Understanding Rapid Cycle PDSA Testing

Prepared for the South of England Improving Safety in Mental Health Collaborative

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Now, let’s focus on the PDSA part of the MFI and tests of change

Model for Improvement

Source: The Improvement Guide, API
The Sequence for Improvement

Make part of routine operations
Sustaining improvements and spreading changes to other locations

Test under a variety of conditions
Implementing a change

Theory and Prediction
Developing a change
Testing a change

Act Plan
Study Do

The PDSA Cycle for Learning and Improvement

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

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

Study
- Complete data analysis
- Compare to predictions
- Summarize

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

What will happen if we try something different?

What’s next?

Did it work?

Let’s try it!
PDSA Cycles: Why Test?

- Increasing degree of belief that the change will result in an improvement.
- Deciding which of several proposed specific changes will lead to the desired improvement.
- Evaluating how much improvement we can expect if we make the change.
- Deciding how to adapt the proposed change to the actual environment of interest.
- Evaluating cost implications and possible side effects of the change.
- Giving individuals a chance to experience the change prior to implementation.

*Improvement Guide, 2009, Chapter 7, p. 142*

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**Why Test?**

*“What we gain from academic studies is knowledge. What we gain from experience is wisdom.”*  
Mohandas Gandhi
To Be Considered a PDSA Cycle

- The test or observation was **planned** (including a plan for collecting data).
- **The plan was attempted (do the plan).**
- Time was set aside to analyze the data and **study** the results.
- **Action** was rationally based on what was learned.

*Source: Improvement Guide pp.60-61*

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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!**
Activity ≠ Change

Is NOT a change:
(but may be a necessary preliminary task)
• Planning
• Having a meeting
• Educating staff
• Creating a protocol
• Assigning responsibility

Is a change:
• Include ASC culture in admission pack
• Create a standing order
• Provide staff with protocol compliance feedback
• Test placement of alcohol rub dispensers

For each change idea, you should have an explicit prediction of how it will impact the outcome.

Tips for Testing

“How tests can we complete by next Tuesday?”

• Use a form to document your test.
• Scale down – think “Drop Two”
• Oneness
  • 1 patient
  • 1 day
  • 1 admit
  • 1 physician
• Make changes in parallel
• Know the situation in your organization

• Year
• Quarter
• Month
• Week
• Day
• Hour
More Tips for Testing

- Test with volunteers
- Use simulation
- Do not try to get buy-in, consensus, etc.
- Be innovative to make test feasible
- Collect useful data during each test
- As cycles proceed, test over a wider range of conditions
- Conduct rapid tests in short periods of time

Repeated Use of the PDSA Cycle for Testing

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?

Changes That Result in Improvement
- Spreading
- Sustaining the gains
- Implementation of Change
- Wide-Scale Tests of Change
- Sequential building of knowledge under a wide range of conditions
Change Idea: Standardize Intra-operative Temperature Control

Organizing the OR team & equipment will achieve reliable temp control

Mini-measure tracks improvement cycles

Cycle 1, Day 1: With 1 OR team, assign responsibility for temp monitoring

Cycle 2, Day 2: Checklist and stocking process for warming devices in OR

Cycle 3, Day 3: 1st OR is reliable; test with 3 ORs and surgery types

Cycle 4: Analyze failures, test variation for selected surgical type

Cycle 5: Standardize and document devices and protocol

Cycle 6: Educate staff on new standards

Percent of Surgeries with Intraoperative Temp Control

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Daily % cases in control

Working in Parallel on Multiple Change Ideas or Drivers

Monitor Temp Stock supplies Control Ambient Temp Recovery Transfer
Multiple Change Concepts for a Single Aim

Change Concepts, Theories, Ideas

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”).
### October Sky PDSAs

![October Sky Image]

