Human Factors Training in the National Health Service: A Scoping Study

For NHS Institute for Innovation and Improvement

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This report was commissioned by the Safer Care team at the NHS Institute for Innovation and Improvement.

The study was undertaken by Human Factors Engineering Ltd. and the report prepared in conjunction with members of the Safer Care team.

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Dr Ken Catchpole
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Mr Hugh Rogers

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A copy of the full report can be found and downloaded at www.institute.nhs.uk/humanfactors
ACRONYM LIST

ALS            Acute Life Support
CRM            Crew Resource Management
CSRU           Clinical Safety Research Unit at Imperial College, University of London
DH             Department of Health
DVD            Digital Versatile Disk
FMEA           Failure Modes Effects Analysis
HEART          Human Error Assessment and Reduction Technique
HEL            Human Engineering Limited
HF             Human Factors
LIPS           Leading Improvement in Patient Safety (a training programme)
NICE           National Institute for Clinical Excellence
NHS            National Health Service
NHS Institute  NHS Institute for Innovation and Improvement
NPSA           National Patient Safety Agency
QHFT           Queen’s Hospital NHS Foundation Trust, Burton-on-Trent
RCA            Root Cause Analysis
RIPS           Recognising Risk and Improving Patient Safety (a training course)
TRM            Team Resource Management (a training course)
UHCW           University Hospital of Coventry and Warwick
EXECUTIVE SUMMARY

Human factors concerns the interactions between people and technical components in complex systems. It is associated with a maturation of wider system safety management and can make an important contribution to equipment design, safety assurance, system management and incident investigation. It does this by allowing the requirements and constraints of the system operators (people) to be formally described and systematically understood.

It is recognised that human factors can provide enormous benefits to patient safety through better understanding of human related clinical tasks and risks and the people element of clinical processes, including cognitive, social and behavioural elements.

The Safer Care team aspires to; “build an NHS where every member of staff has the passion, confidence and skills to eliminate harm to patients.” The NHS Institute is committed to raising awareness of and capability in human factors among NHS staff. This document reports the findings from a scoping study into human factors training in the National Health Service (NHS). This study has been undertaken by Human Engineering Limited and the NHS Institute for Innovation and Improvement’s Safer Care team.

The aims of this scoping study were to:

- Describe current human factors provision to the NHS to:
  i. Inform NHS trusts who want to develop human factors capability and capacity
  ii. Identify gaps where work or training may need to be developed or commissioned

- Describe the views of NHS trusts in relation to human factors training:
  i. What would have the greatest impact in improving patient safety?
  ii. How they currently use human factors training to support patient safety
  iii. Barriers to accessing human factors training
  iv. Ways in which their use of training from a range of providers might be facilitated

The study

The study was based upon interviews with different stakeholders: human factors training providers, NHS staff receiving human factors training and senior managers within NHS trusts interested in developing a human factors capability. As an initial exploration, this study has been limited in its scope to providers (commercial, higher education or NHS) easily identified as currently working alongside the NHS. Three sets of interviews were conducted:

- Workstream 1: Review of human factors training provision
  - Internal and external suppliers of human factors training
    - Human factors consultancies
    - Commercial training companies
    - Clinical simulation specialists
    - Academic research organisations
    - Seven interviews conducted (one of which was via email)

- Workstream 2: NHS Trusts’ views on human factors training requirements
  - NHS staff with a leading role in patients safety
    - Clinical or non-clinical
  - Most identified through participation in the NHS Institute’s Leading Improvement in Patient Safety (LIPS) programme
  - Twelve interviews conducted

- Case studies
  - NHS Trusts’ experiences in developing a human factors capability
    - Two trusts:
      - University Hospital Coventry and Warwick
      - Queen’s Hospital, Burton-on-Trent
      - Five interviews conducted
Human Factors in Healthcare: Person and System-level Human Factors

This report distinguishes between two complementary strands of human factors in healthcare:

- Person-level human factors – Emphasises the skills that allow the individual to apply their clinical expertise efficiently, effectively and safely. Such skills include effective communication and decision-making, risk awareness for different situations, how to manage stress and fatigue and how to work as part of a team or lead a team. Such skills are very practical and may be developed specifically for specific groups of practitioners, reflecting the particular demands and experiences of different medical specialisms. Within healthcare this body of techniques is often called non-technical skills.

