



**Patient Safety and High Performance  
Leadership Summit  
Issues in Governance, National Collaboratives, and H.I.T.:  
NTSB for Healthcare Concept & IOM Report**

**April 27, 2012  
Webinar Transcript**

**Charles Denham:** So we'll get started with our next panel now. If we could all take our seats, please. So this panel is one focused on the Institute of Medicine's "Health Information Technology Report." Can everybody take their seats? Thank you. For those [who] have just logged on to the WebEx, you'll be hearing audio and will not see slides. If you go to [www.safetyleaders.org](http://www.safetyleaders.org), you'll be able to take advantage of the streaming video if you have a fast enough line. We'd like to remind all of the hospitals and caregivers [who] are on the WebEx or the streaming that each of the panels will be videotaped; they'll be edited; and each of these programs will be made available for asynchronous learning, and continuing education credits will be available to everyone in the next two to three weeks for asynchronous learning.

This panel is focused on the Institute of Medicine report that had a number of findings. Two of the findings we'll be covering today. One of them is addressing the possibility of a National Transportation Safety Board-like entity for healthcare, and those [who] were in our earlier session saw the movie, kind of a sneak preview if you will, of *Surfing the Healthcare Tsunami: Bring your Best Board™*, and we address this issue lightly. We'll take it to much greater depth. If you log on to [www.safetyleaders.org](http://www.safetyleaders.org), in the HIT agenda and bios, you'll see that we have a terrific panel. I would use up all my time if I covered all of their backgrounds, because they're such a prestigious and accomplished group.

We'll start with Dr. David Bates. Dr. Bates is featured in the film and, because of his flight, he hasn't seen that he's a star. Didn't we all think he was a star this morning? (Applause) And bird watching, and the only guy [who] got in with a hobby. I don't know how that happened. I think it's because [it's] the only hobby of anyone [whom] we shot. Dr. David Bates is an international star in patient safety. He has really shown the way for us to really follow the path of technology adoption and has undertaken terrific research, and – full disclosure – I'm on his development board at the Brigham, and I have to tell you that every moment that I spend with the teams in his center, I am absolutely inspired by the innovation, by the dedication, by the evidence-based approach that they take. Dr. David Bates and Dr. Classen were on the IOM team that developed this report. David, do you want to maybe just frame for our audience here, and our 900 or some-odd hospitals that are on around the world, what the findings were as they applied to the NTSB concept?

**David Bates:** Sure. The backdrop is that our committee was asked to evaluate the problem of new errors being created by [inaudible]. There [has] been a series of studies that suggest that, if you use some information technology, our care gets better; but there [has] also been a series of reports that emerged that showed that some information technology can have unintended consequences and can create new problems. We were asked to address this. We reviewed the evidence that it can create new issues. [inaudible]

Should I take it from the top, or do...

**Charles Denham:** Quick recap.

**David Bates:** Okay. Our panel was asked to address the issue that health information technology can create new errors as well as prevent them. One thing that emerged was that, when providers do find these new issues, there's really not a place to report them. It's been very difficult, in fact, for providers to share these issues. Our panel, therefore, made the recommendation that it would be helpful to create something like a National Transportation Safety Board analogue that providers could report to with these

errors. They could then be freely shared and people could learn from the error reports. That's been extremely successful in aviation, as I think you'll hear from some of the rest of the panel.

**Charles Denham:** Thank you. I'm going to jump around in our panel order here and go to Captain Sully Sullenberger, retired. We all know Sully for really being a terrific example of great leadership. What most people don't know is how thoroughly trained and knowledgeable he is about performance engineering and so many of the things that we really need to know about in patient safety – 20,000 hours as a pilot, terrific history for those of us [who] are pilots. He's got all the credentials and has also been actively involved with the National Transportation Safety Board. He has great passion for this. Then we'll go to John Nance, also an accomplished pilot. Sully, most people are absolutely shocked that we don't have a National Transportation Safety Board-like entity of any type to aggregate knowledge and to learn from these accidents that have really written the rules in blood that we follow in aviation.

**Sully Sullenberger:** It is shocking that we don't. Let me tell you in aviation what a difference it made that we finally had one decades ago. In the bad old days, it was far too easy for accident investigators simply to blame dead pilots for individual practitioner errors and leave it at that. Never do root causes analyses – and I say “causes” and not “cause,” because there's almost always more than one root cause. When we don't do root causes analyses, identify and correct systemic deficiencies, we do not solve the underlying issues and we do not do all we could to prevent accidents from happening again. As Chuck said, almost everything we do in aviation, every rule we have, every procedure we have, everything we know, we have because someone, somewhere, died. We literally have lessons purchased at great cost, literally bought in blood, that from a moral obligation standpoint we cannot afford to have to relearn. Thankfully, with the NTSB formal lessons-learned process, we began to get away from pilot error as a dead-end catchall, literally a dead end. We began to do systems analysis. We understand that nothing happens in a vacuum. We began to do underlying system issues and correct them. We began to transition from a culture of blame, which drives problems underground where they can never be identified and solved, to a more just culture in which accountability and learning can be balanced, and so that was the transition we made in aviation that was critical – that plus the creation in the mid-1970s of the NASA Aviation Safety Reporting System that provided de-identified names and an incentive for practitioners to report safety deficiencies, their own errors, free from repercussion.

**Charles Denham:** So the moment that we hear that there might be a recommendation from an esteemed group like the Institute of Medicine that makes a recommendation to the government is, immediately, we can't afford another agency is the first thing that pops into your mind. But no one really knows what it'll cost, and in the article that Sully and I and John Nance and Dennis Quaid wrote – and in the follow-on article, Jim Bagian will be the fifth author, to expand this – we undertook a pretty detailed analysis of the evidence and actually also looked at the finances, and the NTSB operates at about 30 pennies per citizen, now taxpayers have all paid for those best practices, so they're transportable, they're public domain, we would think; and there's knowledge and institutional knowledge that could be applied. So we're really not proposing another agency. What about a public/private partnership? What about a private one? What about an industry-wide approach that might cost a nickel or a dime per citizen? The evidence is there. The numbers are there and the results are there. John, bring the concept that you brought to us of a Red Cover report.

