HEALTH QUALITY & SAFETY COMMISSION NEW ZEALAND

Kupu Taurangi Hauora o Aotearoa

A masterclass in quality improvement science

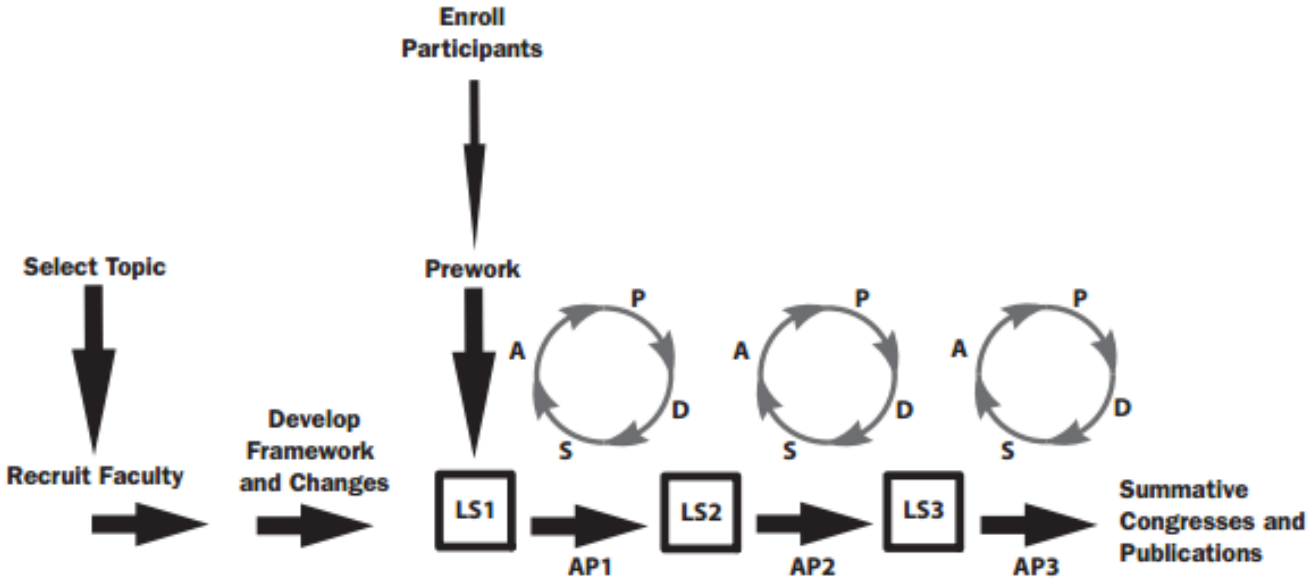
Prem Kumar
Quality improvement advisor
Health Quality & Safety Commission

Agenda

- Collaborative model- Breakthrough series
- Improvement methodology
- Feet for Life project

Breakthrough series

Figure 2. Breakthrough Series Model



Health Quality & Safety Commission New Zealand
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Steps in an improvement project

1. Identify a quality issue

- Data sources
- Team formation
- Project charter
- Codesign
- Stakeholders and comms
- Patient experience

2. Understanding and diagnosing the problem

- Data sources
- Process maps
- Pareto charts
- Histograms
- Fishbone
- 5 Whys
- 7 Wastes +1
- Problem statements
- Project scoping
- Measurement
- Run charts / control charts
- Understanding variation
- Advanced SPC

3. Developing a strategy (generating ideas)

- AIM statements
- Change concepts
- Driver diagrams
- Sources of ideas
- MFI
- Understanding & implementing change
- Coaching others
- Reactions to change
- Creativity tools

4. Testing ideas

- PDSA

5. Implementing and sustaining

- Planning for sustainability
- NHS sustainability score
- MUSIQ
- Sustainability scoring

6. Learn and spread

- Collaboratives

System of profound knowledge

Theory of knowledge

- Improvement by learning and studying facts to learn about the system to develop and test theories, results and improve

Psychology of change

- Understanding people and motivations
- Understanding teams and organisations

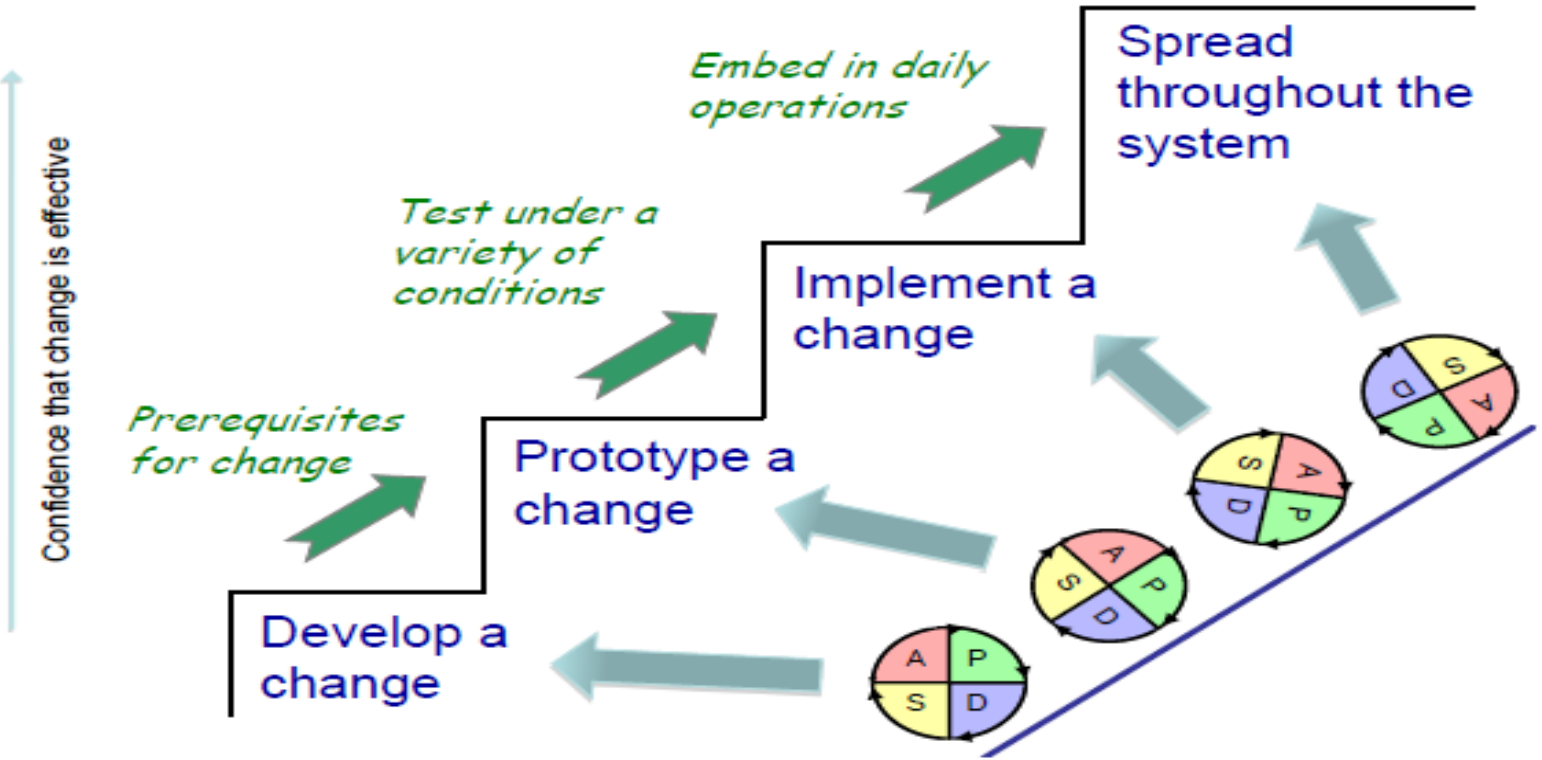
Appreciation of a system

- People
- Processes
- Roles, aim and purpose, and how relates to a whole

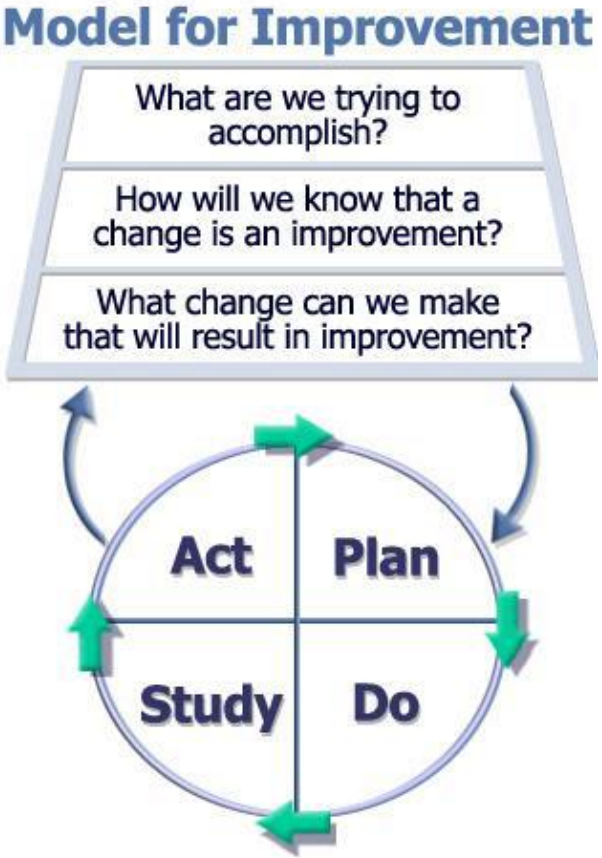
Variation

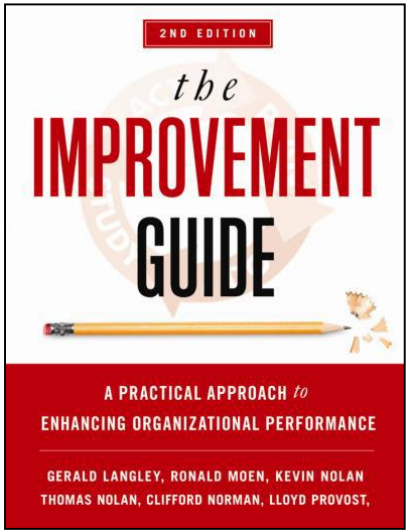
- Common cause and special cause variation

The Steps to change



Improvement methodology





Associates in Process Improvement, 2009

What are we trying to accomplish?

-Is the statement precise about what the team hopes to achieve?

-Will you know if the changes result in improvement?

-Is this ‘do-able’ in the time you have? Are you attempting too much? Could you do more?

-Do you have the resources needed (people, time, support?)

-Do you identify the timeline for the project – when will you accomplish each part?

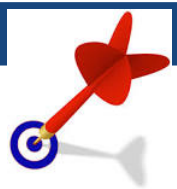
Elements of aim statement

Elements of aim	Description
For whom • Who -population in target • Where-Location • When-during what point in the process	adult inpatients in participating areas of DHB during their inpatient stay
What (what is it about)	preventable harm from clinical deterioration
How much • Baseline • Target • Metric used-(e.g. Percentage, Average)	(not known) 15% Percentage
By when (Timelines)	June 2019

Aim:

To reduce the percentage of preventable harm from clinical deterioration nationally by 15% for all adult inpatients in participating areas of district health board by July 2019.

