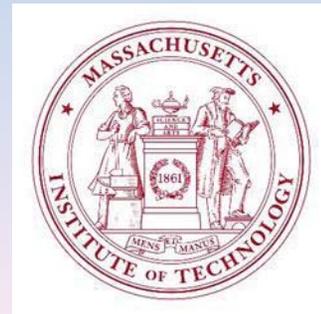
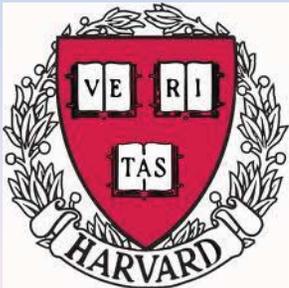


# Overview of Quality Improvement

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# Important Caveats

- My caregivers: no intentions to give me a compartment syndrome or surgical site infection
- BUT the system was designed to give me these complications.



- A student at MIT developed a wrist fracture which was not follow-up properly and led to reconstructive surgery due to missed non-healing.
- A catastrophic infection of the hip was missed on a 15-year old boy leading to a delay in treatment.
- An arrogant pediatrician at Children's Hospital dismissed parents' concern about food allergy and had to be convinced to run some tests. The parents were right.



- A blood thinner was not started on a nursing home in Seattle because the facility forgot to get it approved by the primary care giver (protocol).
- A baby sister's brain injury was missed in Trinidad and Tobago.
- A patient died at MGH because a critical laboratory result was missed. Incident still haunts the junior doctor.



- During surgery in Uganda, a sulfa antibiotic was given to a patient who was allergic to it causing anaphylaxis. Worse, the patient was charged extra for the additional hospital stay as a result of the complication.
- An elderly patient aspirated (food went to the lungs) during anesthesia in Cameroon because she did not understand the instructions not to eat before surgery.
- A grandfather picked up a Staphylococcal infection in a US hospital and died.



- A baby was given an adult dose of a malaria medication in Uganda who developed liver complications from the overdose and died.
- A mother-in-law in Mexico had advanced breast cancer missed. Even when it was discovered, patient and family was not informed of the diagnosis.
- A young healthy woman in Colombia developed a hospital-acquired infection died.



*Every system is perfectly designed to achieve the results that it gets.*

Donald Berwick

*Quality of care is the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge.*

Institute of Medicine



# Six Worthy Aims of Healthcare

- **Safe** – as safe as in our homes
- **Effective** – matching care to science
- **Patient-centered** – respect for the individual's values and choices
- **Timely** – less waiting for both patients and those who provide care
- **Efficient** – reducing waste
- **Equitable** – closing gaps (e.g. racial, urban-rural) in access to and quality of care



- No needless deaths
- No needless pain or suffering
- No unwanted waits
- No helplessness
- No waste



# The Extent of Medical Injury (per 100 hospital admissions)

- Australia 1994 13%
  - United Kingdom 2000 11%
  - New Zealand 2001 11%
  - Denmark 2001 9%
  - France 2002 15%
- 
- US: 1.7 million hospital-acquired infections  
99,000 deaths



