
TESTING FOR IMPROVEMENT

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TESTING FOR IMPROVEMENT

The goal of this module is to provide an overview of proven methods used for testing changes to a health care system for the purpose of improving that system. The module further describes the importance of testing changes prior to their implementation. Throughout the module, a hypothetical case story is provided to exemplify the benefits of using best practices for testing changes made to a health care system.

Part 1: Introduction

Leading authorities on health care and quality improvement, such as those from the Institute for Healthcare Improvement (IHI), theorize that health care systems achieve the precise results they were designed to obtain.¹ It is in this theory that the fundamental concept of quality improvement (QI) is captured.

Improving care and outcomes for patients are often the goals when changing a health care process. An organization needs to change its current system to improve performance and quality. However, not all changes result in improvement. This module focuses on the importance of testing a change before its implementation and describes proven approaches and methods for testing that are used by experienced QI teams. It also illustrates the importance of using reliable data and provides several field examples to illustrate the improvement team's role during the testing process.

Why Testing Before Implementing Change Is Important

Improving the daily practice of health care requires making changes in the processes of care. *Thinking* about making improvements is a natural first step and comes easily to most; however, most experts in the quality improvement field agree that *making* changes that lead to improvements are more difficult. The challenge may be deciding on which approach is best for making a change, and each organization may choose a different change strategy. Discussed below are a few of the methods many organizations may be using now once they recognize the need for a change. While these are legitimate tactics for change, their effectiveness for successful quality improvement is undetermined, and they do not have the same benefits as the *Model for Improvement*, discussed later in this module.

Approaches Being Used

Top-Down Approach

Implementing a change often creates apprehension and resistance within the organization. In order to successfully carry out the change, the process requires considerable leadership. Leaders are chosen because of their ability to influence and guide individuals and groups in a positive and productive way. Overcoming the resistance and fear that change instills in staff may be accomplished through the support and influence of top-level leaders. The top-down approach to organizational change asserts that one or more members of top-level management should

envision strategies and tactics first. The leadership then communicates these plans to the staff, highlights their benefits, and then oversees their successful implementation.

Committee Approach

Developing or using a committee to make changes can play an important role in an organization. It allows more people to be involved and builds commitment of its members to the organization. A committee can discuss and review changes in detail and bring recommendations to the organization's leadership. The work of the organization becomes more efficient, and the specialized skills and interests of the committee's members are used to their full advantage. More members get involved in the detailed work of the organization and responsibilities are often shared according to the skills and interests of the committee's members.

Trial-and-Error Approach

Many organizations have used the trial-and-error approach in making improvements. This approach often involves making a change within the organization and then observing if it has an adverse effect. It is built on the concept that an organization learns more from analyzing its failures and trying again, than from improvement that results from changes made early in the process. The latter has been criticized as moving to solutions without adequately understanding or studying the change and its overall impact on the organization.

Small Incremental Tests of Change

Testing a change provides an organization with a preview of the result before implementing it throughout the organization. It is comparable to test driving an automobile before purchasing it. It is ill-advised for an individual to make a financial commitment without ensuring the automobile meets the buyer's needs. If the buyer later discovers the new vehicle does not meet his or her needs, then resources have been wasted, or in this case, money spent on the new vehicle. This is the same philosophy that should be applied when making changes in an organization. Moving directly to a new change without appropriately testing it can have a negative impact on the organization. Although the change may not have a direct fiscal impact, it can have a negative effect on patient or staff satisfaction. Testing allows an organization to try a change in a controlled situation, which minimizes risk and the potential for a system-wide adverse event.

Reasons to Test Changes

An organization may experience one or more benefits when it tests a change before implementing it. The following list provides some examples of why organizations test changes before moving to implementation:

- To increase buy-in and confidence that the change will result in improvement
- To decide which proposed changes will lead to the desired improvement
- To evaluate how much improvement can be expected from the change
- To decide whether the proposed change will work in the actual environment of interest

- To decide which combinations of changes will have the desired effects on the important measures of quality
- To evaluate costs, social impact, and side effects from a proposed change
- To minimize staff resistance during the implementation of a change

Below is a case story that is followed throughout the module, which depicts a fictional QI team and its efforts to improve the rate of adult patients receiving influenza vaccinations in its organization. The case story may be read in its entirety by clicking [here](#).

The Problem

Redline Health Clinic (RHC) provides primary care services in a rural community. The RHC Quality Improvement (QI) team monitors several quality care measures. Recently, the QI team noticed that many adult patients were not receiving appropriate influenza vaccinations per the adult immunization guidelines. The QI team met and reviewed the information collected from the practice management system. In analyzing data on adult influenza vaccinations, the team noted only 50 percent of patients aged 50 to 64 years received the influenza vaccine. This finding concerned the QI team, because annual influenza epidemics are a leading cause of death in the United States adult population. Given the risk for adults who do not receive influenza vaccinations, the team decided to focus its improvement efforts on increasing the rate of adult patients receiving an influenza vaccine. The QI team decided they would begin by setting a goal or an aim for the improvement project. The team reviewed State statistics when setting its goal and came up with the following aim statement:

Over the next 12 months, we will redesign the care systems of RHC to ensure that 90 percent of patients aged 50 to 64 years have been screened, and if clinically appropriate, will receive influenza immunization.

