

Get A Better Hospital In Five Days

A Special Report by Jay Arthur

The Institute of Medicine's *To Err Is Human* report in 1999 called for a 50 percent reduction in medication errors, but in 2009, Dr. David Bates said: "With respect to the 50% reduction, the truth is that we don't really know, because we don't have good metrics for sorting out how common medical errors are in most institutions.

Every hospital seems to have the same issues: preventable adverse events which will no longer be paid by Medicare and other insurers. This shows up in many ways:

- Catheter-associated urinary tract infections (UTI)
- Blood stream infections (BSI)
- Pressure ulcers
- Surgical errors: Retained foreign objects, surgical infections, wrong site and wrong patient surgeries.
- Blood incompatibility
- Ventilator acquired pneumonia (VAP)
- Patient falls

A recent RAND study found that only about one out of every two patients will receive care that meets generally accepted standards. In 2009, the CDC estimates that 1.7 million healthcare-acquired infections resulted in 99,000 deaths and an additional \$27.5 Billion in unnecessary costs per year. 238,337 preventable deaths occurred involving the Medicare population, 2004-2006.

What one element is critical to both improved outcomes and patient satisfaction?

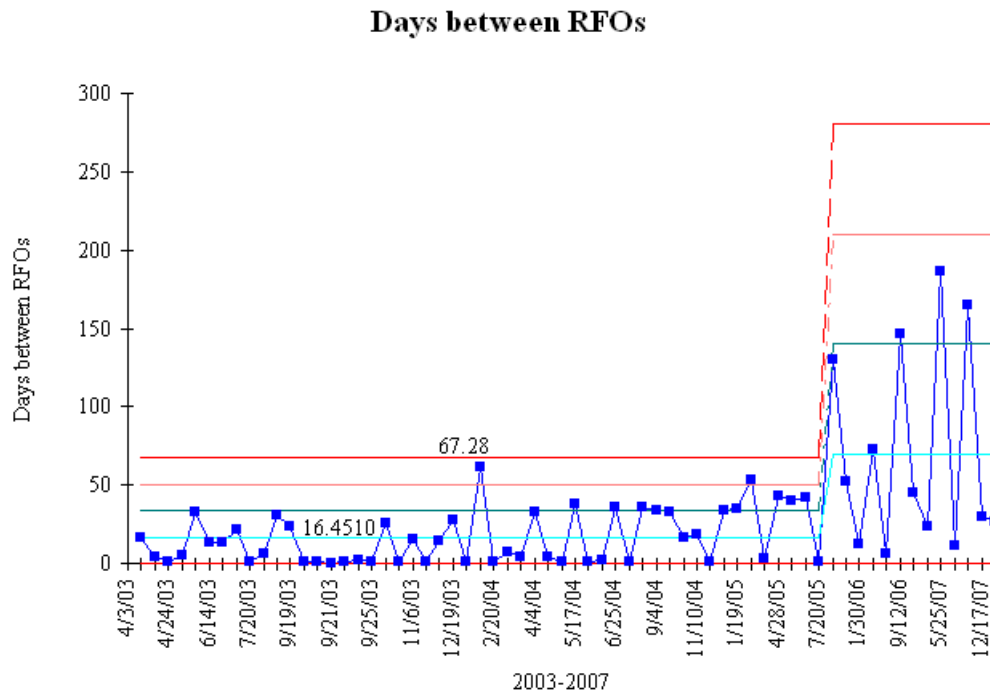
Reducing defects (i.e., medical mistakes) from the current 30,000 patients per million to 3 PPM.

A Better Operating Room in Five Days

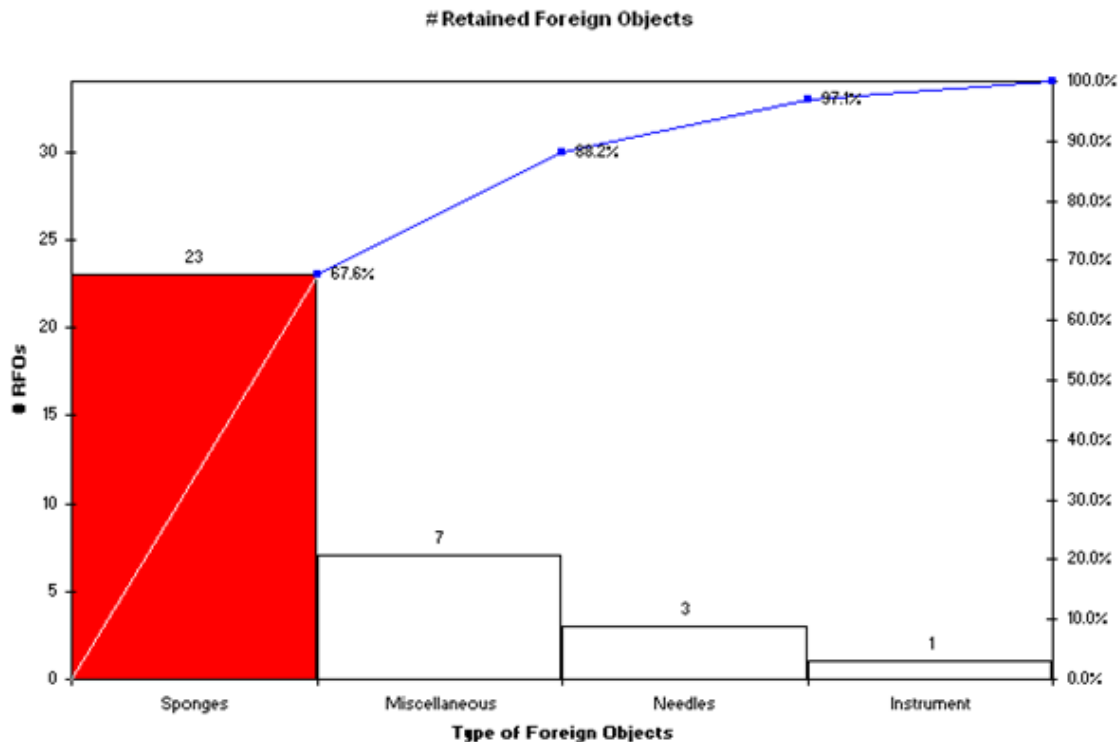
We've celebrated cowboys, but what we need is more pit crews. Atul Gawande

Atul Gawande, a surgeon at Brigham and Women's Hospital in Boston, authored *The Checklist Manifesto*, a book about using surgical checklists to reduce operation times, infections and deaths by more than a third. Gawande advocates simple things to encourage teamwork like having everyone on the surgical team introduce themselves by their first name. Like a pit crew in a NASCAR race, medical teams can swarm the patient, doing tasks in parallel to get results quickly.

