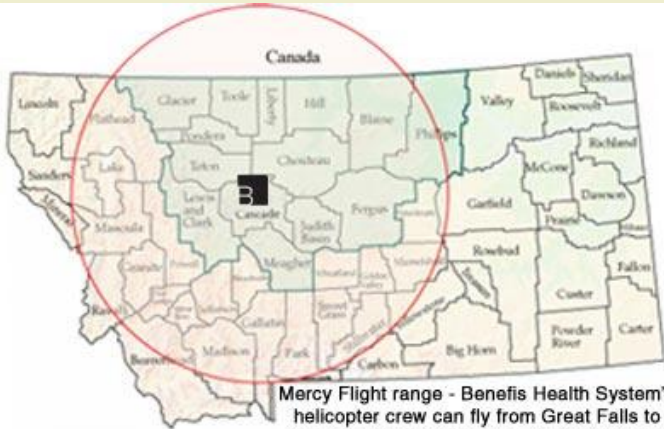


Patient Safety vs. Passenger Safety: A Quality Comparison

Kelly McKeever



A Quick Biography...



Mercy Flight range - Benefis Health System's helicopter crew can fly from Great Falls to the perimeter of the circle and back without refueling. This area covers Central Montana and most of Western Montana.



Anatomy Instructor – MSUCoT
EMS Chair – MSUCoT
Flight Paramedic – Benefis Healthcare
Quality Coordinator – Benefis Healthcare
Manager Orthopedic Clinic – Benefis Healthcare
Clinical Educator – Benefis Healthcare

What is Simulation?

sim·u·la·tion

Definition:

...a person, device, or set of conditions which attempts to present education and evaluation problems authentically.

Characteristics:

- Learners see cues and consequences...just like real life
- Learners may be placed in complex situations
- Learners act as they would in the real environment

So...Why Simulation?

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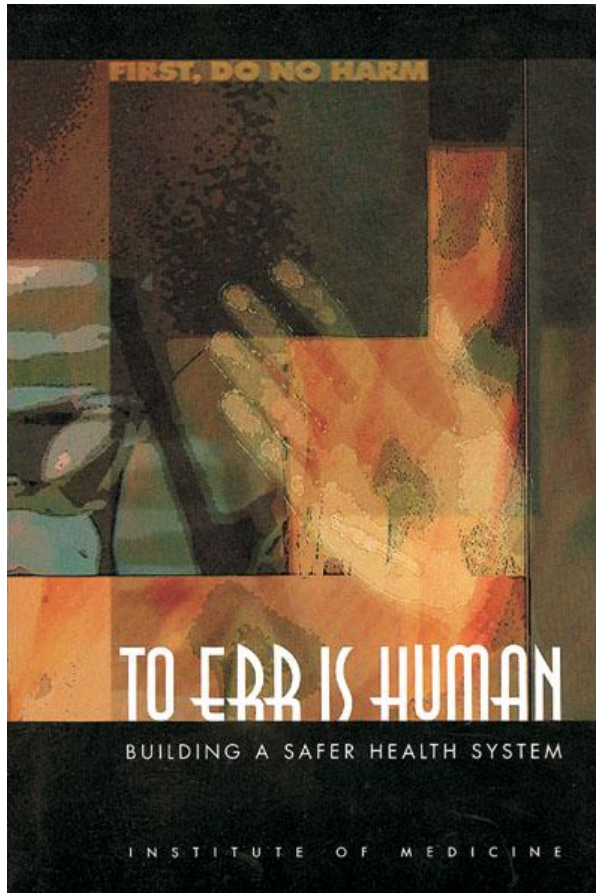
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"Doug needs to work on his landings."



Laerdal
helping save lives

So, Why Simulation? The Medical Perspective



Institute of Medicine, 2000

Two large studies, one conducted in Colorado and Utah and the other in New York, found that adverse events occurred in 2.9 and 3.7 percent of hospitalizations, respectively. In Colorado and Utah hospitals, 6.6 percent of adverse events led to death, as compared with 13.6 percent in New York hospitals. In both of these studies, over half of these adverse events resulted from medical errors and could have been prevented.

More people die in a given year as a result of medical errors than from motor vehicle accidents (43,458), breast cancer (42,297), or AIDS (16,516).

So, why simulation? The Aviation Perspective

“A flight simulator is used to train pilots on the ground. It permits a pilot to crash his simulated "aircraft" without being hurt. Flight simulators are often used to train pilots to operate aircraft in extremely hazardous situations, such as landings with no engines, or complete electrical or hydraulic failures. The most advanced simulators have high-fidelity visual systems and hydraulic motion systems. The simulator is normally cheaper to operate than a real trainer aircraft.”

Simulation in Throughout...



