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Root Cause Analysis
An Introduction

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NPSA - London

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Our objectives

- to increase understanding of the theory underpinning Root Cause Analysis

- to provide you with an overview of some of the RCA tools

- to provide a greater understanding of the advantage of using a ‘systems’ based approach to patient safety incidents

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There is a need to learn from patient safety incidents – a systems view is needed

- Human errors are induced by system failures.
- Evidence from other 'high reliability' industries suggests that systematic investigation of adverse incidents is effective.
- Root Cause Analysis (RCA) is one approach

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Why RCA?

- **In depth analysis of a small number of incidents will bring greater dividends than a cursory examination of a large number**

  (Vincent and Adams 1999)

- **RCA is a structured investigation that aims to identify the true cause(s) of a problem, and the actions necessary to eliminate it**

  (Anderson and Fagerhaug 2000)

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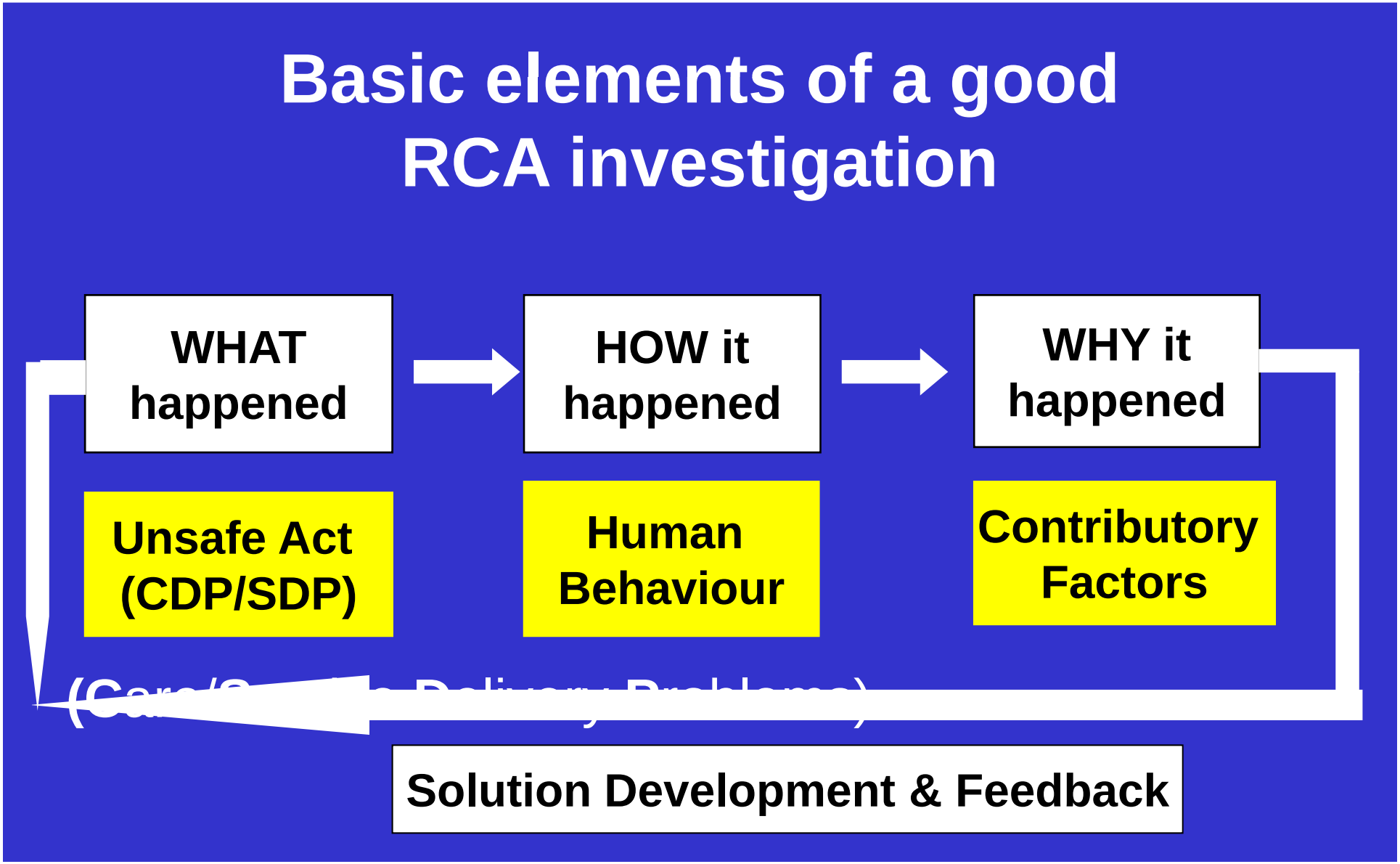
Basic elements of a good RCA investigation



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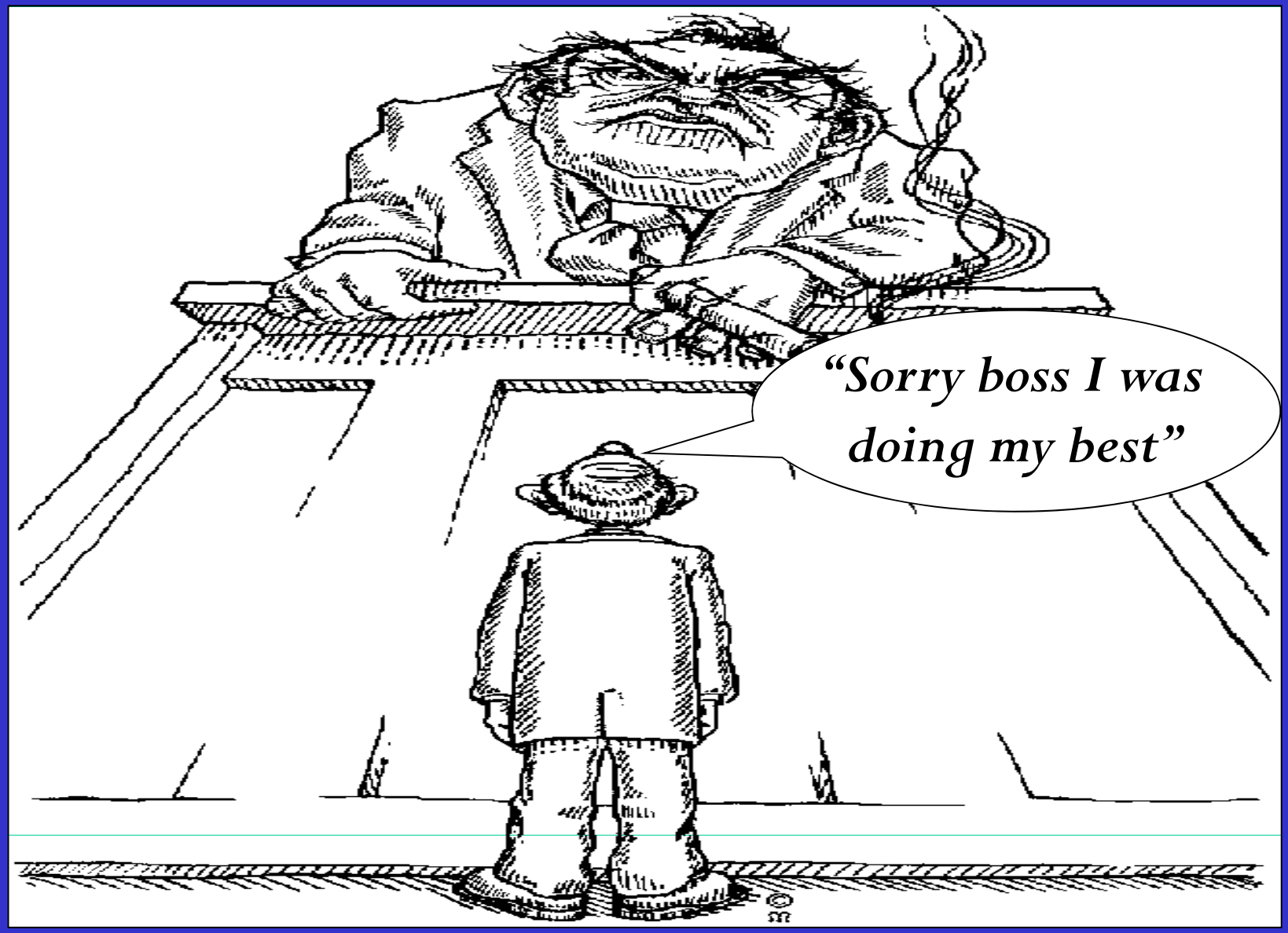
Why do people get things wrong?



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Understanding the causal factors of incidents

Person centred approach

- Individuals who make errors are ‘careless, at fault, reckless’
- Blame and punish
- Remove individual = improve safety

Systems approach

- Poor organisational design sets people up to fail
- Focus on the system rather than the individual
- Change the system = improve safety

Myths

- **the perfection myth**
  - **if we try hard enough we will not make any errors**
- **the punishment myth**
  - **if we punish people when they make errors they will make fewer of them**

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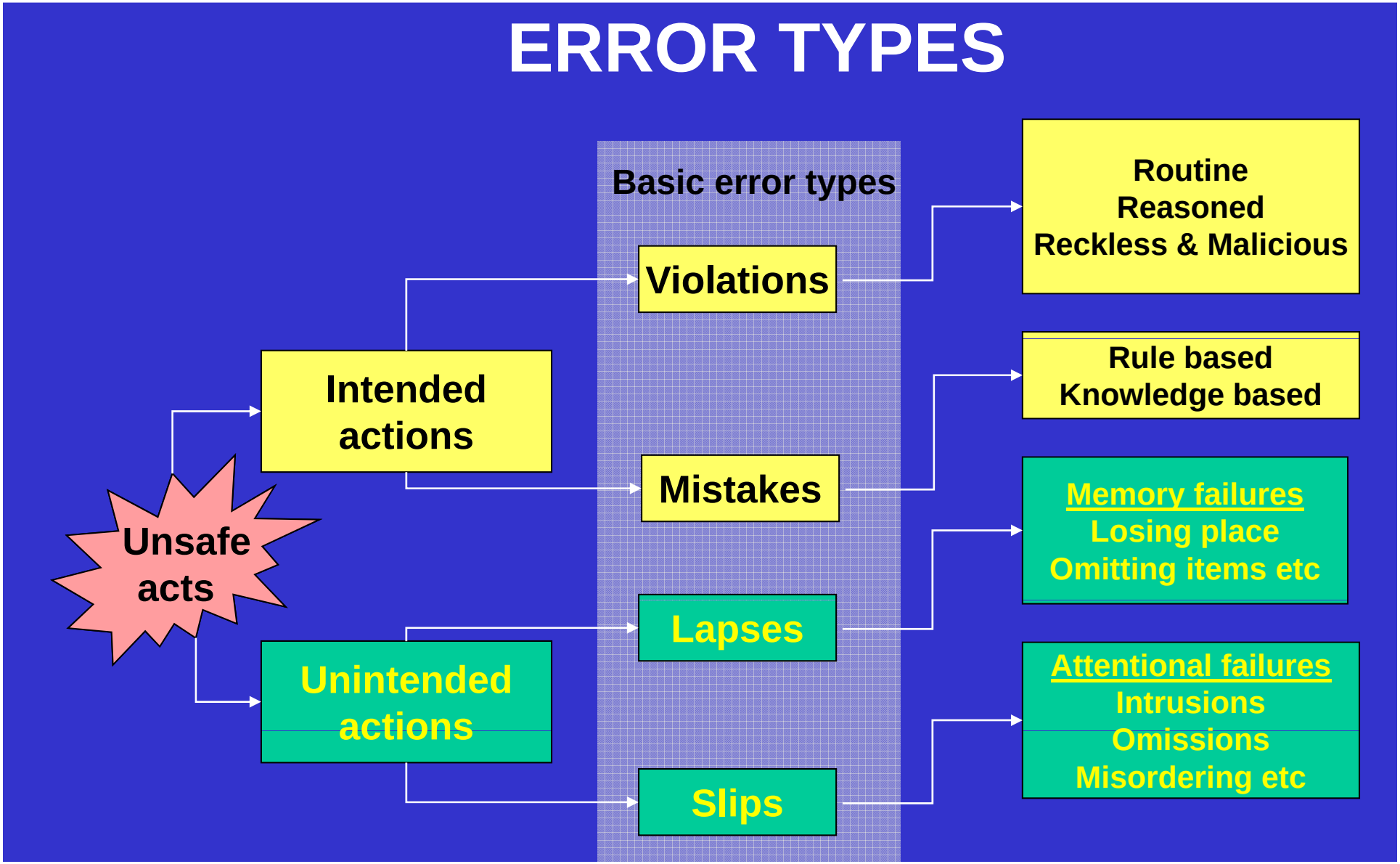