Every 120 minutes a retained foreign body occurs in the U.S. Retained foreign objects (i.e., surgical left ins) occur in one out a thousand (1,000 PPM) abdominal operations resulting in significant adverse outcomes. In 2005, the Mayo Clinic Rochester averaged one RFO every 16 days. By changing the process for counting and tracking surgical supplies and instruments, they were able to extend time between RFOs to 69 days (g chart below recreated using QI Macros).



With over 100 unique surgical items, which was the most common type of left in? Sponges:



Instead of manual counting, why not use technology? ClearCount Medical Solutions developed an FDA approved sponge fitted with a radiofrequency identification (RFID) chip smaller than a dime. A handheld wand detects commonly used surgical sponges. Here's what ClearCount identifies as the benefits of using RFID sponges:

- Passive: Non-emitting tag contains no battery
- Small: RFID tag is the size of a penny
- No line-of-sight required to detect sponges
- Can read multiple sponges simultaneously
- Can't count the same sponge twice

www.medgadget.com/archives/2010/01/markets_first_rfid_surgical_sponge_tracking_system.html

Wrong Site or Wrong Patient Surgery

Several states require hospitals to report adverse events: Connecticut

(www.ct.gov/dph/lib/dph/hisr/hcqsar/healthcare/pdf/adverseeventreportoct2009.pdf), Minnesota

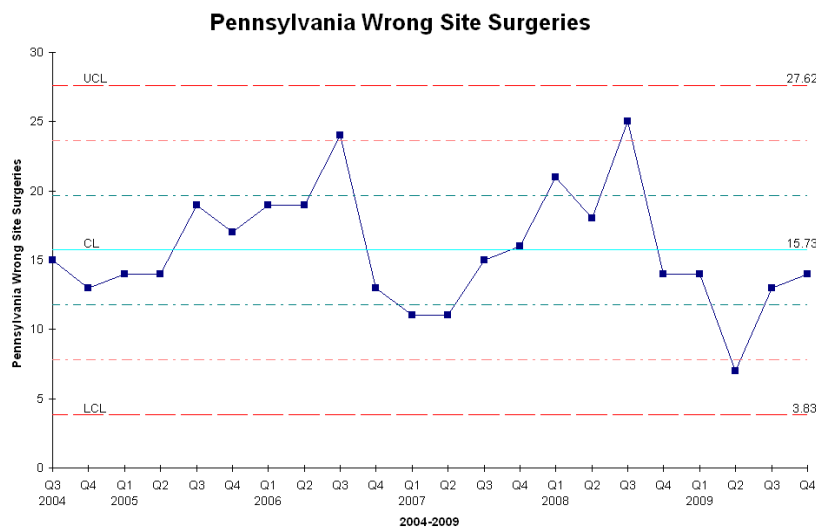
(<http://www.health.state.mn.us/patientsafety/publications/index.html>), New Jersey

(www.state.nj.us/health/ps/documents/ps_initiative_report07.pdf), New York, and Pennsylvania

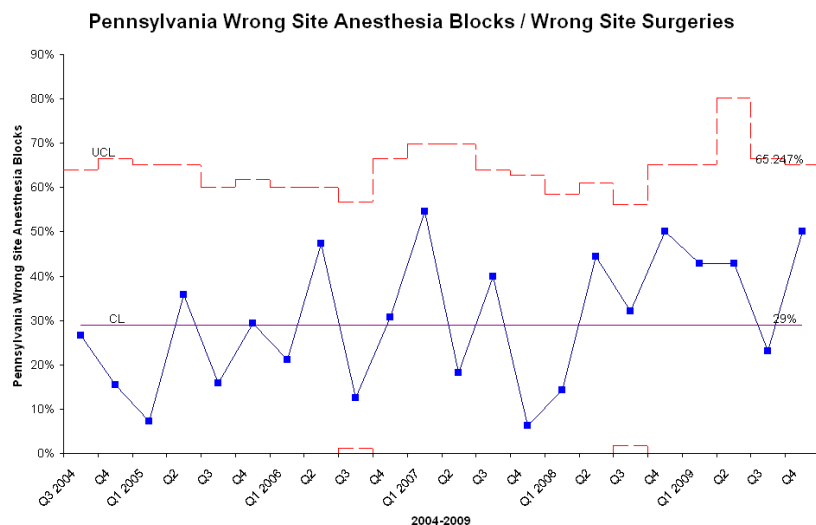
(www.patientsafetyauthority.org). From 2004 to 2009, Pennsylvania wrong site surgeries

averaged 15.73 per quarter. Using a c control chart would suggest a process shift in Q4 2008

when Medicare stopped paying for treating these mistakes, but we need 3 more data points.



Most common type of wrong site error? Wrong site anesthesia (29% on average):

