



Image: Mutzke<sup>1</sup>

# Aviation and Healthcare: Safety Lessons Learned the Hard Way

There are many parallels between the high-risk fields of aviation and healthcare.

- Pilots and physicians have to make life-and-death decisions in seconds.
- Pilots and physicians tend to be highly skilled, strongly-driven personalities who rely heavily on technology to do their jobs.
- “Both involve hours of boredom punctuated by moments of sheer terror.”<sup>2</sup>

## Sheer Terror

In 1977, a series of human errors caused two Boeing 747s to collide on a foggy runway in the Canary Islands, killing 583 people.

The captain of one flight thought he had clearance for takeoff, and the black-box recording showed **miscommunication** with his first officer – who was apparently too intimidated to correct him.

The aviation industry now uses **Crew Resource Management** techniques to address how pilots communicate in the cockpit. It allows junior crew members to directly bring up potential problems with the captain and improve collaborative decision-making.

“Before crew resource management, captains could be gods or cowboys in determining how things ran in the cockpit. The crew member who spoke to the captain about unsafe practices was placing his or her job on the line.”<sup>3</sup>

## What is Crew Resource Management (CRM)?

- CRM is a set of training procedures for use in environments where human error can have devastating effects, such as in air safety.
- The goal of CRM is to improve dimensions such as situational awareness, communication, leadership, decision-making, flexibility, adaptability, self-awareness, and assertiveness.
- CRM aims to foster a more collaborative culture where the freedom to respectfully question authority is encouraged so that mistakes and errors can be proactively prevented.

### Miracle on the Hudson

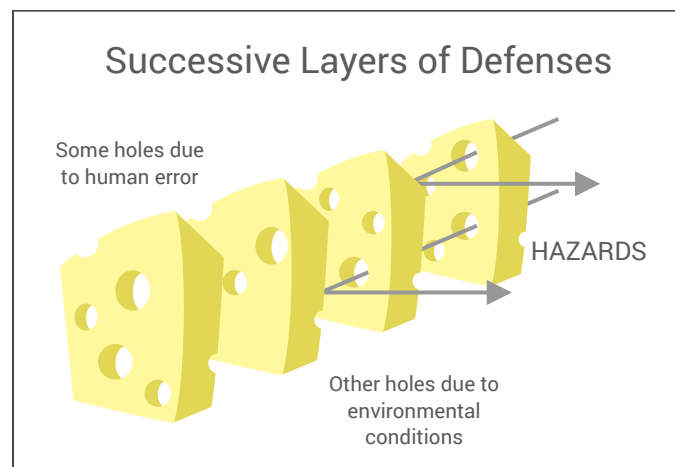
In 2009, minutes after taking off from New York City’s LaGuardia Airport, US Airways Flight 1549 was struck by a flock of geese, instantly disabling the plane’s engines.

As the plane lost altitude, Captain Chesley “Sully” Sullenberger pulled out the plane’s **checklists**. Even with only three minutes remaining before a potential crash, Sully followed the correct checklist and successfully ditched the plane by gliding it onto the Hudson River.

Checklists have been used for decades in the aviation industry to ensure compliance with standardized procedures. In the case of Flight 1549, checklists allowed Sullenberger and his crew to immediately rely on established aviation protocols and make crucial decisions – referencing the aircraft ditching checklist, loss of thrust checklist, and other emergency checklists simultaneously. With this knowledge, Sullenberger and his crew were able to successfully land an unpowered plane in the Hudson River and save the lives of all 155 passengers on board.

### Applying Aviation Protocols to Healthcare

There are a number of aviation safety techniques that can be translated into healthcare. In doing so, it is important to apply successive layers of defenses so that a single human error or single environmental condition never allows for more serious errors to occur.



Here is a list of techniques and how to adopt them into healthcare.<sup>3</sup>

1. **Teamwork Training and Communication**
  - **Crew Resource Management:** improve

communication among physicians, nurses, and others to spot mistakes before they happen and be aware of the medical situation as it develops. The Agency for Healthcare Quality and Research (AHRQ) bases its TeamSTEPPS training<sup>4</sup> on CRM elements, and the principles of CRM have been applied effectively in infection prevention.

