

An NTSB for Health Care – Learning From Innovation: Debate and Innovate or Capitulate

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Introduction: Economic and medical risks threaten the national security of America. The spiraling costs of United States' avoidable healthcare harm and waste far exceed those of any other nation. This 2-part paper, written by a group of aviators, is a national call to action to adopt readily available and transferable safety innovations we have already paid for that have made the airline industry one of the safest in the world. This first part supports the debate for a National Transportation Safety Board (NTSB) for health care, and the second supports more cross-over adoption by hospitals of methods pioneered in aviation.

Methods: A review of aviation and healthcare leadership best practices and technologies was undertaken through literature review, reporting body research, and interviews of experts in the field of aviation principles applied to medicine. An aviation cross-over inventory and consensus process led to a call for action to address the current crisis of healthcare waste and harm.

Results: The NTSB, an independent agency established by the United States Congress, was developed to investigate all significant transportation accidents to prevent recurrence. Certain NTSB publications known as "Blue Cover Reports" used by pilots and airlines to drive safety provide a model that could be emulated for hospital accidents.

Conclusion: An NTSB-type organization for health care could greatly improve healthcare safety at low cost and great benefit. A "Red Cover Report" for health care could save lives, save money, and bring value to communities. A call to action is made in this first paper to debate this opportunity for an NTSB for health care. A second follow-on paper is a call to action of healthcare suppliers, providers, and purchasers to reinvigorate their adoption of aviation best practices as the market transitions from a fragmented provider-volume-centered to an integrated patient-value-centered world.

Key Words: accidents, communications, IT and safety, product/technology development and adoption, quality, reporting systems, risk assessment system/organizational failure

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A medical economic and risk crisis threatens the national security of the United States and is putting its citizens at clear and present danger daily. Cost-saving safety innovations that tax payers have already funded can be put to work immediately with the only barrier to success being inaction by U.S. leaders.

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In this first of a 2-part series, as a group of aviators with significant experience in the overlap between aviation and health care, these authors offer a call to action:

- Collectively we have 38,000 hours of cockpit time with rich backgrounds in patient safety, risk reduction, and direct first-hand experience with hospital accidents.
- All four have been jet pilots, two both in the military and airlines;
- One has owned an aircraft manufacturing company;
- One was both a party to a major NTSB accident investigation as an investigator, and the subject of a major NTSB investigation;
- Two are aviation safety expert commentators for major television networks;
- Two are best-selling authors, one is a physician, one a lawyer, and one has played an astronaut in the movies, who, in real life, has had a preventable near-death experience of his newborn twins.
- In aggregate, we have published more than 100 medical articles.
- All four of us know that an NTSB type program for health care and more aggressive adoption of aviation best practices will save lives, save money, and bring value to our communities.

In early June of 2010, we convened a group of aviation and healthcare experts in person and by phone, including a U.S. congressman, a co-founder and current board member of one of our leading airlines, a former board chair of one of our most decorated independent community hospitals, and quality leaders from some of our nation's leading integrated delivery systems. The purpose was to introduce and accelerate adoption of aviation best practices by health care.

Typical for a group of high-performing experts, the dialogue inevitably migrated into the mire of the complex barriers we faced until one of us, in his attempt to clarify our goal, said, "but for the grace of God I almost lost two newborn babies to preventable harm." "Please remember...we save one little soul at a time."

OUR CRISIS OF WASTE AND HARM

The meeting cited above occurred before we had clarity regarding the catastrophic American healthcare financing crisis and spiraling waste facing us. Then, adopting best practices from another successful industry was the right thing to do; now, it is the right thing to do to survive.

Clear and Present Danger Around the Globe

We are experiencing a global economic downturn; the healthcare financial noose is closing in, and patients are in clear and present danger every single day. Almost no one has been able to concisely communicate the magnitude and growth of our

national debt, the staggering proportion that healthcare represents, and the imminent danger that the unfunded liability poses.

- Our federal debt is \$45,000 per American¹ and, over the long haul, is estimated to be almost \$100 trillion.^{2,3}
- We borrow 41 cents of every dollar we spend.⁴
- Doubling time of healthcare costs for a family of four is less than 9 years.⁵
- The unfunded future liability of Medicare is in the many trillions of dollars.⁴
- 50% of our healthcare cost is waste.⁶
- We lead the world in healthcare spending; we spend 150% more than Norway, which comes in second in worldwide healthcare expenditures.⁷
- healthcare harm is the third leading cause of death in the United States; we are 37th in the world in quality, and even our most progressive states focused on safety can not keep up with the risk because of harm.⁸

The reality came crashing in on all of us when our nation's bond rating was downgraded. In the second part of this 2-part paper, we will drill down on the above economics with focus on how we can use methods from aviation and other sectors to convert waste to value and harm to healing. However, in this first paper, we need to establish the systems risk issues.

Invisible Systems and Invisible Deaths—Who Owns Them?

As shared later in this paper, the similarities between health care and aviation are high risk and complexity, dependency on human performance factors, and the potential to generate highly reliable performance ONLY IF basic safety principles are provided by invisible support systems. The difference is that pilots are the first ones at the scene of the accident, whereas in health care, the causes and effects of accidents are spread over time and space so that only the most egregious errors and systems failures are observed firsthand. Safety is an assumed system property until a bad event occurs...then the name-blame-shame cycle kicks in, and we usually hang the blame-name epithet: "bad apple" onto the caregiver.

