ICU

MANAGEMENT & PRACTICE

THE OFFICIAL MANAGEMENT JOURNAL OF ISICEM

VOLUME 17 - ISSUE 1 - SPRING 2017

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Embracing Safety as a Science

We Need to Tell New Stories

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Since the publication of To Err is Human how do you rate progress in patient safety? What still needs to be done?

There's been some real progress, but the biggest indictment is that we don't know how much progress we've made, because we don't have a valid measurement system for harm. That's tragic and preventable, and we need to address it. We know the main reasons people die from preventable harm, and we have measures for some, like infections, but for most we don't. We should be able to say with confidence whether care is safer or not.

More clinicians and administrators are focusing on safety, but much of what we are training in is superficial and siloed. We have not embraced safety as a science like aviation and the oil and gas industries did. We borrowed error reporting from aviation, but in aviation they report mistakes and focus on sector-wide root cause analysis and risk reduction. We took team training from aviation, but we haven't mandated it or built it in to accreditation. Pilots cannot be certified if they don't pass the teamwork test, but there is no specialty that requires a teamwork test for medicine—you can be a horrible team player and be fully certified as a doctor. In healthcare we know we have harms from the designs of electronic medical records (EMRs) and medical devices, but we have not done sector-wide improvement efforts.

Stories are the most powerful force for change, because they define how you act in the world. The story that is guiding safety now is extrinsic motivation rather than intrinsic; hospitals and doctors have their pay docked to make them care more and there is very little evidence that it works.

The three new stories that I would love to see us tell are:

1) Harm is preventable rather than inevitable.

In our central line-associated bloodstream infection (CLABSI) work (Pronovost et al. 2006) we found that the 'secret sauce' wasn't the checklist, it was changing the belief systems. When we interviewed doctors and nurses and saw what changed when we spoke to them you could see in their eyes what they believed in their heart. They used to say that infections are inevitable. Now they say infections are preventable and they can do something about it.

2) Safety is a performance management system rather than a series of individual projects.

In healthcare systems quality and safety efforts are like whack-a-mole: they are working on a thousand different things, but with no integrating theory or framework. That is not how safe high-reliability organisations operate. Ultra-safe organisations integrate their work into an operating management system that includes governance and leadership, technology, training and recruitment as a seamless whole to eliminate all harm. Healthcare hasn't matured to that extent yet, although the Armstrong Institute for Patient Safety and Quality at Johns Hopkins Medicine is putting that systematic approach in. Early results are encouraging. For example, when looking at harms we saw that some nurses just out of orientation and residents coming out of training weren't skilled in the knowledge to prevent specific harms. This was predictable, because the people who run nurse orientation and residency programmes are completely separate from the people who run safety. So we presented them with the top ten reasons people suffer harm—it's a pretty clear list, and asked them to make sure that when people come out of orientation they have the skills to prevent those harms. We broke those silos down to focus on harm reduction. When you see safety as an integrated system all kinds of possibilities open up.

3) Safety is based on the design of safe systems rather than the heroism of clinicians.

Our clinicians spend over half their time documenting in the medical record—it adds no value. Our nurses spend about 20% of their time manually double checking medication changes to make sure the computer matches the infusion pump, when there is an electronic signal in both devices that in any other industry would do an electronic double

check. We made a checklist for CLABSI, but patients are at risk for a dozen harms. Every harm has a checklist with 5-10 items, and every item may need to be done 3-4 times a day. Multiply that and I am expected as a clinician to do 150 things every day. There is not a single EMR on the market that gives you any visual display if you have done them. It takes literally hundred of clicks and calculations to tell if you have done these things. Our goal is that within five years the inside of an ICU or a hospital ought to be as seamless as the inside of a cockpit. We are taking a disciplined systems engineering approach to plan the ICU of the future (Johns Hopkins Medicine 2016).

Johns Hopkins and Massachusetts General Hospital have successfully trialled peer-to-peer assessments in quality and safety (Mort et al. 2016; Pronovost 2017). Would you like to see this adopted more widely?

We have relied a lot on regulators to solve healthcare problems. Regulators are important, but they won't give the kind of healthcare we deserve. The reason is they can sanction us, and this creates a culture of judging not learning. I am fortunate to serve on the advisory board of the World Association of Nuclear Operators (WANO). After the Three Mile Island nuclear accident the nuclear company CEOs got together and said if there is another nuclear accident the public isn't going to trust nuclear power; we need to solve this ourselves. The regulators, though important, aren't going to fix this and in our own organisations we aren't strict enough, don't hold ourselves accountable or share best practices. They set up WANO, which does peer-to-peer review: one nuclear organisation goes and visits another and they use standard validated tools. It includes people from WANO and some who work in the individual nuclear facility. They have no sanctioning ability and the reports are confidential. They are ruthlessly honest, and it's in the spirit of improvement. We need this in healthcare, because when the regulators come we hide our mistakes rather than make them visible. We experimented with this and went into hospitals with near zero ICU infections and also higher infections to see if there is anything different (Pronovost and Holzmueller 2017). Every time we did this the CEOs and staff said this was the most potent quality improvement intervention, because they could be honest and make themselves vulnerable as they knew they were not going to be punished and would learn. If we see great things we share this so hospitals get credit for this and can focus on improvement. I would love to see healthcare have a global version of WANO with global peer-to-peer reviews. We would accelerate learning and improvement far quicker than we do from our current regulatory approach.

