Healthcare Human Factors Modules Curriculum

*Improving Patient Safety by Bring HFE to the Field: an NCPS Initiative*

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## Introduction

Preventable or avoidable adverse events can often be attributed to a failure to follow recognized, evidence-based best practices or guidelines at the individual and/or system level. Studies of adverse patient incidents have heightened our awareness of the benefits of re-engineering systems and processes to reduce or prevent use-errors. Through this set of training modules, NCPS wants to help organizations apply locally, the very same cognitive, ergonomics, and human factors engineering (HFE) analyses we expect of device manufacturers, to make healthcare systems and services safer for patients. The re-engineering of processes combined with a shift to a culture of safety is essential if healthcare organizations are to continue to reduce harm to patients from increasingly complex medical procedures and associated use-error. Healthcare facilities struggle in their ability to standardize approaches and decrease complexity; yet it is relatively straightforward to reap organizational benefit from incorporating an awareness of and an appreciation for human factors engineering as applied to each service area in the facility.

Lucian Leape has stated that medical schools need to begin incorporating patient safety into their curricula. An integration process is slowly beginning to take shape in some medical schools (the Mayo Medical School has piloted a program), and in 2002 the Accreditation Council for Graduate Medical Education (ACGME) added “systems-based practice” and teamwork to their required set of core competencies. The World Health Organization has a project developing Patient Safety Curriculum for Medical Schools which is due for completion at the end of 2008. But a number of studies, such as those by Griner, Varkey and Davidoff respectively, have shown that there remains a vast need for safety and quality curricula in medical education, from the undergraduate level up.

Despite the existence of considerable information about how to improve care through the application of human factors, healthcare professionals are not provided a means to ensure sufficient education in healthcare human factors and the impact on patient safety. Additionally, even when existing knowledge is taught, providers are challenged to translate and apply knowledge to affect safe patient care. The VA National Center for Patient Safety (NCPS) Healthcare Human Factors Modules were designed to address these challenges by combining dissemination of existing knowledge and recent research into accessible, hands-on activities that drive home human factors and patient safety competencies. These modules represent an innovative and engaging way to allow providers and administrators alike the ability to advance the shift to systems thinking through high-impact education.

The VA National Center for Patient Safety has taught providers and support staff about patient safety since 1999 and has had great success through interactive teaching. Based on adult learning theories, learning experiences are most effective when audiences are engaged through interactive and hands-on exercises. The NCPS Healthcare Human Factors Curriculum includes 12 distinct modules organized around critical concepts of human factors as applied to healthcare. These modules are organized under the following concepts: Human Factors and Ergonomics (the human in the system), Investigation and Analysis (learning from experience), Key Components to a Safer System, and Taking Action (YOU can make the difference).

## Course Description

High-quality coaching lies somewhere near the crossroads of pertinent, current material and effective, dynamic teaching methods. The Department of Veterans Affairs (VA) National Center for Patient Safety (NCPS) Healthcare Human Factors Modules represent an accessible, novel approach to equip the *future instructor* with foundational knowledge necessary to understand the context, key principles, and competencies associated with healthcare human factors, and how these tenets and skills are applied in patient safety. Future instructors may be clinical, administrative, or executive professionals or other individuals who have a role in implementing patient safety practices or other improvement projects in their healthcare communities. Rather than creating a curriculum that targets one specific healthcare profession, the goal of the project is to develop modules that can be taught to interested staff at individual facilities, broadening the utility of the project as a whole. The goals are to provide end-learners with the requisite knowledge, skills, behaviors, and attitudes to understand the issues involved in safe patient care, and also to be able to use human factors engineering methods to identify and mitigate patient safety hazards in their healthcare setting.

The greatest potential to increase knowledge retention leading to changed behavior comes from combining multiple training styles such as lecture, experiential activities, small and large group activities, etc., and repeating key points throughout the training. The curriculum modules are aligned with educational standards for patient safety competencies and are anchored by didactic lectures and accompanying written chapters. Perhaps most importantly, the modules provide strategies for inspiring participant engagement through multiple modes of expression. The knowledge base and skills of the didactic PowerPoint and accompanying chapter are emphasized within the accompanying lab activities, designed to be conducted in-person in a group setting or individually online.

