Analytical Tools

- Tools used for the purpose of analysis to detect
  - Cause (s)
  - Trend (s)
  - Association (s)
  - Effect (s)
  - Prioritization

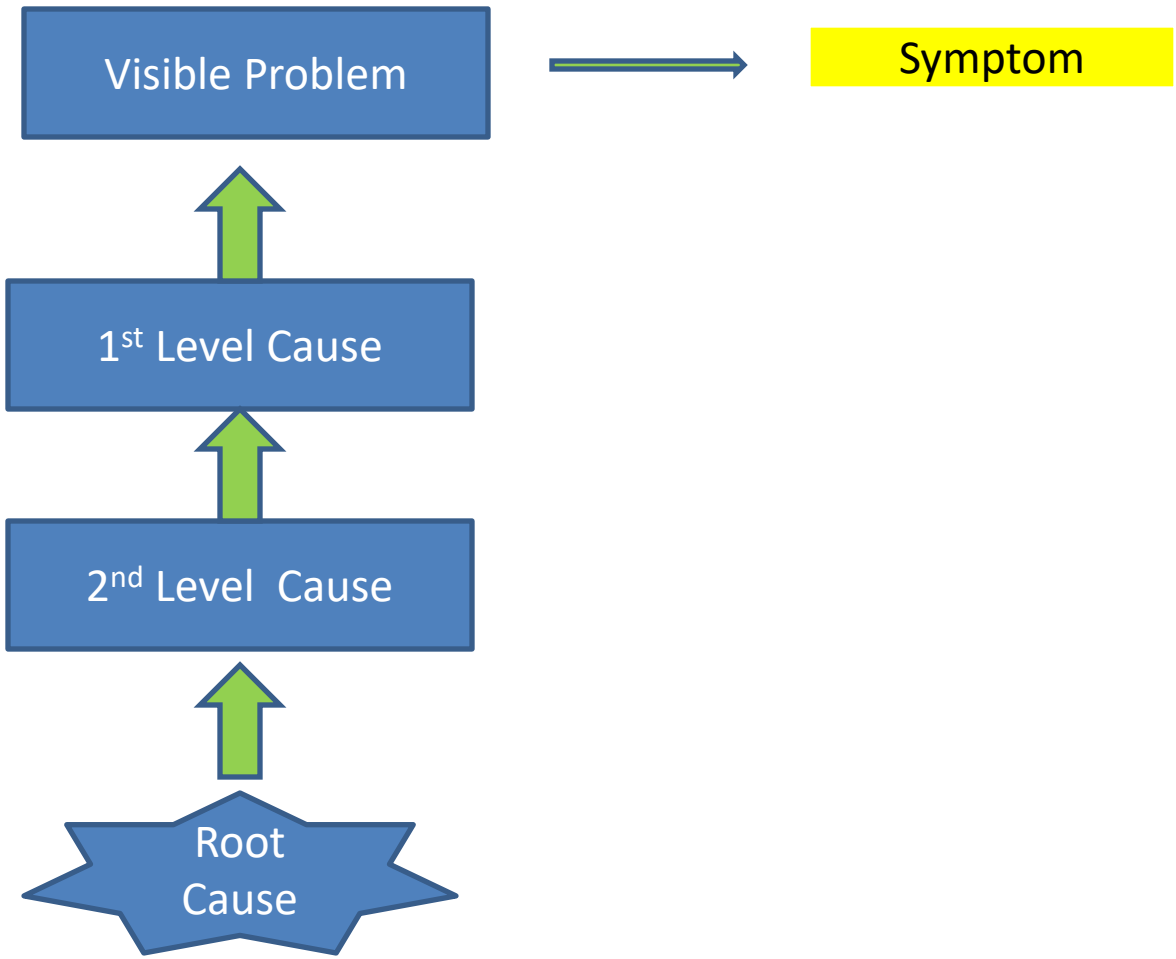
RCA

- Root Cause Analysis (RCA) is group of tools for identifying underlying CAUSE or CAUSES responsible for an Adverse Event
- It is a retrospective analysis AFTER the adverse event .
- “A systematic process designed for investing what how and why something happened and to figure out how to prevent the same thing from happening again”

RCA

- It is
  - Done for investing a cause for an incident
  - Generates effective correction actions
- Important to understand –Why is it being done ?
  - Protect safety , improve quality
  - Get up and running quickly
  - Blame !

