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Development of a human factors classification framework for patient safety

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Background

- Estimated 16.6% of admissions associated with an adverse medical event in Australia (Wilson et al 1995)
- In 2004, NSW Patient Safety & Clinical Quality Program launched
- Electronic Incident Information Management System (IIMS) implemented – for both clinical and corporate incidents
- Severity Assessment Code (SAC) assigned

Background

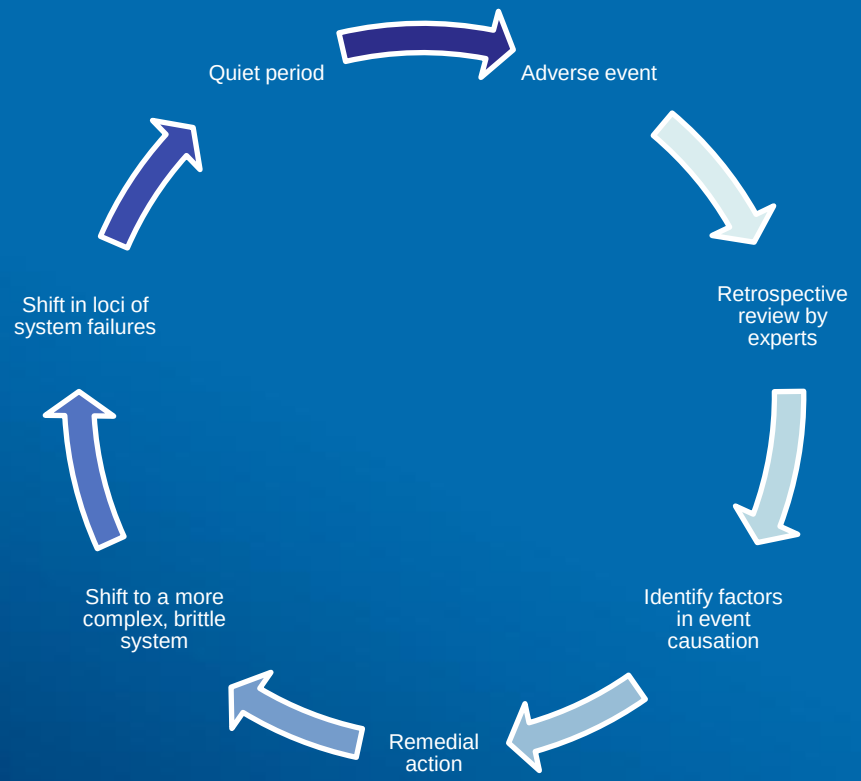
- SAC 1 (Clinical) serious clinical consequences:
  - Death unrelated to natural course of illness; suicide; homicide; wrong patient; wrong body part; retained instruments or material; medication error; intravascular gas embolism; haemolytic blood transfusion; maternal death; infant discharge to wrong family; + patient fall in hospital
- Must be reported to Health Dept. within 24 hours
- RCA conducted and final report within 70 days

Background

- Root Cause Analysis investigation
  - RCA teams – fundamental knowledge about care processes in area where event occurred
  - Statutory privileged investigation
  - Generally 3 meetings – flow chart; cause & effect; causation statements; recommendations
  - Feedback to staff
- Approx 500 RCAs conducted each year in NSW for SAC 1 events

Background

- RCA report & recommendations
  - Often more policies, procedures
- Need additional information on events
- Approached UNSW



Modified from ‘Cycle of Error’; Cook, 1993

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Aims

- Develop a framework for human factors analysis of adverse medical events
- Assess framework reliability in identifying the contribution of human factors and error to these events

Method

- Multi-staged process:
  - Systematic review of frameworks used to classify the human factors contribution to adverse medical events
- Numerous taxonomies developed eg.
  - Purpose-specific (e.g. medication errors)
  - Setting-specific (e.g. GP; ED)
  - WHO International Classification for Patient Safety (2009)
- Existing taxonomies
  - Do not consider temporal sequence of events
  - Often categories are not mutually exclusive
  - Often do not assess reliability

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Human Factors framework

- Records information in 6 content areas
- up to 3-level hierarchical structure for incident precursors and contributing factors

Summary text description	Incident details	Patient characteristics
Sequence of precursor events	Contributing factors	Event detection

