The 27th Annual National Forum on Quality Improvement in Health Care.

Back to the Basics: Building Essential Quality Improvement Skills

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8 December 2015
9:30 - 10:45 and 11:15 - 12:30
Workshop Objectives

• Provide an overview of the Model for Improvement

• Specify the differences between testing, implementing and spreading.

• Identify key concepts and tools that should be part of your QI toolkit.

Neither presenter has anything to disclose.
Is life this simple?

X → Y

Patient encounter with physician → A healthy and satisfied patient

(If it was this simple we would not Improvement Teams)
No, life looks more like this…

There are numerous **direct effects** between the independent variables (the Xs) and the dependent variable (Y).
Actually, life looks like this!

In this case, there are numerous direct and indirect effects between the independent variables and the dependent variable. For example, $X_1$ and $X_4$ both have direct effects on $Y$ plus there is an indirect effect due to the interaction of $X_1$ and $X_4$ conjointly on $Y$.

$R$ = residuals or error terms representing the effects of variables not included in the model.

A healthy and satisfied patient

- $X_1$, $X_2$, $X_3$, $X_4$, $X_5$ are independent variables influencing $Y$.
- $R_1$, $R_2$, $R_3$, $R_4$, $R_5$ are residuals or error terms.
- $R_Y$ represents the effects of variables not included in the model.
- Coordination of care, current health status, communication, age, gender influences the independent variables.
The Messiness of Life!

“Some problems are so complex that you have to be highly intelligent and well informed just to be undecided about them.”

--Laurence J. Peter

A good reference on this topic is “Wicked Problems and Social Complexity” by Jeff Conklin, Ph.D., Chapter 1 in Dialogue Mapping: Defragmenting Projects through Shared Understanding. For more information see the CogNexus Institute website at http://cognexus.org, 2004.
The Quality Pioneers…

W. Edwards Deming
(1900 - 1993)

Walter Shewhart
(1891 – 1967)

Joseph Juran
(1904 - 2008)

Provided us a foundation for addressing the messiness of life
“Both pure and applied science have gradually pushed further and further the requirements for accuracy and precision. However, applied science, is even more exacting than pure science in certain matters of accuracy and precision.”
A healthy and satisfied patient

The messiness of life requires applied science!

R = residuals or error terms representing the effects of variables not included in the model.
Dialogue
Assessing the Messiness of Life!

Do people within your organization regularly view issues as being rather messy and complex or do they see them as simple problems that should be resolved quickly and easily?

List a few of these messy problems and why they are this way.

On a scale of 1-10, how messy are each of these problems? (1 = a simple problem that is not very messy to 10 = a very messy problem)

Do you have measures for these messy problems that allow you to determine just how complex and challenging each problem is?

If you are measuring, do you feel that the measures you have are valid, reliable and appropriate given the complexity of the issues you face each day?
Applied Science requires two types of knowledge

**Subject Matter Knowledge:** Knowledge basic to the things we do in life. Professional knowledge. Knowledge of work processes.

**Science of Improvement (SOI) Knowledge:** The interplay of the theories of systems, variation, knowledge, and psychology.
Knowledge for Improvement

**Improvement:** Learn to combine subject matter knowledge and SOI knowledge in creative ways to develop effective changes for improvement.
Dr. Edwards Deming made an important contribution to the science of improvement by recognizing the elements of knowledge that underpin improvements over a wide range of applications.

He called this body of knowledge a **System of Profound Knowledge**.

*Profound* denotes the deep insight that this knowledge provided into how to make changes that will result in improvement in a variety of settings. *System* denotes the emphasis on the *interaction* of the components rather than on the components themselves.
The Lens of Profound Knowledge

"The system of profound knowledge provides a lens. It provides a new map of theory by which to understand and optimize our organizations."

W. E. Deming

It provides an opportunity for dialogue and learning!

The Lens of Profound Knowledge

- Appreciation of a system
- Theory of Knowledge
- Human Behavior
- Understanding Variation

QI

Aim or Values
Understanding the four components of the Lens

**Appreciation for a System**
- Interdependence, dynamism
- World is not deterministic
- Optimization, interactions
- System must have an aim
- Whole is greater than sum of the parts

**Theory of Knowledge**
- Prediction
- Learning from theory, experience
- Operational definitions
- PDSA for learning and improvement

**Psychology**
- Interaction between people
- Intrinsic motivation, movement
- Beliefs, assumptions
- Will to change

**Understanding Variation**
- Variation is to be expected
- Common or special causes
- Ranking, tampering
- Potential mistakes
Exercise
Profound Knowledge

• Now that you understand the components of PK, we would like you to apply the Lens of Profound Knowledge to an improvement project.

• You can work alone or with others.

• Use the PK Worksheet to record your responses. Remember that there are no right or wrong responses.

• Engage in a dialogue on PK, not a debate, a discussion or a chit chat but a true dialogue about the theories and assumptions surrounding your project and the degree to which it is “messy.”