Ground Zero—The Boardroom, Not the Bedside

We are rapidly finding that many of the events at the sharp end of the system—where care is given—have been set into motion by leadership decisions at the blunt end of the system—where resources are allocated. We are finding that ground zero in the war on healthcare harm is the boardroom made by trustees and the administrators, not the bedside.⁹ This was a lesson that aviation had to learn the hard way, and as military pilots are known to say, "safety rules have been written in blood." The learning from loss of life and limb led to new policies, procedures, and expenditures in safety and performance improvement.¹⁰

Clearly, America is in "alarm fatigue" with warning bells going off continuously in our collective heads from every industry sector. Yet, there is hope for health care if we leverage solutions we have already paid for, own, and understand. We must embrace the 4 Cs: acknowledge our *crisis*, join a *cause* to improve, define the *challenge*, and take personal *charge* of something we each can do; we can dramatically reduce harm and waste. Our policy makers, trustees, and administrative leaders must act now. Let us redirect the energy of the crisis to a positive purpose. Bill George, one of our nation's greatest CEOs, reminds us in his book, "*7 Lessons for Leading in Crisis*," "never let a good crisis go to waste."¹¹

Innovate or Capitulate

Even best-selling author Jim Collins has a personal connection to aviation and has already helped us in the patient safety movement through his wisdom captured in the documentary *Chasing Zero: Winning the War on Healthcare Harm*.¹⁰ Collins is the grandson of and named for the famous test pilot Jimmy Collins, made famous in the book and movie *Jet Pilot*, produced in the 1930s who ultimately died in a plane crash.¹² In his book, "*How the Mighty Fall*,"¹³ Collins defines the trajectory of 5 stages that many great organizations have taken in their fall from success:

- Stage 1—Hubris born of success
- Stage 2—Undisciplined pursuit of "more"
- Stage 3—Denial of risk and peril
- Stage 4—Grasping for salvation
- Stage 5—Capitulation to irrelevance or death.

Many of our healthcare organizations are in Stage 3—the denial of risk and peril. Never before have we been in such jeopardy as a nation. It is critical that we think innovatively and act quickly. We missed the warning signs in banking and on Wall Street, and we all know what happened. The press, award documentaries like Oscar winner *Inside Job* and other movies,^{14,15} and many books^{16,17} have captured the essence of this pattern of pride, greed, and denial that now impacts all of us.

Our message is that we have wonderful solutions that taxpayers have paid for, tools in the public domain, and proven best practices that can help bring us back from the brink of disaster. It is time for our leaders to put them to work; we cannot cost-cut to success, and indecision will be a decision—a decision to capitulate.

I, WE, AND NOW STORIES

A Public Narrative—Marshal Ganz

Marshall Ganz, whom we introduced in a previous article,¹⁸ is an acclaimed educator at the Harvard Kennedy School of Government and is responsible for the success of multiple extraordinary cause-based grassroots initiatives. He teaches that a movement can be mobilized through the "public narrative." This is composed of 3 elements: a story of self, a story of us, and a story of now. A story of self communicates who I am—my values, my experience, why I do what I do.

I, We, and Now Stories

A story of us communicates who we are—our shared values, our shared experience, and why we do what we do. A story of now transforms the present into a moment of challenge, hope, and choice. We will use this approach to communicate our call to you for action. We share our "I stories" to set the context to ask you to join the cause of accelerating the use of best practices we already have.¹⁸

Our "I Stories"

Charles Denham: Coming from a military family as the son of a former fighter pilot who became a rocket systems engineer in our Apollo space program, aviation has always been in my blood. We remember my father weathering the terrible Apollo 1 fire and how he led teams to make rockets safe—we were taught systems thinking from an early age. Later, after my medical training and owning and flying everything from aerobatic biplanes to a business jet for 10 years, I found myself the owner of an airplane manufacturing company responsible for the safety of a global fleet of 8000 aging single-engine airplanes. During that time, my team developed great respect for the

Federal Aviation Administration (FAA) and was surprised to find it an advocate of safety, a mentor, and a force of goodwill for private aviators, not just a bureaucratic regulator. Investigating accidents of our fleet with the FAA taught us how users of technology could be rapidly informed, and performance improvement initiatives could be implemented almost immediately. Clearly not perfect, it operated much better than anything in health care.

Integrity, compassion, accountability, reliability, and entrepreneurship are the core values of our Texas Medical Institute of Technology (TMIT) organization. Our mission is to save lives, save money, and bring value to communities we serve. We have seen these values and the behaviors they generate in public servants in government programs such as Centers for Medicare & Medicaid Services (CMS), Health Resources and Services Administration (HRSA), and Agency for Healthcare Research and Quality (AHRQ). Many are not the slow-walking bureaucrats that some may want us to believe. We have seen these values in leaders of public-private partnerships such as the National Quality Forum, and in private organizations, in all 3 healthcare sectors of suppliers, providers, and purchasers. If faith is defined as “the substance of things hoped for, the evidence of things not seen,” then I have the faith that those values and those people can drive a national approach to safety using the ingredients we already have.¹⁹ I believe we have just scratched the surface of what aviation, nuclear power, and industries like manufacturing can bring to health care. Drawing on my faith, I love the expression, “For God hath not given us the spirit of fear; but of power, and of love, and of a sound mind.”²⁰ Our caregivers do have the power to innovate, the love of delivering great health care, and the sound collective mindset we can put to work to convert waste to value and harm to healing. We just need our leaders to act now.

- **Sully Sullenberger:** Now, almost 3 years after Flight 1549, I have had time to process what happened and to answer for myself a question. What was it about that extraordinary event on that remarkable day that so captured the imaginations of people around the world and has made them feel the way they do about the event, the crew, and me? I think the answer to that question must be that this event occurred against a backdrop of a global financial crisis when many people were losing hope. They wanted to be reassured that our ideals are still true even when they are not evident. Some had even begun to question our collective competence, wondering if people were still capable of doing the right thing, of doing good—or if, ultimately, human nature was really about self-interest and greed. Then, along came a group of people who, on that day, and in that place, made it their mission in life to see that good was done. It was seen as life affirming—it made people feel hopeful again. It served as a reminder—when we very much needed one—of the potential for good that still exists, not only in the world but also within each of us. The public attention’s focus on Flight 1549 gave me and my first officer, Jeff Skiles, the opportunity to have a greater voice about things that we had cared about our whole lives, especially the safety of the traveling public. We felt an intense obligation to do as much good as we could in every way we could for as long as we could while we had this attention focused on us. Had we not done so and had we not quickly grown to be able to be public figures, it would have been a dereliction of duty, and we would be letting down our colleagues and our nation. As a result of a lifetime of safety work, I knew even before Flight 1549 that the many important lessons learned in aviation had analogues in other domains, including medicine. This should not be surprising, given that what we are dealing with is human

performance in complicated systems that involve inherent risk. So I wish we were less patient in making important changes in our systems designs and in implementing culture change. Every day we delay, there are more preventable patient deaths, and the numbers are shockingly large. My belief is that the status quo has failed us and that we must reject it. For over a century, aviation has learned costly lessons that were paid for in lives, lessons that we now offer up to medicine for the taking. The price of admission is leadership, public awareness, and the will to act.^{21,22}