# The Paradox of Healthcare

Well-trained workers

+

Altruistic motivations

+

Advances in science and technology

=

Shortfalls in quality



# Healthcare vs. the Aviation Industry

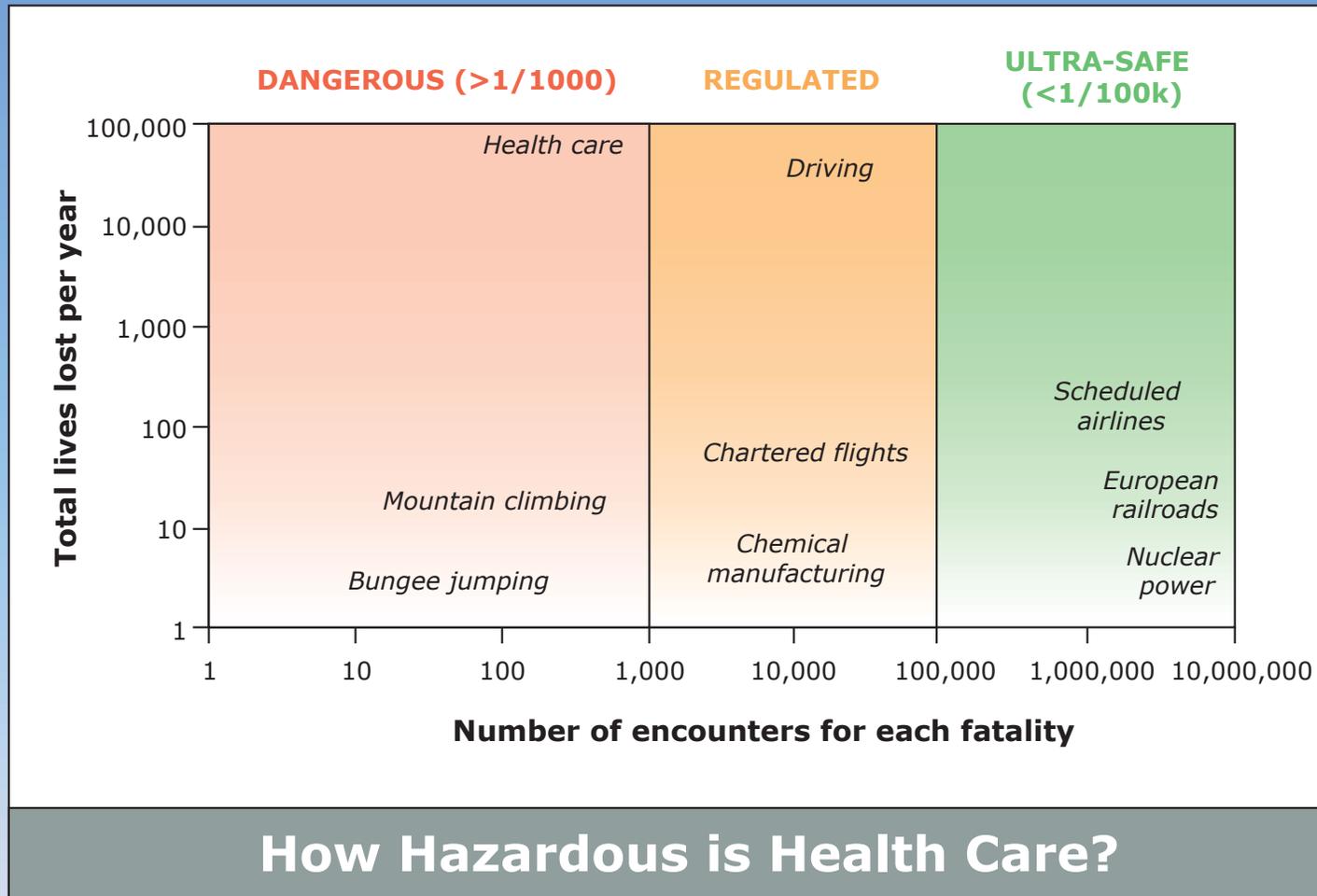


Image by MIT OpenCourseWare. After L. Leape, Harvard School of Public Health.



# Patients are Not Airplanes

- Anaesthesia: 1 death per 200,000 cases  
25x more dangerous than flying
- More than 155,000 possible diagnoses, more than 7,800 possible interventions
- BUT industries of high intrinsic hazards are also complicated (and yet much safer)!
- Main difference: organization and design



# Healthcare vs. Other High Risk Industries

## Healthcare:

- Organized around guilds (doctors, nursing, pharmacy) and specialties
- “Design” is a result of historical, political and economic forces, not the analytical consideration of how to achieve the best results.



# Healthcare vs. Other High Risk Industries

## Other High Risk Industries:

- Focused on integrating new discoveries and disciplines into well-harmonized systems
- Distinct roles for those whose responsibility is ensuring that pieces come together well



# Healthcare vs. Other High Risk Industries

## Other High Risk Industries:

- Relentlessly rigorous in identifying when their designs are inadequate
- Constantly look out for unanticipated outcomes
- Detecting errors and converting them into expertise are crucial to operations.



# Healthcare vs. Other High Risk Industries

## Healthcare:

- Quality, when it occurs, is due to acts of near heroism.
- Nurses and doctors are expected to constantly make do and work around to “get the job done”.
- We fight the same battles everyday and achieve little headway in making things better.



*The definition of insanity is continuing to do the same thing over and over again and expecting a different result.*

Albert Einstein

# Adverse Events

- Medication errors and hospital-acquired infections constitute the majority of adverse events.
- 5-10% of patients acquire infection while in the hospital , and the risks have steadily increased during recent decades (Jarvis, 2001)
- 5-10% of hospital-acquired infections occur in clusters or outbreaks (Gaynes, 2001)



# Infection Control is a Safety Issue

- Hospital-acquired infections are NOT unfortunate, inevitable consequences of medical procedures.



*Our processes are designed to infect the patients who develop hospital-acquired infections.*

Leo Anthony Celi



# Adverse Drug Events

- Unanticipated injury resulting from medication intervention
- Boston study (Bates, 1995)
  - 6.5 per 100 admissions
  - 30% serious
  - 12% life threatening
  - 1% fatal
  - 42% preventable