Initially, it was thought the care team members forgot to inform patients about the importance of proper vaccination for influenza, but the care team assured this point was stressed with patients. The QI team developed a simple and efficient approach to determine why patients were not receiving their influenza vaccines and decided to use sampling to further analyze the situation. To avoid burdening its overworked schedule, the QI team randomly chose 15 patients, aged 50 to 64 years, who were not vaccinated for influenza.

The team divided the 15 patient charts equally and phoned each patient to determine why he or she did not receive the influenza vaccine. Each team member had three patients to contact. The QI team successfully contacted 10 patients. Four received the influenza vaccine through a mobile van; two patients believed they would get the flu from the vaccine; two patients reported an allergy to eggs, and two patients reported "never been sick a day in their life" and felt the vaccination was unnecessary. Of the five not reached, three patients had disconnected phone numbers and two patients did not return the phone call.

The amount of testing an organization should perform before moving to implementation varies; however, high- risk and impact changes should receive more comprehensive testing. **Part 2** describes methods that many organizations use for testing changes for improvement.

Part 2: Methods for Testing Changes

The **Managing Data for Performance Improvement** module explains that most QI work involves closing the gap between a system's actual and ideal operation. An organization's goal is to apply changes that result in improvement to close the gap. To achieve this goal, a QI team understands *what* change is needed and *how* to implement it. The Core Clinical Measures (CCMs) modules provide recommendations of changes to improve patient care and the improvement models guide a team on how to implement those changes.

The *Model for Improvement*, developed by Associates in Process Improvement, provides a framework for developing, testing, and implementing change, and it is a powerful tool for accelerating improvement. The model shown in **Figure 2.1** is meant to augment an organization's existing change model—not replace its current model. The Model for Improvement is used to successfully improve care processes and outcomes by numerous health care organizations. The model comprises two equally important parts:²



Figure 2.1: Model for Improvement

- Part 1 presents three fundamental questions that are essential for guiding improvement work:
 1. ***What are we trying to accomplish?*** An organization's response to this question helps to clarify which improvements it should target and their desired results.
 2. ***How will we know that a change is an improvement?*** Actual improvement can only be proven through measurement. An organization should think about how it wants things to be different when it has implemented a change and agree on what data needs to be collected for measuring. A measurable outcome that demonstrates movement toward the desired result is considered an improvement. For example, showing how the service that patients receive will improve, or how an organization's processes might change.
 3. ***What changes can we make that will result in improvement?*** Improvement occurs only when a change is implemented, but not all changes result in improvement. One way to identify which change will result in improvement is to test the change before implementing it.
- Part 2 involves the Plan-Do-Study-Act (PDSA) cycle that tests and implements a change in real-work settings.

One of the most common tools for improvement is the Deming (or Shewhart) Cycle. This method is also known as Plan-Do-Check-Act (PDCA) or Plan-Do-Study-Act (PDSA), and it is well suited for many improvement projects. The PDSA cycle is shorthand for *testing a change* — by planning it, trying it, observing the results, and acting on what is learned. This is the scientific method used for action-oriented learning. Many quality improvement practitioners believed that the *Check* stage of the process meant to simply measure the improvement and move forward to the *Act* stage. Deming stressed the importance of studying the data collected prior to acting upon it when he changed the name of the stage to *Study*. **Figure 1.2** below shows how the Deming (PDSA) Cycle operates:



Figure 1.2: PDSA Cycle

The PDSA Cycle starts at the *Plan* stage. When an organization understands the nature of the current problem, the process that underpins the problem, and has specific ideas about what would mitigate the problem, it is ready to test changes to that process. The *Plan* stage helps an organization to determine this by working through the following questions:

- Which process needs improvement?
- How much improvement is required?
- What change should be implemented?
- When should the change be implemented?
- How should the effect of the change be measured?
- What does the change affect (such as, documents or procedures)?

An organization identifies those affected by the change and explains how and why their processes are adapted. Whether the reason for change is due to patient challenges, multiple failures, or a continual improvement opportunity, it is important to keep people informed. This ensures their buy-in and results in an effective change.

Testing the change occurs during the *Do* stage. An organization tests the change and required measurements for the *Study* stage then documents any problems and observations during the test. An analysis of the data naturally occurs during the process, which leads to the next stage, *Study*.

The answers from the *Study* stage define an organization's tasks for the *Act* stage. For example, if the process did not improve, there is an opportunity to review the test of change to determine why it did not result in an improvement and further refine or plan another test cycle. An organization may also choose to begin again based on the analysis of the test and plan a new test cycle altogether. Since the problem is unresolved, an organization would then move to the *Plan* stage to consider new options for implementation.