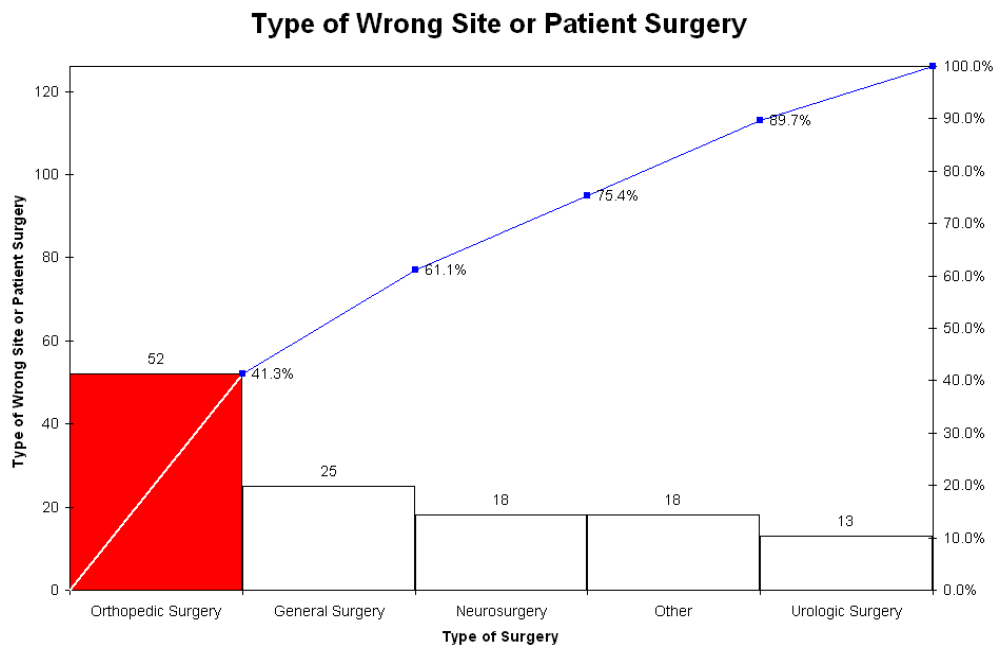


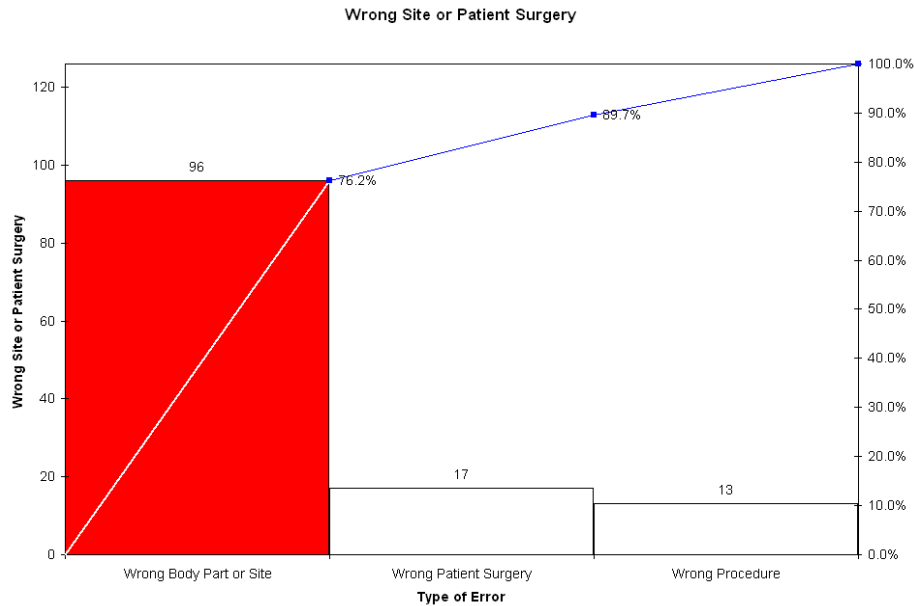
Possible Countermeasure: Stop Paying for Medical Mistakes

As of October 2008, U.S. hospitals no longer receive Medicare reimbursement for healthcare-associated infections: Catheter-associated urinary tract Infections (UTI), Central venous catheter-related bloodstream infections (BSI), and ventilator-associated pneumonia (VAP).

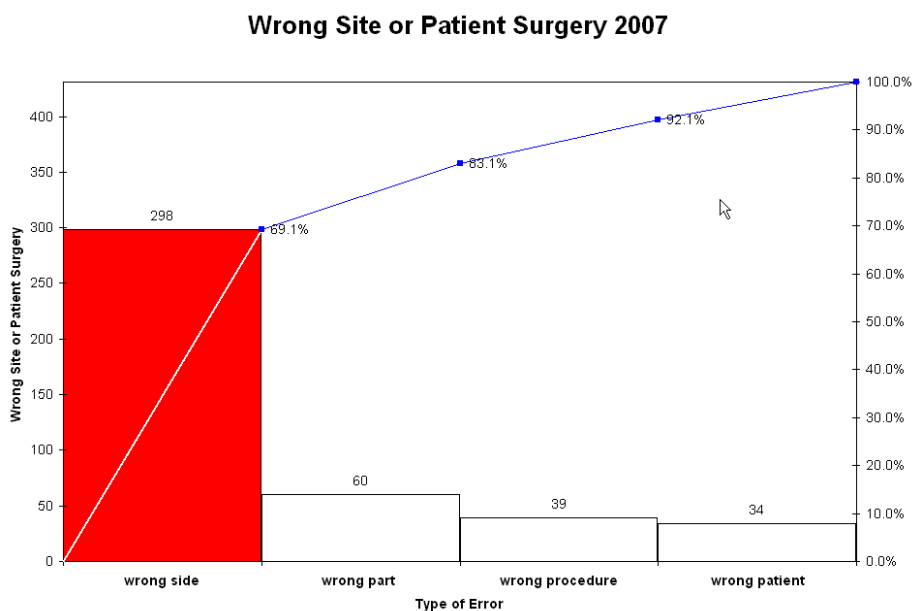
In 2001, the Joint Commission analyzed 126 wrong site or wrong patient surgeries. Most involved orthopedic surgeons and wrong body part or site. This led to the creation of a universal protocol to help prevent these kinds of mistakes:

<http://www.jointcommission.org/PatientSafety/UniversalProtocol/>





Another study in 2007 found that “The number of sentinel events reported to the Joint Commission has not changed significantly, despite the required use of the Universal Protocol. Wrong-site surgery continues to occur regularly, especially wrong-side surgery, even with formal site verification.” In one state over 30 months, there were 427 reported incidents and 83 patients had incorrect procedures done to completion. 31 formal time-out processes were unsuccessful in preventing wrong surgery. Most common type of incident: Wrong *side* surgery. Who is most likely to catch the error? Patients and nurses.



Most common root cause: the actions of the surgeon in the OR (92 reports). Second: Failure of the Time Out Process (59 reports). Either of these may be a function of confirmation bias (the psychological tendency to confirm an impression despite the facts). Another common thread in wrong site surgeries: symmetrical body parts like left/right arm, leg, knee, chest, etc. and, positioning of the patient.

In 2005 in Florida, there were 31 wrong-site operations, 5 wrong patient surgeries and 86 instances where the wrong procedure was done according to Dr. Allen Livingstone (Miami, Florida).

Countermeasure: The longer the patient is awake before surgery and the greater the involvement of the surgeon and anesthesiologist in preop, the greater the chance of preventing wrong site or patient surgeries. Time outs and the Universal Protocol don't seem to work that well. What would work better?

