

# Easy Guide to Clinical Practice Improvement

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A GUIDE FOR HEALTHCARE PROFESSIONALS

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# Introduction

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## Purpose of this Guide

The *Easy Guide to Clinical Practice Improvement* aims to provide practical advice to clinicians and managers on how to use health care data to improve the quality and safety of health care in a systematic way. This 'Easy Guide' complements and is a companion document to the NSW Health publication *The Clinician's Toolkit for Improving Patient Care*. The toolkit outlines three fundamental components for clinical risk management:

1. Developing the knowledge and skills for understanding human performance, the systems of care and for minimising and dealing with error.
2. The application of methods to identify, measure and analyse problems with care delivery.
3. Action upon that information to improve both the individual and the systemic aspects of care delivery.

This *Easy Guide* provides clinicians and managers with the step-by-step detail of the Clinical Practice Improvement (CPI) method that is only briefly outlined in the *Clinician's Toolkit*, together with many of the frequently used quality improvement tools.

## Target audience

The *Easy Guide to Clinical Practice Improvement* is relevant to all clinicians and managers for developing the skills in the method and tools used in clinical practice improvement. It is also particularly relevant to quality coordinators and quality managers involved in teaching and conducting the CPI method for improving practice.

## Background

Quality in health is defined as 'doing the right thing, the first time, in the right way, and at the right time'.<sup>1</sup> The *Framework for Managing the Quality of Health Services in NSW*<sup>2</sup> provides the structure for Area Health Services and clinicians to effectively govern the quality of care and to ensure that the clinical care and services provided are safe, effective, appropriate, consumer focused, accessible and efficient. The framework challenges health care organisations, clinicians and managers to undertake rigorous evaluation of processes and outcomes of services in a manner that is transparent and leads to sustained improvement.

The *Easy Guide to Clinical Practice Improvement* provides practical guidance for achieving these aims.

There are many strategies clinicians and managers can use to obtain information about the standard of care being delivered that provide information about performance, both positive and negative, in our health services. These strategies are described in detail in the *Clinician's Toolkit* and include:

- facilitated incident monitoring
- sentinel event monitoring
- effective use of clinical indicators
- peer review meetings
- morbidity and mortality meetings
- ad hoc audits
- retrospective chart review.

Systematic analysis of the data generated through these activities may identify problems or opportunities for improvement in clinical practice. The essential next step is to use the data in a scientific way to improve the quality and safety of care and services provided.

The two main approaches to investigating these problems, and taking action to ensure improvement, are the Clinical Practice Improvement (CPI) method and the Root Cause Analysis (RCA) method.

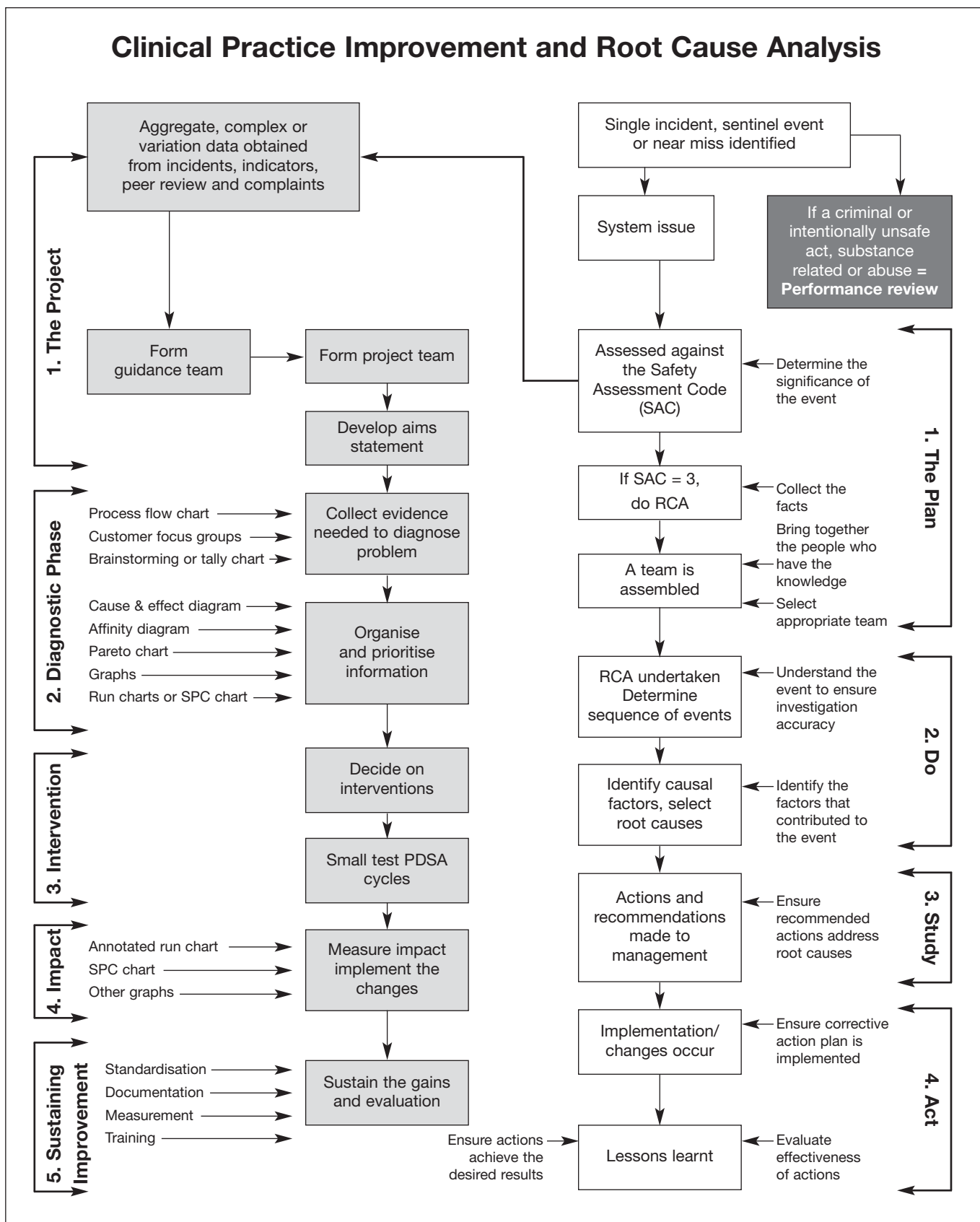
Aggregate, complex or variation data obtained, for example, from incidents, clinical indicators, peer review and complaints are best addressed using the CPI method. This method is described in detail in this Easy Guide No.1 – *An Easy Guide to Clinical Practice Improvement*. The guide is divided into two key parts:

1. Clinical Practice Improvement (CPI) – a description of the model used to improve processes of care and service delivery.
2. Quality improvement tools and techniques – a guide to choosing and using the most appropriate tools and techniques for various stages of the improvement process.

If a single incident, sentinel event or near miss is identified, and is of significant severity, then a 'Root Cause Analysis' (RCA) should be undertaken. The method for this process is outlined in The Easy Guide No.2 – *A Guide to Sentinel Event Management*.

The following diagram describes the steps associated with both CPI and RCA and provides a guide to their appropriate use.

## Clinical Practice Improvement and Root Cause Analysis



# 1

## Clinical Practice Improvement Method

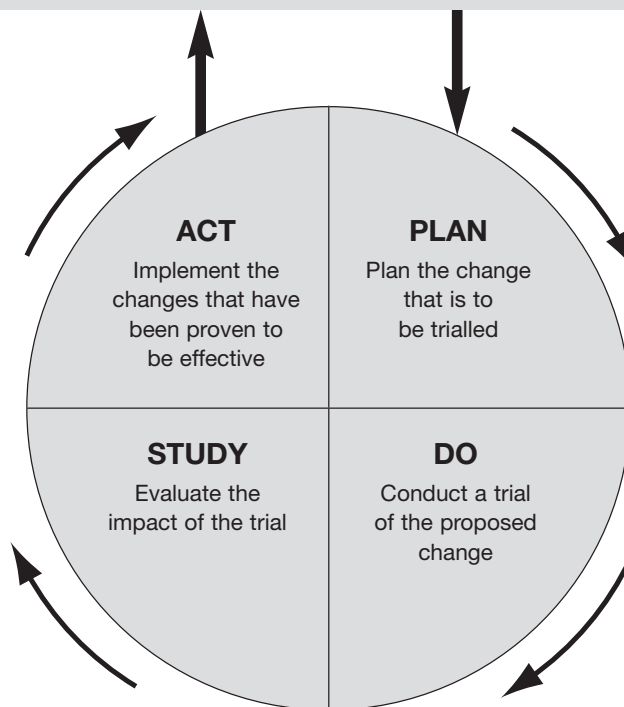
### A summary of steps

The model described below for improving processes of care and service delivery has much in common with the process of clinical care. It involves the identification and diagnosis of a problem, measurement of the scope and size of the problem,

identification of a number of interventions that may reduce the problem, implementation of the intervention(s) and re-measurement to ascertain whether the interventions have been effective.

### The Clinical Practice Improvement Model<sup>2</sup>

1. What are we trying to accomplish?
2. How will we know that a change is an improvement?  
That is, what do we need to measure?
3. What changes can we make that will result in an improvement?





Systematic improvement in quality requires recognition of the systems and processes of the service being provided. This Section gives a step-by-step guide to clinical practice improvement. It describes the tools and skills necessary to define the process of patient care and to prioritise opportunities to improve that care.

The five recognised steps in this improvement process are:

### 1. Project phase

Identify what you are trying to accomplish and who should be involved.

### 2. Diagnostic phase

Establish the full extent of the problem, what changes can be made that will result in an improvement, and how to measure any resulting improvement.

### 3. Interventions phase

Implement the changes identified in the diagnostic phase.

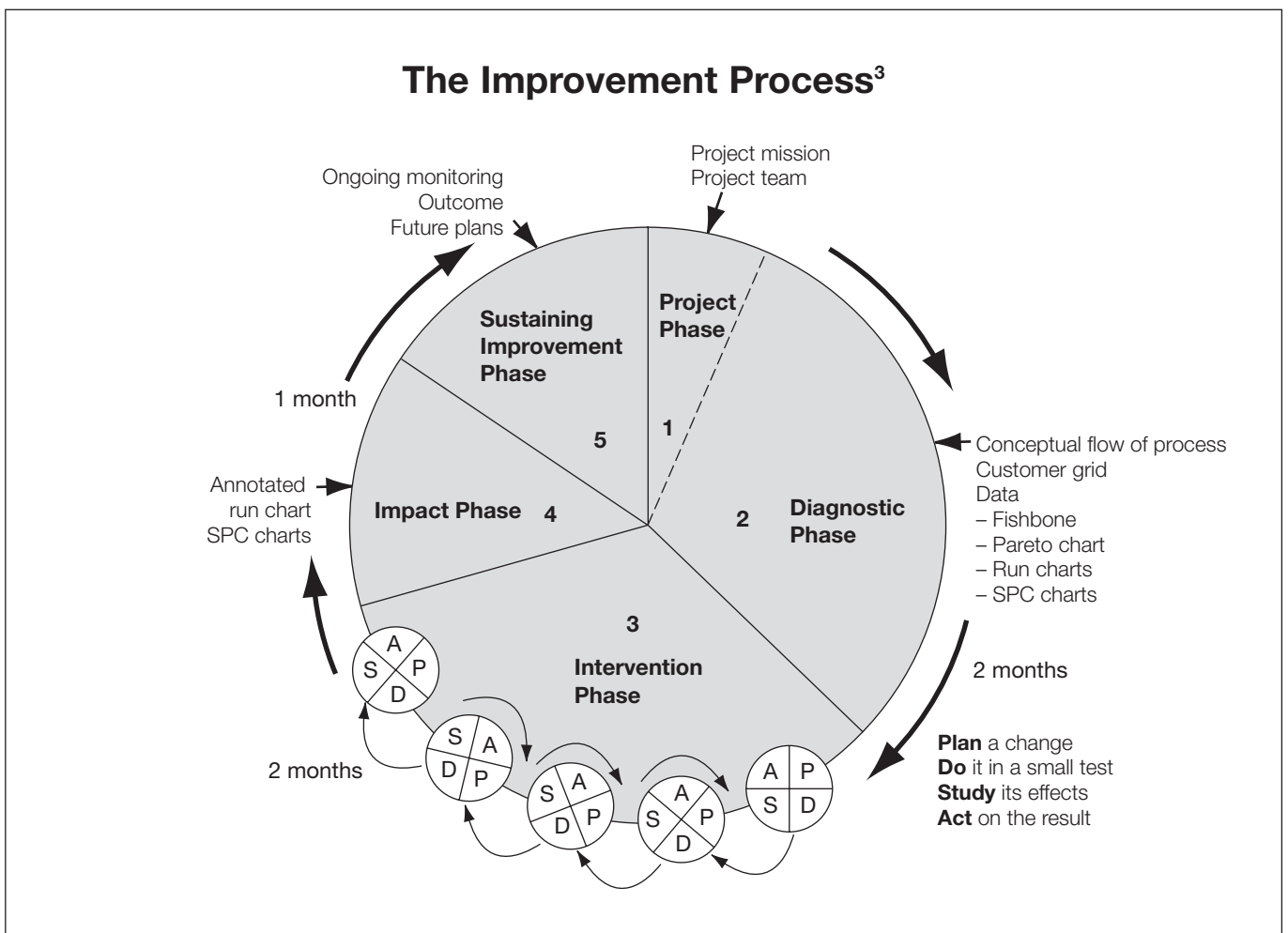
### 4. Impact and implementation phase

Measure and record the effect of the changes.

### 5. Sustaining improvement phase

Continue monitoring and planning for future improvement.

The following diagram represents these five recognised stages in the improvement process and illustrates that the cycle is ongoing. It identifies the essential steps to be taken when using the model and provides an indicative time frame for successfully improving a significant clinical process.



## Project phase

There are four fundamental actions that need to take place at the start of the improvement process.

1. Decide on the process that needs improving.
2. Form teams.
3. Write an aim or a mission statement.
4. Consider appropriate measurements.

### 1. Decide on the process that needs improving

At the outset it is essential to decide on the process to be improved, and there should be data available supporting the assumption that there is a problem. Such data may include variation data, complaints data, clinical indicators and/or aggregated incident data. The data may be population-based, facility-based, clinician-specific or specific to a particular context.

