What is 'Quality Improvement'?

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The scope of the field of quality improvement and patient safety

Quality improvement (QI) is a proven approach to optimise the system that delivers patient care. This is achieved by continuously evaluating and testing how services are provided, and should ideally be integral to the activities of high performing, interdisciplinary teams. The science of quality improvement[1-4] has developed to the degree that there is now widespread appreciation of its value in determining the success or failure of complex interacting healthcare systems, the people who work within it, the variation in terms of outcomes resulting from the system, and how we make use of knowledge to affect these outcomes [Figure 1].

Bailey described quality improvement as 'a broad range of activities of varying degrees of complexity and methodological and statistical rigour, through which healthcare providers develop, implement and assess small-scale interventions, identify those that work well, and implement them more broadly, in order to improve clinical practice'.[5] Quality improvement may be undertaken in a variety of settings, including small clinics, a unit, an operating room, entire hospitals, a group of hospitals, a university division or department, a provincial health system, a national system or even via an international organisation.

The Institute of Medicine proposed a framework of the six domains of healthcare quality.[6,7] These attributes include:

1. *Access:* Patients should have timely care at the appropriate setting by the appropriate healthcare provider.
2. *Efficacy:* Patients should receive healthcare that is evidence-based.
3. *Safety:* Patients should receive care that does not harm them.
4. *Patient-centric:* Care delivery should consider the preferences and values of individuals.
5. *Equity:* Care should be of a consistent standard irrespective of patient demographics, ethnicity, social economic status, geographic origin, etc.
6. *Efficiency:* Healthcare should continuously evaluate its processes to reduce waste of resources, time and investment.

Quality improvement might aid an organisation to avoid costs associated with failing processes, errors and sub-optimal outcomes; streamlined processes are less expensive to maintain than ones that might involve errors and rework. Quality improvement incorporates proactive processes that recognise problems before they occur, and is engaged in effective methods of reporting errors, addressing them proactively if they do occur. Quality improvement involves the engagement of all relevant stakeholders, including healthcare professionals, patients, their families, researchers, payers, planners, administrators and educators.[6]

To achieve a different level of performance, an organisation's current system needs to change, but change *per se* does not necessarily result in improvement. A successful programme of quality improvement incorporates the following four key principles[7]:

1. Obtain a thorough understanding of the system or process.
2. Maintain the focus on patient care.
3. Encourage teamwork.
4. Obtain and continuously evaluate reliable data.

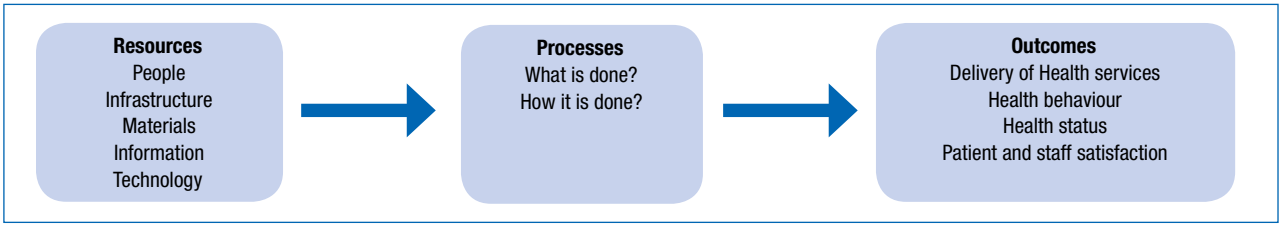

Figure 1. Resources, and how they are utilized within a system or process of care, influences outcomes

Table 1. Prominent differences between Quality Improvement (QI) and traditional research

	Quality Improvement	Traditional Research
Primary goal	Improvement in local process or outcome	Generalizable knowledge
Cycle time	Rapid iterative tests of change	Longer data collection, definitive results
Context	Embraces context to allow for sustainability	Attempts to eliminate impact of context; does not consider sustainability
Data Analysis	Statistical Control (Shewhart) and Run Charts; implicit; accept consistent bias	T-tests, p-values, chi-square and deviations; explicit; adjust for bias
Risk	Minimal risk. Ethics board review often not required; refer to ARECCI tool	May be some risk. Formal ethics board review required
Examples of methods	Model for improvement, LEAN, Six Sigma	Randomised controlled trials, retrospective chart reviews
Hypothesis	Flexible	Fixed
Protocol	Adaptable; new tests of change	Strict adherence