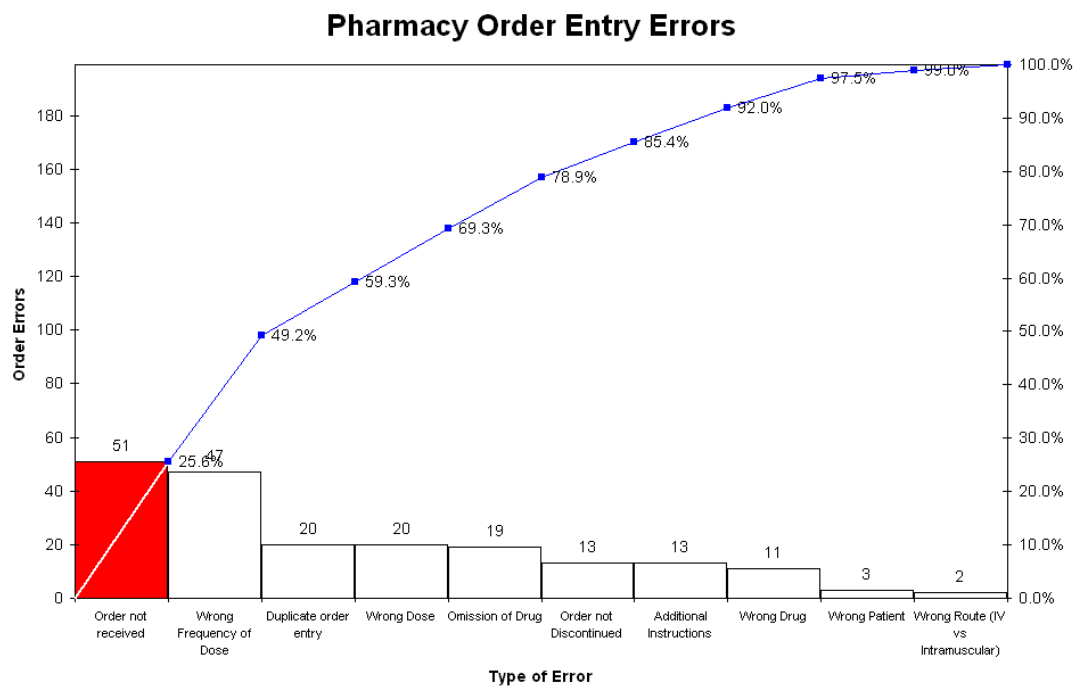
Eliminating Never Events

- Track each Never Event with g chart
- Use Pareto Charts to analyze most common contributor to Never Event
- Analyze root causes of “big bar” of Never Event.
- Implement countermeasures and verify results.
- Monitor improvement *forever*.

A Better Pharmacy in Five Days

With over 400,000 adverse drug events per year costing an estimated \$3.5 Billion, getting medications right is a big opportunity. There are many types of medication errors: wrong drug, wrong dose, timing, route, interaction or patient. At one hospital, medication orders were causing problems. The error rate was 3,300 per million orders.

The most common type of error? **Order not received:**



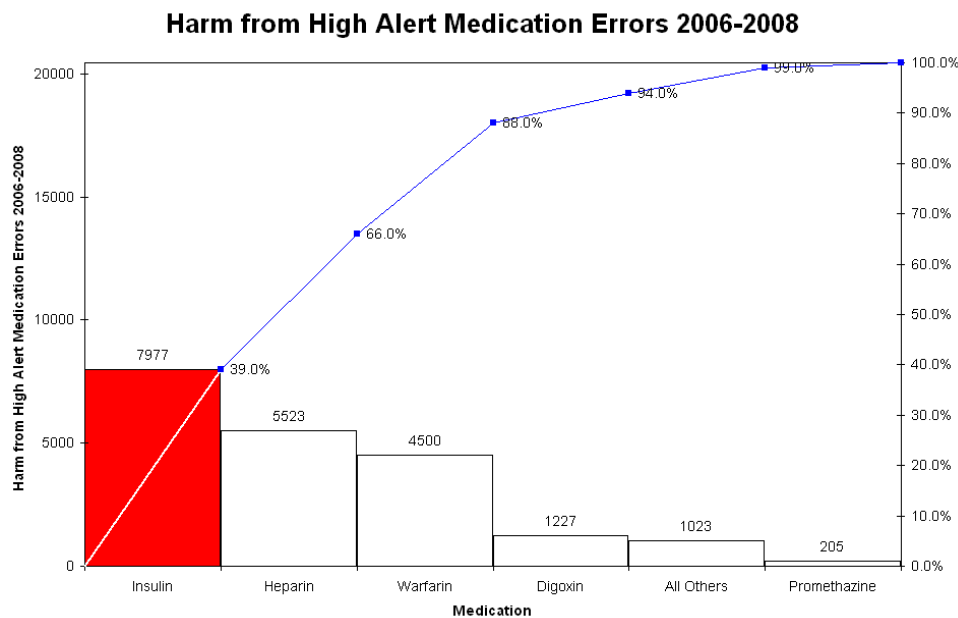
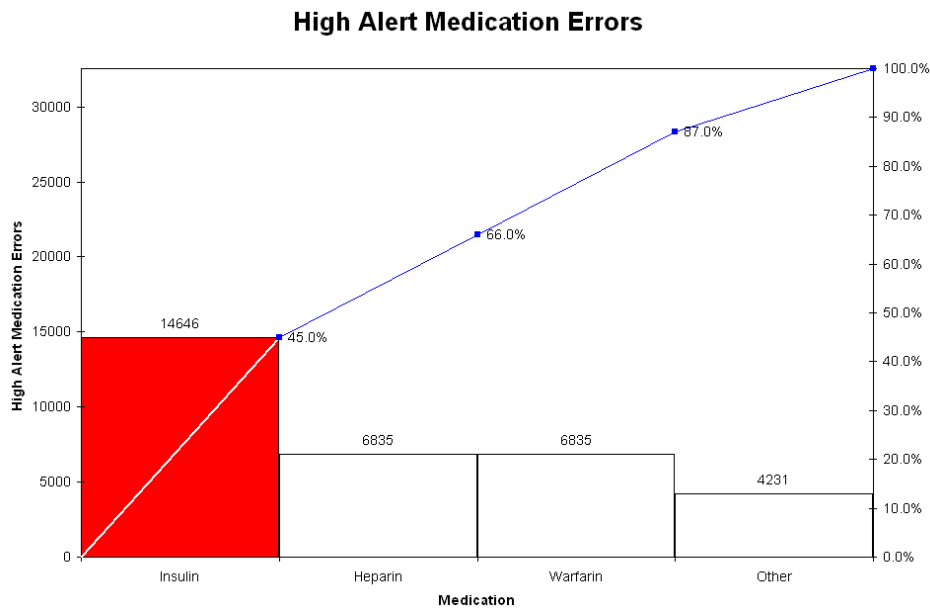
Second runner up? **Wrong Frequency of Dose.** These two accounted for almost half of all order errors.

Most orders were faxed and fax line congestion prevented orders from being received. Nurses sometimes missed changes in frequency or dosage.