The process chosen may:

- involve high cost procedures or conditions
- relate to a high volume diagnosis related group (DRG), procedure or condition

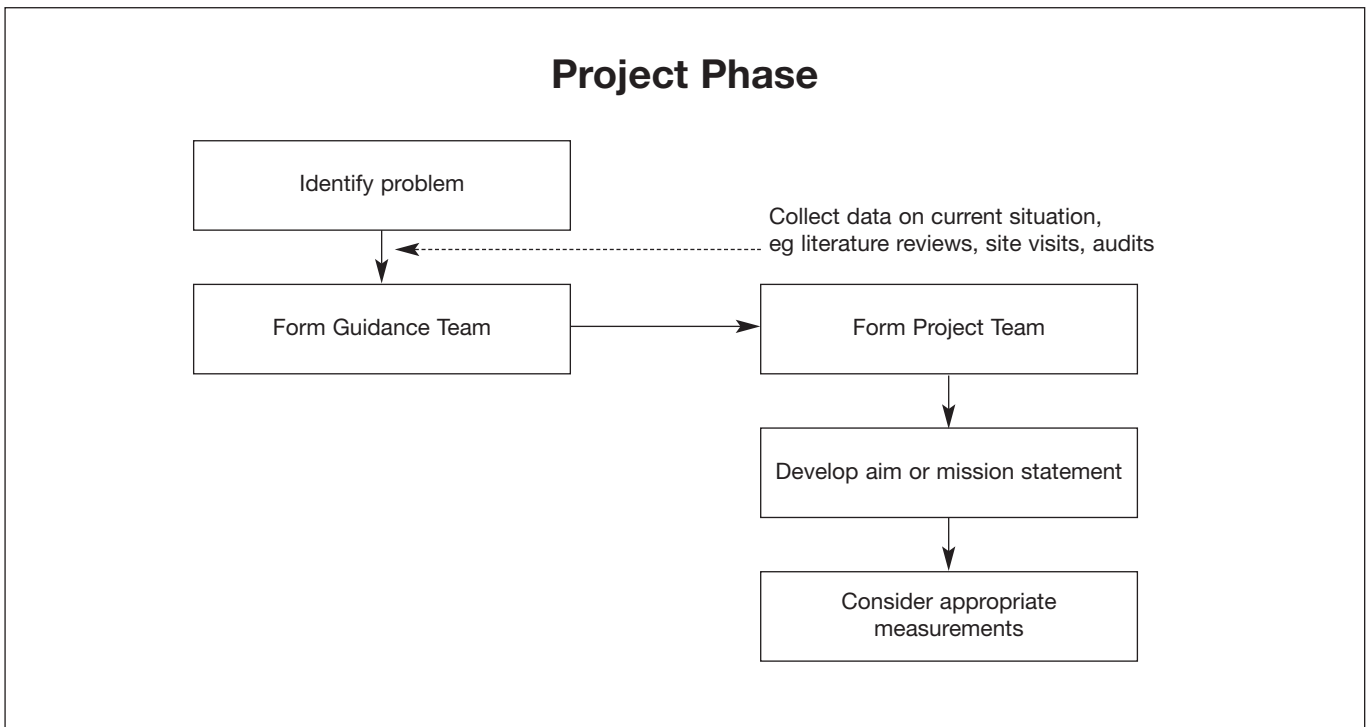
- result in high levels of complications or adverse events
- be associated with documented patient/consumer dissatisfaction
- be one where there is dissonance between the evidence and clinical practice.

Problems may be given to a team to investigate or a team may choose the problem to be studied.

Sometimes problems are suspected but there are no supporting data. Data must be collected to verify the existence of a problem before deciding the process needs to be improved. At the very least, this ensures that there is a baseline for subsequent measurement of improvement.

A literature search may be required for identifying national and international best practice for the particular problem or condition being studied. Conducting a literature review can avoid ‘re-inventing the wheel’ and help to identify gaps in current practice.

Key words for the search and articles should be distributed to all team members for review.<sup>4</sup>



## 2. Form teams

Once the nature of the project has been decided, the next important step is to gather the appropriate people to work on solving the problem that has been identified.

It is helpful to establish a **Guidance Team** to provide support for the project team. The guidance team will usually be comprised of high-level managers who do not work directly on the project and who can ensure that appropriate resources are provided. It can also play an important role in ensuring that barriers to the successful functioning of the project team are removed or at least minimised.

The guidance team should be at a sufficiently high level in the organisation to have the authority to address any difficulties encountered by the project team. Alternatively, such authority can be given to the project by including a high level manager on the project team.

The **Project Team** should be comprised of people who, together, meet the following criteria:

- They must have a **fundamental knowledge** of the process and therefore should be people who work with or have a particular interest in the process. For example, a team looking at refining the admission process for children with cystic fibrosis should include paediatric respiratory physicians, physiotherapists, paediatric nursing staff, children's ward clerical staff and parents (at a minimum), all of whom have first hand experience of the issues involved.

- They must represent all parts of the process and, as appropriate, the various levels of the organisation. It is very easy to unintentionally omit those people who are considered to be external to a process. For example, representatives of the pathology or x-ray departments, allied health professionals, GPs and private health providers.
- At least one of the team members should be trained in **quality improvement methodology**. Ideally, the team leader should have training in the facilitation of teams.
- Careful consideration should be given here to including **consumers** on the project team. They are able to bring a different perspective of the process and areas for improvement. Depending on the process being investigated, the consumer representative(s) may be internal (staff) or external to the organisation.

The ideal size of a team is 5-9 members. If your team is becoming too large, it may indicate that the scope of your project is too ambitious.

Improvement takes time and, in a stressed work environment, it is reasonable for clinicians to claim they do not have the time to participate as active team members. Meetings should therefore be structured to ensure that these people are able to contribute their fundamental knowledge of a given process in the most time-effective manner. Clinicians should not be expected to run team meetings unless they have a particular interest in doing so.

### Guidance team and project team purposes

Type	Guidance Team	Project Team
Purpose	Provide direction and support Trouble-shooting Approve recommendations for action Report to Area Health Service Quality Committees or equivalent	Investigate process, test change and analyse results Recommend improvements or changes Implement improvements or changes in practice
Membership	High level managers with decision making authority Could be single 'sponsor' or an Executive Team	People with fundamental knowledge of process Includes team leader and quality improvement facilitator Ideally maximum 9 members
Time orientation	Varies if overseeing more than one project	Limited to discrete project and short term

### 3. Write an aim or a mission statement

The first team meeting is used to decide exactly what it is the team plans to do. This is recorded as an aim or a mission statement.

The aim or mission statement should be **SMART**, ie it should be:

**S** pecific  
**M** easurable  
**A** ppropriate  
**R** esult oriented  
**T** ime scheduled

Agreement on the team's aim or mission will be more easily achieved if team members are provided with relevant information before or at the first meeting, eg baseline data about the process being investigated: admission rates, infection rates, length of stay and so on.

A good aim or mission statement identifies a 'stretch goal' that is achievable but difficult to achieve. Teams are advised to avoid drifting from the original aim, but be prepared to re-focus the aim.

Examples of aim or mission statements which will 'stretch' a team to achieve improvement are:

- to decrease the rate of infections in joint replacement surgery to less than 1% within twelve months.
- to decrease the number of admissions with a primary diagnosis of asthma by 50% within eight months.

Teams must avoid mission statements that suggest the desired solution to the problem, eg to implement an appendectomy protocol into the Division of Paediatrics.

At this stage teams should also consider whether they need to change their membership to include other people with knowledge and experience of the problem area. To avoid a team becoming too big, additional members can be co-opted for their expertise as and when needed. The power of co-option should be included in the team's terms of reference.

### 4. Consider appropriate measurements

Teams should already have data (measurements) supporting the assertion that there is an issue needing attention, eg variation in rates of admission, mortality rates, specific procedure rates, infection rates or a number of related clinical incidents. These measures are needed to establish whether a planned change results in an improvement.

To demonstrate improvement, it should be possible to plot the variable(s) being measured on a run chart.

Other data also need to be collected to give an accurate view of the whole picture. All quality improvement activities should focus on improvements in:

- clinical outcomes
- satisfaction
- efficiency

Measurement should focus on the six dimensions of quality<sup>5</sup>:

1. Safety
2. Effectiveness
3. Appropriateness
4. Consumer participation (and satisfaction)
5. Access
6. Efficiency

For example, if the primary aim is to decrease the length of stay in hospital for a particular group of patients thereby improving the level of efficiency, it is essential that changes do not result in a decreased level of safety or effectiveness of the care provided. Consumer satisfaction is another important component to measure in any quality improvement initiative.

## Diagnostic phase

The importance of the diagnostic phase cannot be overemphasised. Having decided on the process or problem to be investigated, and agreed on a mission statement defining the boundaries of the project, the next phase is to find the causes of the problem. The focus should be on developing theories to explain why a particular problem or situation exists. It is a trap to take short cuts at this time. Short cuts invariably risk a team starting to put their efforts into a potential solution only to discover it is unrelated to the cause of the problem.

The diagnostic phase involves collecting and analysing quantitative and qualitative data on the process being investigated to establish the causes of, and potential solutions to, the problem. Discussion of how the different causes interact to produce the problem helps the team to prioritise the causes and solutions to ensure effective action.

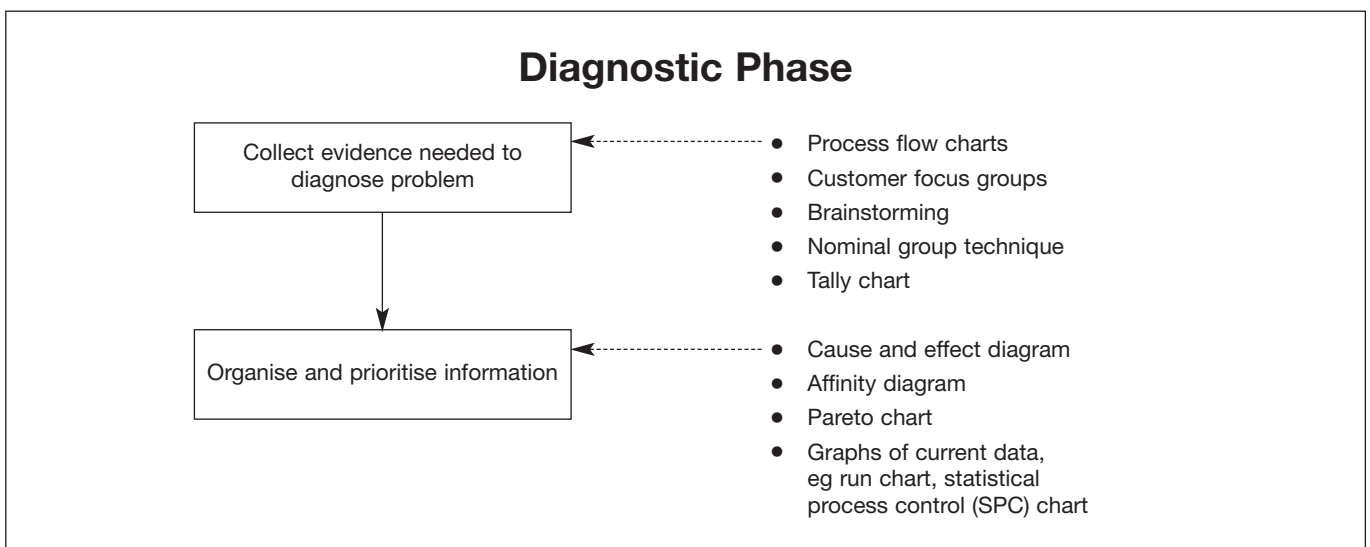
Most health care professionals have an overwhelming desire to decide on the solution to a problem early in the improvement process before the real problem is accurately identified. It is essential to go through the diagnostic phase so that the most appropriate interventions are identified. The most useful solution may not be the one that is the most obvious.

During this phase the team will use a number of diagnostic or quality tools. These tools will provide the team with a thorough understanding of the process being examined, how it currently works, how the process affects consumers, and where opportunities for improvement exist. The tools include development of a process flow chart, brainstorming, developing a cause and effect diagram and running consumer focus groups. It may however not be necessary to use all these tools.

The team will be attempting to establish the nature and extent of the problem, what the consumer understands and expects of the process, and what is available to manage the problem. This involves finding out what others are doing to manage the problem and may include reviewing the literature, site visits and web searches.

The whole team should participate and understand the processes they are investigating to ensure that appropriate and effective strategies are formulated and to ensure ownership of action by the team. This is important because it will be the team members who are involved in testing these interventions.

It is recommended that the following steps occur during the diagnostic phase. Whilst this should give the team sufficient information about the process to enable improvement, many other tools may also be used. A detailed guide to the range of possible tools is contained in Section 2.



Generally speaking the following have been found to work in practice. However, not all actions are always required to yield useful information about the process being investigated.

To identify the current and best processes (which may not be one and the same):

1. Flow chart the process:
  - conduct consumer focus groups
  - collect quantitative data.
2. To identify the issues:
  - conduct a brainstorming or nominal group technique (NGT) session
  - construct a cause and effect diagram.
3. To organise the issues:
  - prioritise causes in a Pareto chart using quantitative and qualitative data.

## Interventions phase

Having mapped the process and identified the nature and causes of the problems associated with it, the team needs to find out where the opportunities for improvement exist or what changes can be made that will lead to an improvement. The CPI model is based on a ‘trial and learning’ approach to improvement. The PDSA cycle is shorthand for testing a change – by trying it, observing the consequences, and then learning from those consequences.<sup>6</sup> The completion of each small PDSA cycle leads to the next small test or PDSA. The team learns from each test what worked, what did not work and what should be kept, changed, or discarded. The team continues linking PDSA cycles in this way until an intervention is identified as suitable for broader implementation.

The steps to the intervention stage are as follows:

- Examine the information collected throughout the diagnostic phase. High priority problems that have been identified by the team are of particular importance.
- Achieve consensus within the team on where to focus improvement energy.
- Decide on the interventions or changes most likely to bring about improvement. Some broad examples of strategies include education for staff, implementation of a protocol or pathway and introduction of prophylactic antibiotics.

Testing a change is not always easy. Things may happen that were not planned, the change may not have an impact on the problem, or there may be unwanted side effects.

To help people develop tests and implement changes, it is best to use the PDSA Cycle as the framework for an efficient trial-and-learning methodology. The cycle begins with a plan and ends with an action based on the learning gained from the Do and Study phases of the cycle.<sup>7</sup>

- **Plan** to test selected improvement or change.  
Who? What? When? Where?

Testing should demonstrate your belief that change will result in improvement. Testing also ensures you adapt change to suit conditions in the local environment, helps to evaluate costs and side effects of the change and minimises resistance upon implementation.

- **Do** the test (ie carry out the plan) and collect data for analysis.

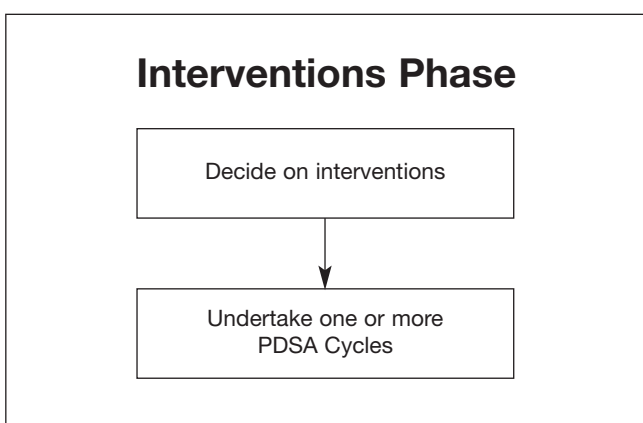
Data collection may be as simple as counting observations and recording them on a tally sheet. It is essential to document problems and unexpected observations as these will help in understanding why a change did or did not result in improvement.

- **Study** the results. Compare data to predictions. Has the test resulted in an improvement? Can this be implemented on a larger scale?

