



Advances in Quality Improvement: Principles and Framework

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EXPERIENCE with implementing quality improvement in different settings has led to a better understanding of how the methodology can be applied to the healthcare field and to further development of the methodology. Advances include the simplification of the methodology, its further application to a wide range of circumstances, and the integration of evidence-based medicine in clinical quality improvement efforts.

This article outlines the key principles and framework of quality improvement. They comprise the fundamental principle of improvement, the four principles of quality management (i.e., Focus on the Client, Understanding Work as Systems and Processes, Teamwork, and Focus on the Use of Data), and the framework for clinical quality improvement. The article also describes the four-step quality improvement methodology (i.e., Identify, Analyze, Develop, and Test/Implement). Lastly, it illustrates the application of this methodology to a spectrum of quality improvement approaches. Four points along this spectrum have been chosen to illustrate a range of approaches (e.g., individual problem solving, rapid team problem solving, systematic team problem solving, and process improvement) that can utilize the quality improvement methodology.

Key Principles and Framework

The Fundamental Principle of Improvement

The central idea underlying modern quality improvement is captured in the words of D. M. Berwick: “Every system is perfectly designed to achieve exactly the results that it achieves.” The level of performance (results) is a characteristic of any given system of

work. A system left unchanged can only be expected to continue to achieve the same results it has been achieving. To achieve a different level of performance, it is essential to change the system in ways that enable it to achieve a different level of performance. QI methodology identifies unnecessary, redundant, or incorrect parts of processes, and then changes processes in ways believed to yield improvements. However, because not every change is necessarily an improvement, a change must be tested and studied to determine whether it has actually resulted in improvement.

The Principles of Quality Management

There are four main principles of quality improvement.

Focus on the client. Services should be designed to meet the needs and expectations of clients and community. An important measure of quality is the extent to which customer needs and expectations are met.

Understanding work as systems and processes. Providers need to understand the service system and its key processes in order to improve them. Using tools of process engineering allows simple visual images of these processes and systems.

Teamwork. Because work is accomplished through processes and systems in which different people fulfill different functions, it is essential to involve in the improvement representatives of the people who fulfill these functions. This brings their insights to the understanding of changes that need to be made and to the effective implementation of the appropriate processes, as well as to the development of ownership of the improved processes and systems.



Focus on the use of data. Data are needed to analyze processes, identify problems, and measure performance. Changes can then be tested and the resulting data analyzed to verify that the changes have actually led to improvements.

The Framework for Improving Clinical Quality

Improvement looks at two major components: what is done (content) and how it is done (process of care). Either component could lead to improvement, but the most powerful impact occurs by addressing both simultaneously. A key advancement in the use of this framework has been to develop norms, standards, protocols, and guidelines based on clinical evidence. In so doing, the literature on clinical practices is reviewed and the content developed based on the highest levels of evidence available. Where evidence for practices is weak or inconclusive, this is also acknowledged. This concept¹ is illustrated in Figure 1.

Quality Improvement Methodology

Quality improvement methodology consists of four key steps, as shown in Table 1.

Step One: Identify

The goal of the first step, *identify*, is to determine what to improve. This may involve a problem that needs a solution, an opportunity for improvement that requires definition, or a process or system that needs to be improved. Examples of problems or processes that are commonly identified include unavailability of drugs, lost laboratory reports, and waiting time.

This first step involves recognizing an opportunity for improvement and then setting a goal to improve it. Quality improvement starts by asking these questions:

- What is the problem?
- How do you know that it is a problem?

Table 1

Key Steps of Quality Improvement

Identify	Determine what to improve.
Analyze	Understand the problem.
Develop	Hypothesize what changes will improve the problem.
Test/Implement	Test the hypothesized solution to see if it yields improvement. Based on the results, decide whether to abandon, modify, or implement the solution.

- How frequently does it occur, or how long has it existed?
- What are the effects of this problem?
- How will we know when it is resolved?

