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Human factors and system safety in incident investigation

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Why Human Factors and systems thinking?



Humans involved in event
Humans investigating



Different lenses to look at
same problem

- We are all human
- Humans make errors and systems fail
- You will see what you expect to see
- You will find what you expect to find
- Everything is easy with hindsight

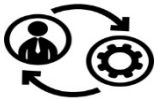
Human factors

Apply theory, principles, data and methods
Understand interactions among humans and system
Design for human well-being and overall system performance



4

Understanding humans as an element of and their interactions within a sociotechnical system



3

Factors affecting human performance
Internal factors (physical and cognitive capabilities and limitations) and external factors (i.e. equipment, procedures)



2

The physical and cognitive capabilities and limitations of the human



1

“the human factor”

What is the health (sociotechnical) system



Health system: onion model

Institutional context factors

Organisational and management factors

Work environmental factors

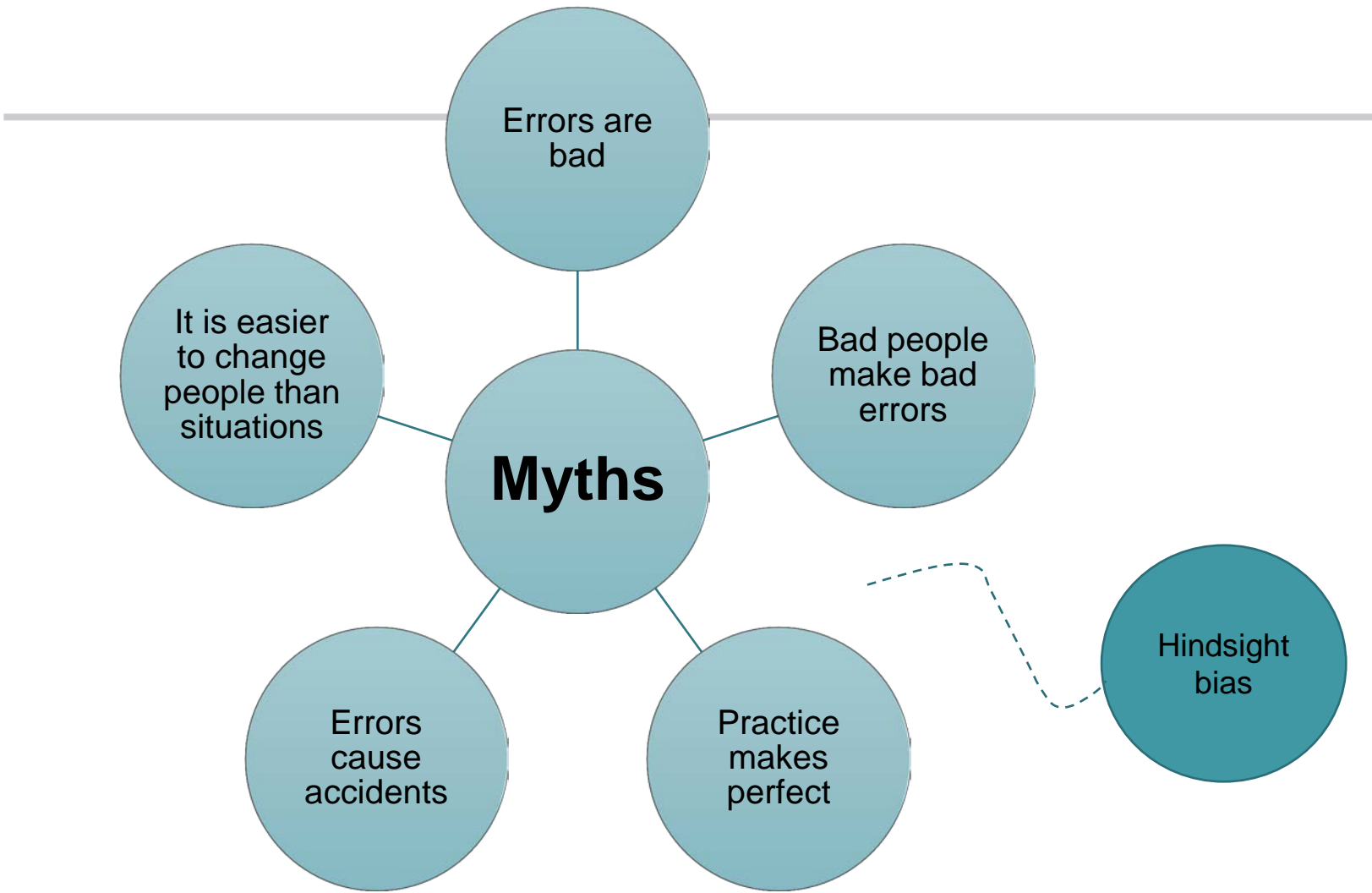
Team factors

Individual staff
factors

Patient factors

Task and technology factors





Just culture

Trust, learning and accountability

People are not punished for actions, omissions or decisions taken by them which are in line with their experience and training,

but gross negligence, wilful violations and destructive acts are not tolerated



Would a similar person in a similar situation with similar experience and training likely have done the same thing?

Was the person set up for success?

i.e. training, selection and experience, resources, supervision, conditions, demands and pressures?

Did they follow procedures?

Were procedures available, workable, intelligible, correct? Perceived benefit to organisation? Previously accepted?

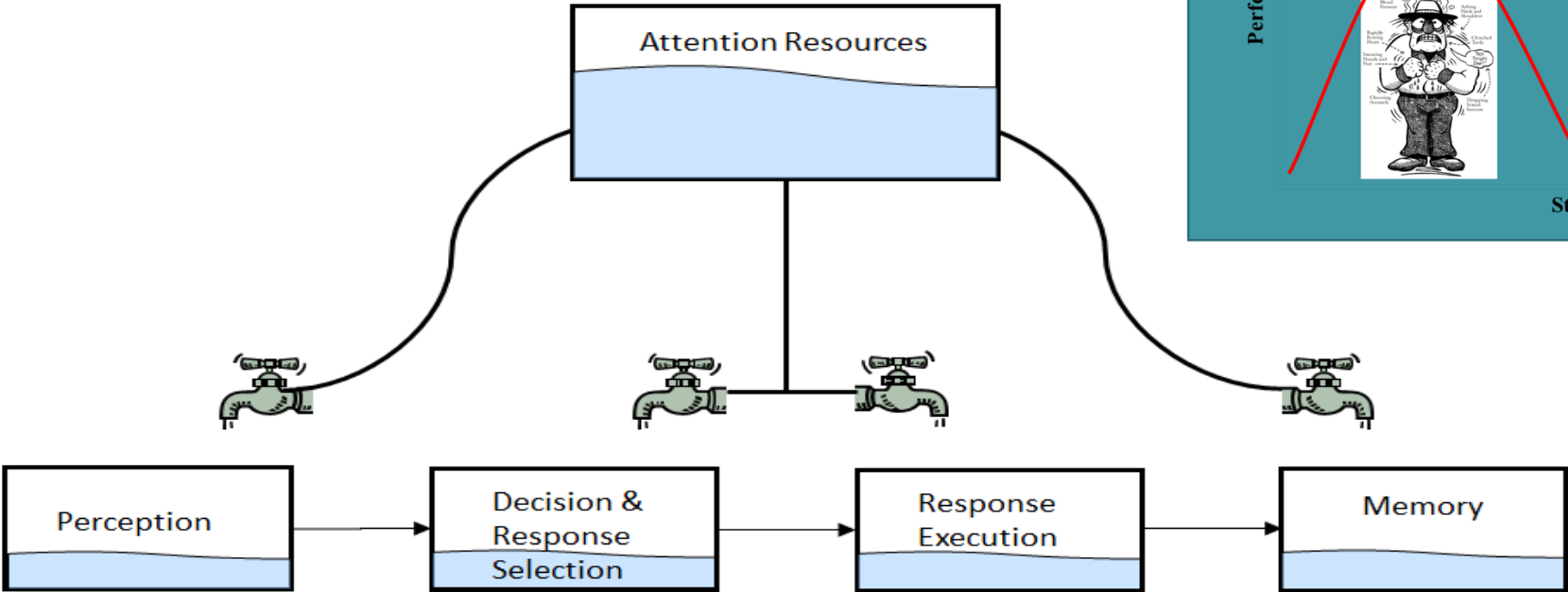
Were actions & consequences intended?

