

## Special Section Commentary: Opportunities and Challenges for Human Factors and Ergonomics in Enhancing Patient Safety

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Can our science help? Yes! Of course, it can. It should. It must. It's beginning to. But more is needed. Patient safety has become a national obsession among health care providers, and with much reason. In 1999 the Institute of Medicine (IOM) published a landmark report, *To Err Is Human*, which created a much-needed awareness of medical errors and launched several sociotechnical interventions designed to create a "safety culture" in all health care settings (Kohn, Corrigan, & Donaldson, 1999). In one way much has happened since the IOM report. Some hospitals across the country (and Europe) have launched diverse initiatives to prevent errors and improve organizational safety, mainly developing programs similar to those used in aviation. The Joint Commission on Accreditation of Healthcare Organizations now look for "safer practices" in its inspections. A growing number of health care delivery systems are trying to achieve high reliability status in patient safety (e.g., Sentara Healthcare System, Kaiser Permanente). These are aggressively applying human factors research and principles to make significant improvements in quality and safety. There is some (limited) funding available for research and demonstrations as well. And so some progress has been made.

But in another way, not much has happened, progress is slow moving, or some key features for achieving safety and safe behaviors are still overlooked. Not all the relevant sciences (e.g., industrial/organizational psychology, modeling and simulation) are being leveraged or their findings used, applied, tried, or implemented. There is overreliance on one model – the aviation one. There is still some resistance to change – to behave, manage, reinforce, and function different-

ly – on the part of physicians, chief executive officers, chief financial officers, and health care providers. The research seems uncoordinated, fragmented, and insufficient to tackle the different complex issues in some depth. However, there is hope: hope that more, better, and useful science will evolve and mature enough to have an impact. There is hope because some institutions, agencies, nurses, and physicians have embraced the need for change. There is hope that research will guide change and implementation of new ways of functioning. There is hope for the science of human factors and ergonomics. And so, we hope that this special section encourages research, debate, new ideas, better theories, practical interventions, and useful findings to ameliorate errors in health care. We next briefly outline some insights from diverse perspectives regarding the opportunities and challenges that our science will be faced with or is now facing. We draw from those who fund the work (Agency for Health Research and Quality, or AHRQ), those who are attempting to create a movement for culture change (Department of Defense), and those who are designing, developing, and evaluating interventions. Again, the insights are offered in the hope of promoting, motivating, and launching thinking, action, and passion for applications to reduce medical errors.

### THE OPPORTUNITIES

Opportunities abound. They are within our reach and are invaluable to those who have an interest or some relevant expertise. These, however, as we will note, are not easy; they are not without political implications, complexities, and controversies. We outline a few in the following

sections. These are offered to stimulate thinking, as “food for thought,” and to provide input to generate action.

### **We Have Lots to Offer...**

Indeed, we do. We have theories, methods, tools, and strategies that address the core of patient safety. We have principles, guidelines, findings, and lessons learned that can directly help solve the patient safety problem. These have much to offer for guiding how to design organizations for safety, how to mitigate the effects of stress, how to minimize human error, how to make better decisions, how to design devices... the list goes on. We have principles, guidelines, and tips for improving performance measurement and diagnosis and for enhancing patient safety through team training, usability studies, simulation systems, and managing human performance, just to name a few. Despite the fact that some say that human factors is not relevant, we have a solid basis rooted in science that can begin to provide solutions to patient safety. Some are documented in this volume; other efforts have been published in other journals (e.g., *Joint Commission Journal on Quality and Patient Safety*, and *Quality and Safety in Healthcare*), and others are yet to come.

### **We Have Been Listened To...**

The medical community, in most cases, has listened to what human factors and ergonomics scientists and practitioners have to say. Most likely, this is because of our contributions to aviation and the military. A few pockets in the medical community have reached out to our community on a frank, open, and equal basis. Some have embedded human factors scientists within their patient safety centers. That is encouraging, but because we have been listened to, we have more responsibility to be principled – scientifically rooted – in our approach to offering advice or solutions. We must rely on our science – on credible and defensible insights for enhancing patient safety. People’s lives depend on it.

### **We Are In...**

We have been listened to, and now we “play” in the medical world. We are in! Of course, we have a way to go. People in some settings still don’t know who we are and what we can offer. In some

settings, we have no credibility. But some have opened their doors. There are numerous initiatives (at the University of Wisconsin-Madison, Vanderbilt University, the University of Miami, Kaiser Permanente, and the Department of Defense Military Health System, just to name a few) where human factors and ergonomics are an integral part of understanding and solving patient safety concerns. There are more research programs where we “hold hands” with nurses, physicians, and hospital staffers. AHRQ has embraced human factors and ergonomics by adding staff with human factors expertise. Moreover, human factors experts are now included as peer reviewers for all patient safety grant reviews. This is refreshing and a great opportunity for us to have impact (we already do), to show that our science matters, and to make a difference. We hope that this special section opens some additional “health care settings” to our contributions.

### **We Must Do More...**

We have been listened to. We are in. We have lots to offer. Great! Now and in the future, we must do more. More studies on patient safety are needed. We need to offer more solvent solutions and strategies to reduce errors; more multidisciplinary research; and more partnerships with educators (medical and nursing schools, engineers) in designing safe physical environments and with economists in strengthening the business case. We need more visibility with accrediting bodies and health policy makers; more research in naturalistic settings (e.g., hospitals, operating rooms, emergency rooms, intensive care units); more principles and guidelines that foster a “culture of safety” in health care; and more focus (such as this special section) in order to debate and have a dialogue with the medical community.

