Anaesthetists’ Non-Technical Skills and Patient Safety

Professor Rhona Flin
Industrial Psychology Research Centre

CAS, Halifax, 14 June 2008
Welcome to the Industrial Psychology Research Centre. The centre specialises in the application of psychology to high reliability workplaces.

The group has worked with the oil industry since 1986, and regularly engage in consultancy projects. We are currently working with the offshore oil industry, civil aviation, nuclear power generation, surgery, emergency services, conventional power generation and transportation.

Interests of the centre include:

• Accident analysis
• Incident command
• Occupational stress
• Emergency decision making
• Crew Resource Management
• Measuring and managing safety culture/climate
• Human factors aspects of safety management and emergency response

Anaesthetists’ Non-Technical Skills

Non-technical skills are the cognitive and social skills that complement technical skills to achieve safe and efficient performance.

Generic Non-Technical Skills

- Leadership
- Team Work / workload management
- Communication
- Situation Awareness
- Decision Making
- Personal Limitations – managing stress and fatigue
Safe and Efficient Performance

Organisational /Professional Culture

Professional Behaviour
Technical & Non-Tech. Skills

✓ Individual actions

Job Performance

Latent Conditions
Good doctors, safer patients (UK, 2006)

Safe in Their Hands?
Licensing and Competence Assurance for Safety-Critical Roles in High Risk Industries

Report for the
Department of Health

Rhona Flin
October 2005
**Human Performance Limitations Training**

- Understanding of physiological and psychological factors influencing task performance
  - e.g. stress, fatigue, work conditions
- Pilots trained at ab-initio stage
- Pilots have to pass an exam in this

- No evidence of this type of training in UK Medical Schools
**Tenerife (1977)**

Two Boeing 747s crashed into each other on the runway. 583 people killed.

Causes: conflict resolution, assertiveness, communication, situation awareness, stress – **non-technical skills**
Non-Technical skills, error and adverse events

- **Identify Non-Technical Skills**
  - **Poor Non-Technical Skills** → **Error Unsafe behaviours** (Increased chance)
  - **Good Non-Technical Skills** → **Safer behaviours Avoid/Capture Error** (Decreased chance)

- **Train and assess using ANTS/NOTSS etc**
  - Observation, rating and feedback using behavioural rating system

- **Adverse event**
Pilots’ Non-Technical Skills

- Term non-technical skills first used in European civil aviation.

- ‘Cognitive and social skills of flight crew members in the cockpit, not directly related to aircraft control, system management, and standard operating procedures’.

- NOTECHS – is a taxonomy and behaviour rating system for pilots’ non-technical skills developed in Europe

Non-technical skills in industry
(Crew Resource Management (CRM) skills)

- Identify skill set
- Train skills (in theatre or simulator)
- Assess skills (in theatre or simulator)
Crew Resource Management

To address these identified weaknesses in individual and crew performance - new training called CRM devised.

“using all the available resources- information, equipment and people- to achieve safe and efficient flight operations.”
Lauber, 1977

CRM training provides a set of countermeasures against human error; it is based on the premise that human error is ubiquitous and inevitable.

Helmreich 1996
Primary goals of CRM

- Mitigate consequences of error
- Trap error
- Avoid error

(adapted from Helmreich & Schaefer, 1996)
Crew Resource Management

• Based and updated on human factors research identifying behaviours critical for safe performance
• 2-3 days basic training (inc. videos, role-plays, etc.)
• Annual recurrent training
• Practised with feedback in simulator (LOFT)
• Mandated by UK CAA (1993).
• Non-technical skills assessment for pilots now mandated by CAA (2004)
NOTECHS

non-technical skills for European pilots
Why focus on non-technical skills in OR?

- Good non-technical skills can lead to positive outcomes for the team and patient
  - Edmondson (2003) – *effective leadership*
  - Carthey et al (2003) – *behaviours in cardiac surgery*
  - Moorthy et al (2005) – *team skills in operating theatre simulator*

- Adverse events in surgery are primarily caused by failures in perception, judgement, communication and teamwork
  - de Leval et al (2000) – *cardiac switch operations*
  - Way et al (2003) – *bile duct injuries*
  - Gawande et al (2003; 2004) – *insurance claims in the US*
  - Christian et al (2006) – *observations in the operating theatre*
Why are NTS so important in anaesthesia?

- Critical incident studies show around 80% of reported incidents involve human factors causes
  - the most common errors occurring include breathing circuit disconnection, syringe swaps, and leaving the vaporiser off unintentionally (Cooper et al, 1984, *Anaesthesiology* 60)
  - the associated factors in these incidents are largely non-technical, examples include non-vigilance or inattention, failures to check, haste, distraction, lack of sleep or fatigue, and poor communication (Chopra et al, 1992, *BJA* 68)
- Observations of team interactions show non-technical problems
  - limited pre-operation briefings and de-briefings, failures to establish leadership and to monitor team activities, and situation awareness limited to what could be observed over the barrier suggesting inadequate communication (Helmreich & Schaefer, ‘94)
  - fixation errors occurring from people moving too fast or too slow and non-verbal communication and term co-ordination strategies breaking down due to task complexity (Mackenzie & Xiao variously ‘96, ‘97, ‘98)
Patient Safety in Anaesthesia

Adverse Event

(30-20\%)

Technical Factors

(70-80\%)

Human Factors

Hospital + Professional Culture

(+/− 70\%?)