- Flight training
- Nuclear power plant operations
- Astronaut training
- Police and military training

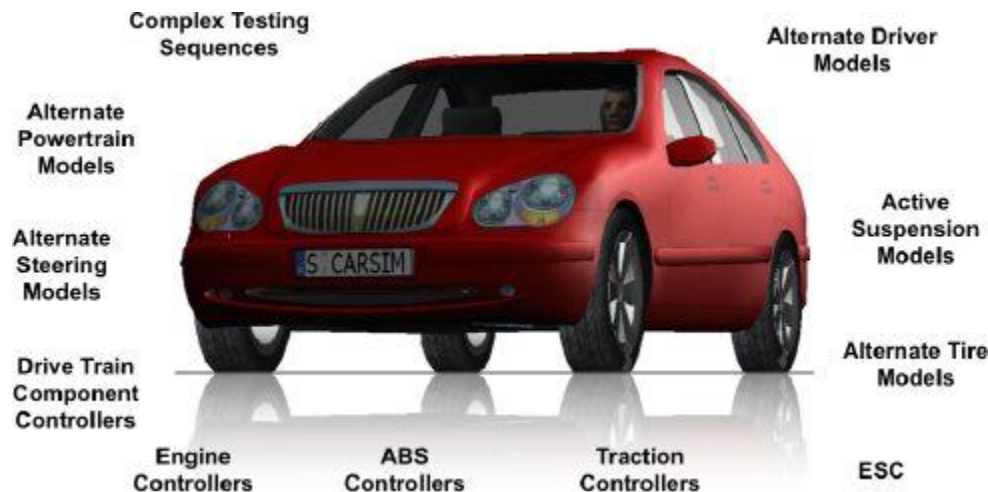
A Horse Simulator from WWI...



Mechanical Simulation...

Why Use CarSim, TruckSim, or BikeSim?

CarSim, TruckSim and BikeSim provide system-level simulations of vehicles. They include enough detail to accurately reproduce vehicle tests for handling, braking, powertrain, etc., possibly with advanced electronic controllers.





Don't sweat your best ideas, test them.

free trial



Avoid risks by simulating your ideas with **Flexsim**

overview

visualize in 3D

analyze your system

optimize your process

ease of use

customized modeling

system requirements

screenshots

Flexsim web demo

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Flexsim Simulation Software - Overview

Flexsim is the most powerful tool for modeling, analyzing, visualizing, and optimizing any imaginable process - from manufacturing to supply chains, abstract examples to real world systems, and anything in between.



Visualize in 3D

Break out of 2D simulations and into a whole new world of true to life visualization. Build your models in Flexsim's native 3D from the start - no post processing! [Learn more](#) ▶



Analyze your system

Discover the causes of bottlenecks and backups. Create 3D charts and graphs right in your model. Export reports and statistics. [Learn more](#) ▶



Optimize your process

Flexsim includes a built-in experimenter as well as OptQuest® to allow you to maximize your system's potential. [Learn more](#) ▶



Ease of use

Drag and drop model building, intuitive controls, comprehensive help, and more combine to make Flexsim the easiest simulation software you'll ever use. [Learn more](#)

A Partial List of Simulation in Other Industries

- City Simulators/Urban Simulation
- Classroom of the future
- Digital Life Cycle Simulation
- Engineering, Technology, or Process Simulation
- Finance Simulators
- Physics Simulators
- Sales Process Simulators
- Truck Simulators
- Simulation and Games
- Robotics Simulators
- Military Simulators
- Flight Simulators
- Marine Simulators

Aviation Simulation vs. Medical Simulation



A Quick Comparison Between Passenger Safety and Patient Safety Simulation

Aviation

- Originated in 1910
- Has strict government oversight (FAA)
- Provided app. 500,000 jobs in 2006
- Sr. Pilots are among the highest paid workers in US
- 19,824 US Airports in the US in 2004
- 741 million passengers in 2006
- FAA approves flight simulators
- Simulators can cost in to the multi-millions
- FAA dictates training curriculum
- Commercial pilot...Bachelor's Degree "preferred"
- Anywhere from 33% – 40% of a pilot's flight training can be in an approved flight simulator (FAA 142)

Medicine

- Origins debatable...Eastern Medicine used cadavers & clay figures to represent patients & circumstances
- Has government oversight (CMS)
- Provided 14 million jobs in 2006
- Healthcare wages are among the highest in the nation
- 580,000 facilities...7,600 – 8,000 are hospitals
- 33.7 million inpatient discharges in 2002
- 110 million annual visits to ERs
- Simulators are "endorsed"
- Simulators can cost into 6 figures
- Educational requirements vary widely
- Little has been established with simulation hours in Medical Education

Does Simulation Work in Aviation?



