Session Objectives

- Describe the three questions of the Model for Improvement
- Develop effective aim statements and measures
- Generate PDSA cycles to test high-leverage change ideas
Agenda

- Introductions
- History of Quality Improvement
- The Model for Improvement
  - Aims
  - Measures
  - Changes
- PDSA Cycles- Exercise!
- Closing
Lauren H. Macy, an Improvement Advisor at the Institute for Healthcare Improvement (IHI), serves on IHI’s Improvement Science and Methods Portfolio and teaches in IHI programs across a variety of settings and topic areas. Ms. Macy first started practicing improvement science with IHI in Ghana as a part of the Project Fives Alive! initiative, a seven-year project funded by the Bill & Melinda Gates Foundation striving to accelerate the reduction of mortality in children under five years old in Ghana using QI methods. After seeing the impact of improvement science on strengthening a health system at a high level and all the way down to the daily lives of mothers and children, she grew inspired to teach and coach others to improve.

Ms. Macy currently serves as faculty for IHI’s Improvement Coach Professional Development Program, leads the curriculum development and teaching of the Health Research & Educational Trust (HRET) Hospital Improvement Innovation Network’s (HIIN) nine-month Accelerating Improvement QI Fellowship, serves as Improvement Advisor for The Conversation Ready Massachusetts Collaborative and the NYC Early Years Collaborative, and supports IHI’s internal improvement efforts on Joy in Work and Equity.
Jesse McCall, MBA, Director and Improvement Advisor at the Institute for Healthcare Improvement (IHI), manages programs and projects throughout the world, including IHI's Strategic Partnership with the Hamad Medical Corporation in Qatar. Mr. McCall has expertise in program and product development, practical application of the science of improvement, human capital management, marketing and communications, customer relationship management, and large-scale initiative operations. He received his undergraduate degree in Business Administration from Northeastern University in Boston and his MBA at the UMASS Amherst Isenberg School of Management.
Introductions

Turn to your neighbor, introduce yourself:

1) Your name, role and where you work
2) Complete this statement:
   Quality is ________________.
What is Quality?

“Quality is meeting and exceeding the customer’s needs and expectations and then continuing to improve.”

W. Edwards Deming
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.

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Knowledge for Improvement

**Improvement**: Learn to combine subject matter knowledge and SOI knowledge in creative ways to develop effective changes for improvement.
Three Quality Pioneers

W. Edwards Deming
(1900 - 1993)

Walter Shewhart
(1891 – 1967)

Joseph Juran
(1904 - 2008)
The Foundation for Quality Models

Deming’s Profound Knowledge
- Systems Thinking
- Variation
- Theory of Knowledge
- Human Behavior (Psychology)

Juran’s Quality Trilogy
- Quality Planning
- Quality Control
- Quality Improvement
The Deming Wheel
1. Design the product (with appropriate tests).
2. Make it; test it in the production line and in the laboratory.
3. Sell the product.
4. Test the product in service, through market research. Find out what users think about it and why the nonusers have not bought it.

Development of the Shewhart Cycle

Old Shewhart Cycle
1. Specification
2. Production
3. Inspection

New Shewhart Cycle
1. Specification
2. Production
3. Inspection
4. Study the results. What did we learn? What can we predict?
5. What could be the most important accomplishments of the team? What changes might be desirable? What data are available? Are new observations needed? If yes, plan a change or test.
6. Decide how to use the observations. Carry out the change or test decided upon, preferably on a small scale.

Step 5. Repeat Step 1, with knowledge accumulated.
Step 6. Repeat Step 2, and onward.

Walter A. Shewhart

The PDSA Cycle for Learning and Improvement

Plan
- Objective
- Questions & predictions
- Plan to carry out: Who? When? How? Where?

Do
- Carry out plan
- Document problems
- Begin data analysis

Act
- Ready to implement?
- Try something else?
- Next cycle

Study
- Complete data analysis
- Compare to predictions
- Summarize

What will happen if we try something different?

Let’s try it!

What’s next?

Did it work?
The Model for Improvement

- API added three basic questions to supplement the PDSA Cycle.
- Used to develop, test and implement changes in all types of organizations.
- Provides a framework for the application of improvement methods guided by theory.
- Allows project plans to adapt as learning occurs.