**John Nance:** Basically, when you look at the NTSB – and by the way that's all forms of transportation, not just aviation for that 30 cents – and you look at one of their major work products, there's something very interesting that I noted from the beginnings as a professional pilot. That is, if you lean in a pilot lounge and throw a couple of so-called Blue Cover reports in, be prepared to jump back, because we as pilots will dive for those reports, because we want to find out what somebody did wrong so we won't do it wrong too. There is no source like this in medicine. So the Red Cover report idea is basically an extrapolation. It's an extrapolation of the intellectual rigor of a report the way the NTSB does it. They no more call it a Blue Cover, by the way, but that's what we all call it. A Red Cover report would simply say, “We're going to take a look at a select number, not everyone. We couldn't possibly humanly do this, but a select numbers of representative mistakes, errors, problems, disasters in healthcare, and we're going to take them apart with a philosophical approach,” which is now standard at the NTSB, which says that there's not one cause, as Sully mentioned, number-one cause. Secondly, we're not interested in blame at

all, under any circumstances. Blame is for the lawyers to hash out later. We want to know everything that happened and contributed to what occurred. Everything that could have been done that wasn't, as well as everything that did get done that became a contributing factor. You do "just the facts, ma'am," as the first part, and then you get into an analysis of the facts. Again, no blame, no finger-pointing, no names. You can de-identify these. Then you take that analysis into recommendations and into also an extrapolation of the causal chain, which is usually, for just any complex accident or incident, going to be ten, 20, maybe even 30 different contributing factors. Here's one of the most important points that came out of the NTSB's maturation over time, as personified by the Blue Cover, is that we want to re-create it in a Red Cover, and that is that every single solitary link in that causal chain, or every hole in Jim Reason's "Swiss cheese slices," will form, will absolutely form the nexus of another accident, incident, or disaster, or in other words, it will become a causal chain element if it is not snipped away. So when you just look at one, you're not solving anything but that one accident by firing somebody, because they're the one [who] made the mistake. It gives you a warm feeling and accomplishes nothing. When you take care of every one of those links in one fell swoop, you eliminate for the entire industry the ignorance that these things can contribute to a major problem. I think in healthcare, since we have nothing like this, that we literally have not just a burning platform – we have a house on fire in desperate need.

**Charles Denham:** In our article we said we didn't make the case to do it – we need the case for "why aren't we doing it?" What is the case for not doing it when you already know how to do it, you know the methods? And so I come to David Classen and this issue of the socio-technical model. You have front-line experience in seeing these accidents happening and you've written about the fact that the unintended consequences of these new, great breakthroughs and the technologies – and Farzad, we'll come to you about what you're trying to do to disseminate them – but the risk/benefit, just like any new thing we put in – Dennis Quaid and I kind of laughed being around you two. We're a couple of guys with 2,500 to 3,000 hours in private jet time, and you all are the giants in aviation. As we look at the aviation crossover data, you're seeing the unintended consequences we did when we brought in new instrumentation in airplanes, when we advanced some new way of going faster or higher or do something new, there are unintended consequences, and you're seeing that at the sharp end. Is that a fair statement?

**David Classen:** Yes, that is a fair statement. I've been involved in accident investigations around health information technology, both inside organizations and outside organizations from the outside looking in. The perspective is very different. When you're inside an organization, even when you think you're doing a good root cause analysis, you always end up rounding up the usual suspects and identifying the usual suspects, which is usually a person, and you don't usually get, even with RCAs, to all the many factors that contribute. I think that's natural within organizations; it's a real challenge. If you do get to the real causes, you almost never share them nationally, so other people don't learn from your mistakes, despite all that we've done. So I think the future will be, how do we create a learning system, and a learning system that doesn't relegate us to silos. When we have an HIT-related accident, we look at an HIT problem. We're not thinking always about the organizational problems, the people problems, the workflow problems, the external forces that play a role in causing that accident. I think that is something that we could really use with great improvements and iterations that would come from an external board that would have that capability to look at life as a socio-technical system rather than just a slice of IT. In the IOM report we talk about this socio-technical model, about a new way to think about safety that goes beyond just the IT system, to a much larger socio-technical model that wraps in people, process, organization, and external factors. I think that is probably what you have learned from NTSB. That much larger model is what is needed to frame the perspective on an accident investigation. Unfortunately we often do not do that in healthcare with our RCAs, our root cause analysis.

**Sully Sullenberger:** These report findings must be widely disseminated but also be locally actionable. You are right. We found in aviation as well, with the increasing use of technology – in particular automation – that these things do not always solve all of the errors; they in fact change the kind of errors that are made. It is important that we realize, as you said, that we have a human technology organizational system [in which] all the parts have to play together well. We need to assign appropriate roles to the human and technology parts that take into account our abilities and our limitations, and we need to have the end user involved in the system design from as early as is possible.

**Charles Denham:** One of the things for time, I would go to Jim for the first time. Jim, as you and I over the years have discussed, aerospace. As an astronaut, as an engineer, as a doctor, you were involved in the investigations of Challenger and Columbia. In the movie that we produced, one of the greatest dilemmas I had was almost all of you are in the movie and it was so hard to pick and choose to just grab one byte or another byte. The expanded discussion about the NTSB for healthcare, where we did not put in the film, Jim, if it was ever a push-the-envelope creating a new envelope, socio-technical model, it was aerospace. My dad was a rocket scientist with the Apollo program. There were lessons learned that you shared with me that we will put in our toolbox about Challenger and Columbia. About communication and direct applicability, as Sully just said – actionable applicability. Would you share those with us?