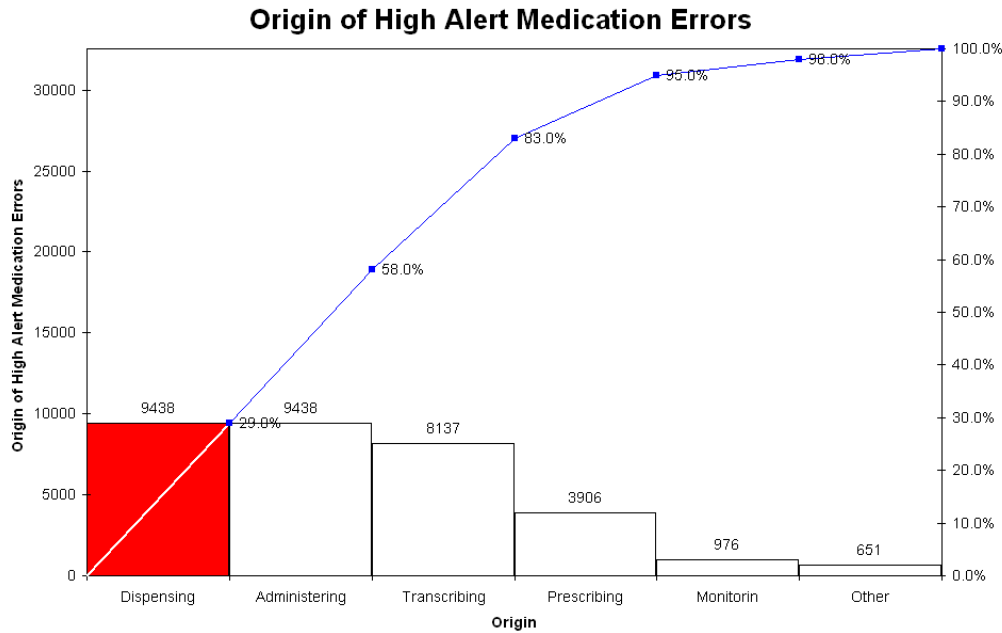
After implementing a computerized order entry system and other procedural changes, order errors fell from 3,300 to 1,400 per million, a 55% reduction with an estimated cost savings of \$1.2 million per year.

The 4-50 Rule in Medication Errors

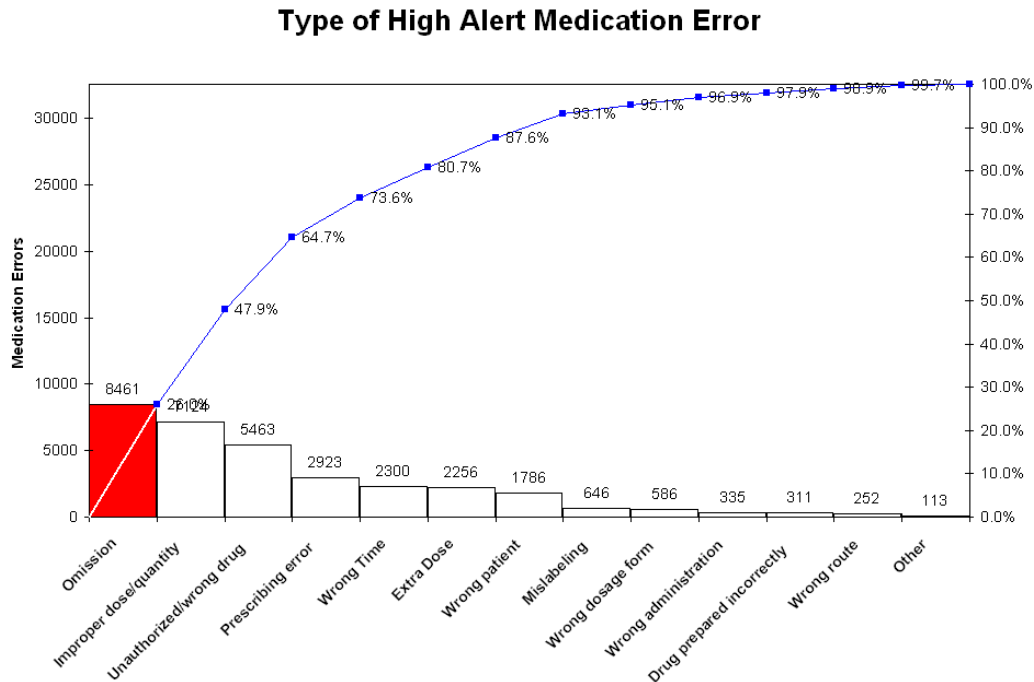
As you might expect, some medications are more dangerous than others. *High-alert medications* including insulin, anticoagulants, narcotics and sedatives should trigger a heightened focus on the opportunity for a medication error according to the IHI. From 2006 to 2008, 537 hospitals reported 443,683 medication errors; 32,546 were related to high-alert medications. Most frequent error and most frequent cause of harm: **insulin**.



Where did the errors originate? Dispensing, administering and transcribing.



Most common type of error: omissions, dosage (e.g., 5.0 misread as 50) and wrong drug:



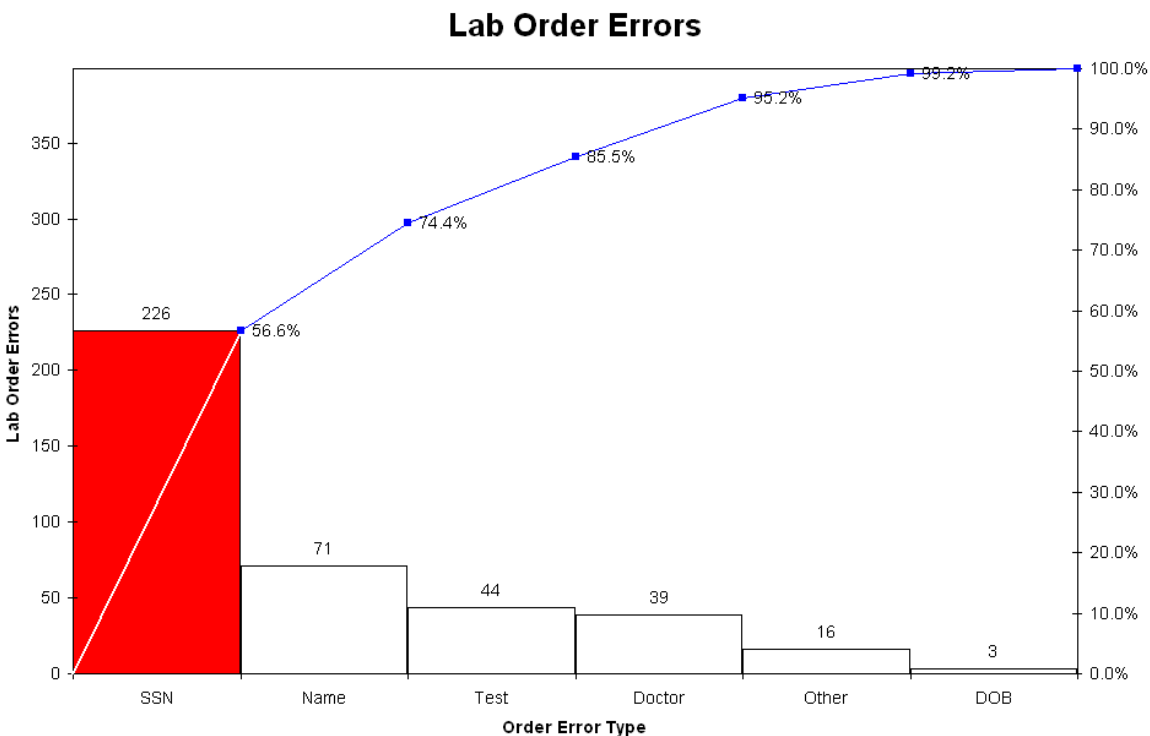
Shouldn't there be a way to mistake-proof this process? Some hospitals are adopting computerized prescriber order entry (CPOE).