- System-level human factors – Emphasises analytical approaches for managing the human element within the healthcare system in support of activities such as incident investigation, assessment of new procedures, designing equipment, and maintaining a record of how different human-related risks are managed within an organisation. Such approaches are formal, based around processes such as error or risk identification, root cause analyses, and human-centred design. System-level human factors is closely related to systems-engineering and safety governance in organisations.

The insights afforded by this understanding of human factors into the training needs of different staff, of preferred course delivery, and of strategy to develop a human factors capability at a trust level are developed further in this report.

Workstream 1: Review of Human Factors Training Provision

The following points summarise the survey of training providers:

- Three broad categories of human factors training providers were distinguished:
  - Commercial companies
  - Higher education research centres
  - Human factors training capability available internally within the NHS.

- The training delivered in system-level human factors, while it uses many of the same concepts (such as human error) and addresses many of the same problems, is very different from that provided at the person-level. This presents the possibility of confusion, or uncertainty over the training that would be appropriate for a particular requirement.

- The bulk of the human factors training supplied to the NHS is in person-level human factors (synonymous with non-technical skills). This seems to reflect the level of demand within the NHS for these practical skills and the limited understanding of the scope of human factors. Also, such training tends to be delivered in critical care and theatre contexts within acute care.

- Anaesthesia has led the way in incorporating human factors principles and skills into clinical training and clinical practice. Training is routinely provided in high fidelity simulation centres across the UK by a pool of healthcare professionals who have become instructors in Crew Resource Management (CRM).

- The identification of non-technical skills relevant to anaesthetics (ANTS) and surgery (NOTSS) practice has allowed these skills to be explicitly incorporated into current training curriculum.

- Surgical simulation delivers high quality training at relatively high cost. Unlike the other person-level courses reviewed here, which are aimed at all front-line staff, this provision is currently used primarily in surgery.

- Within the commercial companies that supply predominantly person-level human factors training, the courses have similar content, aim to achieve a similar level of training attainment in their attendees and share similar costs and modes of delivery. It is concluded that this lack of variation reflects an established formula for delivering such training.
It is possible to identify the following trends in the delivery of person-level human factors courses:

- a move towards splitting the course delivery between a main session and a follow-up session later
- a move towards delivering training to multidisciplinary teams who routinely work together to deliver care
- the delivery of training through interactive or digital media
- steps to introduce some type of assessment

**Workstream 2: NHS trust views on human factors training requirements**

The following general observations were made about the interviews with NHS staff:

- The staff interviewed were relatively senior, having been selected through their previous experience of Leading Improvement In Patient Safety (LIPS) programme or other courses.
- The human factors training provided in the LIPS programme offers an introductory session. This covers the basic cognitive aspects of human fallibility that form the foundation on which to build both system and person level human factors understanding.
- The human factors training provided in the LIPS programme places a greater emphasis on the system-level than person-level human factors. This seemed to be well suited to the requirements of staff undertaking the training.
- Person-level training provided in the LIPS programme included the creation of a fair or just culture in relation to incident reporting.
- Despite agreeing that human factors concepts would be useful for all staff across the service, participants also identified that the kind of training they had received in LIPS would not be suitable for all staff:
  - They identified that some staff would require greater depth of understanding, while the majority of staff would require a less detailed, more practical understanding, as their different roles require.
  - Among the priority areas of human factors for the NHS they identified culture (especially reporting), team working (especially issues relating to deference to authority) and reducing rule violations – the first two of which are more readily addressed through person-level human factors training.
  - When discussing how human factors training can best be delivered in the NHS, participants expressed a preference for more practical on-the-job training closely related to the work of the staff undertaking the training. This style of delivery is unsuitable for the more theoretical system-level human factors, but applicable to the more practical person-level human factors.
  - Some participants identified that a beneficial strategy for implementing human factors training within their organisations would involve trained staff training their colleagues. Again, this style of delivery is better suited to the more practical person-level human factors.
- Many participants identified that a programme to raise awareness of human factors and its contribution to patient safety would be necessary before a more extensive human factors training initiative can be undertaken. It was considered particularly important to have acknowledgment and support from the trust executive board to provide leadership for the human factors initiative.
Case studies: NHS trusts’ experiences in developing a human factors capability
The experiences of two trusts were investigated:

- University Hospital of Coventry and Warwick NHS Trust in developing a human factors training capability with a commercial training provider
- Queen’s Hospital NHS Foundation Trust, Burton-on-Trent with the R²IPS course - a human factors training course developed by senior clinicians within the trust

