Getting Started in Continuous Quality Improvement

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Getting Started in Continuous Quality Improvement

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**Schedule**

1:00-1:10 pm  
(P. Rudd)  
Introduction of faculty, needs assessment of audience, session agenda

1:10-1:30 pm  
(P. Rudd)  
Overview of CQI  
(professionalism, accountability, leadership, 12 steps)

1:30-2:00 pm  
(A. Dembitzer, M. Bergen)  
Module 1  
Project team selection, organization, topic selection, mission statement

2:00-2:30 pm  
(T. Sharp)  
Module 2  
Flowchart the current process, distribute details of clinic layout, available staff, numbers and types and training of providers.

2:30-3:00 pm  
(L. Osterberg)  
Module 3  
Data to be collected, how to embed monitoring in the workflow; baseline data for review and interpretation, selection of intervention, method and timing of implementation

3:00-3:30 pm  
(E. Holmboe)  
Module 4  
Interpreting the PDSA cycle data, did change occur, is it an improvement, holding the gains

3:30 -4:15 pm  
C. Braddock, moderator  
Small Group Reporting out  
Q&A (whole panel)

4:15-4:25 pm  
(C. Braddock)  
Summary, overview, cautions, reinforcements (Clarence)

4:25-4:30 pm  
audience completes pre-course evaluation
Module 1

Project Team Selection, Organization, Topic Selection, Mission Statement

<table>
<thead>
<tr>
<th>Time</th>
<th>Task</th>
<th>Who</th>
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<tbody>
<tr>
<td></td>
<td><strong>Orientation to the Module</strong></td>
<td>Anne Dembitzer</td>
</tr>
<tr>
<td></td>
<td>Topics: selecting and organizing a team, choosing a project topic,</td>
<td>Merlynn Bergen</td>
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<tr>
<td></td>
<td>writing a mission statement</td>
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<tr>
<td>10 min.</td>
<td>**You are a busy GIM faculty member but asked by your Division</td>
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<td></td>
<td>Chief/Department Chair to develop a plan, a structure, and a</td>
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<td>program for teaching system-based improvement to your fellow</td>
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<td>faculty members and Department of Medicine housestaff.</td>
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<td></td>
<td>You have done some preliminary reading, thinking, and discussion</td>
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<td>with peers and trainees about the subject. You select DIABETES</td>
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<tr>
<td></td>
<td>MELLITUS as the initial topic area because it is a <strong>high cost,</strong></td>
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<td></td>
<td><strong>relatively high volume, and high variability</strong> clinical cluster</td>
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<td>in your General Medicine Clinic. You are not sure how to learn the</td>
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<td>the CQI process and to teach it to others.</td>
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<td></td>
<td>You call together a meeting of all the key potential players (those</td>
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<td></td>
<td>seated together in your group).</td>
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<tr>
<td>20 min.</td>
<td>1. Select a <strong>RECORDER</strong> to document the deliberations</td>
<td>Each Breakout Group</td>
</tr>
<tr>
<td></td>
<td>2. Select a <strong>REPORTER</strong> to summarize conclusions at the end of the</td>
<td></td>
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<tr>
<td></td>
<td>module</td>
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<tr>
<td></td>
<td>3. Determine how you will organize your project team</td>
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<td>4. Brainstorm about how DIABETES MELLITUS might serve as a focus</td>
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<td>for learning about quality improvement and implementing QI at your</td>
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<tr>
<td></td>
<td>institution</td>
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<td>5. Write a project mission statement that will serve as an</td>
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<tr>
<td></td>
<td>organizer for the group and rally others to support your efforts;</td>
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<tr>
<td></td>
<td>focus on reducing diabetic foot complications; use terms that are</td>
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<tr>
<td></td>
<td>measurable, time-limited, actionable, and inspiring for those in your group.</td>
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<tr>
<td></td>
<td>6. Enumerate the things you learned from the exercise</td>
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</tbody>
</table>
Module 2