# Adverse Drug Events

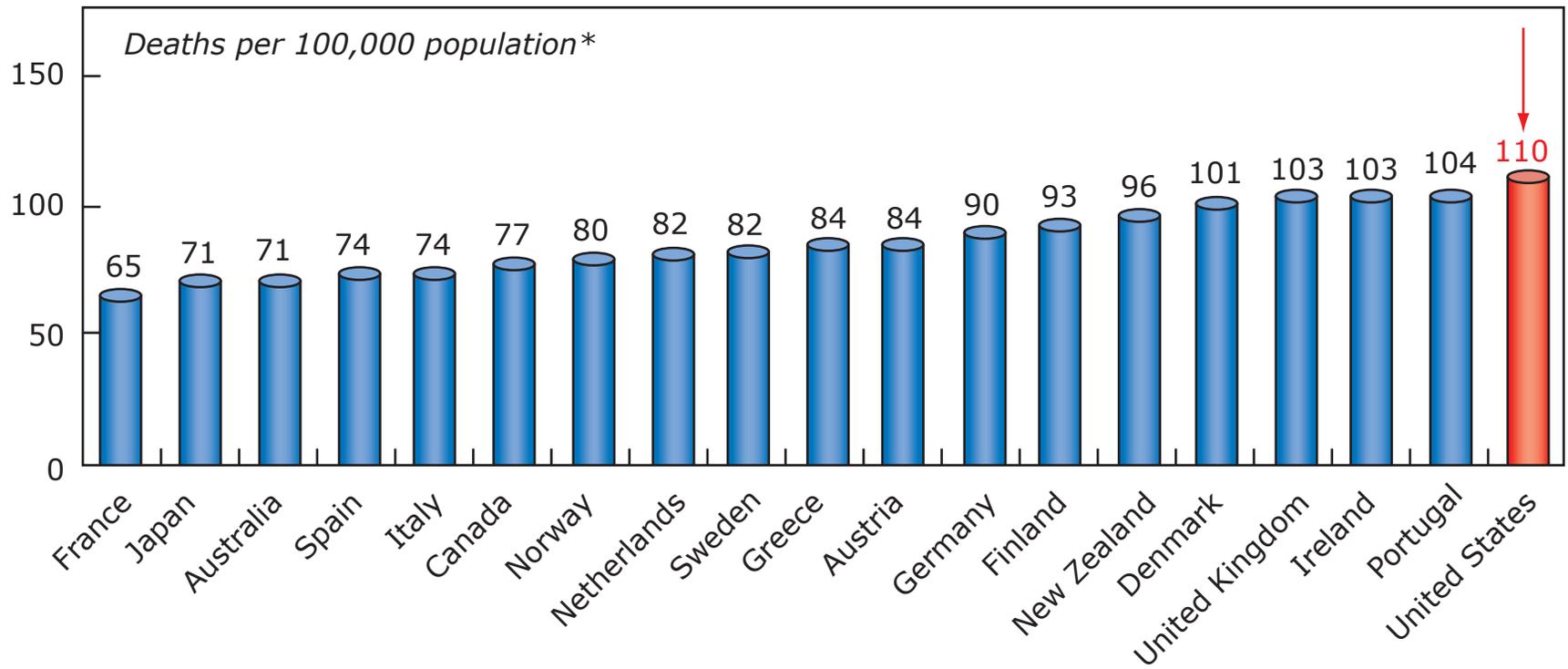
- Estimates for ambulatory care (Gandhi, 2003):
  - 27 events per 100 patients
  - 13% serious
  - Close to half of serious ADEs were preventable
- 8 million ADEs per year in US, 38 ADEs per provider per year on average
  - 3 million preventable
  - 500,000 life threatening



- In the last hour,
  - 1000 ADEs occurred in the US
  - 92 were hospitalized for ADE



# Preventable Deaths in Healthcare



**Mortality Amenable to Health Care, 2002-03**

Image by MIT Open Course Ware.



# Preventable Deaths in Healthcare

- If the airline industry tolerated the error rate that healthcare industry does, there would be 3 jumbo jet crashes every 2 days.

Photo of 747 runway crash (1977, Tenerife)  
removed due to copyright restrictions.



# Preventable Deaths in Healthcare

- “Tip of the iceberg”
- Most errors do no harm
  - Intercepted
  - Amazing ability of the body to heal and “absorb” the error



Photo courtesy of [Rita Willaert](#) on Flickr.

# Preventable Deaths in Healthcare

- Lack of awareness of magnitude of the problem
- Perceived as unusual events – “outliers”
- Poor outcomes from error blamed on complication of disease or inherent risk of procedure, e.g. hospital-acquired infection



# Preventable Deaths in Healthcare

- Healthcare culture not particularly conducive for error detection



# Healthcare Culture

- Mistakes are unacceptable
- Error as failure of character
  - *“You weren’t careful enough.”*
  - *“You didn’t try hard enough.”*



# Healthcare Culture

- Reliance on individuals not to commit errors rather than assuming that they will
- Proper training and motivation prevent mistakes.
- Such need for infallibility creates a strong pressure to cover-up mistakes.



# Healthcare Culture

- No support in place for clinicians who have committed errors
- Individuals typically learn from mistake but lessons not shared with colleagues
- Errors repeated in other locations or later in time unless lessons learned are captured in the system



# Medical Errors

- Committed by competent, caring people doing what other competent, caring people would do

*“Quality problems occur not because of a failure of goodwill, knowledge, effort, or resources devoted to healthcare, but because of fundamental shortcomings in the ways care is organised.”*



# Approach in the 20<sup>th</sup> Century

- Everyone did what they wanted in medicine
  - Substantial variation
  - One learns of new findings through conferences
- Few guidelines and protocols
- No routine measurement
- No individual feedback



# Approach in the 20<sup>th</sup> Century

- No benefit for better performance, and worse, incentive for poor quality in fee-for-service reimbursement scheme
- Little information available to the public



# Barriers to Quality Improvement

- Old-style control-oriented management
- Leadership system more focused on finance and revenue than on improving operational processes
- Strong sense of professional hierarchy and entitlement
- Lack of integration of the healthcare system with community resources

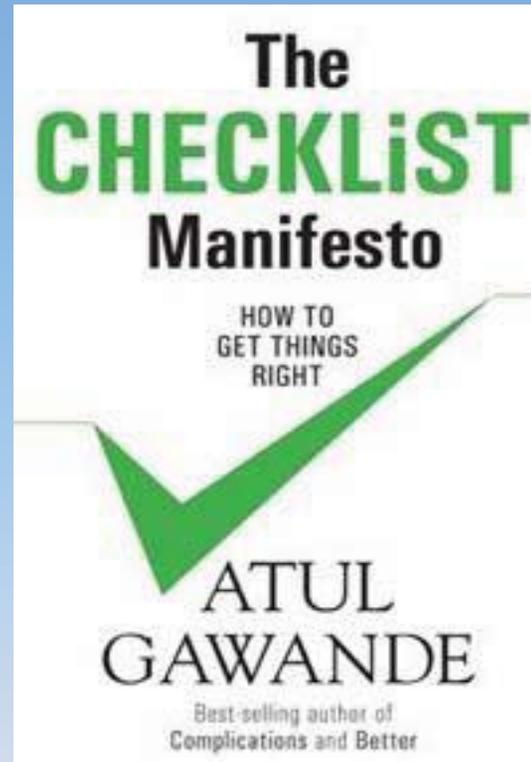


# Quality Improvement Approaches

- Checklist
- Lean
- Positive Deviance
- Six Sigma
- Plan-Do-Study-Act (PDSA) Cycle