<http://www.youtube.com/watch?v=imDFSnkIB0k&feature=related>

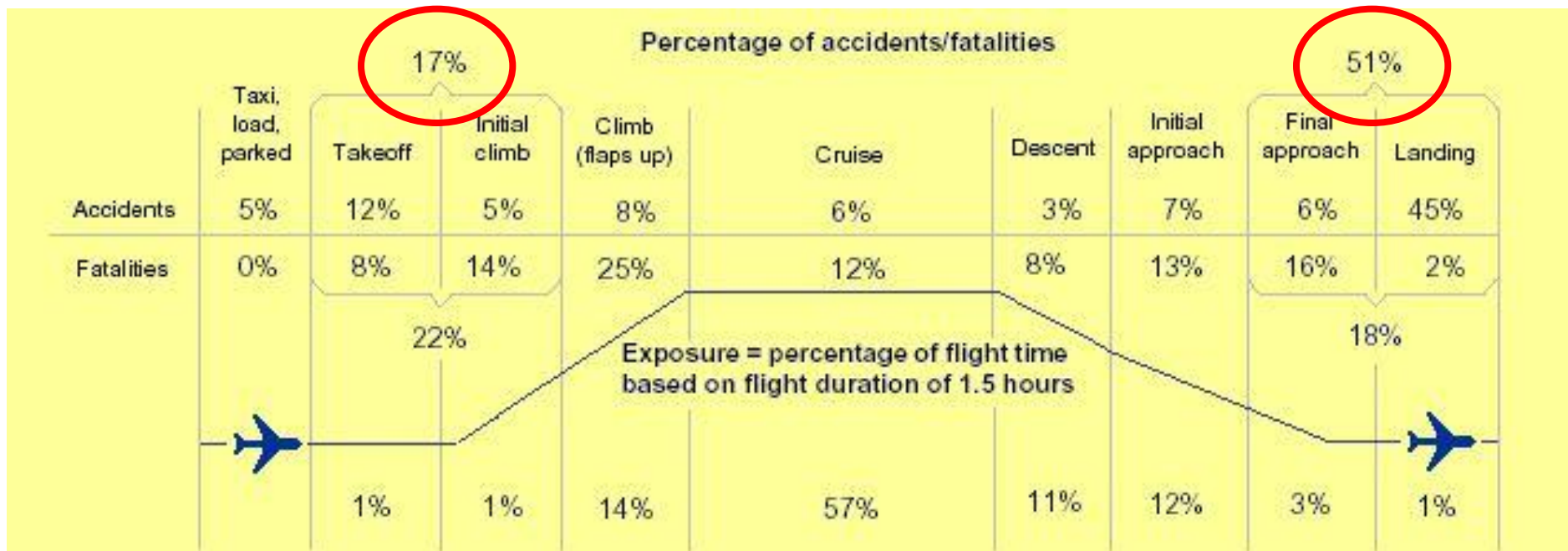


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Is Simulation Linked to Passenger Safety?

- FAA is the quality oversight agency for aviation
- All safety systems (ie., slides, doors, rafts, processes) on a passenger plane must be simulated with results exceeding FAA standards
- “At American Airlines we are fully committed to total simulation.” – 1983
- A University of Illinois study of simulator use in flight instruction grew from 12% in 1969 to 20% by 1978
- A quick case-study...Microburst
- A few statistics

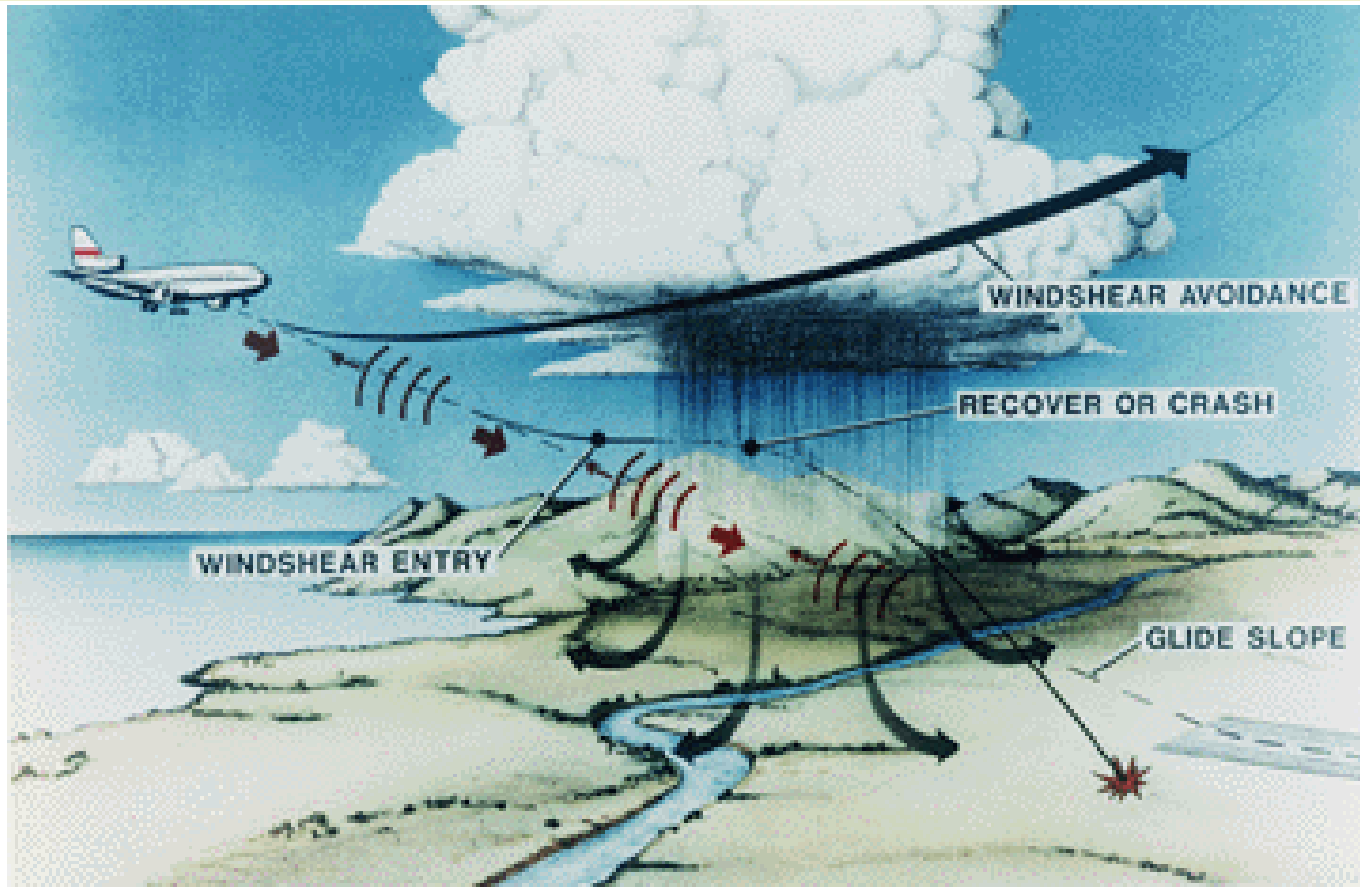
When do Air Accidents Occur?