In the *Study* stage, an organization performs analysis of the data collected during the *Do* stage and considers the following:

- Is the process improved?
- If improved, by how much?
- Is the objective for improvement met?
- Is the process more difficult using new methods?

The responses derived from the *Study* stage define an organization's tasks for the *Act* stage. For example, if the process is not improved, an organization may review the change tested to determine why, then further refine it, or plan another test cycle.

An organization may choose to start again with a new test cycle based on the analysis. If the problem is unsolved, an organization may return to the *Plan* stage to consider new options.

If the process improves, an organization should determine if the improvement is adequate. For example, if the improvement speeds up the process, an organization should evaluate it to see if it is fast enough to meet its requirements. If not, the team may consider additional methods to tweak the process until its improvement objectives are met. It also may consider testing the same step of the process, or possibly a different step in the process, to reach its overall goal. Again, an organization is back at the *Plan* stage of the Deming Cycle. For most system changes in health care, multiple small tests of change are needed to improve one system. Fortunately, these tests are performed in a very short time so overall improvements can be accomplished efficiently.

The case story continues with an example of RHC's approach to the PDSA process:

The Approach

The following steps outline RHC's approach using the PDSA cycle and its process to improve influenza immunization rates in adults aged 50 to 64 years:

1. **Plan:** The RHC QI team agreed to test a combined approach to address the gaps in its current process. The team created a brief intervention of first asking patients if they received their vaccine this season and then expressing the importance of vaccination with an optional handout. The QI team proposed that the MA test this approach on the next three patients between the ages of 50 to 64 years who presented for care.
2. **Do:** During the morning clinic, the MA asked three patients about their influenza vaccine and reinforced the importance of being vaccinated through a verbal explanation and offered the handout.
3. **Study:** Since the practice has several patients in this age range, testing was completed during the morning clinic. Patients readily gave information about their latest flu shot and appeared to accept the information verbally. Only one patient wanted an educational handout. For patients needing an influenza vaccine, the MA administered it per standing orders. If a patient seemed reluctant or needed more information, however, the MA was uncertain how to handle the situation.
4. **Act:** The team acknowledged the change would likely cause a positive impact, but how to handle reluctant or declining patients needed more thought. The team planned the following actions:
 - a. Continue testing the change with the MA for the rest of the week to see what other issues it needed to consider.
 - b. Design a related PDSA to determine the best communication approach with the provider if more information or encouragement is needed from him.

Most system changes, however, require more than one PDSA cycle. The concept of linking PDSAs to accomplish a change is covered in the next section, *Using Multiple Test Cycles*.

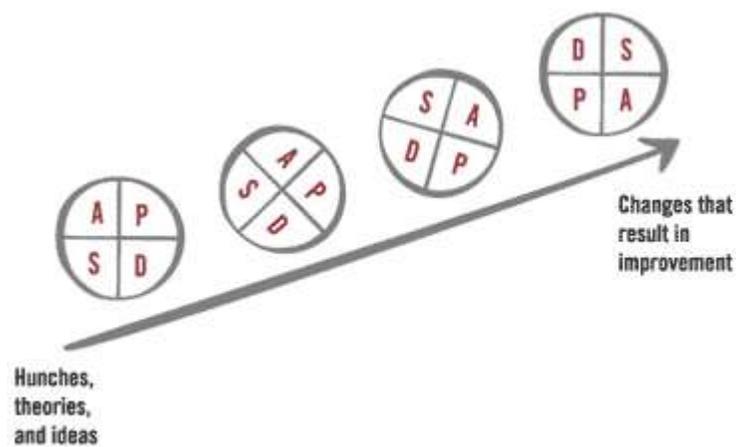
Using Multiple Test Cycles

The use of multiple test cycles helps an organization improve upon each test of change, as shown in **Figure 1.2**. Linked PDSAs focus on improving one process, but they also reflect the complexity that those in health care encounter. Sometimes linked PDSAs show that multiple interventions need to be applied at one step. Each test is a learning experience and identifies if an organization needs to make additional steps or changes to improve the targeted process. For example, one team evaluates the benefits of group visits as a means to improve diabetes care. It performs PDSAs around three factors—group size, the weekday and meeting time, and the content-to-conversation ratio. The team considers each factor and tests it over time, but the results of the three sets of PDSA cycles show that a group-visit strategy enhances diabetes care for a subset of patients.

An organization may learn from linked PDSAs of some unintended consequences and issues that it did not consider initially. For example, a clinic follows HIV patients on Highly Active Antiretroviral Therapy (HAART) and decides to test an aggressive approach for retaining patients in care. It designs an outreach system to contact patients 75 days after their last visit and to remind them of their need for care. When the clinic tests the system, however, it learns that a small percentage of patients dislike receiving reminders about their illness; they pointed out their good track record by using their own systems. The team recognizes its approach is not patient

centered and consults with the consumer advisory board before embarking on additional PDSAs to improve retention.