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Who has received any human factors training ?

- Why errors occur
- The systems approach to errors

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a guide to Root Cause Analysis from the NPSA

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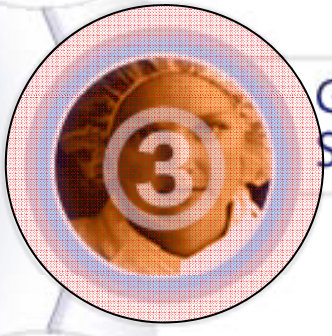
Why things go wrong

Generating Solutions



Getting Started

Analysing Information

Gathering and mapping information

Exit

Resources

Help

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Getting Started

A Patient Safety Incident (PSI) is:

Any unintended or unexpected incident(s) that could have or did lead to harm for one or more persons receiving NHS funded healthcare

Which PSI requires an RCA?

- PSI causing death or severe harm
- Frequently occurring PSI / Prevented PSI

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Classifying Incidents

- **Use organisational procedure for PSI classification**

- **Classify according to**
  - **the degree of harm or damage caused at the time**
  - **its realistic future potential for harm if it occurred again**

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Select People for the RCA Investigation Team

Incidents causing death or severe harm

- **Multidisciplinary group of 3-4 persons**
- **One of which should be fully trained in incident investigation and analysis**
- **Objective attitude**
- **Good organisational skills**
- **Use of experts**

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Who has been involved in any form of investigation following a patient safety incident?

What was your experience?

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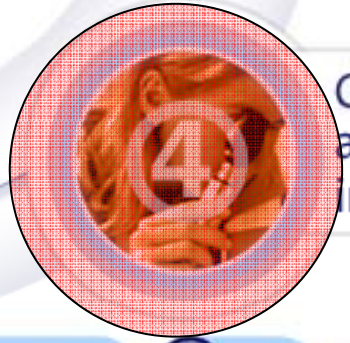

Gathering and mapping information

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Gathering Information

- **Information is the lifeblood of investigation**
- **60% of your investigation time should be spent on data gathering**

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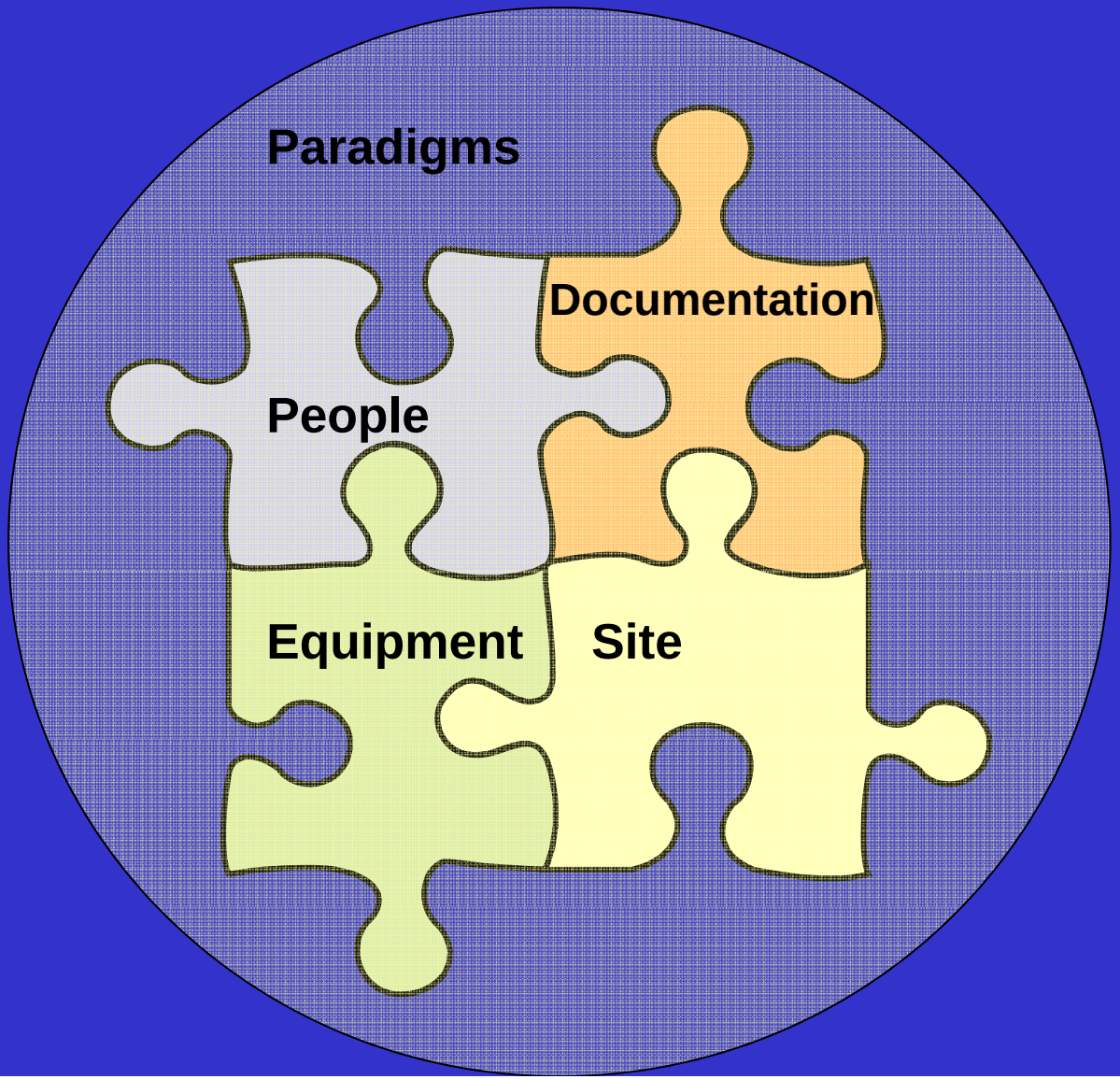
What Information to collect?



People

- **Personnel directly involved in the incident & Other witnesses**
  - Clinical staff
  - Patient/family
  - Porters
  - Health care assistants
  - Ward clerks
  - members of the public, etc

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What and how?

- Interviews
- “Brain Storming / Writing”
- Reflective practice documents
- Retrospective clinical records

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Documentation

- Incident report (s)
- Prescription, dispensing and administration record
- Medical record
- Guidelines, policy and procedures (in operation at the time of the incident)
- Relevant audit data (clinical, risk management, H&S)
- Staff rota's
- Training and supervision records
- Medical equipment maintenance records
- etc

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Equipment

Any equipment involved in the incident

- Medicine pack, ampoules, pack information
- Infusion bag and administration set
- Infusion pimp

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Site

Consider the following

- Securing the site
- Take some photographs
- Sketch the layout
- What was the position of the equipment/ people?
- Reconstruction

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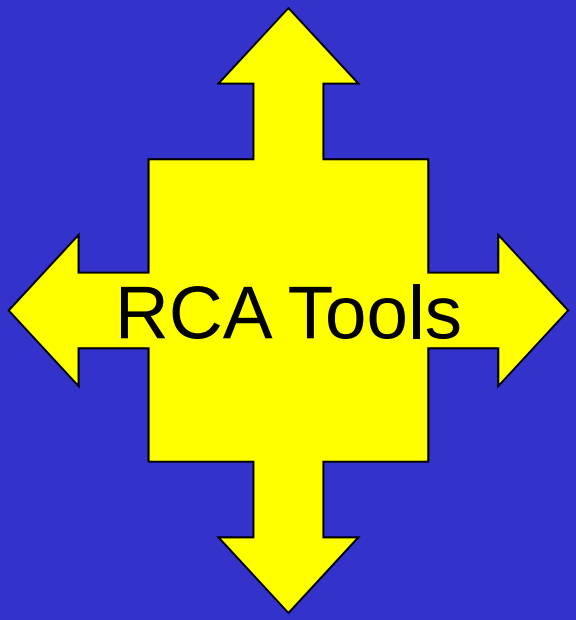
Mapping the information



Timeline & Tabular Timeline

Narrative Chronology

Time/Person Grids

Cause and Effect Charts

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Narrative Chronology

Community Dentistry – failure of the chair

September 2000- Month 11 week 1.

Four weeks later the suction was found to be permanently on, on the dental chair and the Supplier was informed. It seemed that the motor was burnt out.

Month 11 week 2.

Seven days later the supplier came to repair the motor. The chair seemed to be working better again and disruption was minimal over the following three weeks.