• Spend about 10 minutes working on this exercise.
# Profound Knowledge Worksheet

<table>
<thead>
<tr>
<th>Appreciation for a System</th>
<th>Human Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Theory of Knowledge</th>
<th>Understanding Variation</th>
</tr>
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<tbody>
<tr>
<td>•</td>
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</tbody>
</table>
Learn more about the Science of Improvement

Deming’s System of Profound Knowledge

- Understanding Systems Thinking
- Understanding Variation
- Building Knowledge
- Understanding Human Behavior
- QI

Combines with

Provides the Philosophical and Theoretical Base for

Improvement

Key Improvement Methods:
- Model for Improvement with PDSA
- Shewhart charts
- Operational Definitions
- Analytic Studies
- Graphical Data Analysis
- Intrinsic motivation
- Multi-disciplinary teams

Subject Matter Knowledge

Characteristics of the Applied Science of Improvement:
1. Bias toward action learning
2. Focus on prediction of future outcomes
3. Multiple testing cycles before implementation
4. Visual display to learn from data
5. Learning from special and common causes
6. Simple and complex study designs
7. Ongoing interaction of scientists and practitioners

Seven Propositions:
1. Grounded in the Scientific Method
2. Foundation of conceptualistic pragmatism
3. Embraces a weak from of psychologism
4. Considers context of justification and discovery
5. Recognizes value of operationism
6. Variation is defined by chance-cause system
7. Systems theory

Now, let’s take a closer look at …

...the Model for Improvement!
A Model for Learning and Change

When you combine the 3 questions with the...

PDSA cycle, you get...

...the Model for Improvement.

The Improvement Guide, API, 1996
Question #1: What are We Trying to Accomplish?

Developing the team’s Aim Statement
Constructing an Aim Statement

- **Boundaries**: the system to be improved (scope, patient population, processes to address, providers, beginning & end, etc.)
- Specific *numerical goals* for *outcomes*
  - Ambitious but achievable
- Includes *timeframe* *(How good by when?)*
- Provides *guidance* on sponsor, resources, strategies, barriers, interim & process goals
Constructing an Aim Statement

Involve senior leaders
- Obtain sponsorship (geared to the project’s complexity)
- Provide frequent and brief updates (practice the 2 minute elevator speech)

Focus on issues that are important to your organization
- Connect the team Aim Statement to the Strategic Plan
- Build on the work of others (steal shamelessly!)
Example #1 of an Aim Statement

Aim Statement for the IHI Hospital Acquired Infections Community:

Overall, to reduce infections from MRSA, VRE and \textit{C. diff} by 30% within 12 months.

How good? By When?

Hope is not a plan!
Example #2 of an Aim Statement

In the pilot units, we will reduce the incidence of Ventilator Acquired Pneumonia by 50% within 3 months and to zero within 1 year. Within one year, reduce VAP incidence by 50% system-wide and to zero within 2 years.

We will ensure that our work contributes to a sustainable QI infrastructure to support future projects.

- **System**: ventilator care in pilot units, all hospitals
- **Goal**: Reduce VAP “by 50%”, “to zero”
- **Timeframe**: 3 months, 1 year, 2 years
- **Guidance**: Build QI infrastructure
Check Points in Developing an Aim Statement

AIM Content
- Explicit overarching description
- Specific actions or focus
- Goals

AIM Characteristics
- Measurable (How good?)
- Time specific (By when?)
- Define participants and customers
Aim Statement Exercise: You Make the Call!
<table>
<thead>
<tr>
<th>Aim Statement</th>
<th>Good</th>
<th>Bad</th>
<th>Ugly</th>
</tr>
</thead>
<tbody>
<tr>
<td>We aim to reduce harm and improve patient safety for all of our internal and external customers.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>By June of 2016 we will reduce the incidence of pressure ulcers in the critical care unit by 50%.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Our outpatient testing and therapy patient satisfaction scores are in the bottom 10% of the national comparative database we use. As directed by senior management, we need to get the score above the 50th percentile by the end of the 3rd Q of 2016.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We will reduce all types of hospital acquired infections.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>According to the consultant we hired to evaluate our home health services, we need to improve the effectiveness and reliability of home visit assessments and reduce rehospitalization rates. The board agrees, so we will work on these issues this year.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Our most recent data reveal that on the average we only reconcile the medications of 35% of our discharged inpatients. We intend to increase this average to 50% by 6/1/16 and to 75% by 12/31/16.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Exercise
Develop an Aim Statement

- If you are already working on an improvement project review your Aim for clarity and how good/by when criteria.

- If you aren’t working on an improvement project then write a personal improvement aim (e.g., lose some weight, improve my golf game, reduce my morning commute to work).

- Spend a few minutes working on this exercise, then compare your aim statement with that of the person sitting next to you.

- Use the *Aim Statement Worksheet* to create or revisit your an Aim Statement.
Aim Statement Worksheet

Project: _______________________________________

Aim statement

(What’s the problem? Why is it important? What data do you have to indicate this is a topic for improvement?)

How good? _______________________________________

By when? _______________________________________
TIP: A Driver Diagram is a good way to show your aim and the system you want to improve.