An organization may use linked PDSAs to broaden the test of a change and ensure that special conditions or sets of patients are not missed. For example, a change may be tested on different clinic days or with other personnel. An organization may continue linking tests in this way and refining the change until it is ready for a broader implementation. People are more willing to test a change when they know the changes can and will be modified as needed. Linking small tests of change helps an organization to overcome its natural resistance to change and helps to promote buy-in from the staff.



Adapted from Institute for Healthcare Improvement
Figure 1.2: Linked PDSAs for Tests of Change

Tips for Successful Linked Tests of Change³

1. Plan multiple cycles for testing a change.
2. Think ahead through a couple of cycles.
3. Scale down the test size (the number of patients or location).
4. Test with volunteers.
5. Focus on getting consensus or buy-in from management, staff who will do the work, and patients and families.
6. Be innovative to make the test feasible.
7. Collect useful data during each test.
8. Test over a wide range of conditions.
9. Use a quick test; for example, ask "What change can we test by next Tuesday?"

The case story continues below and exemplifies RHC's use of repeated PDSA cycles to improve adult influenza vaccination rates:

The RHC QI team's aim was to improve adult influenza vaccination rates. The team learned that improving vaccination rates requires multiple PDSA cycles. **Figure 1.3** shows linked multiple test cycles for improving adult vaccination rates, followed by RHC's specific changes.

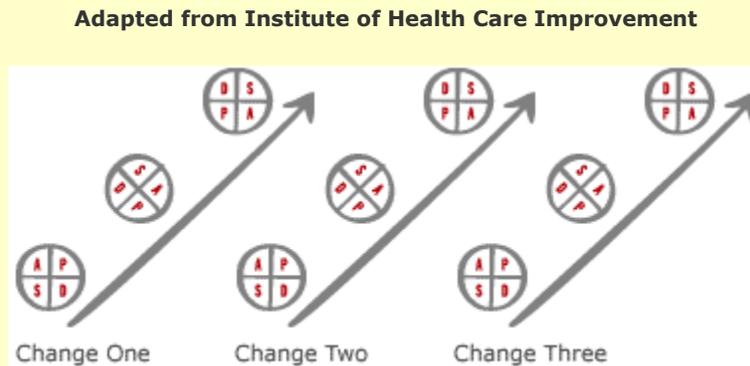


Figure 1.3 Linked Multiple PDSA Cycles to Test Improvement in Adult Influenza Vaccination Rates

Change 1: Initial query of patients: The QI team surveyed 15 patients by phone to learn if they received the influenza vaccine. If patients said yes, the team asked where they received their vaccine, and if not, why they refused it. The team contacted 10 of the 15 patients and learned 4 received their vaccine elsewhere, 2 had egg allergies, 2 believed the flu vaccine would make them ill, and 2 thought the vaccine was ineffective.

Change 2: Develop scripting for the MA: Based on the survey, the QI team needed to develop patient education and inquire where patients received their influenza vaccine. The MA queried three patients about their vaccine during the morning clinic, provided education on the importance of vaccination, and vaccinated them per standing orders. However, the MA was unfamiliar with addressing patients who were reluctant to get vaccinated and wanted more information.

Change 3: Provider education about influenza vaccine's risks and benefits: The QI team proposed an influenza vaccine process map for the MA's use when discussing influenza vaccination. The flowchart directed the MA to inform the provider when a patient needed more information. The provider discussed the risks and benefits of vaccination with the patient. The influenza vaccination flowchart was presented at the provider meeting and one provider agreed to test it with the practice team.

Change 4: Educate staff: The MAs and providers were educated on the risks and benefits of the influenza vaccine. The QI team gave the practice teams a copy of the new influenza vaccination flowchart to post in their work areas, and asked them to query patients aged 50 to 64 years and offer the vaccine, if needed. If the patient refused the vaccine, the provider offered more education about its risks and benefits.

Most QI literature references the PDSA process—small sequential tests of change to reassure the team that change will result in improvement when tested before implementation.

Part 3: Successful Tests of Change

Because all change does not necessarily result in an improvement, individuals who are developing the change should always be looking for a way to reduce the risks involved with the test while maximizing the learning experience. A few simple rules, which are described in the

following subsections, can help an organization to gain the optimum learning experience with minimum risk.

Test on a Small Scale

The extent or scale of the test should be decided while considering factors related to risk. For example, an organization should take into account the level of confidence it has that the change will result in an improvement. It should also contemplate the risks from a failed test. Very small tests are needed when the repercussions of a failed test could have a negative impact on an organization's finances, staff, patient care, or could even cause injuries.

Testing on a small scale reduces people's fear of making a change. When small scale tests are not considered, the individuals developing the change often work to perfect it because of the potential consequence of failure. When planning a test of change, an organization should consider building its knowledge through small scale tests.

Use Multiple Test Cycles

Testing on a small scale leads to the use of multiple test cycles and builds knowledge that the change will, in fact, result in an improvement when it is implemented. Generally, people have a more difficult time committing to a change when an organization moves to a large scale change instead of a small scale change. An example of a small scale change is testing the refined check-in process in a health care organization to improve patient flow at one facility as opposed to an organization-wide change. It is also suggested that volunteers can be used to test the cycle and reduce the burden on overworked staff.