## **THE CHALLENGES**

Just as these are opportunities, there are numerous challenges. None is a “show stopper” – but difficult – yes. Will it take effort? Of course! But what activities that we are involved in as a science and practice do not have “gatekeepers,” politics, biases, and roadblocks? This is no exception. We believe our community has the ingredients to face the challenges; we have (some of us) the

motivation and passion to make a difference; we have, as noted, the theories, tools, methods, and funding that will help.

### **We Are In...**

Being “in” is a double-edged sword. It is good that we are in, but the demand to do more, do better, and show relevancy is significant. As some businesses have advertised, success demands more. And that is our case. The health care community is demanding (we think) more data, more studies, more evidence, more involvement, more education, more solutions, more information, and so on. The long-term success of this partnership will depend on our willingness to satisfy the demand. Are we up to it? What will our role be? This special section demonstrates our most recent contributions!

### **We Must Go Beyond the “Aviation Model”...**

Aviation is a good model for safety and managing human error. It is a good point of departure; a good place to seek advice, lessons learned, barriers, and successes; a good place to understand what it might take and what the obstacles might be; a good place to begin a road map to success; and a good place to find out what it took to change aviation. But let’s not forget how long it took to transform the aviation community to the point of accepting human factors – about 20 years. Indeed, there is much to learn from aviation. But, there are as many differences as there are similarities. Health care needs to learn not only from aviation but also from the Department of Defense’s simulation, training, and behavioral research; the nuclear power industry; and some pockets in manufacturing. It also needs to learn from itself – its own studies and its own culture. Furthermore, health care needs to venture “beyond aviation” by learning about human-computer interaction, usability issues, designing for safe environments, sociotechnical systems, macro-organizational design, and other disciplines. We submit that in order to create a safe culture in health care, we must go beyond the aviation model (no disrespect to what it has accomplished – the two authors of this piece have contributed significantly to that movement) – take the best of it and improve it.

### **We Must Foster Partnerships...**

This should go without saying. Particularly among nurses, physicians, human factors scientists, and staffers, partnerships are a must. It’s in the best interest of all. But this, of course, is easier said than done. There are many barriers: cultural, personal, organizational, and philosophical. These are strong and difficult to overcome, but not impossible. They are manageable when there is a cause and a motivation. The movement cannot afford a “we can do it ourselves” mentality. As noted, some partnerships have emerged, and we hope more will. Partnerships in diverse disciplines can happen, we submit, only when parties meet “in the middle,” when parties have a shared and valued mental model of what needs to be done, and when all parties recognize one another’s contributions. It has been said clearly that “the solutions to patient safety are not in medicine, but in psychology” – and in human factors and ergonomics, we add. So, participation is imperative. We hope this special section and other forums generate true partnerships.

### **We Must Continue to Seek Evidence That Human Factors and Ergonomics Matter...**

We are in, we have partnerships, and we can go “beyond aviation.” Now, does it matter? Do our principles, tools, methodology, and, more importantly, our findings matter? Do they make a difference? Do they reduce errors and promote safety? That is one of our biggest challenges here (and in other domains, for that matter). The demand to show that our science matters is immense. But, we believe we are up to the challenge, and the preliminary evidence (at least in team training) is encouraging (see Salas, Wilson, Burke, & Wightman, in press). In our multidisciplinary studies and in our partnerships we must, we submit, continue the pressure to show that human factors and ergonomics make a difference in patient safety. Furthermore, there is a need to have human factors and ergonomics research to be more widely accepted as part of what is often referred to as “evidence-based medicine,” which currently has a primary focus on using the randomized clinical trial as the gold standard of research. A big challenge, but we know how to do it. And so we must.

## We Need to Educate and Translate...

The key to understanding, to partnerships, and to having impact is, of course, communication – communication that reaches the intended audiences and that changes how the others operate or think. In our field (and many others), that means translation. We must translate what we find into language that researchers and scientists can understand and that health care providers and administrators can apply to daily practice – translate findings, conclusions, or what was learned into words that are understood by those whom need to apply the findings, conclusions, or lessons learned. We don't do enough of that. We are not encouraged to do it, and it does not come to us naturally. Most applied psychology disciplines suffer from poor translation. We would like to encourage more translation. Translations will educate. Translations will create relevance. Education will bring partnerships, impact, research, and more. Translation that is creditable, defensible, and applicable is imperative to reducing medical errors.

There is a need to open up training opportunities, both formal and informal, for health professionals to gain a better understanding of human factors. A growing number of physicians, nurses, and allied health professionals are seeking formal training opportunities in the area of human factors and ergonomics. Our academic programs need to accommodate this growing need and interest. There are some interesting interdisciplinary programs emerging, such as at the University of

Wisconsin-Madison, where health professionals and engineers are working together on an innovative joint academic program.

## CONCLUDING REMARKS

This special section brings together a set of studies in diverse settings and domains. They are not perfect by any means. All studies have weaknesses. These do as well. But, they all have messages, some small and some big. Some made it not because of what they found, but where they might take us. We hope that this is just the beginning of more pieces that show how our science and practice matter to our national problem. Time will tell. Let's not forget: The most significant factor in making the nation's health care systems safer is the human element. And that is our business...

## ACKNOWLEDGMENTS

The views expressed herein are those of the authors and do not represent the official position of the organizations or government agencies with which they are affiliated.

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