A TRAINEE'S GUIDE TO A QUALITY IMPROVEMENT PROJECT
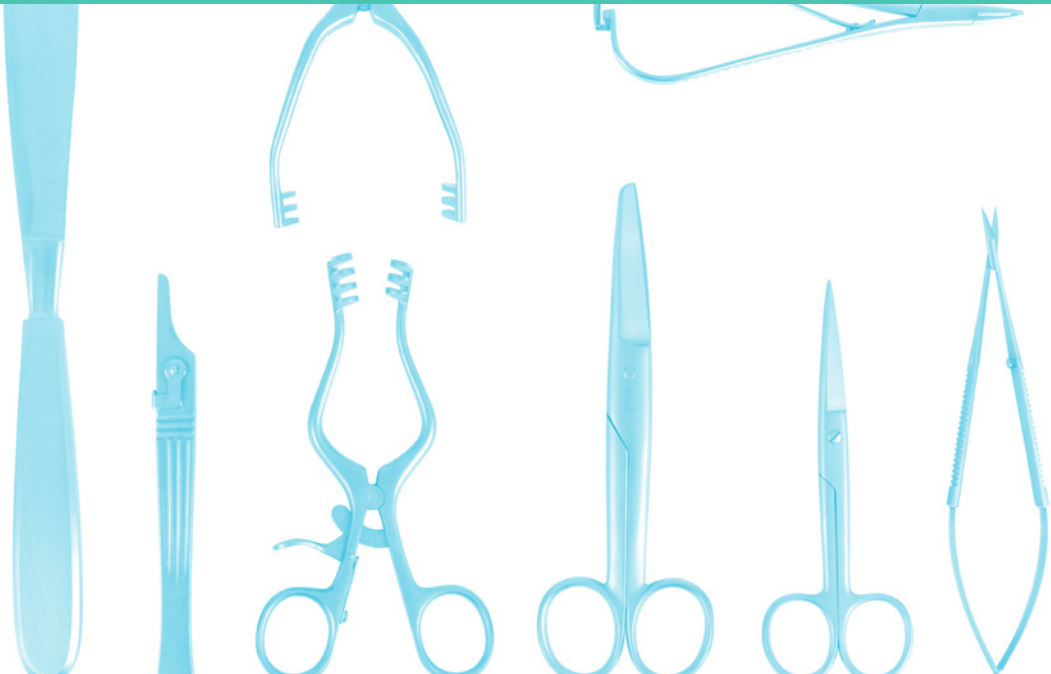
Royal College
of Surgeons
of England

ADVANCING SURGICAL CARE

A TRAINEE'S GUIDE TO A QUALITY IMPROVEMENT PROJECT

Quality Improvement Directorate

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Introduction

Every hospital environment and healthcare setting contains opportunities to improve patient care. Existing and novel processes and ways of working require constant re-evaluation and adjustment to ensure areas of weakness are not overlooked; a structured quality improvement (QI) project provides a framework to facilitate this. In a healthcare setting, a QI project can be undertaken by any member of the hospital trust.

As part of their training, junior doctors are often expected to instigate projects, being uniquely placed to identify areas for improvement 'on the ground'. Here we present a simple guide, based on our own experiences of organising a successful QI project from conception to completion and detail our mistakes and lessons learned in the process. We hope this guide will serve as a valuable roadmap for anyone planning to embark upon their own QI journey.

Stages of a project

Sometimes the terminology of QI projects can be confusing, but the underlying principles are quite simple and intuitive. We recommend a simple six-stage approach to a QI project, in line with the 'model of improvement' framework.

1. IDENTIFY

The first step of any QI project is to identify an area that needs improvement. This often results from:

- personal experience of patient care;
- a critical incident;
- an audit.

Once identified, a couple of tools can then be used to explore this further to understand the underlying issues:

- root cause analysis;
- driver diagram.

better system performance (care) and better professional development (learning)'.[5]

Root cause analysis

When improving standards following an incident, root cause analysis can be used to identify the underlying cause to prevent recurrence.

Three basic types of cause are normally identified.

- Physical causes – material items failed in some way (for example, the online handover list is not functioning, resulting in an inability to identify patient caseload).
- Human causes – a person has made a mistake or not carried out a required task. Human causes can often lead to physical causes (for example, a task handed over to a wrong staff member).
- Organisational causes – a system, process, or policy that people use to make decisions or do their work is not present or does not work as intended (for example, lack of standardised uniforms).