Outcome

Primary Drivers

Secondary Drivers

Specific Change Ideas

Change Concepts

Aim: Expresses stakeholder value!

P. Driver

S. Driver 1

S. Driver 2

S. Driver 3

S. Driver 1

S. Driver 2

S. Driver 1

S. Driver 2

S. Driver 1

S. Driver 2

S. Driver 1

S. Driver 2

S. Driver 1

S. Driver 2

Ips: 1

2

3

4

5

6

7

N
The Driver Diagram provides a theory for your Aim

AIM: A New ME!

Outcome

Primary Drivers

Calories In

drives

Secondary Drivers

Limit daily intake

Substitute low calorie foods

Avoid alcohol

Exercise

Fidgiting

“Every system is perfectly designed to achieve the results that it gets”
Question #2:
How Do We Know that a Change is an Improvement?

“You can’t fatten a cow by weighing it”
- Palestinian Proverb

Improvement is NOT just about measurement!

However, without measurement you will never be able to know the answer to question #2 in the MFI.
Measurement is Central to the Team’s Ability to Improve

- The purpose of measurement in QI work is for *learning not judgment!*

- All measures have limitations, but the limitations do not negate their value for learning.

- You need a **balanced set of measures** reported daily, weekly or monthly to determine if the process has improved, stayed the same or become worse.

- These measures should be linked to the team’s Aim.

- Measures should be used to guide improvement and test changes.

- Measures should be integrated into the team’s daily routine.

- Data should be plotted over time on annotate graphs.

- Focus on the Vital Few!
Milestones in the Quality Measurement Journey

AIM (Why are you measuring?)
- Concept
- Measure
- Operational Definitions
- Data Collection Plan
- Data Collection
- Analysis

### Every concept can have many measures


<table>
<thead>
<tr>
<th>Concept</th>
<th>Potential Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Falls</td>
<td>Percent falls</td>
</tr>
<tr>
<td></td>
<td>Fall rate</td>
</tr>
<tr>
<td></td>
<td>Number of falls</td>
</tr>
<tr>
<td>Compliance with VAP bundle</td>
<td>Percent compliance</td>
</tr>
<tr>
<td></td>
<td>Compliance rate</td>
</tr>
<tr>
<td></td>
<td>Number of cases with full compliance</td>
</tr>
<tr>
<td>Employee Evaluations</td>
<td>Percent of evaluations completed on time</td>
</tr>
<tr>
<td></td>
<td>Number of evaluations completed</td>
</tr>
<tr>
<td></td>
<td>Variance from due date</td>
</tr>
</tbody>
</table>
Three Types of Measures

- **Outcome Measures**: Voice of the customer or patient. How is the system performing? What is the result?

- **Process Measures**: Voice of the workings of the system. Are the parts/steps in the system performing as planned?

- **Balancing Measures**: Looking at a system from different directions/dimensions. What happened to the system as we improved the outcome and process measures (e.g. unanticipated consequences, other factors influencing outcome)?
# Potential Set of Measures for Producing a New Me

<table>
<thead>
<tr>
<th>Topic</th>
<th>Outcome Measures</th>
<th>Process Measures</th>
<th>Balancing Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>A New Me! (Lose some weight)</td>
<td>Weight</td>
<td>Daily calorie count</td>
<td>Money spent on healthy food</td>
</tr>
<tr>
<td></td>
<td>BMI</td>
<td>Exercise calorie count</td>
<td>Number of days not exercising due to injuries</td>
</tr>
<tr>
<td></td>
<td>% Body Fat</td>
<td>Average drinks per week</td>
<td>Family and friends satisfaction</td>
</tr>
<tr>
<td></td>
<td>Waist Size</td>
<td>Percent of meals off plan</td>
<td></td>
</tr>
</tbody>
</table>
How will I know I am improving?

The Driver Diagram provides a good frame on which to hang your measures.
An Operational Definition... 

... is a description, in quantifiable terms, of what to measure and the steps to follow to measure it consistently.

• It gives communicable meaning to a concept
• Is clear and unambiguous
• Specifies measurement methods and equipment
• Identifies criteria
### How do you define the following healthcare concepts?

<table>
<thead>
<tr>
<th>Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>World Class Performance</td>
</tr>
<tr>
<td>A little pain and swelling</td>
</tr>
<tr>
<td>Teenage pregnancy</td>
</tr>
<tr>
<td>Cancer waiting times</td>
</tr>
<tr>
<td>Health inequalities</td>
</tr>
<tr>
<td>Asthma admissions</td>
</tr>
<tr>
<td>Childhood obesity</td>
</tr>
<tr>
<td>Patient education</td>
</tr>
<tr>
<td>Health and wellbeing</td>
</tr>
<tr>
<td>Adding life to years and years to life</td>
</tr>
<tr>
<td>Children's palliative care</td>
</tr>
<tr>
<td>Safe services</td>
</tr>
<tr>
<td>Smoking cessation</td>
</tr>
<tr>
<td>Urgent care</td>
</tr>
<tr>
<td>Delayed discharges</td>
</tr>
<tr>
<td>End of life care</td>
</tr>
<tr>
<td>Falls (with/without injuries)</td>
</tr>
<tr>
<td>Childhood immunizations</td>
</tr>
<tr>
<td>Complete maternity service</td>
</tr>
<tr>
<td>Patient engagement</td>
</tr>
<tr>
<td>Moving services closer to home</td>
</tr>
<tr>
<td>Successful breastfeeding</td>
</tr>
<tr>
<td>Ambulatory care</td>
</tr>
<tr>
<td>Access to health in deprived areas</td>
</tr>
<tr>
<td>Diagnostics in the community</td>
</tr>
<tr>
<td>Productive community services</td>
</tr>
<tr>
<td>Vascular inequalities</td>
</tr>
<tr>
<td>Breakthrough priorities</td>
</tr>
</tbody>
</table>
Exercise

