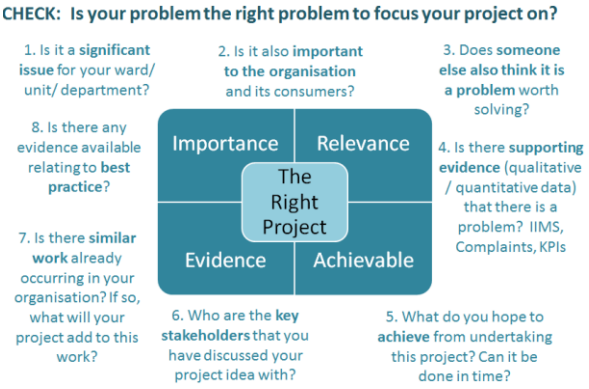
Improvement Science Step by Step Cheat Sheet

More information at CEC Website: http://www.cec.health.nsw.gov.au/quality-improvement/improvement-academy/quality-improvement-tools

Reference: The Improvement Guide (2nd Edition) by G. Langley, R. Moen, K. Nolan, T. Nolan, C. Norman & L. Provost

Step 1. Define the problem you want to fix



Common errors in selecting quality improvement projects

- No one is **interested** in the problem
- Selecting a **solution** to implement rather than a **problem to investigate**
- Selecting a process in **transition** – ie manual to electronic process
- Selecting an entire system to study, not a **process**
- Not defining a **manageable scope** of the project ie too large
- Selecting a problem **beyond your authority** or outside your influence

TASK: On a piece of butchers paper start your Driver Diagram. Document the *problem* in the top left corner.

Step 2. Teams: i) Sponsor ii) Project Team

Sponsors

- **High level manager/s** - who do not work directly on the project, but can provide support and guidance for the project.
- You will report your project progress to your Sponsors on a regular basis (maybe every 2 months).

Project Team

- **Gather people with the right expertise**
  - ✓ People from all **areas of the process** under review
  - ✓ Ensure it's an **Interdisciplinary** team
  - ✓ Include a **Consumer** (or interview 3 consumers)
  - ✓ Include a **Quality Advisor**
  - ✓ Appoint a **Team Leader**

TASK: Document the names / positions of the people you will have as your (i) Sponsor/s and (ii) Project team members in the bottom left corner of your DD.

Step 3. SMART Aim Statement

Remember:

- Include a **stretch goal** and a **timeframe** ie: how much and by when.
- Do NOT put the 'solution' in the Aim statement.
- 'Some' or 'better' is not a measure and 'soon' is not a time frame.

Example: *"By 30th June, 100% of elective surgery patients will be screened for anaemia pre-operatively."*

An Aim Statement can be developed when the team has agreement about the problem they want to improve and they have confirmation that:

- it is a significant issue
- others agree it is a problem worth investigating, and
- there is supporting evidence that it's a problem (qualitative/quantitative data).

An Aim Statement needs to follow the SMART criteria and:

- clearly state **what** you are trying to accomplish
- focus on a **measurable outcome**
- include a **'Stretch Goal'** – an *aspirational* target that is achievable

Check that your Aim statement specifies a:

- Timeframe ie: "Within 6 months" or "by 30th August"
- Stretch Goal ie: "100% of patients will have …"
- Criteria - What are you trying to fix?
- Scope – the target population ie: "Hospital X" or "Ward Y".

REMEMBER: An Aim statement should **NOT** include a 'solution'.

TASK: Document your SMART Aim statement on the left side of your DD.

Step 4. Literature Review

What key words will you search on?

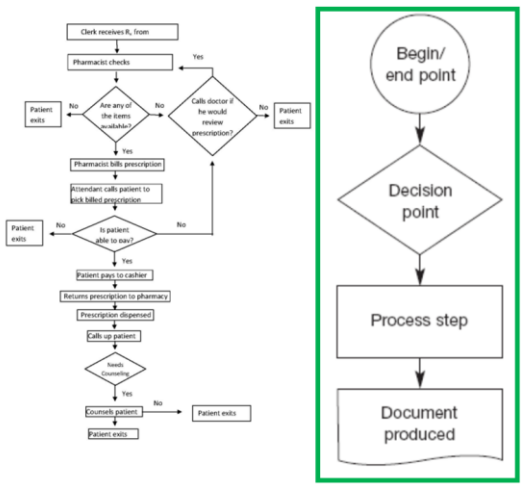
A literature search is essential to help you:

- identify best practices for the problem under review
- prevent reinventing the wheel
- Ideas for measurement

Time efficiency - 1 or 2 team members perform this task

TASK: On a different piece of paper, document the words you would search on for your literature review (top 5 words).

Step 5. Flow Chart the current process & collect Diagnostic Data



A Flow Chart (Process map) is a diagram showing each step and decision in a process.