# The Checklist as an Innovation in Healthcare



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# Checklists

- Reduce variability and standardise work processes
- Democratize knowledge: same knowledge is available to doctors, nurses and other members of the team
- Summarise evidence into explicit behaviours



# The Science of Memory

- Humans can retrieve 7 (plus or minus 2) pieces of information from memory with relative accuracy (Miller, 1956)
- Memory increasingly unreliable with complex procedures, stress and fatigue
- Significant decrease in accuracy and speed when managing 3 or more tasks simultaneously



# Central Line-Associated Bloodstream Infection



Public domain image (U. S. CDC)



# Getting to Zero: CLABSI

- Johns Hopkins Hospital Catheter Sepsis Intervention
- The Protocol
  - Clean hands
  - Sterilise procedure site
  - Drape patient in sterile fashion
  - Use cap, mask, sterile gown
  - Use sterile gloves
  - Apply sterile dressing



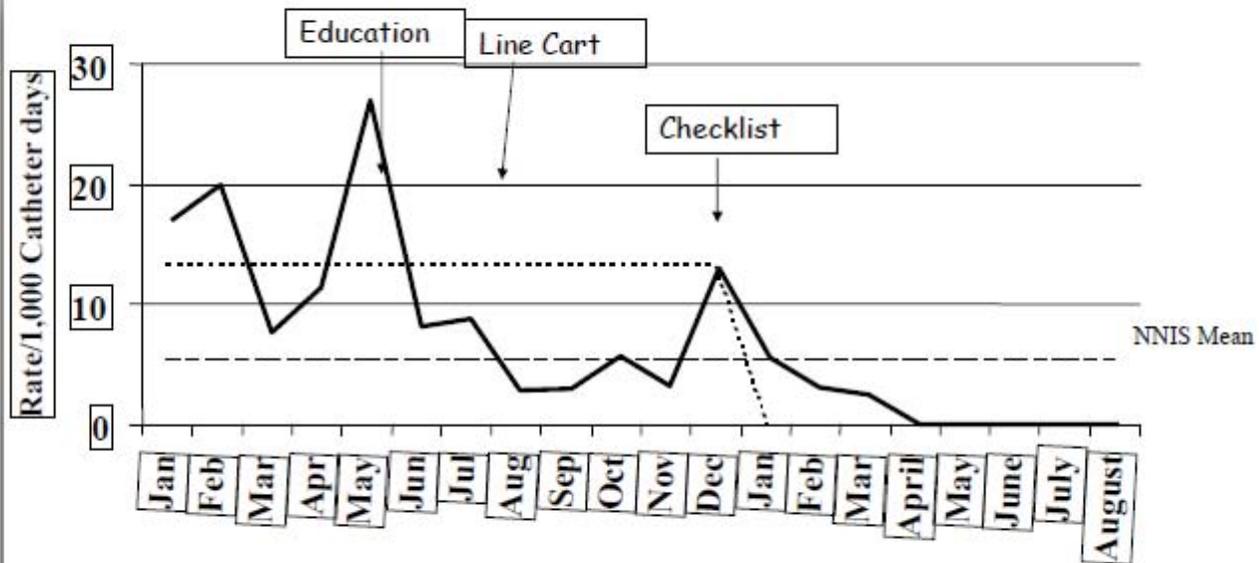
# Getting to Zero: CLABSI

- The Program
  - Education regarding control practices
  - Created a central line insertion cart
  - Implemented checklist for catheter insertion
  - Ask daily why catheter has to stay
  - Empower nurses to stop procedure if protocol is not followed



# Getting to Zero: CLABSI

## JHH ICU Catheter-related Blood Stream Infections



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# Getting to Zero: CLABSI

## Michigan CLABSI Initiative

- 68 hospitals
- 2004 March – 2005 June
- No CLABSI for more than 6 months
- 1578 lives saved
- 81,000 hospital days averted
- Cost reduction of \$165 million



# Is quality improvement feasible in resource-poor settings?



# Developing World

- Lack of sufficient staff
- Absence of continuing education
- Poor physical facilities
- Long distance between health centers
- Top down management systems common:  
legacies of colonialism



# Why QI is More Relevant in the Developing World

- Can optimize resource allocation and use
- Provide donors confidence in the ways in which their money has been spent
- Resources without improvement only buying the same, failed processes



# Examples of Quality Improvement in Resource-Poor Settings



# Zambia Hospital Accreditation Program: 1997 - 2000

- Bukonda et al., Int J Qual Health Care 2003
- Accreditation council stymied by
  - lack of legal standing
  - government's indecision on incentives and feedback
  - lack of sufficient funds
  - heavy workload
  - difficulties in retaining surveyors



# Measuring Compliance with Maternal and Child Care Quality Standards in Ecuador

- Hermida et al., Int J Qual Health Care 2003
- QI interventions to improve compliance with clinical standards, client satisfaction, and resource utilization
- No difference between intervention and control groups in client satisfaction and resource utilization despite improved compliance with clinical standards



# Measuring Supervisor-Provider Interactions in Zimbabwe

- Tavrow et al., Int J Qual Health Care 2003
- Supervisors were district and municipal nursing officers responsible for guiding, assisting and motivating health providers
- Supervisors deficient in seeking input, problem solving and building on previous visits



# Introducing IMCI Guidelines in Niger

- Legros et al., Int J Qual Health Care 2003
- Quality management effectively implemented to promote IMCI guidelines with improvement in health program indicators
- Follow-up 2 years later found continued practice of quality management by healthcare providers



# The Chilean Quality Assurance Program

- Legros et al., Int J Qual Health Care 2003
- Ministry of Health launched a nationwide QA program in 1991
- Evaluated by team of international consultants in 1999 based on framework developed by Center for Human Services, USA
- Program successful in achieving sustainability and institutionalization



How do you decide how much resources to allocate to quality improvement in resource-poor setting?