There are several basic tools that can be used to perform a root cause analysis. These include:

- five whys – by repeatedly asking why something has occurred you can get to the root of the problem.
- drill down – split a problem into sections to better understand each area.
- cause and effect (fishbone) diagram – a chart that helps identify the many possible causes for an effect or problem by sorting them into categories.

It is usually helpful to ask other members of the team what they think causes the issue and how they think it might be improved. Valuing and listening to other team members can help to generate ideas and can also help with embedding change at the end of the project.
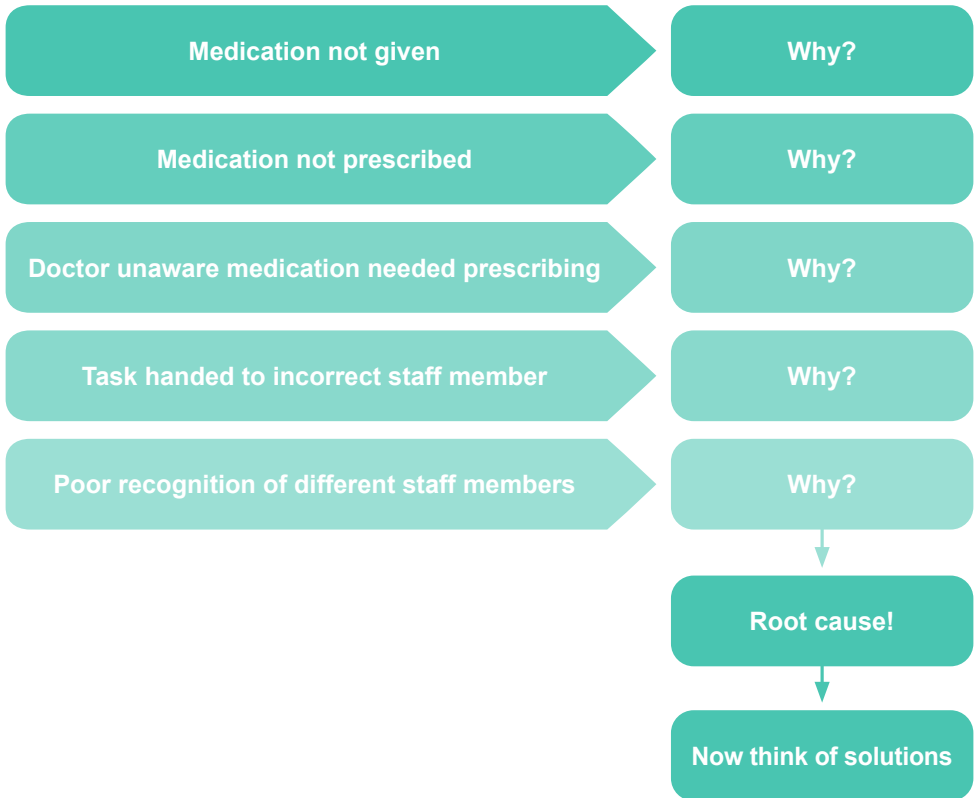
Medication not given	Why?
Medication not prescribed	Why?
Doctor unaware medication needed prescribing	Why?
Task handed to incorrect staff member	Why?
Poor recognition of different staff members	Why?

Root cause!

Now think of solutions

Figure 1: *Example of a 'five whys' root cause analysis*

Driver diagram

When trying to improve patient experience, a root cause analysis may not be the best option. Instead, a driver diagram or alternative tool may be more useful.