When a team flow charts the patient journey through the process under review, it allows for a common understanding of the steps and decisions made by staff and consumers. A Flow chart also identifies gaps, variations, unreliability, bottlenecks, areas of concern and opportunities for improvement. A flow chart can also highlight areas where **data may need to be collected** to demonstrate the current reliability of particular steps in the process (**BASELINE / DIAGNOSTIC DATA – use Run Charts, Pareto Charts and Histograms**).

On Butchers paper, construct a Flow Chart of the <u>CURRENT</u> process by stating the journey from:

- From start (top of page) to finish (bottom)
- Every step & every decision
- Each step ask '*Does this usually happen*?'
- Then highlight areas where data needs to be collected.

REMEMBER: Flow chart the ***<u>current</u>*** process (do NOT chart what you think 'should' happen – you can do that later as part of your 'Change Ideas').

TASK: On another piece of butcher's paper, draw a Flow Chart of the current process. Then highlight areas where data needs to be collected to determine how reliable the process is (**BASELINE / DIAGNOSTIC DATA**).

Step 6.1 Brain Storm with 'post it notes' the CAUSES of the problem

Source: NSW Health GEM Workstar – CPI module.

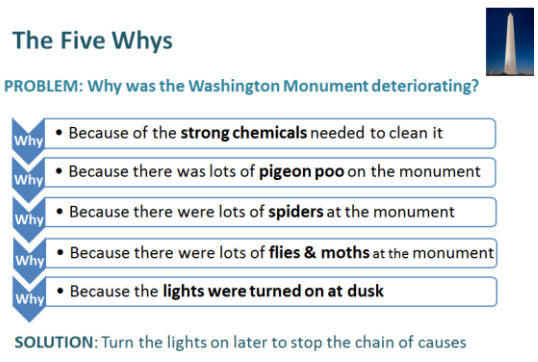
Brain Storm in silence with 'post it notes' is an effective way of quickly generating ideas from all team members.

TASK:

1. Participants write (**in silence**, to cut through the authority gradient) on '**post it notes' all the reasons / causes they can think of that contribute to the problem** (do NOT brainstorm the Change Ideas / solutions):
   - one idea per 'post it note'
   - use as many 'post it notes' as needed
   - ideas need to be specific (phrases) e.g. "Education" although a good idea, is not specific enough. It needs to be "education not available to staff", "education not available to patients", "materials provided for education inadequate" etc.
   - To assist with brainstorming think of issues around: Environment, People/staff, Materials, Machines / Equipment, Methods, Measures, Communication, Patient, Policies/ Procedures, process, Education, Documentation, Supplies etc
2. Stick the 'post it notes' on a **flat surface** eg: onto the Driver Diagram (butchers paper)

6.2 Brain storm using Five Whys

The **5 Whys** is a technique to find the root cause of a problem



TASK: When you are brainstorming in silence consider using the 5 Whys technique to try and drill down to the *root cause* of the problem.

1. State the PROBLEM and ask 'WHY' does it exist?
2. Document the ANSWER and ask 'WHY' does it exist?
3. Repeat 5 or more times until you reach the ROOT CAUSE.

In summary:

- When attempting to solve a problem, a common error is to **stop too soon** when you're **hunting down the 'cause'**.
- People keep taking the first or second simple answer, **blinded by the symptoms** or settling for the first 'apparent' cause.
- The 1st 'cause' offered is ***almost never* the real root cause.**
- And it's only when you find the **real cause/s** - not just symptoms -- that you can **take really effective action** to remove the cause and prevent the problem cropping up again.
- It's important to note that the purpose of the 5 whys **isn't to place blame**, but rather to **uncover the root cause** of why something unexpected occurred.

Source: Mapwright www.mapwright.com.au/5-whys-method.html

Step 7.1 Affinity Diagram – sort 'Post it Notes' into categories & assign Headings

Category Headings = Primary Drivers

Causes = Secondary Drivers

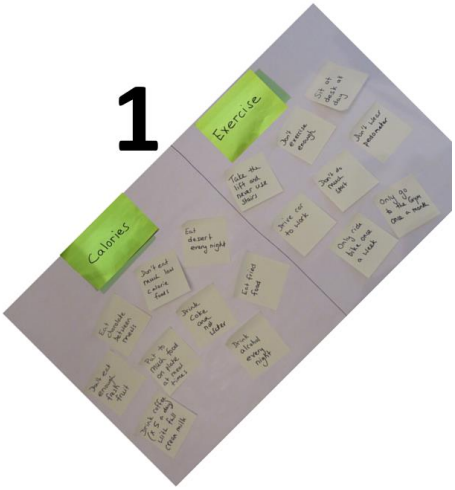
The **Affinity Diagram** process follows brainstorming. After brainstorming the 'post it notes' are in no particular order. The team needs to **sort them into categories.**

TASK:

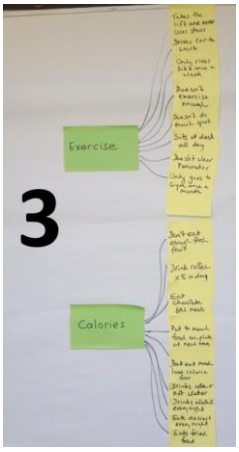
1. Team members silently begin to read and then **arrange the 'post it notes' into categories** (similar care processes, themes or pathways). You will generally have between 2 and 6 categories.
2. A **HEADING** is assigned to each category at the end of this process (write headings on a new 'post it notes').
3. Re-read all the 'post it notes' & **remove any double ups.**

The **Category Headings become 'Primary Drivers'** and the 'post it notes' under each heading are your **'Secondary Drivers'**.

