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Quality improvement 101 for surgeons: Navigating the alphabet soup

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ABSTRACT

It is a fundamental value of the surgical profession to improve care for its patients. In the last 100 years, the principles of prospective quality improvement have started to work their way into the traditional method of retrospective case review in morbidity and mortality conference. This article summarizes the history of "improvement science" and its intersection with the field of surgery. It attempts to clarify the principles and jargon that may be new or confusing to surgeons with a different vocabulary and experience. This is done to bring the significant power and resources of improvement science to the traditional efforts to improve surgical care.

Introduction

"Quality Improvement" is a relatively new concept in surgery that means different things to different people, as the definition of "quality" itself can have tremendous variations. Two individuals may look at the same situation or problem and see something completely different and therefore tackle it differently. In addition, surgeons may feel that they always have been trying to improve, and that this is just a new "management flavor of the month," or form of business jargon from the "C-wing." But despite the inherent issues with the definition of quality, this has become a buzzword in healthcare, with specific emphasis on surgical disciplines.[1] Organizations can no longer afford to ignore quality care at the expense of sheer quantity, and outcomes are being measured for individual surgeons, divisions, departments, and hospitals, … and then publicly reported.[2–4]

The recent emphasis on quality improvement in healthcare has led to the proliferation of a large number of monitoring agencies and methodologies with a bewildering assortment of acronyms and jargon. Quality improvement (QI) gave way to continuous quality improvement (CQI) and total quality management (TQM).[5] The means to do this have been described under six sigma, lean, kaizen, and others.[5] These various strategies have been used by the Centers for Medicare and Medicaid (CMS), Institute for healthcare improvement (IHI), and the VA Surgical Quality Improvement Program (VASQIP) and its sister, the American College of Surgeons National Surgical QIP (ACS-NSQIP).[3,6] Vascular, thoracic, plastic surgery, transplant, and other surgical specialties have all established their own programs for quality as well. It is not surprising that surgeons are confused about how to address improving contemporary surgical quality.

This incredible emphasis on quality care and its effect on patient outcomes attracted the attention of the payors, as well as the patient advocacy groups and the physicians. With the weight of billions of dollars behind them, the government (the largest payor for healthcare in the US) and the private insurance agencies are not only interested in quality of patient care, but also in the cost of poor quality as well.[7,8] Variations in care, non-standardized outcomes, and differing complication rates are scrutinized carefully. Payors have begun to levy punitive fines for surgical complications, and bonuses for better performance to encourage improvements.[8,9] Pay for performance (P4P) was instituted, with similar quality incentives in the new affordable care act (ACA).[8,10] Individual and institutional healthcare providers realized that they must partner with non-clinicians in the process to establish appropriate quality benchmarks. Therefore, Lean, QI, and other methodologies have become critically important to understand.

This article will attempt to demystify quality improvement for pediatric surgeons. We will first trace the history of quality improvement in industry and why it became rapidly accepted. Then we will explore briefly the adoption of QI in the healthcare industry, and how surgeons have applied these principles. Finally, we will look at the QI world in pediatric surgery to describe the recent efforts at establishing benchmarks and improving outcomes in neonates and children.

Where it all started

The concept of continuous quality improvement came from post-war Japan, as they were resurrecting their damaged

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industries. Their vehicles and products were initially viewed as unreliable and inferior to western products. W. Edwards Deming, an engineer from Bell Labs, brought the rigor of statistical process control and quality improvement to Japan during the reconstruction. The Bell Labs quality efforts were based on the idea that systematic, reproducible, and evidence-based methodologies are beneficial for improvement.[11] The Japanese took this concept seriously and implemented it in their industry; it also fit in well with their cultural norms and ideas such as *bushido* (loyalty, frugality, and code of honor). *Kaizen* was a term introduced in Japan, which literally means "improvement." The Japanese were not satisfied with just one cycle of improvement, rather they wanted this cycle to be *continuous*, thus assuring that there was no stagnation and products kept getting better.[12] They realized that for true CQI to work, everyone involved with the process should be able to contribute and be empowered to speak up without fear of reprisal. Workers were empowered to halt production if they recognized a quality defect. This was an innovative idea that blame for mistakes, and responsibility for better outcomes was seen as a system issue, not just directed at an individual. It became a nonpunitive methodology. Innovation was encouraged rather than stifled. People were congratulated for their ideas and for improving quality.

Innovations in quality also lead to considerable cost savings as processes improve. Motorola introduced the concept of *Six Sigma* in 1986, which improved quality by identifying and preventing errors to a "six sigma" level or 3.4 defects per million opportunities (DPMO).[2,13] Subsequently, *Lean* was a QI methodology, which evolved from the Toyota production system in 1990, which used a cyclic continuous quality improvement to increase value as well as reduce waste.[14] They used a 5-stage system referred to as DMAIC (define, measure, analyze, improve, and control), which combined the concepts of Lean and Six Sigma (statistical rigor and cyclical waste reduction).[2,15] Some also referred to this combination as TQM or total quality management.