Test Under Various Conditions

Whether a change will sustain improvement over time is challenging to predict because unforeseen situations occur, and conditions, policies, and organizations eventually change. A team may overcome this challenge by testing a change under various conditions, such as, different times, days, shifts, conditions, materials and populations. This in itself is difficult when an organization has limited resources or little knowledge of testing across a wide range of conditions, which is common in a health care delivery site. The following subsections offer suggestions for overcoming some of these challenges.

Collect Data Over Time

Effective change requires observation before and after its implementation and documentation of any differences. The process of collecting and documenting data results in a measurement; however, the mere act of gathering data can also cause a change, such as, interruptions to workflow. Measuring and recording such occurrences moves an organization to its desired improvement results.

Collecting data over time provides insights and learning by revealing trends and improvement opportunities. A graphical display of data tracked over time is a compelling tool in an improvement campaign. Additional information on methods for displaying data is in the **Managing Data for Performance Improvement** module.

Data collected and analyzed over time enables an organization to make informed decisions, incorporate backup plans, and prepare for uncertainties. Observing trends and patterns in any area, such as, length of patient stay, volume, visit demand, patient satisfaction, clinical outcomes, and staff turnover, is a prerequisite for achieving continuous improvement.

There are numerous tools available for an organization to track data when performing a test cycle. One QI tool is the PDSA Worksheet . An organization completes a PDSA Worksheet for each test conducted. If an organization tests several different changes, each change may go through several PDSA cycles. An organization retains electronic or paper copies of the PDSA Worksheets for all changes tested, which helps it to understand why a PDSA did not work, or it provides additional testing opportunities.

Use Comparison Studies

An organization may use simultaneous or paired comparison studies when it observes and analyzes two or more alternatives at the same time. An organization compares a change tested with the current system. Comparing alternatives studies the effect of outside or unforeseen events during the test.

Implement Random Sampling

Random sampling is a method that produces an independent and equal chance of selecting a participant, which is also known as a *probability* sample. Random sampling provides an objective snapshot of an organization's performance on a process or measure without the burden of collecting data from the entire population. This methodology can be complex, such as, a computerized sampling technique seen here or a simple mathematical equation. The random sample should be representative of the targeted population, with each group having an equal chance for selection.

Determining whether a change will result in an improvement is important. The *Model for Improvement* is just one model that can be used to tailor the change to an organization's system until the predicted improvement is achieved. The PDSA cycle helps an organization to increase its ability to determine whether a change will have the desired outcome or if it should be abandoned. For example, a change might be tried in one area of the organization, with one or more individuals. As learning occurs, the test can be increased. If the test is successful, then the cycle is used as a framework for implementing knowledge into practice.

Part 4: Test for Improvement

Planning Tests of Change

Quality is directly linked to an organization's service delivery approach or underlying systems of care (see **Quality Improvement** module). To achieve a different level of performance and improve quality, an organization's current system needs to change. When planning a test of change, a successful QI program uses four key principles, which are described in the following

subsections:⁴

- QI work as systems and processes
- Focus on patients
- Focus on team approach
- Focus on data use

QI Work as Systems and Processes

A QI team must know the organization's delivery system and key processes to make improvements. In a health care organization, there are generally two major activities or processes: 1) what is done, that is, what care is provided, and 2) how it is done, that is, when, where, and by whom care is delivered. Improvement is achieved by addressing either function; however, the greatest impact for QI is when both are addressed simultaneously. An organization usually considers both when planning a test of change.

Process mapping is a tool used for understanding a health care system's processes better. The map is a visual diagram of sequential events that cause a particular outcome. An organization uses the process mapping tool to evaluate or redesign a current process. By reviewing the sequential steps, whom performs each step, and the overall efficiency of the process, an organization can identify opportunities for improvement. When an organization compares its map to one that shows optimal service care, other opportunities to improve care are presented. The process map in **Figure 1.4** is an example of how RHC improved vaccination rates after its process was changed.