Analysis of the data will help to identify where change was well executed, where support processes were adequate or where hypotheses or hunches were correct. Where data does not support the process, then recognise that the solution may be inappropriate.

- **Act** on the results. Implement the improvement or changes or select another possible improvement to test. Action should be rationally based on what was learned from testing the planned intervention.

Running early small PDSA cycles is often better than waiting to run large cycles after a long period of planning. Even when the change is ambitious and innovative, it should be tested on a small scale (eg with only one or two clinicians, or with the next three patients, or in one ward).



A PDSA cycle may be completed in as short a time frame as a day, a week or a month. Each PDSA cycle, properly carried out, is informative and provides a basis for incremental improvement. If a change works on a small scale and is improved in successive PDSA cycles, it can then be implemented on a larger scale.

Completion of each PDSA cycle leads directly into the start of the next cycle. A team learns from testing what worked and what did not work, what should be kept, changed, or thrown out. This new knowledge can be used to plan the next test. The team continues linking PDSA cycles in this way, refining the change until it is ready for broader implementation.

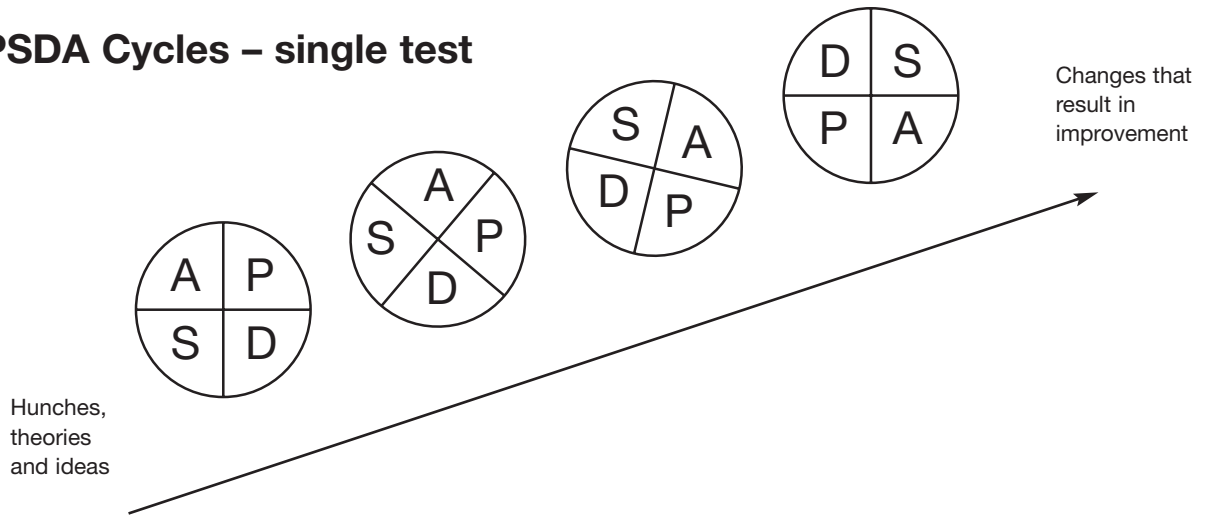
These linked PDSA cycles are called ‘ramps’ presented on page 12. Linking small cycles in this way helps overcome the natural resistance to change.

Teams may also be involved in testing more than one change at a time, ultimately aiming to achieve the same goal. In health care and in pragmatic science, it is not necessary to initiate tests one at a time, but it may be appropriate to introduce the things you know are going to work, together. Therefore testing a number of changes at the same time is appropriate and teams should continue testing interventions or changes to achieve the best practice possible.

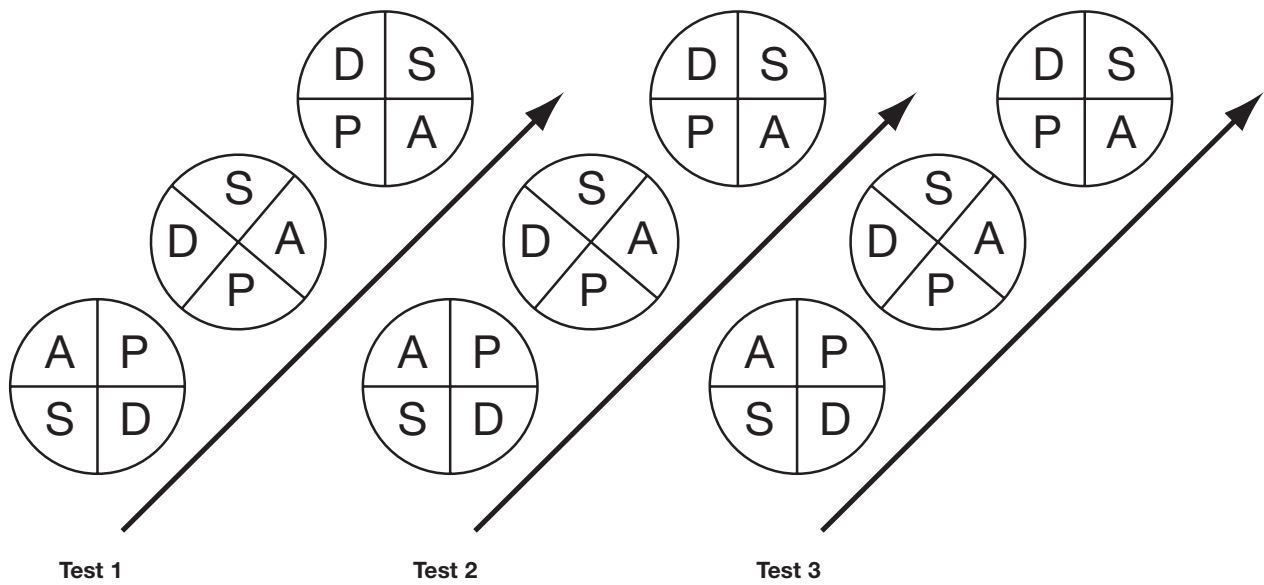
PDSA cycles take time, improvement takes investment. One important way to reduce the resources required is to establish and maintain measurements of important performance variables over time. Brief, measurable snapshots of performance over time may be sufficient. If clinical groups keep track of such measurements, the effects of deliberate changes can easily be assessed. Simultaneous multiple tests are schematically presented on page 12.

In trying to improve the process of care, wisdom often lies not in accumulating all of the information that could be used to prove a point, but in acquiring only that amount of information necessary to support taking the next steps.<sup>8</sup>

### PSDA Cycles – single test



### PSDA Cycles– multiple tests





## Impact and implementation phase

Teams should measure the impact of changes they have made in order to be sure the intervention has resulted in an improvement, and to provide the evidence required to justify permanent implementation of these changes.

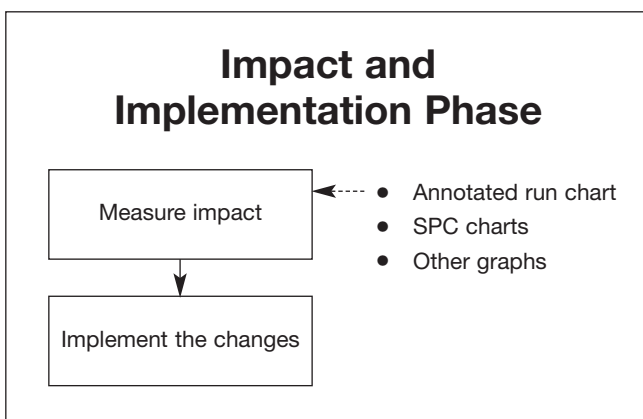
It is therefore necessary to collect, analyse, and display data for all to see.

Two popular ways of displaying data are run charts and statistical process control (SPC) charts. These are described more fully in Section 2.

Achieving success in a PDSA cycle does not guarantee sustained improvement. The successful interventions then need to be formally implemented. Implementing a change means making it a permanent part of normal business. To be successful, it is wise to implement only those changes you are sure will result in improvement.

Implementation differs from testing in several important ways.

1. Since testing a change is not permanent, there is no need to create a support structure eg. training, documentation, standardisation. However, to implement a change, the relevant support processes have to be implemented at the same time.
2. While the results of testing a change are uncertain, it is wise to implement only those changes you are sure will result in improvement.
3. Since the PDSA tests are usually conducted on a small scale, fewer people are involved than in the actual implementation of the change. This means that greater resistance to change is likely to be associated with implementation and therefore will require an effective change management plan.



## Sustaining improvement phase

Once improvements have been implemented, mechanisms need to be established to sustain the improvement.<sup>9</sup> This may involve:

1. **Standardisation** of existing systems and processes for performing work activities.
2. **Documentation** of associated policies, procedures, protocols and guidelines.
3. **Measurement and review** to ensure that the change becomes part of the routine practice.
4. **Training and education** of staff.

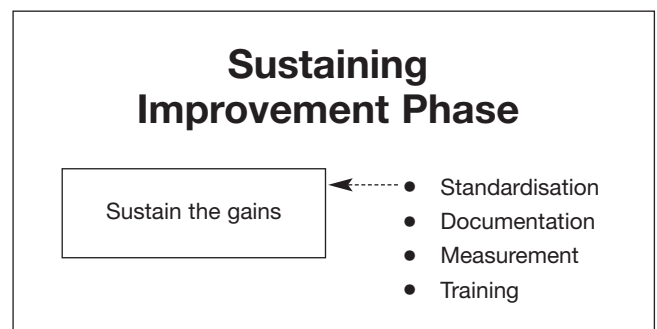
### Standardisation

Standardisation should ensure that the new work methods or processes are implemented consistently over time. The team needs to communicate its recommendations for improvement to management so that the changes become part of policy and day-to-day practice. Management in turn needs to incorporate the recommended changes as appropriate in 'standards' or 'best practice guidelines' and to promulgate them to all who need to know.

They may take the form of clinical pathways or decision-making trees, more conventional narrative policies and procedures, or a mixture of both.

### Documentation

Teams are responsible for documentation of all stages of the project from planning through testing, review of progress, implementation of change and all follow-up activities including project closure. This serves as 'the organisation's memory of the team's work'.



Organisations depend on the documentation for education and training of staff during the implementation of the change, consistency from one group to another, understanding of a method or process and for developing a common definition of the change.

Documentation may take the form of minutes of meetings, copies of reports, correspondence, and worksheets. This forms the basis for reviewing progress and achievements, helps the team keep track of developments over time, and provides information to brief new members who may join the team after the project has started. Complete and up-to-date documentation makes it easier to prepare presentations on the work of the team.

## Measurement

Measurement of the process ensures that the implemented changes are in fact being carried out, and provides a source of learning during implementation and a method of maintenance after implementation. Measurement provides the basis for continuous review and improvement. Displaying process and outcome measurements in a prominent place will ensure a continuous focus on that process.

Some of the measurements developed and used in the testing and the implementation stages should be considered for permanent use after implementation. Viewing measurements over time allows a clinical team to determine whether it is continuing to achieve the desired results and whether it can expect these results to be achieved in the future.

## Training and education

Some form of training and education is always required to implement a change. New methods or work processes also need to be documented and people trained in the new way of doing things. When considering how much training is required, the team needs to take into account:

- the type of change being proposed
- who will be asked to implement the change
- the skill level and work experience of the target group.

If the desired change is a simple extension of the work currently being performed, a one-off discussion of the change with the clinicians and managers affected may be all the training required. Such training can be done on the job or by reviewing the new standards at a meeting. Learning by doing is usually the imperative with this style of training.

If the change is more complex and extensive (eg. if it involves the use of new technology), formal classroom training may be required to support implementation of the change. Most effective here is interactive workshops or seminars. They may also need to be followed by on-the-job training, coaching or some other form of staff education.

## Conclusion

This section has summarised the five essential steps in clinical practice improvement specifically designed to help clinicians improve processes of care and service delivery.

Section 2 provides detail on specific quality improvement tools and techniques.

# Quality improvement tools and techniques

# 2

Specific guidance is provided in this section on the range of tools and techniques most commonly used in conjunction with the CPI model for improvement. While not an exhaustive list of all available quality improvement tools, familiarity with use of the following tools will allow you to take a systematic and structured approach to clinical practice improvement in most situations.

To help make the information more useful in practice, the tools are presented in order of their likely use as part of the CPI approach.

## **Choosing the right tool**

- Tools matrix

## **Developing an effective team**

- Tips for running a meeting well
- Team ground rules
- Negotiation and conflict resolution

## **Collecting data about the process**

- Tally sheet
- Table
- Observational data
- Indicators and variation

## **Diagnosing the problem**

- Flow chart
- Brainstorming
- Multivoting
- Nominal Group Technique (NGT)
- Customer focus groups

## **Analysing the problem**

- Cause and Effect (Fish Bone) diagram
- Affinity diagram
- Pareto chart
- Graphs and charts
- Measuring impact through sampling

## **Reviewing progress**

- Checklist

## **Selling your achievements**

- Presentation format

## Choosing the right tool

As stated in Section 1, there are several tools that are recommended for use in every CPI process. They are:

- Process flow charts
- Cause and Effect diagrams
- Pareto charts
- Run charts
- Customer focus groups

These and other tools are also described, however it is important to choose the right tool for a given study or project. Therefore it is recommended that the following matrix<sup>10</sup> be reviewed to assist in choosing the most appropriate tools that may be effective in your quality improvement process.

### Tools Matrix

Tools \ Phase	Diagnosing problem	Analysing problem	Measuring impact	Reviewing progress	Sustaining improvement
Tally sheet	X		X		X
Table	X		X		X
Literature review	X				X
Flow chart	X	X		X	X
Brainstorming	X	X			
Multivoting		X	X		
Nominal Group Technique (NGT)	X	X			
Customer focus groups	X	X	X	X	X
Indicators and variation	X		X		X
Affinity diagram	X	X			
Cause and Effect diagram		X			
Pareto chart		X	X		X
Bar graph, pie chart, histogram		X	X		X
Time plot, run chart		X	X	X	X
SPC chart	X	X	X	X	X
Presentation format					X

## Developing an effective team

'Teams' do not just happen when you bring together a group of people to work on a CPI project or other common goal.

Individuals need to learn to work together as a team and to understand that their performance will be judged by the output of the team as a whole. Teams undertake a considerable amount of their work in meetings and this can be time consuming. Individuals want to feel that this time is used well.

The following tips and ground rules should be considered:

- Work together to agree on and define the roles and responsibilities of the various team members; specifically team leader, coach or quality adviser and team members.
- Agree on who should lead the different team activities. An effective team will share leadership roles, thereby promoting shared responsibility for completing specific tasks and achieving team objectives.
- Try to create an environment in which all team members accept that the team's work is a priority, not an intrusion on their real jobs. The project is now part of the members' real jobs.<sup>11</sup>

### Tips for running a meeting well

1. Begin and end on time.
2. Use an agenda: identify items to be discussed, persons responsible for each item and, if useful, limit time allocated to discussion of each item.
3. Keep notes or a register so that ideas are not lost, even ideas that do not seem currently relevant.
4. Have ground rules (see right).
5. Control dominating individuals.
6. Include quiet individuals.
7. Summarise at the end.
8. Ensure a recorder is appointed to document plans, key points discussed, decisions, tasks and other actions as necessary.

