

Patient safety in training

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Abstract

Patient safety has developed considerably in the past 15 years and must be seen as an own field of knowledge. Despite the evidence of its effectiveness, patient safety skills and techniques are often ignored in medical education and training.

This results in an unnecessary great number of patient harm – also known as “adverse events”.

High reliability industries such as civil aviation found out, that the so called “human factor“ is the main reason for the most catastrophic accidents. It could also be shown, that these “human factors“– problems, including ineffective communication and teamwork can only be improved by education and training of the so called “non-technical skills“. Meanwhile this could also be demonstrated for the patient safety problems in health care. It turned out, that all safety related human problems are the same in every industry, no matter how different they may look from the outside.

Education and training concepts in medicine must therefore be changed and adopted according to the current needs, as also proposed by WHO in their guidelines concerning patient safety.

Key words: Patient safety, human factors, non-technical skills, adverse events, patient harm.

Introduction

The topic of patient safety, as we understand it today, was completely ignored by our healthcare systems for a long period of time. Even after Lucian Leape wrote his milestone paper “The Harvard medical practice study” (Brennan et al., 1991) published in the *New England Journal of Medicine* in 1991, it lasted many years before some pioneers – including Lucian Leape – took the lead in this important field of medicine. Despite the existence of a “patient safety science” and the evidence of its positive effects in clinical medicine, if it is implemented in our daily work, we are far from the desired status in education, training and implementation in our daily routine.

1999 the Institute of Medicine published the book “To err is human” (Kohn et al., 1999) which can be seen as the beginning of a new area in medicine concerning patient safety. Before one can describe the necessities in medical education and training, it is necessary to understand the systemic problem as

well as the solutions that are already implemented in other industries.

Because of the little knowledge of patient safety science in medical staff, universities and hospitals, this chapter of the Monograph will outline just the very basics of patient safety and skills that have to be learned to provide the best medical care as safe as possible to our patients.

The problem

All clinical important papers, published in medical top journals up to now indicate that between 10 and 15% of all patients admitted to an acute hospital suffer from some kind of preventable harm. Three out of 1.000 experience severe permanent harm up to patients’ death (Kohn et al., 1999). While treating patients with complex diseases in a complex world under time pressure and limited resources will always produce some harm, experts could demonstrate, that at least 50% may be prevented by using simple safety-strategies as they are used in the so

called high reliability industries like aviation, space travel, petro chemistry, mining or in dangerous sports like downhill racing, climbing or Formula 1.

Lessons from Aviation

No question, civil aviation today is among the so called high reliability industries with the best safety records worldwide. Therefore it is worth while to explore the history of safety work in this industry. In summary was shown again and again, that 80% of all causes, that ended up in severe accidents involved not technical, but so called “Human Factor” – problems.

“Everything that is able to disturb human performance” - represents a broad definition of the “Human Factor” (Leonard et al., 2004).

On one hand side there are personal factors like fatigue, anger, hunger or illness, while on the other side there are environmental factors like noise, high workload, stress, time pressure, interruptions and other common things.

Furthermore it was shown again and again, that steep hierarchies, insufficient teamwork and dysfunctional communication are more often than other things at the core of the problem.

Despite improvements in selection, education, training, technique, the introduction of checklists and many other things, errors and accidents happened in an unacceptable high number resulting in thousands of victims.

Soon it turned out that error is inevitable and a result of human physiological and cognitive limitations. In modern safety concepts these facts have to be recognised and respected.

Moreover it turned out, that human error is not a cause, but a symptom of an insufficient system, not able to facilitate working conditions, that would be able to catch human errors, before an accident happened.

Recognizing these facts, Prof. Helmreich, a leading aviation psychologist started to develop special trainings for the aviation industry. The main target of these trainings was to demonstrate to the crews the performance limitations of human beings, and why errors happen so easily, and how crews can deal effectively with the so called “Human Factors”. Successful training is able to prevent 80% of these problems (Helmreich, 2000).

The relevance of human factors in improving safety cannot be overstated and this was realized and acted upon in aviation with the introduction of these trainings known today under the name “Crew Resource Management” (CRM) – Trainings.

Such CRM trainings, required by law for all pilots in civil aviation in all western countries, are an

essential part of every successful comprehensive safety program in each industry.

Again, knowledge and dealing with the “human factors” using the so called “non-technical skills” (NONTECHS) – which will be explained in detail later in this article – is central to all safety trainings.