Better Medical Imaging in Five Days

Peer pressure can be a powerful incentive. One analysis showed wild variation in the use of CAT scans and MRIs in one medical group. After presenting the data, radiology test use fell by 15 percent the first year. Continuous monitoring has held the rate constant.

A Better Lab in Five Days

As much as two-thirds of lab errors occur in the order and labeling process, before testing begins. In 2003, North Shore Long Island Jewish Health System set out to use Six Sigma to reduce these errors. They found that 5 out of 100 samples were inaccurate or incomplete. The team analyzed 5,667 laboratory requisitions and identified 285 errors. The most common: Social Security Number errors in skilled nursing facilities:



Root Cause: Skilled nursing facilities used addressographs instead of available bar code labels for sample identification.

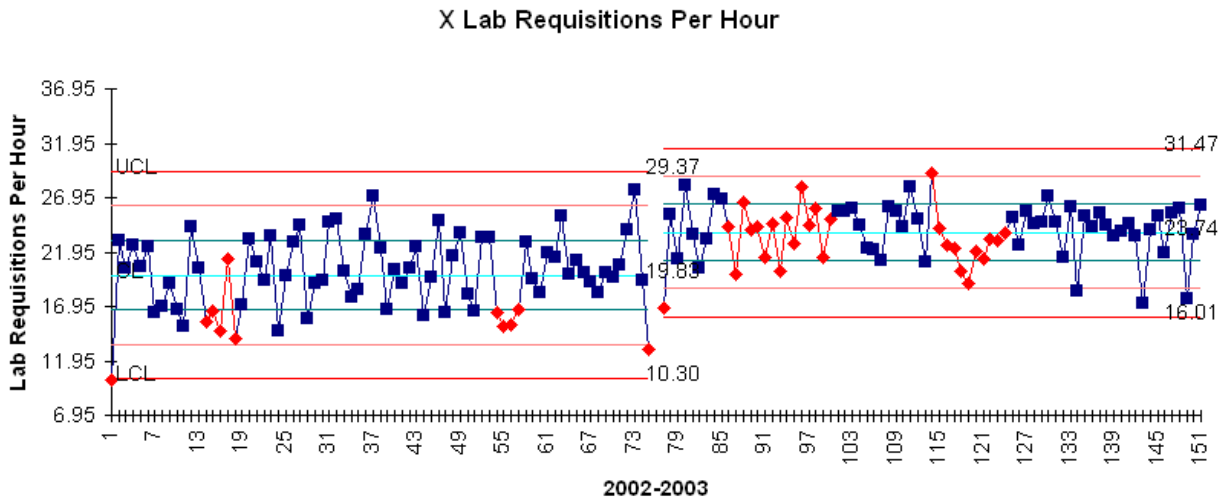
Countermeasure: Use bar code labels.

They also color coded samples and parts of the lab to ensure that samples were delivered to the correct location for processing, saving additional time and reducing errors.

Results

Defects per million opportunities fell from 7,210 to 1,387.

Staff productivity rose from 20 to 23 requests per hour to handle additional volume:

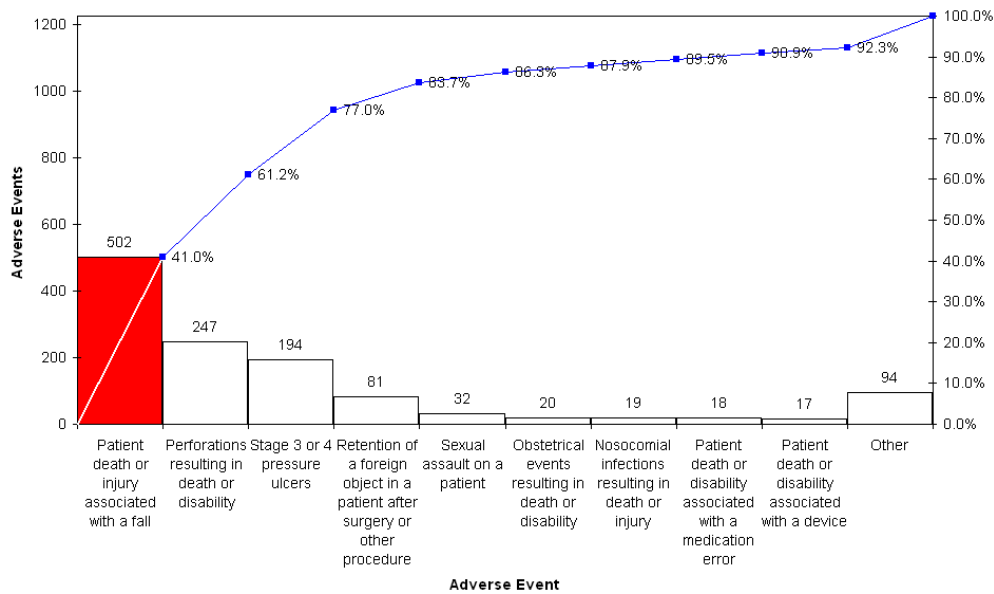


Combined improvements resulted in \$339,000 in increased revenue and cost reduction.