9. Assign responsibility and set time frames for all agreed action items: who committed to do what work, by when.
10. Always review and follow up actions from previous meetings.

### Team ground rules<sup>11</sup>

The following team ground rules are suggestions only. Teams may choose to endorse the entire list or choose those which best suit their team. Team members should agree to the list chosen. The basic ground rules are as follows:

1. All members and opinions are equal.
2. Team members will speak freely and in turn; all participants will have a say.
3. Team members will listen attentively to others.
4. Each person must be able to be heard.
5. No one person will be allowed to dominate.
6. Team members will speak for themselves only and not on behalf of everyone.
7. Team members will say what they think and not what they think someone else wants to hear.
8. Problems will be discussed, analysed or attacked, not people.
9. Members will respect the confidentiality of the team.
10. Once there is agreement, team members are requested to speak with 'One Voice' even after leaving the meeting.
11. Honesty comes before cohesiveness.
12. The team will aim for consensus rather than democracy.
13. Each person will have their say, and will not necessarily get their way.
14. Silence will equal agreement.
15. There are no wrong or right answers.

## Negotiation and conflict resolution

Reaching agreement on the way a team is to work will often require negotiation, whether on assigned functions and responsibilities or on decisions for action.

Negotiation within a team aims to have all team members satisfied with the agreement reached on a particular issue or decision. Ideally this will be a 'win-win' situation that meets the needs of all team members. Sometimes however, conflict will arise, particularly when differing points of view are strongly held by individuals within the team. This can affect the team's motivation and energy and therefore needs to be addressed.

There are many effective negotiation and conflict resolution approaches. These may include:<sup>12</sup>

- determining the end objective and any non-negotiable matters
- analysing the issue before jumping to a conclusion
- understanding the interests of all team members
- respecting the opinions and positions taken by other team members
- avoiding dominance by one or more individuals
- seeking information from individual team members to clarify their perspective or position on the matter
- looking for options that might lead to a satisfactory compromise. While respecting the different points of view, the team should explore solutions that are acceptable to all parties. At the very least all team members need to feel they have been listened to in the process
- finding an agreement which all members can support and no member opposes (ie consensus)
- documenting the agreed solution at the end of the negotiation process.

## Collecting data about the process

Data collection is an essential component of problem identification and resolution. Scholtes asserts that, without good data, other quality improvement tools are worthless.<sup>12</sup>

### Tally sheet

Useful data do not always come from complex databases and electronic data systems. Data collection may be effectively achieved simply with a piece of paper and a pencil. A tally sheet is a simple data collection tool (log or check sheet) useful for quickly recording events using a counting scheme. It makes it easy to tally events or to count how often something happens and to help identify patterns or trends.

Tally sheets may be used for collecting data retrospectively, concurrently or prospectively. As with any data collection tool, it is important to:

- decide on the area of performance or problem to be investigated
- decide the categories of data to be collected
- design a simple form or method for gathering data
- agree on the time period for data collection
- train people in use of the tool to ensure data are collected consistently
- trial the tool to help ensure useful data are collected
- collect data for the specified time period
- analyse the data using such tools as Pareto charts, histograms and run charts.

Tally sheets or checklists are particularly useful when used in conjunction with observation. Using agreed criteria, they help ensure consistency in data collection. You may, for example, be observing standards of cleanliness, food wastage, disposal of sharps, date labels on medications, contents of emergency trolley, compliance with policy on lifting or washing of hands or the number of people in a waiting room or attending an education session.

## Table

A table is a compact way of graphically organising data. Tables are particularly useful when you have large data sets to present.

The steps are simple:

1. Count your data and summarise under the relevant category headings.
2. Create a table with columns and rows. Add the data in the various categories and add totals to right and bottom margins of the table. See example below.
3. Label each column and row.
4. Check to ensure that both vertical and horizontal totals add up.
5. Label the table.

## Observational data

Many of the tools described rely on direct observation as the source of data. Observation may be the only way of collecting data on activities for which there are no written records, particularly observations of patient, staff or other people's behaviour.

Direct observation is the most reliable way of evaluating the actual performance of care givers (eg. compliance with no-lifting protocol, standards of cleanliness, manner of speaking to patients, compliance with hand washing routine, checking out-of-date medication). Observation is also useful for assessing attendance at education sessions, adequacy of seating in waiting rooms and Emergency Departments at peak periods, utilisation of equipment or rooms, food wastage, and compliance with keeping fire exits clear of clutter.

Observation is usually used in conjunction with tally sheets or checklists in some form so that a timely record of observation is consistently maintained. It may also be used in association with other tools, particularly those designed to capture customer perceptions (eg customer focus groups, patient interviews and satisfaction surveys).

## Example of a simple tally sheet

Event – causes of bed block	Tally	Subtotal
No cleaner to clean bed in ward		3
Delay in investigation		5
No bed in ward		7
Instances of bed block		15

## Example table – Causes of discharge delay from emergency

Cause	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Totals
X-rays	39	30	28	29	126
Bed shortage	13	16	21	13	63
Review by team	5	4	7	4	20
Doctor busy	4	7	8	5	24
Patient	3	2	1	4	10
Other	3	2	1	3	9
TOTAL	67	61	66	58	252

## Indicators and Variation

The overall objective for indicator use by NSW health services is to improve the quality of care being delivered to consumers of health services. Indicators are measures of performance that can be used to describe a problem: how often it occurs, when and where it occurs, and who is affected by it.

Indicators are developed by collecting data and then expressing that data in the form of mathematical formulas or through tables and graphs. The formula comprises a numerator (what is observed) and a denominator (the reference). The indicator may be expressed in terms of, for example, the **proportion** of the population affected by a certain event or condition, the **percentage** of people attending a particular event, or the **rate** of a condition or event occurring within a given population. Indicators are therefore useful for diagnosing a current situation, comparing the characteristics in a given population or a process to others, or evaluating variations in the occurrence of an event or characteristic.

Indicators require a standard or reference point for comparison. Some form of variation occurs in all processes. Hence, to reduce the amount of variation in a process, you need to compare the results of the process with a standard or previously determined reference point.

Indicators are hierarchical. Different indicators will be relevant at different levels of the system, ie population, state, Area Health Service, hospital, department, and clinical level as each level has different information needs. This means the aggregation of data useful at the clinical level may not provide useful information at the Area Health Service or state levels. Effective indicator development therefore requires a good understanding of information needs. The ‘usefulness’ of a particular indicator lies in the value of providing the information to the individuals or groups who are using it.

### Clinical Indicators

Clinical indicators are measures of specific clinical conditions, or measures of function related to particular conditions.<sup>13</sup> They are an objective measure of either the process or the outcome of patient care in quantitative terms.

Clinical indicators are not exact standards; rather they are designed to be ‘flags’ which can alert clinicians to possible problems and/or opportunities for improvement in patient care. Clinical teams can then investigate variations in indicator data as a starting point for improvement.

Donabedian described a model for analysing quality by using indicators as measures of either the structure, the process or the outcome of patient care in quantitative terms.<sup>14</sup> For example, the number of staff per bed is a measure of structure; the percentage of day surgery patients and the mean length of stay are process indicators; and the case-fatality rate is an outcome measure.

### Variation

Variation exists in all aspects of life: among people and among institutions. In the early twentieth century, Walter Shewhart developed the concept that variation should be viewed in one of two ways:

1. Variation indicating that something has changed or is not right, or
2. Random fluctuation that continues over time and does not indicate that a particular change has occurred.

The key to Shewhart’s concept is that, while there should not be an automatic reaction to each observation of random variation, patterns do require attention, hence decisions should be based on the nature of the variation.<sup>15</sup> If variation is found there should be a thorough examination of possible causes. If this examination reveals opportunities for improvement, these improvements must be instituted.

There are many reasons for variation including:

- hospitals and other types of health services may have different patient mix
- populations may have different needs
- differences in socioeconomic status also influence health status and health care need
- services have different cost structures
- services have different management practices
- different clinical practices.



Data problems (associated, for example, with poor documentation or inadequate coding) often result in a variation but are not a true reason for variation. Rather they should be viewed as indicators of a systems problem.

### Potential pitfalls

Indicators provide data that identify areas where there is the potential to improve performance. However, there are many pitfalls in using data that need to be avoided. These include:

- Lack of scientific approach to interpreting indicators and setting targets.
- Setting targets that are not achievable.
- The ‘ratchet effect’. Problems can arise when targets are increased, for example annually, on the basis of performance that proves to be due to chance and makes the revised targets unachievable.
- Aiming for the mean rather than best potential gain.
- Neglecting long-term considerations.
- Failing to determine the reasons for ‘good’ performance.
- Creative, non-standardised or irregular reporting.

## Diagnosing the problem

The diagnostic phase involves:

1. Collecting the evidence needed to diagnose the problem
2. Determining the causes and
3. Organising and prioritising the information.

There are several quality improvement tools that may be used to diagnose the problem. Some tools are designed to seek information and opinion from service providers and others from consumers. The most common tools are:

- Flow chart
- Brainstorming
- Multivoting
- Nominal Group Technique (NGT)
- Customer Focus Groups

### Flow chart

The first task for the project team is to construct a flow chart of the existing process.<sup>16</sup> As all processes are hierarchical, both the macro and micro level of the process should be documented. This activity should take place after the aim or mission statement has been developed. Flow charts visually present the sequence of steps or decision flows in a process. They help a team reach consensus on the process and how it can be improved. They can be complex in nature and should be kept as simple as possible.

The process of developing a flow chart facilitates:

- Understanding of the process as it currently exists.
- Open criticism of the process, comparison with other more effective processes and identification of improvement points, as and when applicable.
- Identifying the complexity of the process and its management.
- Identifying ‘outcome’ and ‘process’ steps.
- Establishing process measures.
- A better, less complex process.

Boxes or other symbols represent different steps or actions. These step-by-step pictures can be used to plan a project, describe a process, identify the steps that led to an adverse event or document a standard method for doing a job. They can help group members understand what is happening now in a process, as well as help them agree on the order of activities in a new, improved process.<sup>16</sup>

It is useful to flow chart a process at two levels:

1. A high level flow diagram (macro level) that describes the overall process (see left of Labour/Delivery diagram on page 23) and
2. A low level flow diagram (mini level) with more detail of the major stage in the process under examination (see on right of Labour/Delivery diagram on page 23).

The diagram on page 23 represents the macro process of having a baby and the mini process of one stage of the macro process, namely labour and delivery.<sup>17</sup>

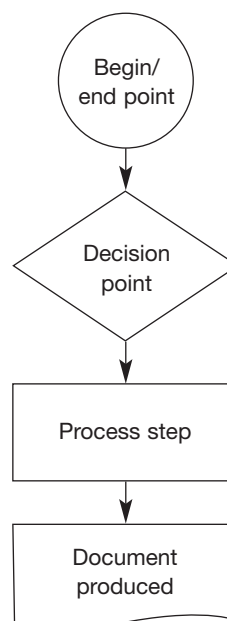
Some people further break down the process into macro, mini and micro levels of the process being examined. The very 'simple' process of getting up and going to work each day is mapped at the bottom of page 23.

The key steps in developing a flow chart are:

1. Define the process to be studied. In particular, establish the boundaries of the process: where it starts, stops and interfaces with other processes.
2. Identify the steps within the process – as it currently happens, not how the team thinks it should be. Identify key activities or operations, as well as decision points. These may well highlight the potential for blockages, errors or miscommunication in the system. Brainstorming is a useful way of developing a list of all major activities and decisions involved from start to finish in a process.

3. Draw the chart, using the appropriate symbols. Use 'Post-It' notes or a white board where a group of people are contributing their ideas. Keep the flow chart simple and use arrows to show the direction of all steps in the process. Make sure the steps in the process are arranged in the order they are carried out. Having people with knowledge of the process involved in the activity should help ensure the flow chart is a true reflection of what actually happens.

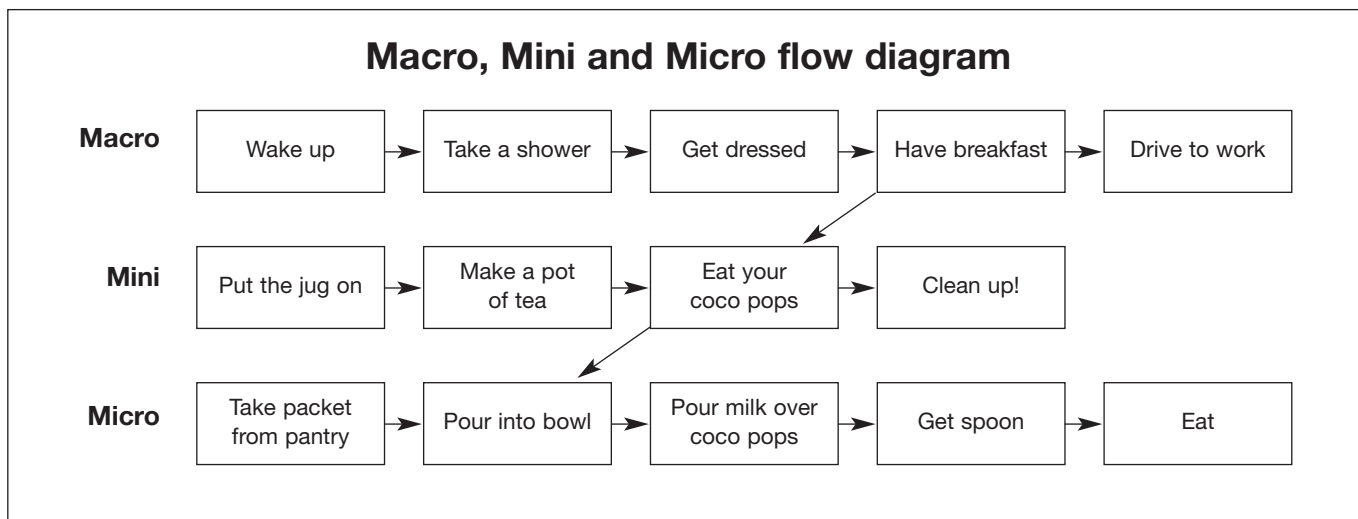
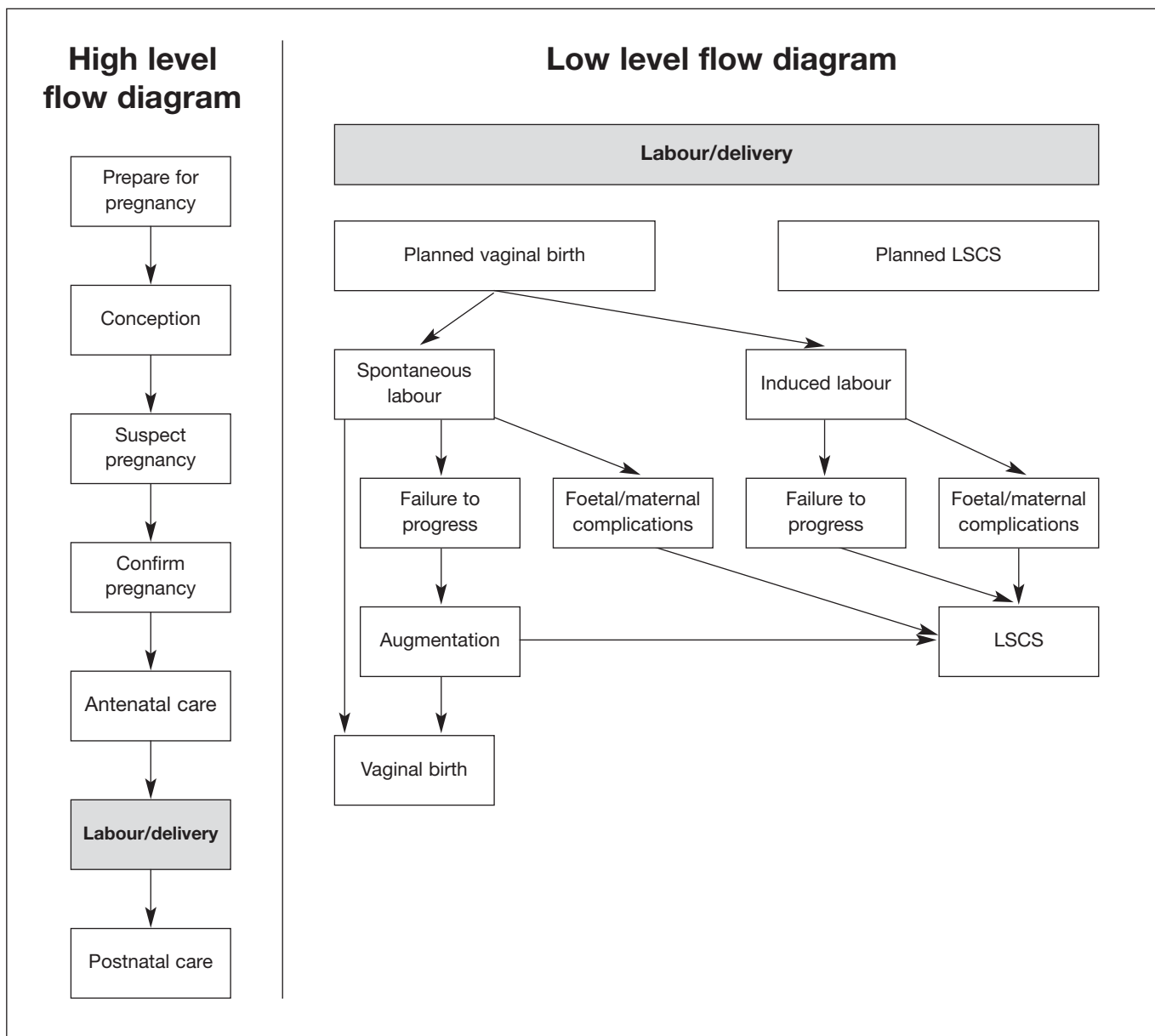
The basic symbols used when constructing a flow chart are:



It is not essential to use these symbols but they may be helpful.

Finalise the chart after a process of reflection. Make sure it contains all key steps, including re-work and decision loops and the start and end points. Label the flow chart with the title of the process, the date, and members of the team involved in its preparation.

The team will usually refine the process flow chart at its second meeting.



## Brainstorming

The objective of brainstorming is to generate as many ideas as possible from team members. Such sessions are usually useful either when the team is trying to identify the causes of a particular problem or when the team is trying to identify the solutions to the causes. A more structured alternative to brainstorming is the Nominal Group Technique (NGT) described later in this section.

With the right team – that is, all those people who have a fundamental knowledge of the process being improved – this process can quickly identify causes and solutions.

There are two common methods for brainstorming:

1. **Structured:** Go around the group and have each person contribute one of their ideas in turn, until everyone is out of ideas.
2. **Unstructured:** Anyone calls out an idea, no order, until all ideas are exhausted.

### Guidelines for brainstorming<sup>18</sup>

1. Appoint a ‘scribe’ to write up the ideas.
2. Write the problem or idea or use a well structured question on flipchart or board.
3. Start by reviewing the topic; make sure everyone understands the issues.
4. Give people a minute or two of silent thinking time.
5. Write all ideas on ‘Post-It’ notes and place them on flipcharts or a board so everyone can see them.
6. Agree to no discussion during the brainstorm. That will come later.
7. Agree to no criticism of ideas – not even a groan or grimace!
8. Build on ideas generated by others in the group.
9. Leave historical solutions behind; think fresh, be creative.
10. Focus on creating a new order rather than on bandaiding old problems; do not use words like: less, more, better, not, as they tie you to current problems.
11. Use complete sentences (5–7 words) with noun, verb, and object – to help clarity.

The results of a brainstorming session may appear as follows.

### **Problem: Post-operative infections in joint replacements**

1. Poor antibiotic cover
2. Exposure to hospital ‘bugs’
3. High risk patients undergoing surgery
4. No / poor post-operative infection surveillance
5. Inadequate JMO education
6. Poor aseptic techniques
7. And many more.

The next step is to identify the priority issues for the group. Some form of voting usually achieves this.

In a small group discussion a show of hands may be sufficient. When the issue is more complex and more people are involved, consensus may be unlikely in the time allowed. In this instance, multivoting may be the best option.

### Multivoting<sup>19</sup>

Multivoting is a simple, structured approach used by groups to select the most significant or top priority items on a list. It usually follows a brainstorming session that has generated many ideas and the objective is to identify a small number of items requiring or worthy of immediate attention.

Multivoting involves the group in a series of votes, each cutting the list in half – even a list of 30 to 50 items can be reduced to a workable number in 4 or 5 votes.

The outcome of multivoting reflects popular opinion and should not be confused with data collection. It is not a substitute for collecting data to identify the most important item out of a group of items.

**The steps in multivoting**

1. Take the list of items generated in the brainstorming session and number each item.
2. Combine two or more similar items if the group agrees that they are the same. Re-number all items if necessary.
3. Ask all members to choose several priority items for discussion and to write down the numbers corresponding to each of these items on a sheet of paper. The number of choices may be up to one-third of the total number of items on the list (eg 48 item list = 16 choices; 37 item list = 13 choices).
4. Tally the votes after all members have silently completed their selections. Members can vote by a show of hands as each item number is called out.
5. To reduce the list, eliminate those items with the fewest votes. As the size of the group affects results the following rule of thumb is suggested.
  - If it is a small group (5 or fewer members), cross off items with only 1 or 2 votes.
  - If it is a medium size group (6 to 15 members), remove any item with 3 or fewer votes.
  - If it is a large group (more than 15 members), eliminate items with 4 or fewer votes.
6. Repeat steps 2 through 5 for the remaining list of items. Continue the group voting process until only a selected few items are left. If no clear favourite has been identified by this stage, discuss with the group which item should receive top priority. One last vote may still be necessary.

**Nominal Group Technique (NGT)<sup>20</sup>**

The Nominal Group Technique (NGT) is another structured method of generating a list of ideas or condensing the ideas to a more manageable number. It is a more formal approach than brainstorming or multivoting. It is called 'nominal' because, in the process of generating ideas, the group does not engage in the usual amount of interaction typical of a real team. The relatively low level of interaction means the NGT is good for controversial issues. NGT also allows every team member to have an equal say and vote on issues raised.

The NGT may be used to make decisions by consensus or allow each team member to have equal input into discussions. This may be useful to defuse a domineering staff member or influential employee who would otherwise control the discussion and dominate the process.

The NGT is usually conducted in two stages – a formalised brainstorm followed by a selection process.

**Stage 1: Formalised Brainstorm**

1. Define the task in the form of a question
  - usually prepared by the team leader or team facilitator before the meeting.
2. Describe the purpose of the discussion
  - including rules and procedures.
3. Introduce and clarify the question
  - display the question on the wall or include it in handouts to team members for easy reference. It may also be helpful to read the question aloud to the group to ensure it is understood by all participants.
  - encourage anyone who does not understand the question to ask for more explanation. This should not develop into a discussion of the issue itself.
4. Generate ideas
  - this is the most important step in the process.
  - ask team members first to write down their answers in silence. This is a proven method of eliciting good ideas. Do not allow any distractions at this stage: no joking, no moving around, no whispering. People who finish first should be asked to sit quietly until all are finished.
5. List ideas
  - when everyone is finished, ask each participant in turn to read one idea from their list. Write every answer on a flipchart. Continue round-robin style until everyone's list is exhausted or until time runs out (maximum of 30 minutes suggested).
  - allow no discussion, not even questions for clarification, at this stage, to expedite the process and prevent the exercise becoming tedious.

6. Clarify and discuss ideas
  - display all of the flipchart pages in full view of the entire group. Ask if anyone has questions about any items listed. The person who contributed the idea should be the one to answer a question. Other members may join in the discussion to help define and focus the wording. The wording may only be changed with the agreement of the person originally proposing the idea.
  - when there are no more questions, condense the list as much as possible. If the originators of the ideas approve, the leader may combine ideas. If the originators think there is a difference, then ideas should remain separately listed.
  - number each item on the remaining list for ease of reference.

### **Stage 2: Making the selection**

This stage is a more formal type of multivoting, used to narrow or condense a list of options, and to select the choice or choices preferred by the team.

1. When the first stage has generated more than 50 items, try some method to reduce the list to 50 or less, eg one or two rounds of multivoting, or simply let members withdraw the less serious items they put on the list. No member is allowed to remove another person's item, unless the originator agrees.
2. Give each participant a set of 5cm x 10cm cards or pieces of paper. The number of cards is a rough fraction of the number of items still on the list: 4 cards apiece for up to 20 items; 6 cards for 20 to 35 items; 8 cards for 35 to 50 items.
3. Ask members to individually select items from the list according to their own preference or ranking of importance. They are to write down one item per card (up to 4, 6, or 8 items, depending on how many cards they were given).
4. Ask members to assign a point value to each item, based on their preferences. The highest point value should be given to the most important item. The top value again depends on the number of items selected (4, 6 or 8). In an 8-card system, for example, the most preferred item will be number 8,

the second most preferred item number 7, and so on until the least preferred item is assigned number 1. This system is the same for groups with 4 to 6 selections.

5. After each participant has given point values to the items selected, collect the cards and tally the votes. It is easiest to score directly on the flipchart, noting the point value of each vote against the specific item, then adding up these values. The item with the highest point total is the group's selection of the most important item.
6. Review the results as a group, and discuss the reaction. If there is time, display the results on a Pareto chart to highlight the items which received the most votes and which have the greatest point total (these are not always the same items).
  - Were there any surprises?
  - Any objections?
  - Is anyone asking for another vote?

If members do not agree on the top priority item, the team may focus its efforts on investigating more than one (two or three) of the items receiving the highest scores. If members agree on the importance of the highest scoring item, the NGT can be concluded. The team then has to decide its next action.

### **Customer Focus Groups<sup>21</sup>**

Quality is about meeting and, if possible, exceeding customers' needs and expectations. Obtaining the customers' perception of a problem or their satisfaction with service provision helps achieve this goal. Useful techniques include direct observation of performance or behaviour and the use of surveys, interviews or questionnaires to define customer perceptions. They help to identify gaps between the customers' expectations and the actual services being provided, allow the development of service quality indicators so that customer satisfaction can be measured and monitored and assist with facilitation of communication between customers and suppliers.

Focus groups are also a particularly efficient and effective way of obtaining consumer or customer feedback where specific or more in-depth information is required.

Customers will include patient groups, carers and/or parents, nurses, doctors, allied health practitioners and health service administrators. For example, for a team conducting customer focus groups as part of a process to improve the physiotherapy treatment of a child with cystic fibrosis, the following customer groups should be considered:

1. All paediatric physiotherapists
2. Physiotherapists who treat children with cystic fibrosis
3. Paediatric respiratory physicians
4. General practitioners
5. Paediatric registrars and residents
6. Night nurses
7. Day nurses
8. Parents of children with cystic fibrosis
9. Children with cystic fibrosis aged over 13 years.

Some of the key points to remember when running customer focus groups are:

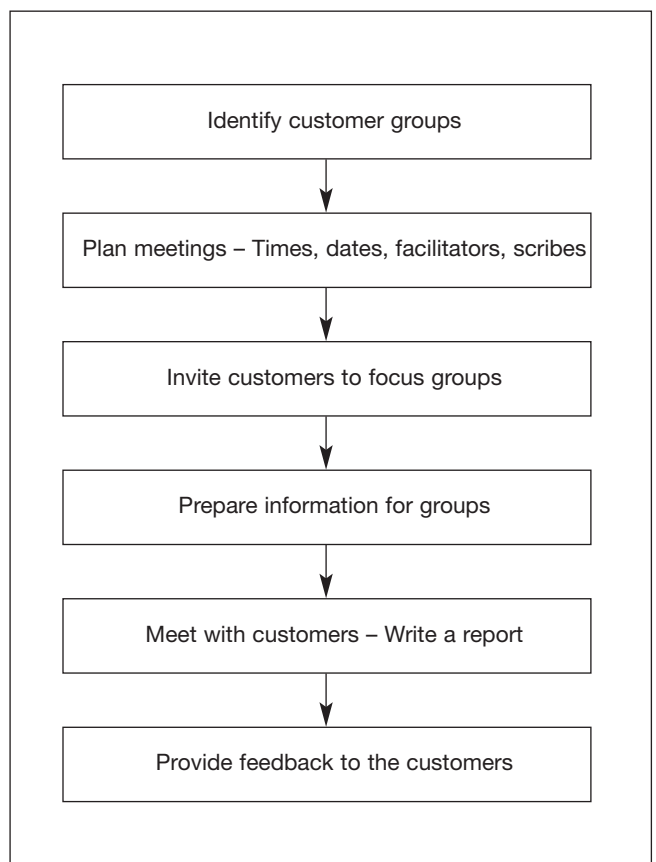
- Establish some simple ‘rules’ before starting. This makes it easier to maintain control, especially with a larger group. They could be:
  - all participants are to be given a say
  - no person should speak at the same time as another person
  - people should say what they think or believe not what they think someone else wants to hear
  - there are no right or wrong answers
  - individuals should speak for themselves only and not on behalf of others
- Commence with an easy, positive, general question, for example:
  - What did you like best about the treatment you received when you were a patient in this hospital having your procedure?
  - As the doctor admitting patients to this ward, what do you like about the care currently being given?

- Continue with approximately 4-5 set questions which will stimulate discussion, for example:
  - What do you dislike about the service?
  - What would you like to change?
  - What information would you like to be receiving?
  - How would you like to receive this information?

These types of questions usually promote a great deal of discussion and provide vast amounts of information.

- Devise customer questionnaire(s) based on the information provided by focus group customers in relation to their expectations. This should be used to establish a baseline of customer satisfaction prior to any implementation of change.

The following diagram describes the process for conducting customer focus groups.