Flowchart the Current Process

<table>
<thead>
<tr>
<th>Time</th>
<th>Task</th>
<th>Who</th>
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</thead>
</table>
| 10 minutes | **Orientation to the Module**  
Topics: Flowchart the current process, distribute details of clinic layout, available staff, numbers and types and training of providers.  | Topher Sharp          |
| 10 minutes | **Your group has selected DIABETES MELLITUS FOOT COMPLICATIONS as the initial topic area because it is a high cost, relatively high volume, and high variability clinical cluster in your General Medicine Clinic.**  |                      |
| 10 minutes | **You call together a follow up meeting of all the key potential players (those seated together in your group) and prepare the following simple diagrams to get them started.**  |                      |

```
Patient at risk for complication presents

Risk of complication is identified

Complication recently assessed?

YES

Patient education reinforced for prevention

NO

Complication assessment performed, recorded

Diabetes well controlled

Initial diagnosis

Initial management

Adjusted management

Complication prevention

Routine monitoring

Complication management
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<table>
<thead>
<tr>
<th>Time</th>
<th>Task</th>
<th>Who</th>
</tr>
</thead>
</table>
| 20 minutes | 1. Select a RECORDER to document the deliberations  
2. Select a REPORTER to summarize conclusions at the end of the module  
3. Generate a flowchart of the current clinical process to monitor and prevent diabetic foot problems  
4. Consider the clinic layout, staff, providers, workflow and inherent variability in current process in your deliberations  
5. Enumerate the data that you are likely to need to establish a baseline and to plan your improving intervention  
6. Define at least ONE key process factor or quality outcome factor and the customer(s) for that step  
7. Enumerate the things you learned from the exercise  | Each Breakout Group       |
Your group has flowcharted the processes related to DIABETES MELLITUS FOOT COMPLICATIONS in your General Medicine Clinic. They have many ideas but remain uncertain which ideas are the best ones to implement first. Even more concerning is the resistance of physicians and staff to any extra work to collect data. The challenges are to optimize the dataset for collection and to embed the data collection process into the workflow itself as much as possible.

To help with these tasks, you call together a follow up meeting of all the key potential players (those seated together in your group).

<table>
<thead>
<tr>
<th>Time</th>
<th>Task</th>
<th>Who</th>
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</thead>
<tbody>
<tr>
<td>20 min.</td>
<td>1. Select a RECORDER to document the deliberations</td>
<td>Each Breakout Group</td>
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<tr>
<td></td>
<td>2. Select a REPORTER to summarize conclusions at the end of the module</td>
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<td></td>
<td>3. Prune the array of possible process and outcome variables to the irreducible core</td>
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<td></td>
<td>4. Consider how the data can be collected at baseline and after implementing changes in the clinical process</td>
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<td>5. Identify the sources of likely opposition and plan maneuvers to minimize resistance</td>
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<tr>
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<td>6. Summarize how the data collection process has been embedded in the workflow</td>
<td></td>
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<tr>
<td></td>
<td>7. Enumerate the things you learned from the exercise</td>
<td></td>
</tr>
</tbody>
</table>
Module 4

Interpreting the PDSA Cycle

<table>
<thead>
<tr>
<th>Time</th>
<th>Task</th>
<th>Who</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 minutes</td>
<td>Orientation to the Module: Interpreting the PDSA cycle data, did change occur, is it an improvement, holding the gains</td>
<td>Eric Holmboe</td>
</tr>
</tbody>
</table>

Your initial CQI curriculum project involves your house staff in the continuity clinic. The project to date has PGY-2 residents read important sections of the Institute of Medicine’s medical errors and quality chasm reports, perform medical record audits of their own diabetic patients, and generate suggestions for clinic improvements.

Based on input from the residents, the clinic over the past year implemented the following interventions:
1. Added a diabetic flowchart to patient’s paper medical records
2. Placed posters in the exam rooms calling for diabetic patients to remove their shoes and socks
3. Implemented special colored stickers on the chart identifying the patient as a diabetic.

You lucked out and found an MPH student available to perform a follow-up medical record audit. Data for a number of metrics are listed in the table below.

<table>
<thead>
<tr>
<th>Time</th>
<th>Task</th>
<th>Who</th>
</tr>
</thead>
</table>
| 20 min. | 1. Select a RECORDER to document the deliberations  
2. Select a REPORTER to summarize conclusions at the end of the module  
3. Review the data as a group  
4. Considering the interventions used and the results listed above, discuss what appears to work and how you will “maintain” the gains  
5. Discuss what did not work as well and what will you do with this information?  
6. Develop a plan, a structure, and a program for sustaining the gains made so far  
7. Consider what changes, if any, you want to make to the current curriculum in CQI for residents  
8. Specify what interventions you may add or change, and how residents will be involved in the process  
9. Enumerate the things you learned from the exercise | Each Breakout Group |
Comparison of PGY2 and PGY3 residents during baseline and follow-up years:
The data listed below represents 13 PGY-2 and PGY-3 residents from the continuity clinic. The PGY-3 residents did not participate in the curriculum but were exposed to the clinic interventions in the follow-up year. One other important thing you learn from the audit is that 60 patients had to be excluded from the table below because they did not see their “primary” resident at least once in each of the 2 study years. You call together a meeting of all the key potential players (those seating together in your group) to discuss the following data:

<table>
<thead>
<tr>
<th>Test</th>
<th>PGY 2 (Patients = 42)</th>
<th>PGY 3 (Patients = 48)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HbA1c performed at least twice per year</td>
<td>62%</td>
<td>70%</td>
</tr>
<tr>
<td>Mean HbA1c levels (± SD)</td>
<td>8.8 ± 2.6</td>
<td>8.4 ± 2.5</td>
</tr>
<tr>
<td>Mean blood pressure &lt; 130/80</td>
<td>32%</td>
<td>59%</td>
</tr>
<tr>
<td>Lipid panel performed at least once per year</td>
<td>65%</td>
<td>70%</td>
</tr>
<tr>
<td>Mean LDL cholesterol</td>
<td>139</td>
<td>112</td>
</tr>
<tr>
<td>Patients with LDL &lt; 100</td>
<td>66%</td>
<td>73%</td>
</tr>
<tr>
<td>Foot exam once during year</td>
<td>63%</td>
<td>65%</td>
</tr>
<tr>
<td>Monofilament once during year</td>
<td>14%</td>
<td>26%*</td>
</tr>
<tr>
<td>Pneumovax ever</td>
<td>35%</td>
<td>63% (total)*</td>
</tr>
<tr>
<td>Baseline ECG in chart ever</td>
<td>33%</td>
<td>67% (total)*</td>
</tr>
</tbody>
</table>

* Compared to PGY-3 follow-up year, p < .05
A Primer of CQI

A. **Summary:**
   - Continuous Quality Improvement (CQI) helps general internists shape the future with professionalism and accountability.
   - Precourse participants will examine the rationale for CQI, barriers to getting started, and principal steps to design and execute a project.
   - Teaching methods will include lecture, small group problem-solving, and summary group discussion.
   - Participants will learn techniques and perspectives to focus their own efforts and offer hope that conditions can actually improve.
   - Principal topics will include selecting a first project, assembling a project team, designing a project, linking process and outcome, holding the gains, and avoiding common pitfalls.
   - Handouts will guide participants to examples of successful programs, demonstration projects, and helpful readings.
   - Breakout exercises will emphasize small group dynamics, fine-tuning a flowchart, and planning project integration into the workflow.
   - Summary group discussions will underscore the key subgroup lessons and how best to bring the lessons home.

B. **Learning Objectives:**
   After completing this workshop, participants will be able to:
   1. Identify common barriers to initiating quality improvement efforts and useful methods to minimize them
   2. Learn and practice methods to engage peers and trainees in joining CQI efforts
   3. Enumerate important characteristics for a successful first CQI project
   4. List common pitfalls in CQI projects and methods to minimize them
   5. Learn about useful resources in print and electronic media

C. **Definitions**
   *(CQI is Continuous Quality Improvement)*
   Various authorities use different terms to describe the central process we shall use:
   - Best Practices
   - Continuous Quality Improvement (CQI)
   - Performance Improvement (PI)
   - Total Quality Management (TQM)

   Whatever the name, the critical underlying concept is simple but subtly differs from how most health professionals have been trained. Here are the major components:
   - Problem-identification and problem-solving
   - Learning and improving from learning
   - Collaboration among those with complementary perspectives
   - Leveraging the work of champions and leaders
   - Rapid Cycles of Plan-Do-Study-Act

D. **Basic Concepts**
   1. Best practices or CQI are methods to learn and to improve. Traditional medical training and practice reinforce consistency as good. Learning has some obvious advantages over consistency.
2. Learning assumes (a) a defined goal, (b) repeated measures of how well we reach the goal, and (c) repeated adjustments until we reach the goal.

3. Learning also is an ongoing process, not one that it completed with graduation or after a certain number of years in practice.

4. Best practices or CQI
   - Start with identifying a bulls-eye, a problem needing improvement
   - Provide a series of steps by which problems may be defined and solved
   - Offer a context for learning and for improving from learning
   - Use rapid, repetitive cycles of planning a change, doing the change, studying the change to determine if it is an improvement, and acting on the system to hold the gains and plan the next possible improvement.
   - Best practices or CQI help us become the "best we can be."

5. The Plan-Do-Study-Act (PDSA) cycle forms the core model for improvement.
   When applied to improving clinical processes, the PDSA cycle presupposes a number of items:
   - An explicit model of how a clinical process currently works
   - An enumeration and prioritization of potential steps or sites for interventions to improve the clinical process
   - A set of hypotheses about how one might intervene for process improvement
   - A selection of the top hypothesis (the best intervention to try first)

   ![PDSA Cycle Diagram]

6. When well planned and executed, the PDSA cycle provides answers to three key questions:
   - What are we trying to accomplish?
   - What changes can we make that will result in improvement?
   - How will we know that the change is an improvement?

7. The PDSA cycle is not a one-time event. The cycle is repeated again and again as waves of small improvements are considered, tested, evaluated, and incorporated if effective.
The cycle may start with ideas or hunches or theories but always tests them for practicality and impact and acceptability. The cycle relies on learning as you go rather than insisting on a perfect or comprehensive plan before starting the process. The changes for each improvement cycle may be small, but the cumulative impact may be large because of the repetitive nature of the cycles.

8. So far, we have seen two important parts of CQI: (a) Learning and (b) Collaboration in Project Teams. The special attractiveness of CQI builds on this foundation. Despite constrained resources, competing priorities, and widespread frustrations, CQI may offer the following:
   - Increased professional control of clinical processes
   - Reinforcement of our roles as health professionals
   - Self-correction and lifetime learning
   - Enhanced collaboration among physicians, nurses, pharmacists, other health professionals, and support staff

The CQI process does not pretend to have magic answers or a simple fix. The process does allow self-correction and lifetime learning. It further encourages process ownership, commitment, and collaboration among all stakeholders and members of the Project Team. Perhaps most importantly, undertaking CQI allows health professionals to take back some control.

