federation forum
Winter 2015

Human Factors and Non-technical Skills: What do I need to know?

This article is based on a presentation by Professor Rona Patey, Head of Division of Medical and Dental Education, University of Aberdeen and Consultant Anaesthetist, NHS Grampian, at the 2015 FSBPT Annual Meeting.

The use of clinicians' non-technical skills (e.g. decision making, situation awareness, communication, and managing stress and fatigue) are important in their practice for efficiency and safety. The term "non-technical skills" was explained in the presentation, as well as describing how these skills relate to the study of human factors. Real-life examples illustrated how these skills can impact the safety and quality of day-to-day clinical practice and suggestions were made on why and how we can better support teaching and learning in this area going forward.

The presentation began with a story about Martin and Elaine Bromley. Martin is an airline pilot, an important distinction because the airline industry culture focuses on solving problems when they occur instead of assessing blame. The flying public generally believes all accidents are preventable. The aviation industry, however, realizes that human error is inevitable and when errors occur, it's best to find ways to ensure a repetition of the error is minimized.

Martin's wife, Elaine, was a fit, healthy woman with no major medical problems. She was admitted to London hospital for a minor and routine procedure. She did not survive. Elaine died from a wholly preventable anesthetic mishap.

After a time of grieving, Martin asked hospital administrators, so what happens now? They didn't understand. What he meant was: Where are we in the accident investigation? What have you learned from that accident, and how do you incorporate that into your system moving forward to make it safer? He wasn't asking who to blame and what anesthesiologist he should sue. He was asking what the organization learned to make sure this didn't happen again — because that's what would happen in the aviation industry.

Since then, Martin has been very influential in lobbying for a human factor approach to accidents when they happen in any industry.

In the early 1900s, aviation accidents were of a technical nature. People built flying machines out of some science and a lot of guesswork. Accidents were routine. Those who survived built on their mistakes. The Federal Aviation Agency (FAA) was founded in 1958 to regulate the new industry. Now, most aviation accidents are the result of human error.

The fact is, our most expert and best-trained people make mistakes. To combat that, the aviation industry enlisted human factor scientists from the field of human psychology to look at how humans behave, to understand human behavior, and to try to design systems to try to make it safer moving forward. In the United Kingdom, all aviation mishaps large and small are required to be reported and assessed. Human factor science is integrated into core training and assessment strategies. Annual recurrent training is required. There also are regular formal assessments in the workplace by trained assessors.

Martin Bromley defines human factors as being "about making it easier to do the right job."

Human factors display themselves in the organizational and management components in the workplace in terms of safety culture, management leadership, and communication. There are hazards present in the work environment itself. Team structures, processes, and leadership lend themselves to human factors. Then there are the individual worker's cognitive skills and personal resources.

The human factor approach to safety acknowledges the universal nature of human fallibility and the inevitability of error. It acknowledges there are human biases and limitations in attention span, memory constraints, automatic responses, situational awareness, and other areas. It takes a systems approach to errors and designs workplace systems to minimize the likelihood of errors and to minimize the consequences.

James Reason's "Swiss Cheese Model" of accidents states that layers of Swiss cheese present an opportunity to prevent catastrophic failure. Because Swiss cheese holes are uneven in placement and size, a problem that gets through one hole will likely be stopped by the next layer of cheese. A catastrophic failure occurs when the holes all line up and there is nothing to stop the error from escalating.

It's human nature is to blame the person who made the mistake, such as the anesthesiologist who picks up the wrong syringe. But even if the anesthesiologist is sent for more training and even if the anesthesiologist became the most diligent person ever, he could still make the same mistake. Likewise, another anesthesiologist coming into that room also could make the same mistake — unless the system is redesigned. Human factor science is about changing the system so it's unlikely anyone would pick up the wrong syringe.

Human factor scientists recognize that healthcare is one of the most complex industries in the world. Patients are not like airplanes. Each plane model is the same. Each patient is different. They come with their own pathology and behavior.

Our colleagues come with their own behaviors, too. A team is more than one person, often with different abilities or roles. They have a common goal, they have to time and coordinate their actions, and have a limited duration. Teamwork can be taught, but particularly in a hospital setting, the composition of teams varies routinely, often patient to patient.

Latent conditions and individual actions are the factors that go into a safe and efficient job performance. Latent conditions include safety systems, the organizational and professional

culture, and work conditions. Individual actions include worker behavior and technical and non-technical skills. It's the non-technical skills that are now garnering greater scrutiny.

Gradual change is something latent conditions and individual actions need to take into account. People believe that any changes will draw their attention, but that is not true with gradual change. We're blind to our own "change blindness."

This has consequences in medical settings because we tend not to notice things that change gradually, like a patient's skin color or slowly dropping blood pressure.

So, just what are non-technical skills? Key categories include:

- Situation awareness
- Decision making
- Communication
- Team working
- Leadership
- Coping with stress
- Coping with fatigue

Situation awareness is knowing and understanding what is going on around you. It sounds simple, but in complex situations under intense time pressure often there is too much information to process and workers have to attend to things selectively.

Decision making is the process of reaching a judgement or choosing a course of action to meet the needs of a given situation. In the dual process theory, there are two types of decision making. Intuitive decision making is very dependent on context. Most errors occur with this type of decision making. The second type is analytical. Often, this is what we do when we encounter a new situation. It's time-consuming and hard work and human nature is to revert to Type 1 decision making as soon as we can.

Healthcare workers are taught that 90% of a good diagnosis is taking a good history. What isn't taught is how to communicate safely and effectively in the workplace. Not taught is how to speak up when a superior is making an error, active listening, and being open. Briefing and de-briefing has been rarely done historically, although it's on the rise. SBAR is a tool to allow people to ask for help by providing a structure to describe a Situation, its Background, your Assessment, and then to make a Recommendation or Request for help.

Rudeness also affects communication. Studies show that rudeness in the workplace lowers cognitive abilities.

Stress and fatigue also affect workplace performance. Twenty-four hours of sleep deprivation has the same effect as having a blood alcohol level of 0.1%. Other contributing factors include an excessive workload, dealing with a patient's suffering, dealing with errors made by you or others, and insufficient professional support and training.

But we cope with it. We use problem-solving processes to manage and adapt to stress and

fatigue and for the most part are successful. But sometimes workers use altered coping mechanisms by working harder not smarter, or fall into addictive behaviors, anxiety, or depression.

Research has identified behavioral marker systems to identify observable non-technical behaviors that contribute to superior or substandard performance in the workplace.

The Aberdeen Anesthetic Department has created a half-day workshop for all new employees. Included in the workshop is an introduction to human factors, how to identify one's own behavioral markers, and practice identifying non-technical skills. It also uses a series of tactical decision games with table-top role playing of emergency situations and debriefing and reflection on the use of non-technical skills.

The World Health Organization has been very interested in this area and has developed a patient safety curriculum whereby aspects of human factor and non-technical skills are taught in the undergraduate level. The University of Aberdeen's undergraduate medical program incorporates a number of explicit patient safety teachings within its curriculum.

The traditional — and simplistic — view of clinical performance is to look at a patent's risk factors and use technical skills to foster an outcome. The "Systems" view of clinical performance replaces technical skills with individual skills, both technical and non-technical. It also includes teamwork and communication, operative environment and procedures, and organizational context.

There will always be adverse advents. There will always be presentations we've never seen before. There will be equipment failures. But if we have better trained humans in term of non-technical skills, we'll be better able to pick these things up and respond and adapt to it.

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