A driver diagram is a visual representation of all the factors that could influence a patient's experience, which then enables structured thinking as to how their experience could be improved. See example diagram opposite (*Figure 2*).
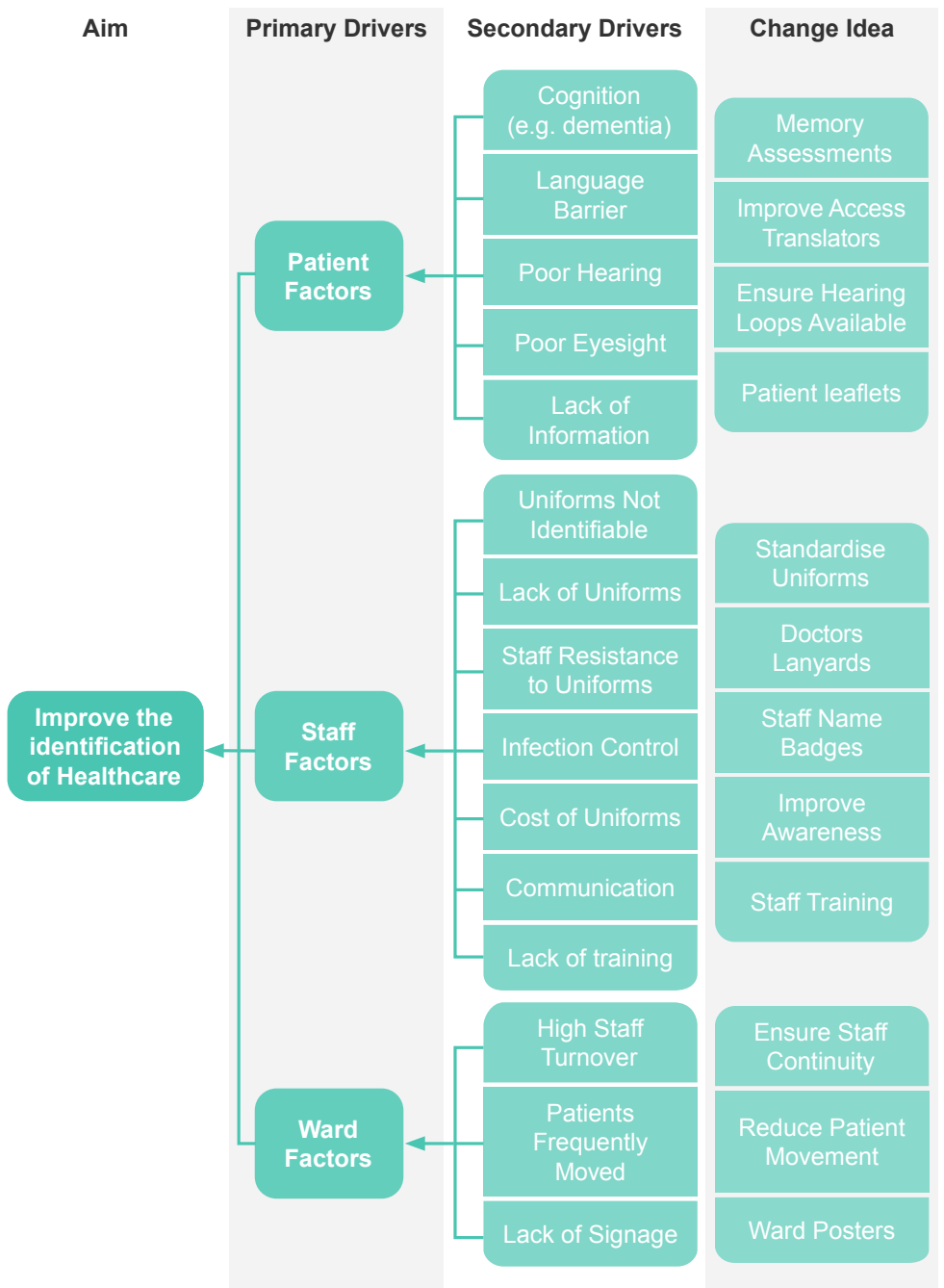
Aim	Primary Drivers	Secondary Drivers	Change Idea
		Cognition (e.g. dementia)	Memory Assessments
	Patient Factors	Language Barrier	Improve Access Translators
		Poor Hearing	Ensure Hearing Loops Available
		Poor Eyesight	
		Lack of Information	Patient leaflets
Improve the identification of Healthcare	Staff Factors	Uniforms Not Identifiable	Standardise Uniforms
		Lack of Uniforms	Doctors Lanyards
		Staff Resistance to Uniforms	Staff Name Badges
		Infection Control	
		Cost of Uniforms	Improve Awareness
		Communication	Staff Training
		Lack of training	
	Ward Factors	High Staff Turnover	Ensure Staff Continuity
		Patients Frequently Moved	Reduce Patient Movement
		Lack of Signage	Ward Posters

Figure 2: *Driver diagram highlighting factors that influence the identification of healthcare staff*

Other tools that can be used to assess how a system works include:

- conventional process mapping;
- value stream mapping;
- spaghetti diagram.

OUR PROJECT

The aim of our project was to improve the recognition of healthcare staff on the hospital ward. While on the ward we noticed that both staff and patients were frequently struggling to identify the job roles of other staff members. This led to incorrect handover and miscommunication among staff and, most importantly, to confusion among patients.

LESSON LEARNED

Our initial idea focused only on improving the recognition of doctors but following discussions with both patients and staff, we expanded our project aim to include all clinical healthcare staff.