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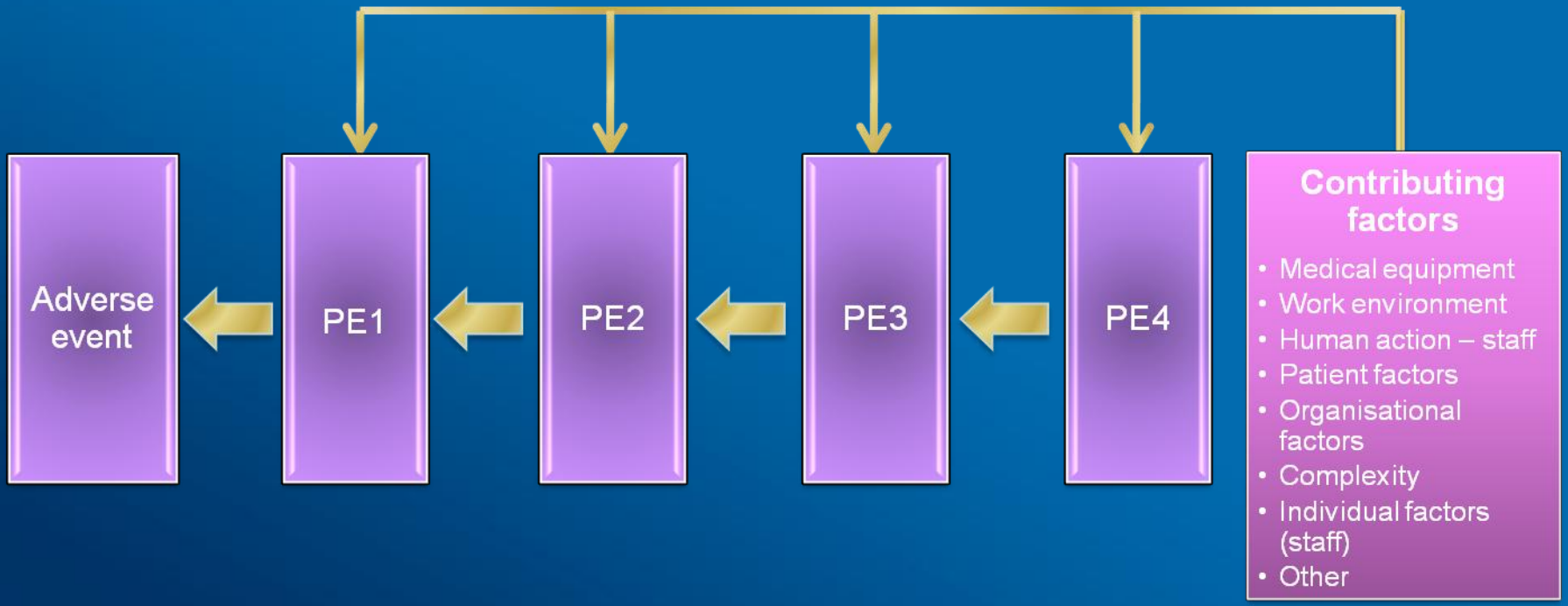
Example of sub-categories of precursors

Level 1	Level 2	Level 3
3. Human action – staff		
	3.2. Medical task failure	
		3.2.1. Skill-based
		3.2.2. Rule-based
		3.2.3. Knowledge-based
		3.2.4. Violation

Precursors and contributing factors



Precursors (PE)

- 1. Medical equipment eg. 1.1 lack of equipment; 1.2 equipment failure
- 2. Work environment eg. 2.1 light; 2.2 temperature; 2.3 noise
- 3. Human action – staff eg. 3.1 communication/teamwork; 3.2 medical task failure; 3.3 monitoring - inadequate; 3.4 delay; 3.5 misdiagnosis
- 4. Human action – patient