Step Two: Analyze

Once we have identified areas for quality improvement, the second step is to *analyze* what we need to know or understand about this opportunity for improvement before considering changes. The objectives of the analysis stage can be any combination of the following:

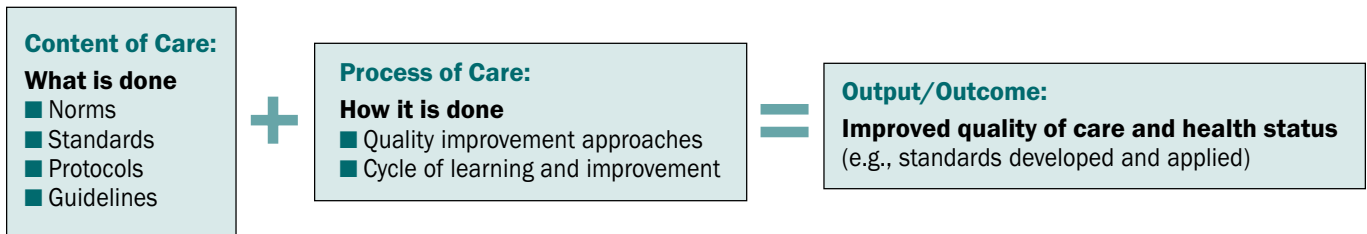
- Clarifying why the process or system produces the effect that we aim to change
- Measuring the performance of the process or system that produces the effect
- Formulating research questions, such as the following:
 - Who is involved or affected?
 - Where does the problem occur?
 - When does the problem occur?
 - What happens when the problem occurs?
 - Why does the problem occur?

¹ Adapted from P.B. Batalden and P.K. Stoltz. 1993. A framework for the continual improvement of healthcare: Building and applying professional and improvement knowledge to test changes in daily work. The Joint Commission Journal, 424–52.



Figure 1

How QI Integrates Content of Care and the Process of Providing Care



- Learning about internal and external clients through the tools available

To reach these objectives, this step requires the use of existing data or data collection. The extent to which data are used depends on the quality improvement approach chosen. A few techniques to analyze problems include:

- Clarifying processes through flowcharts or cause-and-effect analyses
- Reviewing existing data
- Collecting additional data

Step Three: Develop

The third step, *develop*, uses the information accumulated from the previous steps to explore what changes would yield improvement. Hypotheses, tentative assumptions used to test consequences, are formulated about which changes, interventions, or solutions would reduce the problem and thus improve the quality of care. Hypotheses are based on people’s knowledge and belief about the likely causes and solutions of the problem. It is crucial to remember that at this point the hypothesis remains a theory, as it has not yet been tested.

Step Four: Test and Implement

This step, *test/implement*, builds on the first three. A hypothesis is tested to see if the proposed intervention or solution yields the expected improvement. Because interventions that prove to be effective may not yield immediate results, allowing time for change to occur is important in the testing process. The results of this test determine the next step (Table 2).

Table 2

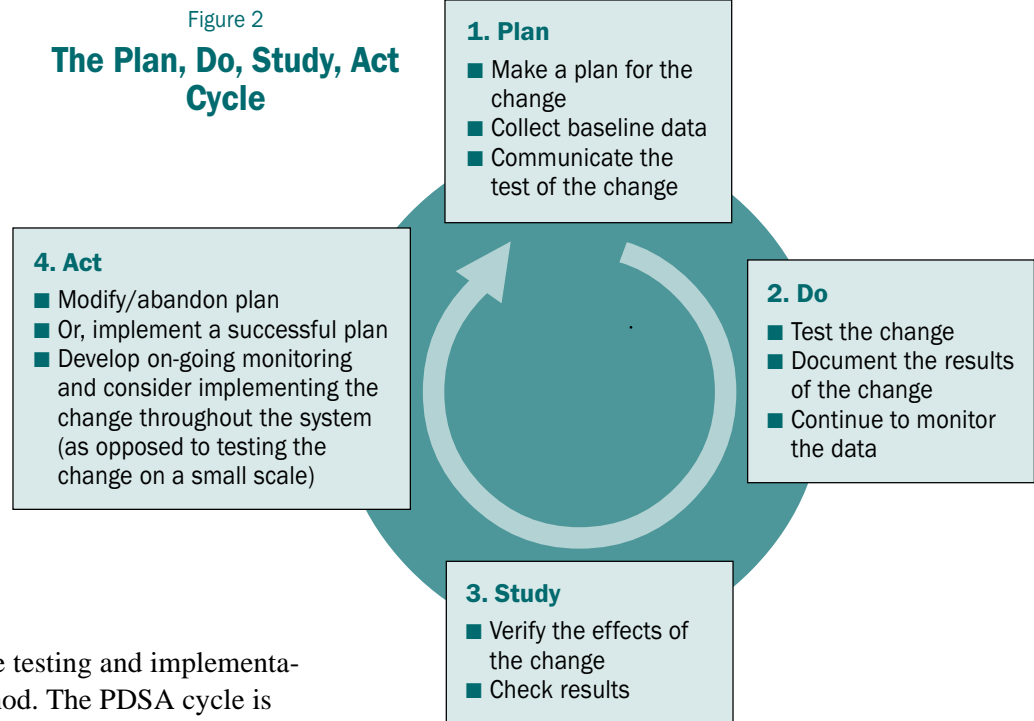
Test Results Determine Next Step

Test Result	Next Step
Proposed change did not produce an improvement	Start the improvement process again or look for flaws in the proposed change
Proposed change yields improvement that is not completely satisfactory	Modify the proposed change and then re-test the modification
Proposed change yields satisfactory improvement	Begin the implementation of the change or intervention