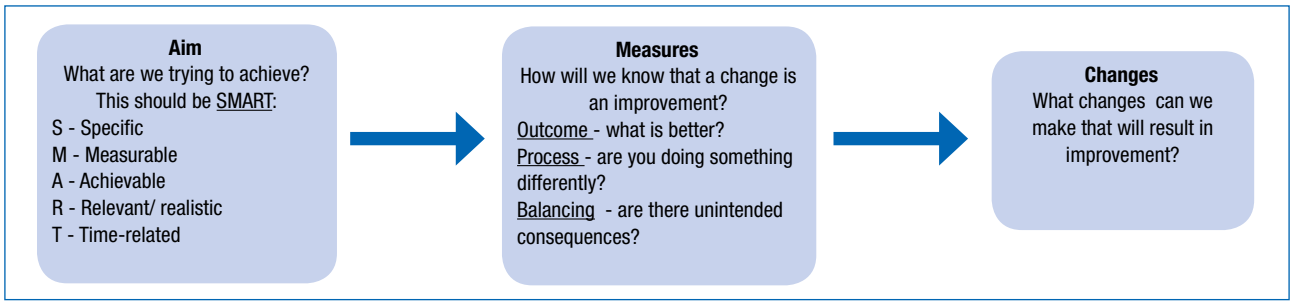

Figure 2. The 'Model for Improvement' approach

Quality improvement interventions are quite distinct from traditional research (Table I), particularly because it involves the implementation of changes that are embraced by the members of the team who effect a change in a system or a practice. Not all changes are an improvement, but all improvements involve change. This change is generally based upon generalisable scientific knowledge, but translating this knowledge into action requires us to characterise the environments in which the care that we are delivering actually occurs. We require measurements of what is happening in the system prior to the intervention and once the intervention has been instituted. Quality improvement also gives us the ability to make iterative changes to the intervention, in real time, rather than waiting until the end of the intervention, as would be appropriate with a prospective trial, where a protocol would need to be followed, and research ethics board approval obtained. The ARECCI tool (A pRoject Ethics Community Consensus Initiative)[8] allows one to determine whether formal research board approval would be required for the execution of the QI project in your setting.

In order for scientific knowledge to take hold, one needs to thoroughly understand the context in which it is being applied. If this context is variable, its effect may be difficult to understand. As a result, one needs to understand the traditions, culture, habits and processes of those who are likely to implement the intervention. QI is best implemented in an environment where its initiatives are supported by institutional leadership, is realistic given environmental and resource-related factors, and is well aligned with the organisation's strategic objective. Some of the tools available (see Figures 3–5) to determine and illustrate the true nature of a problem include Fishbone/Ishikawa Diagrams (a brainstorming strategy which assists in laying out all the possible causes), process mapping (a visual representation of the steps undertaken in the execution of a clinical process), and Pareto Charts (prominent contributing factors are charted). The Squire guidelines have been produced to assist investigators to report initiatives in a scientific manner, is suitable for publication.[4,9]

In addition to reinforcing a change in culture, the science of QI provides tools to more effectively facilitate your efforts. Some of the structured improvement methods include the 'Model for Improvement', 'Six Sigma' and 'Lean'. Each of these methods offers evidence-based methods to achieve success in quality improvement. Each model reflects a common thread of analysis, implementation, and review, but focuses on different types of change concepts. There are two major quality improvement methodologies that specifically aim to evaluate processes. Lean methodology emphasises the elimination of waste, and therefore the improvement of flow, by removing process steps that add little value, and improves the connections between these steps. Six Sigma, on the other hand, aims to improve quality by reducing variation. Lean is usually best for high-volume or frequent processes, while any process may be amenable to evaluation by Six Sigma. Both interventions are usually concluded within a few months. Lean is usually more *ad hoc* in nature, with minimal formal training required, while Six Sigma usually involves dedicated resources and broad-based training.