Step 7.2 Spin the Affinity Diagram on its side to form a Driver Diagram



TASK: Re-arrange the 'post it notes' (Primary & Secondary drivers) so that they are in vertical columns then draw the relationship arrows from the secondary to the primary drivers. Remember, some secondary drivers may have relationships with several primary drivers.

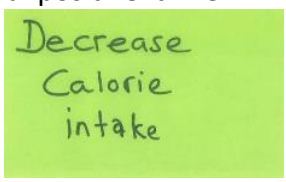


OPTIONAL STEP

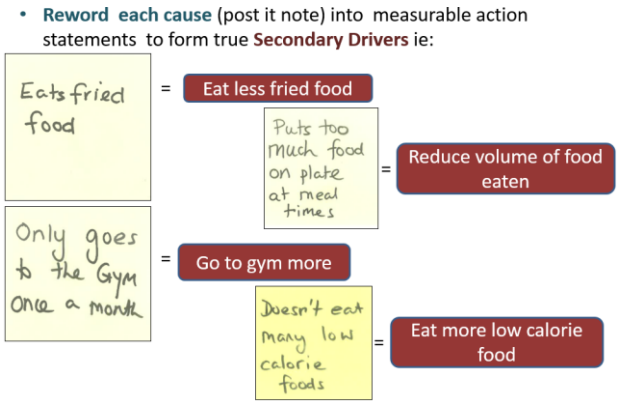
Step 8. Re-word each Primary & Secondary Driver

Was…

Re-word to a 'positive' driver



OPTIONAL: Wording of both Primary & Secondary Drivers: The wording of all 'post it notes' needs to be converted to 'drivers' ie: action or improvement statements – 'How to improve…'. Use words such as increase/decrease; improve; commence/cease etc.



Step 9: Brainstorm Change Ideas

Brainstorm Change Ideas (interventions to test via PDSA) for **each** secondary driver.

- For each secondary driver, the team brainstorms (or researches from literature) **specific Change Ideas to address** the driver
  - **WHAT exactly** are you going to do **next week / next month**
  - **HOW exactly** are you going to do it?
- Pass a 'talking stick' around to team members to give each person a say about Change Ideas.
- TASK: Document Change Ideas in the DD and draw relationship arrows to all relevant secondary drivers (some Change Ideas may have relationships with several secondary drivers)

OPTIONAL STEP

Step 10: Assess Priority of Change Ideas

Impact: High Low

Implementation: Easy Hard

You have many Change Ideas (possible solutions) – which ones will you test / implement first via a Plan Do Study Act (PDSA) cycle?

TASK Assess each Change Idea for:

- **Ease of Implementation** – will it be **Easy** or **Hard** to implement?
  - Will it cost a lot $$$?
  - Can it be done next week?
  - Will it take: hours, weeks or months to embed?
  - Will many people have to be re-trained / educated?
- **Impact on the Aim** – will it have **High** or **Low** impact on the **Aim Statement**?
  - How much will the Change Idea **effect** the:
    - Problem
    - Aim statement
    - Outcome measures

NB: Just because a Change Idea maybe considered **Hard** to implement does not mean it should be a low priority PDSA. Some of the **Hard** interventions maybe the most important ones to test.

Step 11: Devise Measures

Outcome Measure:

- *How much: Reduce weight by 40 kg*
- *By when: 12 months*

Process Measure:

- ***How much:** Reduce calorie intake by 60%*
- ***By when:** 4 months*

Balancing Measure:
How much: Arrive at work on time (9am) 100 % of time .
By when: 1 month

TASK: Review the primary & secondary drivers to decide what measures you will use (data) which will demonstrate the impact of the PDSAs.