The modules include a work document (engaging story, module objectives, comprehension questions), lab activities (in-person and online options), and reading materials (recommended articles, annotated bibliography). Each activity provides a hands-on approach to absorbing the knowledge base and/or acquiring specific skills and provides learners examples of changes they can make in their own practice setting. Future instructors are provided a detailed instruction key, printable material, and the equipment necessary to execute the lab.

The core curriculum represents an important body of work with essential knowledge about human factors and patient safety and brings participants up to speed with regards to recent practices and innovative interventions. This knowledge is imperative for those working in, or in partnership with, the healthcare system of today. The curriculum is designed to be self-paced and able to be used at the convenience of the learner. The material is presented through a variety of approaches that, as a whole, provides a rounded and in-depth presentation of the content in a way that caters to multiple styles of learning. The modules that comprise the curriculum are intended to be taken sequentially, but the learned is not precluded from taking them in order of preference. The first set of plenary modules is designed to cover fundamental human factors and patient safety topics including healthcare ergonomics, cognition, usability, proactive risk assessment, and root cause analysis. A middle group of modules progresses to specific topics including stress and fatigue, teamwork and communication, and multitasking and mitigating interruptions. The final set of modules will be created based on participant input and hot topics in the field.

## Course Materials

### *Work Document*

Each of the modules begins with a description of the content area, its significance to patient safety, and the learning objectives that outline the knowledge base and skills that the module is intended to convey to the learner. The work document provides an engaging story of an adverse event to introduce the topic at hand (link and/or transcription). Lastly, the work document provides comprehension questions based upon the learning objectives. It is recommended that they be reviewed in advance and again, subsequent to completing the module, in order to ensure that the learner is reviewing the materials in a manner and to the degree necessary to achieve the learning goals.

### *PowerPoint and Accompanying Chapter*

Each module contains a lecture portion in the form of a PowerPoint presentation, accompanied by a written chapter. Each lecture highlights key themes of healthcare human factors and patient safety that cut across disciplines (i.e. proactive risk assessment, stress and fatigue, teamwork and communication). While the PowerPoint and written chapter are available to be accessed and used individually, the full conveyance of the module content requires that both be reviewed, either together or separately.

### *Lab Activities*

The human factors team at NCPS posits that hands-on learning fosters the multidisciplinary integration of research to the field. In order to make human factors research useful for practical applications that enhance the healthcare profession, lab activities provide a hands-on approach to absorbing the knowledge base and/or acquiring specific skills and provides learners examples of changes they can make in their own practice setting. Future instructors are provided a detailed instruction key, printable material, and the equipment necessary to execute the lab. Each lab activity portion includes a lab worksheet to outline the structure and content of pre-lab materials (introduction, objectives, time duration, equipment required, instructions, debrief suggestions) and printable activity materials.

David Gaba defines simulation as “a technique – not a technology – to replace or amplify real experiences with guided experiences that evoke or replicate substantial aspects of the real world in a fully interactive manner” (2004). Rather than ‘hope’ the engineering tools and strategies makes sense to healthcare professionals, basic principles and a variety of human factors tools are discussed and demonstrated through hands-on lab activities using both ‘every day’ and healthcare examples. In some instances, the activities use non-healthcare themes to draw parallels between familiar concepts and healthcare. In other instances, healthcare simulation activities provide an opportunity to empower and equip learners for future scenarios. Practice scenarios can help learners develop effective communication techniques or re-enact the circumstances of past adverse events to highlight the importance of speaking up within a care team.