Wh

Errors occur not only in hospitals but in other health care settings, such as physicians' offices, nursing homes, pharmacies, urgent care centers, and care delivered in the home. Unfortunately, very little data exist on the extent of the problem outside of hospitals. The IOM report indicated, however, that many errors are likely to occur outside the hospital. For example, in a recent investigation of pharmacists, the Massachusetts State Board of Registration in Pharmacy estimated that 2.4 million prescriptions are filled improperly each year in the State.

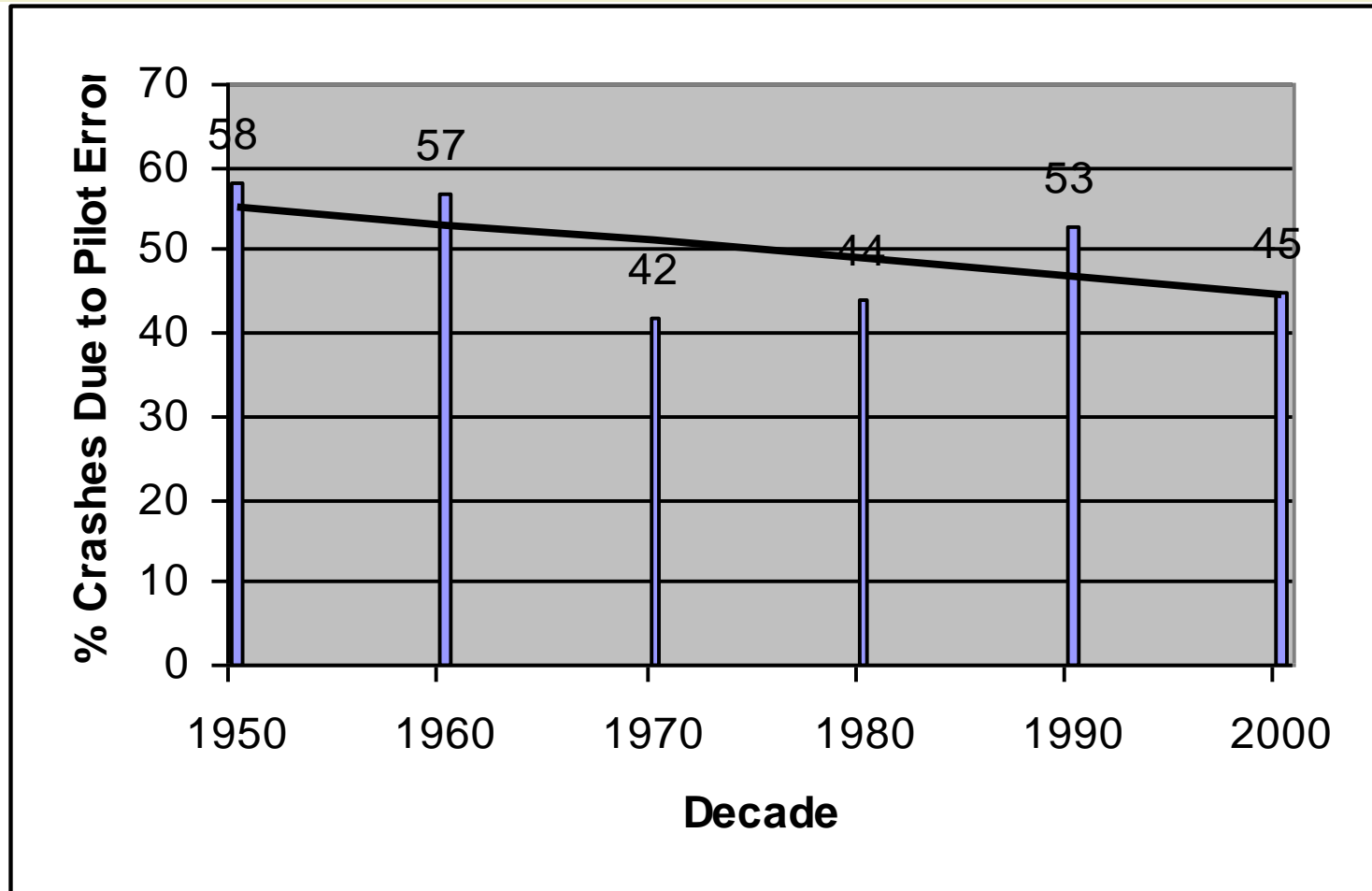
Surviving the Microburst...Windshear



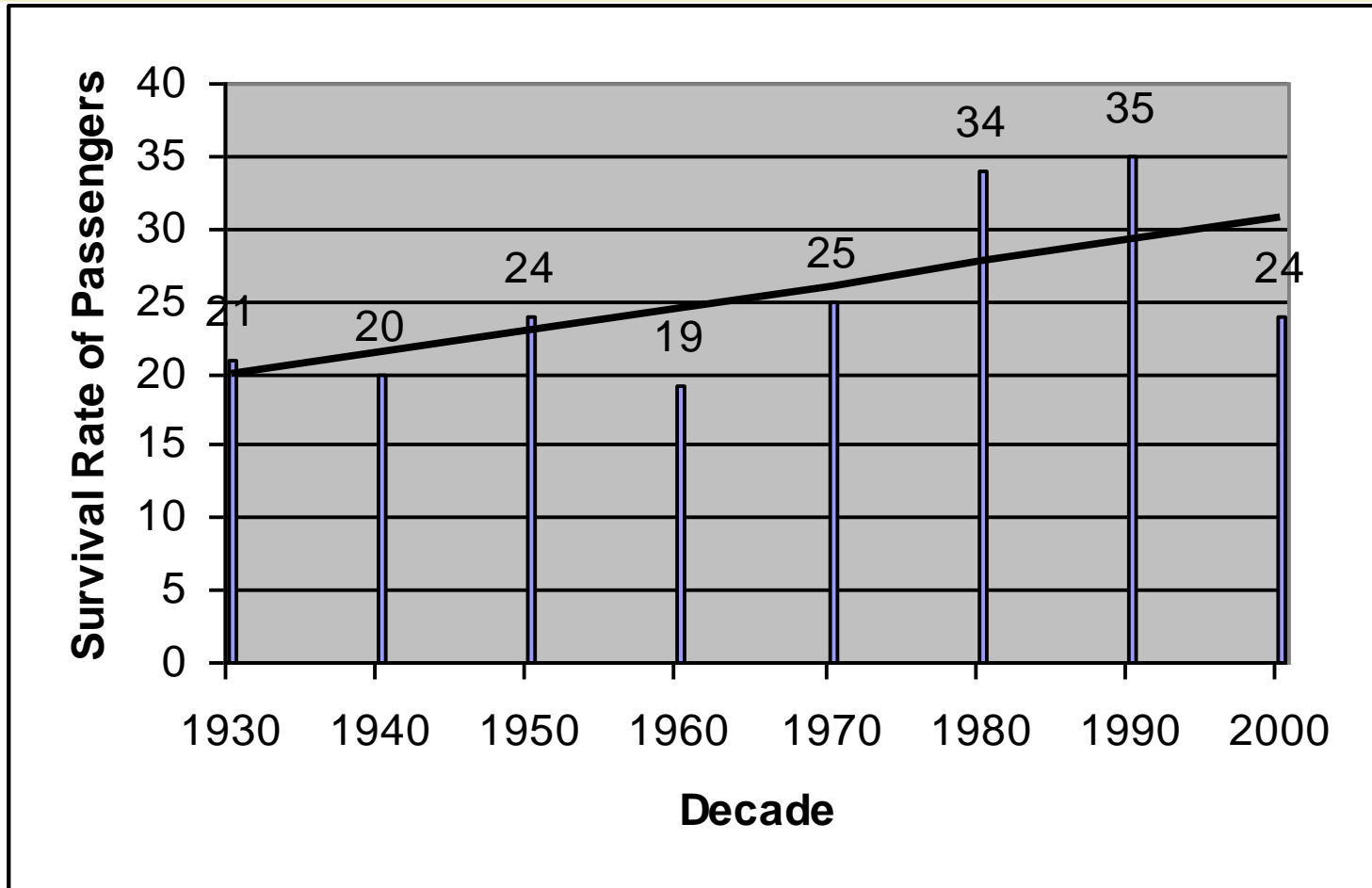
Surviving Windshear from a Microburst

- Making the Skies Safer
 - Identification of the microburst phenomena
 - Identification of the greatest potentials for danger (Take Off and Landing)
 - Detection of the microburst
 - In 1988 the FAA mandated that all commercial aircraft have onboard windshear detection systems
 - Create a model
 - Simulate the solution
 - First, research pilots "flew" possible flight test scenarios in the Transport Systems Research Vehicle (TSRV) fixed base piloted simulator to establish operating procedures with adequate safety margins.