Behaviour of Anaesthetist, Surgeon et al

(+/− 30\%?)
Non-technical skills are the ‘behavioural’ aspects of performance necessary to underpin good anaesthetic practice
- not technical expertise e.g. knowledge of drugs or equipment
- They can be developed through training
- They have not previously been explicitly addressed in medical education but this is changing

To be effective, non-technical skills training requires to be properly supported and evaluated
- Need to know what the skills are
- Need to be able to assess the skills reliably and transparently
Anaesthetists’ Non-Technical Skills

ANTS

- Task Management
  - Planning & preparing
  - Prioritising
  - Providing & maintaining standards
  - Identifying & utilising resources

- Team Working

- Situation Awareness

- Decision Making

Category

Element

Behaviour

Checks equipment, prepares drugs for the case
## Anaesthetists’ Non-Technical Skills (ANTS)
*Flin, Fletcher, Glavin, Maran & Patey (2004)*

<table>
<thead>
<tr>
<th>Categories</th>
<th>Elements</th>
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</thead>
</table>
| **Situation Awareness** | Gathering information  
                          Understanding information  
                          Projecting and anticipating future state |
| **Decision Making**   | Considering options  
                          Selecting and communicating option  
                          Implementing and reviewing decisions |
| **Team Working**      | Coordinating activities with team  
                          Exchanging information  
                          Using authority and assertiveness  
                          Assessing capabilities  
                          Supporting others |
| **Task Management**   | Planning and preparing  
                          Prioritising  
                          Providing and maintaining standards  
                          Identifying and utilising resources |
# Rating Scale

<table>
<thead>
<tr>
<th>Rating Label</th>
<th>Description</th>
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<tbody>
<tr>
<td>4 – Good</td>
<td>Performance was of a consistently high standard, enhancing patient safety; it could be used as a positive example for others</td>
</tr>
<tr>
<td>3 – Acceptable</td>
<td>Performance was of a satisfactory standard but could be improved</td>
</tr>
<tr>
<td>2 – Marginal</td>
<td>Performance indicated cause for concern, considerable improvement is needed</td>
</tr>
<tr>
<td>1 – Poor</td>
<td>Performance endangered or potentially endangered patient safety, serious remediation is required</td>
</tr>
<tr>
<td><em>Not observed</em></td>
<td>Skill could not be observed in this scenario</td>
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- Video ‘Just a Routine Operation’
- Elaine Bromiley case
Elaine Bromiley Case (ANTS)

- Situation awareness
  - Gathering info, comprehension, anticipation
  - Fixation error
- Decision Making
  - Identifying options, balancing risks, re-evaluating
- Team work
  - Shared SA, coordination, assertiveness
- Leadership/Task Management
  - Maintaining standards
  - Prioritising
Welcome to the website of the Clinical Human Factors Group (CHFG)

"Human factors are all the things that make us different from logical, completely predictable machines. How we think and relate to other people, equipment and our environment. It is about how we perform in our roles and how we can optimise that performance to improve safety and efficiency. In simple terms it's the things that affect our personal performance."

The CHFG formed in 2007 when a group of experts, clinicians and enthusiasts brought their talents together for the sake of patient safety. It was recognised that although all firmly place an understanding of human factors at the heart of improving patient safety, it is an area that the vast majority of healthcare professionals, policy makers, managers and politicians are unaware of.

Find out more about the background to the organisation >>

The CHFG is an independent body, set up as a non-profit making organisation. It has close links with many UK based healthcare bodies but sets its own agenda based on impartial, expert opinion. The members of the Standing Group are made up of specialists from both within and also outside the clinical professions who provide a diverse knowledge of human factors. Their
NOTSS: A non-technical skills taxonomy for surgeons

Project steering group
Rhona Flin & Steven Yule School of Psychology, University of Aberdeen
Simon Paterson-Brown & Nikki Maran Royal Infirmary, Edinburgh
David Rowley Ninewells Hospital, Dundee

Project sponsors:
Royal College of Surgeons of Edinburgh (RCSEd)
NHS Education for Scotland (NES)
Non-technical skills for theatre nurses (under development)
Applying Non-Technical Skills in Anaesthesia?

- Training the NTS skill set (Medical school? Postgraduates?)
- In theatre or in a simulator?
- Feedback post case/list for trainees
- Formal assessment (trainees, qualified or both)
- Incident analysis

- Human Factors/ NTS knowledge of trainers/ raters?
- Debriefing skills of senior staff?
r.flin@abdn.ac.uk

- www.abdn.ac.uk/iprc
- www.abdn.ac.uk/iprc/ants
- www.abdn.ac.uk/iprc/notss

project papers and reports

- Scottish Patient Safety Research Network
  - www.spsrn.ac.uk