Operational Definition

• Select an improvement project that is work related or a personal improvement project.

• Select one measure from this project and develop an operational definition that is:
  • Clear and unambiguous
  • Specifies measurement methods and equipment
  • Identifies criteria if appropriate.

• Use the *Operational Definition Worksheet* to guide and record your work.
WHAT PROCESS DID YOU SELECT?

WHAT SPECIFIC MEASURE DID YOU SELECT FOR THIS PROCESS?

OPERATIONAL DEFINITION
Define the specific components of this measure. Specify the numerator and denominator if it is a percent or a rate. If it is an average, identify the calculation for deriving the average. Include any special equipment needed to capture the data. If it is a score (such as a patient satisfaction score) describe how the score is derived. When a measure reflects concepts such as accuracy, complete, timely, or an error, describe the criteria to be used to determine “accuracy.”

## DATA COLLECTION PLAN
- Who is responsible for actually collecting the data?
- How often will the data be collected? (e.g., hourly, daily, weekly or monthly?)
- What are the data sources (be specific)?
- What is to be included or excluded (e.g., only inpatients are to be included in this measure or only stat lab requests should be tracked).
- How will these data be collected?
  - Manually ______
  - From a log ______
  - From an automated system
- Will sampling be required? If ‘yes’ what type of sample will you pull?

## BASELINE MEASUREMENT
- What is the actual baseline number? ____________________________
- What time period was used to collect the baseline? ____________________________

## TARGET(S) OR GOAL(S) FOR THIS MEASURE
- Do you have target(s) or goal(s) for this measure?
  - Yes ___
  - No ___
- Specify the **External** target(s) or Goal(s) (specify the number, rate or volume, etc., as well as the source of the target/goal.)

- Specify the **Internal** target(s) or Goal(s) (specify the number, rate or volume, etc., as well as the source of the target/goal.)
<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Operational Definition</th>
<th>Data Source(s)</th>
<th>Data Collection</th>
<th>Baseline</th>
<th>Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Provide a specific name such as medication error rate)</td>
<td>(Define the measure in very specific terms. Provide the numerator and the denominator if a percentage or rate. Indicate what is to be included and excluded. Be as clear and unambiguous as possible)</td>
<td>(Indicate the sources of the data. These could include medical records, logs, surveys, etc.)</td>
<td>• Schedule (daily, weekly, monthly or quarterly) • Method (automated systems, manual, telephone, etc.)</td>
<td>• Period • Value</td>
<td>• Short term • Long term</td>
</tr>
</tbody>
</table>

**NON-SPECIFIC CHEST PAIN PATHWAY MEASUREMENT PLAN**

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Operational Definition</th>
<th>Data Source(s)</th>
<th>Data Collection:</th>
<th>Baseline</th>
<th>Goals</th>
</tr>
</thead>
</table>
| Percent of patients who have MI or Unstable Angina as diagnosis | Numerator = Patients entered into the NSCP path who have Acute MI or Unstable Angina as the discharge diagnosis  
Denominator = All patients entered into the NSCP path | 1. Medical Records  
2. Midas  
3. Variance Tracking Form | 1. Discharge diagnosis will be identified for all patients entered into the NSCP pathway  
2. QA-UR will retrospectively review charts of all patients entered into the NSCP pathway. Data will be entered into MIDAS system | 1. Currently collecting baseline data.  
2. Baseline will be completed by end of 1st Q 2010 | Since this is essentially a descriptive indicator of process volume, goals are not appropriate. |
| Number of patients who are admitted to the hospital or seen in an ED due to chest pain within one week of when we discharged them | Operational Definition: A patient that we saw in our ED reports during the call-back interview that they have been admitted or seen in an ED (ours or some other ED) for chest pain during the past week | All patients who have been managed within the NSCP protocol throughout their hospital stay | 1. Patients will be contacted by phone one week after discharge  
2. Call-back interview will be the method | 1. Currently collecting baseline data.  
2. Baseline will be completed by end of 1st Q 2010 | Ultimately the goal is to have no patients admitted or seen in the ED within a week after discharge. The baseline will be used to help establish initial goals. |
| Total hospital costs per one cardiac diagnosis | Numerator = Total costs per quarter for hospital care of NSCP pathway patients  
Denominator = Number of patients per quarter entered into the NSCP pathway with a discharge diagnosis of MI or Unstable Angina | 1. Finance  
2. Chart Review | Can be calculated every three months from financial and clinical data already being collected | 1. Calendar year 2010  
2. Will be computed in June 2010 | The initial goal will be to reduce the baseline by 5% within the first six months of initiating the project. |

You have performance data. Now what do you do with it?
“If I had to reduce my message for management to just a few words, I’d say it all had to do with reducing variation.”