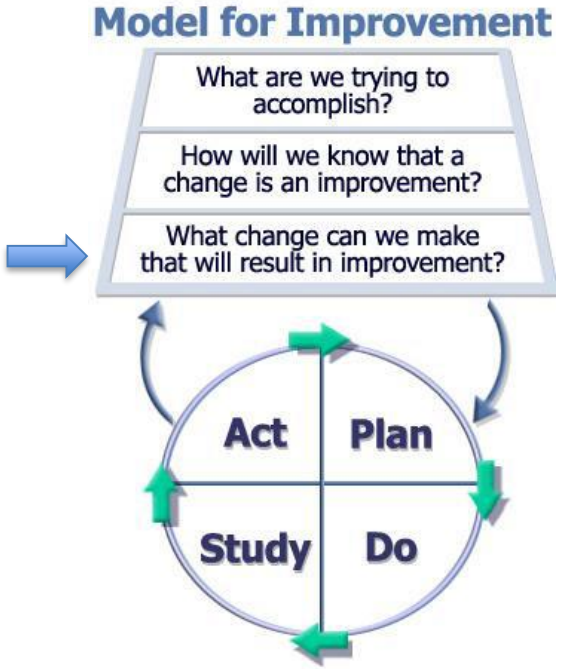
Example of aim statement



- To reduce constipation from 17% to 5% in postoperative total joint replacement patients in Christchurch Hospital by December 2015
- To reduce the harm related to opioid use nationally by 25% in all the participating areas of district health board hospitals by April 2016
- To reduce the rate of CLAB in New Zealand ICUs towards zero (<1 per 1000 line days by 31 March 2013)
- To decrease the morbidity rate for general surgery patients undergoing elective colorectal surgery at Vancouver General Hospital by 50% by November 2014.

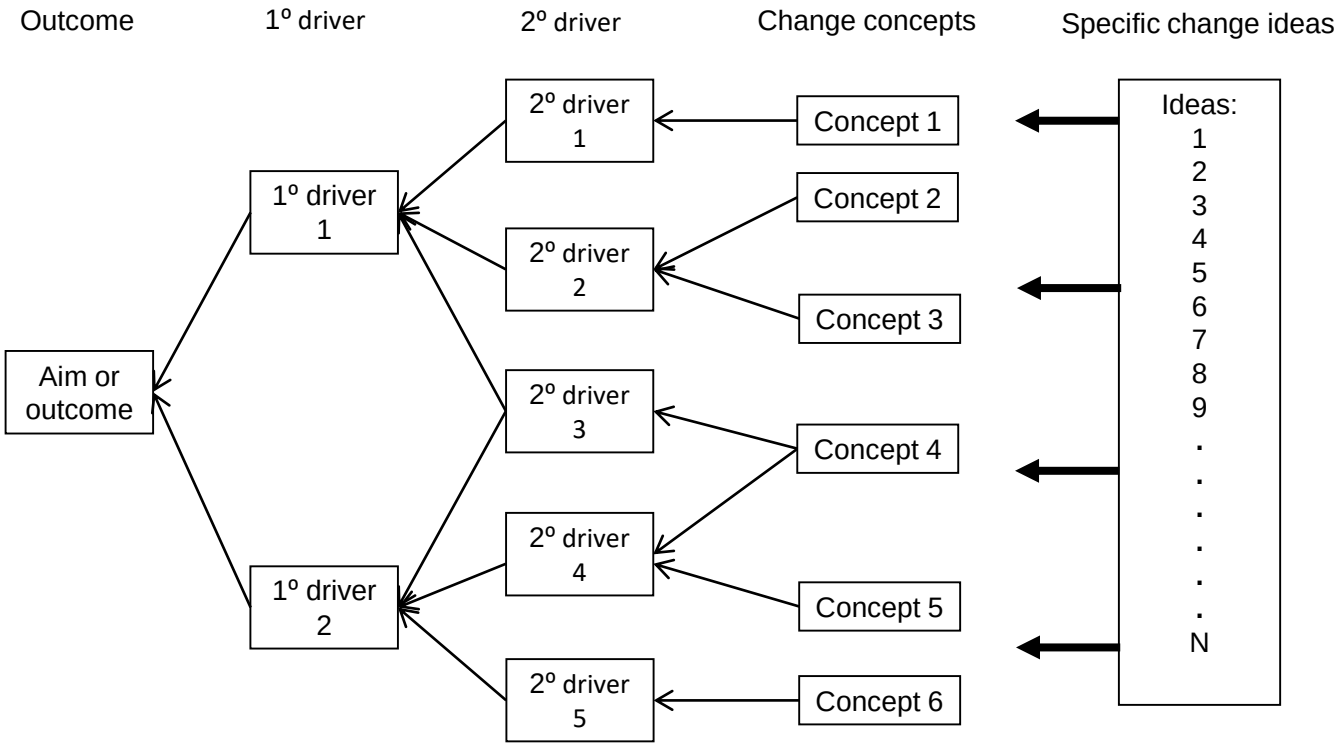
All improvement requires change, but not all changes result in improvement

How do we develop fundamental change that will result in improvement?



Driver diagram

Conceptual driver diagram

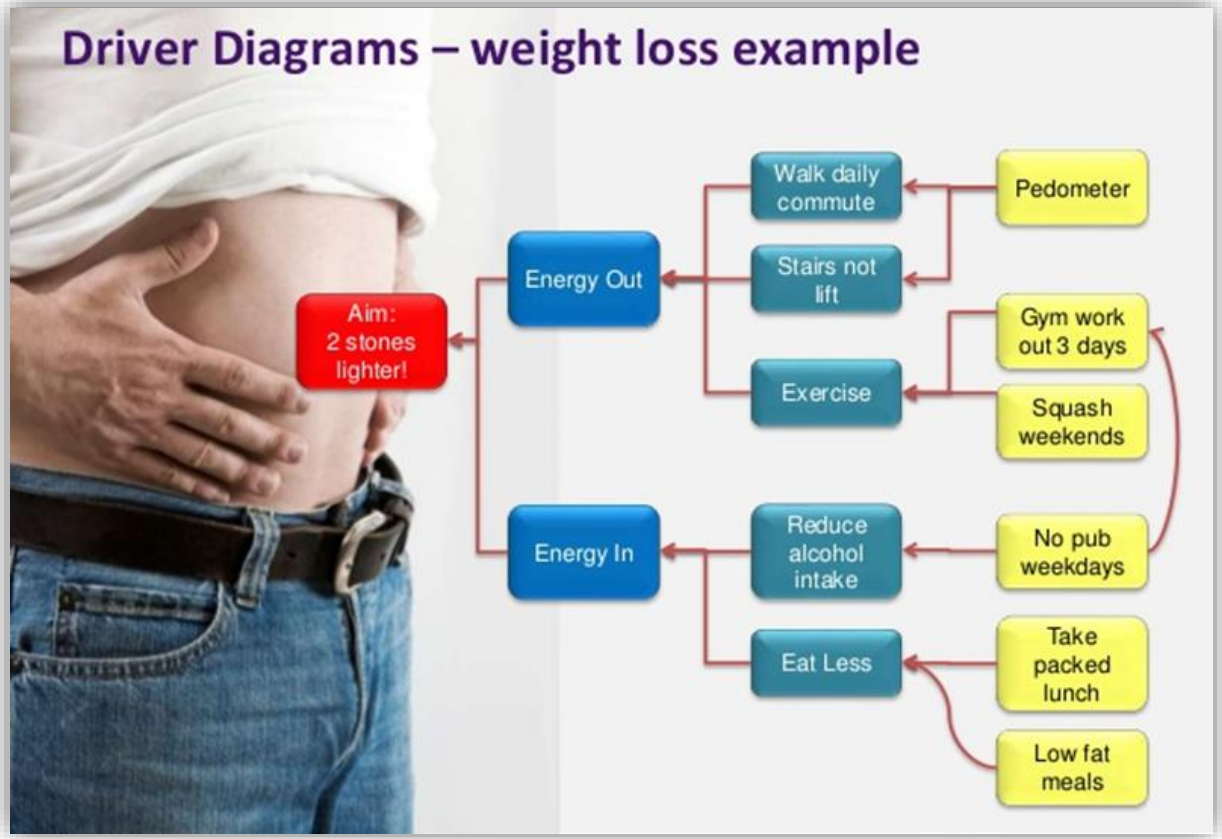


The initial driver diagram for an improvement project might lay out the descriptive theory of improved outcomes that can then be tested and enhanced to develop a predictive theory.

Purpose of Driver diagram

- A driver diagram is an approach to describing our theories of improvement
- Used to help organise our theories and ideas in an improvement effort
- To conceptualise an improvement area and to determine its system components which will then create a pathway to achieve the goal
- The initial driver diagram for an improvement project might lay out the descriptive theory of improved outcomes that can then be tested and enhanced to develop a predictive theory.
- By improvement teams for analysis, organisation and communication of information to help direct the improvement work
- As a communication tool for explaining a change strategy
- To provide the basis for a measurement framework.

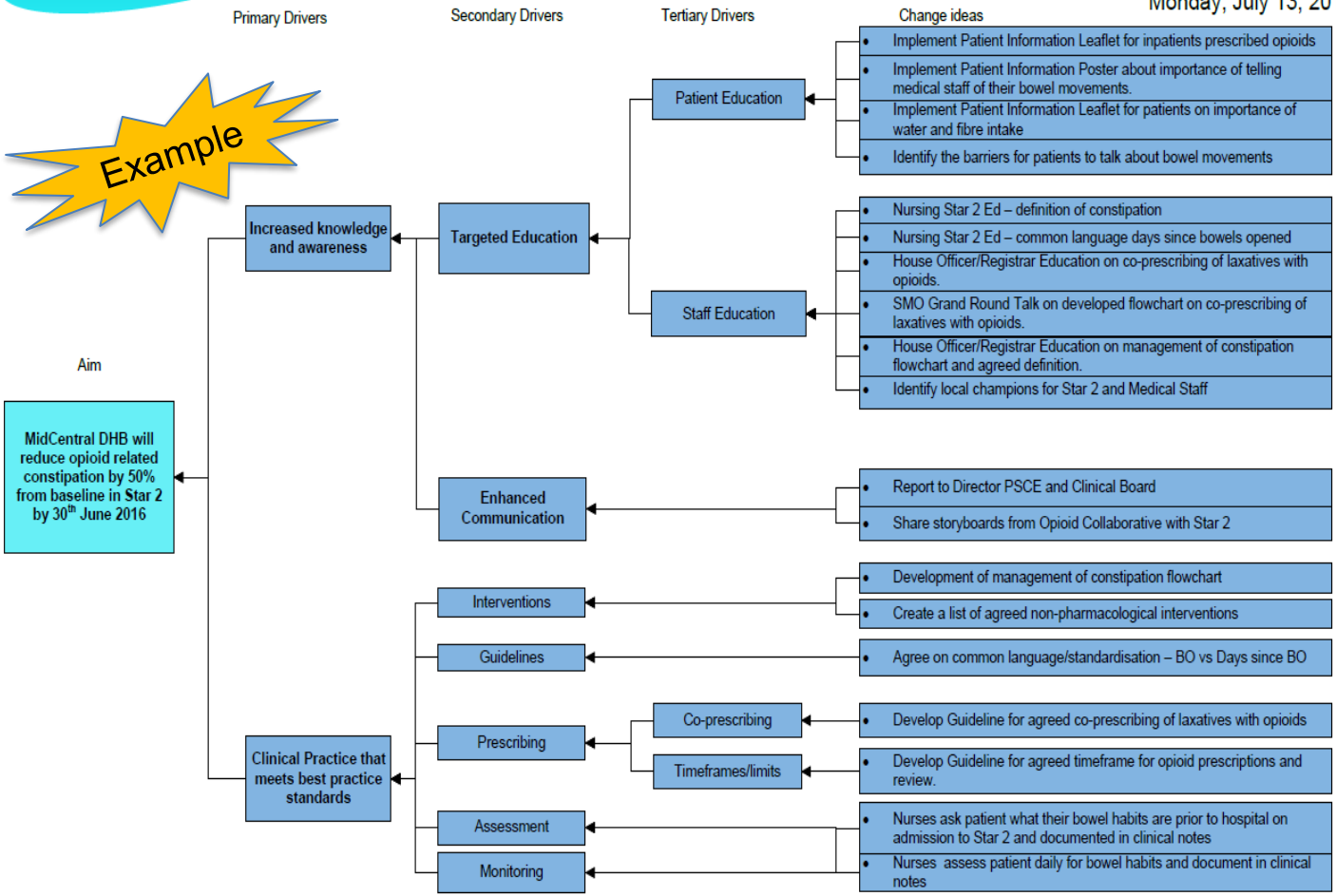
A tool to visualise our theory



A driver diagram is an approach to describing our theories of improvement.
Theory: A description of our best understanding about why things are the way they are.