There is a choice. Either one can say, “There is a problem. Let us get busy to do something about it.” OR One can say, “There is a problem. Who did this to us?” If one chooses to focus on whom to blame, much energy and creativity is wasted instead of getting on with fixing the problem.

9. Definition of Professionalism: A profession is a group that reserves the right to evaluate its own quality. True accountability is always internal and transparent. Physicians and other health professionals are internally driven. Components of Medical Professionalism

<table>
<thead>
<tr>
<th>We put our patients first.</th>
<th>We act as our patients’ advocates. We accept, promote, and honor a fiduciary trust on behalf of our patients.</th>
</tr>
</thead>
<tbody>
<tr>
<td>We maintain a special body of knowledge.</td>
<td>We have knowledge not generally available outside of the profession. We seek to advance the science of medicine &amp; generate new knowledge</td>
</tr>
<tr>
<td>We reserve the right to evaluate our own quality.</td>
<td>We hold one another accountable for our behavior and for the outcomes we achieve on our patients’ behalf</td>
</tr>
</tbody>
</table>

10. Our proper focus for CQI is how to make the clinical care the best it can be. We take on the responsibility to make the care the best possible as part of our professional role with its accountability to ourselves, to our peers, and to society as a whole.
11. The health care system consists of thousands of clinical processes, usually linked up in sequence to cause some outcome to occur. These links may be large or small, obvious or invisible. Together the links carry trade-offs. The links are beneficial when they facilitate good care and foster ongoing improvement. The links may also constrain our professional activities, our decisions, and our degrees of freedom. The search for Best Practices or CQI is a search for improving Process Management that is the discipline of linking knowledge of processes and systems with human psychology, process variability, and ongoing learning. When all are linked, quality improvement occurs.

12. "The challenge physicians face is not how to give up their traditional role of leadership or whether to give in to managed systems of care. Instead, the task is to come to understand that this emergent system of care demands many things that are different from what was valued in the recent past…"

Edward O’Neil
Director, Center for the Health Professions
Dept. of Family and Community Medicine, UCSF

13. Some people worry about terms like "clinical processes" and "constrained resources" and ask "What about the patient?"

Traditional training in medicine, nursing, pharmacy, and most health care professions focuses on the individual patient. Such a focus creates tension with the emerging themes of cost control and quality control. Consider the following:

Which model is more like medicine?

**"Traditional" Manufacturing**

- Craft-style production
- Long apprenticeship
- Unique or customized solutions
- Labor intensive
- Expensive

**"Scientific Management"**

- Assembly line production
- Short training & limited skills
- Mass production and standardized solutions
- Machine dependent
- Less expensive

Medicine has evolved as a craft. Like manufacturing a fine violin, the provision of fine medical care has traditionally required long apprenticeship (health professional training), unique or customized solutions (each patient is different), and services that are labor-intensive and quite expensive.

In contrast to such "traditional" care, business evolved complex theories and practices of "scientific management" to enhance outcomes and reduce costs. Using the example of the automobile, practices came to include assembly line production, short training among workers with limited skills, mass production with standardized solutions, dependency on machines but less expensive products.

14. Health professionals generally are both responsible and accountable for their professional acts. This responsibility is in keeping with their special knowledge and with their acceptance of the social contract that they act in the best interests of their patients to optimize outcomes.
The key word is OPTIMIZE. Rarely are all outcomes (physical outcomes, service outcomes, and cost outcomes) perfect. The art form is to consider all three components and seek to optimize them for the individual patient and for society as a whole. This is a difficult responsibility, but such accountability is the price for professional autonomy.

15. Steps to MASS CUSTOMIZATION include:
   a. Identify the best clinical process for most people with the condition. If the clinical process is well chosen and reflects the best available evidence, it is likely to be the process of choice for most situations. STANDARDIZE THE PROCESS
   b. Make that process the standard or default process for all such patients, unless there is an important reason to waive or modify the standard process in particular cases. TEACH WHEN AND HOW TO DEVIATE FROM THE STANDARD
   c. Teach the standard process as well as the reasons for deviating from the standard to all relevant providers (trainees and faculty, physicians and other health professionals). CREATE A FUNCTIONAL RULE FOR 80+% OF CASES
   d. Keep evolving the standard process to make it the best and the most appropriate default process possible, even if it will apply to most but not all cases. KEEP UP WITH EVOLVING KNOWLEDGE AND TECHNOLOGY

16. Brent James, the Vice President for Medical Research (Intermountain Health Care) emphasizes a culture of learning and mutual respect among professionals. In the search for accountability and improved care processes, he says,

"I don't have to show that what I am doing is perfect, only to show that it's better than what you are doing now."

The obvious corollaries go as follows:
* If I do better than you, you should follow my lead.
* If you do better than I, I should follow your lead.

17. Under traditional QUALITY ASSURANCE, the process starts when some event(s) fall outside of the standard, creating an "outlier." The immediate question is "Who did this? Who allowed it to happen?" The immediate response from management is to conclude, "Bad Apple! Get rid of him/her!" The immediate response from employees is to generate the cycle of fear and to worry individually if he/she is good enough to avoid punishment.
