QI Boxset: Introduction to Human Factors

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Helen Silver-MacMahon:

Hello and welcome to an Introduction to Human Factors. My name's Helen Silver MacMahon, and I'm a veterinary nurse that specializes in human factors. I became really interested in the link between people and the environment they work in and the things that affect us, including the non-technical skills, culture, civility, and our wellbeing, during my time as Senior Surgical Nurse at the Animal Health Trust. Human factors is described as "The scientific discipline, concerned with the understanding of interactions amongst humans and other elements of a system and the profession that applies theory, principles, data, and methods in order to optimize human wellbeing and overall systems performance". It's a science at the intersection of psychology and engineering, which encourages a systems approach to consider a range of aspects related to human work, including how humans interact with each other and the other elements in a system. This can include tools, technology, processes, and tasks. Really what we're looking at is understanding human capabilities and limitations and using this to find the best possible fit between people and their working environment. Whilst these definitions may seem scientific in themselves, this can be broken down into something much simpler. The Clinical Human Factors Group describes human factors as "Making it easy to do the right thing".

By understanding limitations and capabilities and the fit between people in their environment, were able to improve system performance and optimize human wellbeing. We want to increase accuracy and efficiency and decrease harm and improve the wellbeing of our people by increasing health and safety, wellbeing and satisfaction and achievement and pride.

Within the veterinary profession, it's likely the performance will be measured by patient safety and therefore, it's important to consider how human factors impacts patient safety. Patient safety is described as the "Absence of preventable harm to a patient during the process of healthcare and reduction of risk of unnecessary harm" by the World Health Organization and the NHS describes it as the "Avoidance of unexpected or unintended harm due to the provision of healthcare". Within the discipline of human factors within the veterinary profession, we take many lessons from aviation and human healthcare. Aviation are thought to be about 40 years ahead of us in this respect, and this is largely due to a series of accidents which occurred in the 1970s in which the aircraft involved had no major malfunctions, are in relatively normal operating environments, yet they still occurred. The Tenerife Airport disaster is one of these disasters. Due to thick fog and miscommunication the KLM flight started to take off whilst the PanAm flight was still on the runway. Unfortunately, when the KLM flight realized they were going to fast stop and tried to lift off instead, but the underside of the plane collided with the upper right side of the Pan-Am plane. This resulted in almost 500 fatalities. In this case, all of the people involved had the technical skills needed. The captain was highly experienced. He was in fact Chief Flying Officer and instructor on the 747, and there was no malfunctions in the aircraft. So we need to look beyond the people to discover what happened. When we listened back to the black box recording, the copilot in the KLM plane hinted that he was concerned that the runway was not clear, but he wasn't assertive in this communication and the culture at this time was that the captain was somebody who you didn't question, a God-like creature.

It was a stressful day with fog and lots of time pressure. They were running out of hours that they could fly, and they were worried that this would cause them to be grounded overnight, which would cost the airline an enormous amount. So on the recording, it's evident that the air traffic controllers realize that there was a problem and they say, "Do not take off. You're not cleared for take-off". But unfortunately, the radio blocked and the only word they heard was "take off" and assumed that was what they were being told to do. This is known as confirmation bias, and it's what the pilot expected.
All of these things, culture, communication, stress, fatigue - they're human factors, and as a result of lessons learned from this accident, an event such as this has not occurred since. Martin Bromiley states that we know that 75% of accidents and incidents in

aviation are caused by human factors. In healthcare, we don't know that statistic, and in veterinary healthcare, we definitely don't know that statistic, but imagining that it's similar, that's a lot of lives that we could be saving. The human factors "Dirty Dozen" is a concept developed by Gordon DuPont in 1993, and it refers to 12 of the most common human error preconditions or conditions that can act as precursors to accidents or incidents. By understanding what these preconditions can be, we can put countermeasures in place to stop our wonderful skills being disrupted by human error and causing a problem.

It's important to remember that everybody comes to work to do their best, but we're humans. We make mistakes and errors are normal and they're not by choice. It's important to remember that blame fixes nothing, and we need to look beyond blame and understand how our brains work and the non-technical skills that can disrupt our ability to function. Our brains can do amazing things. If we take a moment to attempt to read the note attached here, we soon realize that actually, our brains are very good at pattern matching, filling in the blanks and deciphering codes. Unfortunately, sometimes our brains can however pattern match and cause us problems, and the next slide demonstrates that.