Status in Medicine

There is a long-lasting, virtually not ending debate in medicine if healthcare service can be compared with other industries in the context of safety. Despite countless papers in top journals showing the huge effect of implementing safety strategies used by industries like civil aviation or space travel into medicine, a good part of the leaders in healthcare carry on their resistance against an urgent system change to reduce patient harm in medical care.

Two of the most impressive studies, showing the huge effect of teamwork and the professional use of checklists are the WHO paper describing the effect of the “surgical safety checklist” (Haynes et al., 2009) and Peter Pronovosts paper showing the unbelievable effect in his study of patients receiving central line catheters (Pronovost et al., 2006).

In contrast to this evidence, curricula for doctors and medical students have focused on pure clinical skills: diagnosis and treatment of illness and follow-up. However, safe communication techniques, effective teamwork, use of checklists, the devastating effect of steep hierarchies and all the other important aspects of patient safety science have been overlooked. (The expression „steep hierarchies“ is often used by experts for a big power distance between different hierarchy levels, for instance doctors and nurses, or chief surgeon and assistant, pilot and co-pilot and so on).

These skills are fundamental to patient safety. Just trying harder will not reduce our problems, neither in education, nor in practice. Major systems changes need to happen to be really successful in the field of patient safety. Medical students, as future clinicians, will need to know how systems impact on quality and safety of health care.

Don Berwick, long time CEO of Institute of the Healthcare Improvement, often cited the QM-Pioneer Edwards Deming aphorism: “Every system is perfectly designed to achieve exactly the results it gets.”

Main Topics essential to be trained in patient safety

In 2007, the world alliance for patient safety published the WHO patient safety curriculum guide for medical schools (WHO, 2007). In this guide one

can find a detailed description of the problem, a basic description of the solutions and an instruction how to teach it in medical curricula.

In the following section you will find a proposal what most important topics in the field of patient safety should be implemented first in a trainees teaching program.

Paragraphs in cursive letters indicate the original wording of the WHO curriculum guide.

The precondition: Train the trainers

If we like to train the right stuff we need to have a group of competent, clinical experienced trainers. Therefore you need to establish a train the trainer program including the same topics as the respective trainees-program. Part 2 of the WHO patient safety curriculum guide gives some good examples how teachers should teach their students in patient safety (WHO 2007).

Whereas one can assume, that most of the topics and skills mentioned in the following paragraphs are not common knowledge in medical schools and hospitals, I will mention the basic topics as well as some details that should be known by teachers and trainees.

Scope of the problem

We have learnt over the last decade that adverse events occur not because bad people intentionally hurt patients but rather that the system of health care today is so complex that the successful treatment and outcome for each patient depends on a range of factors, not just the competence of an individual health care provider (WHO, 2007).

Culture

One of the biggest barriers in the field of patient safety is represented by our shame and blame culture and steep hierarchies (Walton, 2006). As long as young team members are afraid to speak up in the presence of a superior team mate, our culture inhibits safety dramatically. The desired state is the so called “Just culture” (Anon, 2004).

According to James Reason, a famous scientist in the field of human error, just culture should result in an atmosphere of trust in which people are encouraged (even rewarded) instead of punished for providing essential safety related information. Besides that, there must be a clear line between acceptable and unacceptable behaviour.

In summary, a just culture recognizes that competent professionals make mistakes and acknowledges that even the best will develop unhealthy norms

(shortcuts, “routine rule violations”), but has zero tolerance for reckless behaviour.

What is patient safety?

Studies show that additional hospitalization, litigation costs, infections acquired in hospitals, lost income, disability and medical expenses have cost some countries between US\$ 6 billion and US\$ 29 billion a year (Kohn et al., 1999; NHS, 1999). Significant numbers of patients are harmed due to their health care, either resulting in permanent injury, increased length of stay (LOS) in hospitals or even death (WHO, 2007).

Fundamentally, patient safety refers to freedom from accidental or preventable injuries produced by medical care. Thus, practices or interventions that improve patient safety are those that reduce the occurrence of preventable adverse events (AHRQ).

Adverse Events and patient harm

Patient harm is often addressed as “adverse events”. One of the best definitions of an adverse event is: “Any injury caused by medical care” - for example a postoperative wound infection.

It is important to note, that identifying something as an adverse event does not imply “error,” “negligence,” or poor quality care. It simply indicates that an undesirable clinical outcome resulted from some aspect of diagnosis or therapy, not an underlying disease process (AHRQ).

Consider the difference between unintended and preventable harm. The importance of this differentiation lies in the fact that the word “preventable” leads directly into a shame and blame discussions, while the word “unintended” does not.