> **"Our goal is that within five years the inside of an ICU be as seamless as the inside of a cockpit"**

The Armstrong Institute's project EMERGE has developed a clinician app and a patients and family app. Are they in use now?

EMERGE is part of the integrated ICU project (hopkinsmedicine.org/armstrong_institute/improvement_projects/project_emerge.html). Clinicians can look at one screen with a picture of every ICU patient. If I am missing any one of those 150 things that needs to be done for a patient there is a red check next to their name. It is much more efficient. We are pilot testing it at Johns Hopkins and at UCSF, and we are looking to spread it. One of the main worries of patients is if they are going to be able to participate in decisions, to be informed and updated and have good communication. We let patients down on that, because we are working with clunky and clumsy technology and we are really busy. This app seems to be greatly aiding us to improve.

You have written that loss of respect and dignity is actually a patient harm. How can that be addressed?

With the new narrative that safety is not one project but an integrated operating management system it means we have to stop working on one harm at a time but on all harm. When we looked at how we defined harm, we realised we defined it too narrowly. For example, at Johns Hopkins, we now integrate patient experience, value and healthcare equity under quality and safety. Many of the complaint letters were not about technical care, but about lack of caring or respect. We decided to call disrespectful care a harm, because for the patient it is. When you ask patients what they care about, being respected is really important to them. We are working on a number of things: one is a simple measure of patients' perceptions of respect. A staff member asks patients if they feel respected and how well they were respected. In real time we could have a gauge of how patients are feeling, just as for temperature or blood pressure. The tablet that we developed for the patient-centred app is geared around what we found in focus groups that drives disrespect. Patients want you to know their names, they want to know the role of the care teams, they want information and they want you not to lose their stuff they come into the hospital with. The app is designed to help facilitate providing respectful care.

What is the smart list idea behind Doctella?

We learned that with disciplined improvement science, we can significantly reduce harm such as CLABSI. A key lesson was to be very clear about the behaviours people need to do, i.e. the checklist items. They need to be flexible for their local context. There's not one CLABSI checklist, but thousands in different hospitals. They are 90% similiar, but the 10% difference is what makes it work in the local context. Yet our CLABSI work used paper checklists. Doctella (doctella.com) is a platform to make checklists for all types of procedures, to make it easy for physicians to customise their own, engage patients in using them and provide analytics to monitor performance. Without having smart lists, we can't configure patient education material to engage patients in their care and share decision making. That's where the biggest impact is on patient outcome. When a patient has a procedure, their doctor can customise the checklist items to say, for example, to stop taking aspirin at this date or take this medication in the morning, and through secure text communicate with them and get feedback

on their compliance. We've seen about a 60% reduction in cancelled operating cases when patients use this because so much of this is due to miscommunication, with the patient saying, "I didn't know you wanted me to do this" or "I didn't know I was supposed to do that." We are early on in experimentation with this, but see great potential to have this smart list technology as a platform to connect patients and clinicians.

What are your hopes and expectations for personalised medicine in the future, particularly in critical care?

Personalised medicine has still much promise but also some hurdles to overcome if it is to benefit patients. In really safe organisations they don't just solve puzzles, they solve problems by integrating applied and basic research. Too often personalised medicine is viewed as only sequencing genes without making patients benefit from it. This is played out in how some people use the term learning health system, largely researchers, who are learning and thinking about adding new knowledge. But those of us who have operational responsibility for quality and safety, our thinking is about high-reliability organisations and eliminating harm and those two ideas need to be combined. In my view personalised medicine has such great hope, but it is only going to be realised if it is combined with applied research and healthcare managers where genomics, proteomics, environmental-omics or epigenetics are just another variable in a risk model to help patients thrive and stay well. If we don't apply what we learn I think we are going to spend a lot of money and not have a whole lot to show for it. The difference between what we are doing in safety and quality with applied research and precision medicine is that applied researchers start at the end and work backwards. We start with the goal of eliminating harm, continuously improving patient outcomes and experience and eliminating waste in healthcare, then work backwards to design a system that does that.

> "see precision or personalised medicine as another input to make sure we optimise patient experience"

Applied research and precision medicine is feed forward, it asks is A better than B, is this gene related to this disease or not. That is important, but we need to combine both modes of thinking, because if you just ask if A is better than B, we have a whole lot of experience for decades that shows much of that knowledge never reaches patients. We know a lot of therapies that work that patients don't get. So the idea is to see precision or personalised medicine as another input to make sure we optimise patient experience. Perhaps the checklist for you differs from the checklist for me, because of your genes and I need to make a checklist that does that. We have to be mindful of precision medicine offering the hope of giving patients the right therapies. We know that many cancers are not one disease but ten different diseases and each may need a different therapy or dose of drug because you metabolise differently. This is humbling, because now we have to rely on memory to understand all those ten permutations and what each of those therapies should be. When every patient is at risk of a dozen harms there are 150 things we need to do, and if you add personalised medicine it may mean that I need to be aware of a thousand different things to do. We far exceed the cognitive ability of our brains. We have to partner with system engineers and computer scientists to make sure that patients realise the benefit of precision medicine. If we rely solely on our memory, patients will suffer harm and it may even increase, because we are adding such complexity to the system. Ultimately to realise benefits to patients, healthcare will need to think like an engineer, solving problems, and like a biomedical researcher solving puzzles. This is what Bell Labs did. This is what we are trying to do at the Armstrong Institute. ■

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