

Quality Improvement (QI) Tools

Women's Cancer Screening Collaborative

Prepared by

Improvement Foundation (Australia) Ltd
PO Box 3645
Rundle Mall SA 5000

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Overview

In addition to the Model for Improvement, there are a range of other quality improvement tools that can be used to guide and enhance improvement work.

This section includes an additional eight quality improvement tools that can assist with working through the Model for Improvement's three fundamental questions and PDSA cycles. These tools can be used alone, or in combination, to test ideas for change in a health service setting.

The tools covered here are:

Tool	Usage
Brainstorming	Generating ideas
Nominal group technique	Generating ideas
Affinity Diagrams	Organising and categorising ideas
Five Whys	Defining a problem (determining root cause)
Fishbone (Ishikawa)	Exploring and determining factors that cause or influence a problem (cause and effect)
Pareto	Identifying the causes that have the greatest impact on a problem, which assists with determining where to focus an improvement effort
Process Mapping	Visualising and understanding what happens in a process (for service/process redesign)
Force Field Analysis	Identifying factors that can support or hinder a potential solution. Understanding these factors and using strategies to reduce barriers can increase the chances of the solution being successfully implemented

Brainstorming

Brainstorming is an activity used to generate creative ideas. It can be done individually or as a group.

Brainstorming should not be used for analysis or decision making.

How to brainstorm

Define the topic for the brainstorming session; then ask participants to come up with as many spontaneous ideas as possible and write them down. Accept all ideas, however 'wild' they might seem.

The rules for brainstorming are as follows:

- All ideas are acceptable; focus on quantity, not quality
- Everyone suspends judgement until the process is complete
- Encourage wild ideas
- Every contributor is equally important and every idea has equal worth
- Build on the ideas put forward by others – use existing ideas to generate new ideas.

Tips

- The physical environment is important for brainstorming. Avoid a situation associated with participants' usual routines (e.g. leave work premises).
- Make sure you have the right equipment (e.g. sticky notes, pens, flip charts, whiteboard).
- Make sure you have the right people.
- A group of 12 is ideal (but brainstorming can still work well with more or fewer people).
- Aim to generate 20–30 ideas in 5–7 minutes.

Nominal Group Technique

Nominal Group Technique is a variation on the standard brainstorming process and involves a more structured process. It has the advantages of preventing one person from dominating the discussion, and encourages reticent group members to participate.

How to use the Nominal Group Technique

The nominal group technique follows an orderly process:

1. Divide a larger group into smaller groups of five or six people.
2. Ask an open-ended question.
3. Ask each person to think of some ideas independently (i.e. 'brainstorm' individually).
4. Ask each person to share their ideas within their smaller group (no criticism is permitted).
5. Each person evaluates each idea put forward in their small group and votes for their favourite (voting can be anonymous).
6. Each small group determines which idea won the vote.
7. Each small group presents their best ideas to the larger group.

Once you have generated ideas using either technique, you could use an Affinity diagram to help organise the ideas.

Affinity Diagrams

An affinity diagram is a way to organise ideas into coherent patterns or themes, based on their natural relationship. It encourages people to think inventively and make non-traditional connections between ideas.

This process promotes greater ownership of results among participants by allowing breakthroughs to emerge naturally. An affinity diagram can be used at any stage of an improvement project. It is especially useful at stages where you have generated a large volume of ideas.

How to build an affinity diagram

1. Select a topic for discussion and brainstorm ideas, using sticky notes to write down all the ideas generated.
2. Display the ideas by posting them in random order on a flip chart, wall or table.
3. Without talking, participants sort the ideas into related groups:
 - First, look for two ideas that seem to be related in some way and place them in a separate group.
 - Continue to sort through the notes, establishing new groups or adding notes to existing groups.
 - The process is complete when all the notes have been assigned to a group.
 - Create a title for each group that captures the relationship between the ideas contained in the notes. Avoid one-word headings. You may like to sort large clusters into subgroups for easier management and analysis.
 - Once the sorting process has been completed, review the results with the team and other key people.

An affinity diagram can be used to create a cause-and-effect diagram.

Tips

- Assemble an appropriate team.
- Make sure that everyone participates.
- Before you begin grouping, make sure everyone is clear about the meaning of all the ideas. (If any notes are illegible or not understood, correct this before sorting.)
- Don't force notes into groups if there is no natural fit – put them in a separate category.
- Category titles should be concise and should contain the essence and detail of the issues that have been raised.