The following key points are drawn from the case studies:

- Both trusts agree that the burdens of cost and backfilling staff sent for training are justified by the benefits to patient safety and quality, and acknowledged the importance of executive board support in sustaining a human factors capability.
- Both trusts have deployed person-level human factors training and have found it successful in addressing pressing issues in culture - particularly in encouraging discussion and reporting adverse events - and team working, particularly in encouraging authority to be challenged if safety might be threatened.
- Both trusts had initially delivered human factors training in the context of critical care and theatres in an acute setting, but believed that additional benefit could be gained by delivering this training across all clinical specialisms and were developing plans to do so.
- Both trusts have, to a different extent, drawn upon external advice to develop their human factors training programmes. As the courses have matured both have sought to develop (or extend) a training capability within the trust.

Analysis: Drivers, barriers and gaps in human factors training delivery
An analysis of drivers, barriers and gaps in the delivery of human factors training within the NHS is provided in Table 2 on page 26. In this analysis drivers are taken to be factors that are promoting human factors training, barriers are factors that are constraining the delivery of human factors training and gaps are the elements that are missing or under-developed in the mechanisms for delivering human factors training in the NHS. The analysis has been further divided into elements within the NHS (internal factors) and elements relating to the human factors suppliers of all kinds (external factors).

Analysis: Human factors training audience description
An analysis of the human factors proficiency required for different staff groups within the NHS is provided in Figure 5 on page 29 of the report (and shown in Figure 1 and 2 of this summary). The staff groups have been divided into archetypes or personae, reflecting different safety functions within healthcare to illustrate different human factors training requirements across the service. Figure 6 on page 30 presents a similar analysis for two human factors specialist roles that could be made available, as required, to support trust patient safety initiatives and the development of human factors capability across a trust and/or within health communities.

Analysis: Signposting to human factors training
As part of the work the study team made suggestions about how to structure a signposting resource that can guide NHS staff seeking information about human factors training courses with the intention of procuring a training course to meet a particular training requirement in their trust. An illustration of how a resource might appear to a user is presented in Figure 7 on page 34.

Conclusion: Current human factors training provision in the NHS
This scoping study has found many encouraging indicators of the developing human factors capability within the NHS. The study team identified a number of human factors initiatives developed at a trust level by committed and enthusiastic staff. The human factors courses available to the NHS through both external suppliers and internally from NHS resources are perceived by those that commission them to be of a high standard, well-received by staff and effective in supporting trust safety policies (Section 5). This suggests that such initiatives at a trust level (UHCW and QHFT) and at a national level (LIPS) should continue.
Where gaps and barriers were found in the provision of human factors training, these were, as might be expected, in the availability of resources (staff time, cost), but also in the lack of a human factors strategy at a national level to support human factors capability being developed locally.

**Conclusion: Informing the NHS**

This study has identified human factors training appropriate for different NHS staff groups within a trust and has identified two additional human factors specialist roles that may be able to support patient safety initiatives.

- **Human factors training:** All staff involved in patient safety require an awareness of human factors that encompasses an understanding of the origins of human fallibility. This appreciation can be applied at a person-level or system-level of human factors and staff working in different roles in the NHS require a different balance of these skills.

- **Availability of human factors training:** Human factors training has tended to be developed in a piecemeal fashion, with individual trusts or interested groups developing capability in response to specific local issues. Non-technical training in the NHS has tended to be developed and delivered within the context of critical care and theatres in acute settings. The term **boundaried** has been adopted in this report to describe these two clinical settings: that is to say, they are differentiated from many other clinical settings through a combination of physical and professional requirements. As areas with high levels of acuity and risk, they may have clearer boundaries and more defined processes than, for example, a general ward or a community mental health team. In these boundaried areas of the NHS, human factors training has so far tended to emphasise person-level human factors rather than system-level. In contrast, it seems that **non-boundaried** settings have almost no exposure to human factors training.

- **Trends in human factors training delivery:** The development of internal human factors training capability within trusts has been driven by the higher costs of commercially supplied training and the increasing use of e-learning. Self-study allows individual members of staff to acquire human factors knowledge at convenient times outside of formal training courses, minimising extended periods of time out of service. To maximise the benefits of face-to-face training, trusts and training providers have found it more effective to spread person-level human factors training over a number of sessions, using the initial sessions to impart knowledge and later follow-up sessions to provide practical advice on implementation and coaching. These follow-up sessions encourage and reinforce behavioural changes in the everyday work of individual staff and teams.