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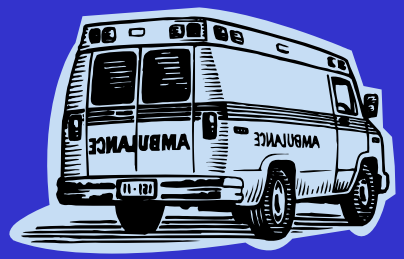
Timeline



08.24
Ambulance crew partly fill diesel vehicle with unleaded petrol at local garage

08.32
Emergency call received by ambulance crew to attend a serious RTA on local motorway

08.38
Ambulance breaks down whilst on Emergency call

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Tabular Timeline

Date and Time of Event	18th March 2002 – 19.15	18th March 2002 – 20.00
Event	The patient was seen on ward by the consultant anaesthetist	The patient was seen by the Senior House Officer (SHO) who applied the operation site mark
Supplementary Information	The patient declined a regional anaesthetic. Anaesthetic pre-assessment information is recorded in a log-book and the information then transferred to the anaesthetic record on the day of the procedure, although this transfer of information did not take place. This practice was adopted as the medical and anaesthetic record frequently got lost	SHO in her first SHO job and first rotation in orthopaedics. SHO applied the mark to an unusual part of the shin with a skin pencil, rather than the thigh or knee. Below knee anti-embolic stockings were then put on by the patient which covered the mark. No guidance or training is given to the SHOs on marking operative sites
Good Practice		
Care/Service Delivery Problem	Failure to document planned procedure in the anaesthetic record	Operative site incorrectly marked

Time-person Grid

Staff	10.05	10.15	10.25
Snr Nurse A	with pt 1	with pt 3	nurses st
HCA 1	with pt 2	?	On break
Social Wker	with pt 1	with pt 1	nurses st
Dr 1	?	?	with pt 2

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Cause and Effect Diagrams

An investigation tool that displays an entire event:

- **Follows a timeline**
- **Presents a summary diagram of a complex incident**
- **Charts the relationship of events, conditions, changes, barriers and causal factors using standard symbols**

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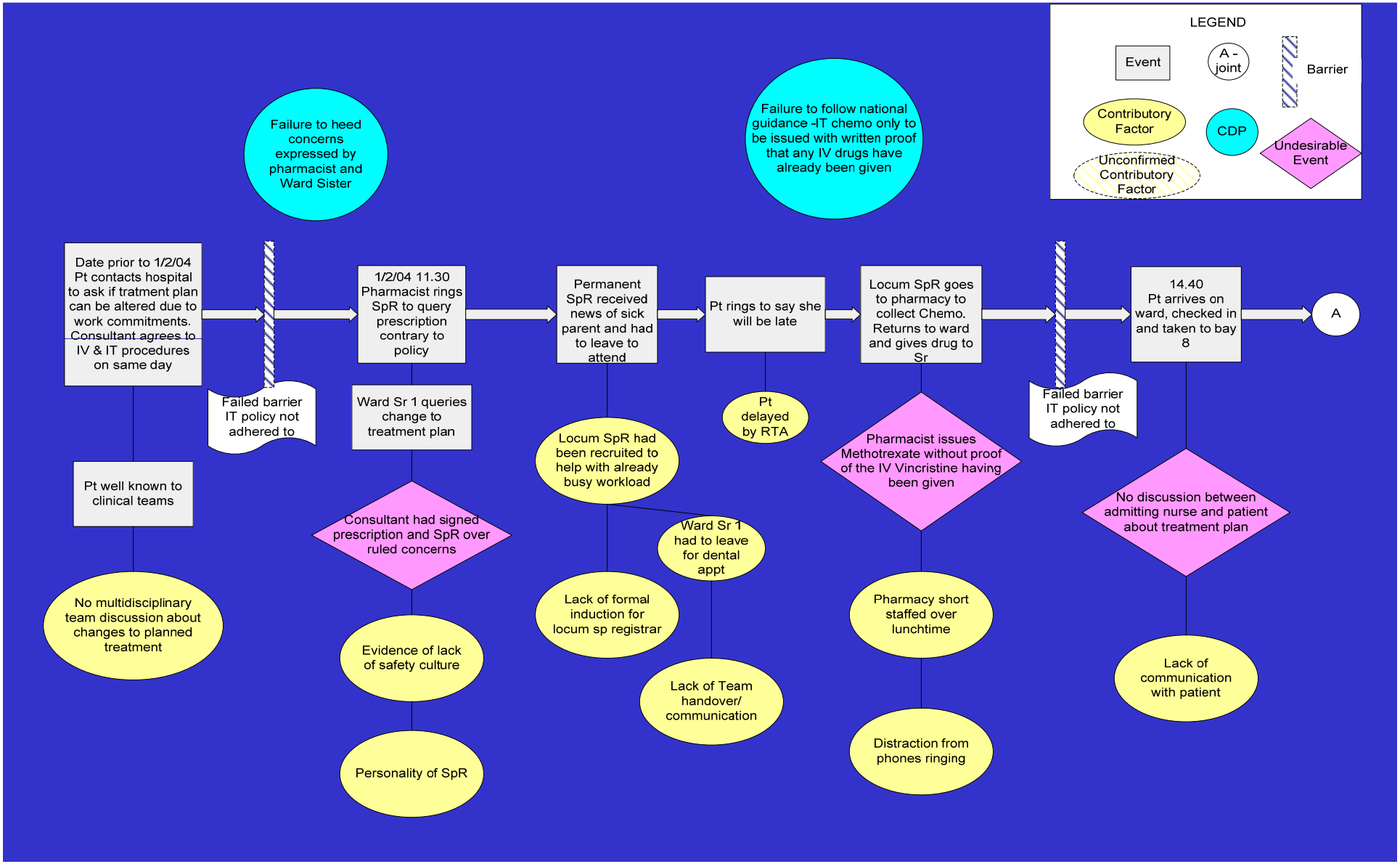

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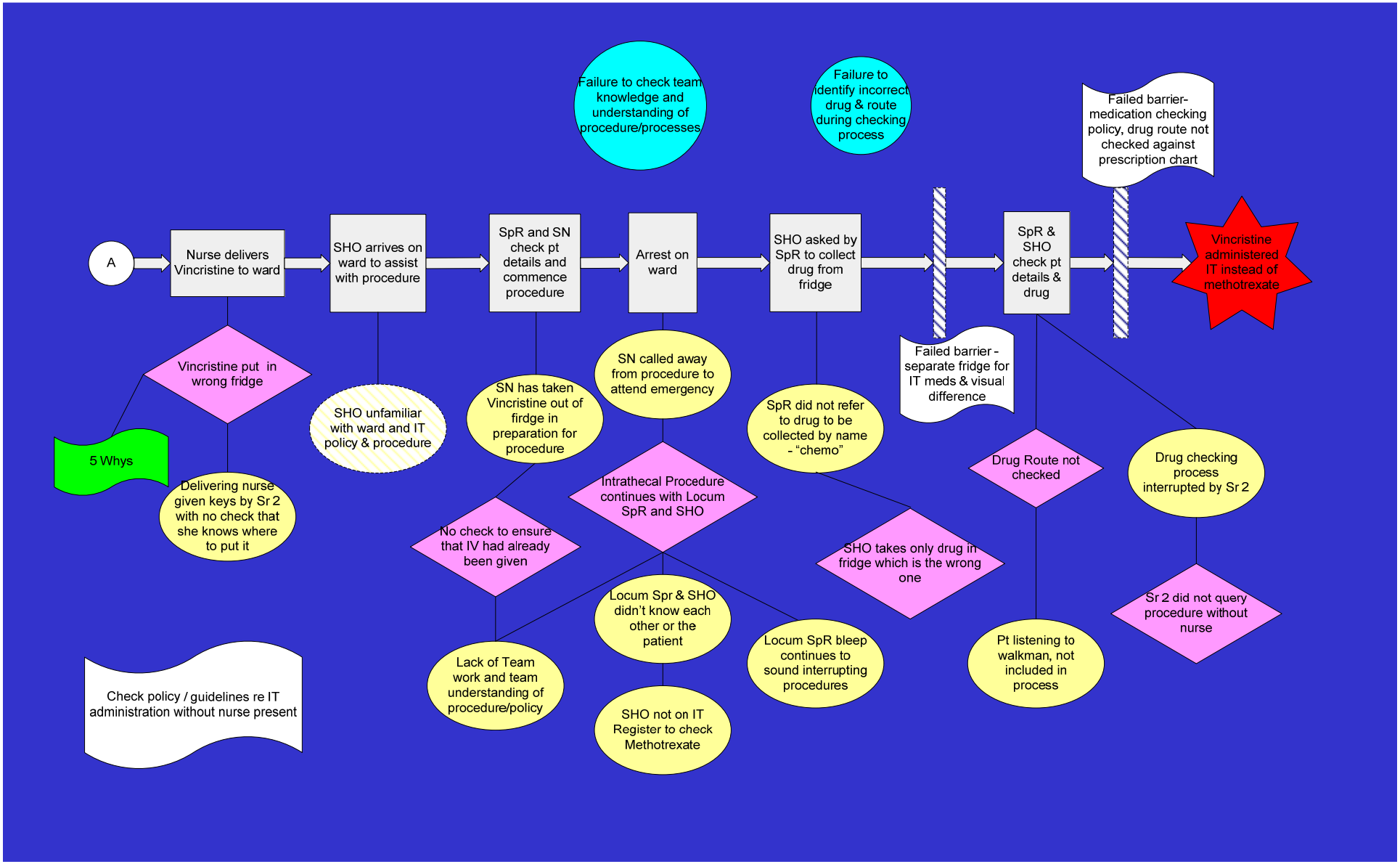

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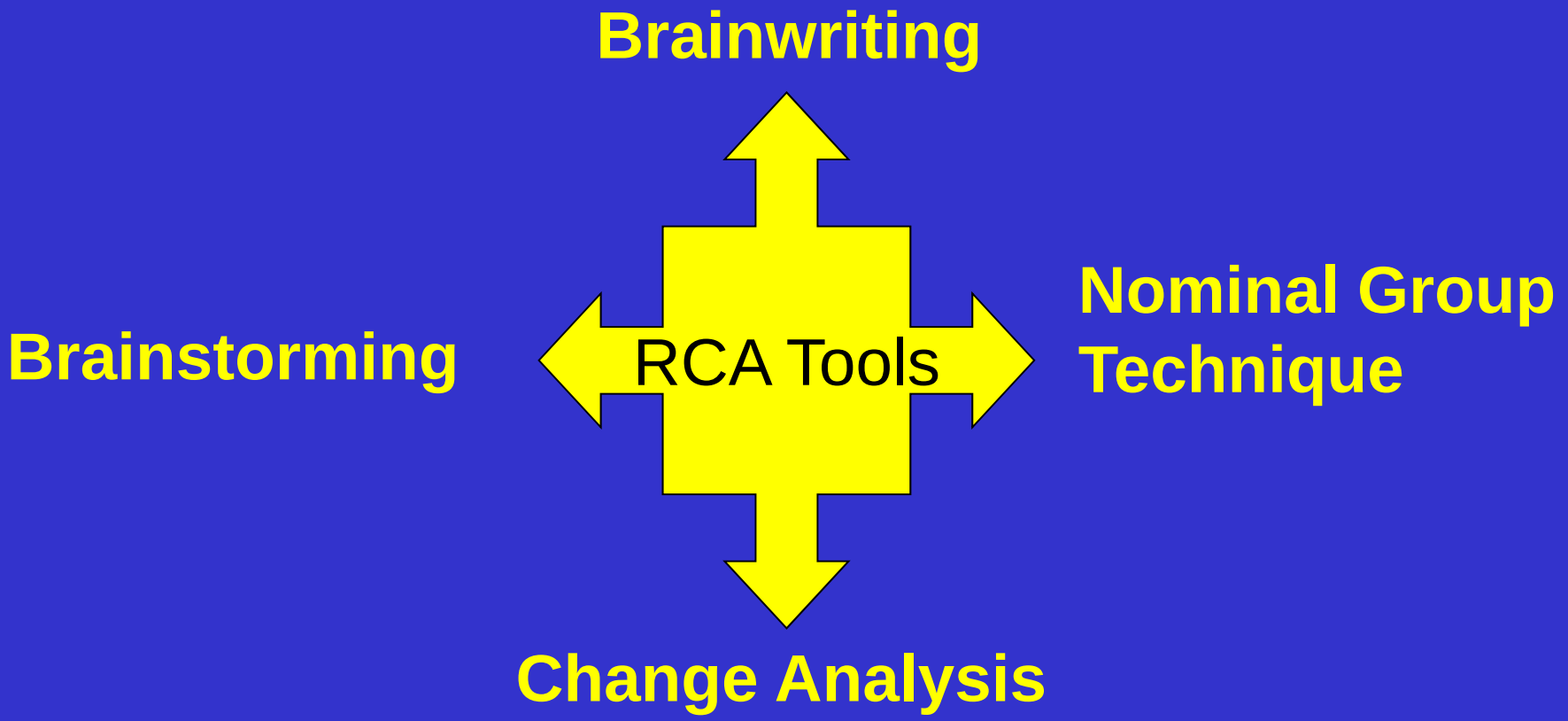
RCA Tools to help identify the problems



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Brainwriting Template

Incident/Issue/CDP/SDP, etc

Idea's

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NGT Ranking Template

Problem:		
Ideas	Points	Total
A		
B		
C		
D		

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Analysing Information – Exploring the Problems

What are Contributory Factors?