# Accountability of Reasonableness

- Requires transparency in the discussions
- Involves all key stakeholders in prioritization and decision-making
- Employs evidence-based approach to weighing the alternatives



# Accountability for Reasonableness

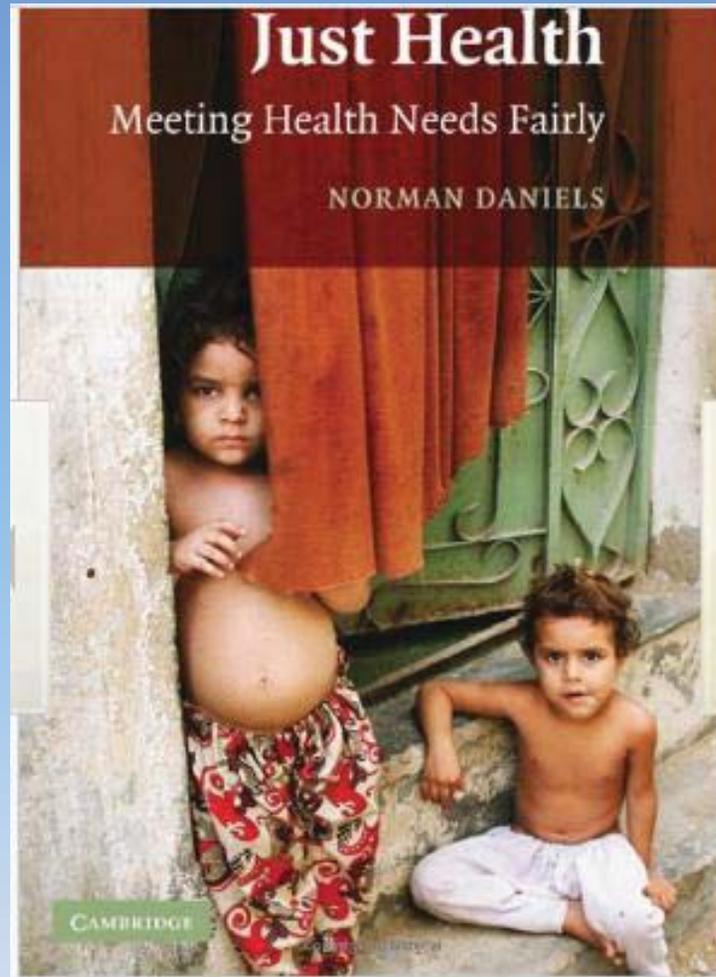
- Mandates continuous monitoring and evaluation mechanisms to assess progress towards the set targets
- Revision and cessation of the intervention allowed if expected gains not realized
- Decisions revisable in light of better evidence and argument



# Accountability for Reasonableness

- Rationing decisions will always have losers
- What matters are the grounds for establishing the priority and the methodologies used
- Methods:
  - Public hearings
  - Testimonies from groups and individuals
  - Focus groups and other investigative approaches





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# What role can information systems (IS) play in quality improvement?



# Role of IS in Quality Improvement

- Link patient care, research and education
  - Medical literature doubles every 19 years
  - ~2 million facts needed to practice
  - Providers have ~1 question for every 1-2 patients
  - Average delay between evidence and practice change is 5 years
- Interface between providers
- Allows standardization of processes and measurement of outcomes