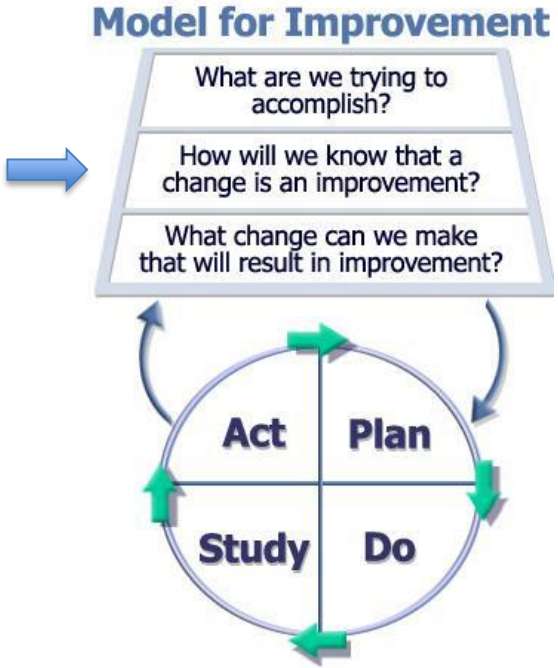
Reducing Opioid Related Constipation - Driver Diagram

Monday, July 13, 2015



How will we know that a change is an improvement

Measurement



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Why are you measuring?

Research ?

Judgement ?

Improvement ?

The three faces of performance improvement

Aspect	Improvement	Accountability	Research
Aim	Improvement of care	Comparison, choice, reassurance, spur for change	New knowledge
Methods: • Test Observability	Test observable	No test, evaluate current performance	Test blinded or controlled
• Bias	Accept consistent bias	Measure and adjust to reduce bias	Design to eliminate bias
• Sample Size	"Just enough" data, small sequential samples	Obtain 100% of available, relevant data	"Just in case" data
• Flexibility of Hypothesis	Hypothesis flexible, changes as learning takes place	No hypothesis	Fixed hypothesis
• Testing Strategy	Sequential tests	No tests	One large test
• Determining if a change is an improvement	Run charts or Shewhart control charts	No change focus	Hypothesis, statistical tests (t-test, F-test, chi square), p-values
• Confidentiality of the data	Data used only by those involved with improvement	Data available for public consumption and review	Research subjects' identities protected

Lief Solberg, Gordon Mosser and Sharon McDonald *Journal on Quality Improvement* vol. 23, no. 3, (March 1997), 135-147.

Measurement guidelines

To answer: *"How will we know that a change is an improvement?"* usually requires more than one measure.

1. A balanced set of a few (three–eight) key measures.

2. Integrate measurement into the daily routine.

3. Think about balancing, process and outcome measures (be careful about overdoing process measures).

4. Plot the data in a time series.

The quality measurement journey

- Aim (how good? by when?)
- Concept
- Measures
- Operational definitions
- Data collection plan
- Data collection
- Analysis
- Action

Source: R. Lloyd. Quality Health Care: A guide to developing and using indicators. Jones and Bartlett, 2004

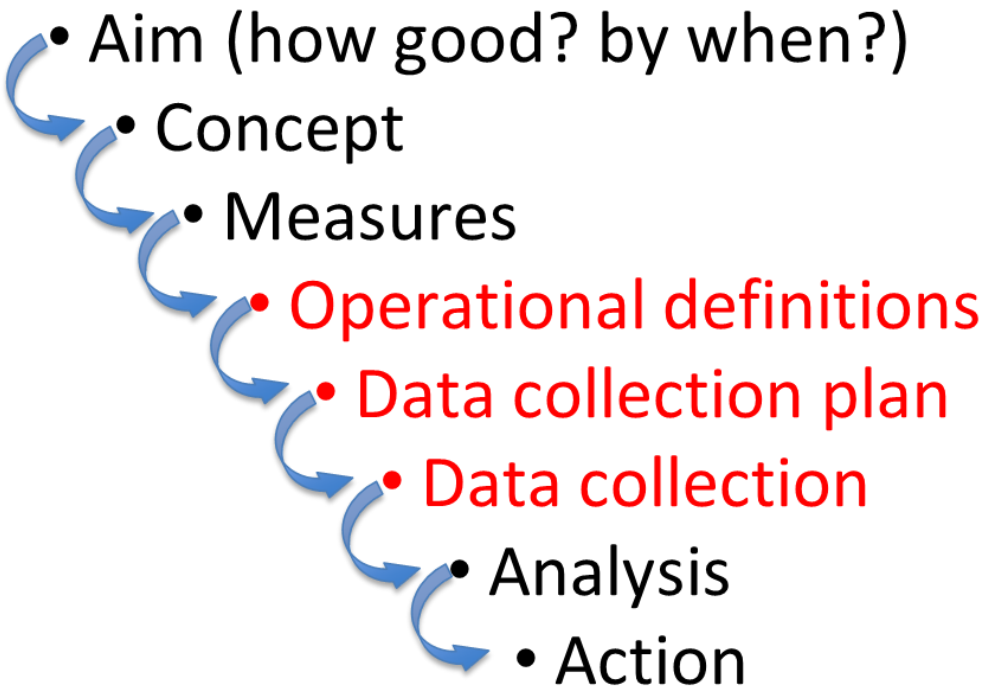
Type of measures

Outcome measures. Outcome measures are measures of the performance of the system under study. They relate directly to the aim of the project. Outcome measures offer evidence that changes are actually having an impact at the system level.

Process measures. Process measures are measures of whether an activity has been accomplished. For example, process measures could be whether inventory checks were made or whether patients received evidence-based interventions. Process measures are often used to determine if a PDSA cycle was carried out as planned.

Balancing measures. To achieve an improvement in some measures while degrading performance in others is usually not acceptable. In making changes to improve outcome and process measures, we want to be sure any related measures are maintained or improved.

The quality measurement journey



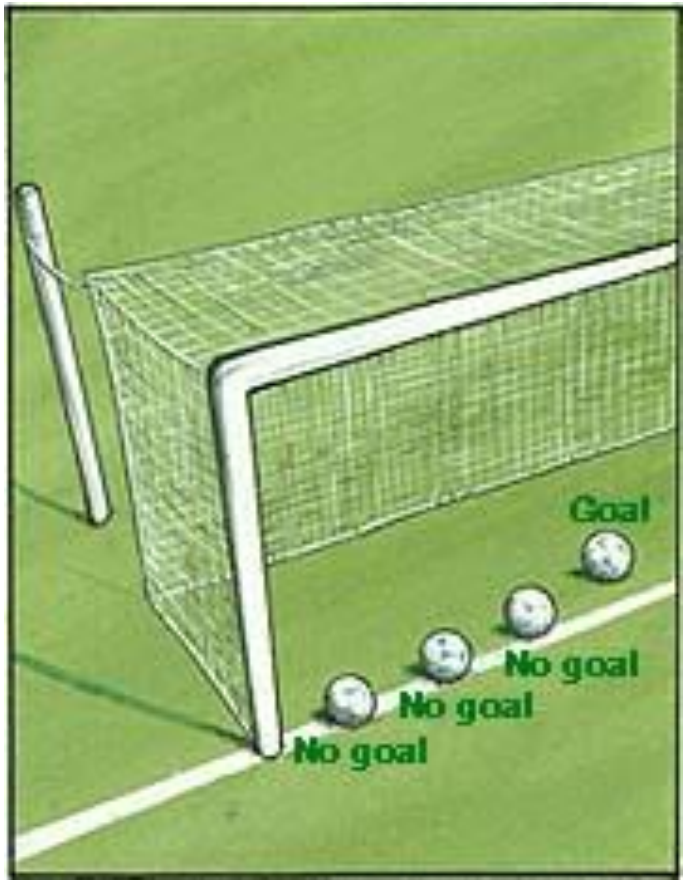
Source: R. Lloyd. Quality Health Care: A guide to developing and using indicators. Jones and Bartlett, 2004

