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CAUSE AND EFFECT DIAGRAM
(Fishbone Diagram)

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12. Play with a fishbone

Create a fishbone diagram on the effect "Rice is overcooked." Consider:
- Materials (kind of rice, water)
- Method (washing the grains, estimating amount of water)
- Machines (stove, pot)
- Man (experience in cooking)

Resources:
1. Benchbook on Performance Improvement of Health Services, PhilHealth,
2. A Toolbox for Quality Improvement and Problem Solving, by David Staker,
3. Continuous Improvement Tools Vol 1, by Richard Chang and Matthew Niedzwiecki, 1993: Wheeler Publishing.
4. The Root Cause Analysis Handbook by Max Ammerman
5. www.asq.org (website of the American Society for Quality)

11. Plan your next step/s.

      ・ if you have decided on the root cause, decide what activities can be taken to address it
      ・ if you think you need to collect more data to confirm the primary and secondary causes, use check sheets or other observational data collecting tools
      ・ agree to meet again to discuss and review the actions taken. You may need to revise the diagram based on the results of data collection and analysis.
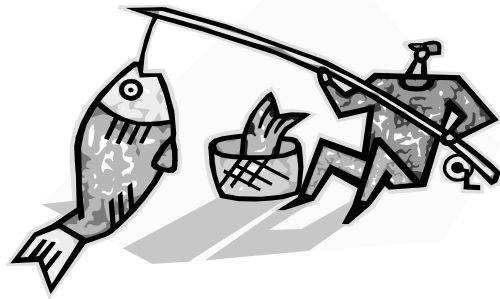
What is a cause and effect diagram?

A cause and effect diagram is a tool used to show the causes of a problem. It displays graphically all the possible causes of a problem with increasing detail so that one gets to the problem's root cause or causes.

The Cause and Effect Diagram is also known as the Fishbone Diagram or Ishikawa Diagram.

Kaoru Ishikawa was a Japanese professor in engineering who believed that quality assurance is attained by eliminating the root cause of error. He created this diagram, which was later named after him, to illustrate causes and effects.

The diagram was eventually called a fishbone diagram because it resembled a fish skeleton, with the head of the fish representing the "effect" or the problem, and the bones connecting to the spine representing the "causes" of the problem.
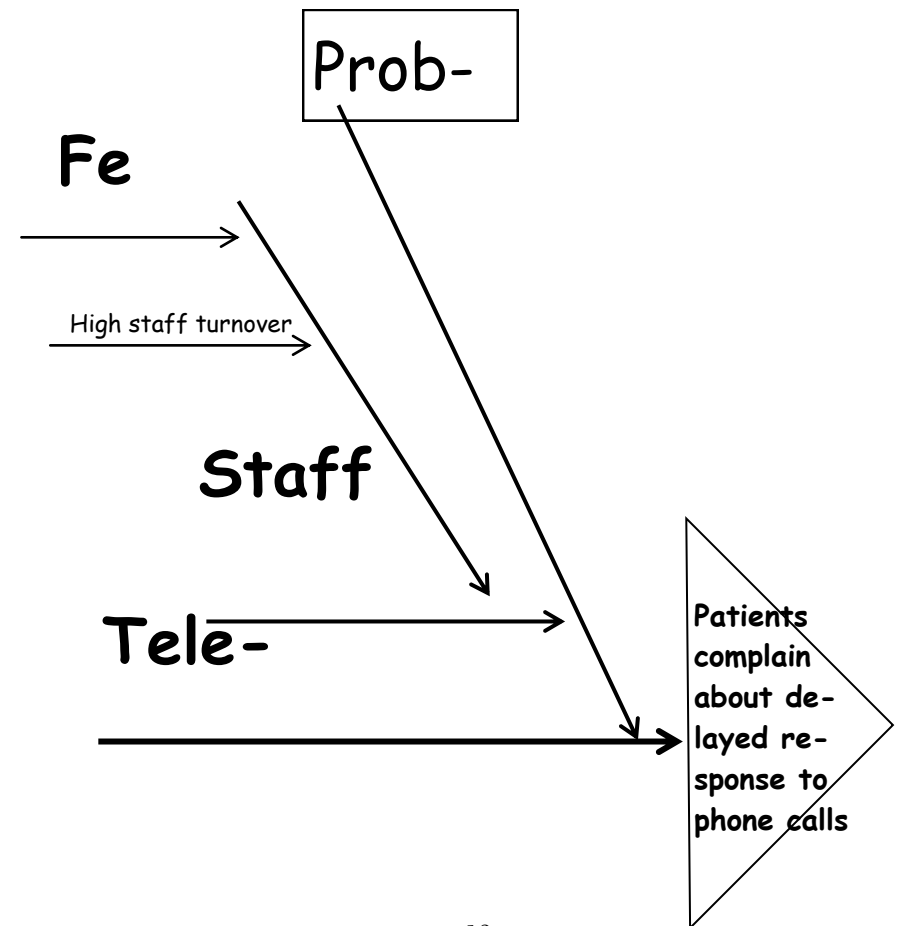
When is a fishbone diagram used?