**James Bagian:** I think many of the things that are familiar with people from aviation and other industries as well is how to go – I like what Sully said, I think root cause analysis is a bad term. It is bad for several reasons. One, there is seldom if ever one root cause. Just to do analysis without action associated with it is kind of pointless. I mean those are main things. Even when we were at the VA, in our National Center for Patient Safety, we actually tried to do this, where we would look at the myriad of causes. It is not the person. If you stop there, it does not get the underlying cause of what led that person to be put in that situation, whether they were not competent? That is a systems property, not an individual property solely. I think even when we talk about the NTSB – which I think is a good model – I think we should not restrict it just to health information technology because the system is broader than that. If we just put where the ones and zeros go, we miss the point. How we have missed the point many times. We have to look at how it interacts with our entire system. How we deliver care. The goal really is, as we said earlier, it is [to] deliver high-quality, safe care to the patient. That is the goal. All of these things are just components that allow that to happen in a reliable way. I think the things we have to look at are, how do we make sure that everybody thinks it is their job? How do they know, when you report something, that it will be used appropriately? It is not going to be to your own disservice and you will not feel like you are being treated unjustly, unfairly. How do we convert that to action? That people actually see that, when they identify a vulnerability, a hole in the Swiss cheese, as John pointed out, that is converted to actual action that mitigates that risk? Sometimes you cannot totally eliminate it but at least identifies it and mitigates it in a way which means we also have to prioritize. If we do not say, “How do we look at the reports we get and decide which are most important to do first?” then we have kind of a tyranny and chaos that people do not understand how we make decisions. That also helps us to tell people what is important. It also helps us as an organization or system of organization. So what do we work on first? Do we do it in a concerted, effective manner?

**Charles Denham:** I am going to stop for a moment. I am going to go, because you are a leader of the Office of the National Coordinator. But before we do, just so we don't lose time, and I am tired of the armchair critics that play journal clubs and say there isn't enough evidence for this and that and the other thing. Is there anybody in this room, we have some of the greatest leaders of patient safety in the globe in this room. Is there anybody [who] wants to go on record [who] says there is not enough evidence for an NTSB for healthcare? Who wants to take that bite now? You got some people to debate it? I didn't think so. I didn't think so. But you know what, we will hear it and we hear that going on. Is there anybody [who] doesn't think that a nickel or a dime or 15 cents per American citizen or a global citizen? We have World Health Organization. Anybody want to go on the record and say there is not enough evidence? Because there is ample evidence. I led that the National Quality for State Practices development program for what, a decade, we put out a number of reports and I went to the leadership and said, “Can we go out of industry?” Absolutely. “Can we go to papers that are not yet published but are going to be published?” Absolutely. So this armchair-critic negativity on something that is so real and has such great face value, I do not think there will be any takers in the national debate but we will hear this noise. I just wanted to get that in the proceedings of this discussion. Yes, Jim?

**James Bagian:** I think not only do we need it but the fact is about the cost. I think the cost is a bad way to term it. It is really an investment. This is a cost and a benefit. We ran into this many years ago where two will take costs and we would always show them, yes you must make an investment. What do you gain on the other side? To look at it as a pure cost, I think, is not a good way to look at it. Yes, there is cost involved but it is not like we flush it down the toilet. Look at the harm, the inefficiencies, the human

suffering, whatever. There are many ways you can do it in very financial terms to show it is foolish not to do so. Absolutely.

**Charles Denham:** Farzad, your position and your role in our government, would you share that with us first? And then your take on the balance of trying to get our nation wired and digital and take advantage and the unintended consequences and the risk and how we have to proceed wisely. Your role first and then that.

**Farzad Mostashari:** I'm Dr. Farzad Mostashari, I am the National Coordinator for Health IT. I am the administrations lead for implementation of the adoption of electronic health records and the nationwide Health Information Network. I also want to thank the gentleman who found my tweed jacket and bow tie in the park today. I'm going to collect it later.

**Charles Denham:** For those of you who are listening on the audio version, he is wearing a suit today and a tie.

**Farzad Mostashari:** Thank you. You know, we just had a meeting in this building a couple of days ago and it was to look at progress made in health IT. There has been, depending on what group you look at, and how you look at it, something like a doubling and a tripling of adoption among different kinds of healthcare providers, outpatient providers, inpatient providers, hospitals, small hospitals, rural hospitals, all the trends that show a hockey-stick curve in adoption in the past three years. We have made more progress on health IT adoption than in the decades before. Recognizing, though, early on that we really – and Ashish Jha, one of David's colleagues at Harvard, summarized it. He said it is no longer a question of whether health IT improves quality or safety; the question now is this is a fact. Health IT adoption is a fact. The question is, how can it improve quality, safety, efficiency, not whether. In recognition of this, we – David Blumenthal, my predecessor, used to say that information is the lifeblood of medicine and I think it is also probably the lifeblood of safety. We asked the Institute of Medicine to take up this issue. While we know that, as David said, health IT, appropriately implemented, can have tremendous gains in terms of quality and safety, how can we maximize its benefits and how can we assure that we minimize any unintended consequences, any safety issues that come out as a result of the technology? On balance, we believe that health information technology is going to be a really critical factor for increasing safety of all sorts in healthcare. As a source of information, as a source of being able to share that information, reporting of safety events of all kinds. I really applaud, I think, Jim saying, you know, it can't be just about the safety of health IT. The question is really much broader, and the socio-technical aspect of how health IT fits into a broader system and the possibilities there. If we are rewiring healthcare, if we are taking a systems view of our delivery system that you have to do, if we're not just paving over the cow patch and digitizing the existing broken processes, if this is an opportunity for us to rewire, let's do it right and let's use the health IT to not just improve reporting of safety events, but use health IT as an intervention to better systematize and to better reduce safety events of all kinds. That is the main goal that I think we have to hold on to; and I think [what] the IOM report really highlighted for us was [that] there is simply a lack of information, a lack of reporting of not just the whether and the magnitude of any health IT-related events, but really an understanding of what are the causes? And we have heard a lot that it is not enough to get reports; we have to be able to analyze and then intervene and keep that move going. This is what we are very interested in.