- **Dennis Quaid—Story Power:** In November 2007, my wife, Kimberly, and I, after years of trying and repeated miscarriages, had twins. A healthy boy and girl, Thomas Boone and Zoe Grace. We were so elated—and so grateful to have our prayers answered. Our babies were 12 days old, still so tiny I could carry one in each hand, when Kimberly noticed a sore on T. Boone’s umbilical cord and a red irritation on Zoe Grace’s finger. They were admitted to the hospital with infections, and during their course, they both received 1000 times the intended dosage of the blood thinner, heparin, than they should have had twice. This led to a 41-hour fight between life and death. The fact that the same accident had occurred less than a year earlier, killing other children, and similar accidents have occurred since speaks to the issue of known systems faults. The look-alike packaging of 2 concentrations of heparin may have been fixed by the manufacturer; however, the question is as follows: have the systems faults and contributive leadership issues been addressed at every hospital? Until they have, we will not rest. My role as a “known person” and my passion lies in using storytelling to drive awareness of the opportunities for improvement, such as using our series of TMIT documentaries to identify role models who have overcome systems failures. We do not have bad people, we have bad systems. My knowledge as a pilot leads me to help accelerate the development of interoperability of technologies, accelerated use of safe computerized prescriber order entry (CPOE), and use of human factor–related tools such as checklists to protect other children and families. By the grace of God, my children are well and safe. I love to go into their room at night, these kids whom I used to carry one in each hand, and watch them sleep. I can see now how God’s plan worked in their lives. Because of them and because of our speaking out, new safety procedures have been put in place. Lives have been saved because of these 2 little children. It is critical for all of us to work together to protect those who as yet are unharmed.^{23–26}
- **John Nance:** “It was a single phone call in the late 1980s that changed my life, and my focus. I had been privileged to help midwife a revolution in aviation safety that turned on the startling recognition that flying airplanes was a human enterprise, and that humans (me included) were incapable of error-free performance and needed entirely new systemic methods to be safe. My second book, *Blind Trust* (1986),²⁷ had propelled me into the public arena as an advocate of human factors and human performance, but until a physician named Eric Knox called one evening and asked me to bring the same message into his world of health care, I was essentially unaware that other great human enterprises were equally in need of transforming themselves from high-risk human organizations to high-reliability status.

I was virtually staggered, in fact, to discover that American health care—as vital as it is to virtually everyone—was 30, perhaps 40 years behind aviation in understanding even the basics of system safety. Built as a cottage industry with hospitals arranged as farmers’ markets for the physicians to use, and with

staggering unexplained clinical variation in practice across the land, even the simplest of safety methods (such as checklists) that aviation had long since embraced and understood were all but unknown in America's operating rooms and hospitals. Worse, while aviation (and several other industries) had built a highly effective means of analyzing its accidents and mistakes and rapidly disseminating corrective information to everyone involved, American health care was (and remains) paralyzed by what too many incorrectly believe to be fear of litigation. By the time the U.S. airline industry had completed 5 amazing years without a major accident or a passenger death (2006), it was obvious to many of us in aviation that a major contributor had been the intellectual rigor of the National Transportation Safety Board's investigatory methods and their role as a mentor and teacher of safety. It is no exaggeration to say that we are desperately in need of that same approach in American Healthcare, and the establishment of a medical version of the NTSB—and establishing a system of issuing detailed reports on many different types of fatal and injurious medical mistakes to rapidly inform everyone in health care how to prevent repeats, is something we ignore at everyone's peril. I am very honored to have been a part of the beginning of what will be a total remake of medical safety and want nothing more than to see us progress with great speed and determination to build systems that reduce patient deaths and injuries to zero.

Aviation and Health Care Compared

In his frame-changing and frequently quoted 1994 article, "Error in Medicine,"²⁸ Lucian Leape has provided one of the most clear and important expressions of the opportunity to learn from aviation. He quotes Allnutt's "Human Factors in Accidents,"²⁹ observing, "Both pilots and doctors are carefully selected, highly trained professionals who are usually determined to maintain high standards, both externally and internally imposed, whilst performing difficult tasks in life-threatening environments. Both use high technology equipment and function as key members of a team of specialists ... Both exercise high level cognitive skills in a most complex domain about which much is known, but where much remains to be discovered." Leape goes on to address the development of innovations that have prevented fatalities as "a complex system of aircraft design, instrumentation, training, regulation, and air traffic control. First, in terms of system design, air craft designers assume that errors and failures are inevitable and design systems to "absorb" them, building in multiple buffers, automation, and redundancy. As even a glance in an airliner cockpit reveals, extensive feedback is provided by means of monitoring instruments, many in duplicate or triplicate. Indeed, the multiplicity of instruments and automation has generated its own challenges to system design, sensory overload, and boredom. Nonetheless, these safeguards have served the cause of aviation safety well. Second, procedures are standardized to the maximum extent possible. Specific protocols must be followed for trip planning, operations, and maintenance. Pilots go through a checklist before each take off. Required maintenance is specified in detail and must be performed on a regular (by flight hours) basis. Third, the training, examination, and certification process is highly developed and rigidly, as well as frequently, enforced. Airline pilots take proficiency examinations every 6 months. Much of the content of examinations is directly concerned with procedures to enhance safety. Pilots function well within this rigorously controlled system, although not flawlessly."²⁸ Now in 2011, as Dr Leape, who many of us feel is the father of patient safety, looks back on his article, forward to the future, and says, "It was more complex than we

thought and we have recognized that we must put more emphasis on the social interaction component of our work where lies great future benefit." (Lucian Leape, MD, oral communication, September 29, 2011).