## Analysing the Problem

Analysing the problem involves examining quantitative and qualitative data collected on the process being investigated during the diagnostic phase of the project. The tools most commonly used in this phase are:

- Cause and Effect (Fish Bone) diagram
- Affinity diagram
- Pareto chart
- Various graphs of current data: run chart and statistical process control (SPC) chart

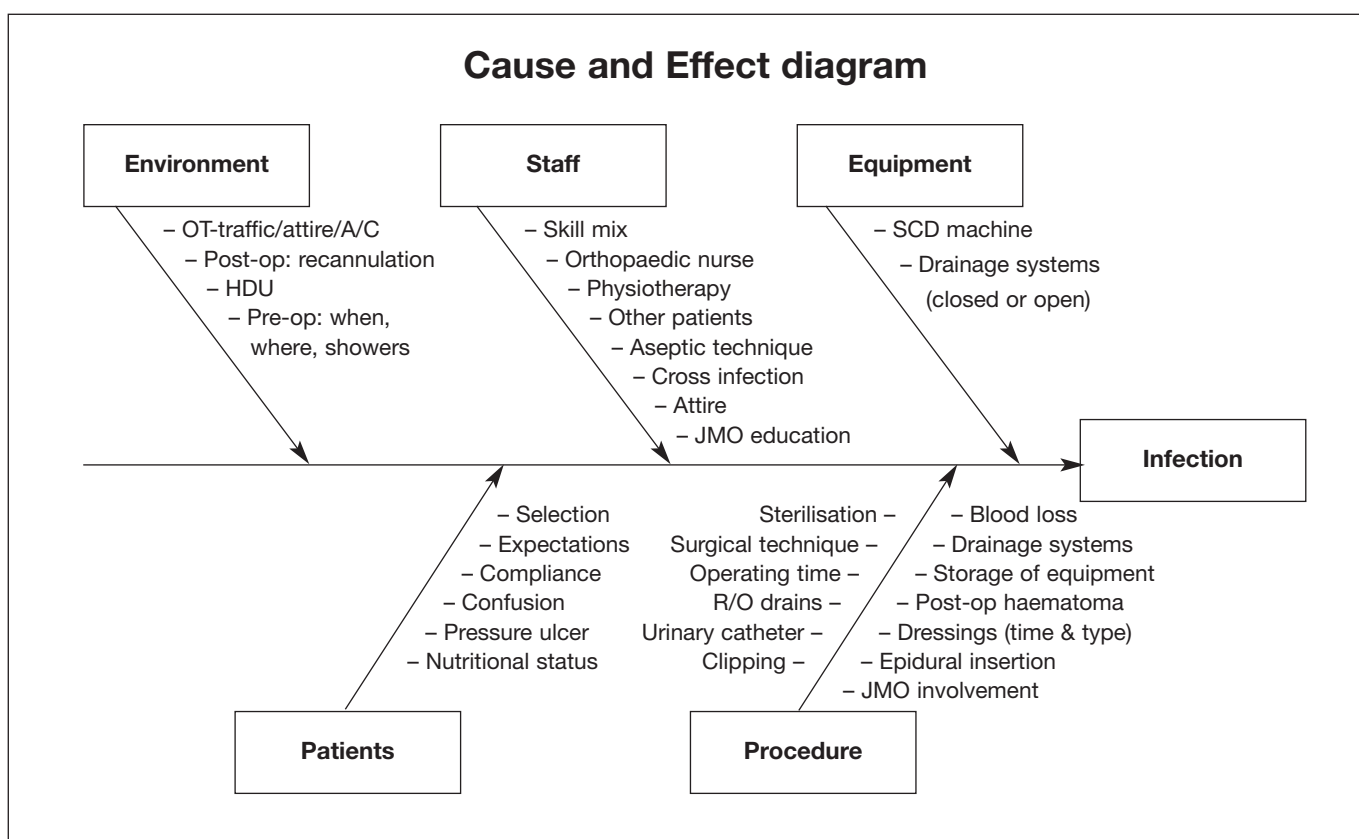
### Cause and Effect diagram

Having documented the current processes in patient management, the team should use the brainstorming information to organise the possible causes of the problem (eg. delays, bottlenecks, staff problems, consumer expectations, and staff education). One approach is to record all suggestions on a Cause and Effect diagram.

The Cause and Effect diagram is also known as a Fish Bone diagram or an Ishikawa diagram. It is an effective tool for organising and categorising ideas generated in a brainstorming session. This style of diagram graphically displays an organised list of possible causes, solutions or factors, focused on the identified process problem being examined.

The team can then vote on the most important problems thereby establishing priority areas for action. In this way it helps focus the team's improvement energy. Multivoting can be used to identify the most common or priority causes of a problem which, in turn, can be used to develop a Pareto chart to help the team prioritise improvement efforts.

Information from customer focus groups should also be used to help identify priorities.





The Cause and Effect diagram features a central horizontal line with a box at the end or head of the diagram containing 'the problem', plus 4–6 bones or spines drawn vertically off the central line. Arrows are used to indicate that the lines feed into the head of the diagram. These lines are used for listing the root causes of a problem labelled according to agreed categories which can be used to group the causes; for example, materials, equipment, people, procedures, environment. Sub causes are listed off these vertical lines under the major category or theme.

As stated earlier, a Cause and Effect diagram can also be used to organise and categorise **solutions** to a problem. In this case, the central horizontal line heads towards a solution statement (eg to reduce bed block) not a problem statement (eg bed block)

## Affinity diagram

An Affinity Diagram is another useful tool for gathering and organising ideas, opinions, or issues identified by a team. Ideas generated through activities such as brainstorming are usually naturally related. The Affinity Diagram identifies the theme for each group of ideas and gives each group a header or title.

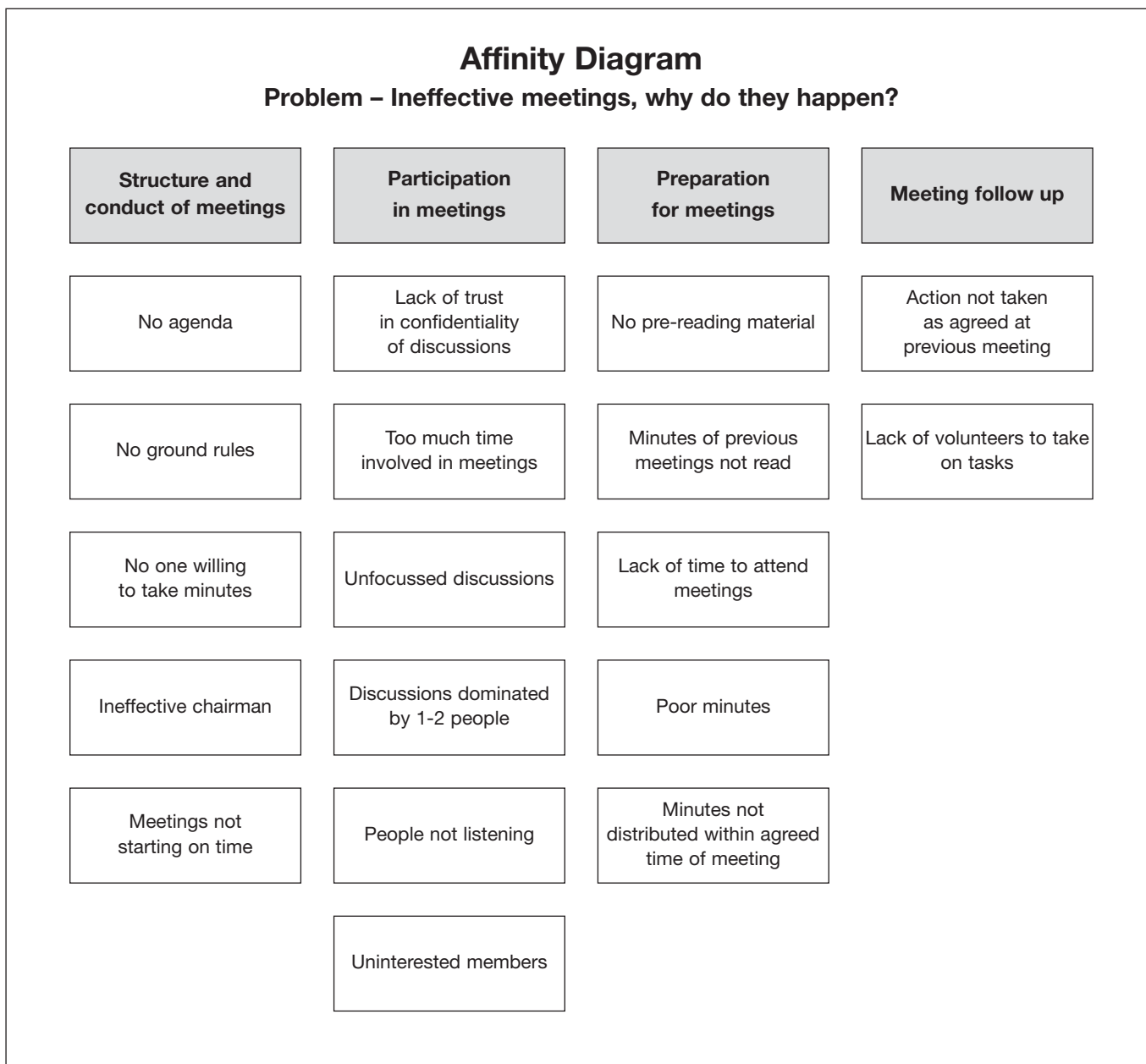
An Affinity Diagram may be used when a team is seeking to:

1. Add structure to a large or complicated issue (eg. useful when identifying the central issues involved in developing a new service or product).
2. Break down a complicated issue into broad categories (eg. useful when identifying the major steps in the completion of a complex project).
3. Gain agreement on an issue or situation (eg. useful when needing to identify the direction to be taken to achieve a particular goal and for minimising the potential for conflict).

## Steps in constructing an Affinity Diagram

1. Start with a clear statement of the problem or goal to be explored. Provide a time limit for the session: 45–60 minutes is usually sufficient.
2. Brainstorm ideas related to the issue or problem. Ask each participant to write their ideas clearly on index cards or 'Post-It' notes, one idea per card (five to seven words per card in large print is suggested).
3. With the assistance of a facilitator, group the cards or 'Post-It' notes in columns according to ideas that appear to have a common theme. This is best done in silence. Do not allow discussion of issues at this point.
4. Review the lists to ensure all ideas are appropriately grouped under a common theme. Regroup if necessary. Do not search for relationships between issues. It is sometimes best to leave a single issue (single card) on its own rather than add it to a group and blur the issue.
5. Give each grouping a title or heading that best describes the theme for each group of ideas. This should express why the group believes the particular set of ideas 'go together' and is usually written as a short action statement (verb).
6. Having reduced the number of ideas to manageable groupings, discuss and prioritise the issues according to their relative importance and potential impact on current performance.

The following page is an example of how an Affinity Diagram may appear.



### Pareto chart

The Pareto Chart is a series of bars whose heights reflect the frequency or impact of problems. The name of the chart is derived from the Pareto Principle that “80% of the trouble comes from 20% of the problems”.<sup>22</sup> Though the percentages will never be that exact, teams usually find that most trouble comes from only a few problems with the top 20% usually clearly visible on the chart.

For teams, the Pareto principle suggests that 80% of their effort should be focused on the top 20% of improvement opportunities. Similarly, teams may also find that 80% of the work is accomplished by 20% of the team members!

The Pareto Chart is a bar chart arranged in descending order of height from left to right. It features a series of bars the heights of which reflect the frequency or impact of problems. The categories represented by the tall bars on the left are relatively more important than those on the right.

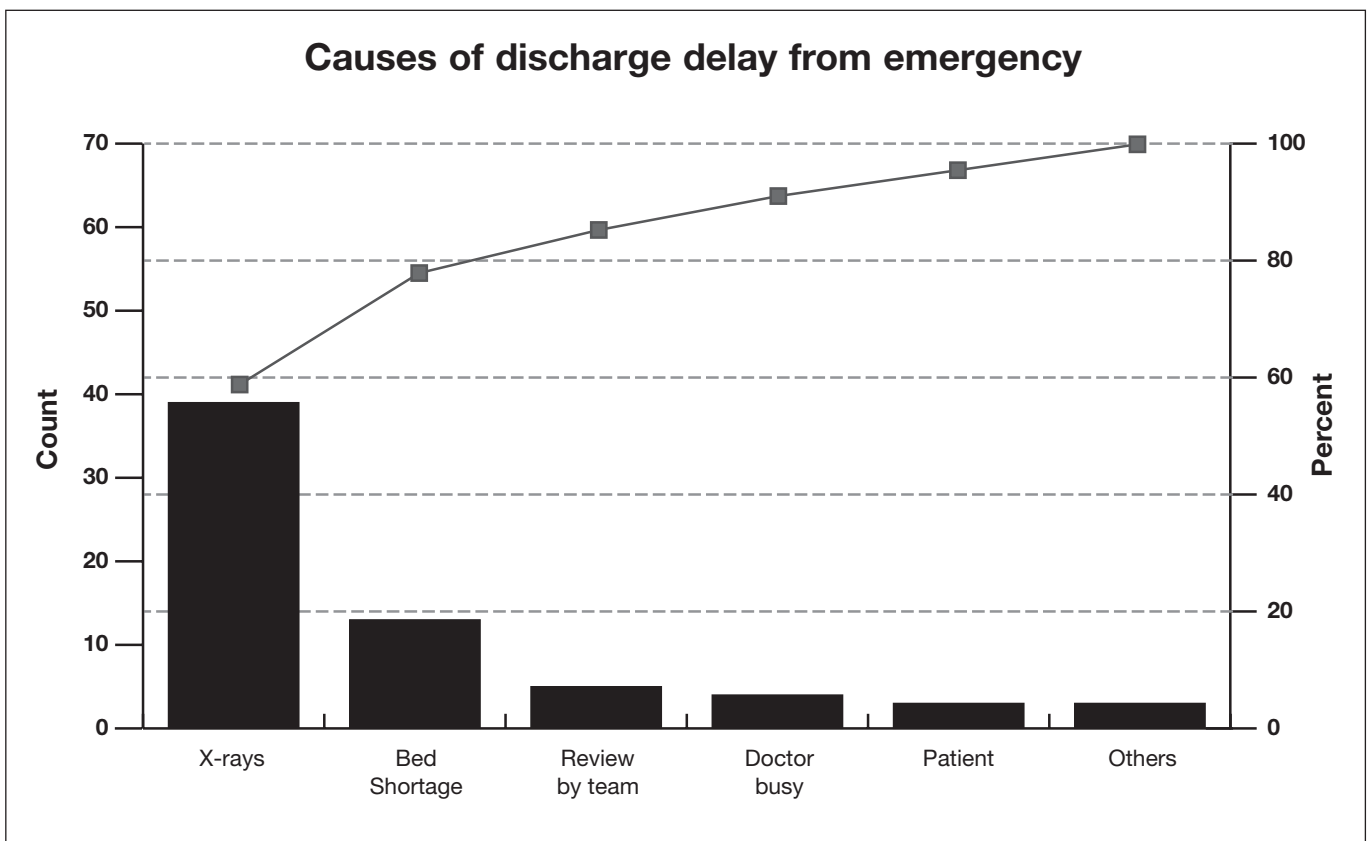
The Pareto chart:

- Graphically displays the relative weights or frequencies of competing choices or options
- Uses a bar chart to sort from greatest to smallest, thereby summarising the relative frequencies of choices or options (nominal data)
- Often includes a cumulative total line
- Helps prioritise where to start the improvement effort
- Can be constructed using informal data collection methods (eg. group methods, brain storming, multi vote and nominal group technique)
- Can be constructed using formal data collection methods such as tally sheets and clinical indicator data bases.