**Charles Denham:** So we will come back. We will come to you in a minute on the IOM and what it really is, because a lot of people – you know we talk about the IOM and we are not sure what that really is. I want to go back to David Bates and David Classen and say, number one, are there common accidents that occur that are common enough that if we had reports that all of us could look at that we could prevent accidents from happening to others? And is it reasonable to take an NTSB-type approach on a small number of very common accidents that are occurring in our hospitals that others can learn from? To both of you, are they frequent enough – you're nodding – and would that be of value?

**David Bates:** I think that is definitely the case. When we do look across institutions, we find the same things happening again and again. We just did a study in six community hospitals in the Boston area and

found that all of them had similar sorts of issues and many of them could have been reported and we could have rooted them out had they been sharing and had they known about it.

**Charles Denham:** David?

**David Classen:** We know that medication safety is the big issue in most hospitals and we know adequately dispensing, safely and reliably, medication in a really production-driven system is also another area of risk; we've seen several problems around that. So that would be an issue that an NTSB-like approach might be very helpful with.

**Charles Denham:** In our research that you saw in the film about imaging and the Five Rights of Imaging – the right study, the right order, the right way, the right report, and the right action – it is fraught with the most common things that occur in imaging happen in the laboratory, but the laboratorians are not talking to the guys in imaging and the guys in various imaging departments are not talking to the other guys in imaging, so we are seeing, even if we didn't do it in those areas, we would see it in imaging. Before I come back to you, Sully, you know when there's a new aircraft that comes online, in those first stages of deployment, do we or do we not learn about the squawks, and do the squawks represent risk, and do they get fixed, and do we share that broadly in aviation where we don't in healthcare?

**Sully Sullenberger:** Yes to all. They provide sentinel events. They are precursors of probable future failures. We have worked very hard to get all the bugs out and again, this is disseminated widely but yet locally actionable. It is an important part of the safety system, this invisible hand that we see in aviation, that we all operate in.

**Charles Denham:** John, you know, in the '80s I owned an airplane manufacturing company and had to do the safety work for a fleet of 8,000 aircraft, and the FAA wasn't a regulator, it was a mentor, it was an advisor, it was a safety system, it was not a big brother as much as it was that kind brother that helped along the way with those accident investigations. The rapid-cycle way that we got out to that fleet when seats were breaking, people were falling back, it changed the center of gravity and these airplanes were stalling and crashing. We don't have that in healthcare. You championed the cause before that the FAA is not just that big brother regulator.

**John Nance:** Absolutely. As a matter of fact, the best use of a federal agency like the FAA – and they are unsung heroes for this over many, many years – is as a mentor. A good example of this is what we call crew resource management; basically telling a captain, "You're not flying solo, you've got to bring your whole crew into it." It was a whole revolution and evolution in aviation. The FAA didn't write a rule on that for almost 20 years, and yet we had it completely deployed into the industry; but they were in the background, mentoring and helping to push it along.

**Charles Denham:** This is an issue and in our next session we'll talk about that type of application in aerospace and I think that NTSB will come back up. Sam, can you give our audience – because a lot of our folks, they hear about the IOM reports and we know that they are safety and quality – can you give us the framework to know what the Institute of Medicine is and what does it carry forth when a report like this comes out?

**Samantha Chao:** Absolutely, the Institute of Medicine, as far as a National Academy of Science, is, which was chartered by Congress in Lincoln's day, and so we were chartered to be advisors to the nation on all matters related to science, engineering and medicine. So we are a membership organization and we recruit members like David, David, and Jim to be part of these committees, to volunteer their time and look at the evidence and really try to get a better understanding of how we, as a nation, can move forward. We make recommendations in these reports about what the nation can do. To be really brief, I think our biggest challenge with this report is that there is only so much that the IOM can do, and only so much that Farzad as the ONC can do. There is a lot of need for – we've slung around the word "system" here today so many times, but I think that each person who's said it has meant it in a different way – but one thing that the report says is that we really need to better understand the larger socio-technical

system, and that if all of the healthcare professionals and the organizations out there really understand what we mean by this larger socio-technical system, we'll make it a long way in terms of improving safety.

**Charles Denham:** Fantastic. I want to keep on time, but we are going to move into aerospace and we want to keep our aerospace folks up here. David, we would like to keep you here as well. We're going to talk about beyond checklists and what we can do at aviation and aerospace. Thank you, Sam, very much. If Perry Bechtle is here, since we have a mic, Perry, would you like to mic-up and come up here? Because one of our study's foci in this last six to 12 months was in leadership, and it was fascinating what we learned with the Blue Angels and what we learned about high-performance organizations, not so much from the pilot-aircraft interface, but leadership and the socio-technical model. I am going to ask Perry to kind of sit in with us and visit a former flight surgeon as well. Would you like to stay with us?