Since 1994, we have made substantial progress in the use of aviation methods checklists, such as the World Health Organization surgical checklist,³⁰ team-based training using Crew Resource Management (CRM), the use of simulation, and even the development of internet-based simulated patients to map harm and cost through impact calculators.^{31,32} Also, simulated patients are used to test electronic health record systems such as CPOE for national transparency programs tied to national standards.³³⁻³⁷ However, success is not defined by individual tools or tactics.

Leadership-Practices-Technologies: The Performance Envelope

High-performance care and safe care exist at the intersection of leadership, practices, and technologies. The boundaries of this high-performance envelope are defined by engaged leaders from the board of trustees at the top to the servant leaders at the bottom of the food chain who clean the floors and lead by example, by safe practices that deliver reliable verifiable outcomes, and by the technologies that enable them.^{24,38} Success begins with leadership, ends with leadership, and is all about leadership, and the starting and revelatory truth about high-reliability human systems is that they require virtually everyone to shoulder the responsibilities of leadership. Because safety in a human system is a team endeavor, everyone must own it, or safety will remain an accidental attribute.

In part 2 of this paper, we will detail how stakeholders can take advantage of applying aviation leadership, practices, and technologies that can have huge impact on health care. There are many surprises, such as the following:

- that the character Maverick from *Top Gun*, the 1986 movie, is a myth and that there is no such *Top Gun* award. The program is about teaching teachers who can then teach their squadrons about warfare tactics;
- that we have said goodbye to "cowboys and gods" in the cockpit—standardization and teamwork is the rule not the exception;
- that high-reliability teams like the Navy Blue Angels flight demonstration squadron have intentional turnover rates of 30% with no formal trainers—frontline members train their replacements;
- and that there is always typically more than one root cause of an accident in aviation and in health care.

Dr. Sanjiv Chopra, the Faculty Dean of Continuing Education and Professor of Medicine at Harvard Medical School is one of our nation's great visionaries on leadership. He reminds us: "leadership is a marathon journey. Not a sprint. And along the way there can be many a Heartbreak Hill." He has defined leadership as "the ability to articulate a vision and walk the path such that it inspires people to rise above the banality and strife of their common day existence and achieve a higher and common goal." (oral communication from The Boston Summit on Leadership, Boston Mass, October 23, 2011) We will address this marathon of leadership and a higher calling for suppliers, providers, and purchasers of health care to apply leadership principles through specific strategies and tactics in our second article. However, we believe we must develop the case for an NTSB for health care first, so we will cover just a few of the health care cross-over benefits below.

HEALTH CARE PROGRAMS POTENTIALLY BENEFITING FROM CROSS-INDUSTRY COLLABORATION—JUST A BEGINNING

There are many programs which either could be or are already benefiting from aviation-crossover opportunities that could be accelerated, and these are just a beginning. We provide them as a list here and will delve into them much more deeply in the second part of this paper. A number are programs and solutions we believe in and are actively engaged in helping bring to the community. They include but are not limited to the following:

- World Health Organization Checklist Surgical Checklist Programs³⁰
- *Partnership for Patients*—a CMS Collaborative³⁹
- NQF Safe Practices for Better Healthcare and *Serious Reportable Events* Adoption^{40–42}
- Care Process Simulation Centers⁴³
- CRM Programs Applied to Healthcare, also trained in part as TEAMSTEPS⁴⁴
- TMIT *Greenlight Program*⁴⁵
- Meaningful Use Initiatives for Health Information Technology Adoption³⁷
- 5 Rights of Imaging and Image Gently Programs⁴⁶
- Value-based Purchasing Initiatives⁴⁷
- All Cause Mortality Review Innovations⁴⁸
- LEAD Programs: Leader Engagement and Development Programs⁴⁹
- Patient Speaker and Seeker Portals⁵⁰
- High Performance Leadership Quality and Safety Certification Programs for clinical, administrative and trustee governance leaders⁴⁸
- Aviation People Systems Applied to Healthcare⁴⁸
- CPOE/EHR Flight Simulator leveraging simulated patient orders to test Health Information Technology (HIT) systems⁵¹

Learning from Airlines People Systems

The methodologies used in airline human resource management and “people systems,” such as behavior-based, values-grounded hiring methods that have their origins in selection of military pilots in the 1940s, have not only provided extraordinary success in employee management and satisfaction for airlines such as *Southwest Airlines* and *JetBlue Airways*, but they have been transplanted into hospitals with amazing results in turnover reduction, which translates into improved safety in hospitals ranging from fewer than 100 beds to major teaching centers such as Loma Linda Medical Center. One of our collaborators is Ann Rhoades who has pioneered this transplantation of best practice.

The Fastest Turn-Around Lever You Have—Your People

An international guru in high performance culture development and “people systems expert,” Ann Rhoades has successfully been able to transplant airline “people systems” best practices to 18 hospitals in 3 states. She is the author of *Built on Values* and is a co-founder of *JetBlue Airways* and former people systems leader of *Southwest Airlines*.⁵² She tells hospital leaders: “Your treasure is in your talent, they are your best investment, and they are suffering the most with the quality and safety crisis ... just look at your employee turnover rates and the cost of this waste ... you can bring joy back to work. The soft stuff is the hard stuff and your people are dying for leadership.”

Aviation Safety Reporting System

Established in 1975, the Aviation Safety Reporting System (ASRS) has been a terrific asset to the industry in helping fast-

track improvements and safety. “The ASRS collects, analyzes, and responds to voluntarily submitted aviation safety incident reports in order to lessen the likelihood of aviation accidents. ASRS data are used to: Identify deficiencies and discrepancies in the National Aviation System (NAS) so that these can be remedied by appropriate authorities; Support policy formulation and planning for, and improvements to the National Aviation System; strengthen the foundation of aviation human factors safety research. This is particularly important since it is generally conceded that over two-thirds of all aviation accidents and incidents have their roots in human performance errors.”⁵³ There is much to be learned from this program that we will discuss in part 2 of this paper. Most importantly, there is nothing like it in health care. This is shocking to consumers.