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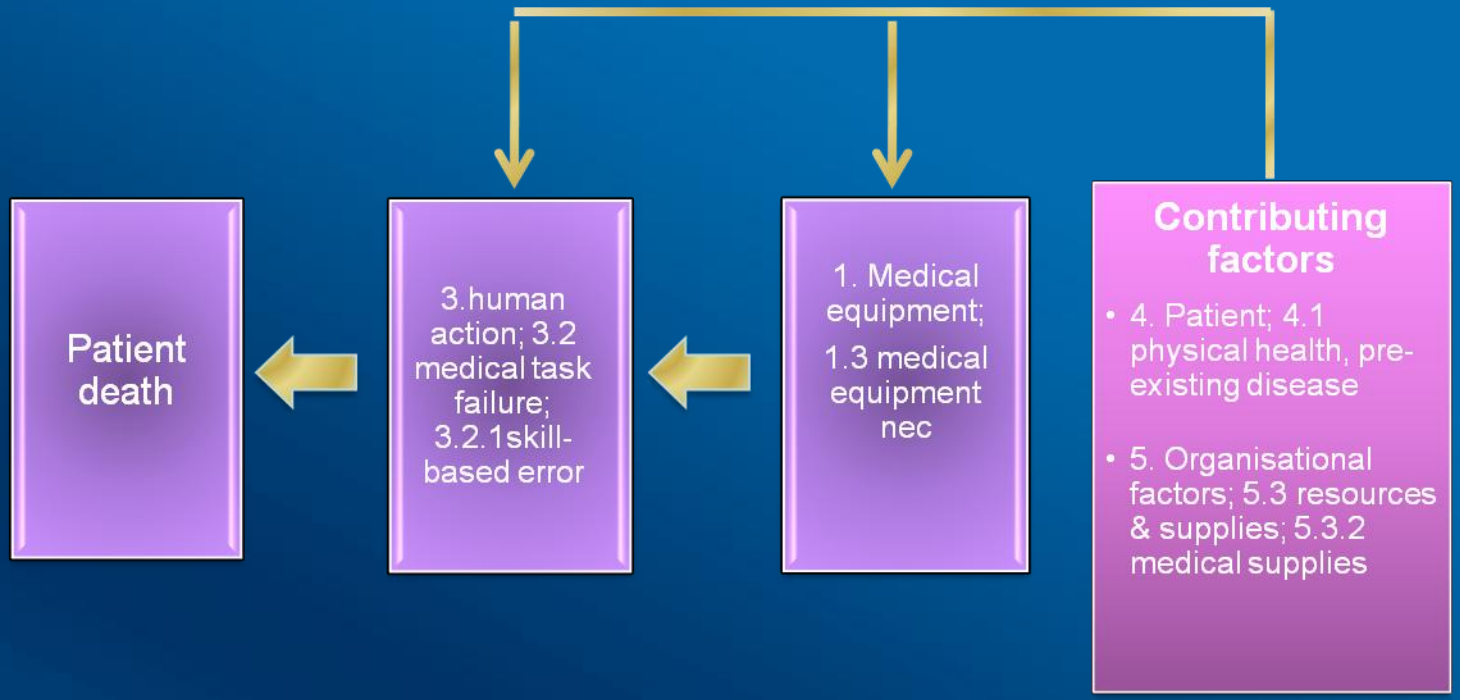
Precursors and contributing factors

A cardiothoracic surgeon performed mitral valve repair on a patient with congestive heart failure and arterial fibrillation. To test the competency of the repaired mitral value, the bevelled end of a soft rubber tubing was inserted into the left ventricle.

The tubing was inserted too far and caused a perforation in the ventricle and the patient died as a result of haemorrhage.



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In progress – inter-rater reliability

- Publically available coronial findings
  - Trialing and modifying classification system
- Random sample of 20 RCA reports (n=4 coders)
- Precursor sub-categories:
  - Level 1: range 55% to 85% agreement
  - Level 2: range 25% to 70% agreement
  - Level 3: range 20% to 55% agreement
- Disagreements between coders:
  - Temporal sequence of precursors
  - Rule or knowledge-based error

Issues and limitations

- RCA reports – pre-processed information
- Same coding; different meaning
- Different coding; same meaning
- To enhance inter-rater reliability:
  - More refinement of precursor and contributing factor classification options
  - Tightening of precursor and contributing factor classification definitions

Conclusion and next steps

- Is a reliable temporal sequence possible?
- Further refinement should improve reliability
- Involvement of clinical expert working group
- Examination of inter-rater reliability:
  - 100 RCA reports
  - Comparison with other human factors classification systems

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