A Better Nursing Unit in Five Days

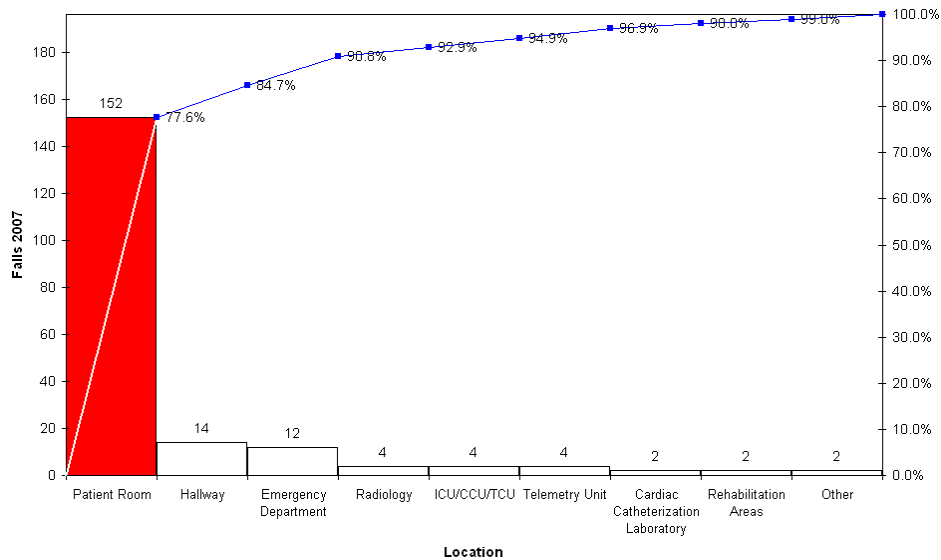
Patient falls can lead to significant morbidity and mortality. The estimated cost to treat serious falls-related injuries ranges from \$15,000 to \$30,000 per fall. In 2009, Connecticut reported that death or injury caused by patient falls were the most common reported adverse event:

Connecticut Adverse Events - Oct 2009



Where Do Patients Fall? According to New Jersey statistics: the patient room.

NJ Adverse Event Patient Falls 2007



Countermeasures to Prevent Falls

- Formalized falls risk assessment for each patient
- Checklist of medications known to increase a patient's risk of falling
- Pharmacy color coding of medications known to increase falls risk
- Track medication related falls and add them to the list
- Use nursing white boards to identify high risk patients
- Use hourly rounds to high risk patients (e.g., toilet needs)
- Use color-coded clip on wheelchairs and stretchers when transporting high risk patients
- Pocket guide to falls prevention for nurses and physicians

These countermeasures use simple Lean Six Sigma principles like: 1) make it visual (i.e., color coded) and 2) use checklists for risk assessment and medications.

Better Diagnoses in Five Days

According to one BusinessWeek article, 15 out of every 100 patients are misdiagnosed. Patients return to emergency departments after being discharged because they still have undiagnosed or untreated symptoms. That's rework!

HOSPITAL CASE STUDY

The Institute for Healthcare Improvement (ihi.org) estimates that preventable physical harm to patients occurs 40,000 times *a day* in U.S. Hospitals. The Center for Disease Control and Prevention estimates that two million people are affected by surgical site infections, drug reactions and bedsores. 99,000 people die as a result of hospital-acquired infections.

Blood stream infections (BSIs) from IVs are a serious problem. Of the 5 million lines inserted each year, about 4% (4-50 rule) become infected within 10 days with a resulting cost of \$3 billion and 30,000 deaths. One hospital found that monitoring infections using fresh needle sticks rather than using blood from the IV provided a better detection method. They also used colored tape to mark IVs inserted under less than desirable conditions (ambulances, EDs, etc.) These were then changed as soon as the patient got settled in a nursing unit which reduced infection rates.

Dr. Peter Pronovost at Johns Hopkins Hospital came up with a five-item checklist that reduced catheter infections to *zero* in 77 Michigan hospitals. Infection rates fell by two-thirds in the first three months of use saving 1,500 lives and \$200 million in the first 18 months. The checklist included simple solutions like washing hands before touching patients, clean patient's skin with antiseptic, wear masks, caps and gowns, etc. Pronovost found that physicians skipped at least one step with a third of patients. So why do doctors resist using checklists?

Unlike pilots, doctors don't go down with their planes. – Joseph Britto MD

Misuse of Antibiotics

While infections are a problem, misuse of antibiotics can lead to other problems. Providence Saint Joseph Medical Center (PSJMC) found that nursing units often failed to discontinue antibiotics within 24 hours of surgery end time for up to 1,000 patients per year. Failure to stop antibiotics can lead to adverse reactions and increased medical costs.

PSJMC found that average stop time for antibiotics was 39 hours after surgery. Only 25% of cases were compliant with guidelines. And there was no standard process or protocol used in the nursing units. They also found that orthopedic and colon surgeons had the highest noncompliance rates.

Countermeasures

- Revise order sets with support from surgeons.
- Identify applicable cases in the operating room.
- Automate discontinuation of antibiotics by the pharmacy at the 24th hour for applicable cases.
- Add orange stickers to patient chart to visually identify the patients.
- Monitor compliance daily.

In a few months, compliance rose to 90% vs 36% which generated \$35,000 in savings.

BAR CODES BUST MEDICATION ERRORS

Good News: When the VA adopted bar codes for patients and medicines, medication errors plummeted. By bar coding medications and patients, and using hand held scanners, clinicians can ensure that the right patient gets the right dosage of the right medication at the right time.

Bad News: An estimated 7000 people a year die in hospitals of medication errors. One out of every 14,000 transfusions gets the wrong blood resulting in at least 20 deaths each year. Only about 125 of the nation's 5000 hospitals use bar codes now.

Good News: The FDA will require bar codes on all medications starting in February, 2004.

Bad News: National average for wristband inaccuracies in hospitals is 3%. (If you get the band wrong, everything else can go wrong too.)

Sadly, safety technology isn't a big diagnostic machine that generates revenue; it's a protective device that reduces the cost of treatment and litigation. The good news is that the technology is out there to make our healthcare safer than ever before. All we have to do is embrace it.

The Problem Isn't Where You Think It Is

The most common root cause of adverse events reported in the state statistics is *communication*. But by this, healthcare professionals usually mean person-to-person communication. If you want to be faster and better, you cannot rely on person-to-person, mind-to-mind communication. It has to be in the medical record or visual. Could patients with a high risk of falls be given a different colored gown or detachable tag that travels with them? What systems could be put in place, like a doctor marking a surgical patient's ID to indicate that the patient has received appropriate checks and instruction before surgery? Could a voice recorder carry a patient's status from the ED to a nursing floor? Stop thinking fleeting mind-to-mind communication; start thinking visual and auditory systems.