Operational definitions


Goal = Like
No Goal = Comment


25
24

The operational definition of a goal



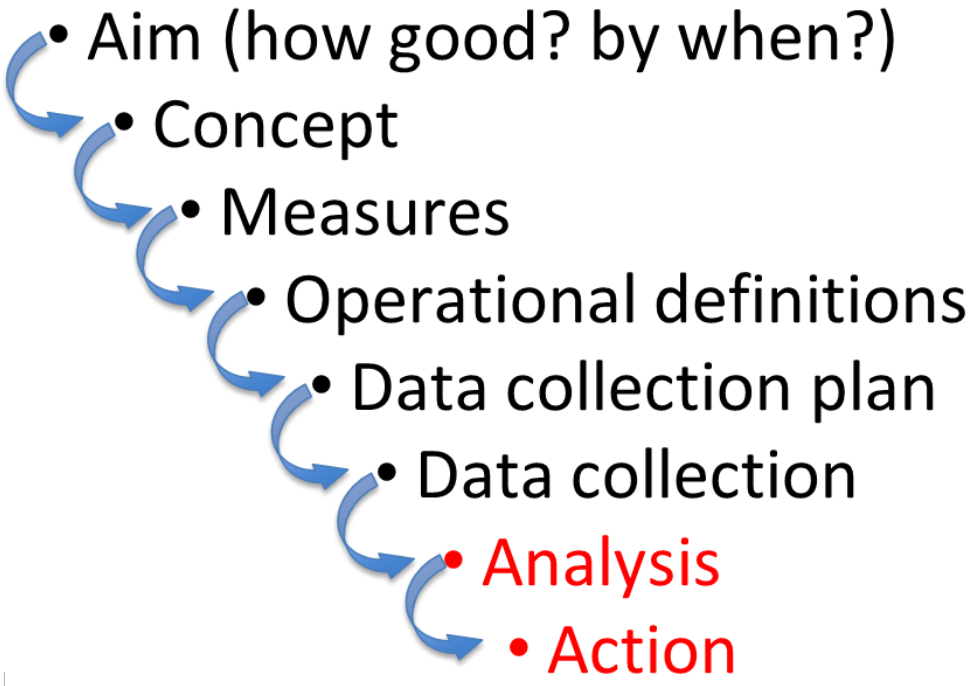

Goal = Like
No Goal = Comment


24

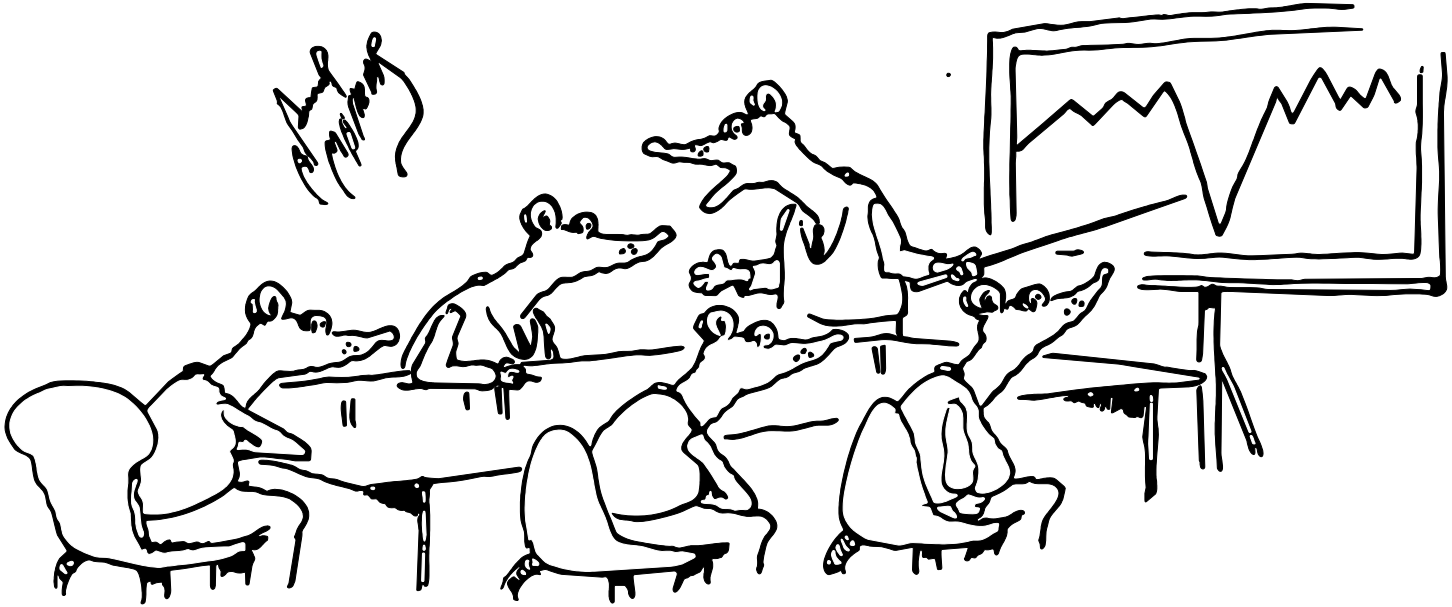
Data collection plan

Safe use of opioid collaborative - Data Collection Plan								
Measure	Type of measure	Operational definition	Data Source(s)	What	Where	How	When	Who
Name of measure	(Outcome, Process, Balancing)	Formula, definition of words used in measure	What is the source of data? (GTT, Audit)	What are we going to collect?	Area of data collection?	How will the data be collected?	When will the data be collected, frequency?	Who will collect the data?

The quality measurement journey



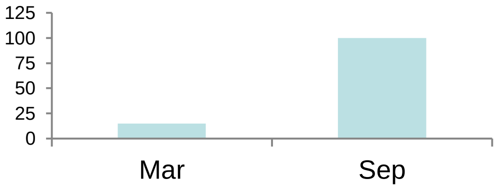
Source: R. Lloyd. Quality Health Care: A guide to developing and using indicators. Jones and Bartlett, 2004



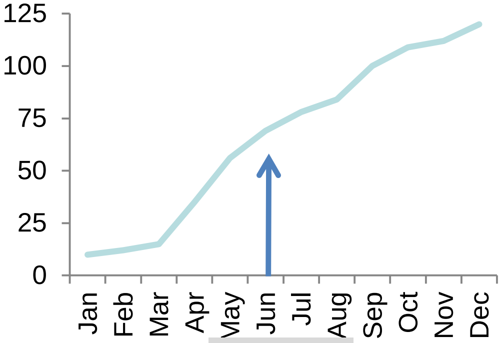
'And this is the period when the cat was away. '

Why we look at data graphed over time

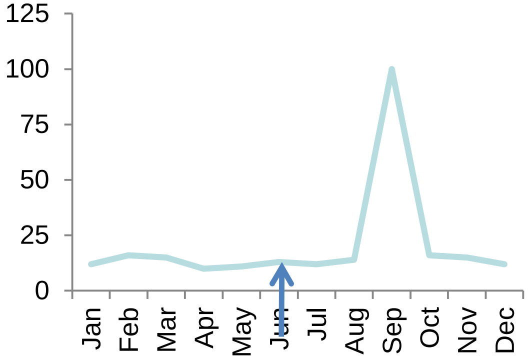
immunizations to children



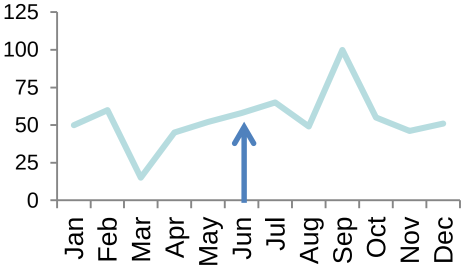
Change to process made in June.



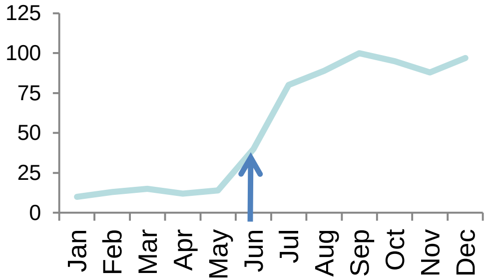
Change made



Change made

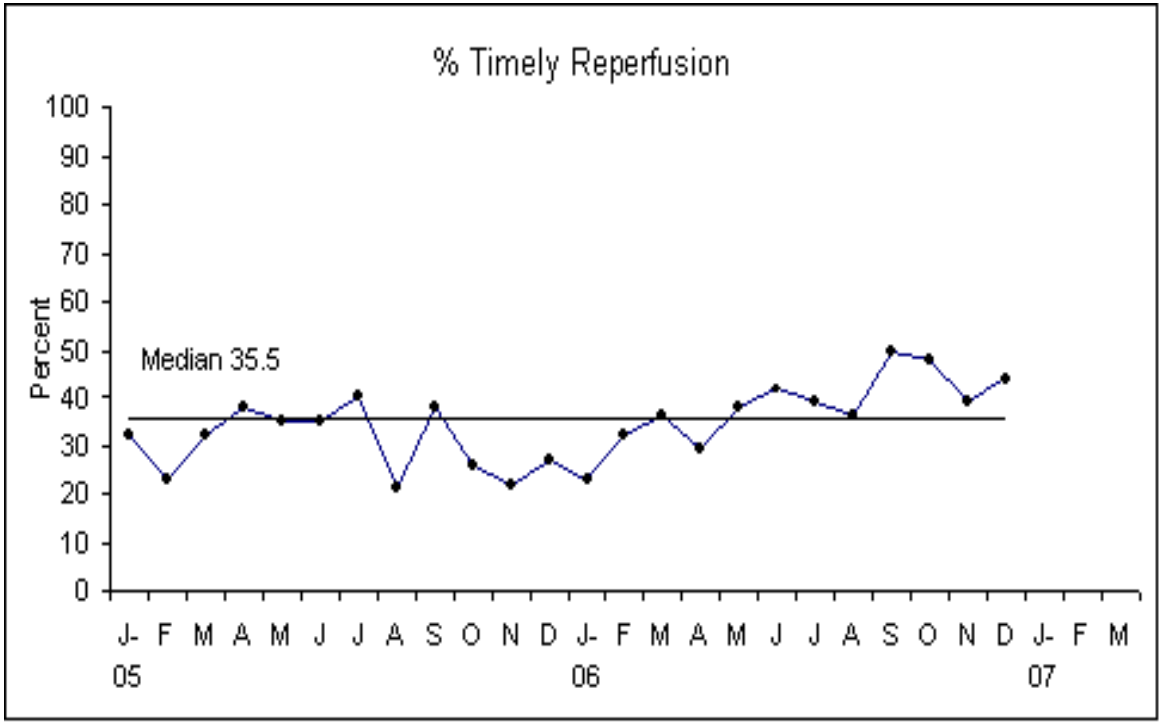


Change made



Change made

Data over a period of time



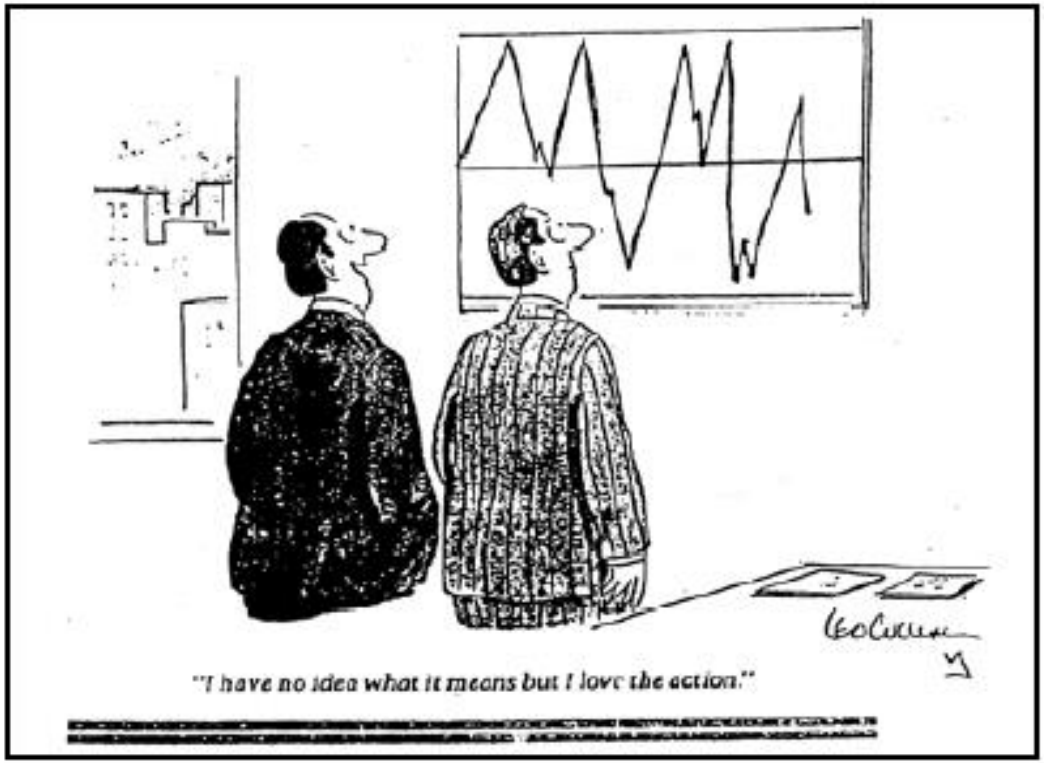
Murray and Provost, Pg 3-4

Type of variation

- ***Common causes/Random variation*** — those causes that are inherent in the process (or system) over time, affect everyone working in the process, and affect all outcomes of the process. Also known as random or unassignable variation

