Step 1. Define the problem you want to fix

CHECK: Is your problem the right problem to focus your project on?
- Is it a significant issue for your ward/unit/department?
- Is it also important to the organisation and its consumers?
- Does someone else also think it is a problem worth solving?
- Is there any evidence available relating to best practice?
- Is there similar work already occurring in your organisation? If so, what will your project add to this work?
- Who are the key stakeholders that you have discussed your project idea with?
- What do you hope to achieve from undertaking this project? Can it be done in time?

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

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).

Tip: discuss “what would success look like” with your team and “how will we measure it”. This will help shape your aim statement.

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
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 CURRENT 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?’
- Themes to help brainstorming further - Are any of the causes of the problem to do with: Education, Communication, Environment, People/staff, Materials, Equipment / Machines, Measures, Policies, Documentation, Supplies etc...
- Highlight areas where data needs to be collected.

REMEMBER: Flow chart the current process (do NOT chart what you think ‘should’ happen – you can do that later as part of your ‘Change Ideas’). You may find you want to change your Aim Statement / problem to work on after you have completed your flow chart as the problem may not exist or be as serious as you initially thought.

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 ‘Sticky notes’ the CAUSES of the problem

Brain Storm in silence with ‘Yellow Sticky 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 ‘sticky notes’ all the reasons / causes they can think of that contribute to the problem (do NOT brainstorm the Change Ideas / solutions):
   - one idea per ‘sticky it note’
   - use as many ‘sticky 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 ‘sticky notes’ on a flat surface eg: onto the Driver Diagram (butchers paper)

Step 6.2 Brain storm using Five Whys

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

**The Five Whys**

PROBLEM: Why was the Washington Monument deteriorating?

- Because of the strong chemicals needed to clean it
- Because there was lots of pigeon poo on the monument
- Because there were lots of spiders on the monument
- Because there were lots of flies & moths at the monument
- Because the lights were turned on at dusk

SOLUTION: Turn the lights on later to stop the chain of causes

**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 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.

Step 7.1 Affinity Diagram – sort ‘Sticky Notes’ into categories & assign Headings

The Affinity Diagram process follows brainstorming. After brainstorming the ‘sticky 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 ‘sticky 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 ‘sticky notes’).
3. Re-read all the ‘sticky notes’ & remove any double ups. The Category Headings become 'Primary Drivers' and the ‘sticky 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 ‘sticky 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 ‘sticky 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.

- Reword each cause (post it note) into measurable action statements to form true Secondary Drivers ie:

  - Eat less fried food
  - Put too much food on plate at meal times
  - Only goes to the Gym once a month
  - Doesn’t eat many low calorie foods
  - Eat more low calorie food

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**

**Implementation:** Easy or Hard  
**Impact:** High or Low

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:** '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)

**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 12: Test Change Ideas via a PDSA cycles / PDSA Ramps**

**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 or Statistical Process Control Charts
- Pareto Charts (for diagnostic stage)
- Histograms (for diagnostic stage)
- Scatter plots (for diagnostic stage)
Step 14: Sustaining the Gains, Scale-up & Spreading the Improvement

**SUSTAIN THE GAINS:** Do you have a plan to ensure the improvement is not lost? Do you have a plan to continue with measurement?

**SCALE UP:** Have you tested the new process during the evening and night shift?

**ACTIVE SPREAD:**
- Do you have a plan to roll out your project in other areas?

**PASSIVE SPREAD:**
- 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](http://www.ihi.org/resources/Pages/Tools/IHISevenSpreadlySins.aspx)

**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)

1. **Figure 1:** Model for Improvement & PDSA (image adapted) (also see CEC Clinician’s Guide to Quality & Safety page 5)

![Model for Improvement](image)

**REFERENCES**

- How to Improve [Internet]. Cambridge MA: Institute for Healthcare Improvement; 2016. Available from: [http://www.ihi.org/resources/Pages/HowToImprove/default.aspx](http://www.ihi.org/resources/Pages/HowToImprove/default.aspx)
- CEC Clinician’s Guide to Quality & Safety page 5

**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](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](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](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](http://www.ihi.org/education/IHIOpenSchool/resources/Pages/AudioandVideo/Whiteboard6.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

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**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. Like values do not add or break a trend.
2. **Shift:** >6 data points above or below the center line. Values on center line do not add to or break a shift.
3. **Too Many or Too Few runs:** Use table to calculate (see next page). Too Few runs can be a signal of improvement. Too Many (Saw Tooth) can indicate there are 2 separate processes (may need to stratify data or use 2 separate Run charts).
4. **Astronomical data point:** outlier

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:


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**Pareto Chart**

A Pareto Chart is a very useful 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:


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**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:


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**Control Chart**

APPLIED 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 (similar to 3 Standard Deviations). A Control Chart works best if there are at least 12 data points (20 data points for I Charts and Xbar&S Chart). Control Chart Rules help you interpret the data:

1. **Trend:** >6 consecutive data points all going up or down. Like values do not add or break a trend.
2. **Shift:** >8 consecutive data points above or below the center line. Values on center line do not add to or break a shift.
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 (inner one-third of chart).

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

- **Attribute (discrete) data (non-conformities or defects):** C Chart (4 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). These charts need at least 12 data points.
- **Continuous data (measures):** I Chart (AKA X Chart) & X Bar & S Chart used to graph data such as time (minutes, hours, days, LOS), $, volume or throughput (# surgeries, patients seen in a clinic), height, weight, temperature etc. These charts need at least 20 data points.

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 Control Charts and how to interpret the data. Dates of workshops are at the “Get Involved” section of CEC Website:

Run Chart Rule:  **Too Many or Too Few runs**

Table for checking for Too Many or Too Few runs  *(Health Care Data Guide page 80)*

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- **Too Few runs** can be a signal of improvement.
- **Too Many runs** (Saw Tooth) can indicate there are 2 separate process (may need to stratify the data or plot in 2 separate charts).

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.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

Evaluation:  Please provide feedback about this document via email CEC-CLP@health.nsw.gov.au
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)

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

Other References on the CEC Website www.cec.health.nsw.gov.au

CEC Clinician’s Guide to Quality & Safety

CEC Masters Clinician’s Guide to Quality & Safety

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