- **Contributory, influencing or causal factors are things that contributed to the incident.**
- **Contributory factors can vary in their significance of impact on the CDP/SDP.**
- **Contributory factors can have both a negative and positive impact.**

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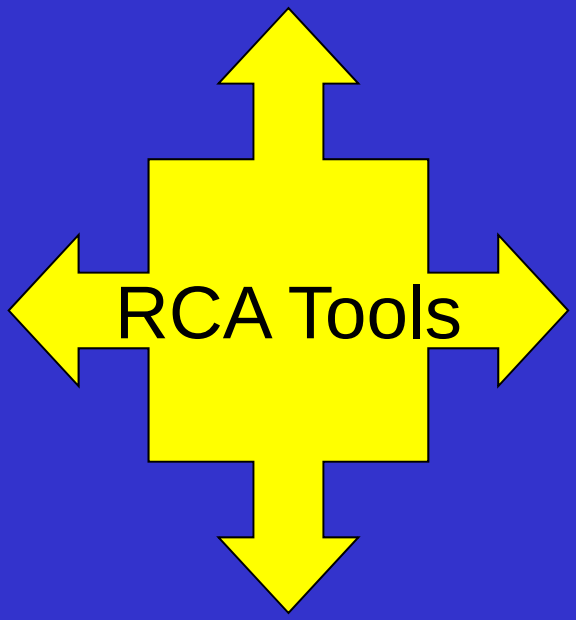
How to identify the contributory factors and root causes

Five Whys Technique

Contributory Factors Framework/ Fishbone Diagrams



Run Charts

Brainstorming/Brain writing & NGT

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NPSA Contributory Factor Taxonomy

- Patient Factors
- Individual Factors
- Task Factors
- Communication Factors
- Team and Social Factors
- Education and Training Factors
- Equipment and Resource Factors
- Working Conditions Factors
- Organisational & Strategic Factors

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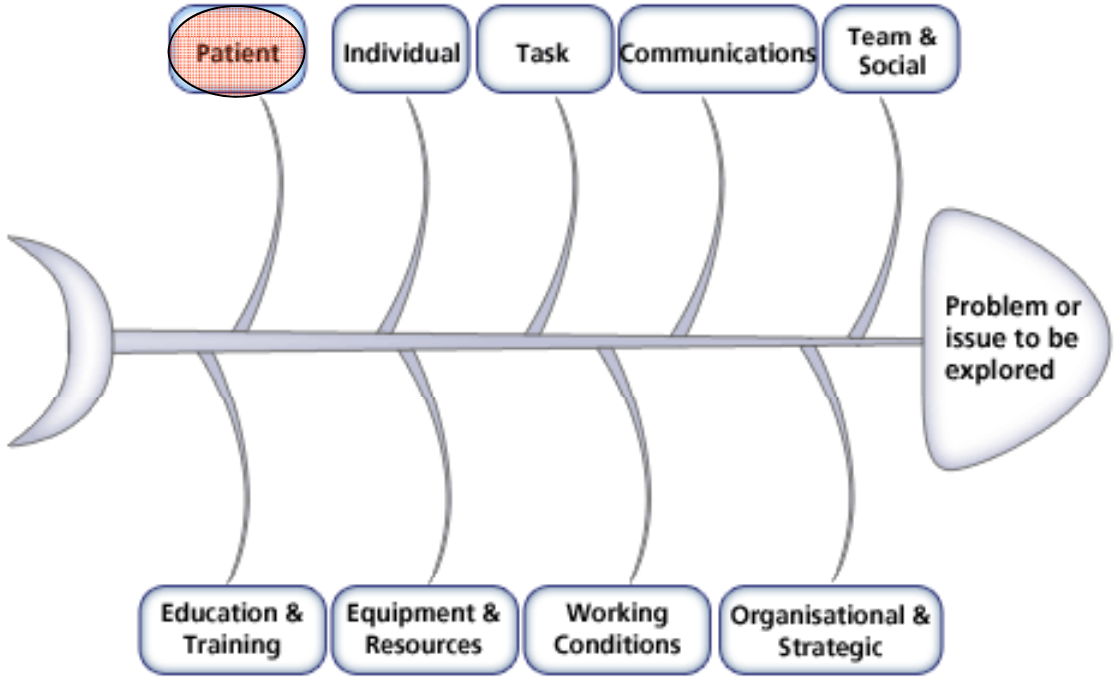
Analysing Information

Contributory factors - NPSA framework

The key part of the analysis is to identify the contributory factors lying behind each problem. The NPSA's CFF has categories and components relating to exploring incidents. Click each category to find out more.



Patient factors

Patient factors are grouped into five types:

- Clinical condition
- **Social factors**
- Physical factors
- Mental and psychological factors
- Interpersonal relationships

Example: The patient did not understand the risks of treatment due to his poor understanding of the English language and no interpreters were available.

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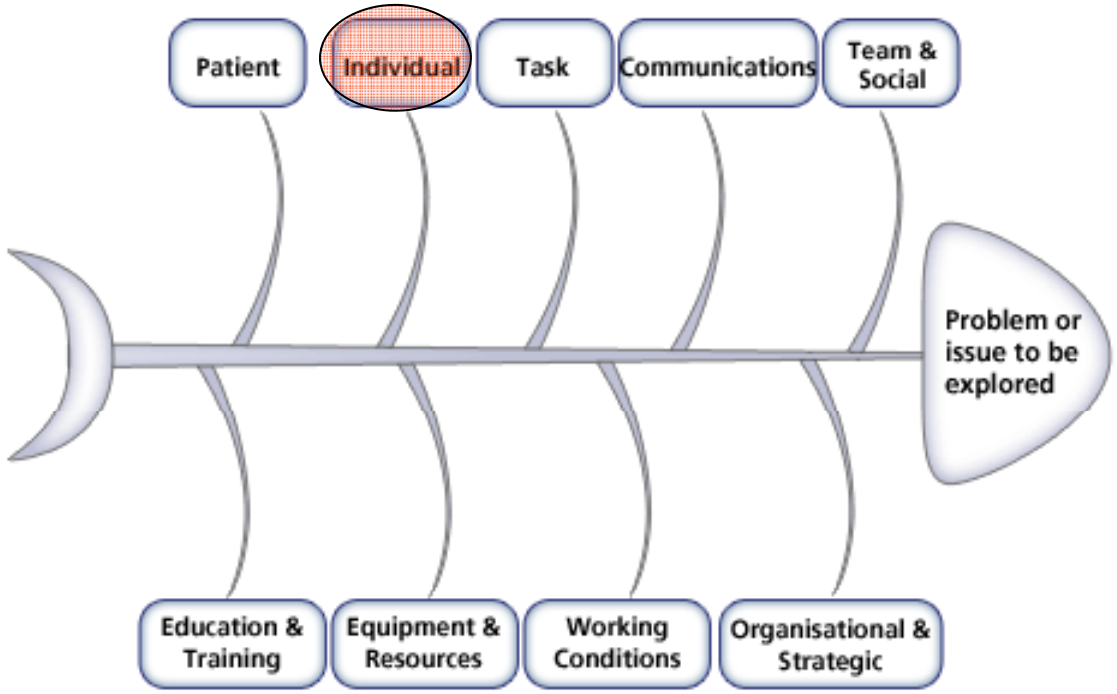

Individual factors

Individual factors are grouped into three types:

- **Physical Issues**
- Psychological Issues
- Personality.

Example: A staff nurse experiencing problems with hearing and misheard handover instructions to patient.

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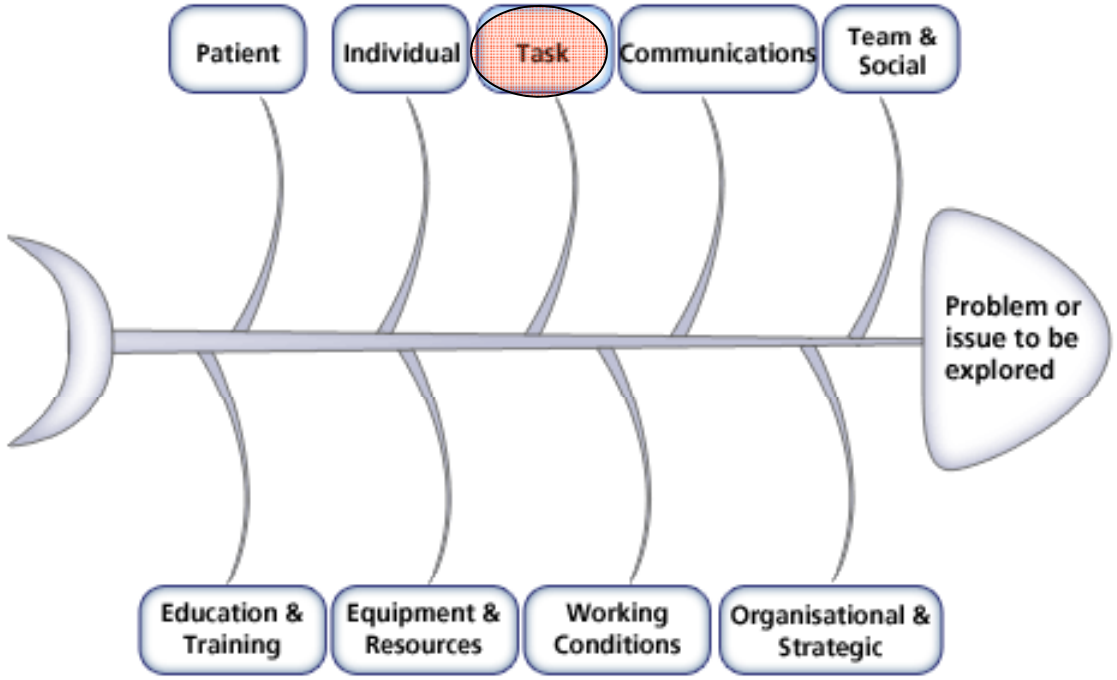

Task factors

Task factors are grouped into three types:

- Guidelines and Policies
- **Decision making aids**
- Task design

Example: The algorithm for managing respiratory arrest had a vital component missing.