TIP

It is important to keep it simple – small incremental changes will be more attainable.

2. OBJECTIVE

Having identified the underlying cause, try to define your project objective clearly so everyone is aware of what you are aiming to achieve. Using the SMART (specific, measurable, achievable, realistic, timebound) criteria as a starting guide is a constructive way of establishing a project aim. Once your project objective is established, try to build a multidisciplinary team around the project. Finding wider support from those most affected by any potential changes (stakeholders) will prove essential for any project. Including them in your project team will make things easier going forward as it can help to build support and allows others to contribute ideas that you may not have thought of by giving a different perspective. Doing this early on can help to shape your project ideas and confirm that improvement is needed.

NB. Some trusts have additional forms of QI assistance. There may be an established QI champion, QI mentors or a QI hub. Approach these resources early for support and advice.

OUR PROJECT

Despite having the ward team onboard, we were met with resistance from senior managers who were based away from the ward. This occurred at a relatively late stage of the project and we facilitated resolution to this by meeting with the director of service improvement.

LESSON LEARNED

We should have tried to canvass the full range of opinions from all those affected, including all service users. Involving an executive or management sponsor may have facilitated an earlier resolution of the problems that we faced.

TIP

Starting small will improve the chance of success, as only a smaller group of people will need to agree to any change. The project can be scaled up once the methodology has proved to be effective.

3. BASELINE MEASUREMENT

Successfully measuring any change will be key in demonstrating its efficacy. It is therefore vital that measurements are taken correctly to demonstrate your project's success. Before implementing any changes, you will need a baseline measurement as a way of tracking your projects progress. Ideally, any baseline should include at least 15 data points to allow you to analyse any changes over time, which will be discussed in more detail later.

Donabedian was a physician who came up with a framework for evaluating health services and quality of care. His model described three main types of measure, each one leading to improvements in the next, with the model of improvement adding one more.
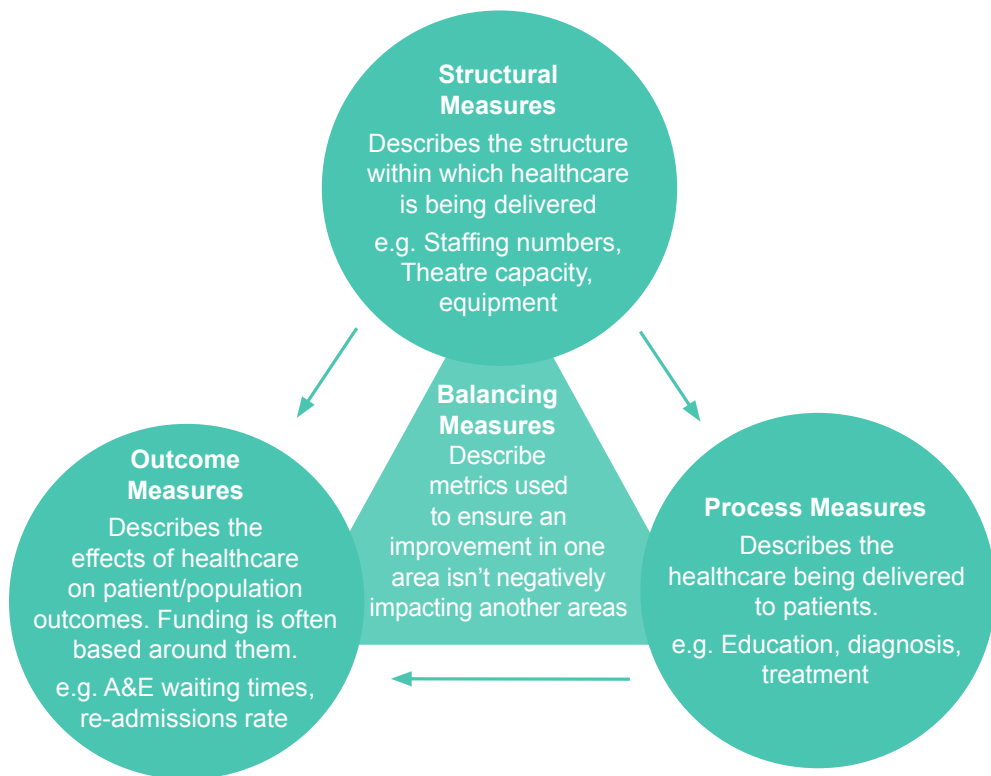

Structural Measures

Describes the structure within which healthcare is being delivered

e.g. Staffing numbers, Theatre capacity, equipment

Balancing Measures Describe metrics used to ensure an improvement in one area isn't negatively impacting another areas

Outcome Measures

Describes the effects of healthcare on patient/population outcomes. Funding is often based around them.

e.g. A&E waiting times, re-admissions rate

Process Measures

Describes the healthcare being delivered to patients.

e.g. Education, diagnosis, treatment

Figure 3: *Framework for evaluating health services*

OUR PROJECT
We created a questionnaire that measured how well staff and patients could identify staff roles to gather a baseline before any changes were implemented.

