

**Course: Knowledge is the Enemy of Unsafe Care****Topic: Quality improvement methods****Summary**

There is overwhelming evidence that quality of care and patient safety improves and errors are minimized, when health-care providers use quality improvement methods and tools. Only when these are used, will efforts to improve care be rewarded by real, sustained progress. Such methods and tools can be applied in any setting—a rural, remote health-care centre or a busy hospital in a large city.

There are a number of examples of quality improvement methods in health care. The most popular and effective ones leading to significant improvements are Clinical Practice Improvement (CPI), Failure Modes and Effects Analysis (FMEA), as well as Root Cause Analysis (RCA).

Why measurement?

Improvement methods all rely on measurement. Most activities in health care can be measured. There is strong evidence to show that when health-care professionals use the tools to measure change, significant improvements are achieved. There are three main types of measures used in improvement: outcome measures, process measures, and balancing measures.

Outcome measures: include frequency of adverse events, number of unexpected deaths, patient satisfaction surveys and other issues that capture patients' and their families' experiences. Information can be collected through surveys, audits of medical records, interviews that seek to ascertain the incidence of adverse events, or peoples' perceptions and satisfaction of a service. Examples include: waiting time for appointments and examinations, number of deaths in the emergency department, or the number of medication dosing or administration errors.

Process measures: refer to measurements of the workings of a system. They focus on the components of systems associated with a negative outcome, as opposed to the incidence of these events. These measures can be used when a manager wants to find out how well a part of a health service or system is working. Examples include: number of times swab count completed in surgical care; delays in administration of drugs, taking into account factors affecting the prescribing, dispensing and administration of the drug; number of days the ICU is full and has no spare beds.

Balancing measures: These measures are used to ensure that any change does not create additional problems to a patient resulting in an adverse event. For example, a balancing measure might involve making sure that efforts to reduce the length of stay in hospital for some patients do not lead to increased readmission rates for those patients who could not take care of themselves.

The most popular and effective methods leading to significant improvements in health care are:

- Clinical Practice Improvement (CPI)
- Failure Modes and Effects Analysis (FMEA)
- Root Cause Analysis (RCA)

1. What is Clinical Practice Improvement (CPI)?

This method is used by health-care professionals to improve the quality and safety of health service delivery. It does this through a detailed examination of the processes and outcomes in clinical care. CPI must cover each of the following five phases:

- **Project phase:** members of a health-care team develop a mission statement that describes what needs to be addressed in a few sentences. At this stage, the team should consider the type of measures they may use.
- **Diagnostic phase:** the team establishes the full extent of the problem by gathering information. Brainstorming and in-depth discussion can generate possible changes that could lead to improvement. How to measure improvement needs to be established during this phase.
- **Intervention phase:** the team is clear about the problems and considers solutions or safety interventions. Each of the proposed solutions will have to be tested through a trial-and-error process, using the PDSA cycle (described in the previous handout) to test changes, observe the results of these changes and retain and use the solution that works.
- **Impact and implementation phase:** measurement of change or trial/test of the solution or intervention is critical, so that the change can be said to truly have caused an improvement.
- **Sustaining and improvement phase:** this phase requires the team to develop and agree on a monitoring process and plans for continuous improvement. It may involve standardization of existing processes and systems for a clinical practice or system improvement, as well as documentation of policies, procedures, protocols and guidelines that will lead to the desired improvement, as well as training and education of staff on these.

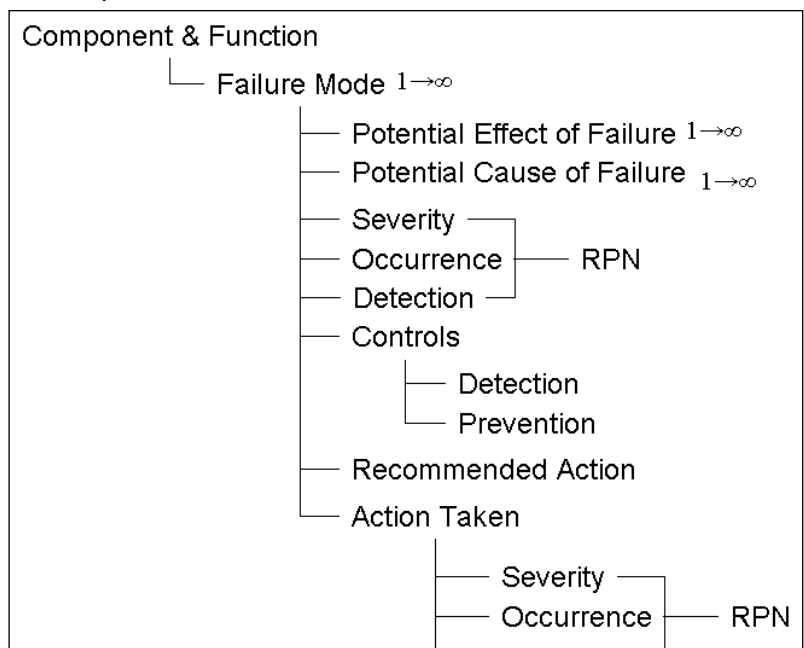
2. What is Failure Mode and Effect Analysis (FMEA)?