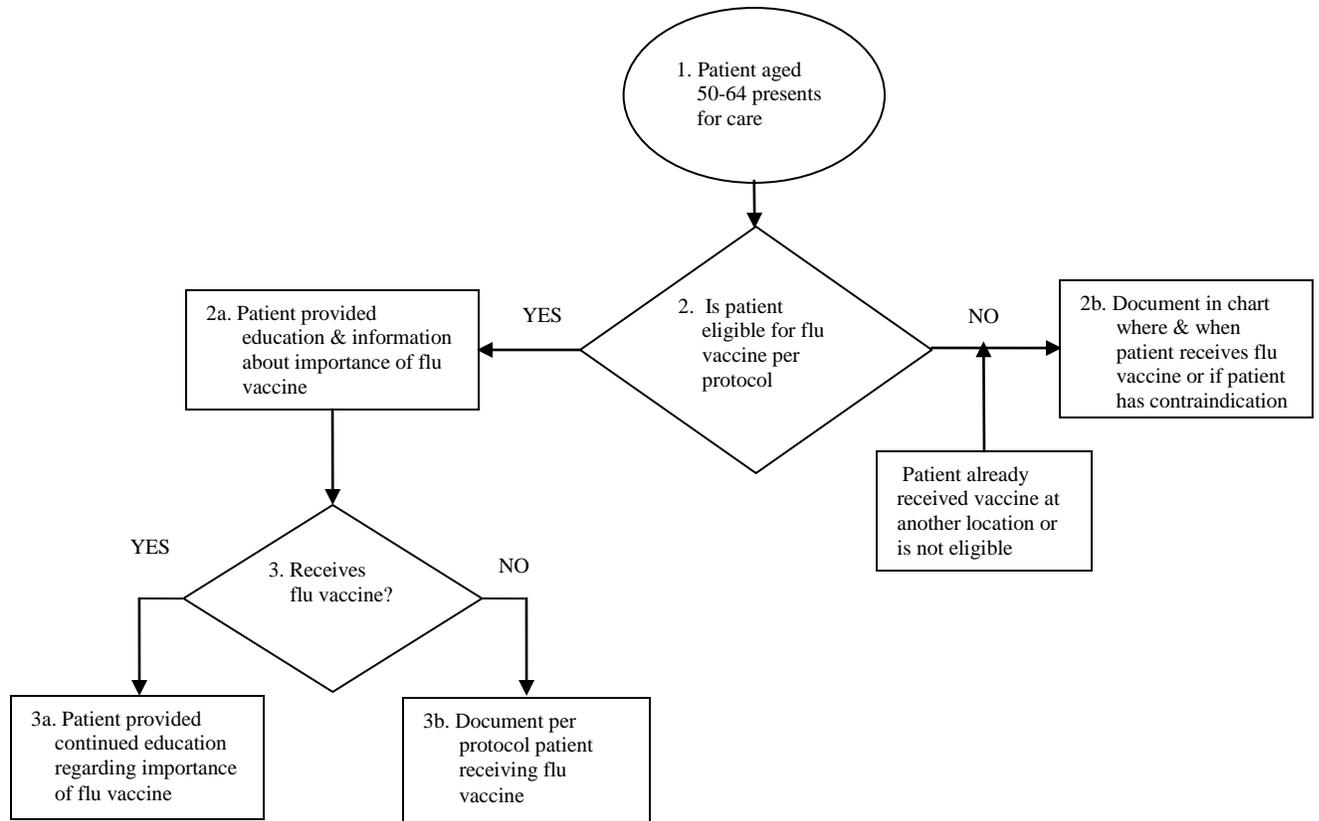


Figure 1.4: Process Map for RHC

The *Root Cause Analysis* method is used to identify or get to the “root cause” of a problem by correcting or eliminating it and preventing its recurrence. The philosophy of Root Cause Analysis is each problem presents an opportunity, because it shows how and why the problem occurred. An organization must understand the true cause of a problem in order to correct it. If a problem’s root cause is unknown, an organization wastes time and resources attempting *quick fixes*. Root Cause Analysis delves into why the problem occurred until the *root cause* or failed process is identified. It assumes systems and events are interrelated, and an action in one area triggers action in another. An organization traces the actions and unveils the problem’s origin and progression to its current level of symptoms. There are three basic types of causes:

1. **Physical** causes are tangible material items that failed in some way.
2. **Human** causes are people not performing a requirement or performing it incorrectly. Human causes typically lead to physical causes.
3. **Organizational** causes are faulty systems, processes, or policies used for decision making.

Root Cause Analysis investigates all three types of causes for patterns of negative effects, hidden system flaws, and specific actions contributing to the problem. When an organization uses this type of analysis, it often reveals more than one root cause.

Focus on Patients

An important quality measure for an organization to study is the extent its patients' needs and expectations are met. Patient-focused services include:

- Systems affecting patient access
- Evidence-based provision of care
- Patient safety
- Patient engagement
- Coordination of care with other parts of the larger health care system
- Cultural competence
- Assessment of patients' health literacy
- Patient-centered communication
- Linguistically appropriate care

An organization should consider patients' needs when it is developing tests of change to facilitate improvement. For example, the RHC QI team in the case story surveyed patients to learn why they did not get an influenza vaccine. In this scenario, RHC accommodated cultural differences, beliefs, and language barriers by assigning a bilingual staff member to the test cycle to meet the needs of its target populations.

Focus on Team Approach

A team approach is critical when testing change. The collaboration of knowledge, skills, experiences, and perspectives of different team members cause lasting improvements. A team approach is most effective when the system is complex and involves multiple disciplines or work areas. One person in an organization cannot know all the dimensions of a complicated process or issue. It requires innovative solutions developed in a team environment, staff commitment, and buy-in. In the RHC case story, the team approach to testing change resulted in less burden on individual members. The QI team gained confidence and moved quickly to the next test cycle with little disruption to the delivery system, where the process of educating patients on the importance of influenza vaccination was tested.