LESSON LEARNED
If you are creating a questionnaire, think closely about what will happen next. It is important to make sure that you are able to easily measure any subsequent changes that do occur. By planning from the start how the changes will be measured and analysed over time will make things much simpler at the end.

TIP
Projects linked to trust or national objectives are more likely to obtain senior buy-in and therefore have a greater chance of success.

4. PLAN, DO, STUDY, ACT

Once you have identified the area requiring improvement, understood the cause of the issue, and measured the baseline, the next stage is to plan and implement the necessary intervention(s). Rather than a single large intervention, implementing several small-scale changes will increase a project's chance of success. This should be done according to the plan, do, study, act (PDSA) cycle.
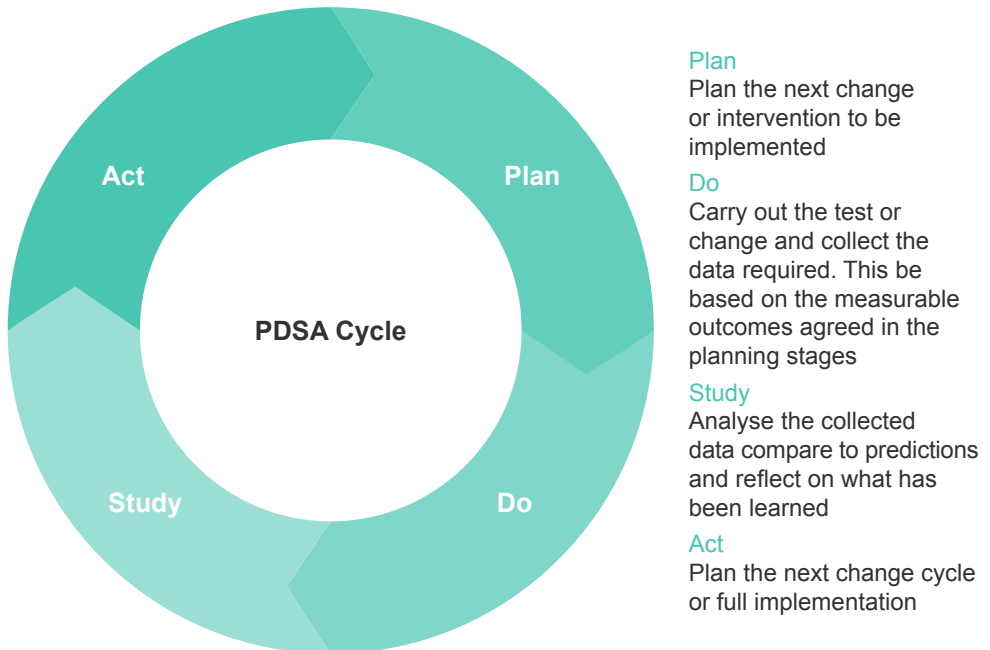

Plan
Plan the next change or intervention to be implemented

Do
Carry out the test or change and collect the data required. This be based on the measurable outcomes agreed in the planning stages

Study
Analyse the collected data compare to predictions and reflect on what has been learned

Act
Plan the next change cycle or full implementation

Figure 4: *PDSA cycle once each change has been tested, measured and acted upon; the process is then repeated, creating a cycle*

Plan

During the 'plan' stage, you should carefully plan which changes you are going to implement and study. The intervention should be small enough that it takes place in a reasonable time scale. The changes should be implemented initially as a local 'trial run'.

OUR PROJECT
We had a few different ideas for improving the recognition of staff on the ward.
We decided to start with patient leaflets.

These would be the easiest to implement as there were already several leaflets that could be adapted.

LESSON LEARNED
Before trying to implement new changes it can be helpful to build upon and improve existing designs and processes to gain traction.