**Perry Bechtle:** Sure, I would like to take the opportunity to urge everybody to write in your comment to our proposed regulation for Stage 2 of the 2014 Edition Certification Criteria for Electronic Health Records. The comment period ends May 7, and you can put your comments into regulations.gov. I want to specifically highlight, for the audience here who is interested in this topic, three areas where we are specifically asking for comments in our certification rules. The first is a requirement that we are proposing that electronic health record designers use vendors who want to sell the product, use user-centered design in medication-related functions, a medication-related requirement for electronic health record. The second is that they report on what they are doing around the good manufacturing practices; quality management processes. And the third is that they all have the capability to use the common format developed in collaboration with Agency for Healthcare Research and Quality, Food and Drug Administration to report, to enable easy reporting on the part of providers of safety events of all types using that common format in electronic health records. These are some of the steps that we took at the earliest opportunity to propose, the core parts of the health IT landscape. We would love your comments on these and other certifications.

**Charles Denham:** This concept of the socio-technical model is – I think the report is terrific and really if you want to stay with us on the panels in the dialogue, because the aviation crossover and aerospace crossover absolutely has direct application. If Jim Bagian wants to come back up – direct application, the model really does make sense and it gets a wider view of the end-to-end systems sort of approach. Perry Bechtle is a former flight surgeon with the Blue Angels and a neuro-anesthesiologist at the Mayo Clinic at Jacksonville. If it had not been for Perry's great servant leadership, we would not have the Blue Angels in the film that some of you saw here in this room and that will be available tomorrow on the Discovery Channel, 8:00 a.m. local time. We found that the Blue Angels were a great example of great leadership. The four Ts that we found, Perry, that we talked about, that we've written about, the three Ts, but the four Ts were truth, trust, teamwork, and training. What we saw in the Blue Angels was what we saw at the Barry-Wehmiller Companies, the other example that we had, and also in government programs that were social-entrepreneurship programs. Perry, what we found was that the truth is the currency of the head, the facts, figures, numbers, the science of what we do. At Barry-Wehmiller, it might be the Lean methodology that they employ; and you know, it might be another form of a PDSA in a hospital or whatever else. The second T was trust – engaging the heart – hope, trust, the emotions, passion, joy, excitement ... and we have that in aviation. We all have this great feeling when we break through the clouds and we see this blue sky above. Flying is an emotional thing. The third T that we had was teamwork; and the fourth was very fascinating, the fourth T was training, and it was developing a voice from within. In every one of the high performers that we studied, the training was undertaken by those inside the organization – Brian Wellinghoff sitting here in front of me. They are training at Barry-Wehmiller. They didn't go outside to get professors. They made the people inside professors. We saw that at Top Gun, we saw that at the Blue Angels. Share for a moment the interesting turnover of the Blue Angels' team. Everyone would think that this has to be a team that are so precise they must have been flying together for ten years – not so.

**Perry Bechtle:** Sure, they act like they're flying together for ten years, obviously, but the structure of it, every pilot and every officer, that the flight surgeon, maintenance officer, and the team changes every two years. They come on the team, they're on the team for two years and then you're off the team. At that

point you go back out to the fleet and take some of those lessons from the Blue Angels out into the fleet. So the training process is pretty intense and there is a big investment that goes on.

**Charles Denham:** And you're trained by the guy or gal whose place you are going to take.

**Perry Bechtle:** Yes.

**Charles Denham:** So there are no outside trainers; you're taught to train.

**Perry Bechtle:** Yes, the sort of on-the-job training you spend – it's very quick. You spend maybe the last three or four weeks on the road just learning the job and then actually somebody who is on the team with you who is a second-year team member will train you. The maintenance officer trains the flight surgeon in his safety duties. The lead solo trains the opposing solo during that work. The number 2, when you have a new boss and new flight leader is actually the number 2 pilot, and the number 4 pilot or second-year team member typically will train the new flight leader in what he has to do.

**Charles Denham:** What we found when we watched them train, because they had a new set coming in, was they saw the passion and the joy of the job. The joy of doing a great job was contagious and it wasn't in the manual and some trainer couldn't drop in and say, "Well, here's how you're going to fly next to the boss at about three feet from the wing tip," right?

**Perry Bechtle:** Yeah, well, the model which you see it a lot in aviation – you don't see a lot in healthcare – is we like to drive decision-making, problem-solving, and communications down to the far ends of the organization. The training is geared toward that, because the real-life decisions are made at the very far end. A lot of times when we see healthcare improvement projects come through, there is still a lot of high-level decision-making that goes on and people will feed the communication – end up with the decisions made from above and then delivered back down. That's really not the model. The model is that the people on the ground are the most likely ones to be able to troubleshoot and make the decisions in real time to make sure that it's a safe program. You don't know if the air show is a dynamic place. You don't know if they've put poles at the end of the runway. That's not going to be noticed by somebody in the tower, it's going to be noticed by the guy working on the runway.

**Charles Denham:** Great. So, Sully, we have had this conversation before and I would love to have you share with this audience, the global audience, but also the audience here, in 208 seconds how life changed for you. You talk about the three things you did right. But my question is the question that you and I chatted about in a hangar up in San Francisco. And that is, is a checklist all we have to learn from aviation or is it just the beginning? Then I'd like to go to Jim Bagian and then back to John Nance. Checklist, is that all there is?

**Sully Sullenberger:** You are exactly right by saying it is everything beyond the checklist. One quick note, many people don't realize that on the Hudson River flight, talking about changing the team all the time and acting like we've been flying together for 10 years, my first officer, Jeff Skiles, and I met each other for the very first time three days before that flight; and yet if you had been allowed to sit in our cockpit and watch us work that day on that flight – not that you would have really wanted to, I grant you – you would have thought that we had been working together for years because we were trained to such a high, professional standard [that] we've become essentially interchangeable. We knew so well and were deeply internalized using these important responsibilities and roles to each other. Out of a 43-year career, 30 years at the airline where we worked very hard to make it routine and never be surprised by anything, we were suddenly confronted with the challenge of a lifetime. All during that time, I never knew on which 208 seconds of my entire career might be judged. I think that sort of understanding of what is important, that diligence, is what led us to have the system we needed in place that day to solve this problem we had never seen before. People sometimes think that the checklist in medicine and surgical checklist is an end to itself, but it's not. It's a means to an end. A checklist is only effective if you have everything that goes along with the effective use of it. You have to have the culture that it takes to use it well. You have to have the leadership, the ability to take a collection of individuals who may not even know each other and quickly form a team, a line goal – create a shared sense of responsibility for the outcome. So part of the

effective use of the checklist is engaging everyone – having everyone who can respond to it. It literally forces everyone to get on the same page. When you do that, you can create a team. Who knew a piece of paper could do all that.