Outcome Measure: *Direct impact on the aim*

- ***How much:***
- ***By when:***

Process Measure: Indirect impact on the aim

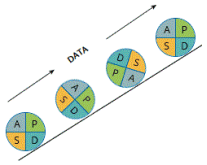
- ***How much:***
- ***By when:***

***Balancing Measure**: - a 'side effect', 'knock on effect', 'barrier' or area to 'watch'*

- ***How much:***
- ***By when:***

Also consider **Diagnostic Measures** that assist you to diagnose the causes of / reasons for the problem (can graph in a Pareto Chart or Histogram)

Step 12. Test Change Ideas via a PDSA cycles / PDSA Ramps



Source: www.ihi.org

Conduct small tests of change using the PDSA concept on relevant (high priority) Change Ideas. Find a friend to conduct the initial PDSA on, then progress to 1 patient, 3 patients, 5 patients etc. *Implementation* of the new process cannot occur until the new process is highly *reliable.*

Four stages of a PDSA:

1. Plan **your change:**
   - **What** you are going to change?
   - **What** do you **predict** will happen?
   - **Who** is going to do it?
   - **When** & **where** will it be done?
   - **Data**: How will you **measure it?**

2. **Carry out your change** and observe & measure

3. **Study the data** & anecdotes

4. **Act on the data:** What will you do in the next PDSA Cycle?

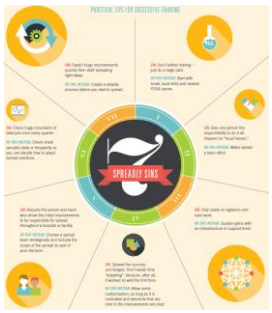
Step 13. Data Collection & Measuring Impact

Will you use quantitative or qualitative data?
How, who, when & where will you collect your data?

Consider the graphs you will use to plot your data and help you better understand the process ie

- Tally Sheet - to collect your data
- Run charts
- Control Charts
- Pareto Charts (for diagnostic stage)
- Histograms (for diagnostic stage)

Step 14: Sustaining the Gains & Spreading the Improvement



Source: www.ihi.org

Spreading the Improvement

ACTIVE SPREAD:

- Do you have a plan to roll out your project in other areas?

PASSIVE SPREAD:

- ACI Innovation Exchange http://www.aci.health.nsw.gov.au/ie
- Quality Awards
- Present at conference
- Poster
- Journal article

Complete the British NHS Sustainability Survey and score your project? The closer the score to 100, the better chance of successful sustainability

Review the IHI *Seven Spreadly Sins* to ensure you have the correct approach via http://www.ihi.org/resources/Pages/Tools/IHISevenSpreadlySins.aspx

Source: NSW Health GEM Workstar – CPI module. www.ihi.org

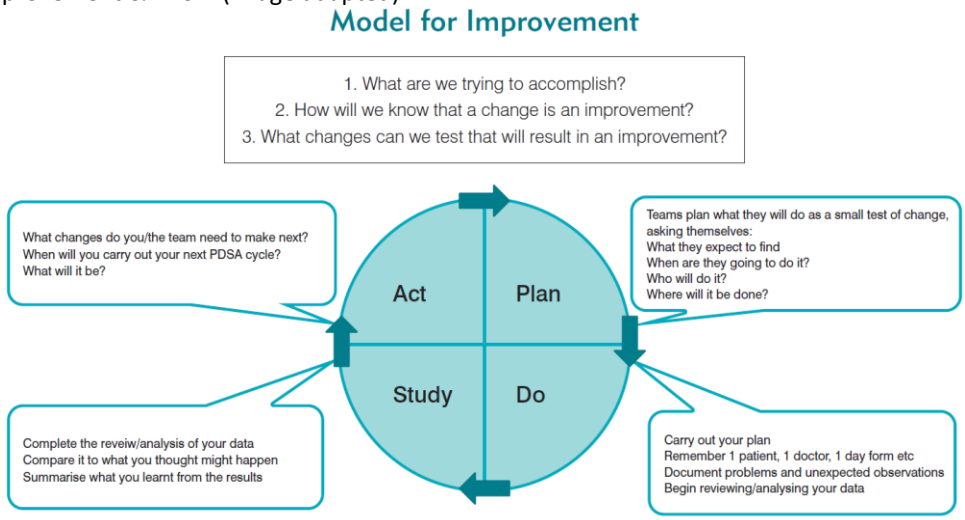
The Model for Improvement & PDSAs

Numerous improvement methodologies are used nationally and internationally, to improve processes of care or patient outcomes. Improvement Science is a commonly used methodology to address identified problems in the clinical area. It involves identifying, defining and diagnosing a problem, before developing change ideas and implementing interventions that may address the identified issues. Change ideas are then tested using small-cycle testing called "Plan, Do, Study, Act" (PDSA) cycles. (1) (2)

It is important to measure the impact of changes in order to verify that your interventions have made a difference. PDSA cycles were originally known as the Shewhart cycle, "Plan, Do, Check, Act", and based on manufacturing models. They were later modified by Edwards Deming to PDSA cycles. (3)

There are three main concepts to consider when undertaking improvement. This is demonstrated well with the Model for Improvement below. (1) (2) This model was developed by Associates for Process Improvement and is used by the Institute for Healthcare Improvement (IHI) as their framework to guide improvement work. (4)

Figure 1: Model for Improvement & PDSA (image adapted)