TIP
Write down everything that is done and keep a folder with all documentation.
This is really useful when writing up your project at the end

Do

The 'do' stage is where you implement your change(s). Any change(s) should be tested on a small scale first. The cumulative result of multiple small-scale changes, each tested, learned from and fine-tuned, should result in a measurable and reliable improvement. Collecting data accurately to show whether the changes being tested have resulted in improvement will be essential in proving your idea's success. To do this, small datasets should be collected regularly, 10 data points with 10 samples for each has previously been suggested.

OUR PROJECT

During our project, we tried to move on to subsequent PDSA cycles before completing the previous one. The urge to move on is understandable but may compound problems later.

LESSON LEARNED

We should have made sure we allocated enough time to complete each PDSA cycle and collected more data.

TIP

Start with the easiest change to implement first, as this can be helpful in identifying any teething problems.

Study

Once your data have been collected they will need to be analysed. One effective and relatively straightforward method to do this is using 'run charts' (*e.g. Figure 4*). These charts allow you to analyse the full impact of any change over a period of time.

Foremost, you need to be sure that the change you are observing is due to the changes you have implemented. This will prevent you from reacting unnecessarily to one-off changes. There are two basic reasons that changes occur, and it is important to differentiate between the two.

- *Common cause variation* – this is the natural variation that occurs within normal practice and cannot be accounted for by any specific factor (for example, patient demographics).

- *Special cause variation* – this is the unnatural variation that is secondary to a specific factor; this should be the intervention you are investigating (e.g. introducing patient leaflets).

You can use run charts to differentiate between these factors when analysing your results. *In Figure 4*, for example, the fluctuations largely represent changes resulting from common cause variation, whereas the overall positive trend represents changes resulting from special cause variation (our interventions).
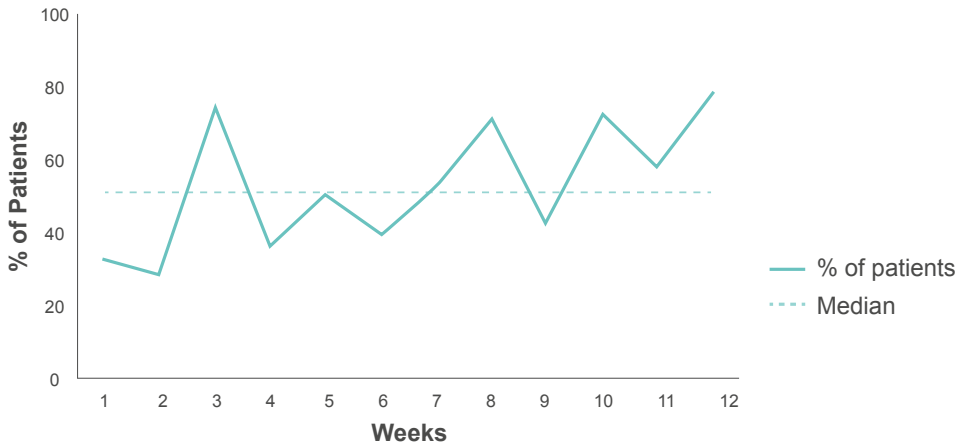
Figure 5: *Run chart showing the percentage of patients who reported that they were able to recognise staff each week (note that the graph is for illustrative purposes only and does not contain real data)*

Please see *Appendix A* for an explanation of rules used to identify special cause patterns in data sets.

Our project
During our study we did not fully appreciate the importance of assessing for a long-term trend. We therefore did not collect enough data points, and so could not demonstrate whether the changes we were seeing were due to common cause or special cause variation.

LESSON LEARNED
Smaller, more regular data samples are more important than larger, infrequent samples.

TIP
Try to ensure that enough baseline measurement are collected so the system can be confirmed to be in a steady state before any changes are implemented. Ensure that data areas collected at different times on different days of the week to reduce the influence of confounding factors.

Act
To complete the PDSA cycle, you must decide on the next step. This can take three different approaches:

- Adopt – fully implement the change from this PDSA cycle.
- Adapt – amend the change from this PDSA.
- Begin the next cycle – start the planning for the next PDSA cycle.

OUR PROJECT
We adapted our patient leaflets and ward posters following feedback from patients and staff after their introduction on the ward.

LESSON LEARNED
Just because your idea was not successful does not mean that it cannot be implemented with adaptations; however, you should make sure to reassess the new idea fully with a complete PDSA cycle.

TIP
Try to ensure that changes are simple and focused or easy to follow.

5. SUSTAINABILITY

One of the biggest challenges with any QI project is sustaining any change that has been achieved. Implemented changes can be forgotten as time goes on, so it may be beneficial to run regular teaching sessions to refresh staff about the findings of your project.