The Pareto chart is a useful tool throughout the problem solving process. It helps identify which problem to address and then which causes of the problem to address first. It makes it easy to visualise the most frequent causes of a problem and therefore where to put your initial effort for the greatest gain.

Pareto charts allow a team to narrow down the causes of a problem progressively and draw attention to the 'vital few' factors where the potential for improvement is likely to be greatest. They also help promote consensus in a group by showing what the problems represented are, by the highest bars and where, in general, teams should focus their attention first.

### Example of a Pareto Chart



## Graphs and Charts

There are many commonly used techniques for helping visualise changes in a process over time or comparing performance before and after an intervention.

They include:

- The bar graph which presents data collected in a way that helps visual relationships between different categories of factors.
- The pie chart which is useful for visualising the relative importance of several categories of data. Results are usually presented as percentages. As the title suggests, this form of graphical tool clearly illustrates how ‘the cake is divided’ but is less useful for illustrating comparisons over time.
- The histogram which illustrates patterns of variation in a process and is particularly useful for depicting variation in a particular process over time.

This section features the run chart and the statistical process control charts that have been found particularly useful tools to use in the CPI model for improvement.

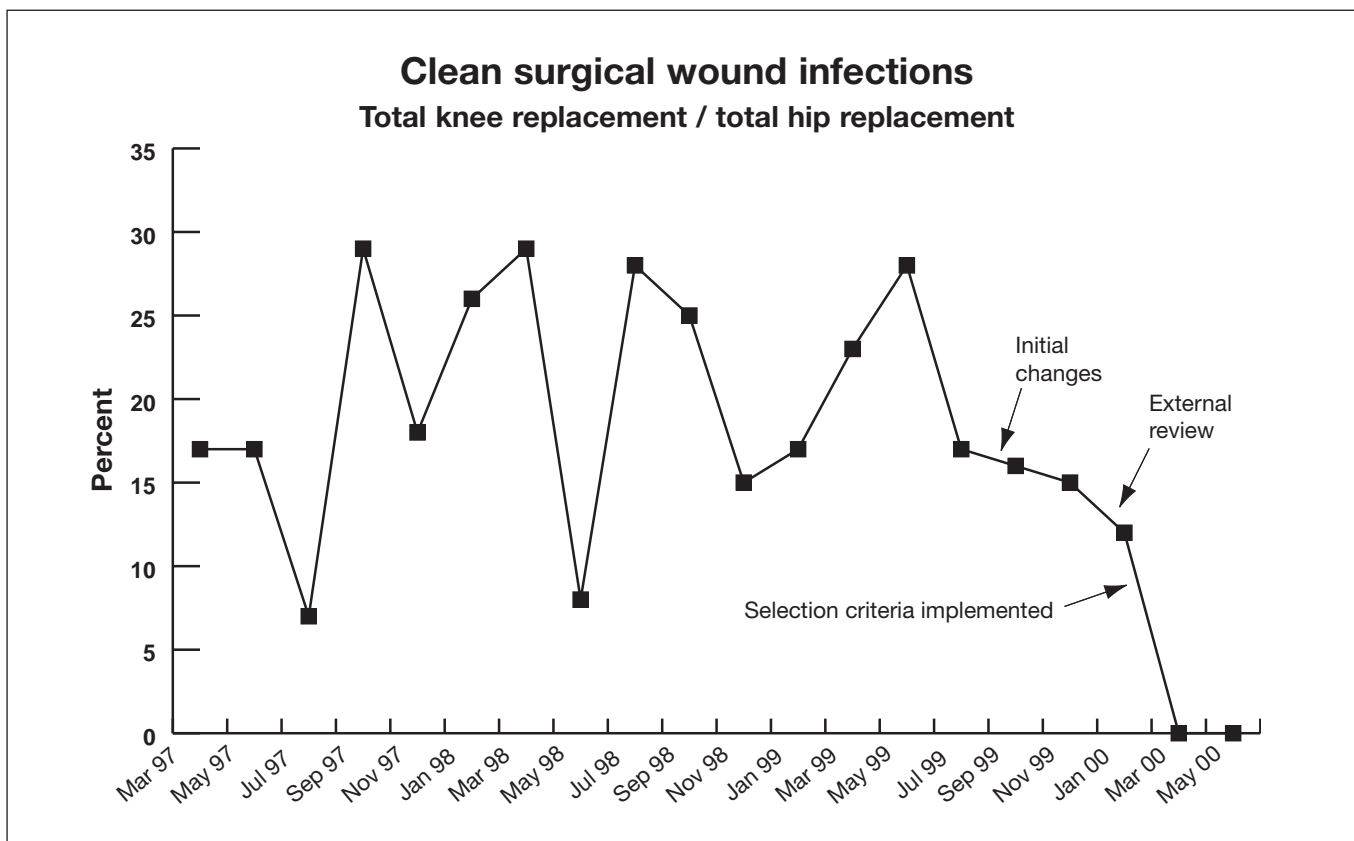
### Run Charts<sup>23</sup>

A run chart (sometimes termed a time plot) can assist in understanding variation and is used to examine data for trends or other patterns that occur over time. It graphically depicts the history and pattern of variation in an indicator or measure. Plotting data regularly on a graph shows when shifts and changes occur and can help identify if and when problems appear.

The run chart is one of a number of tools that help people see patterns or trends in data over time. It is useful for:

- Understanding variation and identifying trends or other patterns in the data over time.
- Demonstrating the impact of interventions over time. This is achieved by annotating the run chart.
- Displaying and plotting data such as counts, mean values and proportions in chronological order.

### Example of a Run Chart



Teams should begin collecting data before they intervene and then graph the results of the intervention to measure change in the process. It is best to note on the run chart when specific interventions occurred so that any resulting changes to the process are more readily seen. By annotating the run chart in this way, it is easier to understand the impact of changes made over time. It is also important when interpreting a run chart, not to see every variation in the data as significant.

Over time, the run chart is useful for identifying the impact of interventions, for demonstrating long-lasting improvement, and for identifying shifts and trends in performance that may indicate the need for further intervention.

### Statistical Process Control (SPC) Charts<sup>24</sup>

Statistical process control (SPC) charts are used when greater interpretation or knowledge of a process is required.

The SPC chart is a run chart with the additional feature of displaying upper and lower statistical control

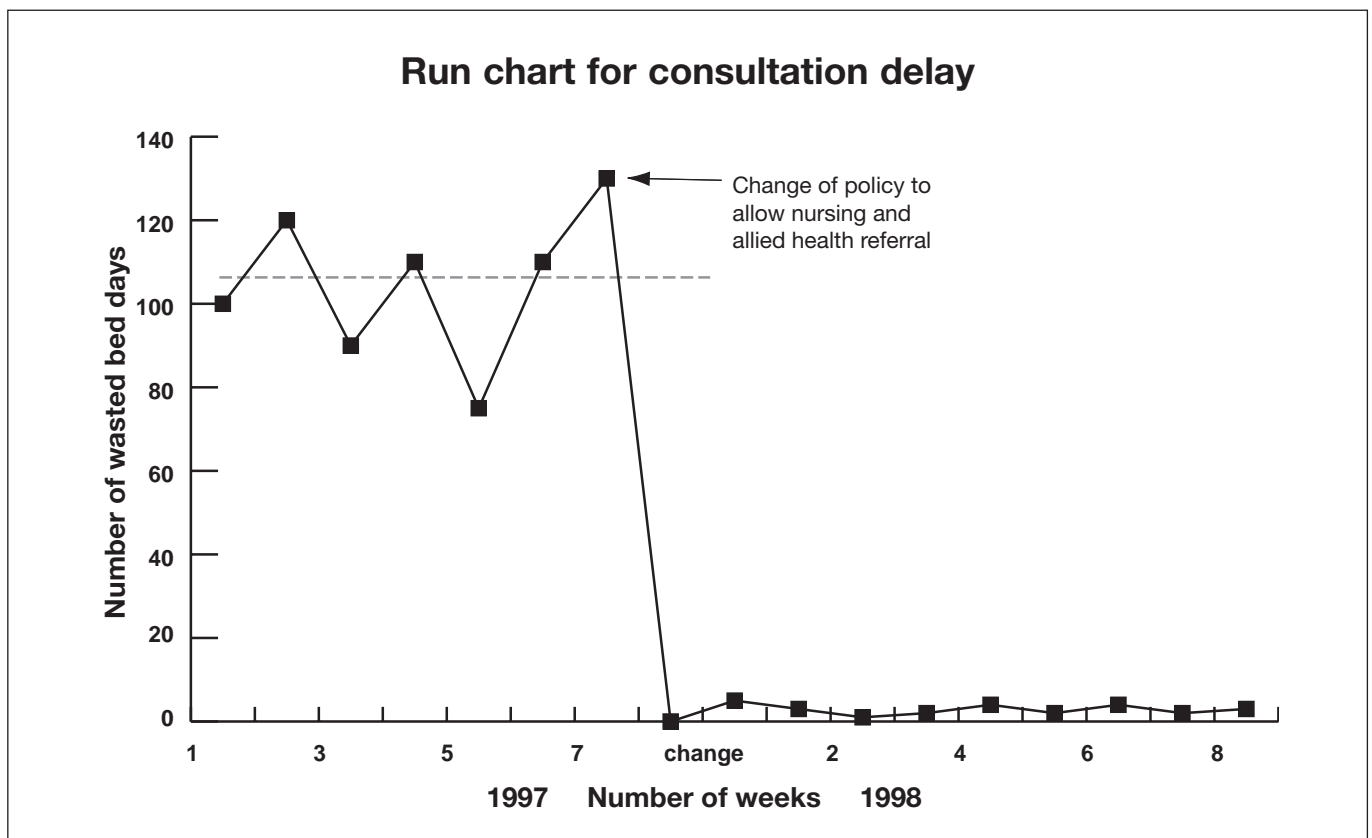
limits for a particular process. These control limits, calculated according to statistical formulas, usually represent 3 standard deviations above and below the mean. They indicate how much variation is typical for the process. They provide boundaries for assessing how much variation in a process is within statistical control (common cause or random variation). When points fall outside the limits or form particular patterns, they may suggest the presence of a special cause of variation deserving of investigation.

If special causes of variation are removed, or their impact at least reduced, a process is more likely to be in statistical control and its performance more predictable. This opens the way for more fundamental improvements to the process.

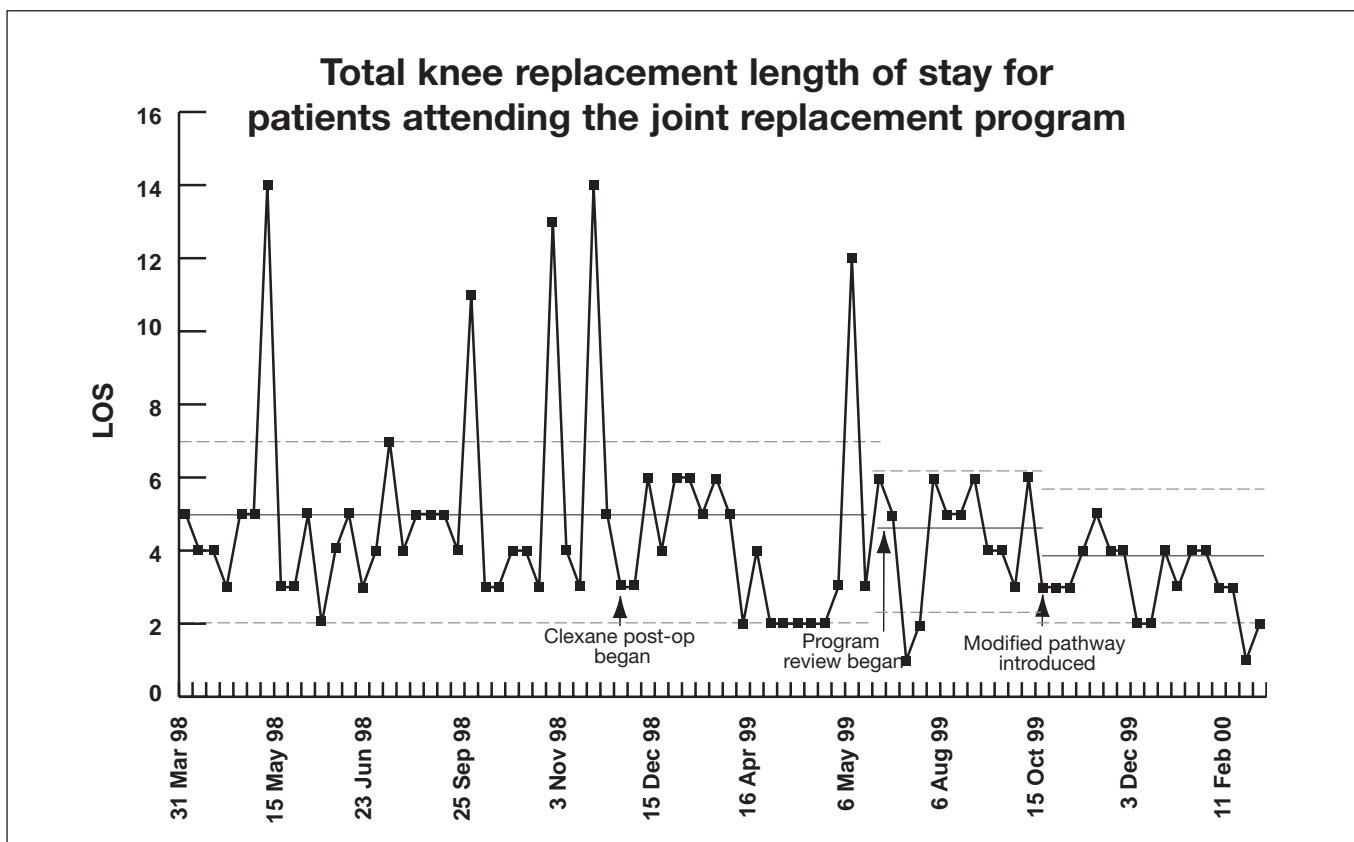
SPC charts may therefore be used to:

- Look at random variation in a process and whether the process is in control.
- Determine what the variation means – is it due to common factors or produced by special causes?
- Assess whether a team has gained more control of a process by reducing variation.

### Example of a Run Chart



## Example of a Statistical Process Control (SPC) Chart



## Measuring Impact<sup>25</sup>

Measurement helps teams understand the performance of the current system and assess the results of changes made.<sup>26</sup>

The minimum standard to monitor progress is an annotated runchart. This plots the performance of the system over time and includes a note about key events during the period. The key events include both changes made to the system (eg 'changed triage nurse role') and other factors that could impact on performance (eg 'flu epidemic').

An example for pathology turnaround time in an Emergency Department is shown on page 35.

Measurement should help to speed up improvement, not slow it down. A team needs just enough measurement to know whether the changes they are making are leading to improvement. This allows them to move forward to the next step.