In any industry including healthcare, managers and employees always think that better training will solve their quality problems. Unfortunately, training doesn't always stick and turnover drains the skill pool. The only way to prevent errors is to build the prevention into the systems and procedures. This means implementing *standard* procedures, checklists, and measurements to monitor performance. It also means endlessly tuning these procedures, checklists and measures to improve performance. If you implement a countermeasure and it doesn't reduce errors, then it's not a good countermeasure. Stop doing it and implement something better.

Key Insight: Processes, procedures and systems cause most medical mistakes and errors, not people.

The Goal: Eliminate Mistakes and Errors by Changing Processes

One in five Medicare patients is readmitted within 30 days, but hasn't seen a doctor before they return. More than 50 percent are readmitted within a year, a defect in ongoing care. One Colorado hospital used a *transition coach* for the first 30 days after discharge, reducing readmissions by 20-40 percent (www.caretransitions.org).

How to Get a Better Hospital in Five Days

The only realistic hope for substantially improving care delivery is for the old guard to launch a revolution from within. Existing players must redesign themselves. Richard M. J. Bohmer

Although the case studies in this report offer some constructive ideas, most clinical staffs will not implement an improvement *unless they have a hand in its design*.

Improvements Are Possible If It Helps the Patient and the Provider

Healthcare professionals want to help create improvements that:

- Increase patient safety and satisfaction
- Improve quality of care
- Reduce lead or turnaround times
- Improve productivity without compromising patient outcomes
- Reduce medical errors

Solutions

- Appeal to provider's need to provide better care.
- Show them the data.
- Shift to a patient-centric model of healthcare
- Switch to using standardized protocols and routines to optimize care.

How is it possible to get a better Hospital in Five Days or Less? It takes a team.

1. Gather a team that believes it's possible to prevent existing problems (e.g., ED team, nursing unit team, pharmacy team, etc.). Some people just don't believe it's possible; if so, they won't be useful on the team. Don't load the team with skeptics.
2. **Focus the Improvement:** Gather and graph the mistake or error data. Do as much of the analysis as possible beforehand. Key graphs: control chart of performance over time and pareto charts of mistake categories. One-to-four teams may focus on each "big bar" of the pareto chart.
3. Have a trained facilitator assist the team in root cause analysis (Why? Why? Why? Why? Why?). Have the team identify possible countermeasures to these problems.
4. **Improve:** Implement the countermeasures and measure results
 - Implement process-oriented improvements immediately
 - Test new visual and auditory communication methods in a limited trial. Evaluate results, revise and roll out to the rest of the organization.
 - Implement methods, checklists and so on to mistake-proof care regardless of the provider.
 - Manage more complicated changes (e.g., information technology changes, hardware changes, etc.)
5. Verify that the countermeasures actually reduce error rates. (Some times they don't.)
6. **Sustain the Improvement:** Standardize the improved methods and measures as a permanent way of doing things.
7. Measure and monitor turnaround times to ensure peak performance.

I Pledge Allegiance to Science and Evidence

At the 2006 Institute for Healthcare Improvement (IHI), Don Berwick asked attendees to *pledge allegiance to science and evidence*. It's been over a decade since IOM's *To Err is Human*. Isn't it time to start capturing every medical error, not to punish the mistake makers, but to change systems to prevent the error *forever*?

The Cost of Medical Harm

An estimated 40-50 patients out of every 100 will suffer some sort of "harm" during their stay. Some of these are minor, but many cause temporary or lasting disability or even death.

From a Six Sigma perspective, this process is worse than 1-Sigma (300,000 PPM).

With an estimated 37 million hospital admissions a year (and perhaps three times that many emergency room visits that aren't admitted), *medical harm affects 17 million patients and their families each year.*

The Goal

The IHI's 2006 5 Million Lives campaign hoped to reduce this number by 5 million over two years or 2.5 million per year. The campaign focused on the top five categories of medical harm (leaving out the minor categories A-D):

- E. Temporary injury from care (an estimated 60% of the overall total)
- F. Temporary injury that requires hospitalization
- G. Permanent injury
- H. Injury requiring intervention within one hour to save the patient's life
- I. Death

Campaign Focus

There are six "planks" in this campaign:

1. Prevent pressure ulcers
2. Prevent MRSA (antibiotic resistant staph infections - \$2.5 Billion per year)
3. Prevent high alert medication errors
4. Prevent surgical complications (about 3 out of 30 million complications per year)
5. Prevent congestive heart failure complications (\$29 billion per year)
6. Get hospital boards on board with the changes required.

There's already plenty of science and evidence that points the way toward solutions that will prevent these types of errors, harm and injuries. Over 3,000 hospitals have committed to implementing these proven methods. Now comes the hard part...implementing the change.

Campaigns

This campaign focuses on hospitals. It doesn't even touch clinics, rural healthcare, doctor's offices, mental health facilities or most of the other care that occurs in this country. Instead of waiting on the IHI to launch an initiative, I hope that these groups will craft their own campaigns and get started. Find out more at IHI.org.

If you want to know why healthcare is so expensive, the answer may well be that there are too many preventable mistakes.

Design Your Own Campaign

One thing I've learned from watching the IHI's 100,000 lives campaign is that a lot of progress can be made quickly across huge geographic and demographic boundaries by setting clear targeted goals that focus around a shared purpose.

Ask any doctor, nurse or clinician, they all want to serve the patient, even if it means strapping on what Berwick calls the "**handcuffs and straightjackets**" of rigorous procedures that ensure every patient gets proven therapies (e.g., aspirin at arrival for heart attacks).

What's the overriding purpose in your hospital? What does everyone agree on? How can you craft a campaign to reduce the "harm" (i.e., delay, defects and deviation) your hospital processes inflict on your patients? How can you craft the campaign so that it will ignite the passion and creativity of your employees and get them to pledge allegiance to science and evidence?

How much progress could you make in the next 24 months?

Need Guidance?

Most hospitals need expert improvement guidance in one or more areas of the hospital. The first project may seem scary, but we can assist you with analysis of data about mistakes and errors to focus the improvement. We can facilitate your improvement teams to achieve dramatic reductions in mistakes and errors. Once you've learned how, you'll find it easy to continue. Haven't you waited long enough to get a better hospital in five days or less?

Jay Arthur, the KnowWare Man, works with hospitals that want to get faster, better and cheaper in a matter of days using the proven methods of Lean Six Sigma. Jay is the author of [Lean Six Sigma Demystified](#) and the [QI Macros SPC Software for Excel](#). Jay has worked with healthcare companies to reduce denied claims by \$3 million per year, appealed claim turnaround time and lab turnaround times by 30-70 percent.

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