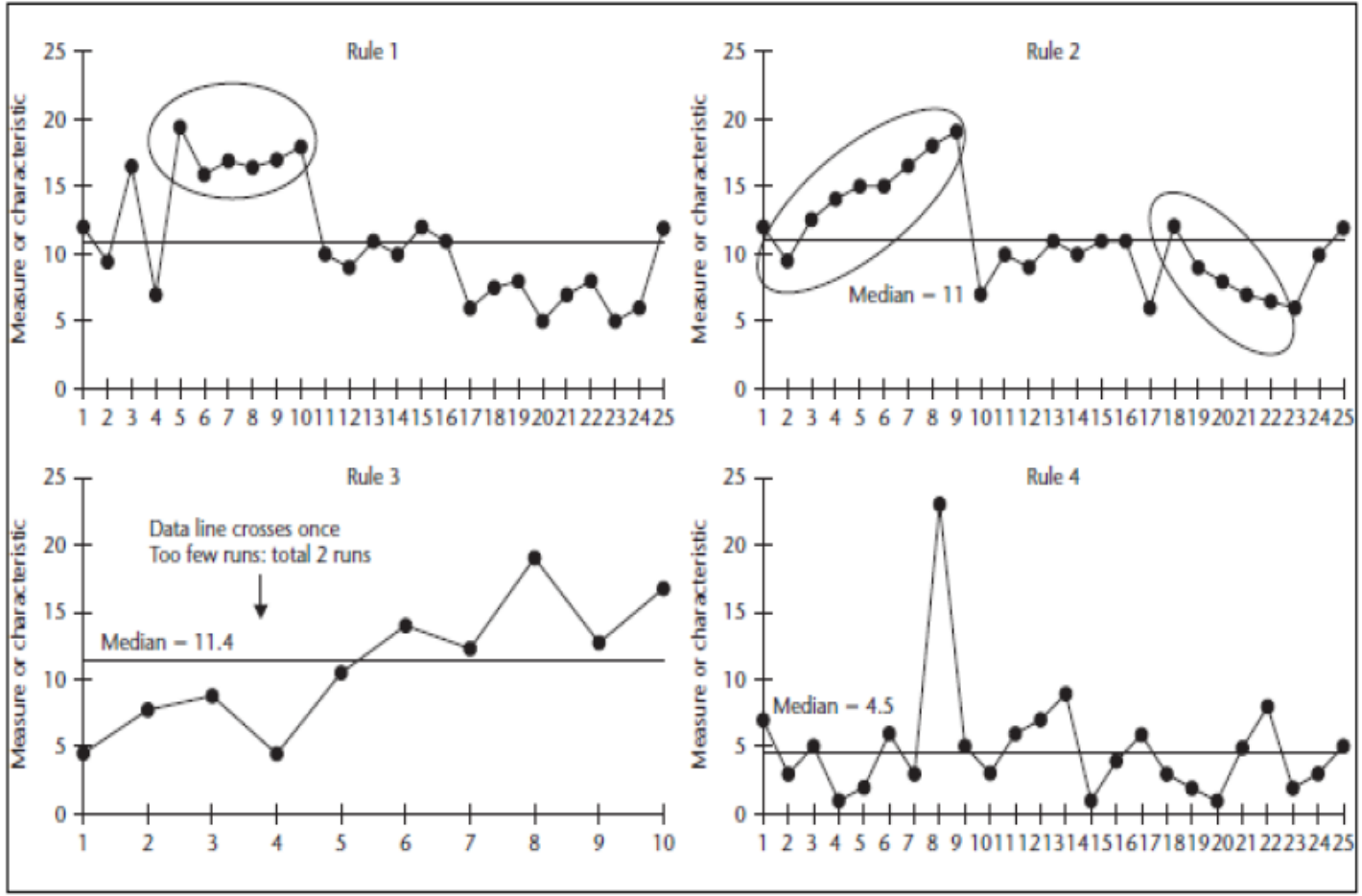
- ***Special causes/Non-random variation*** — those causes that are *not* part of the process (or system) all the time, or do not affect everyone, but arise because of specific circumstances. Also known as non-random or assignable variation

How do we prevent this?



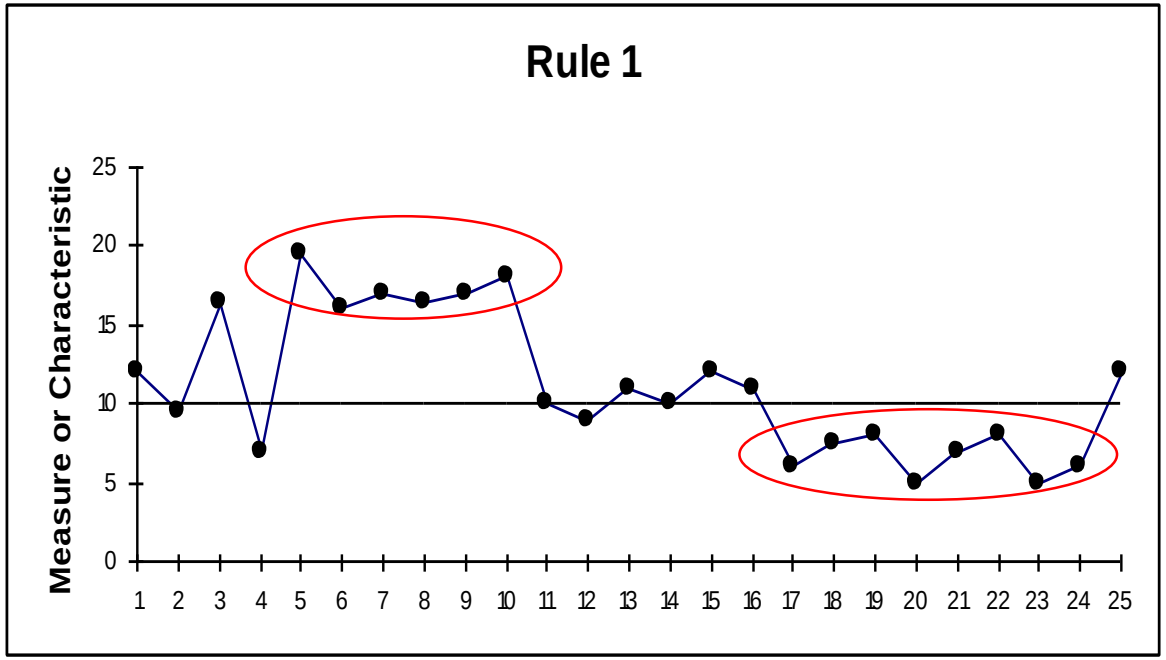
Run chart rules to detect special cause

FIGURE 3.13 Four Rules for Identifying Nonrandom Signals of Change



Shift rule: Six or more consecutive data points either all above or all below the median

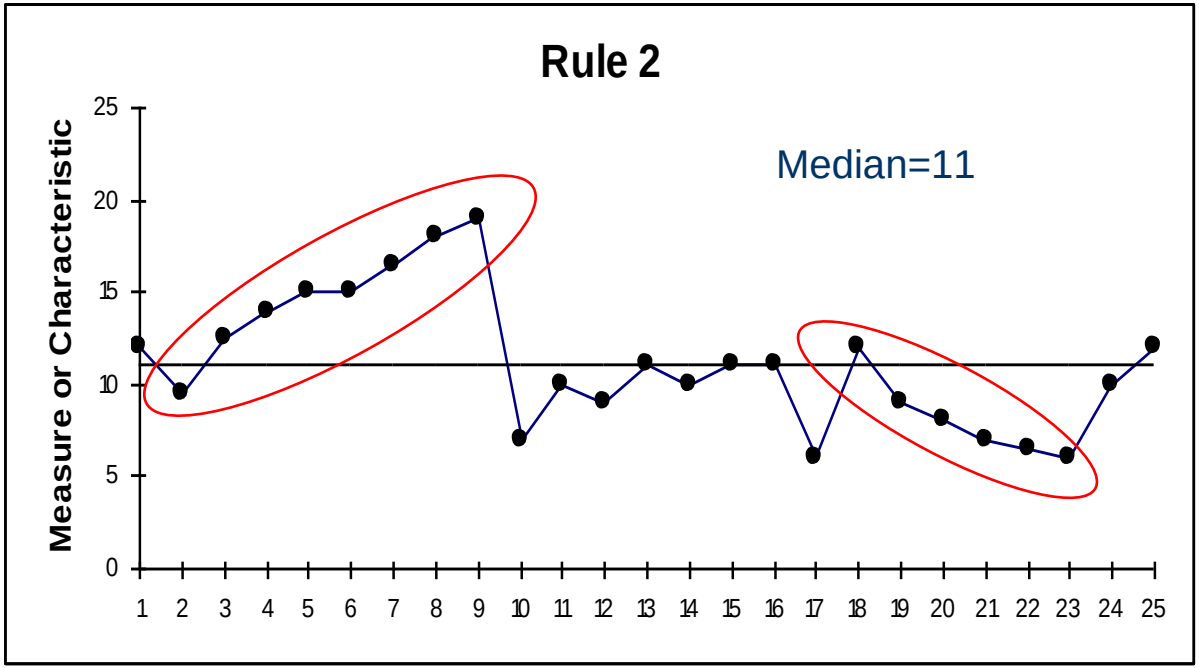
(Skip values on the median and continue counting data points. Values on the median DO NOT make or break a shift.)



Murray and Provost, 3 (11-15)

Trend rule: <u>Five</u> or more consecutive data points either all going up or all going down.

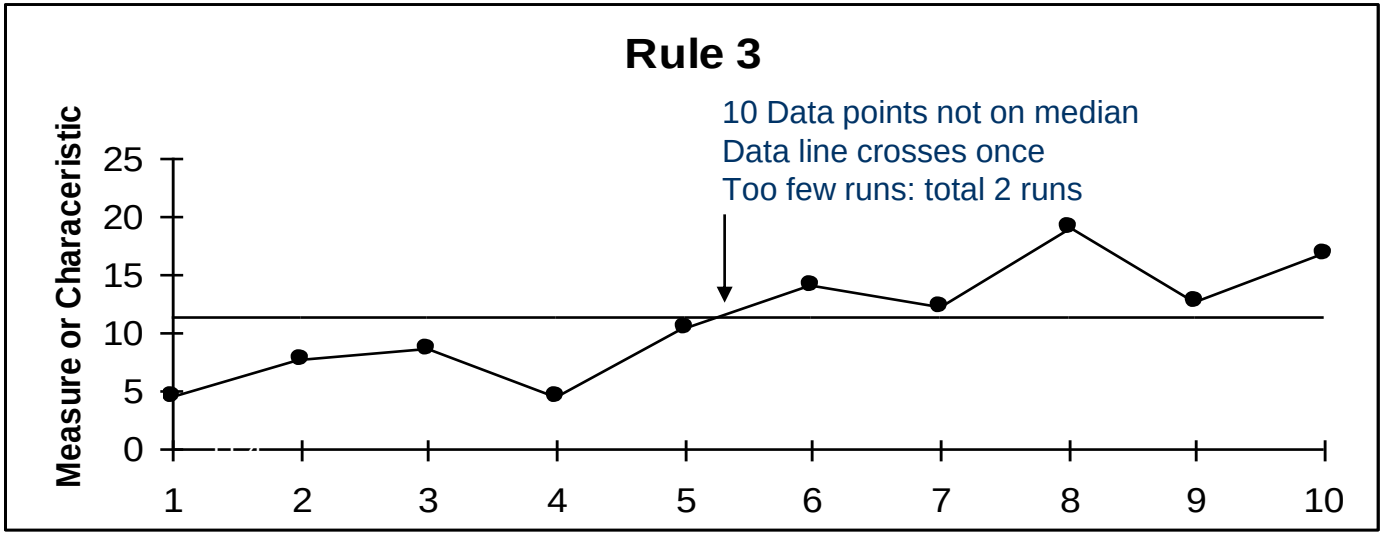
(If the value of two or more consecutive points is the same, ignore one of the points when counting; like values do not make or break a trend.)



Murray and Provost, 3 (11-15)

Run rule: Too many or too few runs

(A run is a series of points in a row on one side of the median. Some points fall right on the median, which makes it hard to decide which run these points belong to. So, an easy way to determine the number of runs is to count the number of times the data line crosses the median and add one. Statistically significant change signaled by too few or too many runs).



Murray and Provost, 3 (11-15)

Run rule reference table

Table for checking for too many or too few runs on a run chart

Total number of data points on the run chart *that do not fall on the median*	Lower limit for the number of runs (< than this number of runs is "too few")	Upper limit for the number of runs (> than this number of runs is "too many")
10	3	9
11	3	10
12	3	11
13	4	11
14	4	12
15	5	12
16	5	13
17	5	13
18	6	14
19	6	15
20	6	16
21	7	16
22	7	17
23	7	17
24	8	18
25	8	18

Table is based on about a 5% risk of failing the run test for random patterns of data.

Adapted from Swed, Feda S. and Eisenhart, C. (1943). "Tables for Testing Randomness of Grouping in a Sequence of Alternatives. Annals of Mathematical Statistics. Vol. XIV, pp.66 and 87, Tables II and III.