VIDEOS

Consider watching these short videos from the IHI:

1. **Model for Improvement Part 1** - 3 minute video http://www.ihi.org/education/IHIOpenSchool/resources/Pages/AudioandVideo/Whiteboard3.aspx
2. **Model for Improvement Part 2** - 3 minute video http://www.ihi.org/education/IHIOpenSchool/resources/Pages/AudioandVideo/Whiteboard4.aspx
3. **PDSA Part 1** - 4 minute video http://www.ihi.org/education/IHIOpenSchool/resources/Pages/AudioandVideo/Whiteboard5.aspx
4. **PDSA Part 2** – 4 minute video http://www.ihi.org/education/IHIOpenSchool/resources/Pages/AudioandVideo/Whiteboard6.aspx

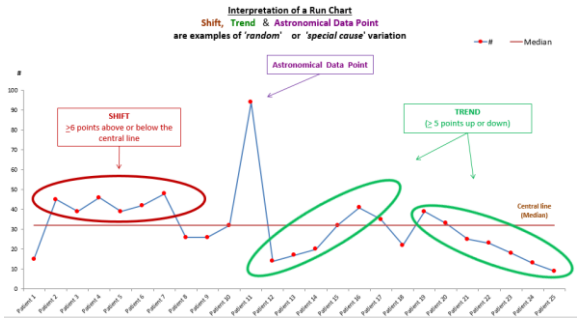
REFERENCES

1. Nolan T, Resar R, Haraden C, Griffi n FA. Improving the Reliability of Health Care. IHI Innovation Series white paper. 2004; Boston: Institute for Healthcare Improvement. Available from: http://www.ihi.org/resources/pages/ihiwhitepapers/improvingthereliabilityofhealthcare.aspx
2. Langley GJ, Moen RD, Nolan KM, Nolan TW, Norman CL, Provost LP. The Improvement Guide: A Practical Approach to Enhancing Organizational Performance 2009.
3. Moen RD, Norman CL. Circling Back: Clearing up myths about the Deming cycle and seeing how it keeps evolving. Quality Progress. American Society for Quality, November, 2010 Available from: http://www.apiweb.org/circling-back.pdf
4. How to Improve [internet]. Cambridge MA: Institute for Healthcare Improvement; 2016. Available from: http://www.ihi.org/resources/Pages/HowtoImprove/default.aspx

Charts to consider for Outcome, Process, Balancing and Diagnostic Measures

Reference: The Health Care Data Guide - Learning from Data for Improvement by Lloyd Provost & Sandra Murray

Run Chart



A **Run Chart** shows the manner in which measurement (data points) vary over time or between observations. An annotated run chart includes explanations of the shifts or trends in the data points and where change ideas have been tested via PDSA cycles. A Run Chart works best if there are **10** or more data points. There are **Run chart rules** which help you interpret the data:

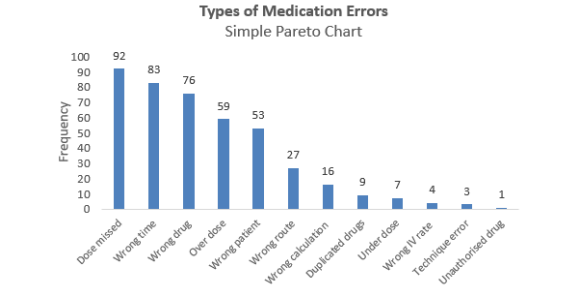
1) Trend (≥5 data pts up or down),
2) Shift (≥6 data points above or below the center line),
3) Astronomical data point &
4) Too many, Too few runs.

A run chart is an effective tool to graph Outcome, Process & Balancing measures.

See the CEC Website for more information about **Run charts**, Run Chart Rules and an Excel template for you to download and start plotting your data: http://www.cec.health.nsw.gov.au/quality-improvement/improvement-academy/quality-improvement-tools/run-charts

Monthly WebEx's are held to explain Run Charts. Dates of WebExs are at the "Get Involved" section of CEC Website: "*Introductory Webex on run charts, Pareto Charts and Basic measurement*" http://www.cec.health.nsw.gov.au/get-involved/events-and-webinars/calendar

Pareto Chart

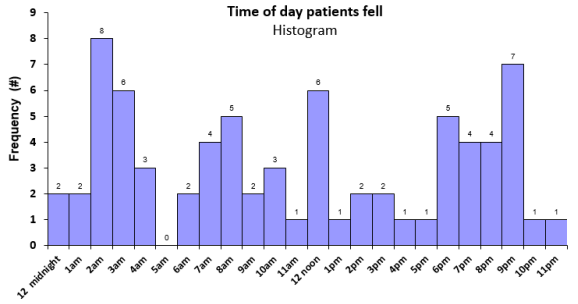


A **Pareto Chart** is a very powerful tool for showing the relative importance of problems. It's a bar chart in descending order. Information can be collected initially in the form of a Tally Sheet via an audit and the data displayed in a Pareto Chart. A more complex Pareto chart with a cumulative and 80% line can also be used. A Pareto Chart is an effective tool to assist you in **diagnosing the causes of your problem**. It also works best if there are at least **30** observations.