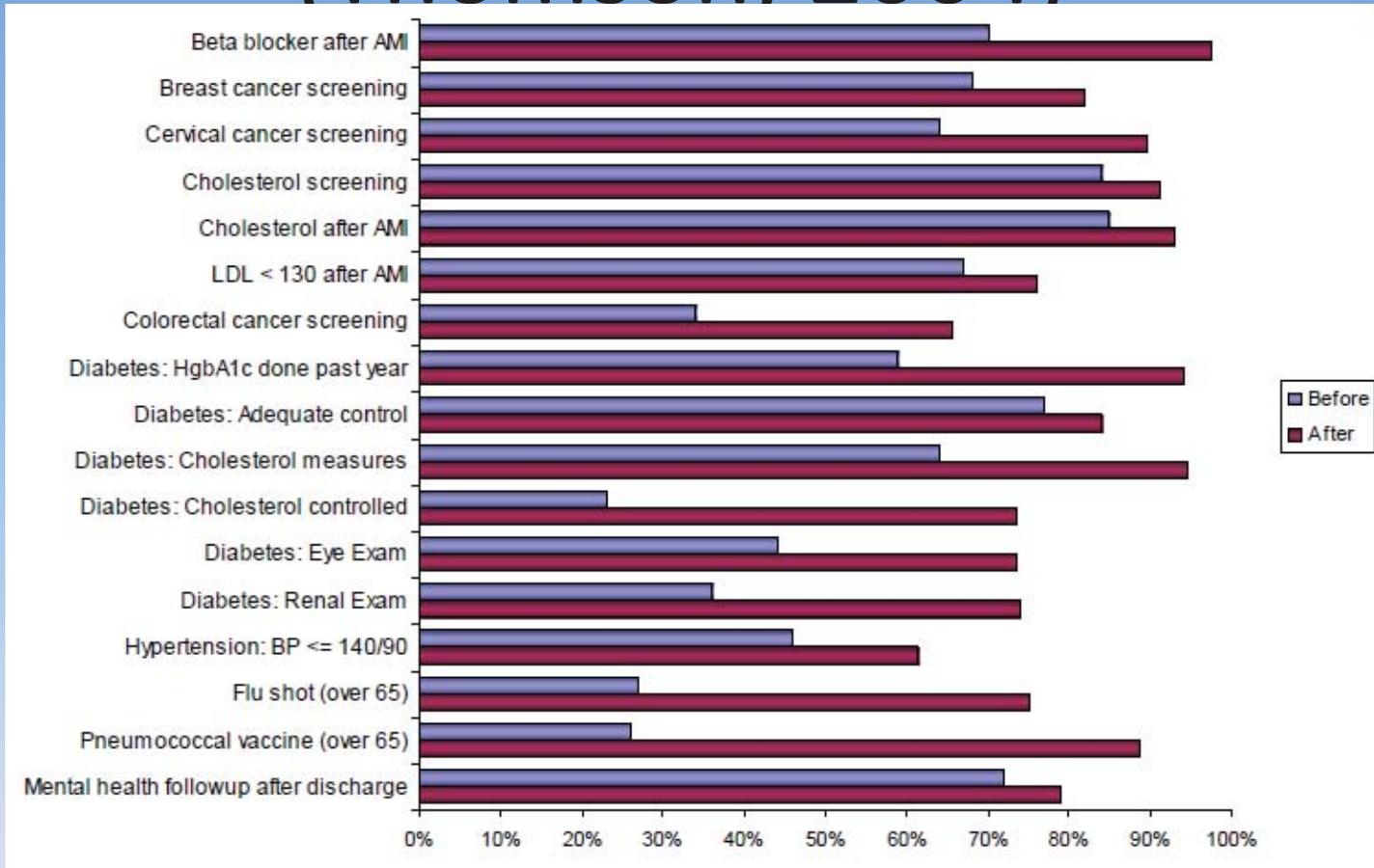


# Evidence for IS in Quality Improvement

- Increased adherence to guideline-based care, enhanced surveillance and monitoring, and decreased medication errors (Chaudhry, 2006)



# The VA Experience (Thomson, 2004)



Source: Thomson, T. G., and D. J. Brailer. *The Decade of Health Information Technology: Delivering Consumer-centric and Information-rich Health Care*. US Dept of Health and Human Services, 2004.