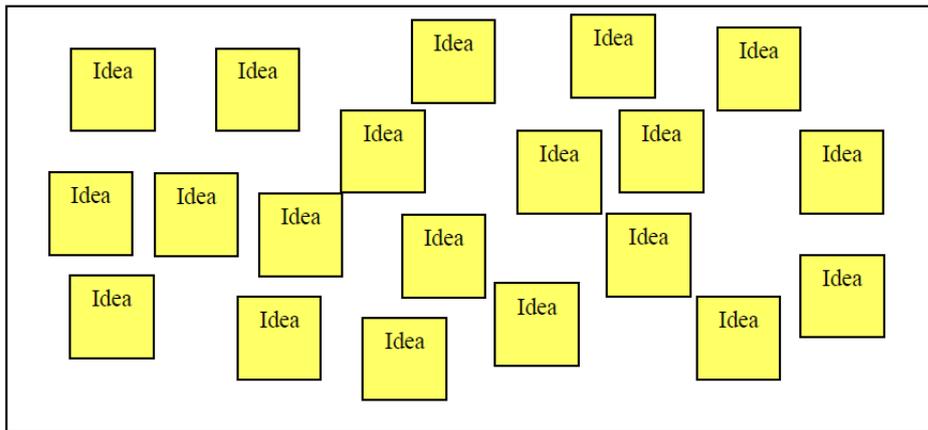


Example

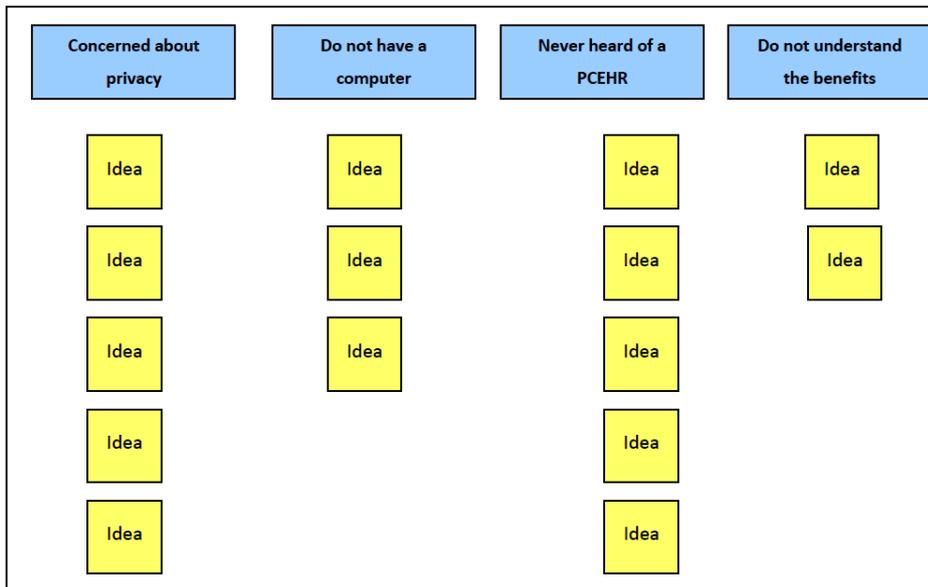
Topic for discussion: Why don't patients sign-up for a health record (MyHR)?

Figure 1.1 shows ideas before sorting (Figure A) and after sorting (Figure B).

A. Before sorting



B. After sorting



Five Whys

The five whys help to identify the root cause of a problem and is a simple, yet powerful tool. The technique originated within the Toyota company when developing their manufacturing methodologies, and is a key component of their training in problem-solving.

Asking the question ‘why?’ repeatedly (five times, as a rule of thumb) allows you to peel back layers of a problem or issue, which can lead you to the root cause. The reason for a problem may lead to further questions, and it may take fewer – or more – than five ‘whys’ to expose the root cause. The aim is to ensure that a problem is solved. Once the root cause has been identified, action can be taken to deal with the problem. This technique enables you to target your improvement work on the true cause of your problem.

How to use the Five whys technique

1. Write down the problem. Describing it as accurately as possible will help all team members focus on the same issue.
2. Brainstorm as a group to answer the question ‘Why does this problem occur?’ (Write down the answer).
3. If the answer does not identify the root cause, ask why again. (Write down the answer).
4. Repeat step 3 until you agree on the root cause (Write it down as a statement).

You will know when you have identified the root cause when asking why does not yield any more helpful information.

Example

Statement of the problem: The patient was not aware of the MyHR initiative, although we sent letters about this to patients with diabetes.

Why? The patient did not receive a letter explaining the MyHR.

Why? The patient is not on the diabetes register.

Why? The patient is not coded as having diabetes.

Why? Not all patients with diabetes are coded in the medical software.

Why? No training has been given to the team on how to code diagnoses.

Action: Train the team members on how to code diagnoses.

Notes: Adding this patient to the diabetes register would solve the immediate problem, but would not ensure that the same problem won’t happen again with other patients. Addressing the root cause of the problem by training the team members on how to code helps ensure that this problem won’t occur again.

Tips

- Focus on the process rather than the people (blaming someone does not solve the problem).
- Avoid making assumptions about a problem when working through the five whys (don’t try to jump to the final answer – instead, try to give an immediate response that directly answers each question).
- When you have identified a root cause, communicate it to everyone involved and make sure they understand it, so that your team effort is focused on the correct problem.