History of unsafe acts? Unauthorised substance? Medical condition?

Being human



Limited attention resources



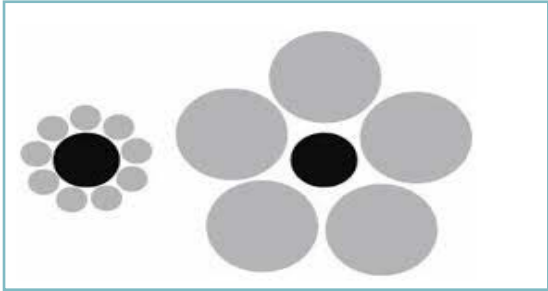
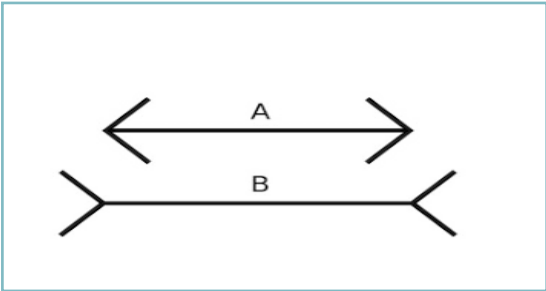
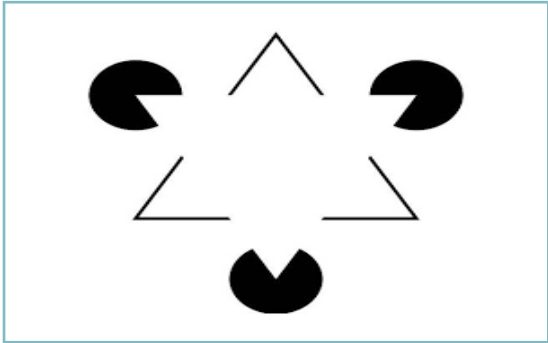
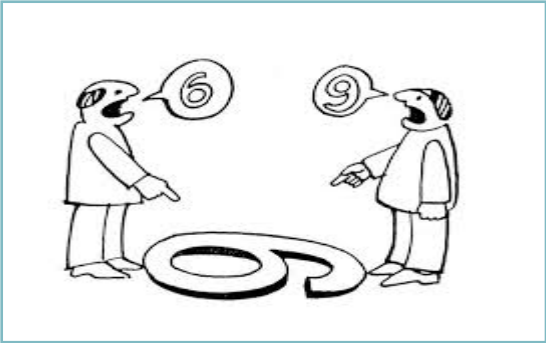
The torch of attention