Each individual is responsible for being an active and contributing member of the team and bringing a unique perspective to the process; i.e., how things work; what happens when changes are made, and how to sustain improvements during daily work. Contributions are made from an individual's skill set and the team's synthesis of ideas. Additional information, tools, and resources for developing and supporting an organization's QI team are in the **Improvement Teams** module.

Focus on Data Use

Data is the cornerstone of QI and an important component when testing a change. Data demonstrates how well an organization's current systems are working, what happens when changes are applied, and documents a successful performance. Data separates what is *thought*

to be happening from what is *really* happening. It establishes a baseline, reduces placement of ineffective solutions, and indicates whether changes lead to improvements.

Both *quantitative* and *qualitative* methods of data collection are useful when planning tests of change. *Quantitative* methods use numbers and frequencies to develop measurable data. In the RHC case story, quantitative data was used to determine an area for improvement. The RHC QI team noted only 50 percent of its adult population received influenza vaccination. This concerned the team, and they decided to target influenza vaccination rates for improvement. *Qualitative* methods collect data with descriptive characteristics, rather than numeric values that draw statistical inferences. Qualitative data is observable but not measurable, and it provides important information about patterns, relationships between systems, and often provides context for needed improvements. In the RHC case story, the team conducted outreach to patients to determine why its adult patients did not receive influenza vaccination. It also collected qualitative data and noted an overarching need to develop a communication and education plan.

Documenting the testing process is crucial, because an organization can study the data (or documented test process) before, during, and after the testing process. It provides qualitative data needed to make improvements to an organization's care systems. Documentation is collected during the test cycle, which enables an organization to evaluate and understand the test process. The PDSA Worksheet is useful for documenting a test of change. This tool guides an improvement team in developing a plan to test the change (*Plan*), carrying out the test (*Do*), observing and learning from the consequences (*Study*), and determining needed modifications for the test (*Act*). The PDSA process and tool also help to develop additional test cycles, which build knowledge in a sequential step.

Developing Tests of Change

An organization's ability to develop, test, and implement change is essential for improvement. Many types of changes lead to improvement, but are developed from a limited number of change concepts. A *change concept* is a useful approach for developing specific change ideas that lead to improvement. Ideas for tests of change are generated by subject-specific experts on the team who creatively combine change concepts. After generating ideas, an organization runs PDSA cycles to test a change or group of changes on a small scale to see if improvement occurs. If a test of change causes an improvement, an organization may expand the tests and gradually incorporate larger samples until it is confident that changes can be widely adopted. Listed below are a few techniques for an organization to consider when developing a test of change:

1. ***Creative thinking techniques*** generate new ideas, different perspectives, and break down large amounts of information quickly. These techniques involve participation of the entire team to develop multiple solutions to problems.
2. ***Brainstorming*** is a team process for generating creative ideas for improvement. It involves everyone on the team, encourages creative thinking, and results in a comprehensive list of ideas. Brainstorming allows ideas to build upon each other as the team works together. General tips for brainstorming include: 1) ensure everyone on the team understands the outcome, and 2) set ground rules, such as, all ideas are welcome and listen to others without comments or criticism. Ideally, brainstorming ideas are

written on a flip chart and read aloud to ensure everyone on the team understands the ideas or has an opportunity to request clarification.

3. **Affinity analysis** helps an organization gather and organize a large amount of information. It uses brainstorming and organizes information and ideas into categories. An organization sees the big picture of a problem and understands how it relates to other areas within the organization. Affinity analysis is useful when the problem needs resolution quickly or it is overwhelming.
4. **Steal shamelessly** means there is no need to reinvent a process. An organization is encouraged to “steal” what worked in other organizations by using existing knowledge of evidenced-based processes and modifying them for its own system.

Predicting Results

A prediction is a statement about a system or process’ expected performance. With each change cycle, an organization usually predicts the change will result in improvement. An organization’s degree of confidence in its prediction is based on two considerations: 1) extent of evidence supporting the prediction, and 2) similarity between the conditions under which evidence was obtained and conditions that apply to the prediction. An organization’s confidence increases in the change will result in improvement, as its ability to predict a test’s outcome over various conditions improves. When an organization incorrectly predicts its test results; however, it questions the validity of the prediction theory. The reassessment process provides an opportunity for an organization to explore new strategies for improvement through continued and refined PDSA cycles.

Determining If Change Results In an Improvement

Measuring the actual change process is the only way to know if change results in an improvement. An organization’s actions are determined by what it learns from the change. For example, an organization’s action to implement the change may involve refining and testing the change again. This stage includes analyzing the test cycles, reflecting on what was learned, comparing predictions to the data collected, and making decisions. Since change in one area of the organization can impact another, it is important to review the entire system and ensure another area is not adversely affected.

Quality improvement is about changing an organization’s approach to managing data. While QI is not about measurement, an organization needs a process in place to manage and interpret data to determine if a change actually results in an improvement. Key outcome measures are required to assess an organization’s progress in achieving its aim. Specific measures, however, are needed for continual learning. Additional information on performance measures in quality improvement is in the **Managing Data for Performance Improvement** module.