Fishbone (Ishikawa) Diagram

The fishbone diagram is a visual tool used to explore the factors that influence or cause a given outcome, to help you understand the problem more clearly. The tool gets its name from its inventor, Kauro Ishikawa, and its resemblance to a fish skeleton.

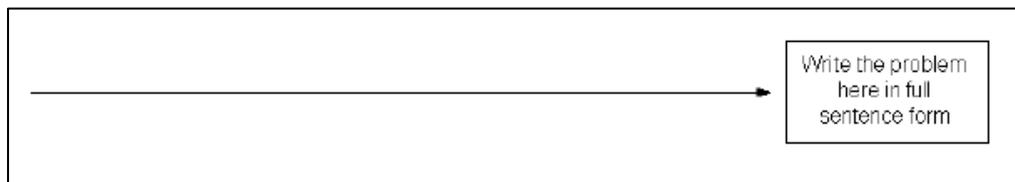
Constructing a fishbone diagram will help you consider how multiple causal factors interact to influence outcomes, and help you identify areas for further investigation. It is important that all team members affected by the problem take part in discussing it and constructing the diagram.

How to construct a Fishbone Diagram

1. First, agree on a single statement that describes the problem, including as much information as possible. Draw a box around your statement with a long arrow pointing towards it (Figure 1.2 A).
2. Then, identify the major relevant categories of causes (e.g. people, place, policies, procedures) and draw these as 'bones' (main causes) off the large arrow. There are often four or more major categories (Figure 1.2 B).
3. For each main cause 'bone', consider which factors contribute to it (minor causes). You can use brainstorming for this step. You may also be able to identify factors that influence minor causes (influences), and show these as arrows pointing to minor clauses.
4. Continue analysing your diagram until every possible contributing cause and influence has been identified (Figure 1.2 C).

