Plan Do Study Act  @Wessexpsc14/6/17

Learning to change and improve complex systems
Learning is doing and changing repeatedly till you get better.

Kolb theory of adult learning:

- Concrete Experience (doing / having an experience)
- Active Experimentation (planning / trying out what you have learned)
- Reflective Observation (reviewing / reflecting on the experience)
- Abstract Conceptualisation (concluding / learning from the experience)

Your story:
- Why
- How
- How long
- Success?
The Sequence of Improvement

- Developing a change
- Testing a change
- Test under a variety of conditions
- Theory and Prediction
- Implementing a change
- Make part of routine operations
- Sustaining improvements and spreading changes to other locations

Data are used throughout the sequence

R Lloyd  IHI
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

**Study**
- Complete data analysis
- Compare to predictions
- Summarize

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

What’s next?

Did it work?

Let’s try it!

What will happen if we try something different?
Repeated Use of the PDSA Cycle for Testing

**Model for Improvement**

<table>
<thead>
<tr>
<th>What are we trying to accomplish?</th>
</tr>
</thead>
<tbody>
<tr>
<td>How will we know that a change is an improvement?</td>
</tr>
<tr>
<td>What change can we make that will result in improvement?</td>
</tr>
</tbody>
</table>

**Changes That Result in Improvement**

- Very Small Scale Test
- Follow-up Tests
- Wide-Scale Tests of Change
- Implementation of Change
- Spreading
- Sustaining the gains

**Sequential building of knowledge under a wide range of conditions**
Small tests of change build will and knowledge of what works (or does not)
Measurement – and PDSA
## Data for Learning

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Improvement</th>
<th>Accountability</th>
<th>Research</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aim</strong></td>
<td>Improvement of care (efficiency &amp; effectiveness)</td>
<td>Comparison, choice, reassurance, motivation for change</td>
<td>New knowledge (efficacy)</td>
</tr>
<tr>
<td><strong>Methods:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Test Observability</td>
<td>Test observable</td>
<td>No test, evaluate current performance</td>
<td>Test blinded or controlled</td>
</tr>
<tr>
<td>• Bias</td>
<td>Accept consistent bias</td>
<td>Measure and adjust to reduce bias</td>
<td>Design to eliminate bias</td>
</tr>
<tr>
<td>• Sample Size</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>• Flexibility of Hypothesis</td>
<td>Flexible hypotheses, changes as learning takes place</td>
<td>No hypothesis</td>
<td>Fixed hypothesis (null hypothesis)</td>
</tr>
<tr>
<td>• Testing Strategy</td>
<td>Sequential tests</td>
<td>No tests</td>
<td>One large test</td>
</tr>
<tr>
<td>• Determining if a change is an improvement</td>
<td>Analytic Statistics (statistical process control) Run &amp; Control charts</td>
<td>No change focus (maybe compute a percent change or rank order the results)</td>
<td>Enumerative Statistics (t-test, F-test, chi square, p-values)</td>
</tr>
<tr>
<td>• Confidentiality of the data</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>
Average aggregate versus time ordered enables detection of early failures
Average aggregate versus time ordered -
muddle in the middle is vital to spot and act on
The problems with PDSA in healthcare

• Always spend time defining the problem, consulting with stakeholders and analysing what is known already
• Improvement is not always a linear ramp (which is why driver diagrams can support thinking)
• Some problems are too big and hairy for just a PDSA (but that does not stop you thinking of very small tests to try)
• Who what where, how, data collection and theory and predictions vital
• Predicting the outcome of a test is crucial if you are to avoid fudging the analysis (P is for Plan and Predict!)
• It is quick but that does not mean it should be done carelessly- design and plan are crucial
• Don’t just do , do , do – analyse, reflect and communicate

• [http://qualitysafety.bmj.com/content/early/2016/01/12/bmjqs-2015-005076](http://qualitysafety.bmj.com/content/early/2016/01/12/bmjqs-2015-005076)
Start with ideas, then build your driver diagram

Task
Class of 20 10 year olds – aiming to be fit for a running obstacle race in 6 months in a national competition (mini spartan)
Ideas on how to Improve Plan

1. Physical stamina to run 4 km
2. Fitness to climb ropes/ walls/ ramps
3. Nutrition
4. Hydration
5. Team working

Step 1 - each row take a topic and put ideas on wall – five minutes

- Think how will you test, what will you measure, how will you adapt or adopt idea
- Pick two tests to share
- Step 2 – Make a driver diagram and organise change ideas
Mini spartan team ready for competition 28/10/2017

Aim

Primary drivers
- Nutrition and hydration
- Fitness for physical challenges
- Team ethos

Secondary drivers
- Food
- Water / other
- Parental input
- Running
- Climbing /ropes etc
- Team values
- Team actions

What will we do
Success is about will, ideas and organised delivery