Patient Safety Organizations and the Patient Safety and Quality Improvement Act of 2005

Dr. Carolyn Clancy, the Director of the AHRQ, is one of our super star public servants. Having served during the Clinton, Bush, and now Obama administrations, she has led investment in healthcare quality and safety. In her 2010 article,⁵⁴ and later in the Federal Register,⁵⁵ she provides excellent summaries of the Patient Safety and Quality Improvement Act of 2005,⁵⁶ which sought to accelerate, identify, and prevent patient safety events with the creation of patient safety organizations (PSOs). Dr. Clancy defined PSOs as private entities called for by the Institute of Medicine, intended to bolster ongoing quality improvement efforts by allowing providers to voluntarily report information to them about patient safety events and to get feedback about how to reduce the frequency of such events. Unlike some types of error event reporting, this information, called “patient safety work product,” is privileged and confidential. It is used by PSOs to identify events, patterns of care, and unsafe conditions that increase the risk of unsafe care. Thus, the law addresses an important barrier to providers’ aspirations to achieve safe care. PSOs are intended to bolster ongoing quality improvement efforts by allowing providers to voluntarily report information to them about patient safety events and to get feedback about how to reduce the frequency of such events. Coupled with the “common formats” work described below, our nation has a terrific set of ingredients to succeed in healthcare safety as we have in aviation. These have been a great investment of taxpayer money led by excellent leaders who understand the key issues and challenges. We will need our hospital and healthcare leaders to embrace this work—it is critical.

Common Formats and Data Sharing

It is critical in the healthcare industry to have standardized information that can be analyzed to enable effective prevention of healthcare accidents, near-misses, and unsafe conditions. This information needs to be captured, shared, and used through organizations like PSOs. Consumers will be surprised and pleased that the process to do this is underway. This definition for common formats was taken directly from Dr. Clancy’s article cited above⁵⁴: “The term ‘Common Formats’ describes clinical definitions and reporting formats (for electronic transmission) used by PSOs to uniformly collect and report patient safety data, including all supporting material. The new formats do not replace any current mandatory reporting system, voluntary reporting system, or research-related reporting system.”

Dr. David Classen, one of our nation’s leading safety experts, is co-chair of the National Quality Forum’s (NQF) Patient Safety Common Formats Steering Committee and has chaired the NQF committee that developed consensus standards on patient safety taxonomy. He states that “Inpatient Common

Formats have now been released with Information Technology (I.T.) specifications. Nursing home formats are coming with ambulatory care formats to follow.” (David Classen, MD, oral communication, October 7, 2011).

According to Bill Munier, the AHRQ leader of measures for patient safety, the importance of the IT specifications is that vendors, PSOs, and even hospital programmers can develop the software or cloud applications to manage the data.

The AHRQ’s recent publication of evidence-based common definitions and reporting formats (Common Formats) for patient safety work products will allow PSOs, health providers, and other entities involved in this effort to collect and report patient safety events in a uniform manner.⁵⁷ Again, it is important that frontline leaders understand how this great work can be leveraged and turn analytics into action.

CPOE/EHR Flight Simulator

Simulation, pioneered in aviation and other high-risk fields, has provided wonderful guidance to develop performance testing capability. The National Quality Forum’s *Safe Practice 16: Safe Adoption of Computerized Prescriber Order Entry* national standard is defined as follows: “Implement a computerized prescriber order entry (CPOE) system built upon the requisite foundation of re-engineered evidence-based care, an assurance of health care organization staff and independent practitioner readiness, and an integrated information technology infrastructure.”^{58,59} The CPOE system is tested against the TMIT CPOE/EHR Flight Simulator and is used by the Leapfrog Group for its Inpatient CPOE Testing Standards, provided to healthcare payers to identify high-performing organizations. These standards were developed to provide organizations that are implementing CPOE with appropriate decision support about alerting levels; these alerting levels need to be carefully set to avoid over-alerting and under-alerting.^{34,35,42,60–64}

Leadership Simulation

Leadership is absolutely critical to successful safety programs; strategies to develop leadership simulators to provide typical scenarios that leaders face in operating healthcare organizations are being developed to help create tomorrow’s leaders today. Such a program, being developed by 2 of our authors, that uses these simulation techniques is the LEAD Fellowship Program, which will be further explained in the second article.⁴⁹

Healthcare Information Technologies—New Opportunities, New Risks

In Recommendation 7 of the recently released Institute of Medicine (IOM) Report, *Health IT and Patient Safety Building Safer Systems for Better Care*, the committee recommended that “The Secretary of HHS should establish a mechanism for both vendors and users to report health IT-related deaths, serious injuries, or unsafe conditions.” The executive summary of the report stated “the committee believes development of an independent, federal entity could perform the needed analytic and investigative functions in a transparent, non-punitive manner. It would be similar in structure to the National Transportation Safety Board, an independent federal agency created by Congress to conduct safety investigations.”⁶⁵ Clearly, the recommendation for an NTSB for health information technology from such a credible body as the IOM must not be ignored.

In their article “*Creating an Oversight Infrastructure for Electronic Health Record-Related Patient Safety Hazards*,” Hardeep Singh, David Classen, and Dean Sittig⁶⁶ have ad-

ressed the fact that electronic health records (EHRs) have potential quality and safety benefits; however, they also addressed reports of EHR-related emerging safety hazards.