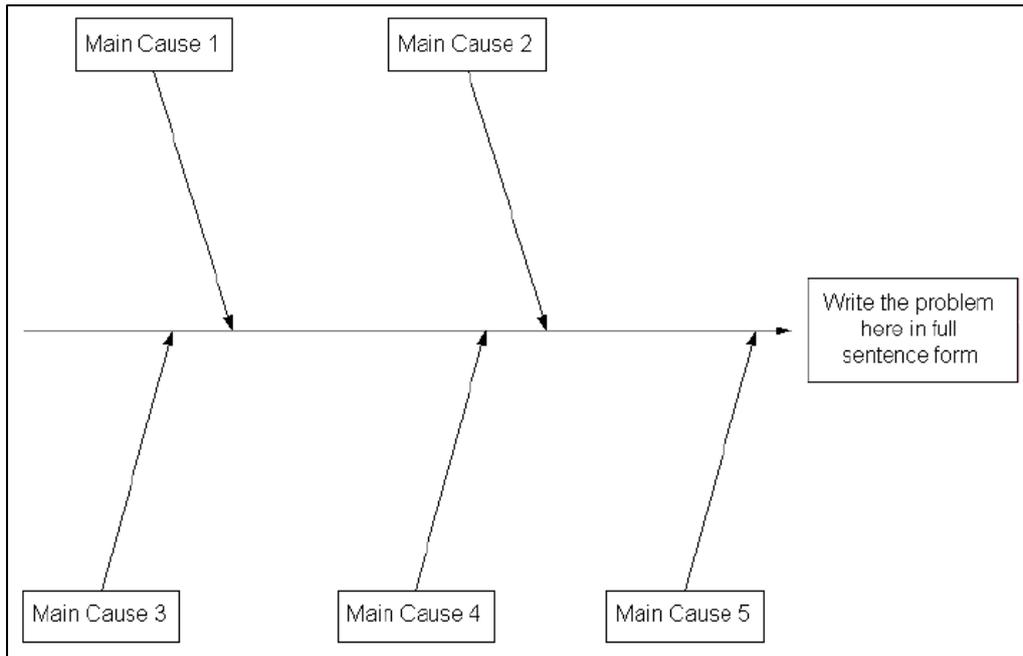
Figure 1.2 Fishbone diagram

A. Stating the problem

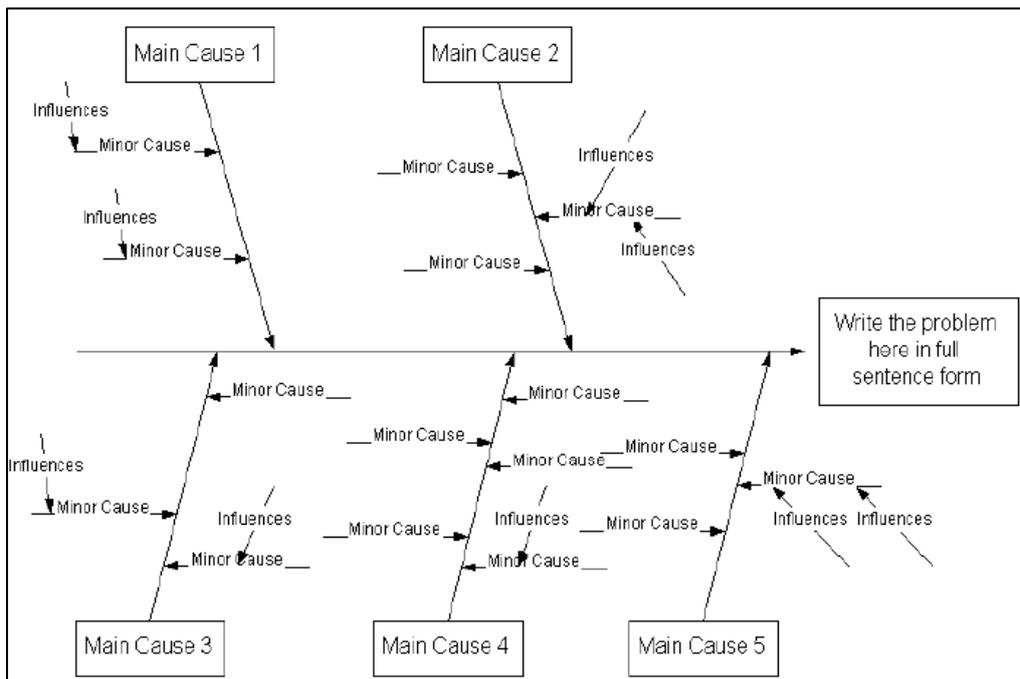


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B. Adding the main causes



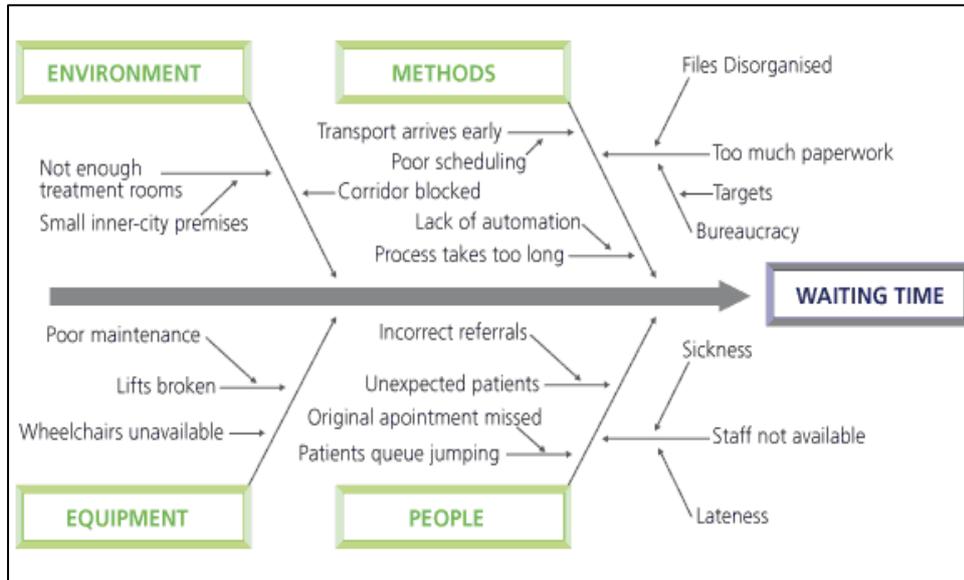
C. Adding the minor causes



Source: Improvement Foundation, 2007

Example

Figure 1.3 Fishbone diagram: waiting time



Source: NHS Institute for Innovation & Improvement, UK

In this example, the problem was long waiting times for patients attending the healthcare service (Figure 1.3). The working group identified the main causes as environment, methods, equipment and people. They identified at least two minor causes contributing to each category. Some minor causes were found to have their own influences (e.g. incorrect referrals could contribute to visits by unexpected patients).

Tips

- The whole team needs to agree on the problem statement.
- Use brainstorming to identify causes.
- Make sure your chosen categories of causal factors (major causes) are truly relevant to the problem.
- Be flexible when choosing the bones. There is no perfect set or number of categories and you should make the 'bones' fit the problem rather than the other way around.
- People affected by the problem should be involved in constructing the diagram.
- Draw your diagram using a medium that will allow you to keep and transport it (e.g. paper, smart whiteboard printout/download).
- Each cause should belong to just one main cause 'bone'.

Pareto Analysis

Pareto analysis is a simple technique using a bar graph to select the ideas for change that will have the greatest overall effect on a particular problem in your health service. The Pareto Principle was developed by quality management guru Joseph Juran (1904–2008) and named after 19th Century Italian economist Vilfredo Pareto, who observed that 80% of the income in Italy was received by 20% of the population.