The goal of FMEA is to prevent care process problems before they occur. FMEA is a systematic and proactive approach that seeks to find and identify possible failures in the system, potential weaknesses, in order to implement strategies to prevent the failures from occurring. FMEA is usually a component of larger quality improvement efforts being undertaken by a health-care organization or hospital and involves a three-step process: risk assessment, implementation and evaluation. FMEA is useful in measuring and evaluating a new process prior to implementation and in assessing the impact of an improvement to an existing system or process. Implementation of FMEA-based quality improvements in health care started in the 1990s and has since then expanded.

Basic knowledge and skills

Health-care providers and managers first need to understand the concept of process mapping and the role of team work.

- **Process mapping** is a process used in all areas of production, but in health care it refers to the identification of all the steps involved in delivering care and gaining a clear picture of the way a specific health service is organized, operated or delivered.
- The goal of **problem-solving** health-care teams is to discuss all the ways in which specific steps in the care process can fail. A particular feature of FMEAs is that health-care teams can quantify failure modes by taking the product of the severity, occurrence and detection scores to produce a risk-priority number. Each of these 'quantifiers' is rated on a 1–10 scale. The risk priority number facilitates rank ordering, which aids problem-solving teams to direct efforts to those areas in a process that carry the highest risk.



Problem-solving teams

Constructing a FMEA is a team-driven activity. A critical element of

this method is that problem-solving occurs within teams composed of people with a diverse range of skills, backgrounds, and expertise. Groups are better problem-solvers than individuals, particularly when the tasks are complex and require the consideration and integration of many components. Through FMEA, the issue to be explored begins in the orientation stage, followed by the team’s evaluation or appraisal of the issue. A decision is then made and agreement reached regarding the action to take. Effective problem-solving teams formulate the objective of their work, allow for an open expression of differences and examination and comparison of alternatives. There are many FMEA templates and formats available, but they all follow the same basic structure shown in the adjacent illustration outlining **FMEA components and functions**. The **Risk Priority Number (RPN)** is a measure used when assessing risk to identify critical failure modes linked with a care design or process. The illustration shows the factors that make up the RPN and how it is calculated for each failure mode.

3. What is Root Cause Analysis (RCA)?

This methodology is presented in a separate handout.

Tools for assessing underlying problems and progress

Several tools for organizing and analysing data are used in health-care quality improvement efforts. Many hospitals and clinics, routinely collect and use data for the services being delivered and statistically analyse the data to report to the health authorities or the head of the health service. The following tools are commonly used in quality improvement efforts: flowcharts; cause and effect diagrams (also known as Ishikawa or fishbone diagrams); Pareto charts; and run charts.

1. Flowcharts

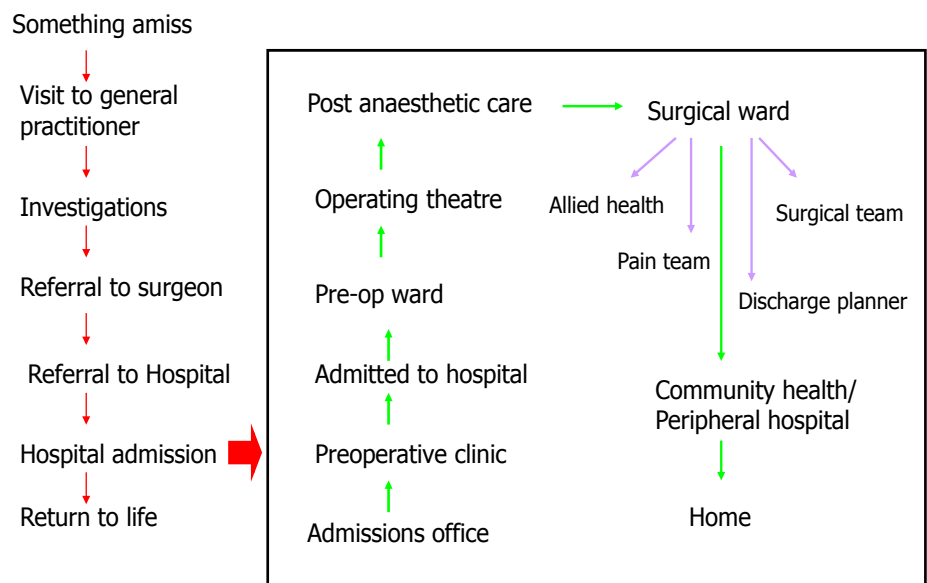
Flowcharts allow a health-care team to understand the steps involved in the delivery of a service to patients. A flowchart is a pictorial method which shows all the steps or parts of a process. Health-care systems are very complex and before any problem can be fixed it is important to understand how the different parts of the system fit together and function. Flowcharts are more accurate and effective when members of a health-care team construct them themselves. There are two types of flowcharts: high-level flowcharts and detailed flowcharts. They can be used to explain the processes involved in the delivery of health care. They can also be used to identify:

- steps that do not add value to the process
- delays
- where communication breakdowns can occur
- unnecessary storage and transportation
- unnecessary work
- duplication.