 - Conduct "on-site" tests
 - Create training program for pilots and recommendations for hardware inclusion on planes

Incidence of Fatal Airline Crashes Due to Pilot Error



Survival Rate of Passengers on Aircraft Involved in Fatal Accidents Carrying 10+ Passengers



Fatalities per Million Flight Hours

Type of Flight	Fatalities per Million Flight Hours
Airliner	4.03
Commuter Airliner	10.74
Commuter Plane (Air Taxi)	12.24
General Aviation (Private)	22.43

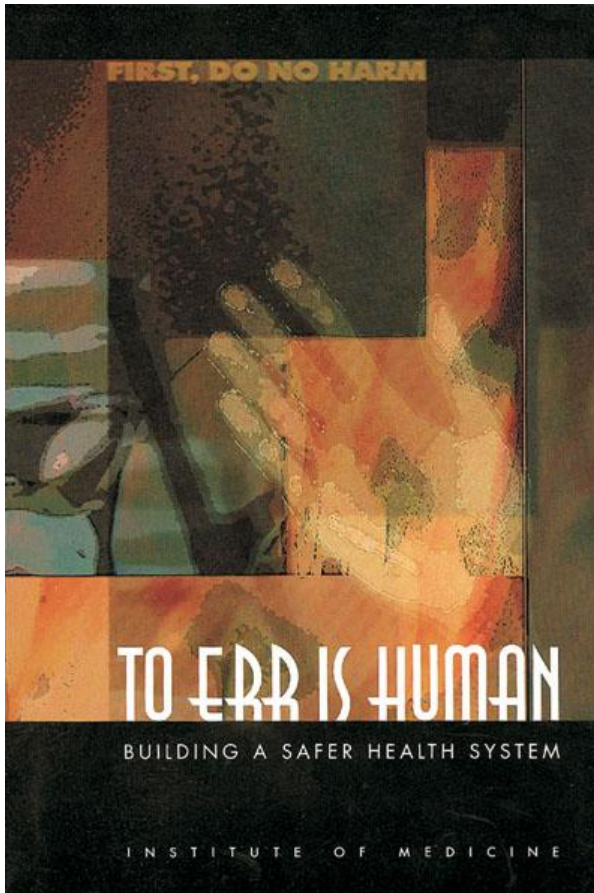
Odds of Being Involved in a Fatal Accident

Odds of being on an airline flight which results in at least one fatality	Odds of being killed on a single airline flight
Top 25 airlines with the best records 1 in 8.47 million	Top 25 airlines with the best records 1 in 13.57 million
Bottom 25 with the worst records 1 in 830,428	Bottom 25 with the worst records 1 in 1.13 million

Is Simulation Linked to Patient Safety?



Rationale for Simulation



Institute of Medicine, 2000

Two large studies, one conducted in Colorado and Utah and the other in New York, found that adverse events occurred in 2.9 and 3.7 percent of hospitalizations, respectively. In Colorado and Utah hospitals, 6.6 percent of adverse events led to death, as compared with 13.6 percent in New York hospitals. In both of these studies, over half of these adverse events resulted from medical errors and could have been prevented.

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Is Simulation Linked to Patient Safety?

- Unfortunately, there is no statistical link at this time, but the effort is underway
- At this point in time, medicine is forced to borrow rationale from other industries with a proven track record

IOM Principle (on Medical Simulation) #4...

Healthcare organizations and teaching institutions should participate in the development and use of simulation for training novice practitioners, problem solving, and crisis management, especially when new and potentially hazardous procedures and equipment are introduced. Crew resource management techniques, combined with simulation, have substantially improved aviation safety and can be modified for health care use. Early successful experience in ER and OR use indicated that (simulation) should be more widely applied.

Is Simulation Linked to Patient Safety?