The principle sets out that the majority of results in any given situation will usually be determined by a small number of causes (the ‘law of the vital few’). Put simply, roughly 80% of results are determined by 20% of the causes (also called the 80:20 rule).

How to construct a Pareto chart

1. Identify the problem and possible causes. (You can use other tools, e.g. brainstorming, fishbone [Ishikawa] diagram).
2. Collect data on the causes you have identified (e.g. frequency of occurrence, cost).
3. Create a table and rank the causes from largest to smallest.
4. Construct a bar graph with the causes along the horizontal axis and the frequency or cost on the vertical axis.
5. (Optional) Make a cumulative frequency graph by stacking the bars on top of each other in order of frequency, with the most common cause at the bottom and the least common at the top.
6. Observe which causes account for the majority of the problem (look for those that make up approximately 80% of the total number of causes counted).

Example

Your healthcare service wishes to discover the reasons why patients’ repeat prescriptions are not always ready for collection when needed.

First, you collect data for a period (Table 1.1).

Table 1.1 Collecting data for Pareto analysis

Reason	Number per day									
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Request brought in late	4	3	0	2	6	0	6	4	2	0
Writing unclear on request	2	1	0	1	0	0	0	1	0	2
Unable to find prescription in office	8	6	1	2	4	3	1	3	4	4
Request box not emptied	0	0	0	3	0	0	0	0	0	0
Lack of staff	0	0	0	3	0	0	0	0	0	0
Computer not working	1	0	0	0	0	0	0	0	0	0
Patient needs review	2	0	0	1	1	0	0	0	2	2
GP too busy to sign	2	4	2	0	0	4	2	1	0	0

Next, collate the data and rank the causes in order of frequency (Table 7.2).

Table 1.2 Collating data for Pareto analysis

Reason	Total number of occasions
Unable to find prescription in office	36
Request brought in late	27
GP too busy to sign	15
Patient needs review	8
Writing unclear on request	7
Lack of staff	3
Request box not emptied	3
Computer not working	1

Number of repeat scripts unavailable for collection per day over a 10-day data collection period, and reason for each occurrence

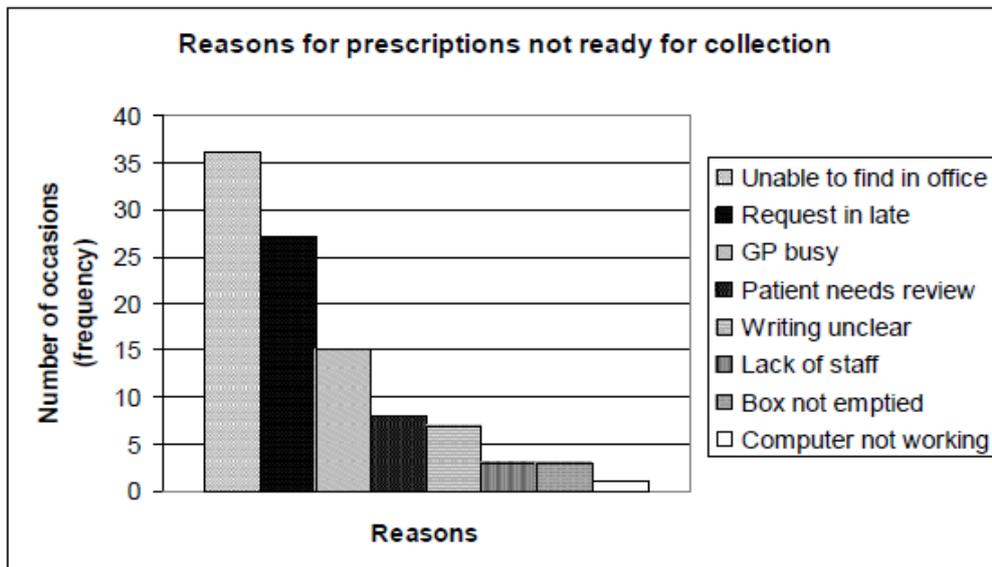
Then, use the data to construct graphs (Figure 1.4). First, make a simple bar graph (Figure 1.4 A).

Identify the three main causes. In this example, these were identified:

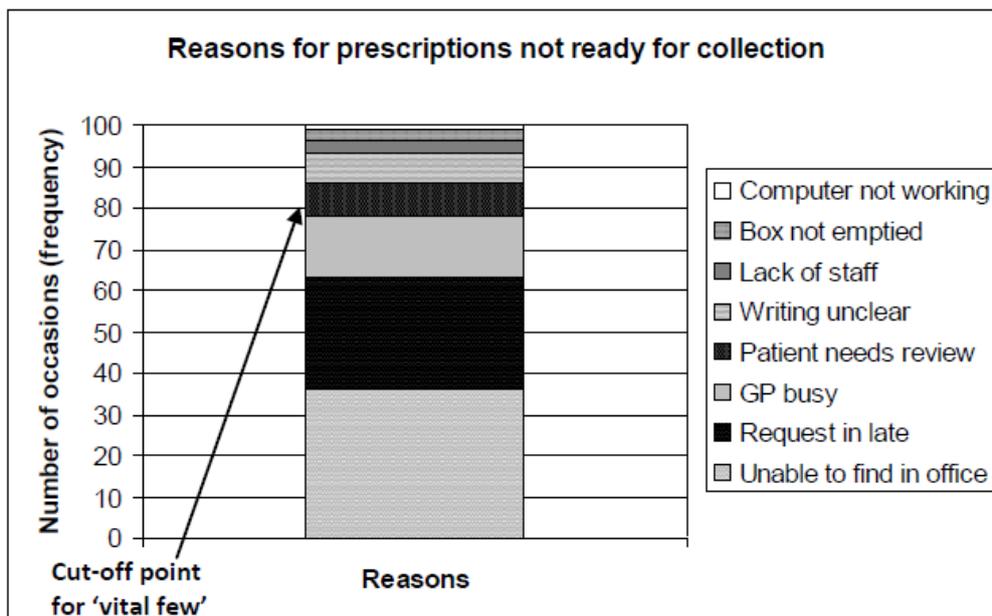
- Unable to find prescription in office
- Request brought in late
- GP too busy to sign.

Figure 1.4 Bar graphs for Pareto analysis

A. Simple bar graph



B. Cumulative bar graph



(Optional) Make a cumulative bar graph (Figure B). This is just another way of easily identifying the 'vital few' causes that account for around 80% of the results (the problem). To do this, build the column from most frequent (bottom) to least frequent cause (top); then identify which causes fall below the 80% level on the vertical axis.

In this example, the three main causes accounted for approximately 80% of occurrences of repeat scripts being unavailable when needed. Since these problems have the greatest potential to improve availability of repeat scripts, the health service team should consider starting their improvement work by focusing on one, or all, of these.

Tips

- The numbers don't have to be 20% and 80% exactly – the purpose is to identify the causes accounting for the majority of the results.
- If you have any categories marked 'other' in the list of possible causes, make sure that this category does not become too large. If the 'other' category accounts for more than 25% of your problem, you should try to break it down.

Process Mapping

Process mapping involves developing a simple visual picture or map of a process that is complex or has many steps. This mapping activity can help you and your team better understand what the process involves and how its various parts work together, so you can improve its overall functioning.

A relevant example is the ‘patient journey’ through the healthcare system. It can be a challenge to understand all the ways in which individual patients interact with your service or the healthcare system, because the ‘journey’ is complex. An individual may receive care from several different clinicians from different departments or organisations, and their care may involve administrative support from multiple departments and individuals.

In complex systems like this, it is unlikely that an individual will have a thorough knowledge of what happens at each stage of the entire process. Process mapping provides an opportunity for people working across different departments and organisations to work together to articulate and understand the current process.

Within healthcare services, process mapping can help teams develop a complete, shared understanding of a process. By documenting all of the steps or actions involved in a process, the team develops a map that can be used to highlight areas for improvement.

Process mapping is useful for:

- Enabling those involved in a complex process to consider the end-user’s (e.g. patient’s) experience. It may be the first time that the whole team realises how complicated the process is from the patient’s perspective.
- Understanding what is actually happening, rather than what the team thought was happening. Quite often what we think happens in a process is not how it actually occurs (Figure 1.5).
- Providing an opportunity for all of the team to share their understanding of the process.
- Highlighting inefficiencies and prompting discussions about how to eliminate them. Using a process map allows you to identify bottlenecks and any unnecessary actions being performed, possibly by the wrong people.
- Encouraging a holistic approach to problem solving that explores the inter-relationships of various parts and people in the process.
- Clarifying tasks and responsibilities.
- Identifying how resources are used.

Figure 1.5 Process mapping: ideal, perceived and actual processes

Figure A. What could happen in an ideal system (hypothetical example)

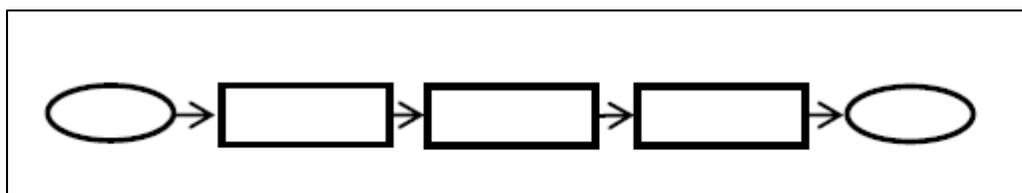


Figure B. What we think happens (hypothetical example)