This can be compounded as staff (particularly juniors) are constantly changing jobs and moving hospitals. While this allows us a great opportunity to pick up new ideas, it also gives little time to implement them. This is part of the reason why senior management should be involved early on during the project, as they may be able to recruit others to continue your work when you have moved on.

Incorporating your changes into standardised frameworks can help ensure your changes are sustained, these can include:

- proformas;
- check-lists;
- protocols;
- hospital policy;
- guidelines.

OUR PROJECT
Our project took much longer to implement than originally anticipated. As a result, team members moved to new trusts before the project was finished. This meant trying to recruit new members to join the project on, to ensure its continuity.

LESSON LEARNED
Incorporating your project within a QI database can allow hospital management to ensure that a project continues long after you have left.

TIP
Make sure that you inform new staff members of your project at changeover times (e.g. August). They will often have an induction that you can present at.

6. SHARE

Once you have completed your project, it is important to consider how you can share your results. Consider local events in your hospital – grand rounds or QI project symposiums can be found in most trusts. These are good ways to update your colleagues. If your results have demonstrated a significant change or improvement, it may have a wider relevance and so it is worth considering writing up the project as an abstract presentation or as a journal paper.

OUR PROJECT
Although our project was not an audit, we were able to present our pilot project at a local audit meeting. This helped us to gain more attention from senior management and allowed us to secure funding to roll out the changes more widely.
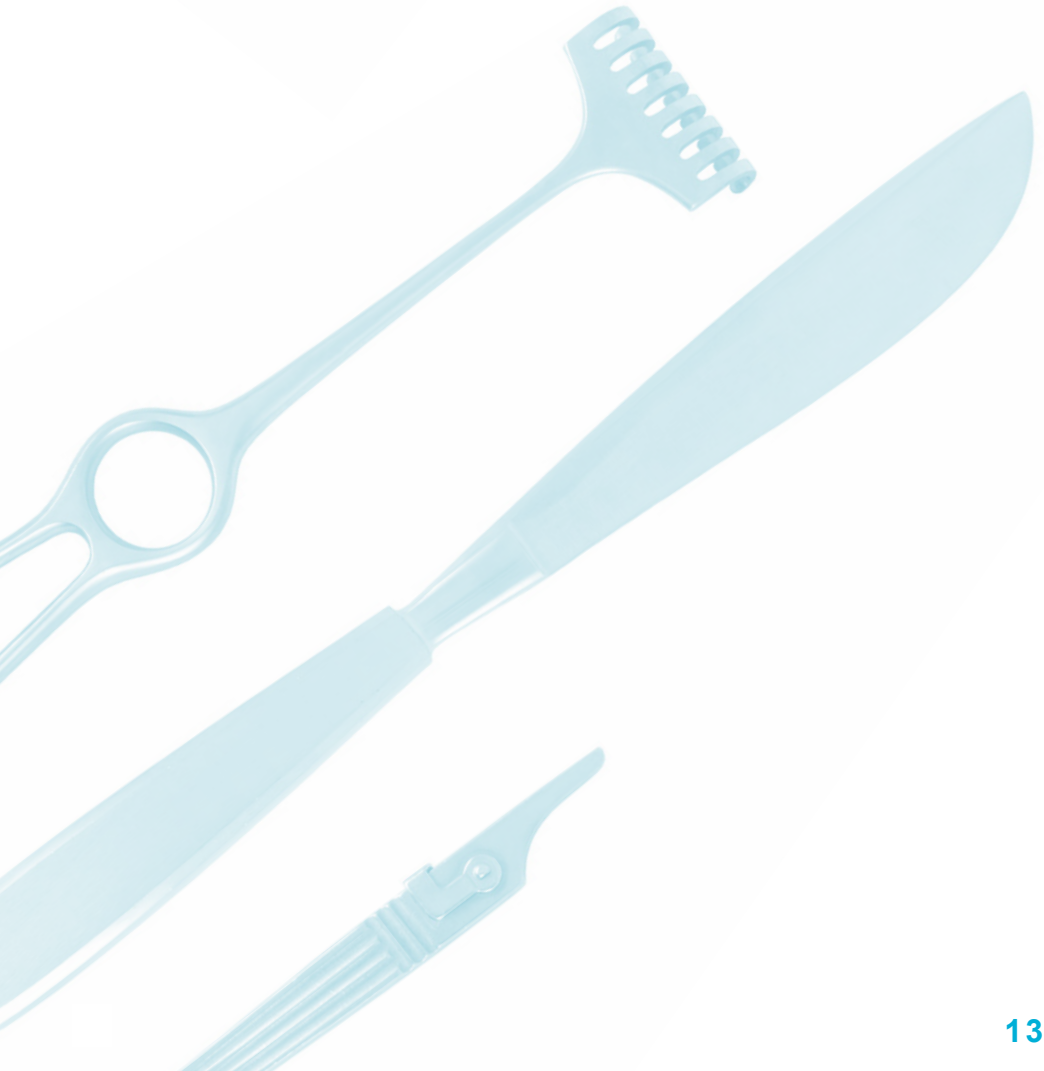
LESSON LEARNED
A project does not have to be fully completed to be presented. You even use presentations to gain support and to gather further opinions.