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- At this point in time, medicine is forced to borrow rationale from other industries with a proven track record
- Quality oversight in healthcare

CMS & JCAHO

- The major players in Healthcare Quality
- CMS sets “Conditions of Participation” for organizations that receive Medicare/Medicaid moneys
- CMS can delegate this oversight by creating “deemed” status to the JCAHO
 - This is demonstrated through compliance with JCAHO’s “standards”
 - Participant organizations commonly report that the Medicare/Medicaid program is typically responsible for 45% - 85% of their total income

JCAHO Standards of Compliance

- **The JCAHO issues a manual called the CAMH**
- **It is organized into 11 Chapters**
 - NPSGs
 - Ethics, Rights and Responsibilities (RI)
 - Provision of Care, Treatment, and Services (PC)
 - Medication Management (MM)
 - Surveillance, Prevention, and Control of Infection (IC)
 - Improving Organization Performance (PI)
 - Leadership (LD)
 - Management of the Environment of Care (EC)
 - Management of Human Resources (HR)
 - Management of Information (IM)
 - Medical Staff (MS)
 - Nursing (NR)
- **Each chapter is further organized into respective standards**
- **Each standard is broken down into 1 – up to 15 elements of performance.**
 - There are approximately 250 standards and over 1,500 EOPs



Anatomy of JCAHO's Position on Patient Safety

- JCAHO's 2009 National Patient Safety Goals
 - Improve accuracy of patient identification
 - Eliminate transfusion errors due to misidentification
 - Improve effectiveness of communication
 - Improve safety of using medications
 - Reduce risks of health care associated infections
 - Reconcile medications across the continuum of care
 - Reduce risk and harm from falls
 - Recognize and respond to changes in a patient's condition
 - Implementation of Universal Protocols

How Does a Hospital Become Compliant with an NPSG (or Standard)

Accreditation Program: Hospital

Chapter: National Patient Safety Goals

Goal 1

NPSG

Improve the accuracy of [patient] identification.












NPSG.01.01.01





Use at least two [patient] identifiers when providing care, treatment, and services.

Rationale for NPSG.01.01.01

Wrong-[patient] errors occur in virtually all stages of diagnosis and treatment. The intent for this goal is two-fold: first, to reliably identify the individual as the person for whom the service or treatment is intended; second, to match the service or treatment to that individual.

Elements of Performance for NPSG.01.01.01

- | | | | |
|---|--|---|---|
|  | 1. Prior to any specimen collection, medication administration, transfusion, or treatment, the hospital actively involves the patient and, as needed, the family in the identification and matching process. When active patient involvement is not possible or the patient's reliability is in question, the hospital will designate the caregiver responsible for identity verification.
Note: The involvement of a single caregiver is acceptable as long as the other components of patient identification are satisfied. |  | C |
|  | 2. Two patient identifiers are used when administering medications, blood, or blood components. |  | C |
|  | 3. Two patient identifiers are used when collecting blood samples and other specimens for clinical testing. |  | A |
|  | 4. Two patient identifiers are used when providing other treatments or procedures. |  | C |
| | 5. The patient's room number or physical location is not used as an identifier. (See also MM.05.01.09, EPs 8 and 11) |  | A |
|  | 6. Containers used for blood and other specimens are labeled in the presence of the patient. |  | A |

KEY: **A** indicates scoring category A; **C** indicates scoring category C;  indicates situational decision rules apply;  indicates direct impact requirements apply;  indicates Measure of Success is needed;  indicates that documentation is required

Other Quality Contributors in Medicine

- CMS (formerly HCFA)
- JACHO
- CARF
- CAP
- URAC
- AHRQ
- National Quality Forum
- Leapfrog
- NAHQ
- AHQA
- NCQA
- NICHQ
- OIG
- IOM
- Medline Plus
- CIHQ
- IHI
- AQA
- ABP
- NACHRI
- CAMTS

JCAHO's Position on Patient Safety

- The Joint Commission is committed to improving patient safety through its accreditation process. Meaningful improvement in patient safety will eventually be reflected by a significant reduction in the number of medical/health care errors that result in harm to patients. Achieving this significant reduction is dependent upon:
 - Identification of the errors that occur
 - Analysis of each error to determine the underlying factors
 - Compilation of data about error frequency and type
 - **Dissemination of information about these errors**
 - Typically not a real popular item among hospitals
 - ***Periodic assessment of the effectiveness of the efforts taken to reduce the risk of errors***
 - The potential home to simulation