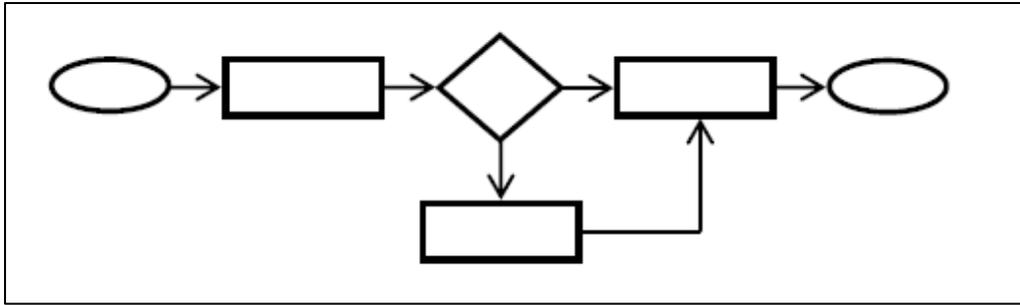
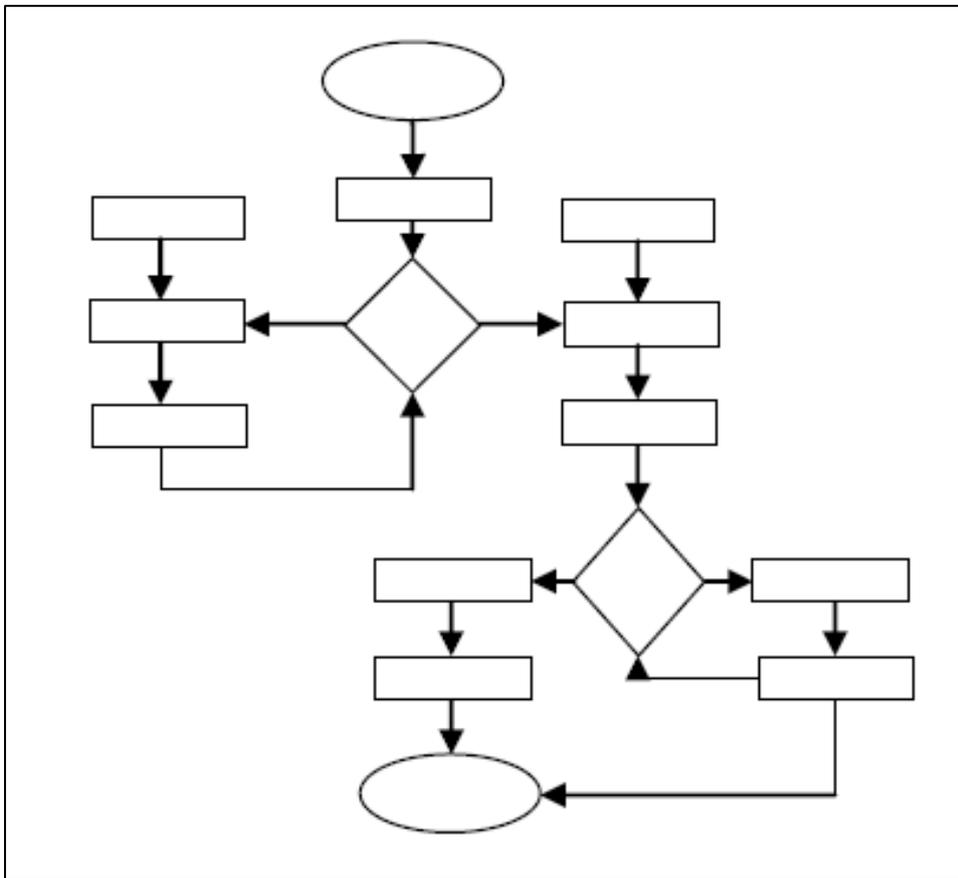


Figure C. What really happens (hypothetical example)



How to do process mapping

1. Decide on the process to be mapped. This is often the most difficult decision to make. Consider starting with a process that is a high priority for the team.
2. Determine the aim of the mapping process (e.g. to identify areas that can be streamlined in managing a certain chronic disease, or getting a patient's electronic health record (MyHR) set up).
3. Define the scope of the process. This involves ensuring that the process is not too large or too small. You do this by establishing boundaries for your process, which means setting a clear starting point and a defined endpoint for the process. These boundaries are often determined by the aim of your project.
4. Select the team who will help you create the process map. Generally, you will need a balance between keeping the group size to a manageable number and making sure all the key stakeholders are represented. When choosing participants, it is critical that you involve managers, as well as staff who work in the process.
5. Map the current process as it is actually occurring. You may be surprised how this differs to what the team thinks should be happening. For each step, capture who, when and where; and any other data you choose to collect. It is important that this process remains objective and does not involve blame.
6. Make sure the map is the simplest possible picture of how the process works. It can be very helpful to use symbols representing different kinds of steps in the process (Table 1.3), but this is not essential. Alternatively, you could use sticky notes in different colours to represent different kinds of steps in the process.
7. Write down the ideas for change that come from this discussion and rank them. You now have some ideas for changes that you can test using the Model for Improvement.