See the CEC Website for more information about Pareto charts and an Excel template for you to download and start plotting your data. Pareto chart: http://www.cec.health.nsw.gov.au/quality-improvement/improvement-academy/quality-improvement-tools/pareto-charts

Monthly WebEx's are held to explain Pareto Charts. Dates of WebExs are at the "Get Involved" section of CEC Website: "*Introductory Webex on run charts, Pareto Charts and Basic measurement*" http://www.cec.health.nsw.gov.au/get-involved/events-and-webinars/calendar

Histogram

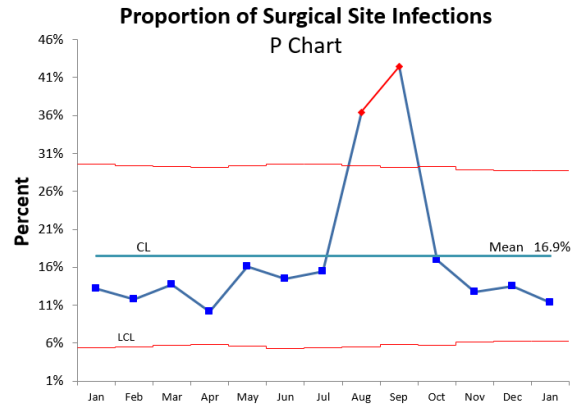


A **Histogram** is a bar graph of the frequency distribution of measurements. The information can be collected in the form of a Tally sheet initially and then displayed in the form of a Histogram that will effectively highlight the interval that is most frequently occurring. A Histogram works best if there are at least **30** observations. It is an effective tool to assist you in **diagnosing your problem.**

See the CEC Website for more information about Histograms and an Excel template for you to download and start plotting your data. Histogram: http://www.cec.health.nsw.gov.au/quality-improvement/improvement-academy/quality-improvement-tools/histogram

Monthly WebEx's are held to explain Histograms. Dates of WebExs are at the "Get Involved" section of CEC Website: "*Introductory Webex on run charts, Pareto Charts and Basic measurement*" http://www.cec.health.nsw.gov.au/get-involved/events-and-webinars/calendar

Control Chart



ADVANCED MEASUREMENT A **Control Chart**, also known as a Shewhart Control Chart or Statistical Process Control Chart (SPCC) is a chart used to determine if a process is in a state of statistical control or how much variation exists in the data / process. Like a Run chart, the Control Chart is a graph of data over time. It uses a center line (mean) and control limits (sigma limits) to determine if the data is displaying *common* or *special* cause. The sigma limits are used to determine the Upper Control Limit (UCL) and Lower Control Limit (LCL) and are usually set at 3 sigma limits above/below the mean. A Control Chart works best if there are at lease **20** data points. **Control Chart Rules** help you interpret the data:

1) Trend (≥6 consecutive data points all going up or down);
2) Shift (≥8 consecutive data points above or below the center line);
3) Two out of 3 consecutive data points near (outer one-third) of control limit;
4) A single point outside the control limits;
5) Fifteen (15) consecutive data points close to the center line (in inner one-third of chart).