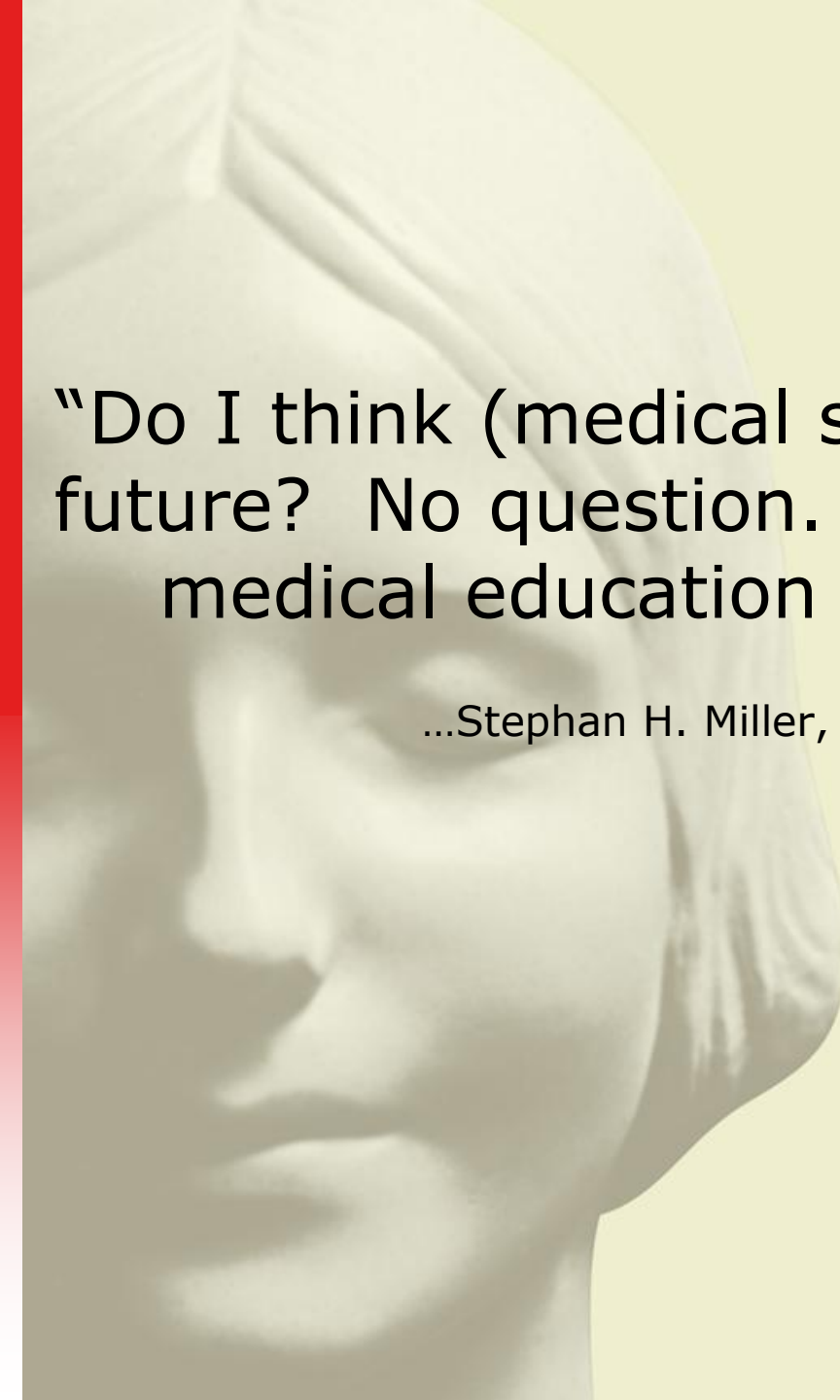
JCAHO's Position on Medical Simulation

- Encourage the adoption of information and simulation technology by building the evidence-base of their impacts on patient safety, and pursue proposals to offset implementation costs.

-**Healthcare at the Crossroads:** Strategies for Improving the Medical Liability System and Preventing Patient Injury. JCAHO 2005

Barriers to the Adoption of Simulation in Medicine (physicians)

- Resistance to paradigm switch
 - Replacing passive lecture and seat time with evidence-based, outcomes focused models
- Replacing traditional patient-centered focus with focus on the Learner's education and skill acquisition
- Rapid, major change is always met with resistance
- Visible costs are high (aviation comparison?)
- Significant cost/benefits are soft, indirect, or long term
- Trainers experienced in using simulation tools & methods
- Need for reliable, validated curricula
- Lack of data on transfer of medical simulation training lessons to actual patient care



“Do I think (medical simulation) is a wave of the future? No question. This is a major goal of the medical education and evaluation system.”

...Stephan H. Miller, MD, MPH American Board of Medical Specialties



Improving Physician Education

“Medical simulation is state of the art education that allows us to create new and realistic methods of learning without putting patients at risk. It is particularly valuable during the crucial early phases of medical training.”

...Steve Dawson, MD, Program Leader, Simulation Group at the Center for Integration of Medicine and Innovative Technology, Massachusetts General Hospital-CIMIT

Medical Simulation Improves Patient Safety and Reduces Cost

“Emerging technologies in medical simulation make a critical difference that ranges from helping a patient who is seeking relief from a phobia to training a surgeon who is rehearsing and perfecting a difficult procedure prior to surgery. The use of medical simulation training increases proficiency while greatly reducing training costs for physicians just as the aviation industry experienced with flight simulators. The field for medical simulation technology is simply burgeoning. We have an incredible opportunity to improve medical education and enhance patient safety.”

...Bob Waters, General Counsel, Center for Telemedicine Law, and Partner, Gardner Carton & Douglas LLP

Interesting Facts...

- Google search for “Hudson River Landing Game” produced 279,000 hits
- Google search for “Medical Simulation Game” produced 306,000 hits
- Google search for “Healthcare Quality Organizations” produced 204 million hits