**Charles Denham:** You know, building on what Sully has just said, you are uniquely positioned having been in space and aerospace, the real innovation's leading edge, also engineering, also a doctor. What are the next horizons for aerospace and aviation application to healthcare from where you sit today?

**James Bagian:** Well, I think many of the things you see in aviation also run in other places even before. One of the things that I think we see a problem with checklists, as an example, is that people think it's a magic bullet. That if I read these things, and a lot of people think they can actually make a mark on a checklist, but a checklist isn't about that. I see John laughing. I mean a checklist is a cognitive aid. Sully said it very well. How do we have a shared mental model of what we're trying to do, what our various roles are, but still allows us flexibility where we need it to attain the goal in a way that we can do in a coordinated way? If I was the first officer with Sully, I would know, he would know, he would expect me to take care of these functions. He doesn't have to check if I'm going to do that; I'm going to run it and he understands that. I think in medicine we have done the Cliff Notes first. We say, "Oh, a checklist. I'll write a checklist now and it'll make it so." Putting it on the wall or putting it in a book doesn't do it. It's all the stuff that goes with the culture, the shared responsibility, to actually focus on the goal. What is the goal? Sometimes I think we have become too focused on being technically expert in our field, in our little silo, and we look at our goal is to do our particular piece of the puzzle correctly. We forget how it fits with everything else. It is not enough for us to be technically correct. If I am technically correct but it doesn't interface with the other team members, and that includes the patient, then we do not get the right result. I think often we do not give our practitioners, our caregivers, the other people involved, the visibility to see how does their action integrate with others and get us to that actual desired end. It was said in one of the earlier panels about it's almost like the Golden Rule, right? If I were the patient or somebody I loved, would this be okay? I think many times we are so busy we don't ask that question; we say, "I did my task." My task is not my task. My task is a component to render [to] the patient the care that we think [he] should get. Often we don't address it that way, I think, and checklists help to have a shared mental model that's not just a piece of paper.

**Charles Denham:** I just want to remind everybody our hashtag is #HITMIT, and I've been on one side of the dais and can't read it from this direction, but we need to really bring them into the dialogue as much as we bring aviation in, and aviation and patients seeing it from that view, because they are air travelers and they seem reliable and they see airlines that are nice to us and those that aren't. They see that is a real view. The counterpoint is we're all patients. I think that the Golden Rule issue is one where we put on if it was my little boy, Charlie, or my wife, Betsy. In my local community we have had a medical error every year with almost every family member. So, yeah, I'm a patient at the table too, but we don't think of that sometimes when we get so technical.

**James Bagian:** Chuck, one thing we did at the VA, we started a thing called the Daily Plan. What we did is we extracted from the electronic health record those things that a patient or a patient's family could see. They would know if they were going to get a medication and what it was. They would know if they were going to get an X-ray or a treadmill – whatever it happened to be. And that would be briefed in a piece of paper that's HIPAA-compliant and everything else, to the patient and their family members or whoever they designated. The nurse would brief it to them every day and the nurse would tell them, "If you don't get one of these things that says what you're supposed to get, you should call me; or if somebody wants to do something I didn't tell you about, you should call me and don't let them do it." We found that about on any given nurse's shift, 17% of shifts, there would be an active omission or commission the patient or the patient's family discovered and would tell their nurse. These things would have slipped through, so it helped identify vulnerability and we then could look at a system solution for it, but it made the patient part of this. So this checklist – a fairly free-form checklist – allowed people in a very routinized way to know here is what we're going to do. Everybody knew it [who] needed to know, and the person who really needed to know in some ways was the patient, because they are there for all the things. The nurse isn't there, the physician isn't there, the order isn't, but the patient happens to be there. Now, they can't all

participate every time, but it's one step that we often had not formally included as part of our system to help deliver good care.

**Farzad Mostashari:** Back on that, as part of the requirement for meaningful use, for providers to get the health IT incentive payment, we have this thing called the After-Visit Summary. This has been something that providers, particularly in small practices, have struggled the most with. Implementation of an after-visit summary, usually paper, where after the visit the patient gets to see what are the medications the doctor thinks I'm on, what am I supposed to do, what are the next steps, what are my diagnoses, etc. And a lot of times, one is the workflow. We said, "Well, we've never done this before. We have never shown the patient that they have a diagnosis of obesity. What if they say, you know, 'What?!'"

**Charles Denham:** It's just like bringing a patient in the boardroom. We have never done it for the fear of them ...

**Farzad Mostashari:** Dr. Chris Tashjian – I was visiting in Wisconsin earlier this week and he said, "I have now a thousand fact-checkers because nobody cares about the accuracy of their information more than the patient does." He said, "There is not a week that goes by when someone doesn't fix my record and update my record because I give them what I think, for example, their medication list is, and they correct it." He talked very highly about this simply piece of paper.