18. Under traditional QA, the assumption is that identifying and eliminating the "perpetrator(s)" will remove the outlier, remove the "tail." It further assumes that more inspections and eliminations will suffice to eliminate the tail and that what remains will somehow be excellent. In statistical reality, it is impossible to eliminate the tail. Any reassessment is likely to confirm that the bell-shaped curve after intervention contains new events and individuals associated with outlying levels. The process itself is misdirected.

19. In contrast, QUALITY IMPROVEMENT focuses on the average performance: what happens most often rather than what happens relatively rarely. The process seeks to reduce unnecessary variation, shifting the mean response in the desired direction and narrowing the distribution of responses. It seeks to improve the average common event rather than eliminate the rare, outlier event. The process thrives in learning environments that strive to improve the system of care and its processes rather than to focus on identifying and punishing the individual. Once in place, this perspective fosters individual clinicians to ask, "Am I the best that I can be?"

20. Measuring What Counts: The focus has been on measurement. This focus is important because: What can be measured can be improved. In reality, most people would acknowledge that not everything can be measured well. "Sometimes what counts can't be counted, and what can be counted doesn't count."
   - Albert Einstein
E. PROJECT TEAM  So, How Do We Get Started?

1. Usually, quality improvement requires a project team. Such a group differs from a traditional committee.

<table>
<thead>
<tr>
<th>Committee</th>
<th>Project Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Representative&quot; individuals</td>
<td>Individuals with &quot;fundamental knowledge&quot; from working</td>
</tr>
<tr>
<td></td>
<td>in the trenches</td>
</tr>
<tr>
<td>Productive capacity = single most able member</td>
<td>Synergistic efforts; productive capacity &gt;sum of the</td>
</tr>
<tr>
<td></td>
<td>individuals</td>
</tr>
<tr>
<td>Unequal ownership of group’s efforts,</td>
<td>Consensus, even if not always full agreement, with</td>
</tr>
<tr>
<td>conclusions, or implementation</td>
<td>ownership of conclusions and implementation</td>
</tr>
</tbody>
</table>

2. In choosing a project, two early dangers may arise:
   a. trying to do too much (trying to change the entire system), OR
   b. deciding in advance that one particular solution is the only solution relevant to the problem.

3. Accordingly, one should select a process to improve rather than a system. The process improvement effort then reflects a perceived problem rather than a preselected solution.
   a) Select
      • Something meaningful to those doing the work.
      • Something not undergoing change from another source.
      • Something that has short-term, measurable parts.

   b) Anticipate
      • Complications, hassles, etc.
      • Something that allows incremental change rather than huge projects of "perfection" or high cost or high complexity.
3. The best projects are those that:
   - Are meaningful to those doing the work.
   - Are not already undergoing change from another source and therefore too unstable for discrete CQI interventions.
   - Have short-term, measurable parts (costs, complications, hassles, etc.).
   - Allow incremental change rather than huge projects that seek perfection or involve very high costs or very high complexity.

4. Selecting Possible Change
   a) When selecting a project, there is a continuum from over-meticulous preparation for action (analysis paralysis) on the one extreme and precipitous action (fire, ready, aim) on the other.
   b) Optimal results will likely result from selecting a middle position that allows and encourages thoughtful preparation but acknowledges the need to move on to concrete action.
   c) At the same time, all potential projects can be classified on the basis of their likely impact (high versus low) and their ease of implementation (easy versus difficult).
   d) For a first project, selecting an easy to implement, although limited impact endeavor may be best.
5. What kinds of people should (be invited to) join a project team?
a) In addition to obvious issues of professional expertise, potential project team members may have different levels of comfort with change and with evidence available before change should occur.

b) One useful perspective comes from E. M. Rogers’ *Diffusions of Innovations* (1983) in which he categorizes and quantifies five subgroups:

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovators (2%)</td>
<td>Venturesome and creative of innovation: although few in number of the work force, they are the true sources of new ideas; may respond rapidly to innovations by others.</td>
</tr>
<tr>
<td>Early Adopters (14%)</td>
<td>Suggestible: Although they may not initiate the ideas, they are open to experimentation and respond to change in a constructive manner.</td>
</tr>
<tr>
<td>Early Majority (34%)</td>
<td>Deliberate: They respond to evidence but are unlikely to support change until “the facts” are fully presented and digested.</td>
</tr>
<tr>
<td>Late Majority (34%)</td>
<td>Skeptical: They are moved less by evidence than by peer pressure.</td>
</tr>
<tr>
<td>Resistors (16%)</td>
<td>Least likely to adopt change: They invoke tradition and respond to authority rather than to the ideas themselves.</td>
</tr>
</tbody>
</table>

c) A few Innovators will generate new ideas, even if they may not have the patience to gather supportive evidence or work to convince others.

d) Early Adopters will be essential to build a critical mass of support but may not be skeptical enough to perform due diligence.

e) That function will come from Early Majority members.

f) Too many late majority or resistor members on the team may undermine the early efforts.

g) The best team will likely consist of Innovators, Early Adopters, and Early Majority.

6. How to Make Your Team Effective

Project Teams, even with the proper members, may function well or poorly on the basis of several key characteristics: Rules, Leadership, Decision-making, Membership, Accountability, Results.

7. Features of a Good Team
Safe
Avoids personal attacks

Inclusive
Remains open to potential contributors
Values diverse views rather than a clique

Open Exchange
Considers all ideas fairly without prejudgment
Fosters active participation

Consensus-seeking