Murray and Provost, 3 (11-15)

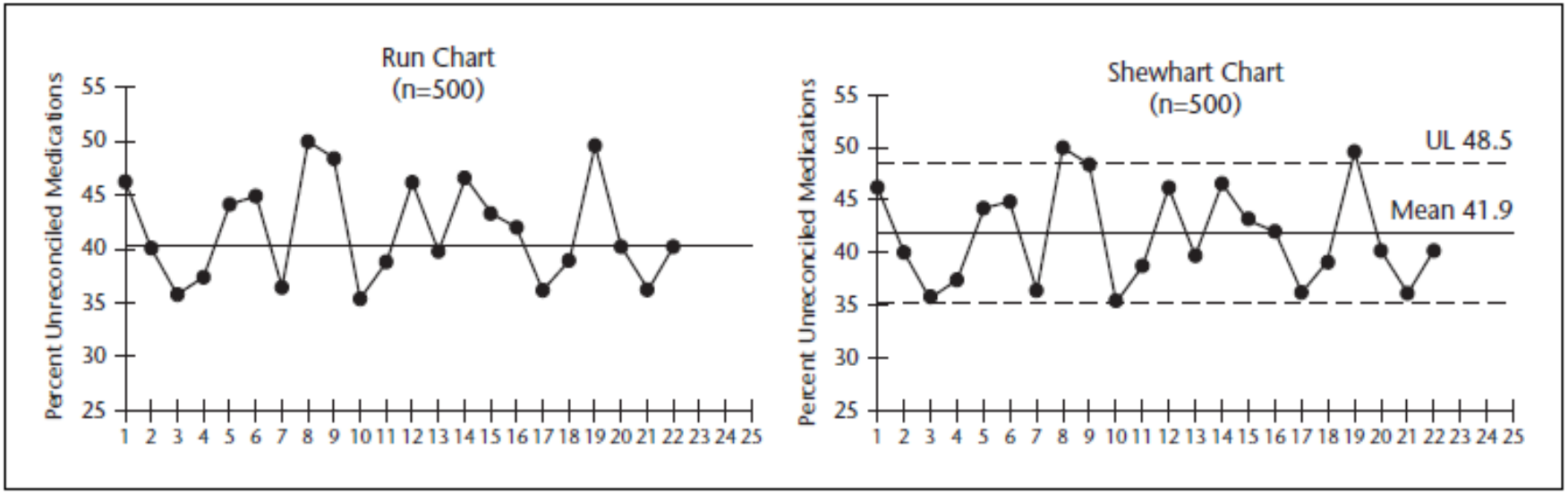
Astronomical data point

(For detecting unusually large or small numbers: Data that is a Blatantly Obvious different value. Everyone studying the chart agrees that it is unusual. Remember: Every data set will have a high and a low – this does not mean the high or low are astronomical).

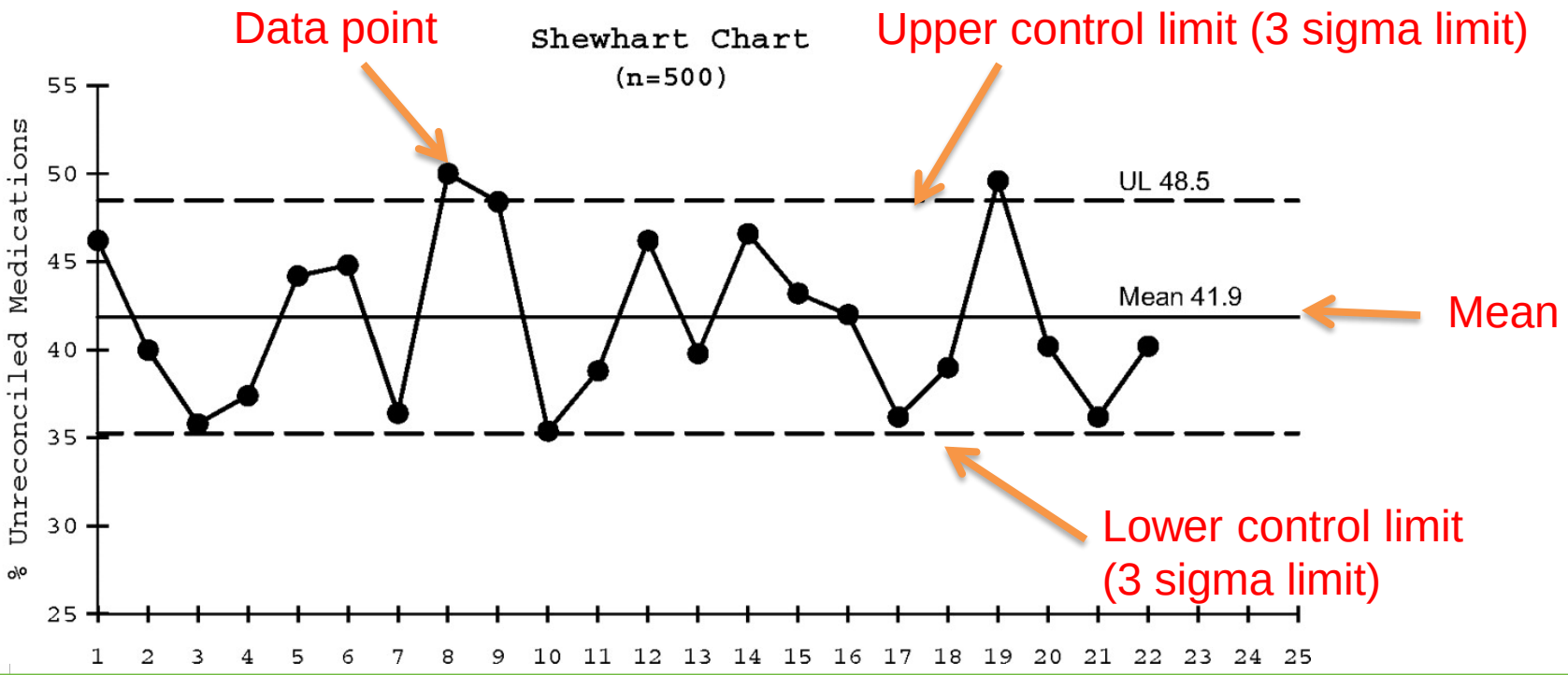
Murray and Provost, 3 (11-15)

When should we transition from using a run chart to a Shewhart Control

FIGURE 4.7 Depicting Variation Using a Run Chart Versus a Shewhart Chart

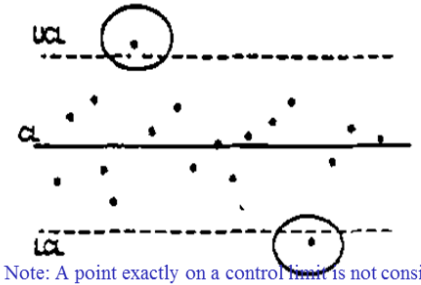


Example of Shewhart chart



Rules for determining a special cause

1. A single point outside the control limits.

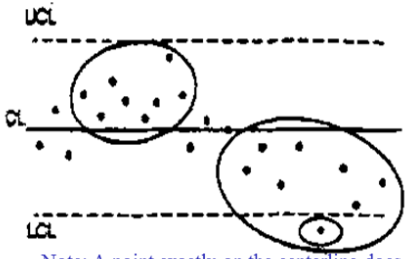


Note: A point exactly on a control limit is not considered outside the limit

When there is not a lower or upper control limit

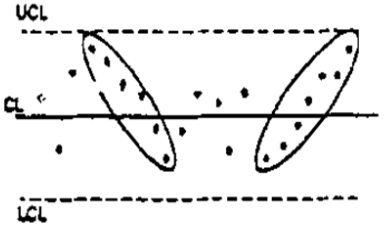
Rule 1 does not apply to the side missing limit

2. A run of eight or more points in a row above (or below) the centerline.



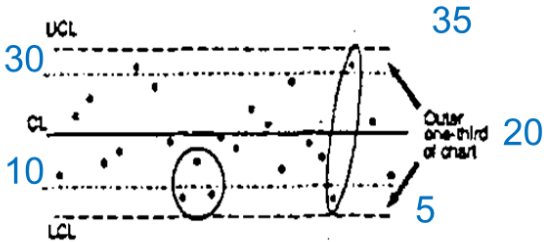
Note: A point exactly on the centerline does not cancel or count towards a shift

3. Six consecutive points increasing (trend up) or decreasing (trend down).



Note: Ties between two consecutive points do not cancel or add to a trend. When Shewhart Charts have varying limits due to varying numbers of measurements within subgroups, then rule #3 is optional

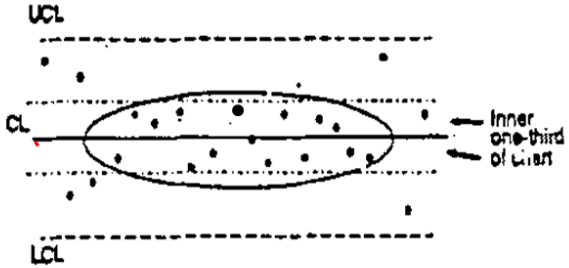
4. Two out of three consecutive points near (outer one-third) a control limit.



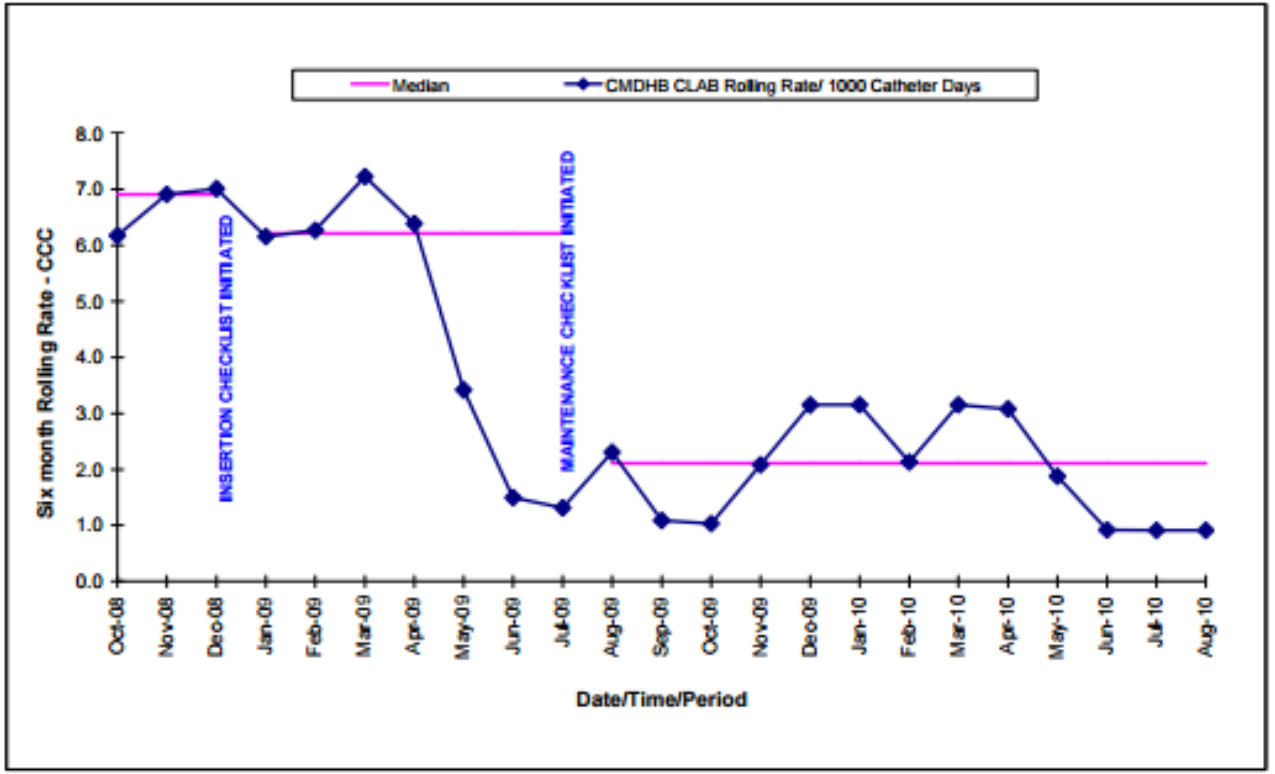
When there is not a lower or upper control limit