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Analysing Information

Communication factors

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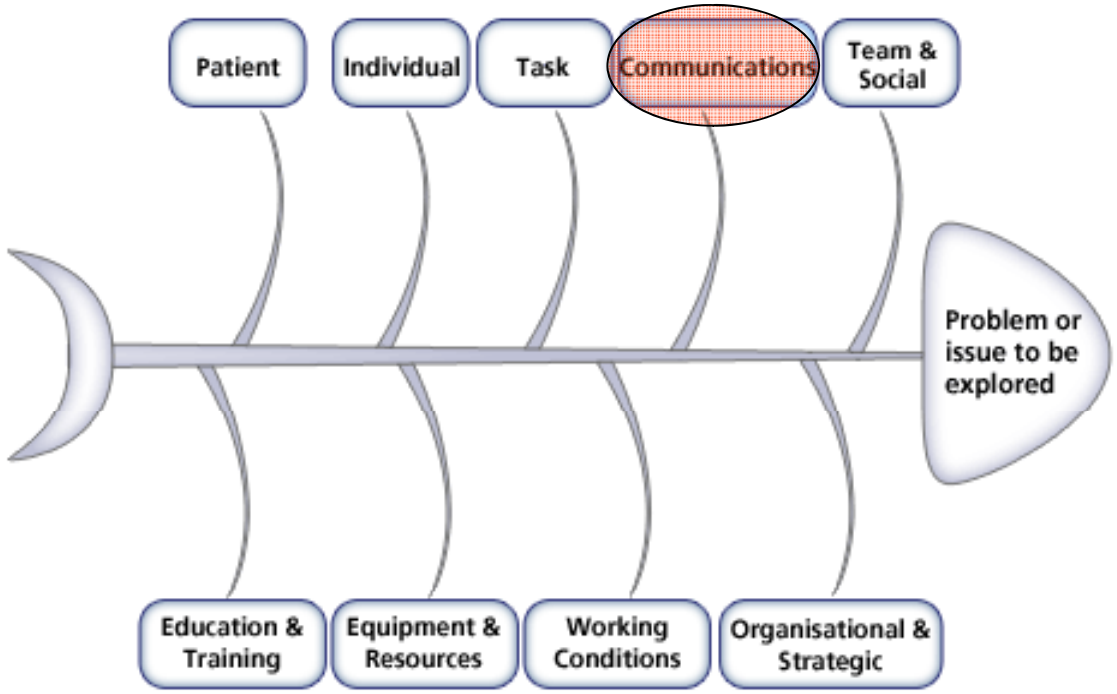

Communications factors are grouped into three types:

- **Verbal**
- Written
- Non-verbal.

Example: Relatives interpret GP's instructions to patient wrongly due to limited understanding of language.

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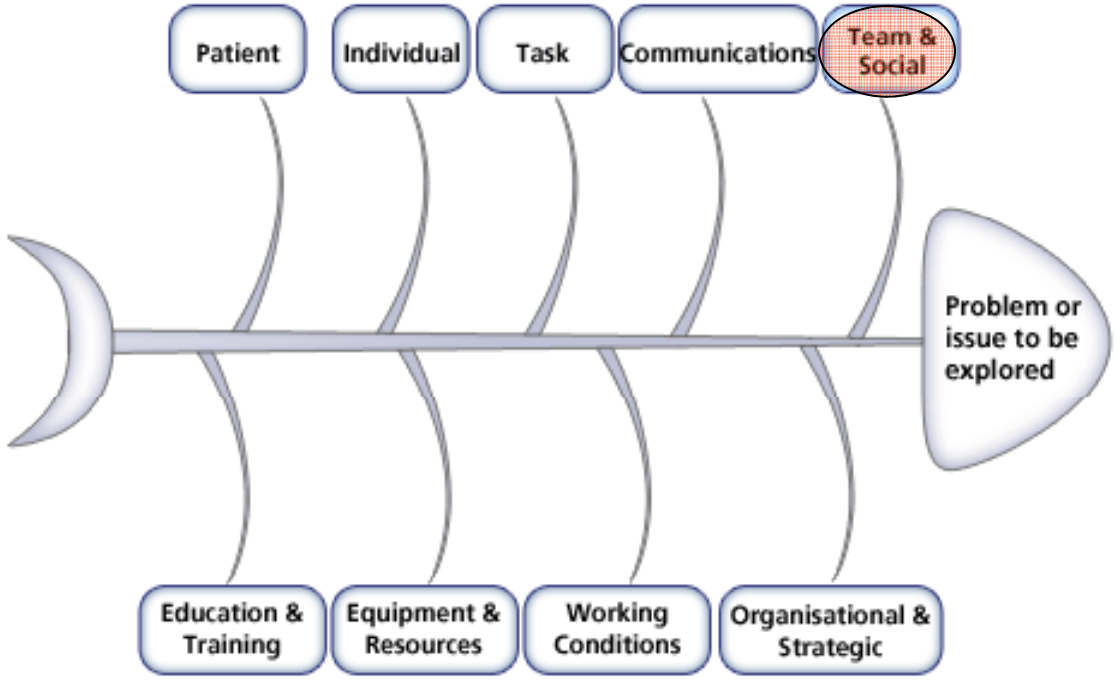

Team & Social factors

Team and social factors are grouped into three types:

- Role congruence
- Leadership
- **Support and cultural factors**.

Example: Multi-disciplinary team rarely met and the weekly Directorate meeting was for doctors only.

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Education & Training factors

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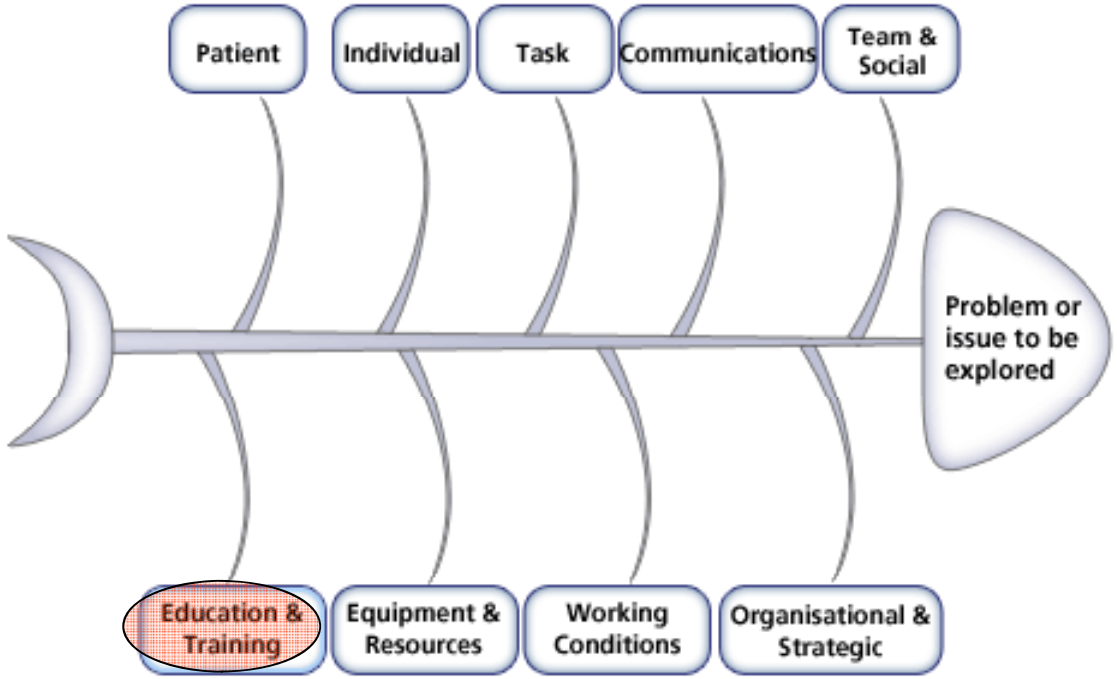

These factors are grouped into four types:

- **Education/training**
- Appropriateness
- Supervision
- Availability

Example: Standards of care were not met as new care assistants at ward level were trained by someone who was competent as a practitioner but had no training expertise or experience.

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Analysing Information

Contributory factors - NPSA framework

Equipment & Resources factors

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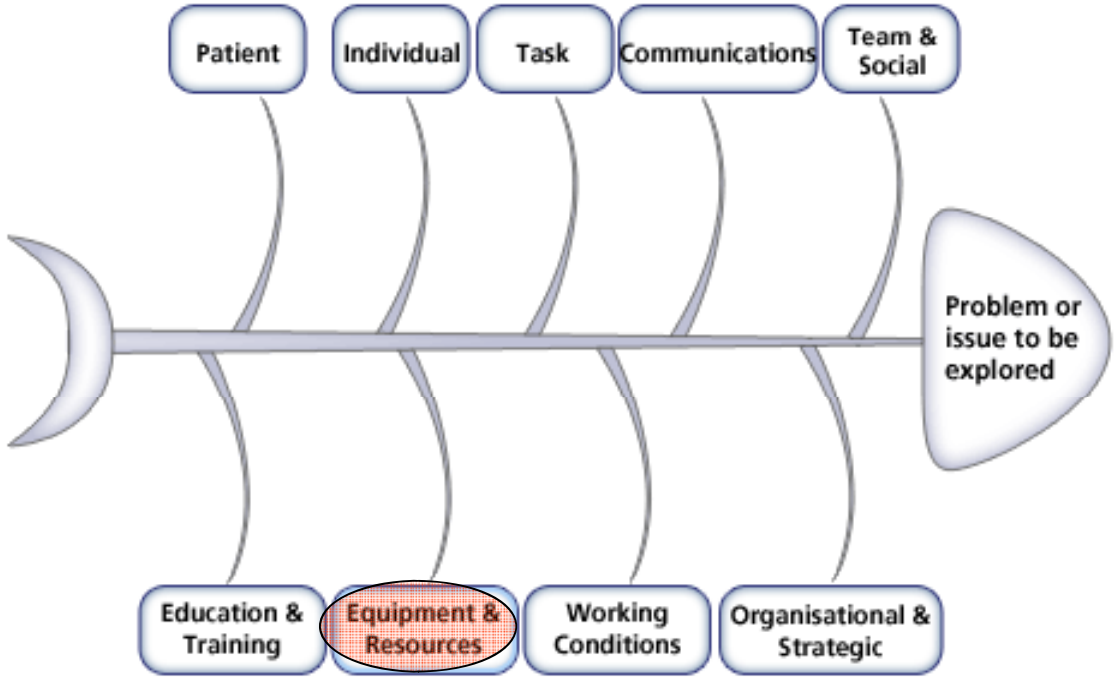

Equipment and resources factors are grouped into five types:

- Equipment and supplies
- Visual Display
- **Integrity**
- Positioning
- Usability

Example: A patient's oxygen levels dropped causing respiratory arrest. The alarm on the monitor was faulty.