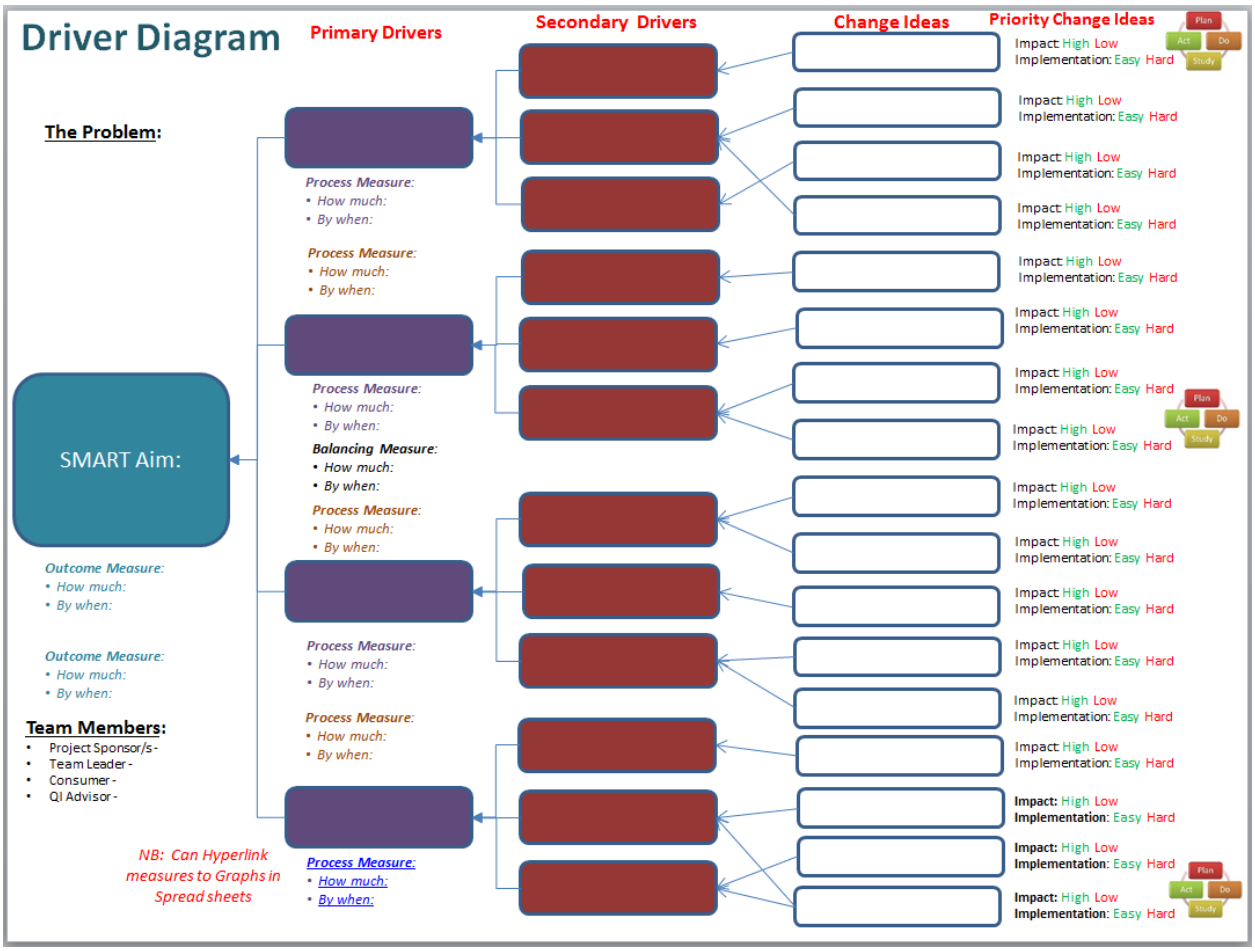
There are specific Control Charts for different types of data / situations:

- **Discrete (Attribute) data** (non-conformities or defects): C Chart (# of incidents), U Chart (rate per 1000…), P Chart (%), T Chart (time between rare incidents) and a G Chart (number of events between rare incidents).
- **Continuous data** (measures): I Chart (AKA X Chart) & X Bar Chart used to graph data such as time (minutes, hours, days, LOS), $, volume (# surgeries, patients seen in a clinic), height, weight, temperature etc.

Special software is required to easily produce Control Charts ie: Minitab, IHI QI Charts or QI Macros etc.

Advanced Measurement Workshops are held several times a year at the CEC to teach participants how and when to use Controls Charts and how to interpret the data. Dates of workshops are at the "Get Involved" section of CEC Website: http://www.cec.health.nsw.gov.au/get-involved/events-and-webinars/calendar

Driver Diagram Starter kit and Template at: http://www.cec.health.nsw.gov.au/quality-improvement/improvement-academy/quality-improvement-tools/driver-diagrams



References

- **You Tube videos from NHS Improving Quality:**
  - NHS Improving Quality - Driver Diagrams Lesson 1 of 3 Introduction https://www.youtube.com/watch?v=2mBpJIzzYI8
  - Driver Diagrams- Lesson 2 of 3- Reasons to use driver diagrams https://www.youtube.com/watch?v=xXRym4aFLa4
  - Driver diagrams Lesson 3 of 3 How to develop a driver diagram https://www.youtube.com/watch?v=BhY-rw9ejDk
- **Driver Diagram References:**
  - http://www.institute.nhs.uk/quality_and_service_improvement_tools/quality_and_service_improvement_tools/driver_diagrams.html
  - http://www.institute.nhs.uk/quality_and_service_improvement_tools/quality_and_service_improvement_tools/driver_diagrams.html#sthash.GNk7SHIo.dpuf
  - http://www.institute.nhs.uk/quality_and_service_improvement_tools/quality_and_service_improvement_tools/driver_diagrams.html#sthash.Kfs7TJjL.dpuf
  - http://www.kingsfund.org.uk/projects/pfcc/driver-diagrams
  - http://www.institute.nhs.uk/quality_and_service_improvement_tools/quality_and_service_improvement_tools/driver_diagrams.html
- **PDSA References:**
  - http://www.ihi.org/resources/Pages/HowtoImprove/ScienceofImprovementTestingChanges.aspx