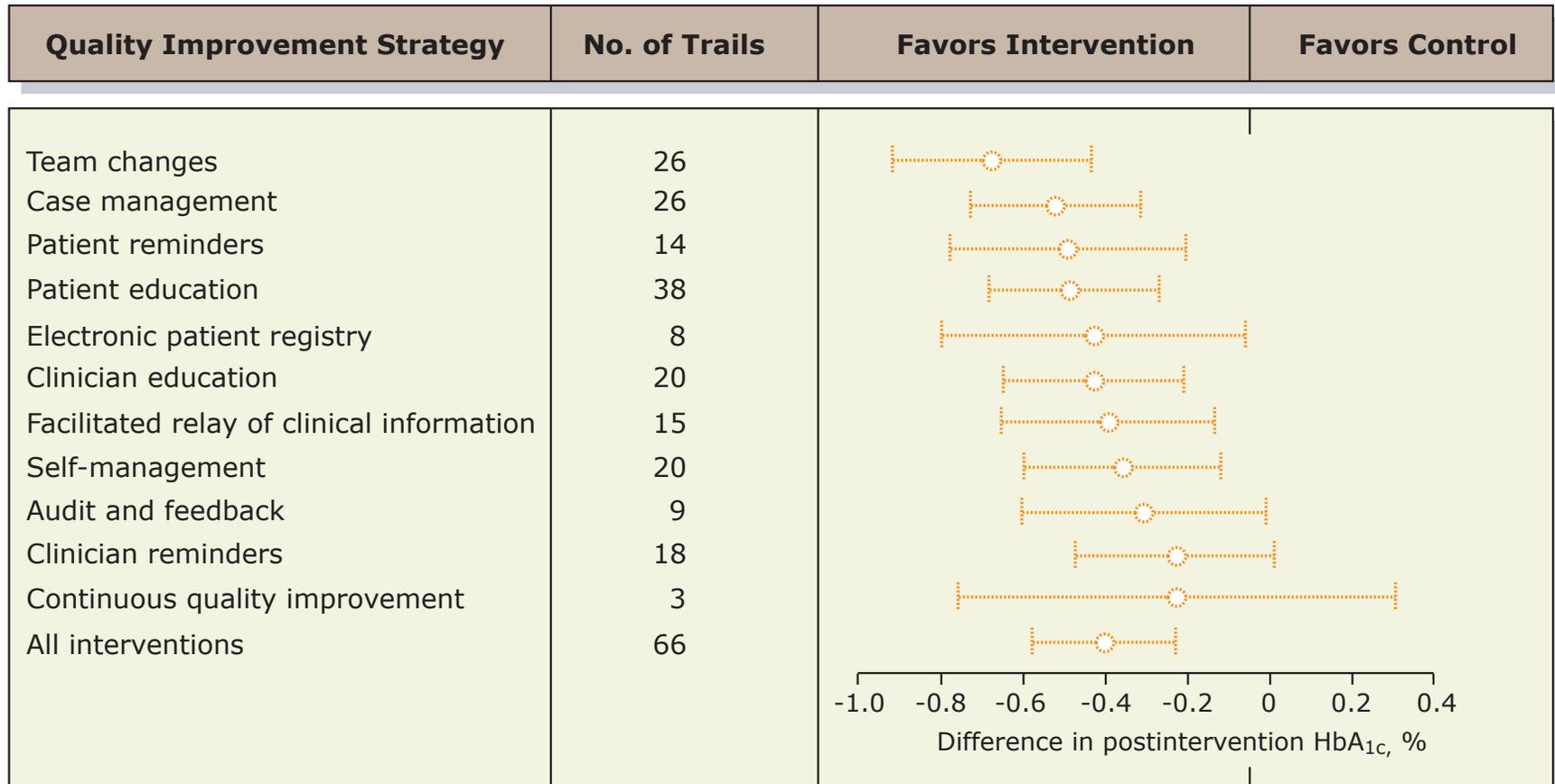


# IS and Chronic Disease Management

- Support patient education
- Improve management of results
- Facilitate population analyses and queries



# Shojania et al., JAMA 2006



Negative difference favors intervention groups over control groups.

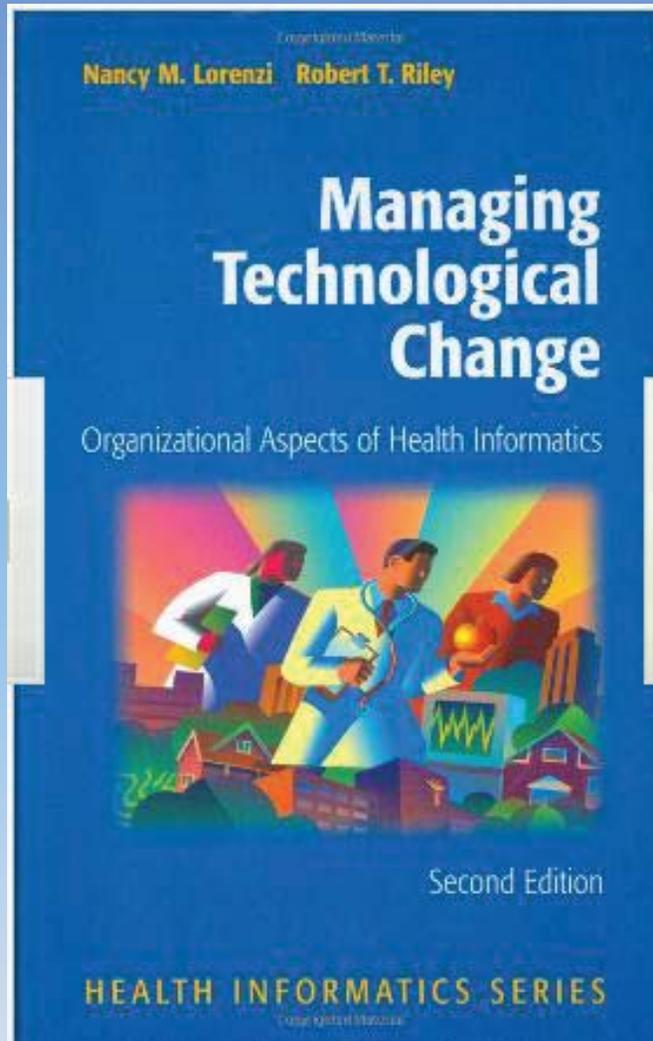
Image by MIT OpenCourseWare. Data from Shojania, K. G., et al. "Effects of Quality Improvement Strategies for Type 2 Diabetes on Glycemic Control: A Meta-Regression Analysis." *JAMA* 296, no. 4 (2006): 427-440.



# Key Point from Shojanian Paper

“Most quality improvement strategies, including those involving information systems, produced small to modest improvements in glycemic control.”





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# Challenges in Quality Improvement

- Gains slow, small and not widespread
- Sustaining systems re-design elusive
- System changes need to be aligned across disciplines and multiple levels.
- Need to integrate re-design efforts with other system features
  - information technology
  - incentives



# Challenges in Quality Improvement

- Preparing and managing healthcare providers for change
  - Confusion about role expectations
  - Discomfort with performance of new roles
  - Lack of clear communication about the accountability associated with the new roles
  - Typically imposes additional burden on staff who already have heavy workloads



# Challenges in Quality Improvement

- Sustaining and spreading re-design efforts
  - Difficult to sustain support for change
  - Need to engage staff after initial excitement subsides
  - Anticipate and plan for uncertainties and disappointments
  - Incentivize different groups (nurses, doctors, pharmacist, therapists within a ward) and specialties (cardiac surgeon and cardiologists) to have shared goals



# Getting to Zero: CLABSI

- Department of Health & Human Services called for a 50% national reduction in CLABSI over 3 years
- <20% of hospitals have volunteered to participate
- Most participating hospitals have not reduced their infection rate.