Testing a Hypothesis

The scientific method generally involves planning a test, conducting the test, and studying the results. Quality management has adapted this method, expanding it by adding “act on what is learned.” Thus, the expanded method includes *plan*, *do*, *study*, and *act* (PDSA), also referred to as Shewhart’s Cycle for Learning and Improvement.² PDSA is a four-step process included in the testing and implementation stage of every QI method. The PDSA cycle is represented in Figure 2.



The Spectrum of QI Approaches

Many approaches to quality improvement exist; deciding on which one to use depends on the circumstances. Some problems are simple and can be resolved rapidly, while others involve core processes and require extensive research. The approaches can be visualized along a continuum of complexity of increased time, resource allocation, and group participation. Along this continuum, the QA Project has identified four points that represent four approaches to quality improvement. They are not the only points along the continuum of complexity, but they do illustrate how quality improvement approaches differ.

Individual problem solving occurs when an individual identifies an apparent problem, recognizes his or her ability to fix it, and feels empowered to make necessary changes. Although teamwork is an essential

part of quality improvement, the QA Project has learned from experience that the simpler or more urgent improvement needs do not necessitate lengthy team-based approaches. The hallmark of individual problem solving is its use to address problems that are not interdependent, meaning that one person can make and implement the decisions necessary to address a problem. Individual problem solving tends to require little time or data and is methodologically the least complex of the approaches. It is seen in organizations where each individual recognizes the overall goal of delivering quality care and acts accordingly when needs arise that he or she can personally address.

Rapid team problem solving is an approach in which a series of small incremental changes are tested in a

² W. Shewhart. 1934. *The Economic Control of Quality of Manufactured Products*. New York: D. Van Nostrand. (Reprinted by the American Society of Quality Control, 1980).



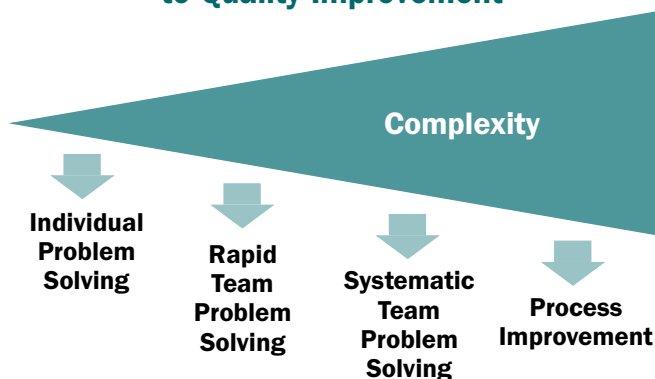
system for improvements in quality. This approach can be used in any setting, although it generally requires that a team has some experience in problem solving and/or seeks a mentor for help in managing this approach quickly. This approach is less rigorous in terms of time and resources required because it relies largely on existing data and the team's understanding of the cause(s) of the problem and likely solutions. Teams are ad hoc and disband once the desired level of improvement has been achieved.

Systematic team problem solving is often used for complex or recurring problems that require detailed analysis. The mainstay of this approach is a detailed study of the causes of problems and then the development of appropriate solutions. This detailed analysis often involves data collection, and therefore often requires more time and resources. Although systematic team problem solving can be used in any setting, its in-depth nature makes it most appropriate when the ad hoc team is able to work together over a period of time.

Process improvement is the most complex of the four approaches because it involves a permanent team that continually collects, monitors, and analyzes data to improve a key process over time. It is generally used in organizations where permanent resources are allocated to quality improvement. This permanent team can use more than one approach, for example, forming ad hoc teams to solve specific problems. Process

Figure 3

Spectrum of Approaches to Quality Improvement



improvement is often used to assure the quality of important services in a health facility or organization.

In sum, experience with quality improvement has rendered it a simpler, more robust methodology, and the application of QI methodology to a wide range of settings has become clearer. The settings include both clinical and nonclinical environments, with the approaches ranging from individual problem solving to core-process improvement by permanent teams. In all of these approaches, the methodology and principles remain unchanged though their different aspects are stressed differently.



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