### *Reading Materials*

The literature in the healthcare human factors/ patient safety field is quite extensive. The readings listed in this section of the module have been selected by experts in the field and deemed to be essential for understanding the content area covered. In some instances, they represent the seminal publications in the topic area. In other instances, they have been selected for their ability to convey the major issues associated with the topic in a clear manner, often by authors who have been successful in bringing the learning to practice. In all instances, they provide further depth to the PowerPoint and accompanying chapter and are an integral component of the curriculum content. The annotated bibliography offers additional articles and manuscripts that are also recognized in the field as providing vital insight into the topic area and were selected to further inform the learner and provide additional perspective and depth in the subject matter.

### *Pilot Program*

In the fall of 2013, VA NCPS Healthcare Human Factors Modules were piloted preceding rollout in VA facilities. Pilot testing of the hands-on labs demonstrates that participants acquired knowledge that will be applied in their current day-to-day operations and in future healthcare endeavors. Participants felt that activities encouraged creative thinking and engaged participants in learning. Post course surveys consistently indicate that participants find the course worthwhile. Participant feedback included quantitative evaluation for each trial and qualitative responses regarding acquired knowledge, strengths, areas of improvement, and general comments. Through the various scenarios, they can readily see how individual limitations and system vulnerabilities may compromise patient outcomes and/or contribute to occupational injury. The VA experience shows that once the organizational members believe they can perceive and evaluate vulnerabilities in their system, they begin to realize the actions they can take to reduce or eliminate the vulnerability. The Veteran patient is the beneficiary as healthcare vulnerabilities are addressed.

### *Evaluation*

Monitoring and/or mentoring for skills acquisition, development and consolidation should continue in the workplace even when classroom skills training are complete. The mentor should use teaching skills presented in problem based learning to provide effective feedback and other aspects of on-site mentoring. The type and duration of monitoring and mentoring during on-site skills acquisition depends on the nature of the project, and can be expected to vary from minimal for short periods to extensive for many years. Immediate performance evaluations are provided to collect data regarding lab significance, comprehension, likeability, and future improvements.

### *Significance*

As the modules move forward through pilot, roll-out, and evaluation, NCPS aims to bring healthcare human factors and patient safety to the point of sustainability – being owned in various clinical settings. The paramount objective of these modules is for providers and administrators alike to learn healthcare human factors and key patient safety practices, and put them into action in their immediate areas of responsibility to the patient. The VA NCPS Healthcare Human Factors Modules will not only provide a core curriculum but a ‘human factored’ framework for the ongoing education and training of healthcare executives and administration, healthcare providers, quality and safety professionals, and trainers or faculty members who contribute towards patient safety curriculum development.

The structure reflects the needs of the field, providing a curriculum that will support both in-person and online learning. Finally, the material is presented through a variety of approaches that, as a whole, caters to differing levels of experience and multiple styles of learning.

### *Disclaimer*

NCPS has made reasonable efforts to present educational subject matter in a scientific, balanced, and unbiased way. However, learners must always use their own judgment and professional opinion when considering future application of this information. NCPS does not endorse or promote any commercial product that may be discussed in this activity.

# Course Modules

| **Human Factors and Ergonomics** |
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| 1. *Healthcare Human Factors \*\** |
| 1. *Healthcare Ergonomics \*\** |
| 1. *Cognition and Mental Workload* |
| **Purchasing for Safety** |
| 1. *Product Usability \*\** |
| 1. *Usability Testing \*\** |
| **Investigation and Analysis** |
| 1. *Proactive Risk Assessment* |
| 1. *Root Cause Analysis* |
| **Key Components** |
| 1. *Teamwork and Leadership* |
| 1. *Communication and Handoffs* |
| 1. *Stress and Fatigue* |
| 1. *Interruptions \*\** |
| **Taking Action** |
| 1. *Addressing the Problem* |
| *\*\* Modules in the 1st VA Pilot* |

# Reference

Gaba D. (2004). [The Future Vision of Simulation in Health Care](http://www.iness.org.br/conteudo/pub/003/cont/000084/000084.pdf). Retrieved April 23, 2014 from *Quality and Safety in Health Care*. 13 (Suppl. 1): i2–i10.