**Conclusion: Informing NHS staff**

This study has identified a requirement for more information about human factors training to be made more widely available across the NHS. NHS staff interviewed expressed a preference for a single source of information that can be consulted on a webpage.

This study has considered different ways that information about human factors training courses can be consolidated into a single resource. It is recommended that this resource includes an interactive element, if possible, which would allow NHS staff who have worked with different suppliers or attended different courses to give feedback to inform other prospective attendees.

**Conclusion: Informing the NHS Institute Safer Care team**

This section proposes some priorities for the NHS Institute’s Safer Care team, drawn from the conclusions of this study.

- The burden of leading the development of human factors training in the NHS is considerable and should not be borne by a single organisation. The NHS Institute should **continue to work in partnership** with the NPSA, Department of Health (DH) Patient Safety Division, the Health Foundation - Clinical Human Factors Group and other stakeholders to drive change across the NHS. A multi-faceted approach using drivers and incentives at policy, practice and practitioner levels is necessary to embed human factors in healthcare.
The LIPS programme represents the only training course available in the NHS that covers system-level human factors and delivers explicit training in the origins of human fallibility in the constraints and abilities common to everyone. **The Safer Care team should continue to promote, deliver and develop human factors within the LIPS programme.**

This study identified that awareness of human factors across the NHS is low. Those involved in human factors training recommended that the first step in wider delivery and application of these skills should be a period of awareness-raising. **The Safer Care team should support this awareness raising** – explaining how human factors can benefit patient safety, reporting the success stories from early adopters and directing those interested to sources of more detailed information.

NHS staff noted that there was a requirement for a single point of information and guidance about human factors in general and, particularly, in the courses of training that are available. **The Safer Care team should investigate the best ways of addressing this requirement,** possibly through developing the signposting resource discussed in this report.

This study identified certain areas of the NHS where human factors training is underdeveloped or less available – particularly in unboundaried contexts. **The Safer Care team should investigate how the demands of these working contexts differ from the better understood boundaried contexts,** and the different human factors techniques or strategies required to support work in these contexts.

The widespread introduction of human factors across the NHS presents considerable organisational challenges. **The Safer Care team should investigate the different training implementation models available for distribution of such skills,** comparing the relative merits of different strategies and drawing upon experience of previous NHS training initiatives (for example, Box 4).

*A copy of the full report can be found and downloaded at [www.institute.nhs.uk/humanfactors](http://www.institute.nhs.uk/humanfactors)*
Mastery
Application
Awareness

- Awareness of human factors: how common abilities and constraints lead to human fallibility.
- Can talk in general and theoretical terms about benefits of human factors.
- Understands relevance of human factors to specific job role.
- Understands how to use human factors in work to improve patient safety.
- Significant hands-on experience of applying human factors.
- Informs strategic decision-making and policy formation.
- Teaches others.

Figure 1: Conceptual Model: Different Levels of Human Factors Proficiency

<table>
<thead>
<tr>
<th>Typical roles</th>
<th>Person-level</th>
<th>System-level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse</td>
<td>2 - Application</td>
<td>1 - Awareness</td>
</tr>
<tr>
<td>Doctor</td>
<td>2 - Application</td>
<td>1 - Awareness</td>
</tr>
<tr>
<td>Pharmacist</td>
<td>2 - Application</td>
<td>1 - Awareness</td>
</tr>
<tr>
<td>Sister/Matron</td>
<td>2 - Application</td>
<td>1 - Awareness</td>
</tr>
<tr>
<td>Consultant</td>
<td>2 - Application</td>
<td>1 - Awareness</td>
</tr>
<tr>
<td>Team leaders</td>
<td>2 - Application</td>
<td>1 - Awareness</td>
</tr>
<tr>
<td>Safety Manager</td>
<td>2 - Application</td>
<td>2 - Application</td>
</tr>
<tr>
<td>Manager</td>
<td>1 - Awareness</td>
<td>2 - Application</td>
</tr>
<tr>
<td>Clinical Risk Manager</td>
<td>1 - Awareness</td>
<td>2 - Application</td>
</tr>
<tr>
<td>Systems Specialist</td>
<td>1 - Awareness</td>
<td>2 - Application</td>
</tr>
<tr>
<td>Chief Executive</td>
<td>1 - Awareness</td>
<td>1 - Awareness</td>
</tr>
<tr>
<td>Medical Director</td>
<td>1 - Awareness</td>
<td>1 - Awareness</td>
</tr>
<tr>
<td>New dedicated Role – Person level</td>
<td>3 - Mastery</td>
<td>2 - Application</td>
</tr>
<tr>
<td>HF Specialist</td>
<td>3 - Mastery</td>
<td>2 - Application</td>
</tr>
<tr>
<td>New dedicated Role – System level</td>
<td>2 - Application</td>
<td>3 - Mastery</td>
</tr>
</tbody>
</table>
## Executive Summary