W. Edwards Deming
The Problem!

Aggregated data presented in tabular formats or with summary statistics, will not help you measure the impact of process improvement efforts.

Aggregated data can only lead to judgment, not to improvement.
The average of a set of numbers can be created by many different distributions.
If you don’t understand the variation that lives in your data, you will be tempted to ...

- Deny the data (It doesn’t fit my view of reality!)
- See trends where there are no trends
- Try to explain natural variation as special events
- Blame and give credit to people for things over which they have no control
- Distort the process that produced the data
- Kill the messenger!
"What is the variation in one system over time?" Walter A. Shewhart - early 1920’s, Bell Laboratories

Every process displays variation:

**Controlled variation**
stable, consistent pattern of variation
“chance”, constant causes

**Special cause variation**
“assignable”
pattern changes over time
## Types of Variation

### Common Cause Variation
- Is inherent in the design of the process
- Is due to regular, natural or ordinary causes
- Affects all the outcomes of a process
- Results in a “stable” process that is predictable
- Also known as random or unassignable variation

### Special Cause Variation
- Is due to irregular or unnatural causes that are not inherent in the design of the process
- Affect some, but not necessarily all aspects of the process
- Results in an “unstable” process that is not predictable
- Also known as non-random or assignable variation
How do we analyze variation for quality improvement?

A Control Chart:
- Is a time series plot of data
- The centerline is the Median
- Added features include Upper and lower control Limits (UCL & LCL)
- 5 Control Chart rules are used to determine if the data reflect common or special causes of variation

A Run Chart:
- Is a time series plot of data
- The centerline is the Median
- 4 Run Chart rules are used to determine if there are random or non-random patterns in the data
Question #3: What Changes Can We Make that will Result in Improvement?

“Nobody really looks forward to change, except a wet baby!”

OK, I’m ready for a change now...any time would be fine!
On the Nature of Change

“All improvement will require change, but not all change will result in improvement!”


The Model for Improvement (MFI) provides an approach to help increase the odds that the changes we make will result in lasting improvement.
So, how do you generate change concepts and come up with new ideas?
Creative Thinking

- Creativity implies having thoughts and ideas that are outside the normal pattern of thinking.
- **What can you do to have “new” thoughts?**
- **How do we “provoke” new thinking?**

*Is the healthcare industry a leader in creative thinking?*

*How creative do you think healthcare professionals are?*
Lateral Thinking of Edward de Bono

Provocation occurs

New thought

Logical in hindsight
(after that fact everyone is a genius)

Provocation occurs

Normal thought

“Provocation has everything to do with experiments in the mind.”
Edward de Bono
Using Change Concepts

**Change Concept:** a general notion or approach to change that has been found to be useful in developing specific ideas for changes that lead to improvement.

Critical and creative thinking can lead to change concepts.

**Concept:**
An opportunity to create a new connection

- Thought Process
- Concept
- Specific Idea A
- Specific Idea B
Eliminate Waste
1. Eliminate things that are not used
2. Eliminate multiple entry
3. Reduce or eliminate overkill
4. Reduce controls on the system
5. Recycle or reuse
6. Use substitution
7. Reduce classifications
8. Remove intermediaries
9. Match the amount to the need
10. Use Sampling
11. Change targets or set points

Improve Work Flow
12. Synchronize
13. Schedule into multiple processes
14. Minimize handoffs
15. Move steps in the process close together
16. Find and remove bottlenecks
17. Us automation
18. Smooth workflow
19. Do tasks in parallel
20. Consider people as in the same system
21. Use multiple processing units
22. Adjust to peak demand

Optimize Inventory
23. Match inventory to predicted demand
24. Use pull systems
25. Reduce choice of features
26. Reduce multiple brands of the same item

Change the Work Environment
27. Give people access to information
28. Use Proper Measurements
29. Take Care of basics
30. Reduce de-motivating aspects of pay system
31. Conduct training
32. Implement cross-training
33. Invest more resources in improvement
34. Focus on core process and purpose
35. Share risks
36. Emphasize natural and logical consequences
37. Develop alliances/cooperative relationships

Manage Variation
51. Standardization (Create a Formal Process)
52. Stop tampering
53. Develop operation definitions
54. Improve predictions
55. Develop contingency plans
56. Sort product into grades
57. Desensitize
58. Exploit variation

Design Systems to avoid mistakes
59. Use reminders
60. Use differentiation
61. Use constraints
62. Use affordances