RCA


Visible Problem
Symptom
1st Level Cause
2nd Level Cause
Root Cause

RCA points

- E.g. Equipment failure COMMON RCA recommendation
  - Training
  - Counselling
  - Procedure revision
  - Repair
- **Fix & forget-** Will it prevent next failure ? No, because all equipment failure can be traced to human errors ! DOES NOT WORK !
- Human errors – Fix the person – Fire or punish – DOES NOT WORK !
- Most common – Fix , Fire &Forget!!

RCA points

Performance Shaping Factors – Whether all are adderesed?

- Organization – work environment , SOPs ,Eqpt, Staffing, supervision , HR policies
- Task Characteristics –Task resource (eqpt,staff,maintenance)&Task environment (Conditions , PPE)
- Personal Factors – Training , past expriences
- Situational stressers
- Unless all addressed - Recurrence cannot be prevented.

RCA Tools –Fish –Bone Diagram

- The shape of fish bone is used to group potentials root causes into different subcategories such as methods , measurements , materials and many others for easier determinations of the cause .
- Relatively easy to use in complex processes

RCA Tools –Process Mapping

- Creating a workflow diagram with the goal of gaining a cleaner derstanding of
- How a process work and
- How its parallel processes work.

RCA Tools – Swim lane Diagram

- It adds an extra level of clarity about who does what to process flowcharts.

RCA Tools -5 Whys

- Continuously asking “WHY” until you reach the root cause
- E.g. Patient Fall
  - Why did patient fall ?- Slippery floor , old age patient
  - Why was it slippery ?- It was wet .
  - Why an old patient went bathroom alone ?-No attendent
  - Why was it wet? Housekeeper cleaned it but left it wet
  - Why did he leave it wet ?

RCA Tools – Pareto Chart

- The Pareto chart is a very powerful tool for showing the relative importance of problems .
- It contains both bars and lines , where individual vales are represented in descending order by bars , and the cumulative total of the sample is represented by the curved lines .
- An 80% cut off line is also included to indicated where the 80/20 rule applies i.e the vital few factor that warrant the most attention sit under the 80% cut off line

FMEA

- Systematic method of examining a process prospectively for possible ways in which failure can occur and then redesigning the process to eliminate the possibility of failure, before it harms or minimize the consequences of failure .

  The joint commission

- Started in the 1940s by the U.S. military ,FMEA is a step by step approach for identifying all possible failures in a design , a manufacturing or assembly process , or assembly process , or product or service

FMEA

- Failure are prioritized according to how serious their consequences are how frequently they occur and how easily they can be detected .
- The purpose of the FMEA is to take actions to eliminate or reduce failure starting with the highest priority ones .

FMEA

- Eg . Sample transportation – Steps

1. Collected from ward /sample collection room
2. Placed in open tray
3. Carried by hand by an Aide to lab
4. Collected from ground floor room & walk 50 metres
5. Reach first floor –use stairs /lifts &walk 20 metres to lab
6. Go through a narrow door to lab
7. Deposit samples in the lab

FMEA – Benefits & Challenges

Benefits	Challenges
Anticipates &eliminates	Resource intensive – efforts , time, people
Multidisciplinary	
Seeks inputs from the sharp end	
Systematic method of improvement	

RCA Vs FMEA

RCA	FMEA
Retrospective , reactive	Prospective ,proactive
Why, who !	What if …
How can harm be avoided in future	How can harm can be prevented
Systematic , needs Involvement & open Discussion	Systematic , needs involvement& open discussion

Run Chart

Using run charts has a variety of benefits , they :

- Help depict how well (or poorly) a process is performing :
- Help determine when changes are truly improvements by displaying a pattern of data that can you can observe
- Give direction on improvements and information about the value of particular changes .

Control chart

- The control chart is a graph used to study how a process charges over time . Data are plotted in time order .
- A control chart always has a central line for the average , an upper line for the upper control limit and a lower control limit .These lines are determined from historical data .
- By comparing current data to these lines you can draw conclusion about whether the process variation is consistent (in control) or is unpredictable (out of control , affected by special cases of variation).
- This is an example of Statistical Process Control.
- Eg. Levey- Jennings Control Chart

Control chart

Day	Control	Day	Control	Day	Control
1.	250	11	240	21	247
2	255	12	254	22	245
3	245	13	246	23	248
4	232	14	257	24	249
5	232	15	250	25	241
6	257	16	255	26	247
7	244	17	259	27	240
8	259	18	247	28	252
9	262	19	246	29	247
10	246	20	248	30	264