HUMAN FACTORS TRAINING IN THE NHS: A SCOPING STUDY

JUNE 2010

### Conceptual Model:
Different Levels of Human Factors Proficiency - Descriptions and training

<table>
<thead>
<tr>
<th>Typical roles</th>
<th>Human factors capability required to support Patient Safety work</th>
<th>Appropriate human factors training (content and delivery)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse, Doctor, Pharmacist</td>
<td>Applying person-level human factors in their patient care work</td>
<td>Combination of workshop and on-the-job training, supplemented by e-learning or video resources</td>
</tr>
<tr>
<td>Sister/Matron, Consultant</td>
<td>Applying person-level human factors in their patient care work and set standards in application for their team</td>
<td>Combination of workshop and on-the-job training, supplemented by e-learning or video resources</td>
</tr>
<tr>
<td>Clinical Risk Manager</td>
<td>Supporting development of person-level training initiatives across the Trust</td>
<td>Lectures, self-study and some formal evaluation (coursework or learning portfolio of practical work)</td>
</tr>
<tr>
<td>Clinical Systems Specialist</td>
<td>Using system-level human factors in processes and equipment</td>
<td>Training to build on existing technical skills</td>
</tr>
<tr>
<td>Chief Executive Medical Director</td>
<td>Understand and critically evaluate contribution of person-level human factors in the Trust</td>
<td>Training to build on existing technical skills</td>
</tr>
<tr>
<td>New dedicated Role – person level</td>
<td>To provide person-level human factors training to NHS staff at all levels, including train-the-trainer sessions.</td>
<td>Expected to have achieved person-level human factors to Application level from a background in safety-critical team working – especially in healthcare</td>
</tr>
<tr>
<td>New dedicated Role – system level</td>
<td>To understand how person-level human factors approaches can be supported by system-level human factors.</td>
<td>Healthcare domain knowledge acquired through working in the sector, self-study and briefings by domain experts</td>
</tr>
</tbody>
</table>

**Figure 2**

**Organisational capacity**

**Non-clinical support**

- HF Specialist
  - To provide person-level human factors support and advice to safety managers and clinical systems support staff.
  - To provide authoritative support to safety management in all aspects of system-level human factors, conducting investigations of adverse events, supporting design of equipment and processes, advising on strategy.
  - Combine person-level human factors support and advice to safety managers and clinical systems support staff.
  - Training to recognise system-level human factors issues in equipment or procedures, and in reports of their staff.
  - Training specific to job role.
  - Training to recognise system-level human factors issues in equipment or procedures, and in reports of their staff.
  - Training specific to job role.

**Executive manager**

- HF Specialist
  - To provide person-level human factors training to NHS staff at all levels, including train-the-trainer sessions.
  - To provide awareness level training of system-level human factors.
  - To provide awareness level training of system-level human factors.
  - Expected to have achieved person-level human factors to Application level from a background in safety-critical team working – especially in healthcare.

**Team leaders**

- HF Specialist
  - To provide person-level human factors training to NHS staff at all levels, including train-the-trainer sessions.
  - To provide awareness level training of system-level human factors.
  - To provide awareness level training of system-level human factors.
  - Expected to have achieved person-level human factors to Application level from a background in safety-critical team working – especially in healthcare.

**Health Community**

- HF Specialist
  - To provide person-level human factors training to NHS staff at all levels, including train-the-trainer sessions.
  - To provide awareness level training of system-level human factors.
  - To provide awareness level training of system-level human factors.
  - Expected to have achieved person-level human factors to Application level from a background in safety-critical team working – especially in healthcare.

**Front line staff**

- HF Specialist
  - To provide person-level human factors training to NHS staff at all levels, including train-the-trainer sessions.
  - To provide awareness level training of system-level human factors.
  - To provide awareness level training of system-level human factors.
  - Expected to have achieved person-level human factors to Application level from a background in safety-critical team working – especially in healthcare.