Use it -
- When you are investigating a problem and you want to identify its causes and select a key cause to address
- When the primary symptom or effect of a problem is known, but possible causes are not clear
- To help gain a common understanding of problem causes and relationships, especially in a group setting

Why use a fishbone diagram?

- The brainstorm-style session done to construct a fishbone effectively identifies causes and effect in a manner that can easily be understood
- Causes are laid out hierarchially with the most immediate causes written near the spine
- Causes are categorized logically
- Categories of causes stimulates and broadens thinking about other real and potential causes
- Because everyone's ideas have a place in the diagram, it helps generate consensus about causes.

Testing for the root cause -

Prob-

Fe

High staff turnover

Staff

Tele-

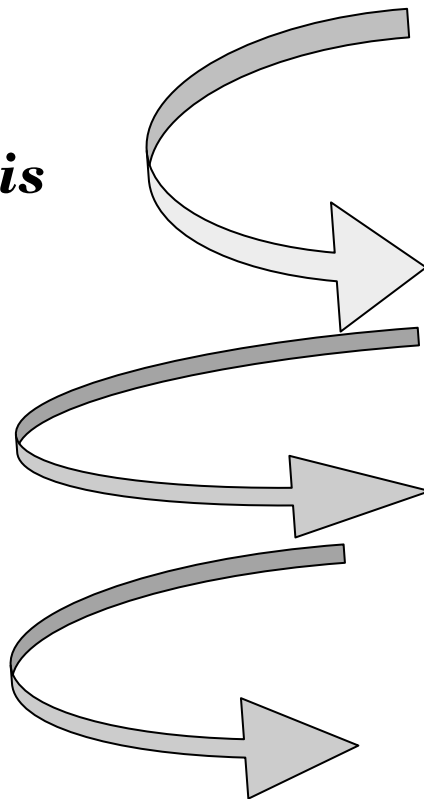Patients complain about delayed response to phone calls

10. Analyze and interpret your diagram. Test for root cause(s) by one or more of the following:
- look for causes that appear repeatedly within or across major categories
- select using an unstructured or structured consensus process, such as Nominal Group Technique.
- check if the problem will be corrected if the primary and secondary causes are eliminated. To illustrate, examine the diagram on the opposite page.
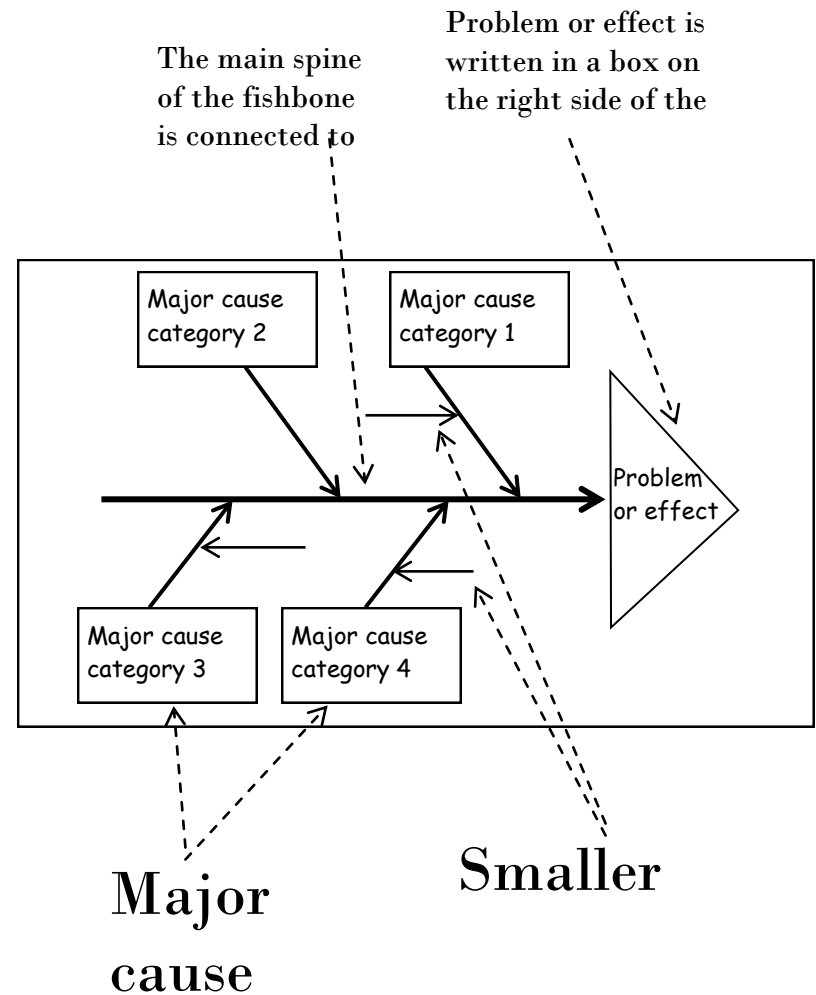
No other cause is