Flowcharts help health-care providers develop a shared understanding of a clinical process and use this knowledge to collect data, identify problems, focus discussions and identify resources. These charts can serve as the basis for designing new ways to improve services. An illustration of an example of

Flow chart of process

Accelerated Recovery Colectomy Surgery (ARCS)
North Coast Area Health Service
NCHI Sydney Australia

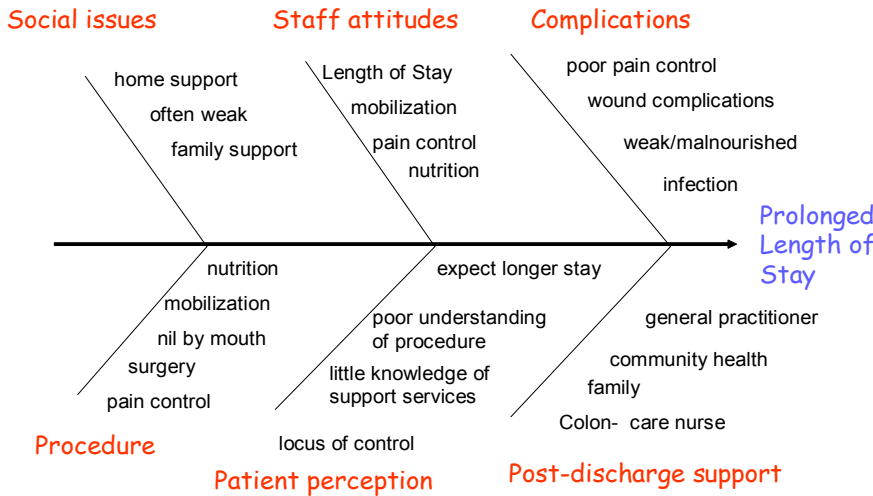


a flowchart is adjacent. It is developed by a team aiming to reduce the amount of time that colectomy patients spend in hospital from 13 days to 4 days within six months.

2. Cause and effect diagrams are used to explore and display all the possible causes of a certain effect. They are also called an **Ishikawa** or **fishbone** diagram.

Cause and effect diagram

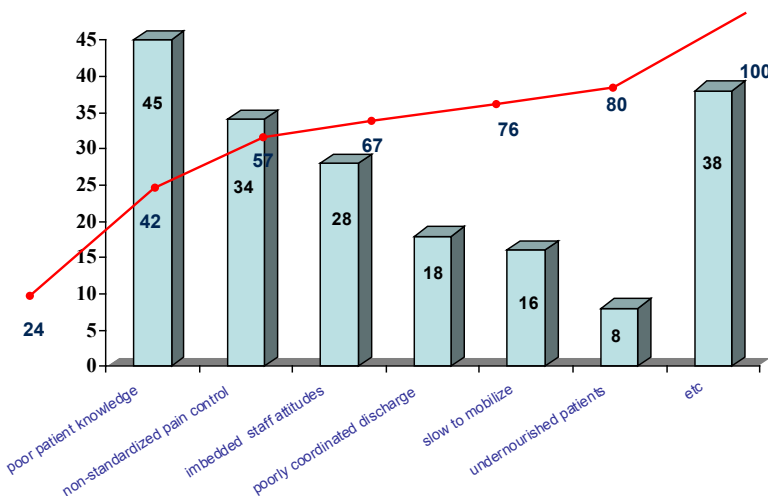
Accelerated Recovery Colectomy Surgery (ARCS)
NCHI Sydney Australia



A cause and effect diagram graphically displays the relationship of the causes to the effect and to each other. It can be used to identify multiple factors that may contribute to an effect or an error. This type of diagram can help a team focus on areas for improvement. The content of each arm of the diagram is generated by members of the team as they brainstorm about possible causes. The adjacent fishbone diagram is the result of brainstorming by a team of health-care professionals working to reduce the length of time colectomy patients need to

stay in hospital. Combined with the CPI methodology, a cause and effect diagram can be used to identify factors that team members see as contributing to the length of time patients stay in hospital.

Pareto chart



3. Pareto charts

The *Pareto Principle* is used to describe a large proportion of quality problems being caused by a small number of causes. The principle that a few contributing factors account for most of an effect is used to focus a health-care team's problem-solving efforts. This is done by prioritizing problems, highlighting the fact that most problems are affected by a few factors and indicating which problems to solve and in what order. A Pareto chart includes the multiple factors that contribute to an effect arranged in descending order, according to the magnitude of their effect. The ordering of the factors is an important step because it helps the team concentrate its efforts on those that have the greatest impact.

4. Run charts

Run charts or time plots are graphs of data collected over time that can help a health-care team determine whether a change or enhancement in a clinical practice has resulted in true improvement over time or whether the observed results represent a random fluctuation (that might be wrongly interpreted as a significant improvement). Run charts help identify whether there is a trend. A trend is formed when a series of consecutive points continually fall or rise.