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Analysing Information

Working Conditions factors

Contributory factors - NPSA framework

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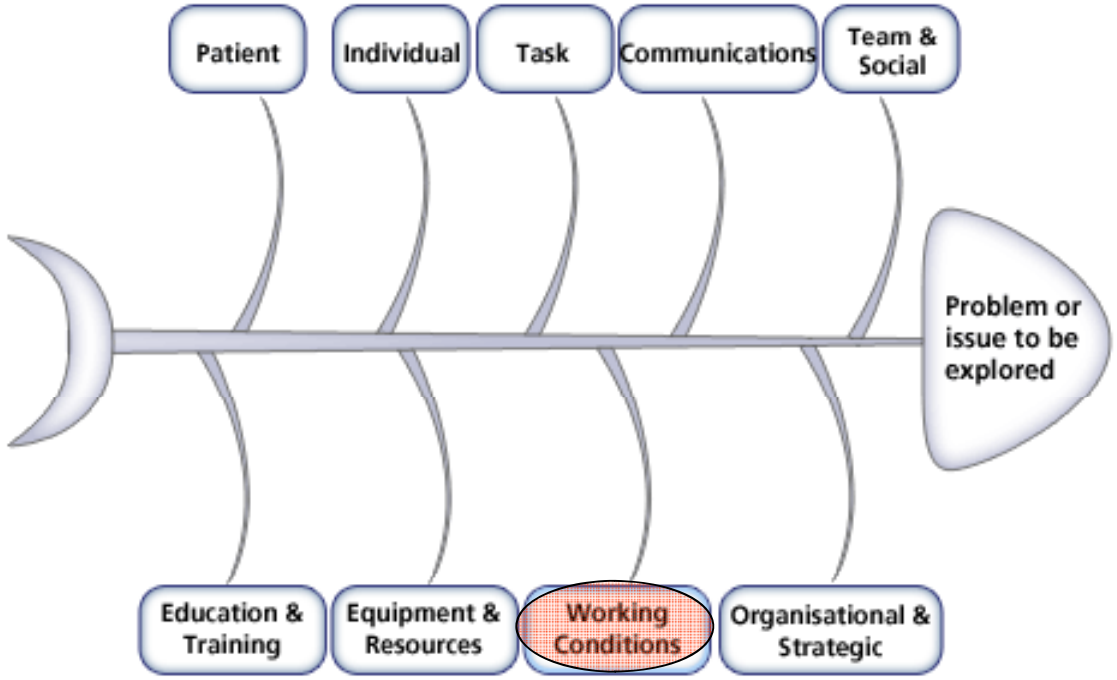

Working conditions factors are grouped into four types:

- **Administrative**
- Design of physical equipment
- Staffing
- Time

Example: Previous medical records were not available for clinical staff to plan treatment and care for an emergency admission, therefore delaying clinical decisions and treatment.

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Contributory factors - NPSA framework

Organisational & Strategic factors

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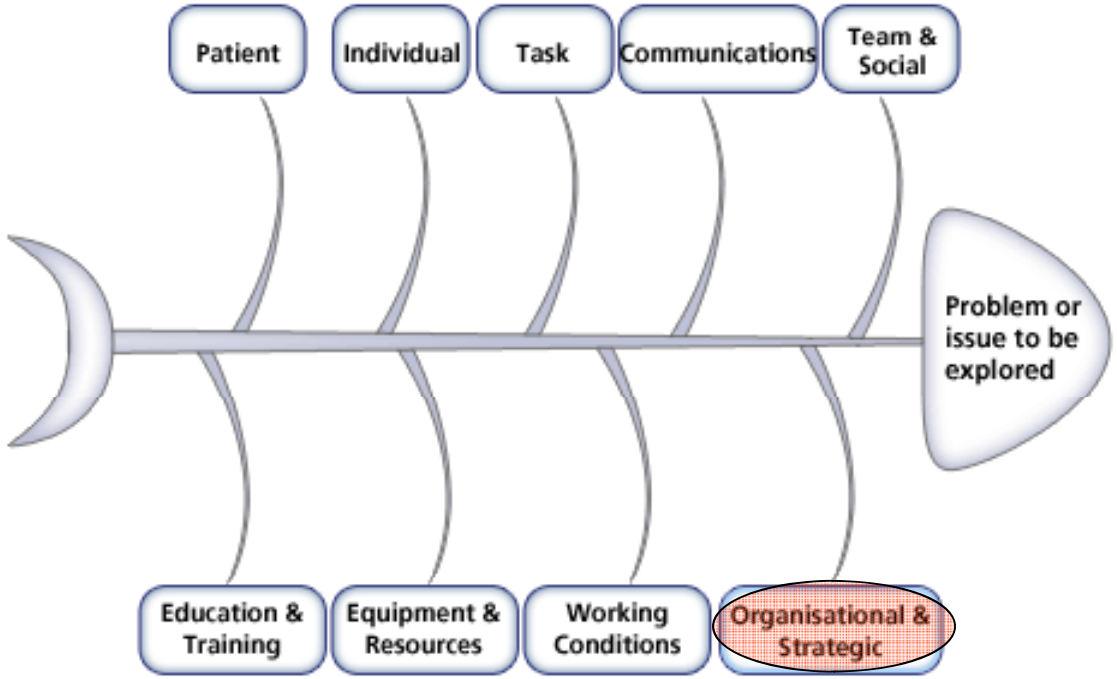

These factors are grouped into five types:

- Organisational structure
- Policy, standards, goals
- Externally imported risks
- **Safety culture**
- Priorities

Example: The ambulance crew would not lift 20 stone cardiac patient as it would put them at risk.

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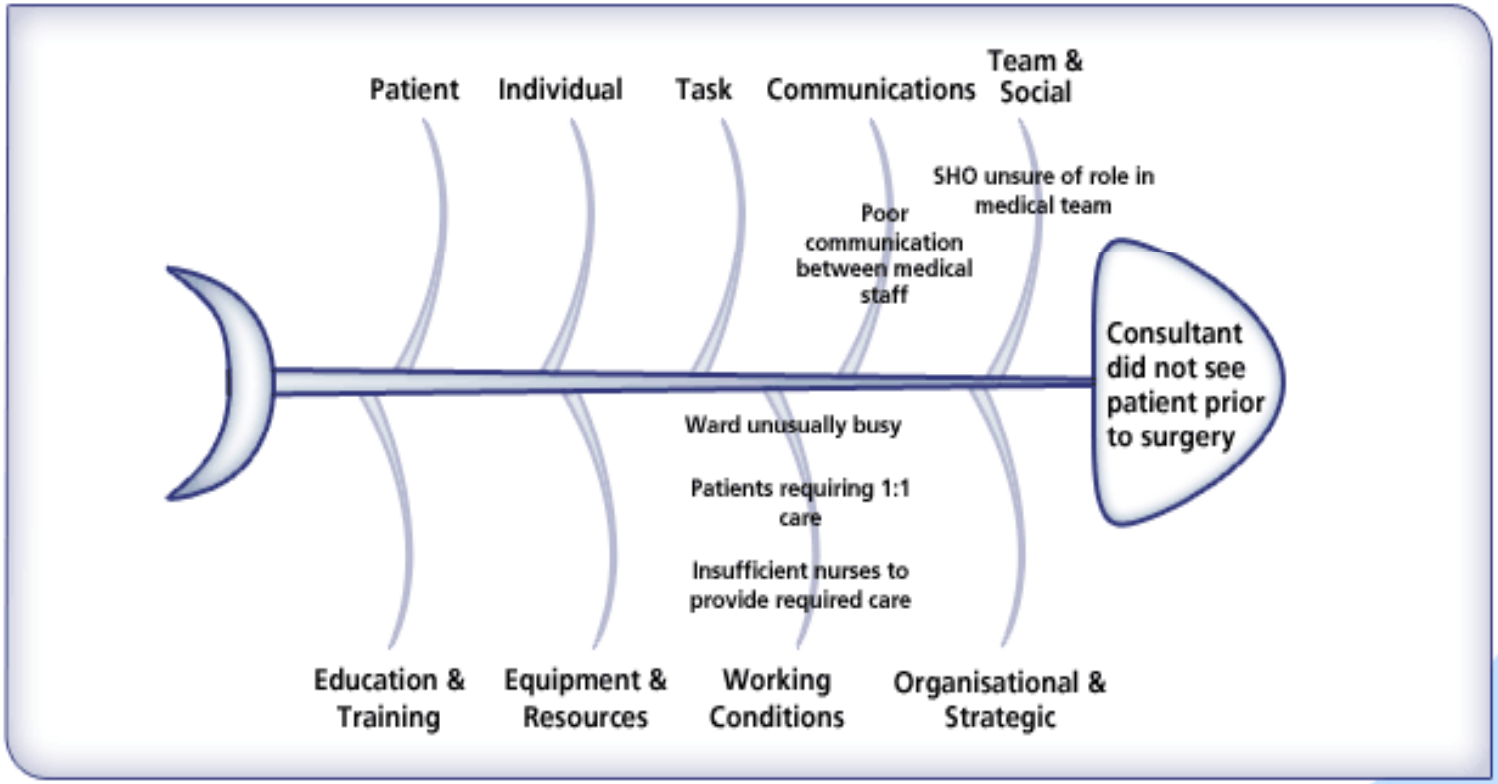
Wrong site surgery

The team now begin taking these factors and plotting them on to a fishbone diagram.



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Spider Diagram

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Five Whys

- Tool that enables investigator(s) to identify the causes for each problem (CDP/SDP).
- Best suited to simple and non-complex problems.
- Quick and easy to teach
- 3 – 5 – 7 whys?