Solving in-

Solving

The parts of a fishbone diagram

The main spine of the fishbone is connected to

Problem or effect is written in a box on the right side of the

Major cause category 2

Major cause category 1

Major cause category 3

Major cause category 4

Problem or effect

Major cause

Smaller

How is a fishbone diagram constructed?

A fishbone diagram is oftentimes constructed through a brainstorming session. Hence, the usual brainstorming rules apply—all ideas are welcome, everything finds a place in the diagram, nothing is criticized.

1. Identify the problem to be solved (see box on opposite page for tips on problem definition).
   - Agree on the statement of the problem.
   - Write the problem in a box on the right side of your flipchart or whiteboard.
   - This box is the "head" of the fish.

2. Draw a thick horizontal line running towards the problem. This is the main spine of the fish.
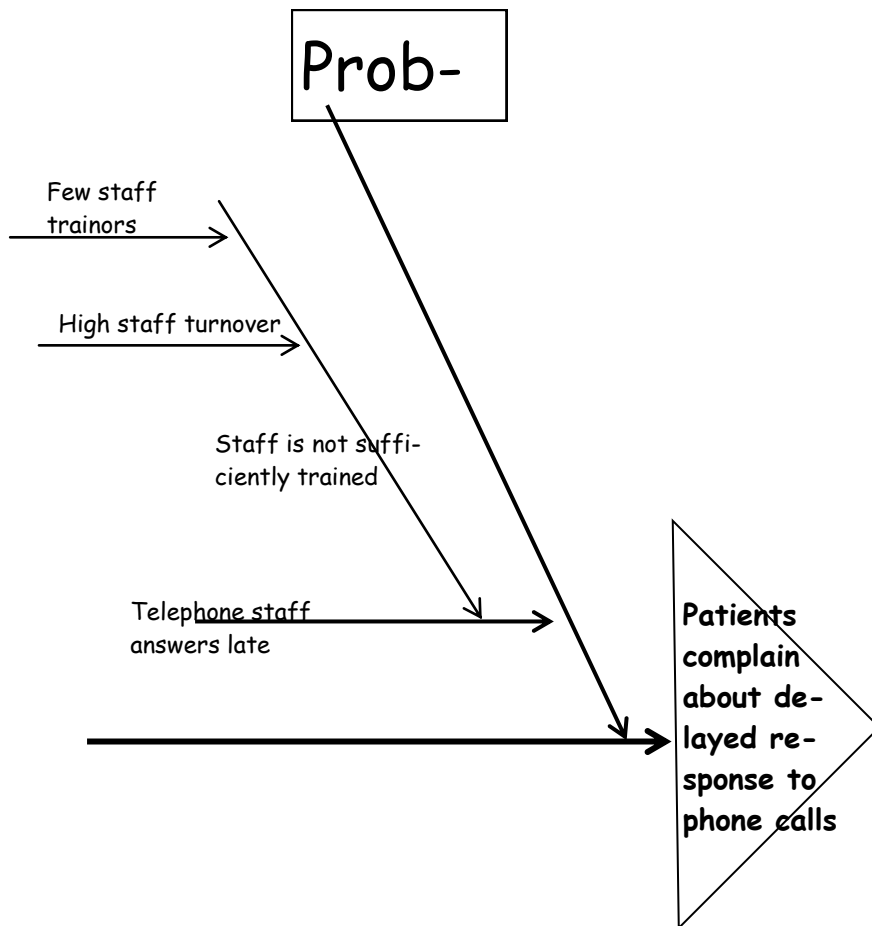
Steps 1-2:
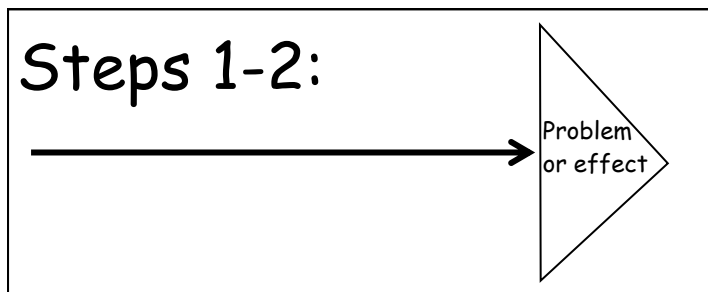
Problem or effect