Focus on the product or service
63. Mass customize
64. Offer product/service anytime
65. Offer product/service anyplace
66. Emphasize intangibles
67. Influence or take advantage of fashion trends
68. Reduce the number of components
69. Disguise defects or problems
70. Differentiate product using quality dimensions
71. Change the order of process steps
72. Manage uncertainty, not tasks

Enhance the Producer/customer relationship
38. Listen to customers
39. Coach customer to use product/service
40. Focus on the outcome to a customer
41. Use a coordinator
42. Reach agreement on expectations
43. Outsource for “Free”
44. Optimize level of inspection
45. Work with suppliers

Manage Time
46. Reduce setup or startup time
47. Set up timing to use discounts
48. Optimize maintenance
49. Extend specialist’s time
50. Reduce wait time

Change Concepts and Related Ideas
Change Concepts vs. Ideas

Conceptual, vague, strategic, Improve process to reduce anxiety

Specific ideas, actionable surgery

Give patients and families access to information

Use beepers for family and friends waiting

Make beepers available to families of all patients for one day next week as a first test of change

Taking a concept and getting specific. Getting to actionable ideas that can be put into a PDSA test.

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What ideas do I have for improvement?

The Driver Diagram provides a way to organize your ideas for change
Exercise
Developer Change Concepts

• Develop several *Change Concepts* and related *Ideas to test* for your project.

• Use the *Developing Ideas for Change Worksheet* to record your ideas.

• Be sure to explore your *theories and predictions* about each idea and why you think this idea will produce an improvement.
Worksheet for Developing Ideas for Change

Project:

<table>
<thead>
<tr>
<th>Change Concept</th>
<th>Specific Ideas to Test</th>
<th>Theories and Predictions as to how or why this idea will achieve the Aim</th>
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</tbody>
</table>

Discussion Questions:

• What specific change concepts and related ideas will achieve the Aim?

• What theories and predictions can you make about how these change concepts and ideas will cause improvement?

• Use Force Field Analysis to evaluate the ideas (see Appendix D for details)
A Model for Learning and Change

Let’s now focus on the PDSA part of the MFI and tests of change.
The Sequence of Improvement

- Developing a change
- Testing a change
- Implementing a change
- Make part of routine operations
- Sustaining improvements and spreading changes to other locations

Theory and Prediction

- Test under a variety of conditions

Data are used throughout the sequence

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The Sequence of Improvement

- Sustaining improvements and spreading changes to other locations
- Developing a change
- Implementing a change
- Testing a change
- Make part of routine operations

Theory and Prediction

Developing a change

Test under a variety of conditions

Testing a change

Data are used throughout the sequence

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The PDSA Cycle for Learning and Improvement

- **Act**
  - What’s next?
  - Ready to implement?
  - Try something else?
  - Next cycle

- **Plan**
  - What will happen if we try something different?
  - Objective
  - Questions & predictions
  - Plan to carry out: Who? When? How? Where?

- **Study**
  - Did it work?
  - Complete data analysis
  - Compare to predictions
  - Summarize

- **Do**
  - Let’s try it!
  - Carry out plan
  - Document problems
  - Begin data analysis

The PDSA Cycle steps are: Plan, Do, Study, Act, then back to Plan, repeating the cycle.

- **Objective**
- **Questions & Predictions**
- **Plan to carry out**
- **Who? When? How? Where?**
Guidance for Testing a Change Concept

- A test of change should answer a specific question!
- A test of change requires a **theory** and a **prediction**!
- Test on a small scale and collect **data over time**.
- Build knowledge **sequentially** with multiple PDSA cycles for each change idea.
- Include a **wide range of conditions** in the sequence of tests.
- Don’t confuse a **task** with a **test**!
To Be Considered a Real Test…

- The test was planned, including a plan for collecting qualitative or quantitative data.
- The plan was carried out and the data were collected.
- Time was set aside to analyze the data and study the results.
- Action was based on what was learned.
Tips for Testing

- Use a form to document your test
- Scale down – think “Drop Two” levels
- Start with “Oneness”
  - 1 patient
  - 1 day
  - 1 admit
  - 1 physician
- Make changes in parallel rather than serial
- Know the conditions in your organization

“What tests can we complete by next Tuesday?”
Objective for this PDSA Cycle

PLAN:
QUESTIONS:

PREDICTIONS:

PLAN FOR CHANGE OR TEST: WHO, WHAT, WHEN, WHERE

PLAN FOR COLLECTION OF DATA: WHO, WHAT, WHEN, WHERE

DO: CARRY OUT THE CHANGE OR TEST; COLLECT DATA AND BEGIN ANALYSIS.

STUDY: COMPLETE ANALYSIS OF DATA; SUMMARIZE WHAT WAS LEARNED.

ACT: ARE WE READY TO MAKE A CHANGE? PLAN FOR THE NEXT CYCLE.

Notes

See Worksheet Packet
Repeated Use of the PDSA Cycle

Model for Improvement
- What are we trying to accomplish?
- How will we know that a change is an improvement?
- What change can we make that will result in improvement?