Cause and Effect Chart

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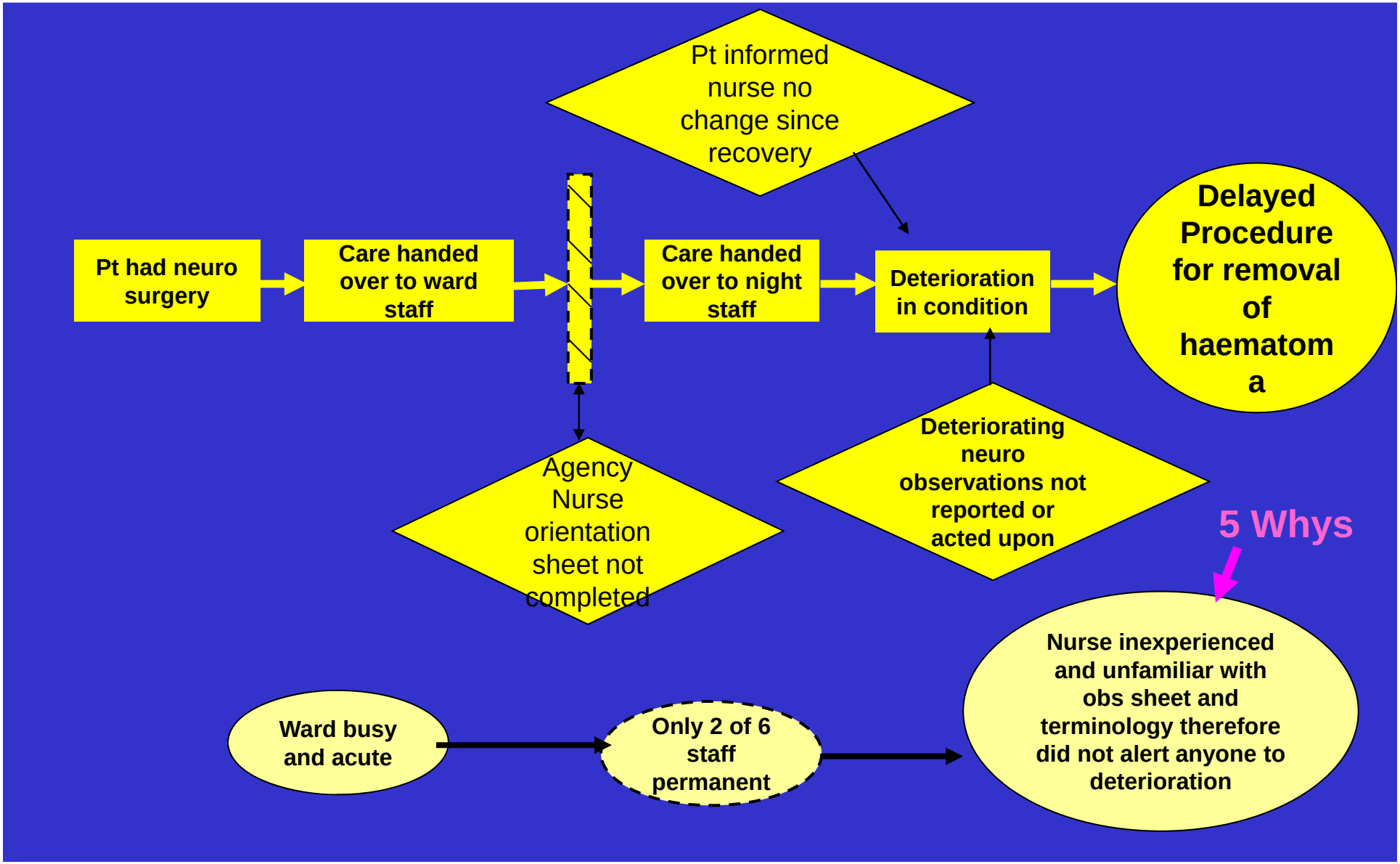

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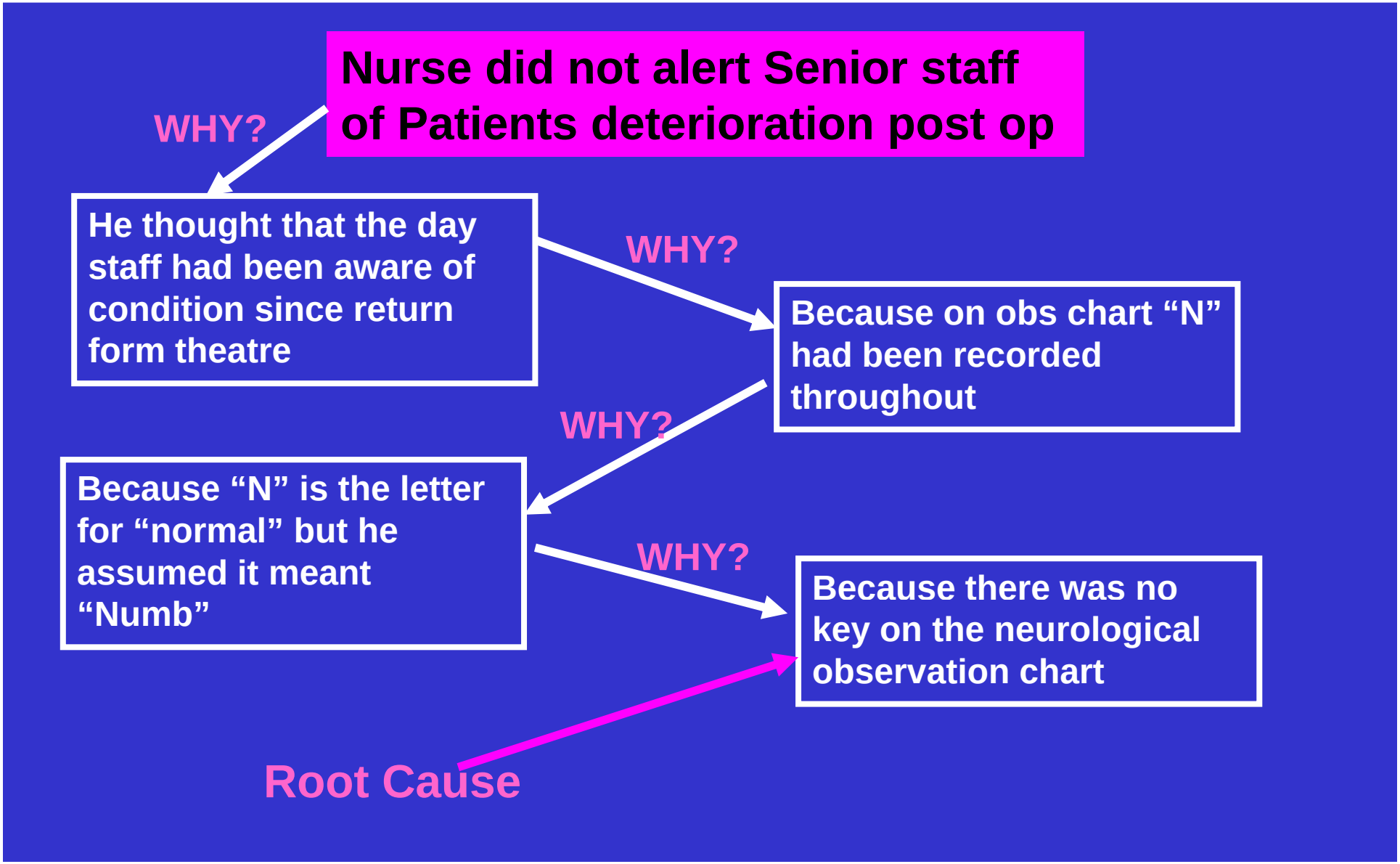

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Run Charts

Purpose

- **To identify trends and patterns in a process, over a specific period of time.**

How to Construct Run Charts

- **Decide what the chart will measure (what data over what period of time.**
- **Draw graph**

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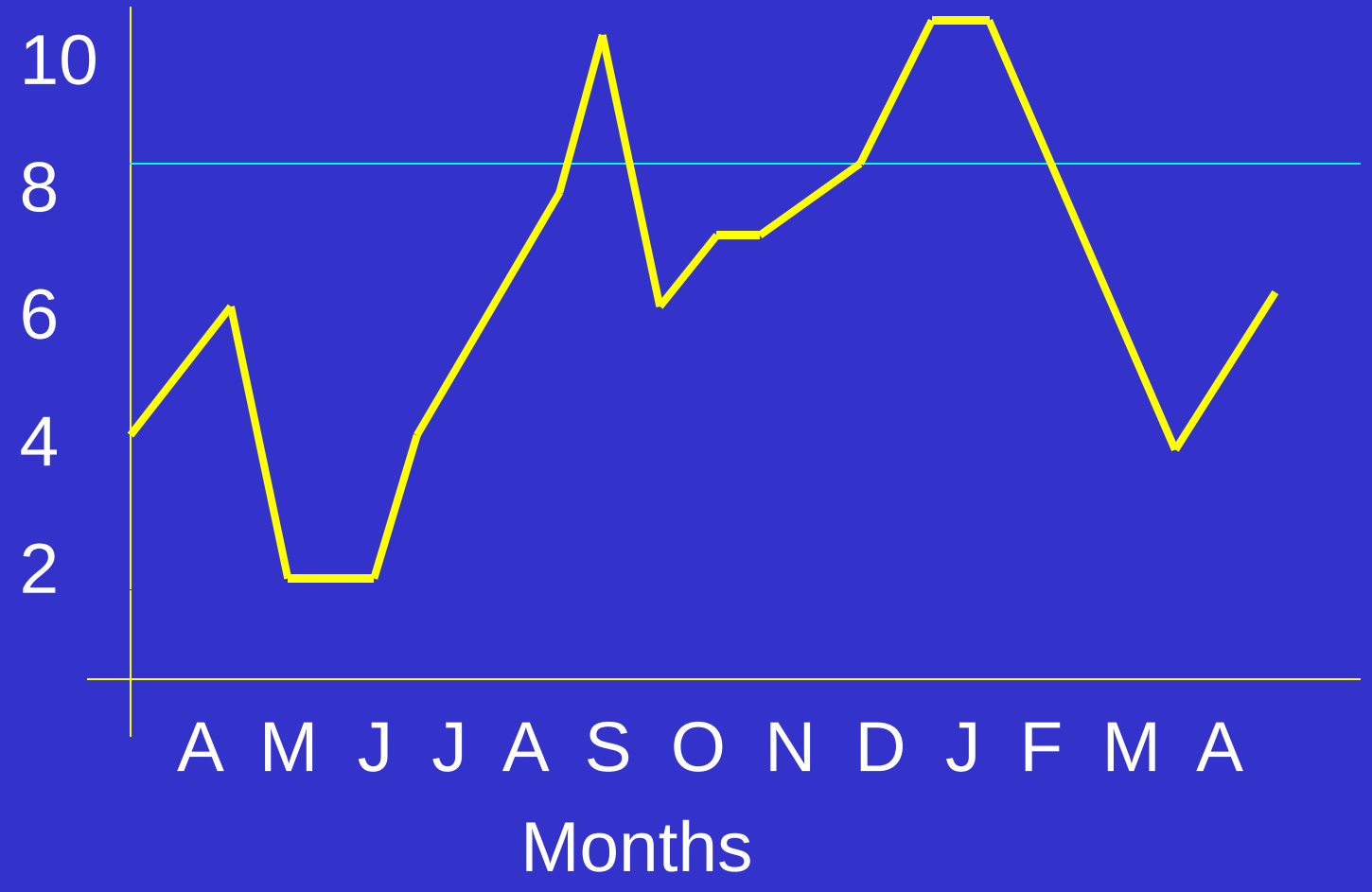
Run Chart Example: Frequency of Violence and Aggression