Finds a solution acceptable enough that all members can support it.
NOT: unanimous, majority vote, everyone totally satisfied

8. Some additionally useful rules might include the following:
   • No complaints without suggested solutions
   • Input and output kept within the project team until the team is ready for dissemination
   • Once agreement occurs, the team speaks with one voice
   • Everyone gets his/her say, not his/her way
   • Silence will be judged to mean agreement
   • Meetings start and stop on time, using a pre-announced agenda

9. Some groups may benefit from having a formal team facilitator to enforce ground rules and suggest techniques to keep the discussion and process on track. These might include brainstorming, nominal group technique, or Delphi methods.

10. Team members are chosen for their fundamental knowledge of the clinical process to be improved as well as for their being stakeholders for implementing any changes selected by the team. Optimal project team size for maximal participation is 5-7 individuals.

<table>
<thead>
<tr>
<th>Shapiro’s Law</th>
<th>Shapiro’s Corollary</th>
</tr>
</thead>
<tbody>
<tr>
<td>No matter how well a system or solution is conceived, designed, and executed, if people don’t like it, it will fail.</td>
<td>No matter how poorly a system or solution is conceived, designed, and executed, if people want it to work, it will succeed.</td>
</tr>
</tbody>
</table>

11. Effective QI project teams practice three complementary types of accountability:
   a) Accountability to the team: follow project team rules and participate in the process
   b) Accountability to the team member’s constituency: reality test about what can and cannot be done as well as communicate to peers about the vision of what the team project might accomplish.
   c) Accountability to senior management: responsiveness to overall institutional priorities, resource constraints, and mission

F. WRITING A MISSION STATEMENT
1. Writing a mission statement is useful to focus the project team’s interest and activities.

2. The mission statement explicitly expresses measurable goals with defined measures, deliverables and timeline
   a. Defines the problem to be fixed in clear and concise language
   b. Defines the project’s context, target population, and duration
   c. Links activities to an outcome (explicit target for success or failure rate)

3. Examples of such mission statement include the following:
1. "Within the next 12 months, 80% of our diabetic patients will have documented hemoglobin A1c levels 8.0%.”

2. "Within 12 months, we shall reduce hospitalizations for our asthmatics to <1/1000 per year for 0-14 year olds."

3. "Within nine months, we shall achieve >90% “highly satisfied” rating on routinely monitored satisfaction surveys from our patients in the XYZ Clinic regarding access to care, waiting times, and service quality."

4. The mission statement links to reasonable, worthwhile, and important goals, providing an issue around which project team members can rally and sometimes including both target and stretch goals compared to a baseline state.

G. FLOWCHARTING A CLINICAL PROCESS

1. Any human activity that produces an output is a process.
   a. Processes, in turn, tend to be hierarchical.
   b. One step occurs before the next in sequence: A -> B -> C etc.
   c. Mapping out the process with a flow diagram allows a comprehensive approach since it breaks the whole process up into more manageable and understandable portions without drowning in detail.

2. The flow diagram is an explicit model of the process. By making it explicit, the Project Team can
   a. share its understanding and approach with one another,
   b. integrate criticism, comparison, and improvement suggestions, and
   c. indicate how and when to measure components.
3. Here is another example, demonstrating the construction of a hierarchical diagram for nosocomial infection.
   a. Start with the broad category of nosocomial infection and then enumerate the major subcategories (post-operative wound infection, urinary tract infection, etc.)
   b. list the major steps under each subcategory
   c. list the major substeps within each step, continuing the process until the level of manageable detail has been reached.
4. Important tips to consider in the flowcharting process include the following:
   a. Flowchart a clinical process, not the entire medical care system.
   b. Avoid too much detail at this early stage of planning.
   c. Flowcharting the process should reflect the Project Team’s mission statement.
   d. Get all necessary information to ensure that the flowchart contains all the principal steps contained in the existing clinical process.
   e. Show the process as it actually occurs, not in the ideal state of how it should or could be.
   f. Remember that this is a critical stage of planning: take as much time as needed to get it right.
   g. Show the flowchart to other front line people for input and modification as needed.
   h. Look particularly for areas of error, handoffs, conflict, confusion, delay, rework loops, hassles, complaints from "customers" of the process.

4. Flowcharting is NOT a solo job.
   a. No one person understands all parts of the clinical process.
   b. All members of the Project Team need to contribute details related to their part of the process.
   c. Flowcharts provide a guide for what data need collection to evaluate the process.
   d. Flowcharting allows the team both to appreciate the complexity of the process and the opportunities for improvement.

6. The opportunities may include simplification, standardization, or other redesign.

H. CREATING A CUSTOMER GRID
1. Once the overall flow diagram has been completed, the Project Team may consider different intervention points for improvements.

2. To evaluate the options, one useful technique consists of creating a customer grid that lays out and links key process factors (KPFs) or steps to:
   - Expected outcome(s) of the process
   - Customers (both external to the organization and internal to it) for each process step
   - Customers’ expectations for each process step
   - Measures for how well current outcomes meet the customers’ expectations (key quality characteristics or KQCs)
   - Best method to display the results for each process step to ensure effective monitoring

3. Here is an example of a customer grid for the common process of sending a patient to the clinical laboratory for blood tests.