Hunches Theories Ideas
- Very Small Scale Test
- Follow-up Tests

Changes That Result in Improvement
- Sustain & Spread
- Implementation of Change
- Wide-Scale Tests of Change

Sequential building of knowledge under a wide range of conditions
Failed Test…Now What?

Be sure to distinguish the reason:

• Change was not executed
• Change was executed, but not effective

If the prediction was wrong – not a failure!

• Change was executed but did not result in improvement
• Local improvement did not impact the secondary driver or outcome
• In either case, we’ve improved our understanding of the system!
The Value of “Failed” Tests

“I did not fail one thousand times; I found one thousand ways how not to make a light bulb.”

Thomas Edison
It took 40 attempts to create WD-40

The 40th time was the charm for the blue canister that boasts more than 2,000 uses. In 1953, chemist Norm Larsen finally created on his 40th try, a formula to stop corrosion by displacing moisture (hence the name “Water Displacement, 40th attempt”).
Testing v. Implementation

**Testing**
Trying and adapting existing knowledge on small scale. Learning what works in your system.

**Implementation**

- Making this change a part of the day-to-day operation of the system
- Would the change persist even if its champion were to leave the organization?
Implementation

• The change is **permanent** - need to develop all support infrastructures to maintain the change
• High **expectation** to see improvement (no failures)
• Increased scope will lead to increased **resistance** (value of evidence from successful tests)
Are you ready to Implement a new idea?

<table>
<thead>
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<th>Current Situation</th>
<th>Resistant</th>
<th>Indifferent</th>
<th>Ready</th>
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<tr>
<td>Low Confidence</td>
<td>Cost of failure</td>
<td>Very Small</td>
<td>Very Small</td>
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<td>will lead to</td>
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<td>Improvement</td>
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<td>Cost of failure</td>
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IG-p. 146
The Sequence of Improvement

1. **Developing a change**
2. **Testing a change**
3. **Making part of routine operations**
4. **Sustaining improvements and spreading changes to other locations**

*Theory and Prediction*
*Data are used throughout the sequence*
The IHI Spread Model

LEADERSHIP
- Topic is a key strategic initiative
- Goals and incentives aligned
- Executive sponsor assigned
- Day-to-day managers identified
- Resources allocated

MEASUREMENT AND FEEDBACK

SUCCESSFUL SITES

SOCIAL SYSTEM
- Key messengers
- Communities
- Networks
- Adoption decision making
- Implementation work

COMMUNICATION STRATEGIES

KNOLEDGE MANAGEMENT

SETUP
- Target population
- Successful sites
- Identify key adopters
- Initial strategy to reach all sites

SUUSTER
- Implementation guides
- Transition support: coaching and mentoring
- IT functions: listserv, social networking, web
“Quality begins with intent, which is fixed by management.”

W. E. Deming, *Out of the Crisis*, p.5
Appendices

• Appendix A: The Quality Improvement Tool Box
• Appendix B: Force Field Analysis
• Appendix C: Driver Diagrams
• Appendix D: Control Chart Decision Tree
• Appendix E: References on Quality
• Appendix F: References on Measurement
• Appendix G: References on Spread
Thank you for joining us today! Good luck with your Quality Journey!

Contact Information:
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Jane Taylor: jane1taylor@mac.com
Appendix A:
The Quality Improvement Tool Box

Seven Basic Tools

Creativity Tools

Design Tools

Statistical Tools

Measurement Tools

Seven Management Tools

The Primary QI Tools...

- **The Seven Basic Tools**
  - Flowchart
  - Cause & effect diagram
  - Pareto chart
  - Check sheet
  - Run & control charts
  - Histograms
  - Scatter diagrams

- **The Seven Management Tools**
  - Affinity diagrams
  - Interrelationship digraphs
  - Matrix diagram
  - Priorities matrix
  - Activity network diagrams
  - Tree diagrams
  - Process decision program charts

What’s in your tool box?
## CQI Tools by Function

<table>
<thead>
<tr>
<th>Creativity Tools</th>
<th>Measurement Tools</th>
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<tr>
<td>• Brainstorming</td>
<td>• Cost of quality analysis</td>
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<tr>
<td>• Mind mapping</td>
<td>• Benchmarking</td>
</tr>
<tr>
<td>• Six thinking hats</td>
<td>• Dashboards/indicators</td>
</tr>
<tr>
<td>• Innovation/IDEO</td>
<td>• Survey analysis</td>
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</table>