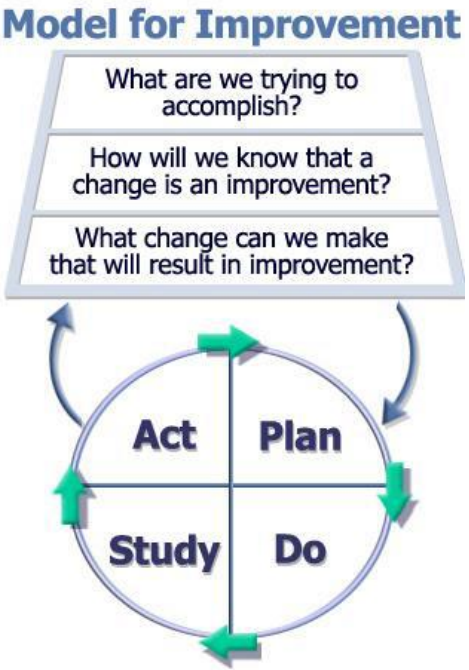
Rule 4 does not apply to the side missing limit

5. Fifteen consecutive points close (inner one-third of the chart) to the centerline.



Improvement





How will we know that a change is an improvement

Testing a change

This comparison/ examination generates new knowledge about what change might work or what modification is needed

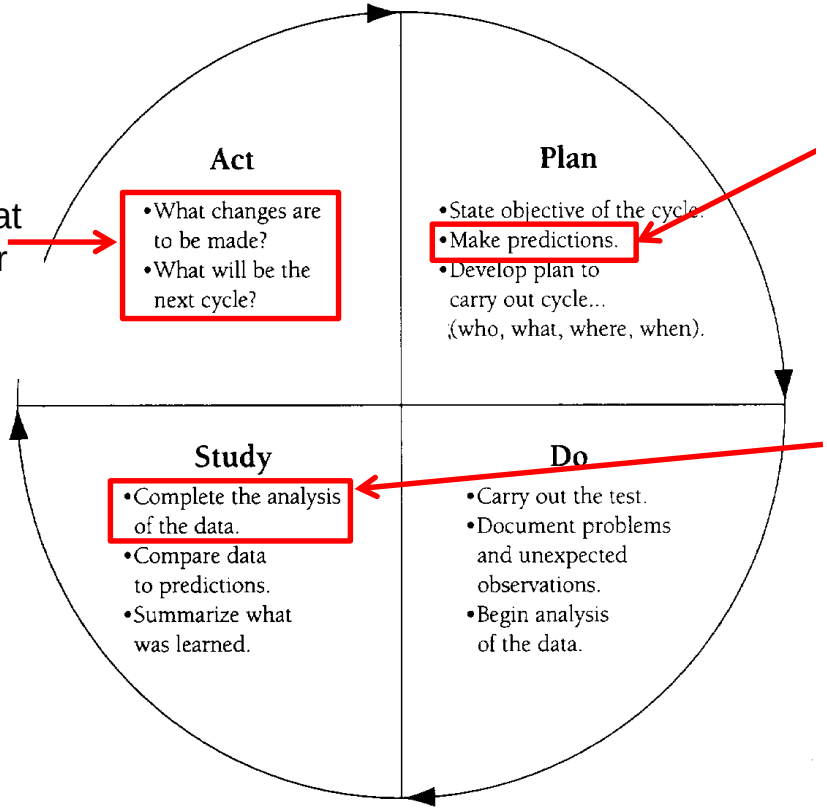


Figure 4.1. Elements of the PDSA Cycle.

Langley et. al

PDSA learning cycle:

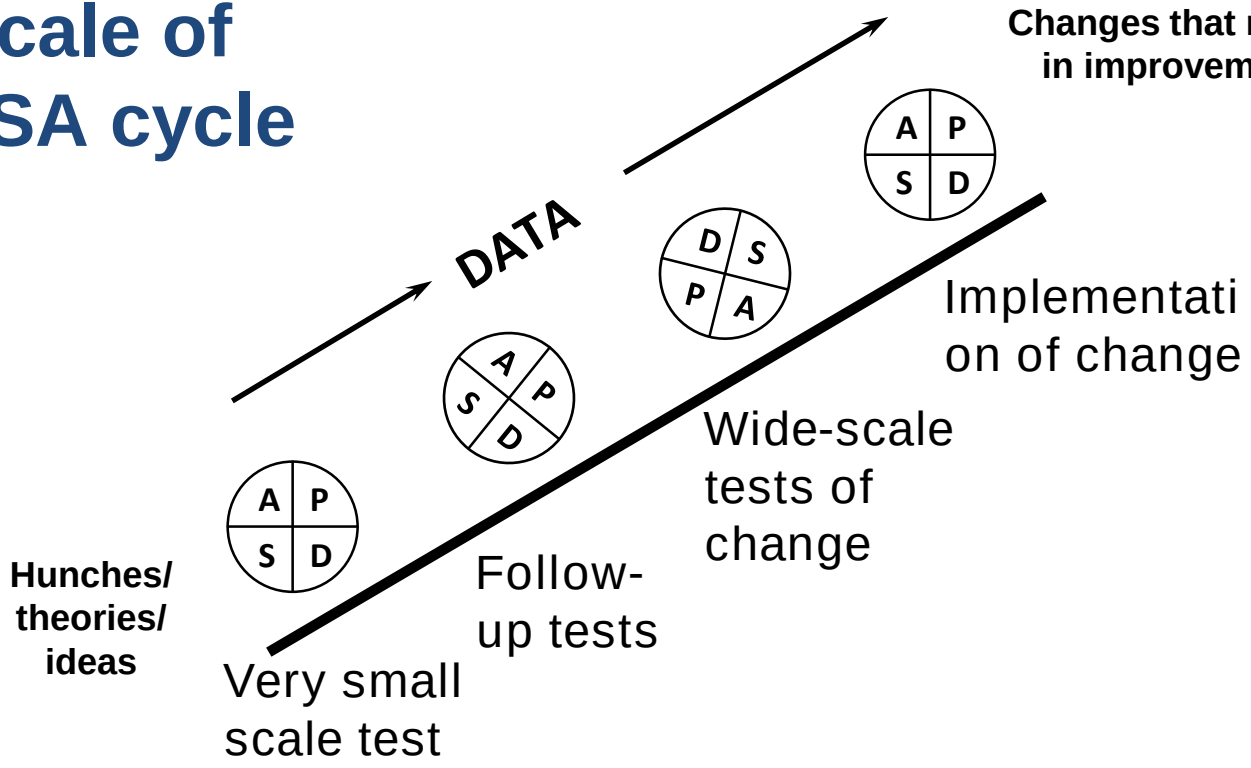
Most important part of any PDSA cycle is the Prediction as it represents current knowledge about how a process or system will behave in the future.

When predictions are compared with actual outcomes they can reveal gaps in our current understanding of why a process or system behaves the way it does

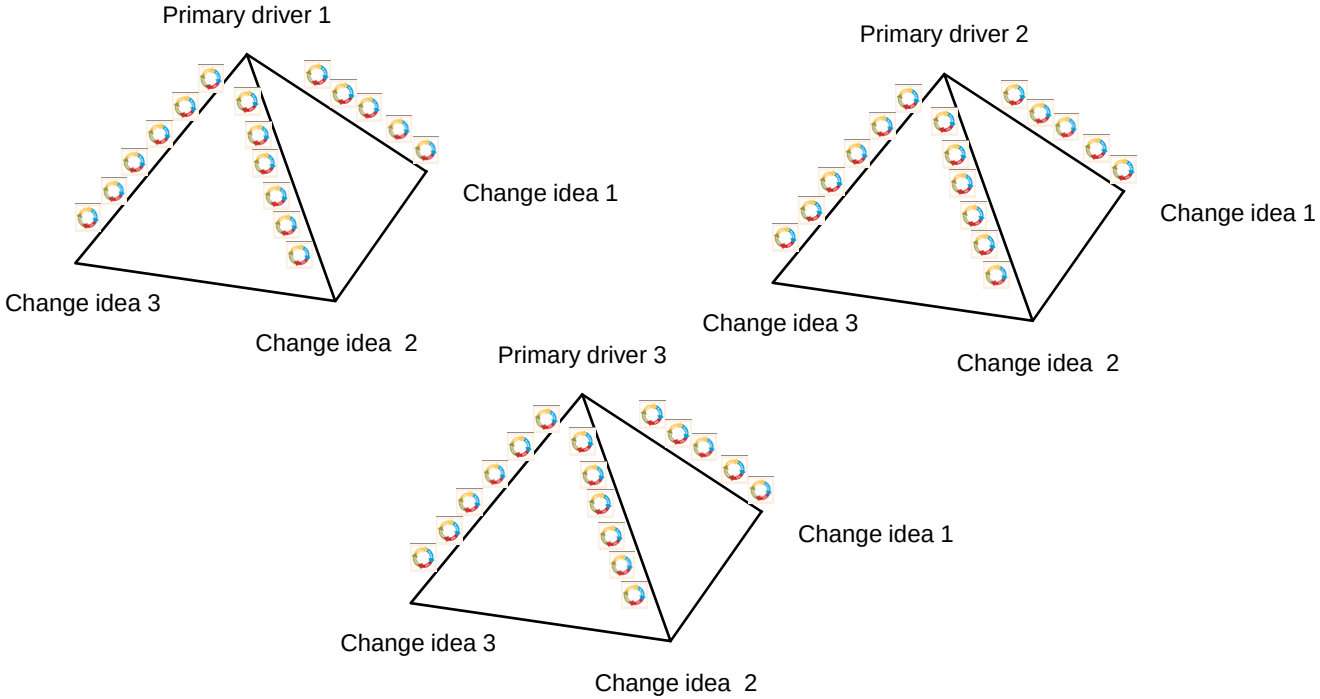
Why prediction?

- Prediction combined with a learning cycle interrogates our understanding of a system.
- It reveals gaps in our knowledge and provides us a starting place for growth.
- Without it, our learning is accidental at best, but with it we are able to direct our efforts toward building a more complete picture of how things work in the system.

Scale of PDSA cycle



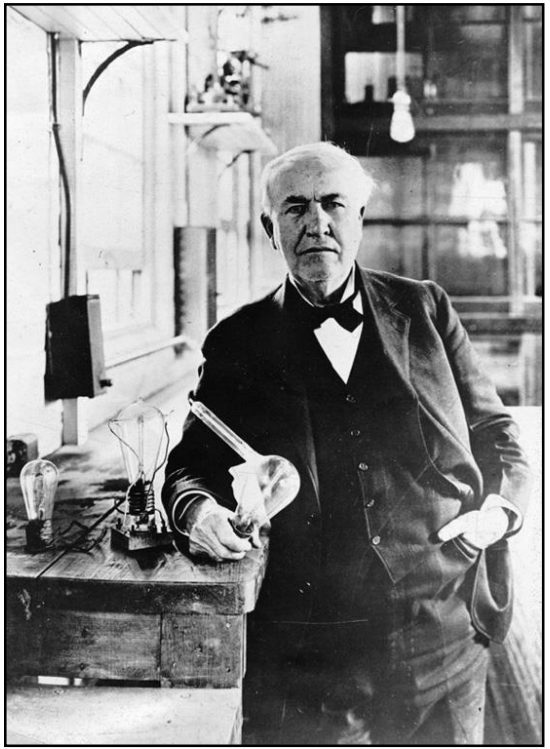
Multiple PDSA

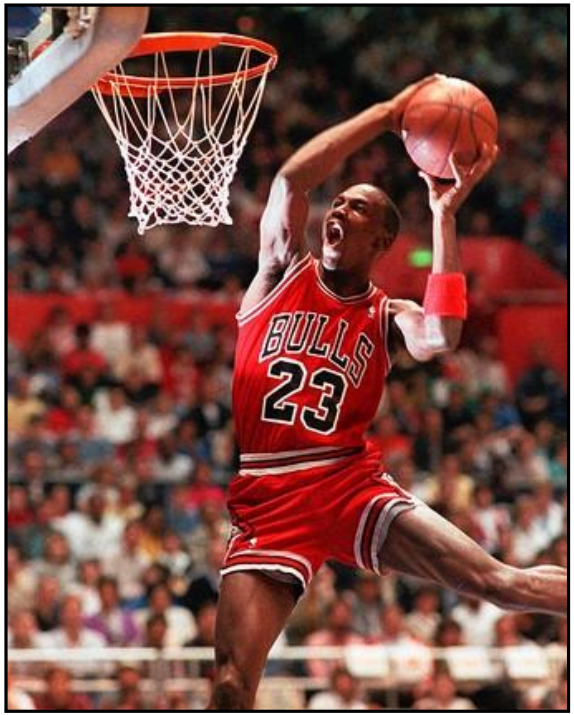


The value of “failed” tests

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

Thomas Edison





"I missed more that 9000 shots in my career. I've lost almost 300 games.