### CUSTOMER GRID - Linking Process, Customers, and Measurements

<table>
<thead>
<tr>
<th>(Key Process Factor) Process Step</th>
<th>Step still necessary</th>
<th>Desired Outcome from Process Step</th>
<th>Customers of Process Step</th>
<th>Customer’s Expectations</th>
<th>(Key Quality Characteristic) Measurement to Determine if Outcome Meets Expectations</th>
<th>Best Graphic Display of Outcome Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient scheduled for tests</strong></td>
<td>Yes</td>
<td>Appropriate tests ordered</td>
<td>Physician</td>
<td>Appropriate tests ordered</td>
<td>% inappropriate tests ordered by provider, by type of test, by surgical procedure</td>
<td>Histogram</td>
</tr>
<tr>
<td><strong>Patient reports to lab for tests</strong></td>
<td>Yes</td>
<td>Appropriate orders in lab for test</td>
<td>Lab Tech</td>
<td>Clear orders before patient arrives in lab</td>
<td># patients arriving at lab without orders for specific tests</td>
<td>Defect Run Chart</td>
</tr>
<tr>
<td><strong>Tests Performed</strong></td>
<td>Yes</td>
<td>Adequate staff to complete test promptly with single blood draw</td>
<td>Patient Lab Tech</td>
<td>One draw Goes to lab once</td>
<td># of redraws per tech</td>
<td>Histogram</td>
</tr>
<tr>
<td><strong>Physician receives test results</strong></td>
<td>Yes</td>
<td>Complete results available promptly</td>
<td>Lab Tech Physician</td>
<td>Sufficient staff to complete tests promptly Prompt reporting of accurate results</td>
<td># tests per day per tech • Turn around time from when pt arrives at lab until tests completed • Turn-around-time from when test completed to when MD gets results</td>
<td>Histogram Scatter Plot</td>
</tr>
</tbody>
</table>


**Change Concepts**

**Eliminate Waste and Error**
- **Examples**
  - Use constraints to guide choices and reminders as alerts
  - Eliminate multiple entry and redo’s of the same work

**Improve Work Flow**
- **Examples**
  - Minimize hand-offs among workers
  - Reduce set-up time
  - Do tasks in parallel rather than in series

**Optimize Inventory**
- **Examples**
  - Reduce choice or features
  - Standardize whenever possible

**Change the Work Environment**

**Customer/Client/Patient Interface**
- **Examples**
  - Implement cross-training and basic training for all
  - Expand focus on customer’s outcomes, not considering only those for health professionals
I. ANALYTICAL TOOLS FOR PROCESS IMPROVEMENT

Tools to Organize & Analyze - Examples

<table>
<thead>
<tr>
<th>Tool</th>
<th>Technique</th>
<th>Usefulness</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) <strong>Cause &amp; Effect diagram</strong> (&quot;fishbone&quot; or Ishikawa diagram)</td>
<td>Graphical connections among contributing factors</td>
<td>Encourages comprehensive listing of components from brainstorming</td>
</tr>
<tr>
<td>b) <strong>Tally sheet</strong></td>
<td>Enumeration of events by predetermined categories</td>
<td>Allows estimates of relative frequency among multiple factors</td>
</tr>
<tr>
<td>c) <strong>Histogram</strong></td>
<td>Graphical display of frequencies</td>
<td>Permits visual comparison of frequencies, e.g., using tally sheet data</td>
</tr>
<tr>
<td>d) <strong>Pareto chart</strong></td>
<td>Graphic display of relative weights or frequencies by bar chart, sorted from greatest to smallest</td>
<td>Provides cumulative total and allows focus among many choices</td>
</tr>
<tr>
<td>e) <strong>Flowcharts</strong></td>
<td>Structured sequence of events and decision points in graphic format</td>
<td>Offers both layout of steps and planning for interventions and measurements</td>
</tr>
<tr>
<td>f) <strong>Data collection forms</strong></td>
<td>Specification of data elements within the usual workflow</td>
<td>Minimized the need for extra staff, extra work, and extra hassle</td>
</tr>
<tr>
<td>g) <strong>Run chart</strong></td>
<td>Monitoring of clinical outcomes over time</td>
<td>Allows crude assessment of trends (see Module 8)</td>
</tr>
<tr>
<td>h) <strong>Statistical process control chart</strong></td>
<td>Evaluation of clinical processes over time by statistical tests</td>
<td>Permits assessment about the process’s stability, predictability, and improvement (see Module 8)</td>
</tr>
</tbody>
</table>

**Strengths of this tool:**
- Graphical display of possible factors.
- Categorizes ideas from brainstorming.

**Cause & Effect diagram**
In 1897, Italian economist Vilfredo Pareto observed that 80% of the wealth in England belong to 20% of the people. This 80/20 principle is not a rigid ratio but a useful organizing principle. For example, about 20% of car drivers cause 80% of the accidents.

The Pareto diagram combines an ordered histogram and a cumulative line graph. In this example, the graph lays out and orders the frequencies of multiple factors contributing to adverse drug reactions. One can quickly sense how the first factor contributes the most to the cumulative effect, the second factors contributes the second most, and so on.

Run Chart

Dr. Larry Staker (Intermountain Health Care) asked his diabetic patients to graph their daily fasting blood sugars over time. The graph was used instead of a table of results. The measurement and feedback served as a form of statistical process control (SPC) with a goal fasting blood sugar (FBS) of 90 - 135 mg/dL.
**Data Collection Form (example)**

**PNEUMONIA (6-98)**

**Allergies**

**DOB**

**A. RISK FACTORS—HISTORY**

<table>
<thead>
<tr>
<th>Y</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age ≥ 65 or smoker ≥ 40</td>
<td></td>
</tr>
<tr>
<td>Suspicion of aspiration</td>
<td></td>
</tr>
<tr>
<td>CHF</td>
<td></td>
</tr>
<tr>
<td>COPD/bronchiectasis</td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td></td>
</tr>
<tr>
<td>ETOH abuse/malnutrition</td>
<td></td>
</tr>
<tr>
<td>Chronic renal failure</td>
<td></td>
</tr>
<tr>
<td>Chronic liver failure</td>
<td></td>
</tr>
<tr>
<td>Postsplenectomy</td>
<td></td>
</tr>
<tr>
<td>Systemic Active Cancer, exit protocol if immune compromised</td>
<td></td>
</tr>
</tbody>
</table>

**B. RISK FACTORS—PHYSICAL**

<table>
<thead>
<tr>
<th>Y</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temp ≥ 101 F or 38.3 C</td>
<td></td>
</tr>
<tr>
<td>RR ≥ 30</td>
<td></td>
</tr>
<tr>
<td>BP &lt; 90/60</td>
<td></td>
</tr>
<tr>
<td>SaO₂ &lt; 85%</td>
<td></td>
</tr>
<tr>
<td>Acute altered mental status</td>
<td></td>
</tr>
<tr>
<td>Physical exam shows signs of consolidation or decreased breath sounds</td>
<td></td>
</tr>
</tbody>
</table>