The model for improvement [Figure 2] emphasises distinct phases of identifying, defining and diagnosing a problem, before developing solutions and implementing interventions .This well-known testing model visually demonstrates incremental change through 'plan-do-study-act (PDSA)' cycles (Figure 6). A family of measures, namely outcome, process and balancing measures, are required to comprehensively assess the intervention (Figure 2).[7]

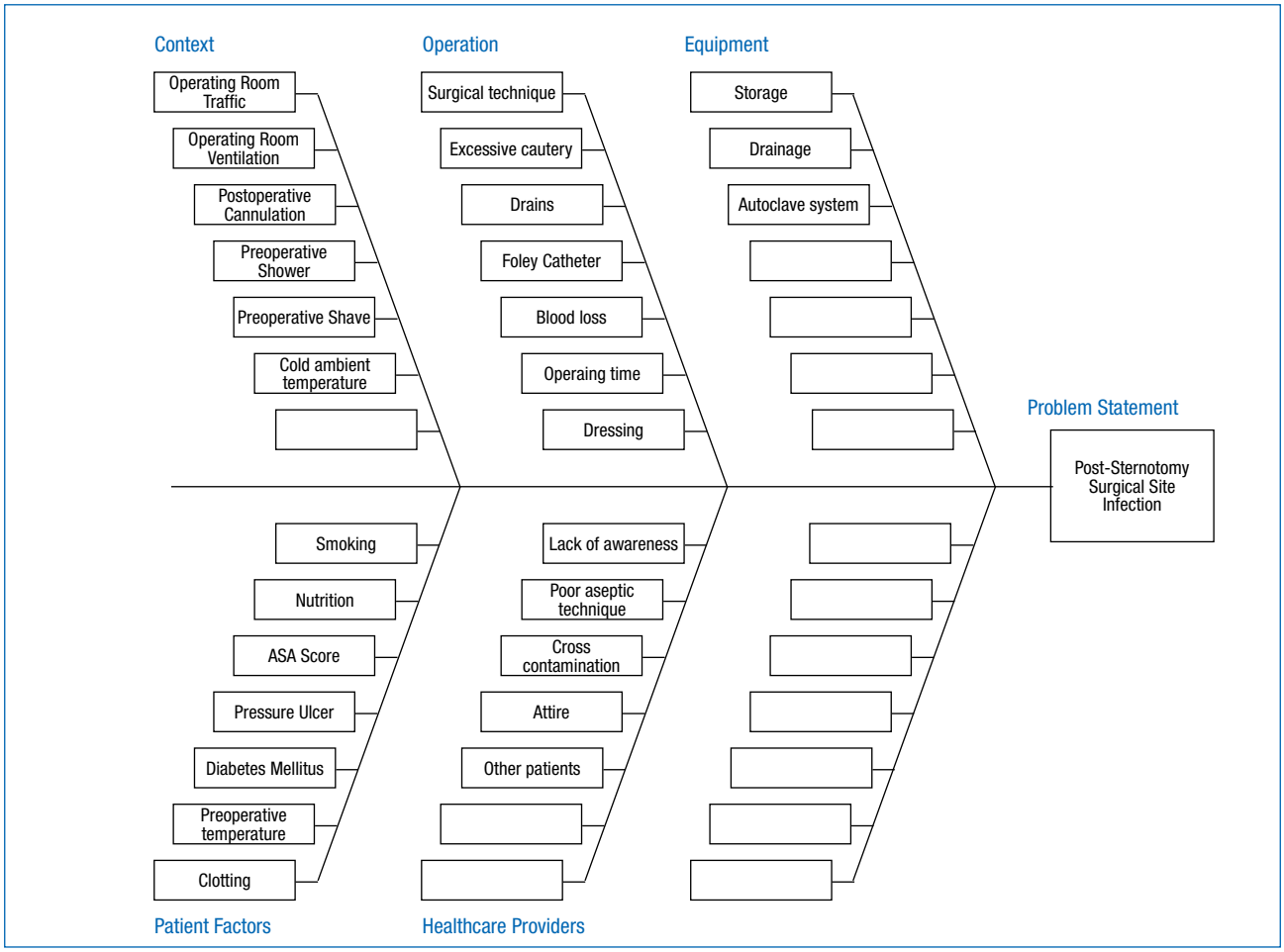

Figure 3. A Fishbone Diagram illustrating some of the potential causes for a post-sternotomy surgical site infection