# Getting to Zero: CLABSI

- Excuses:
  - *Our patients are too sick; these infections are inevitable.*
  - Competing priorities

*If these lethal, expensive, preventable infections are not a priority, what is?*

Peter Pronovost



# Leapfrog Survey: Adherence with EBM

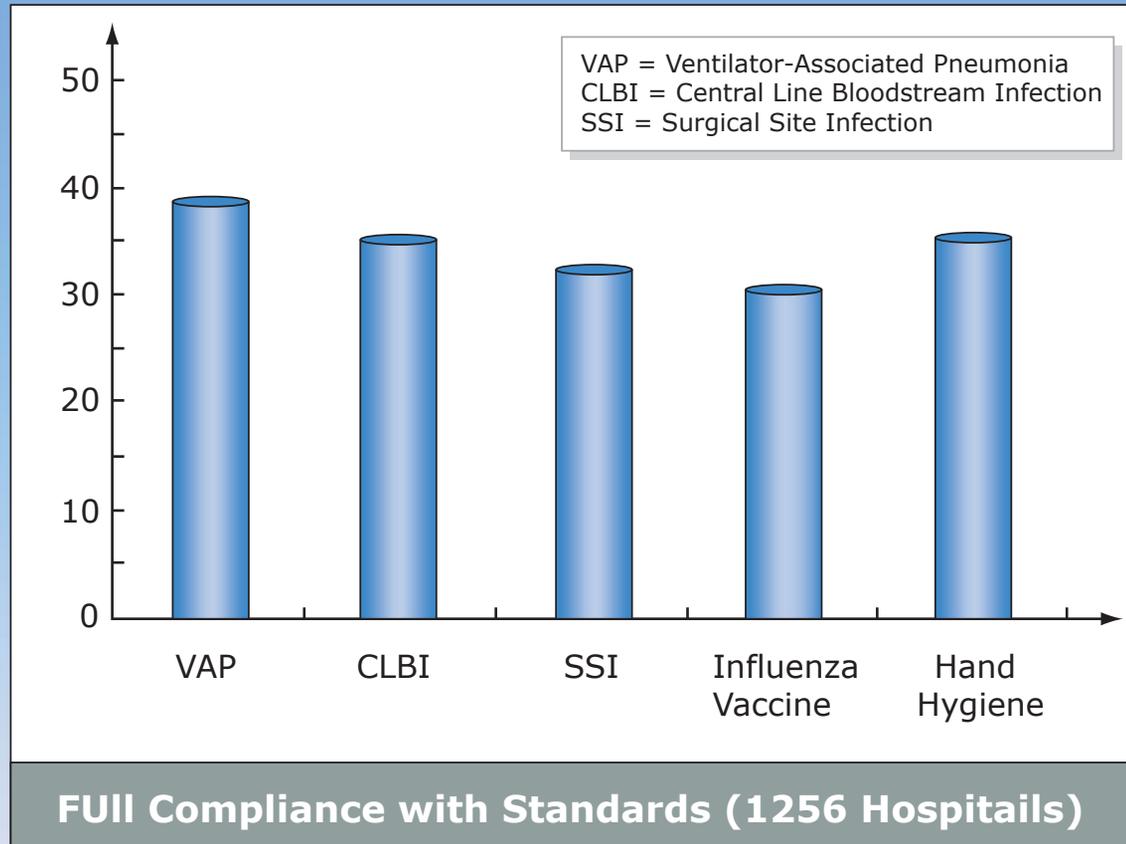


Image by MIT OpenCourseWare. After L. Leape, Harvard School of Public Health.



- It's not about reporting, protocols, checklists and safe practices.
- It's about working together in a team
  - Multi-disciplinary
  - Mutual respect



# Lessons Learned

- Old habits die hard.
- Doctors and managers are still the problem.
- Safety and quality are less about practices than about relationships.



# Essential Elements of Quality Improvement

- Policy: must explicitly recognize importance of quality as system goal and remove disincentives to quality
- Leadership: provides vision and strategy to transition from “the way we work now” to “the way we want to work in the future



# Essential Elements of Quality Improvement

- Core values: emphasize teamwork and continuous improvement
- Resource allocation: delineation of responsibilities and accountability for oversight, coordination, implementation and evaluation
  - Capacity building: staff with necessary knowledge and skills to carry out their QI responsibilities
  - Information system to measure processes & outcomes



# Revised Rules for Healthcare

- Doctor autonomy drives care variability
- Do no harm is an individual responsibility
- System reacts to errors
- Cost reduction is the goal
- Professional roles are emphasized
- Care is customized according to patient and his/her preferences
- Safety is a system property
- Errors are anticipated
- Waste is continually sought and eliminated
- Focus is on working as a team



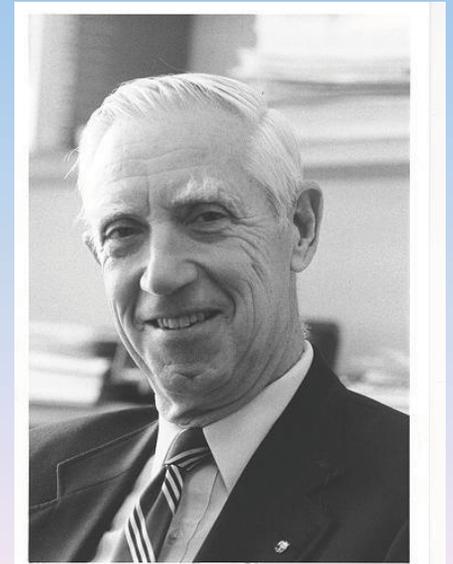
# In simple language...

- Set improvement goals
- Study the work process
- Design and test promising changes
- Measure
- Continuously build skills in system-mindedness
- Involve everyone



Teamwork is the secret of every industry that has succeeded in becoming safe.

Lucian Leape



Quality and safety are a multi-disciplinary sport.

Maureen Bisognano



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