**Critical Care Driver Diagram**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Primary Drivers</th>
<th>Secondary Drivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve Critical Care Outcomes (Reduce mortality, infections and other adverse events)</td>
<td>Provide appropriate, reliable and timely care to critically ill patients using evidence-based therapies</td>
<td>Reduce complications from ventilators, Reduce complications from central venous catheters, Optimal glucose control, Prevent healthcare-associated infections and cross contamination, Proper sepsis recognition and treatment</td>
</tr>
<tr>
<td></td>
<td>Integrate patient and family into care so they receive the care they want</td>
<td>Involve patient/family in daily goal setting process, Promote open communication among team and family, Ensure clarification of care wishes and end of life care planning</td>
</tr>
<tr>
<td></td>
<td>Develop an infrastructure that promotes quality care</td>
<td>Ensure appropriate infrastructure and leadership to provide consistent, reliable, evidence-based care, Improve ICU throughput, Ensure competent staff with knowledge in improvement work</td>
</tr>
<tr>
<td></td>
<td>Create a highly effective and collaborative multidisciplinary team and safety culture</td>
<td>Reliable care planning, communication and collaboration of a multi-disciplinary team</td>
</tr>
</tbody>
</table>
**Aim:** Provide appropriate, reliable and timely care to critically ill patients using evidence-based therapies in Hospital X, Pilot Site Y, by December 2010

### Secondary Drivers

<table>
<thead>
<tr>
<th></th>
<th>Change Concept 1</th>
<th>Change Concept 2</th>
<th>Change Concept 3</th>
<th>Change Concept 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complications from Ventilators</td>
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<td></td>
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<tr>
<td>Complications from CVCs</td>
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<tr>
<td>Optimal Glucose Control</td>
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<tr>
<td>Hospital Acquired Infections</td>
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<tr>
<td>Sepsis Recognition and Treatment</td>
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</tbody>
</table>

**Change Concept 1**

**Change Concept 2**

**Change Concept 3**

**Change Concept 4**

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**Aim:** Reduce Complications from CVCs in Hospital X, Pilot Site by October 2010

- **Central Line Insertion Bundle (Lead 1)**
- **Standardise Process: Line Carts and Dressing Kits (Lead 1)**
- **CVC Maintenance Bundle (Lead 2)**
- **Partner with Accident and Emergency and Operating Theatres for Standardisation (Lead 3)**
**Aim:** Design a Reliable Process for CVC Maintenance Bundle by September 2010

The Marshmallow Challenge

**Objectives**
- Generate and test fresh ideas
- Incorporate prototyping
- Build teamwork and consensus
- Run multiple PDSA tests
The Challenge in 18 Minutes

Teams must build the tallest free-standing structure out of:
- 20 sticks of spaghetti
- one yard of tape
- one yard of string
- one marshmallow

The marshmallow needs to be on top and remain intact.

Directions

- Build the Tallest Freestanding Structure
- Use as Much or as Little of the Kit as you like (but you can’t use the paper bag!)
- Break up the Spaghetti, String or Tape
- The Challenge Lasts 18 minutes

QUESTIONS?
What did we learn?

- When did you start learning here?
- What did you learn about collecting data, testing, implementing?
- Would we have been as successful with one large test?
- Any value in failed tests?
- Did we take time for teambuilding?

How does this exercise relate to your improvement project?

Conclusions

Kids do better than Business Students!

On virtually every measure of innovation, kindergarteners create taller and more interesting structures.
Proto-Typing Matters

- The reason kids do better than business school students is that kids spend more time playing and prototyping.

- They naturally start with the marshmallow and stick in the sticks.

- The Business School students spend a vast amount of time planning, then executing on the plan, with almost no time to fix the design once they put the marshmallow on top.

Test Early and Often!

- The lesson in the marshmallow challenge is that we need to identify the assumptions in our project and test them early and often.

- That’s the mechanism that leads to effective innovation and better results.
Links for further information

http://www.marshmallowchallenge.com/Instructions.html

http://marshmallowchallenge.com/TED_Talk.html