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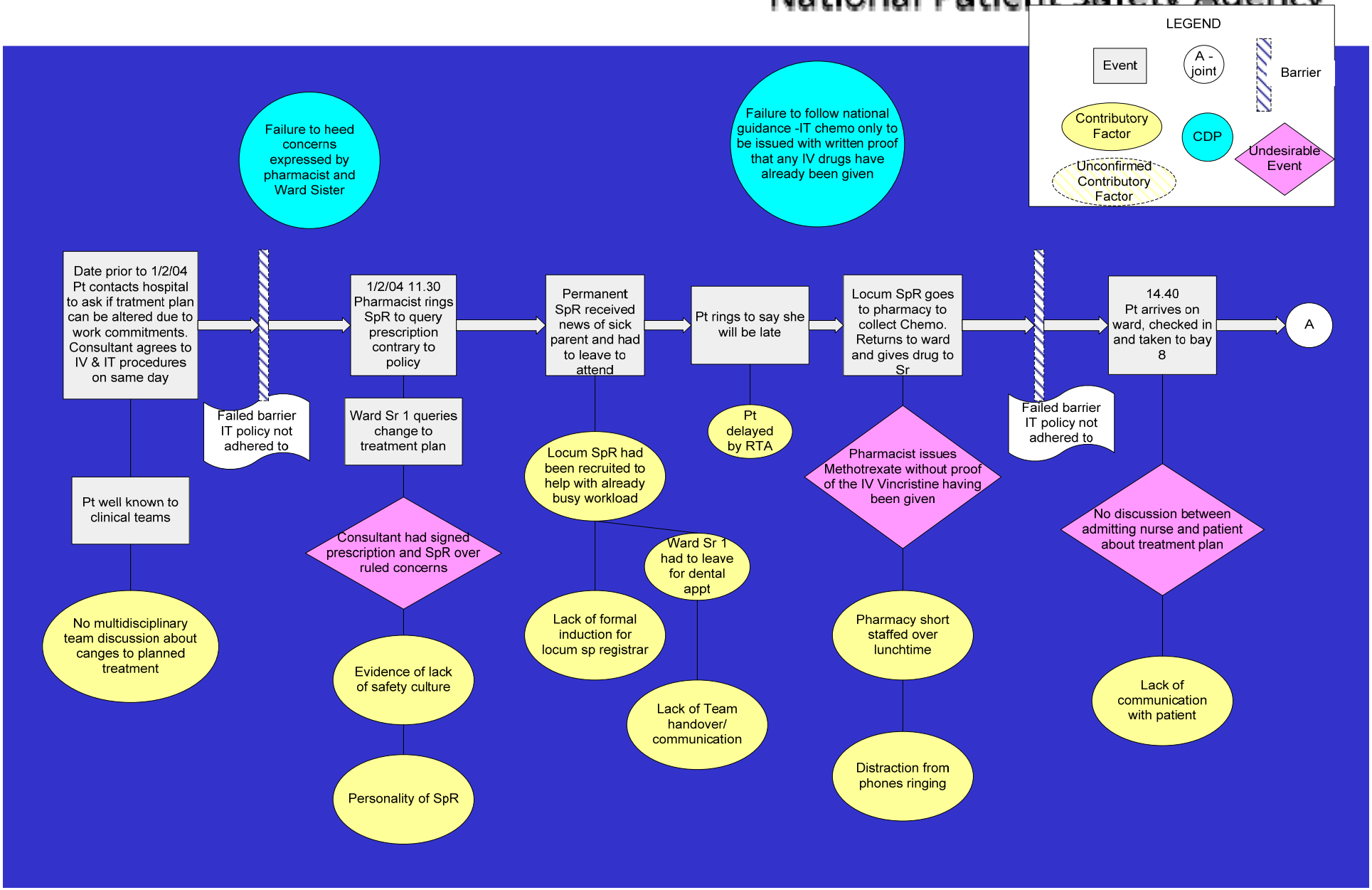

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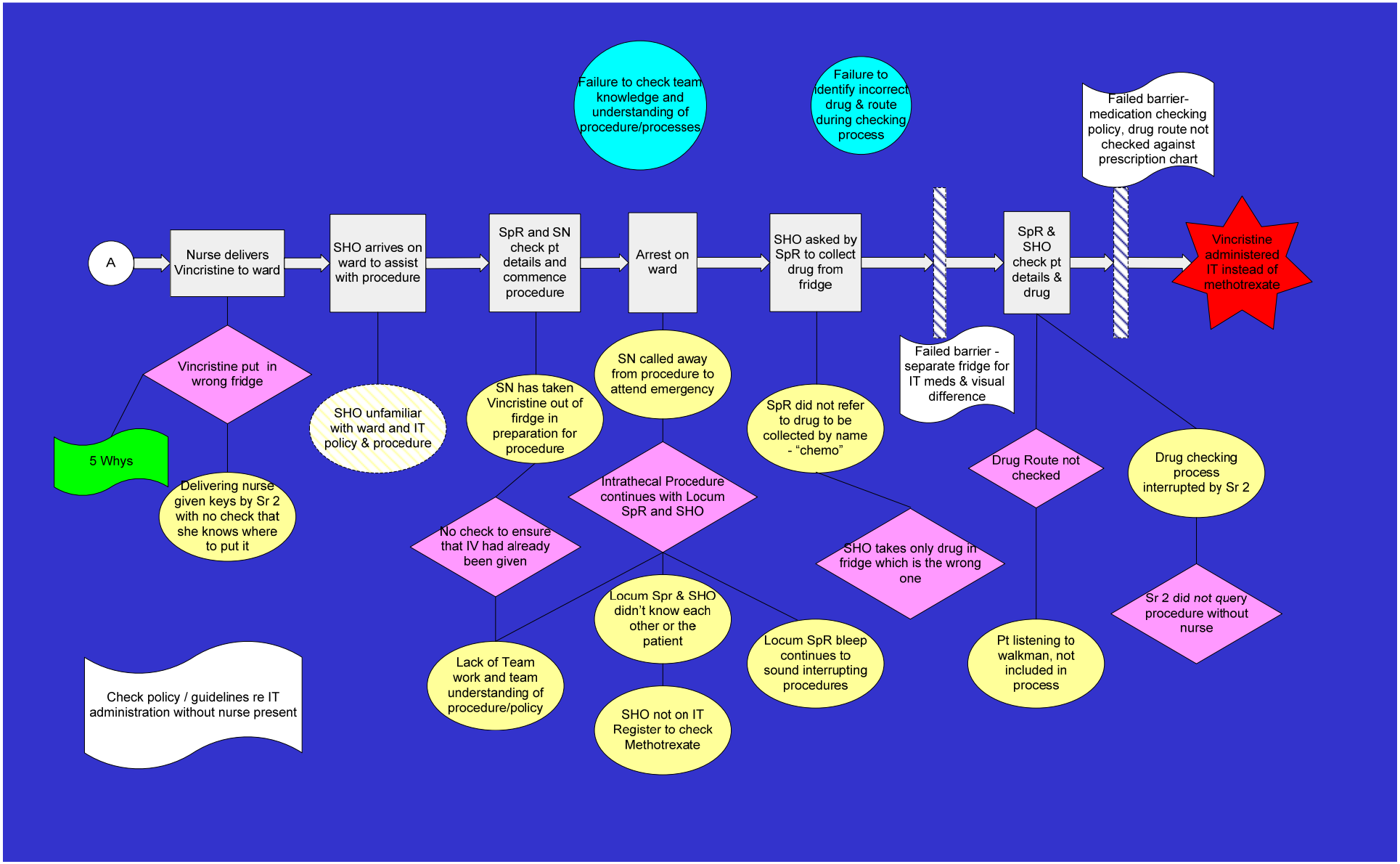

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Identifying the Root Causes

- **Identify the contributory factors having the biggest impact on system failure = ROOT CAUSEs**

- **A Root Cause is a fundamental cause which if resolved will eradicate, or significantly contribute to the resolution, of the identified problem to which it is attached both within the local department and more widely across the organisation**

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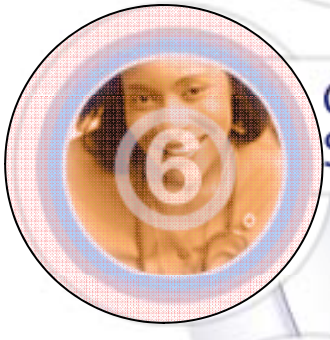
Introduction

Why things go wrong



Generating Solutions

Getting Started

Analysing Information

Gathering and mapping information

Exit

Resources

Help

start

3 Microsoft Powe...

3 Internet Explorer

NPSA Experts RCA...

99%

14:21

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Generating Solutions
The key principles

- Keep it Simple
- List all recommendations for change and prioritise for effective implementation
- Draw up an Action Plan
- Involve Patients and Staff

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Key Principles for Solution Design

- Design tasks and processes to minimise dependency on short-term memory and attention span
- Avoid fatigue: review working hours and workloads
- Retraining is not always the right solution
- Simplify tasks, processes, protocols, equipment
- Standardise processes and equipment
- Use protocols and checklists wisely

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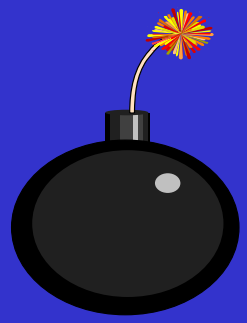
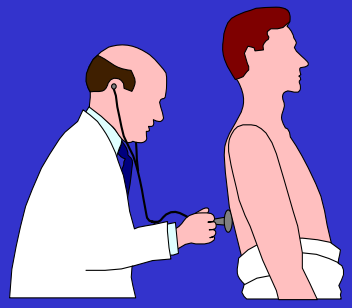
How to Develop Failsafe Solutions

Barrier Analysis



Hazard



Unsuspecting target

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What is a barrier:

A control measure designed to prevent harm to

- **People**
- **Buildings**
- **Organisations**
- **Products**
- **Communities**

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Types of Barrier

Human Action – Checking a drug dose before administering

Administrative - Training, Supervision and Procedures

Physical - Redesign product

Natural - Place, Time or Distance

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When can Barrier Analysis be used?

Prospectively to identify possible 'Hazards' their 'Targets' and potential solutions

Reactively following a patient safety incident to identify the 'Barriers' that should have been in place to have prevented or mitigated against an incident

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Performing a Proactive barrier analysis

- Choose an activity to be analysed (e.g. preparing a patient for theatre, giving blood)
- List, using Brainstorming techniques with relevant experts / others

TARGETS	HAZARDS	BARRIERS
Giving blood to patient	• wrong pt • wrong blood	• checks • protocols

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Barrier Analysis Cont'd

- **Evaluate the list of barriers as strong, average or weak - any barrier involving human action is marked down**
- **Record the findings**
- **Remember barrier analysis can be used proactively or reactively!**

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Performing a Proactive Barrier Analysis

Activity **Target**

Hazard(s)	Barriers in place?	Failsafe ? S/M/W	Improve by?	Additional barriers required?	Cost Implic.?	Responsib. Lead?

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Performing a REACTIVE Barrier Analysis

Event:

Prevention Barriers in Place	Did the Barrier Fail?	Why?	How Barrier affect the outcome of event?

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Action Plan Document

Root Cause	Actions to Address Root Cause	Level of Recommendation (Individual Team, Directorate, Organisation)	By Whom	By When	Resource Required	Evidence of Completion	Sign

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Evidence of change (however small) starts to move the culture from one of fear to one of participation

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NPSA – RCA Tool Kit

http://www.nrls.npsa.nhs.uk/resources/?entryid45=59847