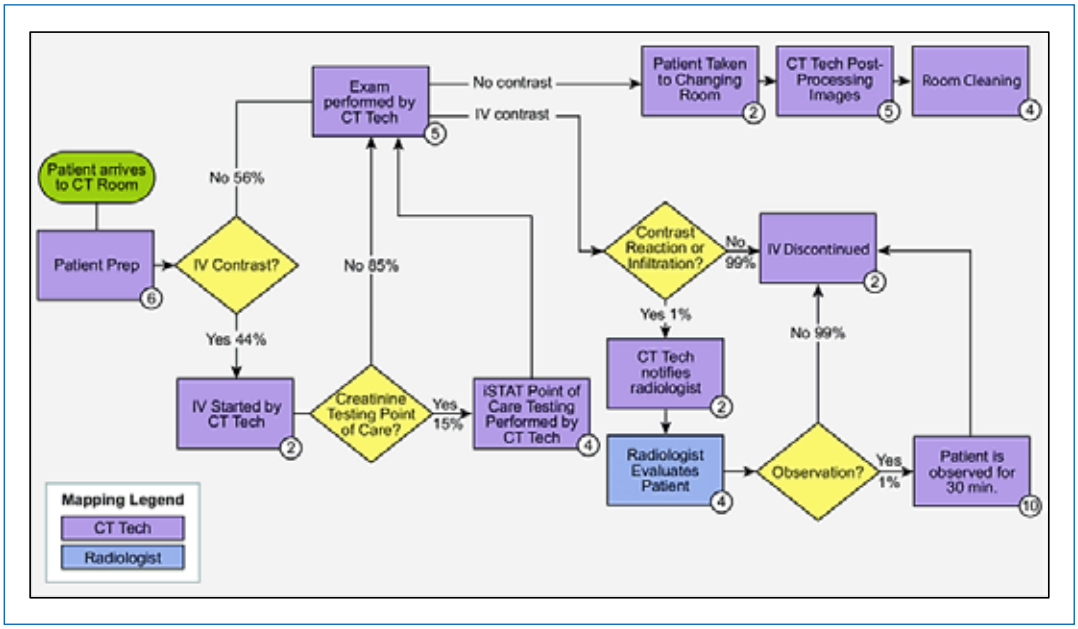

Figure 4. A process map demonstrating all the steps required to perform an outpatient abdominal CT scan at an institution

Run charts and statistical process control charts are two methods of demonstrating results graphically. Run charts are simple to produce and interpret, and are guided by simple rules. Control charts are a more complex method, requiring a greater number of data points. They also have considerably more statistical power to detect improvements. Control charts have the ability to demonstrate whether a process shows common cause variation (i.e. normal variation) or special cause variation, which suggests that something

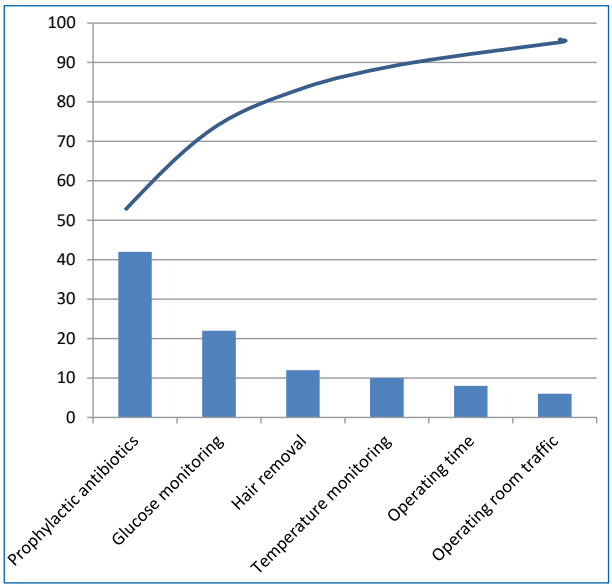

Figure 5. A Pareto Chart showing prominent theories stakeholders may regard as deficiencies perioperatively that may lead to a surgical site infection