New Technologies—New Risks

The Office of the National Coordinator for HIT recently sponsored an IOM study to evaluate how HIT use affects patient safety, which reflected the importance of this safety area, and the IOM will likely make recommendations in the future. The Singh paper proposes the creation of a national EHR oversight program to provide dedicated surveillance of EHR-related safety events and to promote learning from identified hazards, close calls, and adverse events. Technology offers terrific opportunity to make care safer, and we can stand on the shoulders of our innovators in aviation as long as we manage the risks properly. To quote Dr. David Bates, one of our world leading patient safety researchers, from an upcoming documentary we will contribute to on the Discovery Channel, “There’s been a lot of crossover from industries like aviation and nuclear power. How would you feel if you’re getting on an airplane and you look to the left and you saw that there were no instruments on the panel? You probably wouldn’t feel very safe getting on that airplane. Well, that really is what it’s like when a doctor sits down with a blank piece of paper in a hospital and writes an order for a drug or a test. We need to computerize ordering, and that can make things substantially safer.”⁶⁷

Converting Waste to Value and Harm to Healing

The TMIT Greenlight Program⁴⁵ is a national collaboration of leading healthcare organizations, frontline hospitals, and subject matter experts focused on leadership team decision making. This initiative is a participant in the CMS *Partnership for Patients*.^{39,68} The aims are to accelerate investment in performance improvement initiatives that reduce costly waste because of harm and create a more healing environment for both patients and caregivers at the same time. In our second paper, we will address the use of impact calculators, performance models, and standardized simulator patients.

Real-time analytics and decision support systems are only in their infancy in health care; yet, such systems are actually on board most modern private business aircraft and airliners or central dispatch systems which have been uplinked to aircraft. The near real-time integration of weather information, aircraft trajectory and scenario mapping are well understood by aviators. In health care, we are just developing impact calculators, performance models, and standardized “simulated patients” that can be used by administrators and clinicians to make care decisions. We are finding great use for these tools in the reduction of waste and harm. Published data have provided a view into the fully loaded cost of health care-associated infections,⁶⁹ and more are soon to be published. However, national audiences are continuously being briefed ahead of full publications.⁷⁰

20 Boeing 747 Airliners Crashing Per Week

Interestingly, when we compute how many deaths we have because of healthcare harm—including 100,000 deaths due to hospital-acquired infections—the loss is equal to 20 Boeing 747 airliners going down each week.^{10,71} If you take the 50% waste in health care and attribute less than half of that to unreliability and harm through overuse, underuse, and misuse of care, it would be like ten million dollars in each cargo hold of

each of those 20 747 airliners each going down a week. How can we allow this?

THE NATIONAL TRANSPORTATION SAFETY BOARD EXAMPLE FOR HEALTH CARE

Boeing Study Drives a Safety Era

The study of airline accident probability was undertaken in 1993 by the Boeing Commercial Airplane Group that forecast the loss of one airliner every week by 2010. It forecast a growth of the global airline fleet and found that unless emphasis was placed on prevention in addition to just understanding the cause, the losses of airliners would be unacceptable. Studies like this historically prompted industry-wide collaboration of all stakeholders, with the FAA acting more as a mentor than a legalistic regulator. Such studies led to invisible support systems developments that minimize the risk of human error, manage information to maximize safety, and recognize design improvements that can save lives.^{72,73}

Commercial Aviation Safety Team

In 1997, the White House Commission on Aviation Safety and Security report challenged government and the airline industry to reduce the accident rate of air travel by 80%. The National Civil Aviation Review Commission recommended that the FAA and industry work together to develop a comprehensive, integrated safety plan to implement many existing safety recommendations and develop performance measures and milestones to assess progress in meeting safety goals. They found that aviation safety needed to be addressed worldwide, not just in the United States. The Commercial Aviation Safety Team (CAST) was formed in 1998.

American Fatalities Reduced 83% Over 10 Years

The strategy was to “significantly increase public safety by adopting an integrated, data-driven strategy to reduce the fatality risk in commercial air travel.” The CAST model was to identify the top safety areas through the analysis of accident and incident data; charter joint teams of experts to develop methods to fully understand the chain of events leading to accidents; and identify and implement high-leverage interventions or safety enhancements to reduce the fatality rate in these areas. Since CAST implementation, the fatality rate of commercial air travel has been reduced in the United States by 83% over the last 10 years.⁷⁴

INTRODUCING AN NTSB FOR HEALTH CARE

The NTSB is an independent agency of the U.S. Government, established by Congress primarily to investigate all significant transportation accidents in the United States for the purpose of learning lessons from significant accidents and applying those lessons through specific recommendations to prevent repeats.

In his *New York Times* editorial on July 28, 2009, Jim Hall, the NTSB chairman from 1994 to 2001, made the case for an NTSB for health care.⁷⁵ He stated that the tens of thousands of deaths each year and billions of dollars lost could be prevented by “known techniques and technologies.” He said that these could be addressed with little cost to the American taxpayer. He acknowledges the fact that American health care accepts harm because of error as an inevitable consequence of treatment and that we need to change this culture.

25 Cents per American per Year—A Small Price to Pay

Conversely, Jim Hall stated that the NTSB views every death as a preventable occurrence. Regarding cost, he states: “The National Transportation Safety Board costs each citizen approximately 25 cents per year.” He goes on to say: “This is a small price for an agency that has eliminated midair plane collisions, persuaded Americans to put children in the back seats of cars instead of the front and prevented deaths in every category of transportation. Given health care’s notorious struggles with rising prices, this is a cost-saving opportunity the industry cannot afford to overlook.” He goes on to recommend an NTSB for health care, stating: “Such a move would save money by saving lives and would ensure that our nation’s health care system is equipped to provide the safest medical care possible.”

Chris Hart, the current Vice Chairman of the NTSB, a terrific champion of cross-industry learning, has recognized in numerous presentations the unique collaboration seen in aviation that he has not seen in other industries. He also presents the remarkable finding that productivity has improved through improvement of safety.

The NTSB routinely issues so-called “Blue Cover Reports” as end-of-investigation public releases containing the fruit of their investigatory and analytical labors. It is the standard format of the Blue Cover Reports and the intellectual rigor of the presentation methodology inherent to them that could be of great benefit to American health care.

Not Why an NTSB for Health Care—Why Not?

We believe that the question regarding an NTSB for health care is not why ... but why not!