If no risk factors present, go to treatment (top right).

If risk factors present, order CXR, CBC, BUN, Creatinine.

Consider: K, Na, glucose, HCO₃, Cl-

**C. RISK FACTORS—LABS**

<table>
<thead>
<tr>
<th>Y</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC &lt; 4,000 or &gt; 20,000</td>
<td></td>
</tr>
<tr>
<td>Hgb &lt; 9 OR Hct &lt; 30</td>
<td></td>
</tr>
<tr>
<td>CXR findings:</td>
<td></td>
</tr>
<tr>
<td>Multilobar</td>
<td></td>
</tr>
<tr>
<td>Effusion</td>
<td></td>
</tr>
<tr>
<td>If cavitation, exit protocol</td>
<td></td>
</tr>
<tr>
<td>If no infiltrate on CXR compatible with pneumonia, exit protocol</td>
<td></td>
</tr>
<tr>
<td>BUN ≥ 20 or Creat ≥ 1.2</td>
<td></td>
</tr>
<tr>
<td>Coexisting illness lab abnormalities</td>
<td></td>
</tr>
</tbody>
</table>

Sum of Risk Factors in A, B & C

3 or more

**COMMENTS TO PNEUMONIA TEAM:**

Send to: INTERMOUNTAIN HEALTH CARE, Attn: Carol Hadlock
36 South State Street, Salt Lake City, Utah 84111 FAX: 442-3821

*This Pneumonia Care Process Model (PCPM) may need to be adapted to meet the needs of a specific patient. The model should not replace clinical judgement.*

**CARE PROCESS MODEL—ADULT PNEUMONIA AGE 17 & OLDER FOR THE IMMUNOCOMPETENT PATIENT**

**Assess for ICU admission**

- Sustained RR ≥ 30 or needs mechanical ventilation
- Sustained BP < 90/60 or on vasopressors
- O₂ supplementation ≥ 50% (PaO₂/FiO₂ < 250 mm Hg)
- Acute renal failure
- If present, draw two blood cultures and give first dose of antibiotics. Admit to ICU.

**Assess for admission**

- Sat < 85%
- Coexisting illness requiring admission
- Acute altered mental status
- Patient dependent and no caregiver available
- Pleural effusion with ≥ 1 cm on doublilbus chest film
- If any present, draw two blood cultures and give first dose of antibiotics. Admit to hospital.

If none present, consider treatment as outpatient* parenteral and/or oral

**Perenteral Outpatient Therapy**

- Ceftriaxone 1 gram every 24 hours for ____ days.
  (PLUS)
- Doxycycline 100 mg bid x 10 days
  OR
- Zithromax ZPAK as directed

---

*This Pneumonia Care Process Model (PCPM) may need to be adapted to meet the needs of a specific patient. The model should not replace clinical judgement.*
Tables vs. Graphs

Graphing the same data allows more rapid review and conclusions.

<table>
<thead>
<tr>
<th>Day</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. Wait Time (min)</td>
<td>60</td>
<td>22</td>
<td>41</td>
<td>59</td>
<td>23</td>
<td>81</td>
<td>79</td>
<td>20</td>
<td>39</td>
<td>40</td>
</tr>
</tbody>
</table>

Average Wait Time for Physician Visit

The mind can rapidly evaluate the pattern in the graph. In a table, the mind must laboriously compile the data before detecting central tendency, trends, or outlier data.

Graphs frequently have more impact than do tables of data.

Variability generally reflects common cause variation when it remains within 2–3 standard deviations of the mean value.

Variability generally reflects special cause variation when it exceeds 2–3 standard deviations of the mean value.

Examples of Special Cause Variation

- New employee
- New procedure
- Defective machine
- Unusual patient etc.
Skewhart - Economic Control of Quality of Manufactured Product

"A phenomenon will be said to be controlled when, through the use of past experience, we can predict, at least within limits, how the phenomenon may be expected to vary in the future. Here it is understood that prediction within limits means that we can state, at least approximately, the probability that the observed phenomenon will fall within the given limits."

- Walter A. Skewhart

1. Certain kinds of variation are part of normal functioning: **Common Cause Variation**

2. Other variation is special or assignable to other causes: **Special Cause Variation**

So:

- One should seek to understand, control, and reduce special cause variation
- One should seek not to respond to common cause variation, so as to avoid tampering or micromanaging, or wasting resources on variability that is normal, expected, and predictable.
- One should not seek to improve a process until it is controlled, i.e. limited to common cause variation.
- Once controlled, a process may be subject to intervention with reasonable probability that observed changes are due to the intervention rather than to natural variability.

**Seeing When Change is an Improvement**

Control charts can be applied to the data for both individual patients and for patient cohorts.

In the example figure, the patient's LDL-cholesterol is monitored at several month intervals from 7/92 until 4/96.

The control charts and accompanying statistics allow conclusions that the LDL-cholesterol levels were significantly reduced from baseline by the 20 mg dose of simvastatin and even further reduced by the 40 mg dose of the medication. The mean values fell respectively from 180 mg/dl to 139 mg/dl and finally to 114 mg/dl.

![Control Chart Image](image-url)
For further details about each of the subtypes, the interested reader is referred to the following resources:

**Analytic References**

**Websites**
1. Project Hanford Management System docs online http://www.hanford.gov/safety/vpp/spc.htm
2. Quality and Statistical Process Control
3. Prof. Sid Sytsma - Ferris State University http://www.sytsma.com/tqmtools/ctlchtprinciples.html

**OTHER REFERENCES**

A. **Articles**

B. Books
5. Kohn LT, Corrigan JM, Donaldson MS (eds.); Committee on Quality of Health Care in America. Institute of Medicine To Err Is Human: Building a Safer Health System), National Academy Press, 2000

C. URLs
1. Organizations
   a) Agency for Healthcare Research and Quality: http://www.ahrq.gov/
   c) University Healthsystem Consortium: http://www.uhc.org/
   d) Institute for Healthcare Improvement: http://www.ihi.org/
   e) Managed Care Education Clearinghouse: http://www.mceconnection.org/mce/

2. Software
   c) Think Through Your Chance of Success: http://mason.gmu.edu/~falemi/cqi/sccss00.htm
   d) Inspiration version 7 for brainstorming and concept mapping: http://www.inspiration.com

3. Other Resources
   a) Clemson Engineering, QI tools: http://deming.eng.clemson.edu/pub/tutorials/gctools/stdntndx.htm
   b) Template for teaching personal CQI project: http://mason.gmu.edu/~falemi/cqi/frpers.htm
   c) AAFP web-based tutorial on CQI projects: http://www.aafp.org/x3874.xml

4. Examples of Successful Programs
   a) UCLA CHAMP for 2ary prevention of atherosclerotic events: http://www.med.ucla.edu/champ/