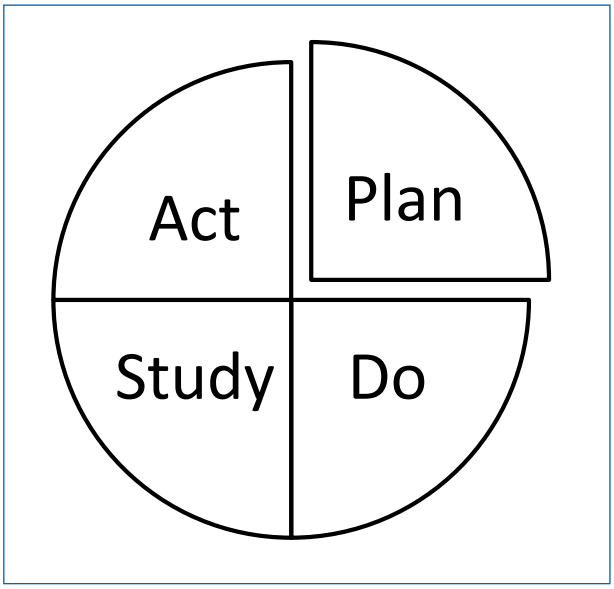

Figure 6. PDSA Cycles. Plan a change; Do the test of change; Study the results; Act on the results.

has occurred, either positive or negative, to influence the results. Control limits are calculated to show standard deviations for the plotted data, and rules exist to demonstrate when special cause variation has indeed occurred. Different types of charts exist depending on the nature of the data.

In addition to courses offered by organisations such as the Institute of Healthcare Improvement (IHI) there are an increasing number of university certificate, diploma and master's degree programmes offering training in quality improvement and patient safety. Individuals with quality improvement training and experience add value in a variety of contexts within the hospital and in burn units. In addition to undertaking specific quality improvement initiatives, these individuals are frequently engaged in risk management and other patient safety related hospital functions. Examples of these include the assessment, prevention and management of medical errors, adverse events, and complications as diverse as infections, communication issues, medication errors, as well as surgical and diagnostic considerations. Quality improvement experts, either internal or external to the organisation, may recommend a diverse range of solutions for safety-related issues incorporating, amongst other strategies, information technology, reporting, culturally sensitive programmes, training and educational initiatives, accreditation, workforce assessment and engagement solutions.[10-12] They are also well-placed to implement processes for incident reporting, and are frequently called upon to facilitate and modernise clinical meetings such as those dedicated to discussing mortality and morbidities, and to obtain consensus for best practices.[13-15]

Increasingly, governmental agencies and medical insurance services internationally are insisting that health services maintain outcome and process measures so that performance can be linked with payment and resource allocation. As in other surgical specialties, burn centres and wound services have begun to focus on a series of quality improvement indicators in their field. The involvement of burn surgeons (and professions allied to medicine) in activities of their various affiliations has undoubtedly been of value, as for example has been the impact of the American College of Surgeons' National Surgical Quality Improvement Program (NSQIP) on the process of QI applied to the practice of burn surgery.[16]

Conclusions

Few clinical sub-specialities require the kind of dedicated interdisciplinary involvement as major burn injury or the management of complex wounds. There are countless opportunities in these areas for quality improvement interventions to optimise the care that is delivered for these patients at each stage of their care. This first part of a two-part series on 'Quality Improvement' defines and outlines its scope, and introduces some of the various instruments and methods used for QI interventions. The next part highlights selected QI strategies as they pertain to burn and wound care at the macro- and microsystem level. Principles and opportunities for benchmarking, verification and reporting are also included. The great challenge in relatively well developed burn and wound-care centres is to maintain a quality improvement focus in the execution of all activities, and to constantly evaluate how local practices can adapt to generalisable knowledge, while also advocating for prevention strategies and improvements in patient care in less well developed settings.