Take a moment to look at this commonly well-known phrase and just think about what you've read. In the time that I allowed, it's most likely that most people reading that phrase will have seen "The cat sat on the mat", but like lookalike and sound-alike medications, sometimes we see or hear what we expect to, and the more we can understand about how our brains work, we can anticipate errors that might occur. Most of us won't have noticed that in fact, there are two "the" in this sentence, it reads "the cat set on the the mat." There's a clear error there, but just like the pattern matching that our brain used to decipher the code on the first example I showed you, our brain uses pattern matching to read this quickly and uses automatic decision-making to make a decision about what we expect to see here.

As I mentioned, this can be really, really dangerous when we're looking for medications that look the same or sound the same, and so we need to put interventions into place to stop us making errors. This graphic demonstrates James Reasons, accident, causation model, the Swiss cheese model. The idea is that we recognize that there may be holes in our defences. That may mean that hazards can eventually

translate into accidents or losses. Some of the holes may be due to latent conditions. Some of them may be due to active failures, but by recognizing what these conditions and failures may look like, we can begin to put barriers in place to stop error from occurring and to stop it reaching our patients.

Many of the tools that we use that you might already be familiar with, things like checklists or debriefs or handovers or pre-briefs have all been adapted from the military or from aviation. These have been specifically designed when errors have been noted and designed to improve communication, identify what's different about today, and to make our procedures safer, to make sure that we hand over all of the information that we need. We have an aid to remind us of all the things we need to remember and to make sure that our brilliant brains aren't clogged up by worry at the end of the day of the things that we might have forgotten.

Systems thinking is an important part of human factors. We have to understand that the veterinary system is a complex socio-technical system. It's not a one-box-at-a-time system. It's not like making a cake or building a car where we have several ingredients or parts. We assemble or put them together in a specific fashion, and at the end, after we've baked our cake at a specific temperature for a specific time, we come out with the same result. The veterinary system is very, very complex. It involves lots of different parts of a puzzle, and it can be like a bowl of messy spaghetti rather than an orderly assembly line.

When we employ systems thinking, we look at why the system affects the person and causes them to do the things that they do, and then we use human factors to understand our system, understand the organization, the technology, the task, the person, the physical environment. We put everything together and design it so that it's easy to do the right thing. Within human factors, we also need to understand the non-technical skills that we need to execute our fabulous technical skills. These are the skills that we're perhaps not taught so much but are incredibly important when it comes to preventing error. Situational awareness, decision-making, leadership, teamwork, communication, managing stress, and coping with fatigue have all been found to be important non-technical skills in a range of different safety-critical industries. And by understanding each one of these non-technical skills, we're able to

design interventions which overcome some of the pitfalls we might experience and make sure that we avoid error and keep our patients safe and optimize the wellbeing of everybody.

Optimizing wellbeing is a key outcome from understanding human factors and being well means that we're able to deliver our fantastic skills and knowledge to care for our patients in the best way possible. Models like Maslow's Hierarchy of needs explain that we have basic physiological needs, the need to sleep, to eat, to drink. It then goes on to explain that we need psychological safety and physical safety, and to reach self-actualization, we have to have love and belonging in our lives, and we have to have self-esteem. Human factors is a wide and ranging scientific discipline. It covers many, many facets. It covers the psychological elements of understanding why civility is so, so important to us, why communication impacts our wellbeing, why we need to sleep, why we need to eat appropriately, and what the interventions are that we can put in place, like the whole campaign to make sure that we attend to those needs. We also understand that we have core emotional concerns as humans, and they have to be met too, and when they're not met, that can cause us to become unwell too.

So the aims of human factors: to improve performance, as I said at the beginning, that's probably going to translate into patient safety from most of our perspectives. However, performance might be measured by people in different ways. For some people in the finance department, it might be financial performance. For some people in the safety department, it might be safety. For some people in other departments, it might be measured by KPIs or turnover or profit, but it's important to recognize that human factors, whatever your performance goals are, can help and assist in reaching them. Human factors also aim to decrease harm and improve the wellbeing of the people who are delivering this fantastic care.

I hope you've enjoyed this very short introduction to human factors. As I said at the beginning, it's a scientific discipline. It's absolutely huge. If you want to find out more about it, then please do head to the Chartered Institute of Ergonomics and Human Factors. Ergonomics and human factors are two words that are interchangeable, but when we're talking about healthcare, we're more likely to talk about human factors as scientific knowledge about the human body, mind, and behaviour. It helps us

understand our capabilities and limitations. It helps us understand how we can fit people and their working environment together to create exceptional performance. But more than that, it's making it easy to do the right thing. Looking from a system's perspective, asking why did the system let us down? Not apportioning blame, but looking beyond that, asking the person, why did it make sense at the time for them to behave in that way and what we can do in the future to make it easier to do the right thing, easier to keep our patients safe and easier to make sure that our people in our teams are kept well. Thank you so much for listening. If you'd like more information, please do head over to RCVS Knowledge

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