<table>
<thead>
<tr>
<th>Design Tools</th>
<th>Statistical Tools</th>
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<tr>
<td>• QFD</td>
<td>• SPC</td>
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<tr>
<td>• House of quality</td>
<td>• DOE</td>
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<tr>
<td>• FMEA</td>
<td>• Descriptive statistics</td>
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<tr>
<td>• Hoshin planning</td>
<td>• Multivariate statistics</td>
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<tr>
<td>Category</td>
<td>Method or Tool</td>
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<td>--------------------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td></td>
<td>2. Linkage of Processes</td>
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<tr>
<td>Gathering Information</td>
<td>3. Form for Collecting Data</td>
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<td>4. Surveys</td>
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<td>5. Benchmarking</td>
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<td>6. Creativity Methods</td>
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<td>Organizing Information</td>
<td>7. Affinity Diagram</td>
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<td></td>
<td>8. Force Field Analysis</td>
</tr>
<tr>
<td></td>
<td>9. Cause and Effect Diagram</td>
</tr>
<tr>
<td></td>
<td>10. Matrix Diagram</td>
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<td>11. Tree Diagram</td>
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<td>12. Quality Function Deployment (QFD)</td>
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<td>Understanding Variation</td>
<td>13. Run Chart</td>
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<td>14. Control Chart</td>
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<td>15. Pareto Chart</td>
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<td>16. Frequency Plot</td>
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<td>Understanding Relationships</td>
<td>17. Scatterplot</td>
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<td>18. Two-Way Table</td>
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<td>19. Planned Experimentation</td>
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Two Essential Tools

Flowcharting

Cause & Effect Diagrams

- People
- Equipment
- Material
- Environment
- KQC
Tools to Understand Variation in Data

Run Chart

Shewhart Chart

Frequency Plot

Pareto Chart

Scatterplot

IH p. 8-34
Appendix B: Force Field Analysis

**What is it?**

Force Field Analysis is a QI tool designed to identify driving (positive) and restraining (negative) forces that support or work against the solution of an issue or problem.

When the driving and restraining forces are identified, steps can be taken to reinforce the driving forces and reduce the restraining forces.

**What does the Force Field do?**

- Allows comparisons of the “positives” and “negatives” of a situation
- Enables easy comparisons
- Forces people to think together about all the aspects of making the desired change a permanent one
- Encourages people to agree about the relative priority of factors on each side of an issue
- Supports the honest and open reflection on the underlying root causes of a problem and ways to break down barriers
How do I set up a Force Field Analysis?

1. Draw a letter “T” on a flipchart page
2. Write the name of the issue or project across the top of the page
3. Label the left column “Driving Forces” and the right column the “Restraining Forces”
4. Use brainstorming or nominal group technique (NGT) to generate the list of forces or factors that are driving the issue or project and those that are restraining or the holding things back
5. Eliminate duplicate ideas and clarify any ideas that are vague or not specific
6. If the team feels the need, they can use rank ordering to set priorities for the driving and restraining forces
7. Generate a list of ideas about actions that can be taken to reduce the restraining forces
# Force Field Analysis Worksheet

**Issue or Project:**

<table>
<thead>
<tr>
<th>Driving Forces (+)</th>
<th>Restraining Forces (-)</th>
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<tbody>
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**Actions to reduce the Restraining Forces:**

- 
- 
- 
-
Appendix C: Driver Diagrams

Driver Diagrams, a tool to help us understand the system and the messiness of life.
A Driver Diagram is a good way to show your aim and the system you want to improve.
What Changes Can We Make?

**Primary Drivers**
System components which will contribute to moving the primary outcome

**Secondary Drivers**
Elements of the associated Primary Driver. They can be used to create projects or a change package that will affect the Primary Driver.
To improve the inpatient experience for adult female inpatients on a mental health unit in order to increase satisfaction by 25% in 10 months

AIM

PRIMARY DRIVERS

- Ward Environment
  - Bed occupancy
  - Stop sleep outs
- Multidisciplinary Ward Team Process
  - Nursing input
  - Pharmacy input
- Patient Choice
  - Family support
- Ward Activities
  - Ward round
  - Complaints
  - OT programme
    - Add senior OT to project team

SECONDARY DRIVERS

- Review of delays at weekly bed meetings
- Rewrite protocol
- Ensure daily 1:1 time with named nurse
- Offer pharmacy advice to every patient during stay
- Train one staff member on each ward to use support skills
- Change concept of large MDT ward round meetings
- To change OT programme content

CHANGE IDEAS

What Changes Can We Make?
Understanding the System for Improving Dental Health

Reduce burden of dental disease
- % pts with new cavitation
- % pts complaining of pain
- % of pts with OR Tx

Reliable delivery of evidence based preventive & restorative care

Active, informed families

Improved patient access: ‘Dental Home’

Patient oral health literacy

Patient self management
- Improved diet
- Improved hygiene

Community support
- CHCs, private dentists, pediatricians, PCPs
- Payers

Early, regular risk-based evaluation & guidance

Use of conservative procedures
- Fluoride exposure
- ART

Qualified OR Tx

Coordination with PCPs: referrals

Team-based care

Balancing demand and capacity

Source: Richard Scoville, Ph.D.
Appendix D
The Shewhart Chart Decision Tree

Variables Data

More than one observation per subgroup?

Yes

X bar & R

No

X bar & S

< than 10 observations per subgroup?

Yes

XmR

No

Attributes Data

Occurrences & Non-occurrences?

No

Is there an equal area of opportunity?

Yes

c-chart

No

No

u-chart

Are the subgroups of equal size?

Yes

p-chart

No

np-chart

Appendix E
General References on Quality


Appendix F
References on Measurement

Appendix G
References on Spread