Furthermore it is essential to know how to classify patient harm. The most accepted scale is given by the NCC MERP -- Medication Error Category Index (NCC MERP), originally used for classification of medication errors.

In relation to the level of harm the categories E – I are used for the **classification of patient harm**:

Category E: temporary harm and required intervention

Category F: temporary harm and required prolonged hospitalization

Category G: permanent patient harm

Category H: Need of an intervention necessary to sustain life

Category I: Patient’s death

Using this schematic classification, one can classify patient harm exactly.

Human Factors and Non-Technical Skills (NOTECHS)

As mentioned above, human factor problems stand for 80% of all causes, releasing catastrophic events in every industry as well as in medicine. Therefore trials to solve the safety problems with pure technical solutions had to fail and did so.

Airbags or safety belts in automobiles for example may work well in case of accidents, but cannot prevent them. In most of the accidents adequate safety related behaviours and not technical solutions would have prevented the catastrophe or at least reduced the harm considerably.

The crucial question was, what are the adequate safety related behaviours and how can we implement them in our daily routine.

Due to the results of many accident analyses, the airline industry decided to combat human factors problems by education and training of the so called "Non-Technical Skills" (van Avermaete, 1998), which are an essential part in the so called Crew Resource Management - Trainings.

These NOTECHS should enable airline crews to avoid errors due to miscommunication, steep hierarchies and stressful situations.

The main categories of NOTECHS are:

- Cooperation
- Leadership
- Situational Awareness and
- Decision Making

Each category is subdivided in elements, which are defined in detail and can be learned and trained in the CRM-Training sessions. Since the early 90th the trainings are mandatory and served as a major contribution to flight safety (Helmreich and Foushee, 1993; Beaty, 1995; Wise et al., 1999).

In medicine, CRM trainings were adapted by some pioneers to the specific needs in hospitals. In the recent literature they are frequently named "Medical Team Trainings".

As in aviation, the major part of the trainings also includes "Human Factor Principals" and "Non-Technical Skills".

A detailed definition and description of the categories and elements, as well as good and poor behaviours is published by the group around Flin for operation room staff (Yule et al., 2006).

The main categories and elements according to Flin are:

Situation Awareness

- Gathering information
- Understanding information
- Projecting and anticipating future state

Decision Making

- Considering options
- Selecting and communicating option
- Implementing and reviewing decisions

Communication and Teamwork

- Exchanging information
- Establishing a shared understanding
- Co-ordinating team activities

Leadership

- Setting and maintaining standards
- Supporting others
- Coping with pressure

Education and Training of Human Factors and NOTECHS must be an essential part in a modern trainees' curriculum due to the WHO-curriculum guide (WHO, 2007).

Communication and Teamwork

While each category of the NOTECHS is of major importance, effective communication and teamwork are probably the most critical topics in medicine and must therefore be noted particularly. As far as it belongs to communication, the most important strategies to learn and train are briefing techniques as well as closed and structured communication (Lingard et al., 2004).

All data available today indicate that there is no chance of a significant improvement in patient safety, without mutual, honest teamwork. We know that teamwork does not just happen, you must go for it.

One of the best examples is sport teams, spending over 90% of their time for team training. They standardize their routines, identify roles and responsibilities, improve the communication processes and team coordination to be successful.

Nobody would deny that training of teams is essential for success.

Effective Teamwork in medicine was up to now assumed, but not assured.

Today, regular team trainings are the very exception in medicine. Despite there is also a WHO document: Patient Safety Curriculum Guide - Multi-professional edition (WHO, 2011) trainings like this are not performed in the vast majority of the hospitals or in trainee's education.

The most important study showing the enormous effect of teamwork in addition to evidence based standards was done by Pronovost et al. (2006). It was shown, that infections and mortality after Central Line catheters dropped beyond belief after implementing a bundle of procedures and some team training. It is also worth reading his book about all the circumstances around this experience (Pronovost & Vohr, 2010).

Another great example showing the potential of recent patient safety strategies is given by the Veterans Health Administration Hospitals. The implementation of a formalized medical team training program for operating room personnel resulted in an 18% decrease of surgical mortality rate (Pronovost & Freischlag 2010; Neily et al., 2010).

Conclusion

Patient safety knowledge is different from all other medical fields, because it applies to all areas of clinical practice and personnel. Medical students will need to know how and why the systems influence patient safety and what can and must be done to improve the situation.

Educations in all universities and hospitals should be adopted as soon as possible due to the WHO-curriculum guide. The actions described here may be a good start.

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