The IHI Approach

When you combine the 3 questions with the... PDSA cycle, you get...

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?

...the Model for Improvement.
Question #1: What are we trying to accomplish?

Model for Improvement

Aim Statement

Essential Components of an Aim Statement

**What?** State the focus of your improvement effort (make sure it relates to the fundamental customer need)

**How good?** Declare a Numerical Goal for outcomes Ambitious but achievable.

**By when?** Specify the timeframe.

**For whom?** Name the customers or population of focus. Primary persons to receive benefit?

**Where?** Define the process or system you want to improve What is the scope? Boundaries? Starts/Stops?

How Good? By When?
Example #1: Aim Statement

Reduce the number of families with children who are facing eviction from 15% to 5% in the Springfield community by June 2019


Example #2: Aim Statement

- At your tables, discuss if this aim statement has the necessary components (30 seconds):

  Increase the use of the Sepsis Bundle components, on patients who have sepsis or septic shock, from 60% to 90% by December 31, 2017 at Phelps County Regional Medical Center, Rolla, MO.

- Volunteer to report out? (30 seconds)
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
- “If you can’t measure it, you can’t improve it”
  - Have we made a difference?
  - Is this change making a positive impact?
  - Have we met the aim of our project?

Source: Dr. Robert Lloyd, IHI
# The Three Faces of Measurement

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Improvement</th>
<th>Accountability</th>
<th>Research</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The aim of …</strong></td>
<td>Improvement of care</td>
<td>Comparison, choice, reassurance, spur for change</td>
<td>New knowledge</td>
</tr>
<tr>
<td><strong>Bias</strong></td>
<td>Accept consistent bias</td>
<td>Measure and adjust to reduce bias</td>
<td>Design to eliminate bias</td>
</tr>
<tr>
<td><strong>Sample Size</strong></td>
<td>“Just enough” data, small sequential samples</td>
<td>Obtain 100% of available, relevant data</td>
<td>“Just in case” data</td>
</tr>
<tr>
<td><strong>Flexibility of Hypothesis</strong></td>
<td>Hypothesis flexible, changes as learning takes place</td>
<td>No hypothesis</td>
<td>Fixed hypothesis</td>
</tr>
<tr>
<td><strong>Testing Strategy</strong></td>
<td>Sequential tests</td>
<td>No tests</td>
<td>One large test</td>
</tr>
<tr>
<td><strong>Determining if a Change is an Improvement</strong></td>
<td>Run charts or Shewhart control charts</td>
<td>No change focus</td>
<td>Hypothesis, statistical tests (t-test, F-test, chi square), p-values</td>
</tr>
<tr>
<td><strong>Confidentiality of the Data</strong></td>
<td>Data used only by those involved with improvement</td>
<td>Data available for public consumption and review</td>
<td>Research subjects’ identities protected</td>
</tr>
</tbody>
</table>

Source: Dr. Robert Lloyd, IHI
The Quality Measurement Journey

AIM (How good? By when?)
- Concept
- Measure
- Operational Definitions
- Data Collection Plan
- Data Collection
- Analysis

ACTION
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 processes in 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)?
Improve Waiting Time in the Family Practice Clinic

**Outcome Measures:**
- Total Length of Stay (in minutes) for a scheduled appointment at the clinic

**Process Measures:**
- Time from check-in till seeing the doctor
- Wait time for ancillary services (lab, x-ray, ultra-sound) during a visit

**Balancing Measures:**
- Volume of patients
- % of patients leaving without being seen by the doctor
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

Variation Exists, So We Need Operational Definitions
“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
Understanding Variation in Data

There are several tools we use in improvement to make sense of the variation that is inherent in EVERY measure.

How else would we do it? Make it up?!

“Think of the run chart as a carpenter would a hammer.”
Run Chart: The Tool We Use to Make Sense of Variation

**Benefits**
- Get those closest to the process to measure it in real time, to take ownership of the data
- Can use to test changes against
- Used to prove improvement, to prove success, to strengthen theory
- We provide you with a template to use, to save time
- They can also be a quick low tech solution, paper + ruler + pencil

**Steps (for a paper run chart)**
1. Pick measure, grab graph paper, ruler and pencil (and SME!)
2. Draw X axis
3. Draw Y axis
4. Plot data
5. Find median
6. Apply the four run chart rules to test for non-random patterns
A Run Chart!