To make measurement simpler and more effective, you might like to consider the following steps:

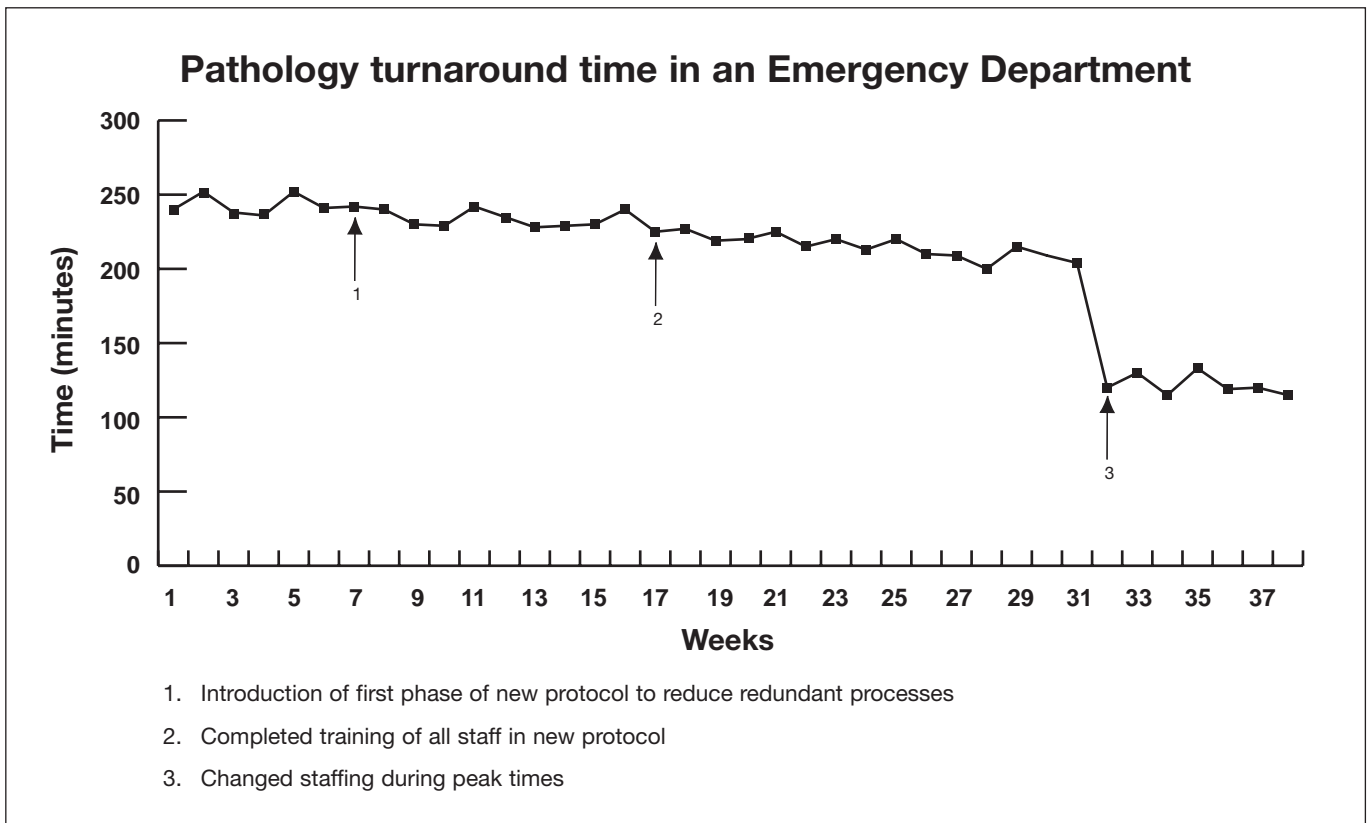
### 1. Plot data over time

Improvement requires change, and change happens over time. Much of the information about a system and how to improve it can be obtained by plotting data over time and observing trends and other patterns.

### 2. Focus on the measures that are directly related to your aim

If the aim is to reduce time to thrombolysis, determine how the measure will be defined, collect data on the measure and plot the data as a run chart or an annotated time series.

## Example of a Measuring Impact Chart



### 3. Use sampling to collect data

Sampling is a simple, efficient way to understand how a system is performing. Use of sampling is especially important if the measure is not available from an electronic data collection system. Examples of purposive sampling include collecting the data on every xth patient to enter the Emergency Department or collecting data at set times during the day or on a set day of the week. Data can be summarised weekly using a median (the mid point from highest to lowest data values).

Sampling is also a simple and efficient method of collecting data to identify change. The sampling technique focuses on getting 'just enough data' to demonstrate a pattern of change. More information is gained from a small sample size over a longer period of time than a large sample over a very short period of time. It has been found that 15–25 plotted points is generally sufficient to recognise a pattern.

*Example: The measure 'Time to IV analgesia' is defined as time from triage to first entry in the Drug of Dependence Register.*

*The sample plan: Sample 20 entries per week from the Register either by random or purposive sampling.*

### 4. Provide information and training for those collecting data and integrate measurement into the daily routine

Ensure that all staff involved in the sampling process are aware of what the data are being used for. Develop simple forms for data collection if the data cannot be sourced from existing information systems, and make the data collection a routine part of someone's job. Sampling will reduce the time burden.

### 5. Create simple graphs

Create simple graphs to display information on the team's progress toward its goal. The aim of the visual display is to present the most information in the smallest space with the greatest impact.

### 6. Refine the data collection process

Review your data collection process and consider how it could be improved.

## Reviewing progress

It is important for a Project Team to regularly review its progress through all phases of its improvement project.

The review process can be built into the meeting process. Effective teams will evaluate each meeting not only to monitor the achievement of goals according to agreed time lines but also to ensure members are satisfied with the way the team is working and to allow reflection on ways of improving the process.

### Checklist

A checklist can be a useful tool for monitoring a team's progress – see sample below. Use of checklists allows the team to collect data and observations as they occur.

### Sample checklist

Action	Progress review	
	Date	Comment / Further action – by whom? By when?
Guidance Team established		
Project Team established		
Team member roles defined		
Team members educated		
Aim / mission statement written		
Improvement plan developed		
Flow chart of process constructed		
Customers and their needs identified		
Diagnostic data collected		
Literature reviewed		
Causes of problem identified		
Interventions chosen		
PDSA cycle implemented		
Data analysed		
Changes identified and implemented		
PDSA cycle repeated		
Improvements monitored / sustained		
Project presentation delivered		

## Selling your achievements

Project teams or groups need to 'sell' the results of their efforts. They need to communicate their message to all who need to know.

One way of sharing your team's results with the rest of the organisation is by making a formal presentation to key stakeholders about the outcome of the project undertaken by the team; the results achieved; the lessons learned; the changes to policy or work practices resulting from the team's efforts. Presentations may also be made along the way to highlight achievements or mark key milestones of the project.

Scholtes also suggests writing an article for your organisation's newsletter or posting your storyboard highlighting the team's work on a noticeboard for others to read.<sup>27</sup>



Remember, all improvement processes must answer three questions:

1. What were we trying to accomplish?  
(What did we want or need to improve?)
2. What changes did we make that resulted in an improvement?  
(How did we improve?)
3. How do we know that this change is an improvement?  
(How do we know we have improved?)

## Presentation Format

The task of preparing a presentation will be greatly helped if the team has kept a good record of its work from the earliest stages of the project. It makes it easier

to remember developments over time and highlight particular achievements or problems along the way.

Presentations may be used to help you run a meeting, explain a new project or a new idea, or promote a change in your organisation in response to the results of a quality improvement project. Verbal presentations are usually more effective when accompanied by visual images whether by means of overhead transparencies or the use of computer software packages such as PowerPoint. Use graphs whenever possible to display progress.

Preparation is the key to a successful presentation. This includes preparing clear and attractive visual displays to support your key points. The following format is simple and straightforward and may help in preparing either an overhead transparency or PowerPoint presentation.

### Presentation Format – Storyboard

<p><i>Slide 1</i> <b>The Project</b> Project name</p>	<p><i>Slide 2</i> Team – list of team members and positions held</p>	<p><i>Slide 3</i> Mission statement</p>	<p><i>Slide 4</i> List of customers and their expectations</p>
<p><i>Slide 5</i> <b>Diagnosis</b> of the problem – process flow charts, customer focus groups, brainstorming etc</p>	<p><i>Slide 6</i> Prioritising the information – Pareto chart, Cause and Effect diagrams etc</p>	<p><i>Slide 7</i> <b>Interventions</b> Outline of the interventions chosen</p>	<p><i>Slide 8</i> Statement of plan – small PDSA cycle examples etc</p>
<p><i>Slide 9</i> <b>Impact</b> Run charts, SPC and other graphs – showing ongoing monitoring and progress</p>	<p><i>Slide 10</i> Statements of results – improved care, cost savings, customer satisfaction etc</p>	<p><i>Slide 11</i> <b>Sustaining Improvement</b> Sustaining the gains</p>	<p><i>Slide 12</i> Future plans</p>

# 3

## Bibliography

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- Berwick, D. (1998). Developing and Testing Changes in Delivery of Care. *Annals of Internal Medicine*, 128 (8), p 651-656
- Berwick, D. & Nolan, T. (1998). Physicians as Leaders in Improving Health Care: A Series in *Annals of Internal Medicine*. *Annals of Internal Medicine*; 128 (4), p 289-292
- Boyce, N. McNeil, J. Graves, D. & Dent, D. (1997). Quality and Outcome Indicators for Acute Healthcare Services. Commonwealth Department of Health and Aged Care
- Brassard, M. (1989). *The Memory Jogger Plus +*, Featuring the Seven Management and Planning Tools. Massachusetts: GOAL/QPC
- Fritz, R. (1989). *The Path of Least Resistance*. New York: Ballantine Books
- James, B. (1993). Implementing Practice Guidelines through Clinical Quality Improvement. *Frontiers of Health Services Management*, 10;1
- King, B. (1989). *Better Designs in Half the Time, Implementing QFD Quality Function Deployment in America*. 3rd Edition. Massachusetts: GOAL/QPC
- King, B. (1989). *Hoshin Planning, The Developmental Approach*. Massachusetts: GOAL/QPC
- Langley, G. Nolan, K. Nolan, T. Norman, C. & Provost, P (1996). *The Improvement Guide. A practical Approach to Enhancing Organizational Performance*. San Francisco: Jossey Bass Publishers.
- Mizuno, S. (Ed) (1988). *Management for Quality Improvement, the 7 New QC Tools*. Cambridge, Massachusetts: Productivity Press
- NSW Health (1999). *A Framework for Managing the Quality of Health Services in NSW*.
- Ozeki, K. & Asaka, T. (1990). *Handbook of Quality Tools, The Japanese Approach*, Productivity Press: Cambridge, Massachusetts, 1990
- Parker, M. (1990). *Creating Shared Vision*. Clarendon Hills, Ill: Dialog International Ltd
- Ryan, S. (1993). An Australian Case Study – Quality Begins and Ends with Data. *The Quality Magazine*, p 26-30
- Schein, E. H. (1988). *Process Consultation, Volume I; Its Role in Organisation Development*. Reading, Massachusetts: Addison-Wesley Publishing Company
- Schein, E. H. (1987). *Process Consultation, Volume II, Lessons for Managers and Consultants*. Reading, Massachusetts: Addison-Wesley Publishing Company
- Scholtes, P. Joiner, B. & Dreibel, B (1996). *The 1996 Team Handbook, 2nd Edition*. Madison WI; Oriel Incorporated
- Senge, P. M. (1990). *The Fifth Discipline, The Art & Practice of the Learning Organisation*. New York: Doubleday

# Endnotes

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1. NSW Health (1999). A Framework for Managing the Quality of Health Services in NSW. Available from the NSW Better Health Centre - Publications Warehouse or [www.health.nsw.gov.au](http://www.health.nsw.gov.au)
2. Institute for Healthcare Improvement, Boston
3. The model identified in this guide is based on the work of Nolan, James, Berwick, Shewhart and many other proponents of quality improvement. The diagrammatic representation of the process was developed by G. Rubin and B. Harrison for NSW Health (for the NSW Clinical Practice Improvement Steering Group) 2000
4. Useful references on conducting a literature review include the NSW Health Clinical Information Access Program (CIAP) website at [www.ciap.health.nsw.gov.au](http://www.ciap.health.nsw.gov.au)
5. NSW Health (1999). A Framework for Managing the Quality of Health Services in NSW
6. The Shewhart Cycle
7. Langley, G. Nolan, K. Nolan, T. Norman, C. Provost, P. (1996). The Improvement Guide. A practical approach to enhancing organizational performance. San Francisco: Jossey Bass Publishers
8. Berwick, D and Nolan, T (1998). Physicians as leaders in improving health care. *Annals of Internal Medicine* 128(4) p 289-292
9. Scholtes, P. et al. (1996). The Team Handbook 1996. 2nd Edition. Madison W1; Oriel Incorporated, p 4-50
10. Based on Scholtes, P. et al. The Team Handbook 1996. 2nd edition. Madison W1; Oriel Incorporated, p 2-29
11. Based on Scholtes, P. et al. The Team Handbook 1996. 2nd edition. Madison W1; Oriel Incorporated
12. Based on Scholtes, P. et al. The Team Handbook 1996. 2nd edition. Madison W1; Oriel Incorporated
13. Boyce, McNeil, Graves and Dent. (1997) Quality and Outcome Indicators for Acute Healthcare Services, Commonwealth Department of Health and Aged Care
14. Donabedian, A. (1980). The definition of quality and approaches to its assessment. Vol.1, Ann Arbor, Michigan: Health Administration Press
15. Langley, G. Nolan, K. Nolan, T. Norman, C. & Provost, P (1996). The Improvement Guide. A Practical Approach to Enhancing Organizational Performance. San Francisco: Jossey Bass Publishers.
16. Based on Scholtes, P. et al. The Team Handbook 1996. 2nd edition. Madison W1; Oriel Incorporated
17. Brent James, IHI
18. Based on Scholtes, P. et al. The Team Handbook 1996. 2nd edition. Madison W1; Oriel Incorporated
19. Based on Scholtes, P. et al. The Team Handbook 1996. 2nd edition. Madison W1; Oriel Incorporated
20. Based on Scholtes, P. et al. The Team Handbook 1996. 2nd edition. Madison W1; Oriel Incorporated
21. Hawe, P. Degeling, D. and Hall, J. (1990) Evaluating Health Promotion. McLennan and Petty, Sydney
22. Adapted from Brent James and Scholtes, P. et al. The Team Handbook 1996 2nd Edition Oriel Publishing
23. Adapted from Brent James and Scholtes, P. et al. The Team Handbook 1996 2nd Edition Oriel Publishing
24. Adapted from Brent James and Scholtes, P. et al. The Team Handbook 1996 2nd Edition Oriel Publishing
25. Based on Scholtes, P. et al. The Team Handbook 1996. 2nd edition. Madison W1; Oriel Incorporated
26. Adapted with the Permission from the Institute For Healthcare Improvement Boston, USA, and prepared by The National Institute Of Clinical Studies
27. Based on Scholtes, P. et al. The Team Handbook 1996. 2nd edition. Madison W1; Oriel Incorporated Oriel Incorporated, p 4-50

# Contacts

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## **For further information**

If you require assistance in undertaking the process of Clinical Practice Improvement (CPI), or if you are able to offer suggestions on how to improve this Guide, please contact a member of the NSW Health Quality and Clinical Policy Branch at:

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