References

1. Jain M, Miller L, Belt D, et al. Decline in ICU adverse events, nosocomial infections and cost through a quality improvement initiative focusing on teamwork and culture change. Qual Saf Health Care. 2006 Aug 15(4):235-9.PMID:16885246.
2. Berwick DM.The science of improvement. JAMA. 2008 Mar 12; 299(10):1182-4. doi: 10.1001/jama.299.10.1182. PMID: 18334694.
3. Berwick DM. A user's manual for the IOM's 'Quality Chasm' report. Health Aff (Millwood). 2002 May-Jun;21(3):80-90.PMID: 12026006.
4. Berwick DM. A primer on leading the improvement of systems. BMJ. 1996 Mar 9;312(7031):619-22. PMID:8595340.
5. Bailey MA. The ethics of improving health care and safety: A Hastings Center/AHRQ Project. The Hastings Center, Garrison, New York, October 2004.
6. Batalden PB, Davidoff F. What is "quality improvement" and how can it transform healthcare? Qual Saf Health Care. 2007 Feb;16(1):2-3. PMID: 17301192.

7. www.hqontario.ca/portals/0/Documents/qi/qi-quality-improve-guide-2012-en.pdf Accessed 5 January 2018.
8. https://albertainnovates.ca/our-health-innovation-focus/a-project-ethics-community-consensus-initiative/arecci-ethics-guideline-and-screening-tools/ Accessed 3 June 2018.
9. Ogrinc G, Davies L, Goodman D, et al. SQUIRE 2.0 (Standards for Quality Improvement Reporting Excellence): revised publication guidelines from a detailed consensus process. Can J Diabetes. 2015 Oct;39(5):434-9. doi: 10.1016/j.jcjd.2015.08.001.
10. Howell AM, Burns EM, Hull L, et al. International recommendations for national patient safety incident reporting systems: an expert Delphi consensus-building process. BMJ Qual Saf. 2017 Feb;26(2):150-163. doi: 10.1136/bmjqs-2015-004456. Epub 2016 Feb 22.PMID: 26902254.
11. Howell AM, Burns EM, Bouras G, et al. Can patient safety incident reports be used to compare hospital safety? Results from a Quantitative Analysis of the English National Reporting and Learning System Data. PLoS One. 2015 Dec 9;10(12):e0144107. doi: 10.1371/journal.pone.0144107. eCollection 2015. PMID:26650823.
12. Rabøl LI, Gaardboe O, Hellebek A. Incident reporting must result in local action. BMJ Qual Saf. 2017 Jun;26(6):515-516. doi: 10.1136/bmjqs-2016-005971. Epub 2016 Aug 24. PMID:27558307.
13. Calder LA, Kwok ES, Adam Cwinn A, et al. Enhancing the quality of morbidity and mortality rounds: the Ottawa M&M model. Acad Emerg Med. 2014 Mar;21(3):314-21. doi: 10.1111/acem.12330.PMID:24628757.
14. Calder LA, Kwok ES, Adam Cwinn A, et al. Enhancing the quality of morbidity and mortality rounds: the Ottawa M&M model. Acad Emerg Med. 2014 Mar;21(3):314-21. doi: 10.1111/acem.12330.
15. Kwok ESH, Calder LA, Barlow-Krelina Eet al. Implementation of a structured hospital-wide morbidity and mortality rounds model. BMJ Qual Saf. 2017 Jun;26(6):439-448. doi: 10.1136/bmjqs-2016-005459. Epub 2016 Jun 29.
16. Steinberg SM, Popa MR, Michalek JA, et al. Comparison of risk adjustment methodologies in surgical quality improvement.Surgery. 2008 Oct;144(4):662-7; discussion 662-7. doi: 10.1016/j.surg.2008.06.010.PMID:18847652.