Source: NSW Health GEM Workstar – CPI module. www.ihi.org
For feedback regarding this document please contact Wendy Jamieson at the CEC wendy.jamieson@health.nsw.gov.au – Version Date: 24th June, 2018

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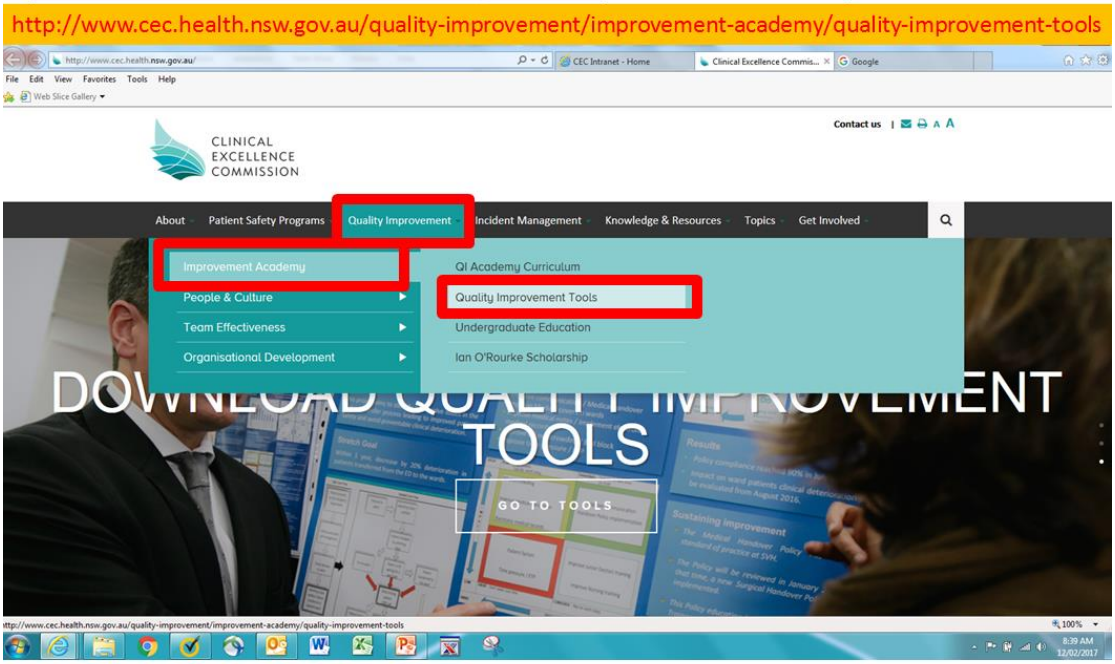
Navigating the CEC Website

www.cec.health.nsw.gov.au

How to find the QI Academy Web pages

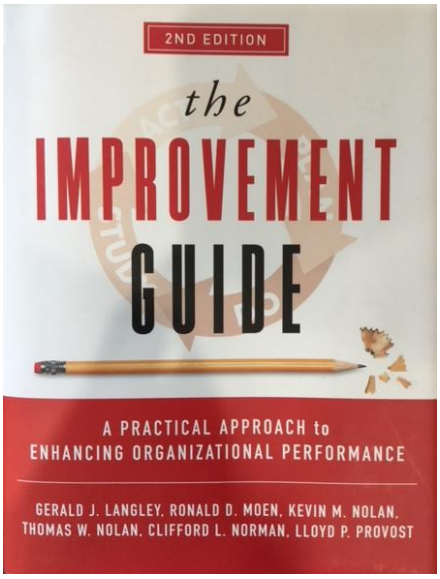
CEC Quality Tools Web Site & your Excel Templates

www.cec.health.nsw.gov.au - *save as a favourite*

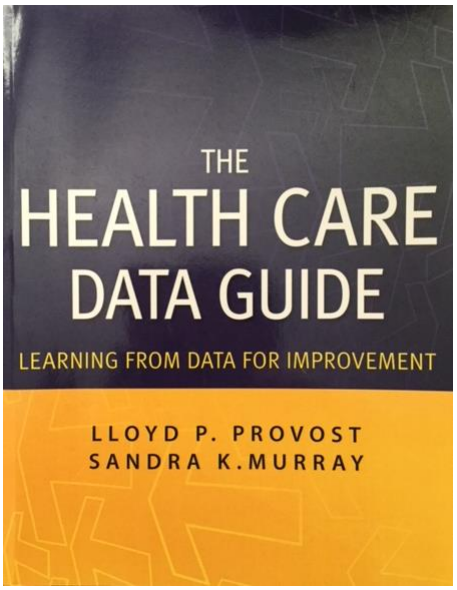


References

Excellent books you may want to consider purchasing if you want to learn more



The Improvement Guide (2nd Edition)
by G. Langley, R. Moen, K. Nolan, T. Nolan, C. Norman & L. Provost



The Health Care Data Guide. Learning from Data for Improvement
By Lloyd Provost & Sandra Murray