**John Nance:** At the beginning of every flight, most people will want to be sophisticated and ignore all the information about the doors and all this stuff, but we have learned to talk to our passengers. We have learned to talk to them sometimes very aggressively and appropriately so. I know one flight attendant got in a little trouble for saying, "Listen up, folks, this is not your living room." But the fact is, every hospital in the United States needs to have a protocol, a videotape, and the capability of sitting the patient or the patient's family down and saying, "You are an integral part of the safety system here. This is an incredibly complex human system and we need your eyes, your ears, and your brain." Here is how to talk to us, here is how to interface with us, here is how not to sit there and wonder, "Should I say something?" Right now, only a couple of hospitals have done this, and most of them who have done it got so wrapped around the axle with their legal department that they pabulumized it. We need aggressively... Yeah, pabulumize, it's a new verb.

**Charles Denham:** I'm watching our time. David, you wanted to add something?

**David Classen:** Wednesday morning I was seeing patients. And to go back to what Farzad was mentioning, there were two instances in which a patient came to me at the end of the visit and said, "Hey, what about this item?" that I had forgotten. If we do have a partnership like that, everybody will be better off. We have learned an enormous amount from aviation in healthcare, and we have gone a couple of years in which there were no deaths related to commercial aviation in this country. It will be a while before we go a year without a death related to medical care in this country.

**Charles Denham:** Did you say minutes? How long did you say?

**David Classen:** We recognize that there is an awful lot to learn. One place we have utilized this is around team training. For example, in the operating room, surgeons do better if they go through some team training before operating. I think that there are an enormous number of lessons that we have to learn and that we have to bring into electronic records. I go back to what Farzad said before in terms of it's not "if" medical records will improve safety, it's how do we do it most effectively. When we have learned those things, how do we share those lessons?

**John Nance:** Far beyond, as we all agree, IT. For instance, it took ten years, and God only knows how many people died from the injection, unintended injection, of undiluted KCl, potassium chloride, before we finally got this on the number-one hit list position with The Joint Commission. Here we are now, what, 15, 18 years down the road from that? And I understand there are still some hospitals using undiluted KCl or having it on the units. The ability to be able to get information out like we do in aviation, there are many, many things to learn from this. If something happens this afternoon in the utilization of the 737, 500, 700,

800, that we find problematic, by tomorrow morning every operator on the planet Earth will know about it and know what to do about it if we have a solution. There is no reason we can't do that in healthcare, and as a matter of fact I think it is a very severe moral obligation.

**Charles Denham:** So one thing, I want to come back to Sully, in that you and I were in a meeting that had an equally prestigious group up in Boston, and it was a time when you and I prepared together and I went through the literature with you, and I thought you brought up a sensational point that kept everyone riveted. Sully described his 208 seconds, and he described how these aviation methods in the socio-technical model framework, how the structured language and how the systematic approach to things and how these things created capacity for you to do something novel that you had never done in a simulator because you had ingrained together with Jeff, you were working together as a team in a good solid socio-technical model, thrown a total curveball that was not one you had seen before. Would you describe that, and also so that people can understand, how much resilience it gave you and what happened to you physiologically with your vision and everything else in those 208 seconds? Because he had us riveted, because we really could understand how these systems, this invisible safety net that Sharon talked about in our movie, how this invisible safety net kept you afloat in 208 seconds. Would you go through that, because we have a few minutes to do that?

**Sully Sullenberger:** That's a long story but I'll make it brief. We had this safety system that we had created that allowed us, based upon what we did know, to apply this knowledge in a new way to solve a problem very quickly that we had never seen before. We had a well-versed team who were trained in the consistent application of best practices with well-defined roles and responsibilities; with a clearly defined vocabulary, a truncated vocabulary, but words rich with meaning. For example the word "brace" – which I used in that one brief announcement to the cabin – triggered in the cabin crew, the flight attendants, their actions to shout over the intercom to the passengers, "Brace, brace, heads down, stay down." Even though I had only met the first officer three days before, we were so well trained, with such well-defined roles and responsibilities, that even in this novel situation where the time pressure was so extreme, that he and I never had time even to discuss our situation or what we were to do about it. We were able to collaborate in those 208 seconds wordlessly. I was able to rely upon him immediately and intuitively understanding this developing situation as I did, knowing what he needed to do and then have him actually do it without me having to direct him because I did not have time. A good example of that is, late in the flight, before the critical maneuver, which was to judge the height above the river visually at which I would begin to raise the nose to achieve the proper rate of descent, speed, and altitude for landing, and this had to be done very critically – I mean literally within a fraction of a second. Had I begun to raise the nose too early or to too great a height, we would reach this altitude too far above the river and lose lift and drop on hard. If I waited too late, we wouldn't get the nose up. It would not have reduced our rate of descent sufficiently and we would have hit too hard. So Jeff knew, again, without [my] being able to tell him, having the chance to tell him, he knew to shift his priorities. So he stopped trying to regain thrust from what turned out to be irreparably damaged engines and he chose instead to call out to me airspeed and altitude above the river to aid me in that critical decision-making process at the last moment. We had this huge obstacle to surmount. We were not starting from the floor; we were starting from here, because he had created this system, this platform to operate from; and it was actually, paradoxically, our insistence on procedural compliance that allowed us to innovate by taking what we did know and applying it very quickly in a new way.

**Charles Denham:** I want to go to David and then to John. David, what we just heard was that the training, the preparation, created a capacity for dealing with something novel and the part physiologically, you felt your vision narrow, and physiologically you didn't get stabilized for months, so we know that it was not a walk in the park, right?

**Sully Sullenberger:** I felt – even though it was seconds – I felt my blood pressure and my pulse shoot up. My resting pulse is normally around 68; for 10 weeks it was 100. My blood pressure is normally 110/70; for 10 weeks it was 160/100.