## 2. Checklists

- Provide evidence-based protocols designed to make it easier for health professionals to rigorously follow safety steps every time.

## 3. Briefings, Debriefings, and Timeouts

- Use when handing off patients in the hospital or before and after surgery.
- Put all members of the care team on the same page with regards to the medical situation and what is expected.
- Integrate the approaches into a checklist.

## 4. Incident Reporting

- Allow physicians, nurses, and others to anonymously report adverse effects, near mistakes, and unsafe conditions to hospital officials and regulatory authorities.

## 5. Simulator Training

- Use simulations to help physicians and nurses in training gain technical competence in different scenarios while also practicing interdisciplinary communication skills.

## 6. Standardization

- Standardize the layout of areas such as nursing stations, patient rooms, and operating rooms to reduce the risk of errors due to unfamiliarity.

simple checklist — as pilots do before takeoff — **patient-mortality rates were cut nearly in half and complications fell by more than a third.** The study — which included 7,688 patients in eight hospitals around the world — saw death rates drop from 1.5% before the checklist was instituted to 0.8% afterward. Serious complications fell from 11% to 7%.<sup>6</sup>

With the increasing use of electronic tools in healthcare, electronic checklists have been shown to reduce more errors than paper checklists. A recent Stanford study showed that electronic checklist users reported higher usage, integration with workflow, usefulness of checklists, and discharge confidence than paper checklist users. Checklists have also been used to facilitate the discharge process. Data from the study showed that electronic checklists were needed to get residents to reliably complete important discharge tasks.<sup>7</sup>

Checklists ensure knowledge is applied consistently and correctly. When properly executed, aviation protocols such as checklists foster healthy communication to deal with the expected as well as the unexpected.

### References

1. Mutzke (2014) Aviation Image [online] available from <<http://johannesmutzke.com/?p=1232>>
2. Murphy (2006) What Pilots Can Teach Hospitals About Patient Safety [online] available from <<http://www.nytimes.com/2006/10/31/health/31safe.html>>
3. O'Reilly (2010) Patient safety: What can medicine learn from aviation? [online] available from <<http://www.amednews.com/article/20100614/profession/306149945/4/>>
4. TeamSTEPPS training. [online] available from <<http://teamstepps.ahrq.gov/>>
5. Pronovost, P., Needham, D., Berenholtz, S., Sinopoli, D., Chu, H., Cosgrove, S., Sexton, B., Hyzy, R., Welsh, R., Roth, G., Bander, J., Kepros, J., and Goeschel, C. (2006) 'An Intervention to Decrease Catheter-Related Bloodstream Infections in the ICU' *The New England Journal of Medicine*, vol. 355, no. 26, December, pp. 2725-2732.
6. Windsor, J. A., and Petrov, M. S. (2010) 'Patient safety in medicine: are surgeons ready for checklists?' *ANZ Journal of Surgery*, vol. 80, no. 1-2, January/February, pp. 3-5.
7. Garg, T., Lee, J. Y., Evans, K. H., Chen, J., Shieh, L. (2015) 'Development and Evaluation of a Best Practice Discharge Checklist for Hospital Patients Using the Electronic Medical Record' *Journal of Hospital Medicine*, vol. 9, no. 2.

## Success with Aviation-Style Checklists in Medicine

A five-point checklist implemented in 2001 virtually eradicated Central Line Infections in the ICU at Johns Hopkins. Dr. Peter Pronovost, a critical-care specialist at Johns Hopkins, also applied checklists to other hospitals in the Keystone Initiative in Michigan with similar results, reducing the incidence of catheter-related bloodstream infection by 66% sixteen to eighteen months after implementation.<sup>5</sup>

In a separate study, when surgical teams heeded a

### About Medisas

Medisas is driven by a mission to create simple, beautiful software for hospitals. Its communication and collaboration platform allows the care team to share critical information for safer handoffs and more streamlined discharges. Medisas has helped hospitals improve patient care and operational efficiency by reducing medical errors and improving discharge times.

Designed for clinicians by clinicians, Medisas was borne from a physician's frustration with hospital technology. Medisas is based in Silicon Valley and backed by top-tier venture capital firms such as Andreessen Horowitz and SV Angel, the investors behind companies such as Google, Skype, and Facebook.