Human Factors and their application in the critical care setting

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Objectives

1. Briefly describe the definition for and key principles of the study of Human Factors
2. Discuss ‘human fallibility’
3. Discuss situational awareness and decision-making in relation to Human Factors
4. Consider these concepts in the context of critical care
Human + Male = Definitely Fallible!
“Grounded in safety science and bringing together such diverse subjects as engineering, biomechanics, industrial design, psychology and statistics, the notion of human factors addresses the complexity of human engagement with the environment and seeks to analyse the interactions which structure behaviour in the workplace.”

(Fawcett & Rhynas, 2014, p.1238)
Human Fallibility

- Health care is increasingly complex
- Fallibility makes healthcare professionals (as humans) prone to error
“Human factors science tells us that the inherent limitations of human memory, effects of stress and fatigue, the risks associated with distractions and interruptions, and limited ability to multitask ensure that even skilled, experienced providers will make mistakes.”

(Leonard, Graham & Bonacum, 2004, p.i86)
Issue impacting on ‘human fallibility’

- Clinical leadership
- Communication
- Fatigue
- Information processing
- Lack of effective training
- Memory lapses
- Poor attention
- Poorly designed equipment
- Retribution for ‘speaking out’
- Role uncertainty and ambiguity
- Situational awareness
- Stress or distress
- The ever increasing complexity of health care and health care environments
- The quality of clinical decision-making
- Teamwork

(Fawcett & Rhynas, 2014)
Workgroup/Team

TEAM PROCESSES AND DYNAMICS
Collaborative working

▪ Healthcare is rarely delivered in isolation, especially in acute/critical care settings

▪ Often in healthcare the team will be made up of members from different professional groups and experience

▪ Teams are often fluid and not fixed

▪ Real or perceived status can impact on behaviours, such as willingness to speak up or challenge another team member when they are making an error (White, Lowes & Hormis, 2015; WHO, 2009)
1. Role definition

If roles within a group are not clearly defined, this can potentially create problems where no-one is leader or several people believe themselves to be the leader (WHO, 2009).

2. Communication

Differences in how doctors and nurses are (generally) taught to communicate (Leonard, Graham and Bonacum, 2004)
‘Human factors affect the quality of cardiopulmonary resuscitation in simulated cardiac arrests.’

- Switzerland
- 16 teams – witnessed VF cardiac arrest
- “Almost two thirds of teams composed of health-care professionals currently working in intensive care failed to treat a witnessed cardiac arrest according to established guidelines. Failure was associated with absence of leadership behaviour and the absence of explicit task distribution among team members.” (p.55)

- Failure to translate theoretical knowledge into effective team activity appears to be a major problem
Andersen et al. (2010)

‘Identifying non-technical skills and barriers for improvement of teamwork in cardiac arrest teams’

- Denmark

- Semi-structured interviews with eleven Advanced Life Support instructors (nine doctors; two nurses)

- ALS training should include
  1. Team leader experience
  2. Structured communication
  3. Maintenance of standards and guidelines
     “Nurses have difficulties in respecting the decisions of younger physicians.” (p.700)
  4. Avoidance of task overload
  5. Mutual performance monitoring
‘Understanding how human factors can cause errors in the operating theatre’

- UK; Discussion paper

  “The study of human and team error in the operating theatre is slowly gathering momentum as we acquire further evidence that many patient iatrogenic injuries and adverse events have human fallibility at their root,” (p.82).

  “It is estimated that around 65–80% of all errors can be attributed to a breakdown in an area of teamwork or specifically ‘non-technical skills,’” (p.84),
The Individual
We cope quite well with complexity…

- Health care workers are good at compensating for some of the complex and unclear design of some aspects of the workplace
  - Equipment
  - Physical layout
But can our brains deceive us?
FINISHED FILES ARE THE RESULT OF YEARS OF SCIENTIFIC STUDY COMBINED WITH THE EXPERIENCE OF YEARS.
Reality can be so complex that equally valid observations from differing perspectives can appear to be contradictory.
FINISHED FILES ARE THE RESULT OF YEARS OF SCIENTIFIC STUDY COMBINED WITH THE EXPERIENCE OF YEARS.

Source:
Aocdcrnig to rscheearch at an Elingsh uinervtisy, it deosn't mtaer in waht oredr the ltteers in a wrod are, olny taht the frist and Isat ltteres are at the rght pcleas. The rset can be a toatl mses and you can sitll raed it wouthit a porbelm. Tihs is bcuseae we do not raed ervey lteter by ilstef, but the wrod as a wlohe.

Say the colour of the word not the word. Why is it hard?
The fact that we can misinterpret situations despite the best of intentions is one of the main reasons that our decisions and actions can be flawed and that we sometimes make ‘silly’ mistakes.

Activity

Think about any ‘silly’ mistakes you have made recently when you were not at work. Why do you think the ‘silly’ mistakes happened.
Selective attention
Situation Awareness

“Situation awareness (SA) is essentially what psychologists call perception or attention. In essence, SA involves continuously monitoring what is happening in the task environment in order to understand what is going on and what might happen in the next minutes or hours...Driving a car is a good example of a task that requires a high level of situation awareness...It is also a precursor for decision-making in dynamic settings when a specific assessment of the current situation is made in order to judge whether there is a need to take action.”

(WHO, 2009, p.29-30)
• Situational Awareness can be affected by fatigue, stress and interruptions
Three levels

1. **What is going on?**
   Perception – noticing critical cues in the environment such as a patient’s vital signs, symptoms, monitor alarms.

2. **So what?**
   Comprehension – what do the cues mean in relation to this patient? How does this new information combine with what is already known?

3. **Now what?**
   Projection or anticipation – what is likely to happen in the next few minutes? What action needs to be taken to prevent or modify this?

   Projection skills are crucial in promoting proactive rather than reactive responses to expected and unexpected events.

   (Endsley, 1995 IN WHO, 2009; Flin, O’Connor & Crichton, 2008)
Simplified model of decision-making

1. Assess the situation - What is the problem?

2. Make a decision - What shall I do?
   i. Intuitive (Recognition-primed)
      Remembering the responses to previous situations of the same type
   ii. Rule-based
      Procedures and rules are applied
   iii. Analytical (Choice through comparison of options)
      Various courses of action are identified and compared to find the one that best fits the situation
   iv. Creative
      A new course of action has to be devised

(Flin, O’Connor & Crichton, 2008; WHO, 2009)
Some questions to consider

1. How often do you have to take risks or shortcuts to get a job done?
2. Have you ever had to work with incomplete information or make assumptions?
3. Have you been given equipment that does not work well but you still have to use it? Who can you tell?
4. Have you ever been put under pressure to use equipment or undertake tasks that you are not comfortable with?

(Norris, Currie & Lecko, 2012)
And finally…

Just a routine operation
Your thoughts and comments

- Loss of situational awareness
- Perception and cognition
- Teamwork
- Culture
  - Authority gradients
- Confirmation bias: Where the observed actions of another, often more senior colleague, are subconsciously accepted, even though there is evidence that they are mistaken.

(Carthey & Clarke, 2009; White, Lowes & Hormis, 2015)
Thank you for listening. Whose got the first question?