The centerline (CL) on a Run Chart is the Median

One measure at a time, could be a percent, count, time, length, weight, etc.

so ... half of the data points are above/below the median

The Y Axis is the unit of measure

The measure is plotted over time displayed on the X Axis

Pounds Red Bag Waste

William Peters

median: 4.47

goal: 2

day

count
Question #3: What Changes Can We Make that Will Result in Improvement?

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?

Aim Statement
Family of Measures
Change Ideas

No more perfect example…

• The following series of pictures perfectly demonstrate the inherent human tendency to solve a problem with MORE

• Ask yourselves, “what would I have done?”
First Order Change

MORE:

- Of the same ideas/changes already tried/implemented

OR

- More resources:
  - Time, money, staff, effort, inspections, alerts, screens, posters, warnings, stickers, education, in-services, “talking tos,” data reviews, meetings, advice, mailings, reminders, beds, paperwork, policy and procedures, blips and bleeps, lights, signage, rooms…

All improvement requires change, yet not all change leads to improvement

Source: Bill Peters
The definition of insanity is doing the same thing over and over and expecting a different result

~Albert Einstein
Second order change

MORE: NOT MORE!

- Change that is fundamentally different
- Think of a flow chart
- Human behavior/movement is changed
- Hard to come up with because of the power of the human mind, “perceptual ruts”
- Is responsible for 90-95% of improvement
- (but sometimes MORE is needed!)

And is a great thing to tease each other about!

(“I don’t know, sounds like more to me?!”)
So, how do you generate second order change and come up with new ideas?

Five methods to develop change ideas:
1. Logical thinking about the current system
2. Benchmarking or learning from others
3. Using technology
4. Creative thinking
5. Using change concepts
Change idea

Something specific enough to test and implement in a particular situation – an actual change to the current process

Properties of a useful change idea:

- **Specific**: Can you describe what will happen when the idea is used? Can you describe who, what, when, where, why, and how the idea will be put into practice?
- **Actionable/Feasible**: Can you envision using the idea with current technology, resources, and authority?

You learn about specifics and feasibility of change ideas through Plan-Do-Study-Act (PDSA) test cycles
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?
Lateral Thinking of Edward de Bono

"Provocation has everything to do with experiments in the mind."

Edward de Bono

Normal thought

Provocation occurs

New thought

Logical in hindsight

(after that fact everyone is a genius)
de Bono’s Lateral Thinking methods

- Provocation
  - Escape
  - Reversal
  - Exaggeration
  - Distortion
  - Wishful thinking

- Random entry (e.g., random word)

- Six Thinking Hats

Source: The Improvement handbook, API, 2007, Chapter 16, Creativity Methods.
Lateral thinking (literally, sideways thinking) uses various acts of “provocation” to escape perceptual ruts and free us from previously locked assumptions and come up with fresh new ideas.
Using Change Concepts

Change concept = A general notion or approach found to be helpful in developing specific change ideas that result in improvement

See:
- *The Improvement Guide*, page 132, for a list of 72 change concepts; Appendix A provides detail on each
- IHI Improvement App
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. Use 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

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

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

Change Concepts and Related Ideas

IHI Improvement App

The Improvement App
Institute for Healthcare Improvement  Education
Everyone

This app is compatible with all of your devices.
Improvement App
– Home Screen
Question #3: What changes can we make that will result in improvement?

Aim Statement
Family of Measures
Change Ideas

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?

PDSA

Once we have a NEW idea that we think is fundamentally different, we test it using the PDSA Cycle

The PDSA Cycle for Learning and Improvement

Plan
- Objective
- Questions & predictions
- Plan to carry out: Who? When? How? Where?

Do
- Carry out plan
- Document problems
- Begin data analysis

Act
- Ready to implement?
- Try something else?
- Next cycle

Study
- Complete data analysis
- Compare to predictions
- Summarize

What will happen if we try something different?

Let’s try it!

What’s next?