The following can be said of this fishbone:

- The main problem or effect is stated as "Patients complain about delayed response to phone calls"

- Manpower problem was identified as a major cause category

- When asked "What are the causes of problems with manpower?", one of the causes included "*Telephone staff answers late.*"

- When asked "What are the causes of why telephone staff answers late?" one of the causes is "*Staff is not sufficiently trained.*"

- When asked "Why is staff not sufficiently trained?", causes given are "*High staff turn-over*" and "*Few trainors.*"

8. Review your diagram for logic. Prune irrelevant or redundant causes to simplify the diagram.

9. Validate the causes by collecting data to confirm.

7. Continue doing step 6 for deeper understanding of the root causes.

Remember that as you go one level down, you now treat the cause **as an effect** and you want to know what are the reasons behind this effect.

For example, study this fishbone:

Prob-

Few staff trainors

High staff turnover

Staff is not sufficiently trained

Telephone staff answers late

Patients complain about delayed response to phone calls

On defining a problem...

In Cause and Effect Analysis as in other problem-solving tools, defining the problem is a very important step. The problem should be clearly described and understood by everyone in the team. This focuses your efforts, saves your time, and prevents solutions that don't truly target the real problem/s.

First, what is a "problem"?
It is - a deviation from a requirement or expectation
    - an actual event different from what it should be
    - an undesirable event, situation or performance

A well-stated problem has the following characteristics:
- Focuses on the **gap** between what is happening and what should be happening according to norm, standard or expectation
- Measurable (how often, how much, when)
- Stated in a positive manner (for example, "discharge takes long" instead of "discharge time *is not* done as promised")
- Avoids "lack of" and "no" statements. ("Lack of personnel" is not the problem; long patient waiting time is.)

These are descriptive facts that can help you define your problem:
- What (what equipment, what machine)
- Who
- When (when does it occur, what shift or phase)
- Where (which unit, area, location of defect)
- How
- How much; how many

3. Brainstorm on the possible causes.

Generate all possible causes the team members can think of. It is important at this point to just maintain the creative flow of ideas.

4. Group related causes into categories.

You may be as flexible as possible in coming up with major categories but make sure these are meaningful ones.

5. Write the major cause categories and connect them to the main spine of the fish. These are the secondary bones.

Step 5:

Major cause category 2	Major cause category 1
Major cause category 3	Major cause category 4

Problem or effect
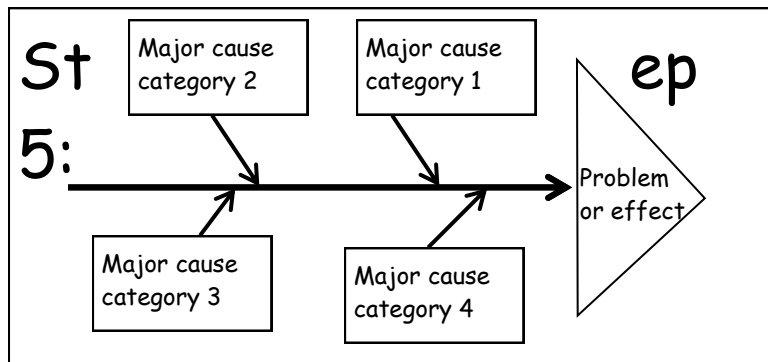
Another tip!
You may use these major cause categories:
- Man (human resources, manpower, people)
- Machine (equipment)
- Methods

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6. Sequence the causes within each category from immediate to distant causes. To sequence the causes:

a) From the items you have brainstormed, determine which is the most immediate cause. Write the most immediate cause near the spine.
b) Ask for each immediate cause: "Why does this (cause) happen?" Write the answer as the next cause.
c) Notice that you are now looking at the immediate cause as an effect.

Place in sequence the brainstormed causes under each major category as smaller bones.

Problem or effect

CAUSE 1
This is an immediate cause

CAUSE 2
This is an immediate cause of Cause 1

CAUSE 3
This is an immediate cause of Cause 2

Major cause category 1

ROOT CAUSE
This is the immediate cause of Cause 3. No other causes of this can be thought of.

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