Performance

Stress

The inset shows a graph with "Performance" on the vertical axis and "Stress" on the horizontal axis. A red inverted U-shaped curve represents the relationship. Below the curve is a cartoon character wearing a hard hat and a vest, surrounded by various stressors like "Traffic", "Noise", "Time pressure", "Lack of information", "Change of direction", "Change of priority", "Change of goal", "Change of environment", "Change of people", "Change of equipment", "Change of materials", "Change of methods", "Change of procedures", "Change of rules", "Change of regulations", "Change of standards", "Change of requirements", "Change of expectations", "Change of demands", "Change of responsibilities", "Change of roles", "Change of tasks", "Change of objectives", "Change of outcomes", "Change of results", "Change of feedback", "Change of evaluation", "Change of assessment", "Change of judgment", "Change of decision", "Change of action", "Change of response", "Change of behavior", "Change of attitude", "Change of mood", "Change of emotion", "Change of feeling", "Change of thought", "Change of cognition", "Change of perception", "Change of knowledge", "Change of skill", "Change of ability", "Change of competence", "Change of expertise", "Change of experience", "Change of wisdom", "Change of insight", "Change of understanding", "Change of awareness", "Change of consciousness", "Change of awareness", "Change of consciousness", "Change of awareness", "Change of consciousness".

Perception: active processing



Situation awareness

1

Timely and accurate perception of elements



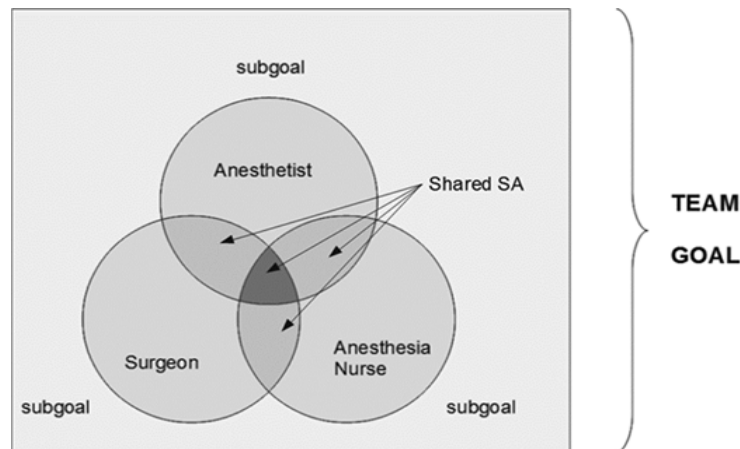
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Integration of this information into existing mental model

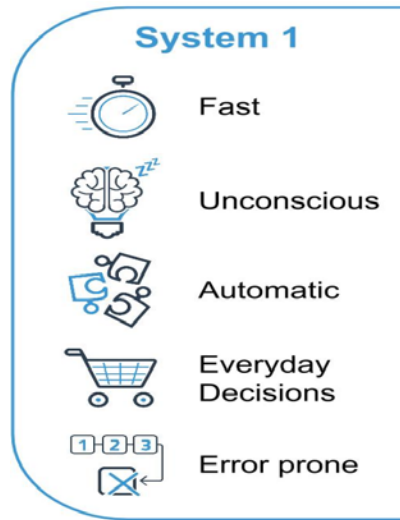


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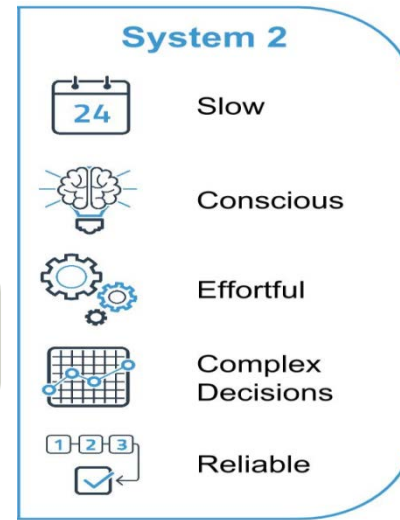
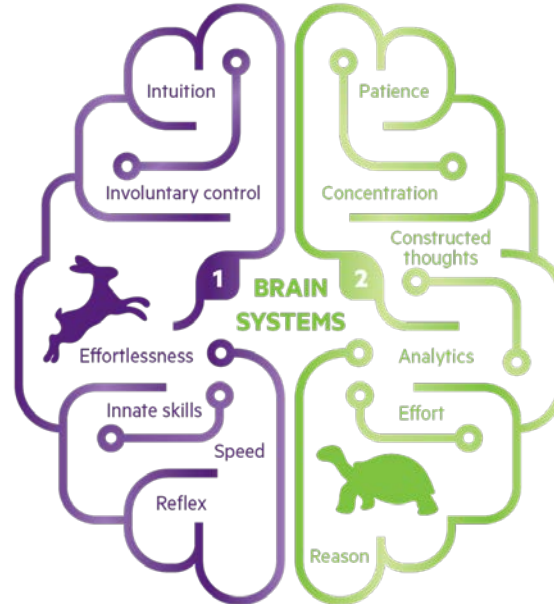
Projection of the information to determine future status



