology for quality improvement is six sigma, which focuses on minimizing variability through the use of statistical tools to achieve and maintain quality. In this methodology that Motorola has first used the company's goal was to have as few as possible defects in their production, as close to standardization as possible. For the healthcare industry this translates in having less readmissions, less operating room "bring backs" for example. The focus is the patient and the goal is to minimize any variability in care administration by different providers/institutions. It uses the D (define), M (measure), A (analyse), I (improve), C (control) methodology and relies heavily on root cause analysis to not only improve processes in any one department, but to foster intra and interdepartmental collaboration in order to avoid costly mistakes. Its applications are wide and include medication errors reduction, optimization of patient flow and safety as well as prevention of communication errors.

While healthcare organizations are widely adopting those methodologies in order to help improve quality of care, culture and decrease costs, CMS has worked in conjunction with specialty societies to develop incentive payment measures that are reportable.

Starting in January 2019 the new MACRA (Medicare access and CHIP reauthorization act), the new Medicare payment reform, will attempt to reengineer the delivery of good quality healthcare.

Redesigned to be accomplished through two tracks, the Merit based Incentive Payment System (MIPS) or the Advanced Payment Model (APM) MACRA will represent, for CMS, the leverage that ties quality measures development to better care, smarter spending and healthier people [14].

This will be accomplished through the development of the Measure Development Plan (MDP) that aims to identify and close gaps in care. As a result, starting January 2019, positive/negative and neutral payment adjustments, in a budget neutral manner will tie each eligible clinician through MIPS based on a composite performance score across five categories: quality, resource use, clinical practice, improved activity and advancing care information defined as the Meaningful Use of Certified Electronic Health Record.

The strategy is to build MIPS from the Physician Quality Reporting System (PQRS), value based payment modifier and Medicare EHR incentive program for eligible professionals. In order to accomplish this, new strategies are being considered by CMS that include:

1. Coordination and sharing across measures leads to development with stakeholders through elimination of inefficiencies by using Lean principles
2. Developing evidence based measures and gap analysis study across quality domains with priority given to clinical care, patient safety care coordination, patient and caregiver experience and population health prevention
3. Development of person centred measures, in essence a portfolio for that person that addresses critical measures gaps and facilitates alignment across federal, state and private programs with accountability shared across multiple providers

The MDP goals are to incorporate broader QCDR use and prioritization of data for quality domains as follows:

- a. Clinical care: measures that will incorporate patient preferences and shared decision making as well as cross cutting across multiple specialties. Development of more outcome measures
- b. Safety – measures that focus on diagnostic accuracy and medication safety
- c. Care coordination- measures that will focus on team based care
- d. Patient/caregiver experience: patient reported outcome measures (PROM database development)
- e. Population health: database for life expectancy, wellbeing, addiction behavior

The Anesthesia Quality Institute just published the specialty specific MIPS [10], which are ([www.aqi.org](http://www.aqi.org)):

MIPS#44 - CABG-preoperative beta blockade in patients with isolated CABG surgery

MIPS#76 – Prevention of CVC related blood stream infections

MIPS#130 – Documentation of current medications in medical records

MIPS#317 – Preventive care and screening for high blood pressure and follow up documentation

MIPS#404 – Anesthesia smoking abstinence

MIPS#424 – Perioperative temperature management

MIPS#426 – Postanesthetic transfer of care measure-procedure room to PACU

MIPS#427 – Post anesthetic transfer of care measure-procedure room to ICU

MIPS#430 – Prevention of PONV-combination therapy

## Conclusion

As healthcare delivery changes in both systems and quality, anesthesiology as a specialty will follow the trends of change. That will include a complete transformation of quality assessment from how it is currently reviewed (mini peer review that mimics a mini mal-practice suit) that focuses on individual performance analysed in educational (mortality and morbidity conferences) sessions with the goal of improvement (although it fosters a blame culture and it discourages reporting of adverse events) to a blameless culture that uses a wide, interdisciplinary approach, root cause analysis and the quality improvement strategies mentioned above. The new approaches are not only patient centred, they also professionalize quality functions that transcend departmental quality review as well as institution wide review. As new continuous quality improvement officers (CQI) become the norm at healthcare institutions, anesthesiologists are presented with a unique opportunity to lead the efforts, being the best positioned to do so based on their existing role as patient-safety champions. That will open the door to training in the LSS methodology, applications of continuous improvement concepts across multi-specialty areas and improved communication and risk management techniques utilization.

The transformation will need champions, and will need to be strategically aligned with organizational culture and directly engage employees. Resident educational programs will have to include curriculums that address methodologies for quality improvement. A new and exciting era in patient safety is beginning championed by our specialty that will mirror societal changes while leading the charge to make healthcare more accessible and affordable.

## Conflict of interest

Nothing to declare

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