- Why not use best practices that taxpayers have already paid for to prevent the more than 30 preventable deaths an hour in American hospitals?
- Why not use methods that have been field-tested with proven results?
- Why not save money while saving lives and bringing value to our communities?
- Why not leverage great tools from aviation that clearly have application to health care?
- Why not challenge common risk-management processes to prevent the national sharing of information?
- Because current databases of healthcare accidents are so small, sparsely populated, and inaccessible to all hospitals, why not have a fast-track program generating “Red Cover Reports?”
- Why not address the HIT risks proactively, as we know unintended consequences occur when we introduce new technologies?
- Why not learn the lesson from aviation—that we must move beyond reporting causes and aggressively move to prevention of accidents?
- Why not give high net worth individuals like Warren Buffet who feel that tax rates are too low⁷⁶ an opportunity to provide funds to create an NTSB-like demonstration project and prove what we already know and save lives in the process?
- In a new report from the IOM *HIT and Patient Safety; Safer Systems for better care*, a committee of independent experts has called for an NTSB-like body to investigate serious problems related to HIT—why not listen to them?

As an example, Sing et al⁶⁶ recently proposed the creation of a new centralized, nonpartisan board with an appropriate

legal and regulatory infrastructure to ensure safety of EHRs nationally. They proposed that “this could be modeled after the National Transportation Safety Board⁷⁷ and funded by the Congress.” They discussed the rationale of the proposed oversight program and its potential organizational components and functions, which include robust data collection and analyses of all safety concerns that are performed in close collaboration with local EHR safety oversight committees, multidisciplinary investigation of selected high-risk safety events, and enhanced coordination with other national agencies to facilitate broad dissemination of hazards information to prevent harm.

A Why Not Dream?

To quote Robert Kennedy’s paraphrase of George Bernard Shaw’s words⁷⁸: “There are those who look at things the way they are, and ask “Why? I dream of things that never where, and ask “Why not?”

Whether a public, private, or public-private partnership would be formed, why would we not push for such a program when it would pay for itself many times over?

The Red Cover Report: A Health Care Sister to the NTSB Blue Cover Report

We credit the concept of a “Red Cover Report” to our co-author John Nance, who envisions a report on healthcare accidents just like the NTSB Blue Cover Report from which pilots learn about accidents that have occurred and how to avoid such events in their own flying. The reports blind individual information and get to the essence of how to prevent future accidents. If such a report had been generated after the heparin overdose events that happened in Indianapolis 11 months earlier, we feel sure that Zoe Grace Quaid and T. Boone Quaid would not have gone through their ordeal, nor would events that have occurred since have brought harm to other children. One of the most compelling reasons for establishment of a broadly based Red Cover Report series (based on the principle of the NTSB “Blue Cover Report”) is the fact that a vast majority of the experiential safety information—which we absolutely must have to reduce patient injuries—is submerged by fear of litigation and by lack of profession-wide cooperation.

A “Red Cover Report” Will Save Lives

Hospitals and other healthcare organizations simply do not have the ethos and/or systems to aggressively share accident/incident/near-miss information. The current practice of allowing sealed records in malpractice cases guarantees that life-saving safety information will be forever denied to the profession. The Red Cover Report could be certified as an avenue of immediate safety communication. No disciplined, systemic approach (including the so-called root cause analysis) has yet been applied in American health care to present accidents and near-misses—stripped of nonpertinent identifying information about hospital, patients, or practitioners—that can harvest the clinically critical knowledge available for prevention purposes. Furthermore, although the institution of the root cause analysis is widely used as an investigative protocol, it has several major flaws: a clear lack of national uniformity in discussion and presentation, heavily curtailed availability outside a specific institution, no translation of the lessons learned to a wider clinical audience, and an incorrect focus on a single cause versus the critical reality that there is never just one cause to a medical accident, incident, or misadventure.

Although The Joint Commission serves a terrific role in health care, its Sentinel Event database is extremely small

compared with the actual incidence of events in America. We need more.

The great benefit of an NTSB approach is that it would not require analysis of every healthcare accident; it could address those events that could have the greatest value to the nation.

Critics of health care argue that many hospitals maintain risk-management strategies that are really “malpractice claims management strategies,” focused on sequestering information, gagging survivors and surviving families through awards, and burying mistakes that prevent learning moments. A “Red Cover Report” will move us closer to prevention and give meaning to the lives that are lost, which is what most families seek through their grief.

So, Back to Our “I, We, and Now Story”

We are inviting you as a reader to become part of a public narrative. You have heard our “I stories,” and it is our goal to enlist you in a cause of embracing innovations we have and have already paid for to be implemented along with quality improvement initiatives underway and to be launched.

Our “We Story”

Together with other aviation and patient safety advocates, we believe that American aviation innovators and innovations have changed the world by making transportation ever safer and that their leadership, practices, and technologies can change our healthcare world as well. We believe an NTSB-like organization can work in concert with PSOs by leveraging common formats and new data system reporting programs to dramatically reduce the risk of health care. Our message is to join the cause of adopting innovations we have already paid for and already have to address the current crisis of waste and harm.

Our “Now Story”

So what will happen if we do not act now? We will continue to have more than 30 avoidable deaths an hour, the equivalent of 20 jumbo jets going down per week, each full of Americans and 10 million dollars of wasted cash as cargo. Sometimes, the medical and business literature sounds like an echo chamber—quoting the same numbers over and over. One factoid that many cite is the 17-year adoption rate of innovation by health care.⁷⁹ It may be of interest to know that it has been exactly 17 years since Lucian Leape wrote his seminal paper “*Error in Medicine*,”²⁸ cited earlier, leading us to believe we can learn from aviation. Do you think it’s time?

Make a Commitment

Our call to action is for everyone. Our national security depends on all action by all healthcare stakeholders. The historical Medicare payment process that, until recently, had no check or balance for quality and safety drove provider-volume-centered care. With private insurers following suit, an amazing industry trajectory was propelled by artificial incentives that defied the laws of business gravity. Quality, cost, speed, trust, and value are intrinsically interlocked and tightly coupled.