The core principles behind these QI concepts permeated to other industries by improving quality, reducing cost, and resulting in significant safety benefits as well. Standardization of routine processes resulted in the development of checklists before procedures such as airline flights. A careful examination of airline crashes revealed preventable causes such as lack of communication, hierarchical lack of information sharing, and mistakes from not following the standard procedures.[16] The flattened hierarchy encouraged employees to speak up if they had concerns regarding process or safety. This also led to the analysis of "near-miss" events as a learning tool to prevent safety events rather than react to the errors.[16] The aviation industry is often used as an example when discussing the applicability of CQI in healthcare. Sedlack[17] suggested that if airlines operated at the same level of effectiveness and safety, as we accept for bile duct injuries in laparoscopic cholecystectomy, there would be 20 crashes a day in the United States alone.

Adoption in healthcare

Implementation of the CQI practice to the healthcare industry was only a matter of time, given the inherent pressure from payors, patients, hospital administrators, and ourselves to provide better results for our patients. While the roots of improving healthcare can be traced back to individual efforts from Semmelweis, Florence Nightingale, and Ernest Codman, the true "movement" did not start until the late 20th century.[8] In the 1980s, concerns about wide geographic variations in practice patterns led Congress to establish the Agency for Health Care Policy and Research (currently the AHRQ—Agency for Healthcare Research and Quality). In 1990, the National Committee for Quality Assurance (NCQA) was established to improve healthcare quality and measure accreditation performance of health plans and physicians.[8] At this time, the rise of "managed care" occurred in the hope that more consistent care would allow organizations to reign in spending while improving quality. Payors realized that they were paying extra for complications and poor outcomes, and noticed significant variation in results between institutions and providers. This led to "pay for quality performance" first in California, which was later adopted by the Centers for Medicare and Medicaid Services (CMS). Managed care organizations began to send their clients to specific hospitals with better outcomes. In 1998, the Leapfrog Group, a collection of large employers, banded together to purchase better quality healthcare by directing their employees to better-performing hospital systems. Hospitals were forced to measure and address complications rates (patient safety indicators/healthcare-associated conditions (PSI/HAC) and reduce them. These efforts resulted in a variety of regulatory organizations tasked with measuring quality outcomes and patient safety.

Surgery quality

Surgeons pioneered the study of quality in healthcare and have been leaders in improving care. Efforts to improve surgical care are seen in the presence of regular morbidity and mortality conferences to the creation of The National Surgical Quality Improvement Program (NSQIP). The idea of measuring the outcomes was started by Ernest Amory Codman, a surgeon from Harvard Medical School, and a founder of the American College of Surgeons (ACS). In 1913, the ACS asked Codman to lead the Committee for Hospital Standardization,[18–20] which established basic minimums for hospitals to meet.[21] In 1917, the ACS created the "End result system," following Codman's initial efforts to measure treatment outcomes, as part of its hospitalizations' quality program.

In the 1960s, the study of quality became more defined. Avedis Donabedian,[22] in his 1966's paper, "Evaluating the Quality of Medical Care," set the framework for the study of quality care in areas of structure, process, and outcomes. Donabedian[23] also described 7 pillars of quality: efficacy, effectiveness, efficiency, optimality, acceptability, legitimacy, and equity, for future study and focus.

In the 1980s, the Department of Veterans Affairs (VA) came under pressure from Congress as the mortality rates in VA hospitals were significantly higher than the private sector. It appeared that surgical care in the VA hospitals was the dominant problem. To address this issue, Congress passed public law 99-166, mandating the VA report their outcomes annually on a risk-adjusted basis, comparing them to national averages. At that time, there were no other risk-adjusted models to compare to. To provide a solution to this problem, The National VA Surgical Risk Study (NVASRS) was created in 44 VA centers between October 1991 and December 1993. Benchmarks were defined to allow for comparisons to be made.[24] The basis of this study was that outcomes were influenced by several issues, namely, patient factors, care delivered, and random events. The study goal was to define preoperative risk factors and postoperative outcomes, specifically 30-day mortality and morbidity. With this information, they developed risk models in multiple surgical specialties, and defined risk-adjusted outcomes for general surgery, vascular surgery, orthopedic surgery, neurosurgery, plastic surgery, and otolaryngology. The risk assessment was evaluated for over 117,000 operations. This first-time measurement of quality for surgical care was systematically developed in different surgical fields. From this model, the VA National Surgical Quality Improvement Program (NSQIP) was developed for continuous quality