Table 1.3 Standard symbols used in process mapping

Symbol	Meaning
Start/End	
Decision	
Action	
Delay	
Connector	

Analysing your process map

Consider how the process could be improved. Depending on your aim (step 2), you may ask yourself the following questions:

1. Are there parts of the process that don't flow efficiently because of delays or bottlenecks?
2. If so, how can they be relieved?

For each step ask:

- Can it be eliminated?
- Can it be done in some other way, in a different order, or in parallel to another task?
- Can it be done somewhere else, or by someone else?

If you identify changes that might improve the process:

- List and prioritise them and
- Consider what the new process might look like.

You can test changes to the process using the Model for Improvement.

When analysing your map:

- Look for parts of the process where a step cannot happen until the step ahead is ready – these can be sources of delays due to bottlenecks.
- Look for parts of the process where a step cannot happen until other things have happened – these can be sources of inefficiency, if the process is not designed to ensure they all happen in sequence.
- Look for steps that could be occurring at the same time to improve efficiency.

Tips

- Involve stakeholders from the beginning and give plenty of notice.
- The people who work in the process should be involved in the mapping.
- Don't map everything – stick to the process that you have chosen to improve.
- While creating your process map, record relevant data that may be useful later when analysing the process (e.g. times, volume of the 'flow' at each part of the process – such as the number of patients per day reaching a certain step).
- Always map what actually happens in the current process, not how you would like it to happen.
- Let your process map cross functional boundaries (across admin, nursing, GP functions etc.).

Force Field Analysis

Force field analysis is a useful tool to help you identify and compare:

- The pros and cons of a change before you adopt it, and
- Enablers and barriers to a change, before you implement it.

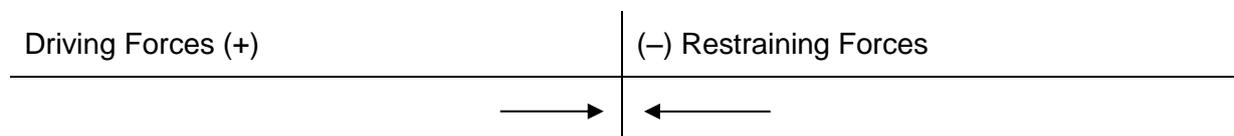
This process helps you make a more considered evaluation of the balance between the opposing forces than you might make intuitively, and helps you prioritise any problems to solve before implementing your change.

After working through this process, your team can consider devising strategies to support the driving forces and to minimise the restraining forces.

How to do force field analysis

1. At the top of a large piece of paper or whiteboard, write down the intended change. This will ensure that you focus on the change as you complete the exercise.
2. Next, draw a line down the middle to make two columns. Label one side 'driving forces' and the other side 'restraining forces' (Figure 1.6). Use brainstorming to identify factors that influence the change or work against it, and list them under their headings. For each, draw an arrow towards the column divider to indicate opposing forces.
3. Next, give each factors a rating (e.g. a simple score out of 10) indicating its likely impact.
4. Analyse the diagram by adding the scores to see which side seems to have the greatest impact.

Figure 1.6 Force field analysis



Example

A primary healthcare service is considering recruiting a practice nurse to improve its management GP Management plans (GPMPs) and Team Care Arrangements (TCAs).

The team identifies the pros and cons, as shown in Figure 1.7

First, the team simply lists the factors in no particular order (Figure 1.7A: Before rating).

Next, the team discusses each factor and agrees on its potential impact from a score of 0 to 10. Scores are written beside the factors, added up, and totalled at the bottom (Figure 1.7B: After rating).

Figure 1.7 Force field analysis: recruiting a practice nurse

A. Before rating

Driving Forces (+)		(-) Restraining Forces	
Share workload	→	←	Financial risk
Increased revenue/growth	→	←	GPs unwilling to hand over responsibility to a practice nurse
Better team communication	→	←	Time to train and induct
Improved patient access due to pre-appointment screening by PN	→	←	Lack of space
Better triaging capabilities	→	←	Availability of PNs
More completed TCAs and GPMPs	→	←	Patients may be unwilling to see PN instead of GP
Health service growth	→		

B. After rating

Driving Forces (+)			(-) Restraining Forces		
6	Share workload	→	←	Financial risk	7
6	Increased revenue	→	←	Clinical staff unwilling to hand over responsibility	6
4	Better team communication	→	←	Time to train and induct	6
3	Improved patient access due to pre-appointment screening by PN	→	←	Lack of space	8
5	Better triaging capabilities	→	←	Availability of PNs	4
7	More completed TCAs and GPMPs	→	←	Patients may be unwilling to see PN instead of GP	3
6	Health service growth	→			
<hr/>			<hr/>		
37					34

In this example, it is easy to see that the positive driving forces outweigh the restraining forces.

By working through the process, the team has also identified the potential to complete more TCAs and GPMPs as the greatest advantage. The team has also agreed that overcoming the lack of space will be a key step before hiring a practice nurse.