Decision making



- Know what to look for
- Accuracy mental model

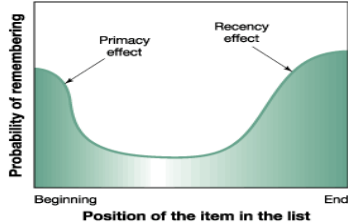


- Time to respond
- Cognitive demands



Cognitive biases

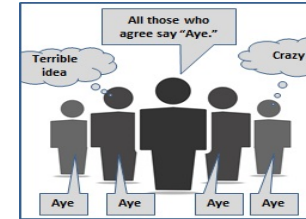
Primacy and recency effect



Confirmation bias



Groupthink



Technology

Landing gear



Flaps



Sound familiar?

Same buttons

Same alarm sounds

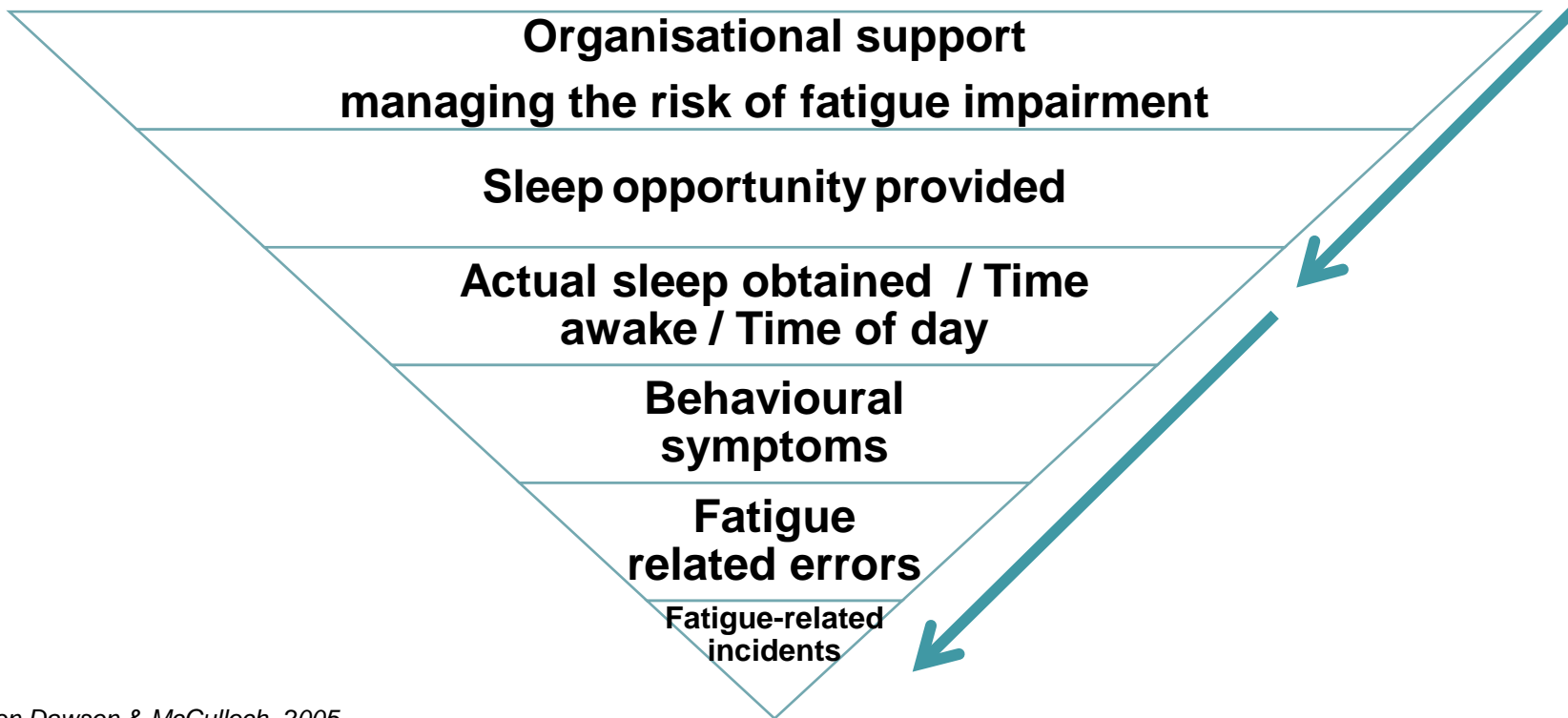
Fatigue

Impact on performance:

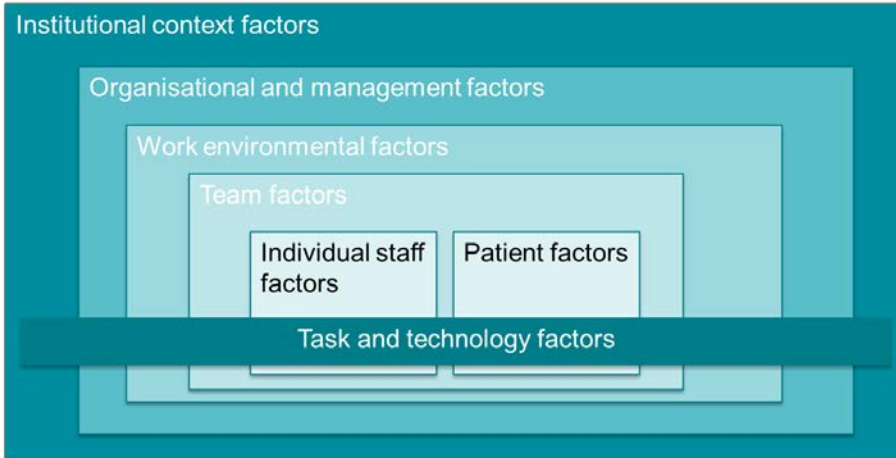
- Judgement
- Concentration
- Memory
- Vigilance
- Reaction time and/or physical coordination
- Work efficiency

We are bad in recognising that we are fatigued

Fatigue is everyone's responsibility



Working in a system



FACTOR TYPES	CONTRIBUTORY INFLUENCING FACTOR
Patient Factors	Condition (complexity & seriousness) Language and communication Personality and social factors
Task and Technology Factors	Task design and clarity of structure Availability and use of protocols Availability and accuracy of test results Decision-making aids
Individual (staff) Factors	Knowledge and skills Competence Physical and mental health
Team Factors	Verbal communication Written communication Supervision and seeking help Team structure (congruence, consistency, leadership, etc)
Work Environmental Factors	Staffing levels and skills mix Workload and shift patterns Design, availability and maintenance of equipment Administrative and managerial support Environment Physical
Organisational & Management Factors	Financial resources & constraints Organisational structure Policy, standards and goals Safety culture and priorities
Institutional Context Factors	Economic and regulatory context National health service executive Links with external organisations

Humans make errors and systems fail

To err is human

To cover up is unforgivable

To fail to learn is inexcusable

(Sir Liam Donaldson)

Hope is not a strategy