TIP
Aiming to present at a specific meeting can help to provide a deadline to ensure that you work more efficiently.

Conclusion

Although the process around QI project can be intimidating, it is a valuable tool for improving patient care and standards within any environment. With the recent significant change in clinical practice resulting from the COVID-19 pandemic, this has been made even more apparent. This simple guide provides the foundations for starting any quality improvement project and allows readers to learn from the mistakes based on our own experiences.

Appendix: Rules to identify special cause patterns on a run chart

Below are some rules you can use to analyse charts objectively to look for special cause variation.[1] If ≥1 rule is met in your run chart, it shows there is non-random variation i.e. due to your intervention.

Note that we have used a figurative data set to illustrate these rules. A run chart should include at least 15 points of data for the rules to be applied.[2]

Rule 1: Shift

This pattern observes a number of consecutive data points, all either above or below the median. Data points cannot include those that fall on the median.

Typically, six or more consecutive points are needed to prove a shift pattern.

Rule 2: Trend

This pattern observes a number of data points all increasing or all decreasing. If the value of two or more consecutive data points is the same, only the first data point is counted. Data points can include those that cross the median.

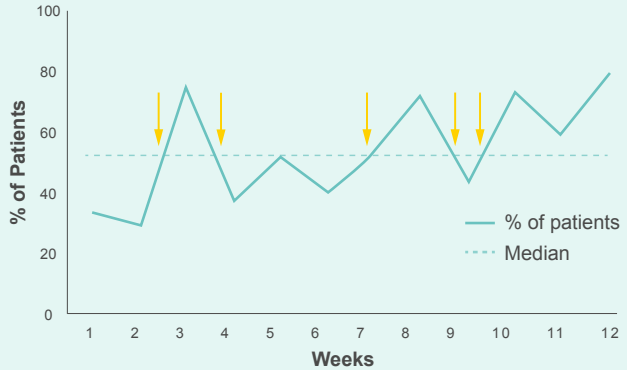Typically, six or more consecutive points are needed to prove a trend pattern.

Rule 3: Runs

This pattern observes too few or too many runs (one or more consecutive data point(s) on one side of the median).

The number of runs can be calculated using the number of crossings of the median line plus one. An appropriate number of runs for a given data set can be calculated using a **statistical table**.

Statistically significant change is signalled by too few or too many runs.
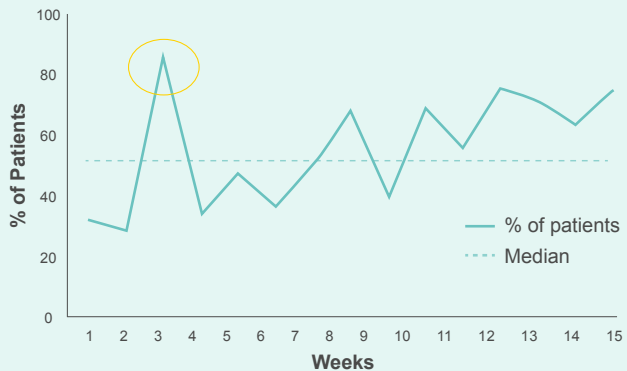
Data points cannot include those that fall on the median.

Example: this data set has 10 useful data points (data points from week 5 and week 7 are not useful as they fall on the median). Using the statistical table, we expect between three and eight runs. Our data set shows six runs and therefore we do not have special cause variation according to this rule.3

(Table summary from p.11)

No. Data Points	Run Limit	
	Lower Limit	Upper Limit
10	3	8
11	3	9
12	3	10
13	4	10
14	4	11
15	4	12
16	5	12
17	5	13
18	6	13
19	6	14

Rule 4: Astronomical point

This pattern observes a data point that is obviously different from the rest of the points – it is subjective (unlike the other rules).

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