26 times I've been trusted to take the game-winning shot… and missed.

I've failed over and over and over again in my life.

And that is why... I succeed."

Michael Jordan

I hear and I forget.

I see and I remember.

I do and I understand.

Confucius

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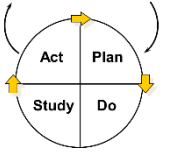
Model for Improvement

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: To have zero tantrum from my son during the international flight from Auckland to Delhi on 22 December 2016

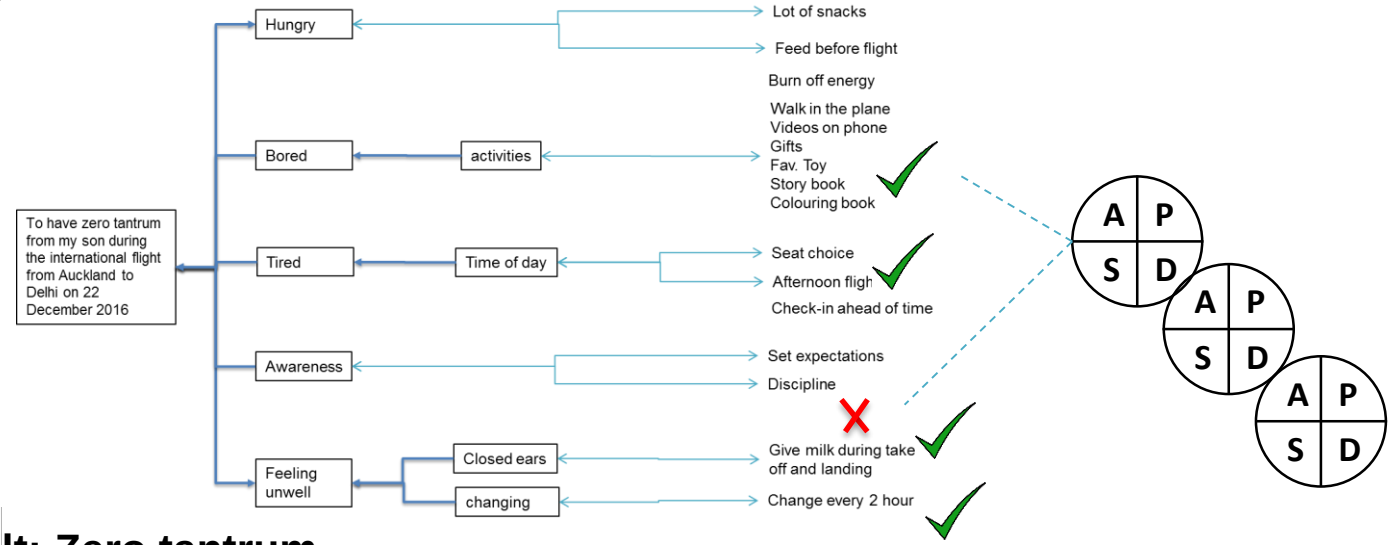
Measure:

Outcome: Number of tantrums, Total time to control the tantrum

Process:

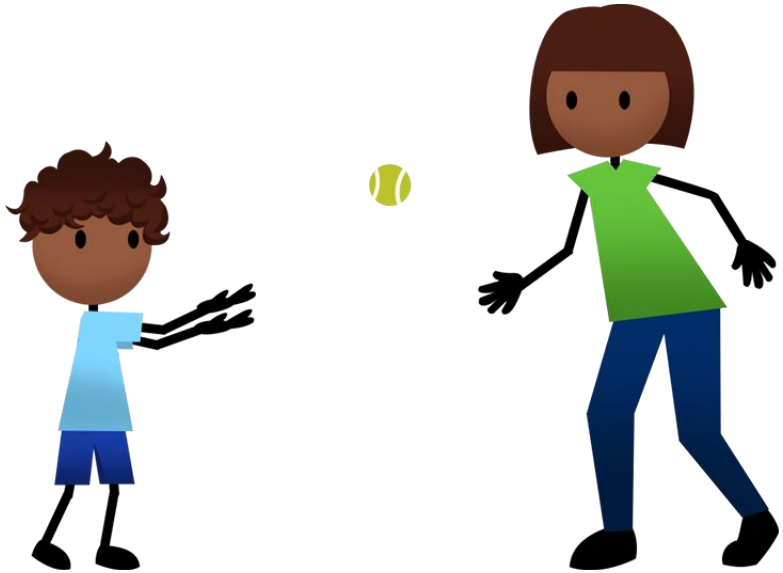
Balancing: My sleep

Theory of change



Result: Zero tantrum

Lessons learnt: Didn't plan for over excitement, Flight timing worked well,



Tennis ball exercise

Breakout

- Assign a time keeper/ball drop counter
- Identify birth date for each person in your group
- Your current process involves tossing the tennis ball provided from person to person, **following the sequence provided**
- Sequence: pass the ball in ascending order of birth date. Don’t leave your location.
- Practice your process one time – Time keeper please time how long the team takes to complete the process and the number of times they drop the tennis ball
- Facilitator will announce the start of first cycle after one round of practise.

Rules

1. Ball must pass both hands of each participant.

2. Fastest time to pass the ball through both hands of all group participants is the desired goal.

3. If ball comes into contact with the ground, prior to touching both hands of all participants the process must start over for all participants.

4. Time starts when called by referee.

5. You may not physically alter the shape, color or surface of the ball.

Break out Exercise

- Team Aim: We aim to reduce the time taken for every person to touch the ball from X to Y. We also aim to reduce our ball drops from A to B.

- Form a theory, come up with change ideas, and use the PDSA to test those ideas
- Rules:
  - The initial sequence as provided must be adhered to
  - You may only test one change idea at a time

Test Cycle #	Change idea	Time in seconds	Ball drops
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

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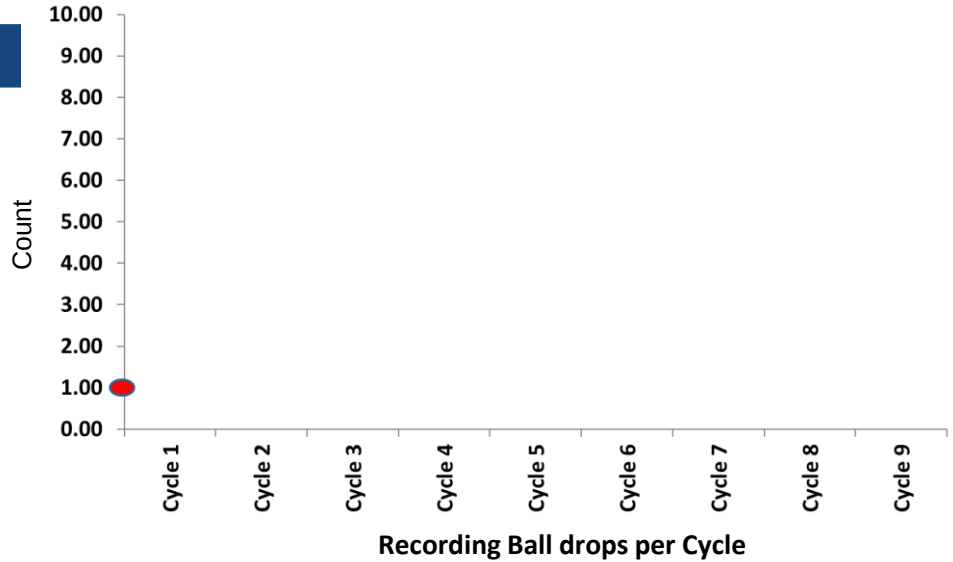
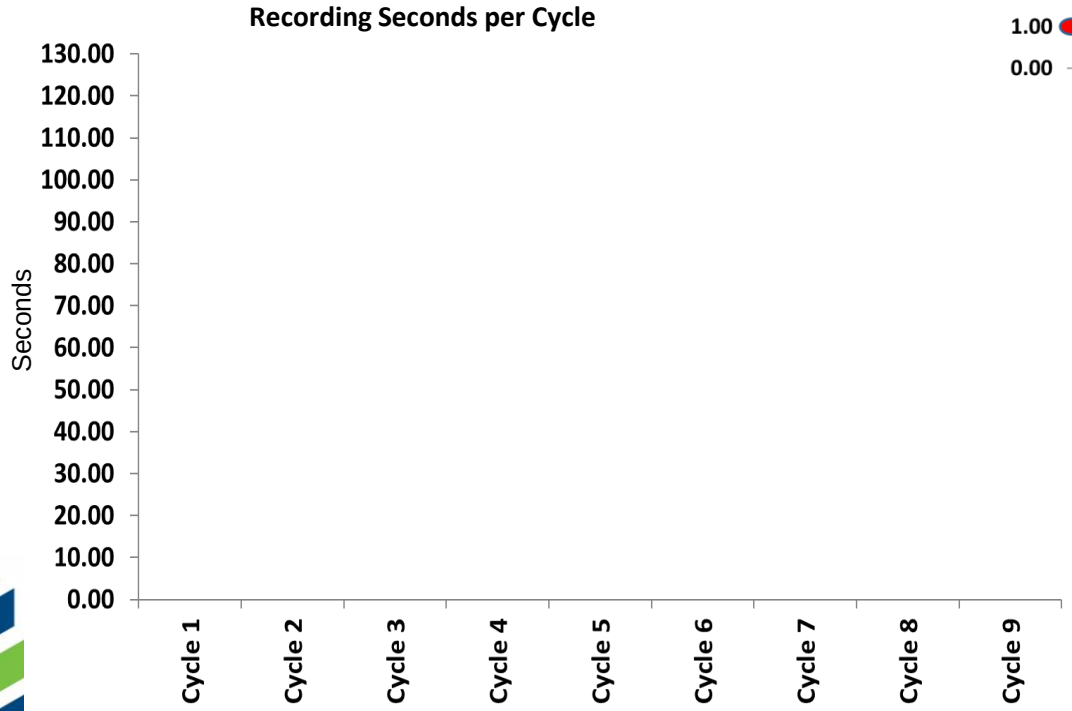
Graph the data





Q & A

Part of a suite of complimentary resources

From knowledge to action: A framework for building quality and safety capability in the New Zealand health system (Health Quality & Safety Commission 2016b)

Governing for quality: A quality and safety guide for district health boards (Health Quality & Safety Commission 2016c)

Engaging with consumers: A guide for district health boards (Health Quality & Safety Commission 2015b)

Improving Together e-Learning modules (Ministry of Social Development, Ministry of Education, Ministry of Health and Health Quality & Safety Commission 2015)

https://www.hqsc.govt.nz/our-programmes/improving-leadership-and-capability/publications-and-resources

Thank you

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