Did it work?
Build Evidence and Commitment by Testing

Changes That Result in Improvement:
After cycles have demonstrated that the change CAN work, use more cycles to help you figure out how the change WILL work, every day.

Investigation → Demonstration → Implementation
Working in parallel on multiple change ideas

Aim: To increase the number of patients that report sleeping 6+ hours from 30% to 60%.
Another view: Multiple change concepts for a single aim

Aim: To increase the number of patients that report sleeping 6+ hours from 30% to 60%.

Change Concepts, Theories, Ideas
Game Time!
Coin Spinning Game Learning Objectives

- Understand rapid-cycle PDSA testing
- Understand how theory and prediction help you learn
- Collect real-time data for measurement
- Practice learning as a team
Materials

- Four different coins
- A timepiece (smartphone)
- A time keeper on your team
- PDSA tracker worksheet
Objective of the game

- **Spin** your coin as long as possible, you may use any
  - Coin
  - Technique
  - Surface
- **Run** as many tests as you can, but also be intentional
- **Document** along the way:
  - *Before your test* (the “Plan”): the question you are trying to answer and prediction you have
  - *During* (the “Do”): Observations and the actual time it took
  - *After* (the “Study” and “Act”): what did you learn? What will you do next?
- **Plot** your data on the tracker worksheet provided
# Predictions and Data Collection

<table>
<thead>
<tr>
<th>#</th>
<th>Plan</th>
<th>Do</th>
<th>Study</th>
<th>Act</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Large coins last longer</td>
<td>Nickel = 10 seconds</td>
<td>Started to wobble. Time = 7</td>
<td>No, Three seconds short. Large Size/weight</td>
</tr>
<tr>
<td>2</td>
<td>Bigger quarter will spin longer</td>
<td>Quarter = 10 seconds</td>
<td>Started to lose spin fast. Time = 8</td>
<td>Two seconds short. Size may be more important</td>
</tr>
</tbody>
</table>

**Data Collection on a Run Chart**

```
<table>
<thead>
<tr>
<th>PDSA Test Cycle</th>
<th>Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
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<td>5</td>
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<td>7</td>
<td></td>
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<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>
```

- **What questions? Theories?**
- **Prediction**
- **Do**
- **Study**
- **Act**

1. What do you see? How Long?
2. How did what you see match prediction?
3. What now? Adopt, adapt, abandon?
IHI’s Model for Improvement

**What are we trying to accomplish?**

**How will we know that the change is an improvement?**

**What changes can we make that will result in improvement?**

**To spin a coin as long as possible during this game**

**The number of seconds the coin spins**

**That’s up to you!**

This Exercise
Let’s go!

- Work in teams of 3-5 (2 teams per table roughly)
- Gather materials and assign time keeper
- Remember: our operational definition of the start and end time for a spin is as follows:
  - Start time: when the coin starts spinning
  - Stop time: when the coin comes to a natural stopping point on your surface
- 15 minutes to spin; 10 min to debrief
Who Had the Longest Spin?
Lessons

- Be creative in generating improvement ideas—think outside the box!
- Make a prediction and generate a theory for each test
- Remember to document your tests and collect data
- Collect just enough data to build a degree of belief in your change
- Use testing to explore questions without judgment (you don’t need consensus for a test!)
- More tests can lead to more learning
- Use simple data collection to make measurement easy

[please leave the coins back in the center of your tables!]
Discussion Questions for Your Table- 2 min

- What did you learn by collecting data on the length of time your coin was spinning? Do you think you would have arrived at the same result without data collection and/or without documenting your PDSA?

- What is the value of each step of the Plan-Do-Study-Act cycle? Use examples from the game, if possible.
We hope you leave today with…

- A deeper appreciation for the Model for Improvement
- The ability to develop:
  - effective aim statements
  - sensitive measures
  - new methods for developing change ideas
- An understanding for the need for multiple tests of change mostly on a small scale in order to build your degree of belief
- Curiosity around when to implement and spread/scale up ideas
- A new game to bring home to your teams and colleagues to teach the power of the PDSA!
Resources for you

- Run Chart Template: http://www.ihi.org/resources/Pages/Tools/RunChart.aspx