Defying the Business Laws of Gravity

Our healthcare world is like a ball thrown into the air propelled by the arm of a multi-trillion dollar giant; however, this sphere has reached its apex. You can only defy gravity so long, and what goes up must come down. When it does, it will come down with the same energy that sent it up. Everyone must weigh in and make sacrifices to soften the landing.

The approval rating of the U.S. Congress is at an all-time low—reflecting its partisan gridlock. It is as if the Thelma and Louise poles of our political parties have accepted taking our healthcare car over the cliff for one last expression of fruitless psychodrama.

Let us grab the national steering wheel and avoid disaster.

THE DEBATE: NOT WHY BUT WHY NOT?

What CAN You Do?

Whether we never develop an NTSB for health care, at least we can open the debate. Whether all American hospitals adopt the best practices from aviation, nuclear power, and other high-reliability organizations, at least some will if we shine a light on them. Whether every hospital brings patients and families into its quality leadership programs, at least some progressive ones will.

Whether you are a hospital trustee, CEO, supplier company leader, physician, a purchasing executive, or a Chief Family Officer at home, there is something you can do in your own community and sphere of influence.

The waste and harm is so great, you will have an impact if you focus your energies on the right leverage points. It is critical that we recognize that health care is no different than any other industry.

Jim Collins's stages of *How the Mighty Fall* provide a sobering framework that may be used as a mirror to examine your organization, your trading partners, and you. Clearly, life is not so simple; however, the concepts are worth considering.¹³

Look in Your Mirror.

Which of Collins's Stages Are You?

Are you or your trading partners at risk for being in *Stage 1: Hubris Born of Success* and being lulled into a feeling of entitlement? Are you still pursuing a "provider-centered volume driven" model of *Stage 2: Undisciplined Pursuit of More* and ignoring the movement to value-based purchasing?

Or are you in *Stage 3: Denial of Risk and Peril*, where so many hospitals find themselves? As Collins would say, are "internal warning signs" beginning to mount, are you explaining them away, putting a positive spin on them, and are you suffering "mural dyslexia"—where you cannot read the writing on the wall?

Sequestering malpractice claim information, being less than fully transparent about adverse events, and accepting hospital-acquired infections as a "cost of doing business" are sure signs of heading for *Stage 4: Grasping for Salvation*.

Suppliers, providers, and purchasers need to prepare for the *No Outcome—No Income Tsunami*, coming our way—huge waves of payment changes will hammer the market. There will be surfers who make things happen, swimmers who will capsize and watch what happens, and sinkers who will wonder what happened.^{80,81}

Provider-Centered and Volume Driven to Patient-Centered and Value Driven

In their latest book, *Great by Choice*, Jim Collins and Morten Hansen declare that great organizations do not thrive on chaos but thrive in chaos. "They don't merely react; they create. They don't merely survive; they prevail. They don't merely succeed; they thrive. They build enterprises that can endure."⁸² They go on to say such high performers exhibit a triad of core behaviors: fanatic discipline, empirical creativity, and productive paranoia. The "central animating force" of these behaviors must be *Level 5: Ambition*. These behaviors and force must be exhibited in our

healthcare mission plan. We must move from our provider-centered volume-driven model to a patient-centered value driven model. True leaders will take risks and know doing the right thing is the right thing to do ... we must choose to win.

Debate and Innovate or Capitulate

It is time for civil debate, real solutions, and authentic governing. To politically balance the earlier quote of Bobby Kennedy, we quote President Ronald Reagan, who was known to say—

*"Cocktails at Five,
Pistols at Dawn"*

— after frequent evenings of storytelling with his 2 friends and adversaries—Teddy Kennedy and Tip O'Neill. Let us follow their lead and agree to disagree on issues while maintaining goodwill and solving problems. We cannot afford to make patient safety a partisan political football. We must become partisan for patients and use effective political and government tools to serve them.

We are recommending growing government and bureaucracy; in fact, one of our original meeting group mentioned above was California Congressman Dana Rohrabacher, known for the quote "Bureaucracy is the best device known to man that can turn entrepreneurial energy and financial resources into solid waste."¹⁸ We are recommending an NTSB approach that could even be accomplished privately; the solution can come from the debate. Government can work, public-private partnerships can work, pure nonprofit programs can work, and our healthcare system can work; all it takes is leadership.

All stakeholders can innovate; creativity is not just a God-given talent that cannot be developed. The research that led to *The Innovator's DNA* by Deyer and Gregersen and best-selling author Clayton Christensen⁸³ did not find that we can all become as creative or productive as the late Steve Jobs; however, it did find that the discovery skills of associating, observing, networking, and experimenting are competencies we can develop.

In the second part of this 2-part article, we will challenge healthcare suppliers, providers, and purchasers to become role models and fully embrace patient-value-centered-care that has as an intrinsic property safety and avoidance of healthcare harm. Our target has to be zero waste and harm. We may never be perfect, but those who are chasing zero will change the standard of care.

Don't Lose Faith

There is evidence to justify the hope that we can learn from multiple industries and use what we already have to save lives and save money. We are in what Warren Bennis and Bill George would call a "crucible," like what Steve Jobs went through in his public failure and the downturn in his career before his extraordinary success.⁸⁴ In his 2005 Stanford commencement speech, Jobs said, "It was awful-tasting medicine, but I guess the patient needed it." He said he was sure his later success would not have happened without it and went on to say, "Sometimes life hits you in the head with a brick. Don't lose faith."⁸⁵

Capitulation to our healthcare economic crisis is not an option. We need you—engaged leaders at every level, best practices from anywhere we can find them, and technologies that absorb our inevitable human error and systems failures.

We Can Soar Again

We 4 authors have faith in you, that America has plenty of creative runway left, that a new wind of innovation can lift our tired wings into the air, and that we can break the surly bonds of healthcare harm and waste and reach for the stars.

What Are You GOING to Do?

Do not wait until you are the one in 3 doctors' families or the one in 4 American families who experiences avoidable death, disability, or harm requiring care. When your eyes strike the last word of this paper, what are you going to do?

Remember, we "save one little soul at a time."

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