Note: If an organization is currently funded by HRSA, some performance measures, including the HRSA CCM set, may be among those that will be reported to HRSA. An organization should consult its program's Web site plus links to bureau- and office-required guidelines and measures for more information:

[BPHC](#) [MCHB](#) [HAB](#) [BHPt](#) [ORHP](#) [OPAE/OHITQ](#) [ORO](#)

General information on HRSA grants, including searchable guidelines, is available and accessible at the [HRSA Grants Web site](#).

Grantees are encouraged to contact their project officers with questions regarding program requirements.

Part 5: Implementation

After a test of change is planned, tested, and studied, an organization summarizes and communicates what it has learned. The summary helps an organization decide whether to implement, modify, or discard the process tested. This decision is based on the data that measured the impact of the test cycle. Two questions determine the next steps in a test cycle: 1) Did the intervention yield improvement, and if so, 2) was the improvement sufficient? An improvement is considered sufficient when it achieves a benchmark level or the level of performance is satisfactory to the team or leadership. *If* the test leads to improvement *and* the improvement is sufficient, an organization can implement the intervention as a permanent part of the system. Since implementation is a permanent change to the way work is done and builds change into the organization, it can affect documentation, written policies, hiring, training, compensation, and aspects of the organization's infrastructure not engaged in the testing phase. Implementation may not look the same in every area of the organization. It is important to take what was learned from previous change cycles and adapt it to the current environment. Therefore, implementation often requires the use of the PDSA cycle. Once an organization redesigns a process using effective PDSA cycles, ongoing monitoring ensures it *holds the gains* over time.

If an organization monitors the process less, some measure assessment is necessary for an organization to meet its goal. Processes that work well now may need to change as the environment shifts. Once an organization moves to implementation, it needs to revisit the improvement. Many organizations review the process measure quarterly and think this frequency provides the necessary insight that the new process still causes improvement. The review process, whether it is monthly, quarterly or semi-annually, needs to become part of the organization's quality improvement strategic plan. This commits resources and time to continuous improvement on the process or measure and ensures the organization reaches its threshold of success. Constancy of purpose means every individual understands the organization's purpose and his or her role in accomplishing that purpose. Linking the QI team's work to the organization's purpose and strategic vision maintains its long-term focus on improving clinical quality. Additional information on developing a quality improvement plan is in the [Developing and Implementing a QI Plan](#) module.

The case story continues with RHC QI team's results of its test of change.

The Results

The RHC QI team increased the adult influenza vaccine rate to 80 percent in just six months. The team continued its process, but also realized it was not finished with this quality of care measure yet. The team knew it wanted to sustain the improvements it worked so hard to achieve. To effectively sustain the improvement, the team knew it needed to regularly monitor the outcomes on the influenza vaccination rate. The team decided that quarterly reviews would provide the needed data to determine if it was maintaining a vaccination rate of 80 percent or greater. The team planned to report the quarterly outcomes at the regularly-scheduled provider meeting.

Part 6: Supporting Information

References

1. Donald Berwick, MD, MPP, President and CEO, IHI, www.ihl.org
2. API Associates in Process Improvement, http://www.apiweb.org/API_home_page.htm
3. The Improvement Guide: A Practical Approach to Enhancing Organizational Performance (2nd Edition), Langley GL, Nolan KM, Nolan TW, Norman CL, Provost LP, San Francisco, California, USA: Jossey-Bass Publishers; 2009
4. Advances in Quality Improvement: Principles and Framework, Spring 2001 issue of the Quality Assurance Project's QA Brief

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1. API Associates in Process Improvement, http://www.apiweb.org/API_home_page.htm
2. The Improvement Guide: A Practical Approach to Enhancing Organizational Performance (2nd Edition), Langley GL, Nolan KM, Nolan TW, Norman CL, Provost LP, San Francisco, California, USA: Jossey-Bass Publishers; 2009
3. Institute for Healthcare Improvement www.ihl.org
4. QA Monograph, A Modern Paradigm for Improving Healthcare Quality, Center for Human Services • 7200 Wisconsin Avenue, Suite 600 • Bethesda, MD 20814-4811 • USA • www.qaproject.org
5. American Society for Quality, <http://www.asq.org/index.html>
6. Improving Chronic Illness Care, www.improvingchroniccare.org
7. Knowledge Gateway (KG) – Portal for Quality Improvement Library provided by HRSA contains an array of QI resources, change strategies, and tools that may be instrumental to organizations who may be designing a QI program. The searchable library can be accessed by entering words or phrases in the “Search For” box.
8. The Migrant Clinicians Network provides web based resources and tools that may be accessed and integrated into health care organizations implementing QI programs.
9. Quality Management Technical Assistance Manual, Health Resources and Services Administration, HIV/AIDS Bureau
10. NQC Quality Academy - <http://nationalqualitycenter.org>