**Charles Denham:** And you didn't sleep.

**Sully Sullenberger:** I didn't sleep more than three hours per day, and it took about three months to finally

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**Charles Denham:** So under that intense pressure, the training was there. So I come back to David and I say, "Okay, we have these wonderful IT systems. Let's pretend we have enough money to buy whatever we want," and somebody in the vendors says that we like the big-bang approach. "Let's go in there and turn CPOE on in five hospitals simultaneously and gut our way through it." The issue is that our clinicians and our administrators and our folks out at the front line, not at the Brigham where you have fabulous, you know – Brigham, Mayo Clinic, my Cleveland Clinic – you all have far greater resources than St. Elsewhere out at the front lines. Without an NTSB approach, without a way of sharing, learning, are we really prepared to go flip on all the switches and pretend like everything is going to be safe?

**David Classen:** Well, I think it would be exceptionally risky to do that. We saw someone raise [his] hand earlier. We have evidence, actually, from a number of stories and studies that do show that there can be adverse consequences, including increases in mortality rate. It does not make sense to do it that way. Now there are a good set of good principles for implementing computer order entry, for example, but they involve taking a measured approach, finding out what the issues are, going through and dealing with them in a systematic way and just making sure that you are on course.

**Charles Denham:** So as we proceed, again in our earlier sessions we talked about an NTSB for healthcare, which is really just something that we could look at as a framework. Were we asking for an agency to be funded at a time when we have no money and \$100 trillion unfunded liability? No. Our article with Sully and John Nance and Dennis Quaid and our next article that will be a second part to it, isn't saying, "Go spend a bunch of taxpayer money," it's "Should we do this?" and really not should we do it, but who could debate not doing it when it works? The answer is, I think it is, I just can't believe that anyone can say there is not enough evidence, meaning that if you do a literature search on NTSB, I don't see a randomized prospective trial. Give me a break; 25% of what we do is in the literature, 75% is habit. It is just impossible. I'd like to come back to John. I know you had a comment, and Farzad, I think you had. I would like to come back to the risk issue of deployment, because we have 3,100 hospitals in our research test bed. I hear every day the fear of the risk of turning things on, and we know after the election we're going to have budget cuts and they're going to be part-way through an IT implementation. They want to get their meaningful-use money, but they are going to cut training. To me there just isn't enough money there. So what do we do if we don't learn from aviation?

**John Nance:** There are a short number of so-called Red Cover reports focusing on the very sort of disasters that we know are out there. All the time we have not learned from. One of the things we can get from it is what I have derived from your experience, Sully. You were talking about it, and with my methodology of discussing this, is minimization of variables. We need to minimize variables all over healthcare, even before we put in standard methodologies. If we minimize – you go into the operating room and there are preference cards that have so much unnecessary garbage on it. Would anyone fly with me as a captain if I had a preference card? You know: I do it this way, I don't put the gear down automatically. This is ridiculous.

**Charles Denham:** Sully has told me that you used to have him as a second officer and you had to carry him around with the captain so that you could get promoted, right? So you had to fly whatever way the boss flew.

**John Nance:** One of the reasons we went five years without killing a single passenger in the US between 2001 and 2006 is because we got rid of all that philosophy. We minimized the variables. When he and Jeff had to make this incredible 208 seconds work, they were unloaded. You correct me if I'm wrong, you were the one there, but they were unloaded with having to reinvent the wheel. They knew what it would take to put it in the water. They knew what it would take to glide to Teterboro. They had to make a decision between the two. If they were garbaged up with all the things they would have to reinvent, like the average preference card and the average nurse trying to set up an OR, I'm not sure you would have had the same guarantee of the right decision. The matter is, we have learned the hard way in aviation and in nuclear power and in NASA and on and on, that if you minimize the variables that a human being

has to deal with, you maximize the opportunity for cognitive brilliance, education, and training to come out at the critical moments, and that is platinum and gold.

**Charles Denham:** Farzad, I heard the glowing here's all the good things we could do. What about the risk? Tell us about that.

**Farzad Mostashari:** The question is not – and we talked about it – the question is not whether we move forward on adoption. That die has been cast. For many of these groups, the question is not whether they move forward, it is not the time to say, “Well, let's wait for a better system to be developed or whatever.” The question is, how do we do this in a way that's safe? Honestly, sometimes doing halfway implementations is the most dangerous thing you can do. To implement a system halfway, to live in a hybrid world where some of your processes are paper-based and some of your processes are electronic is the worst of all possible worlds. The question is not whether we move forward on implementation, for example the CPOE or decision support; the question is how we do it in a way that it is the safest way, the most effective way possible? We were talking about the medication-related safety issues, and you know where a lot of the problems come is when you make electronic one part of the process and then there is a human gap. In Chicago there was a child [who] died because they ordered [inaudible] in a CPOE system electronically, and then they were transcribing by hand that electronic order into a medication dispensing [inaudible].

**Charles Denham:** For sake of time, let's come back. That is a great example. That is a great example of where training and understanding, the risk of adoption, is a really key issue. I am going to come back like a dog on a bone to 30 preventable deaths an hour. We are not really here to write paper, we are here to say 30 preventable deaths an hour. My little boy that was here at this meeting had almost had 2.2 times the anesthesia that he needed and he was sitting on my lap and I couldn't have stopped it because they failed to convert kilograms to pounds on a piece of paper. So the training and the preparation, what can we do now? What can we do now?

**David Bates:** A very big thing that we can do which the National Coordinator has pushed, is to help figure out what the key decision support is and how we share that. Just for example, one issue that every organization has struggled with is which drug/drug interactions do you display. Farzad's agency sponsored our group and ran and developed a list of the most important drug/drug interactions, the ones that should never be overridden, and that was just published in the last day or two. That is something that every organization can take. We need to do this across an array of domains, but this is one, I think, really positive example.

**Charles Denham:** So that kind of low-hanging fruit, coupled with reports of “Here's how it can go wrong and here is how it can go right,” fits in the Red Cover model. I think we are at time. This was a great panel. Thank you all. Thank you for coming up.