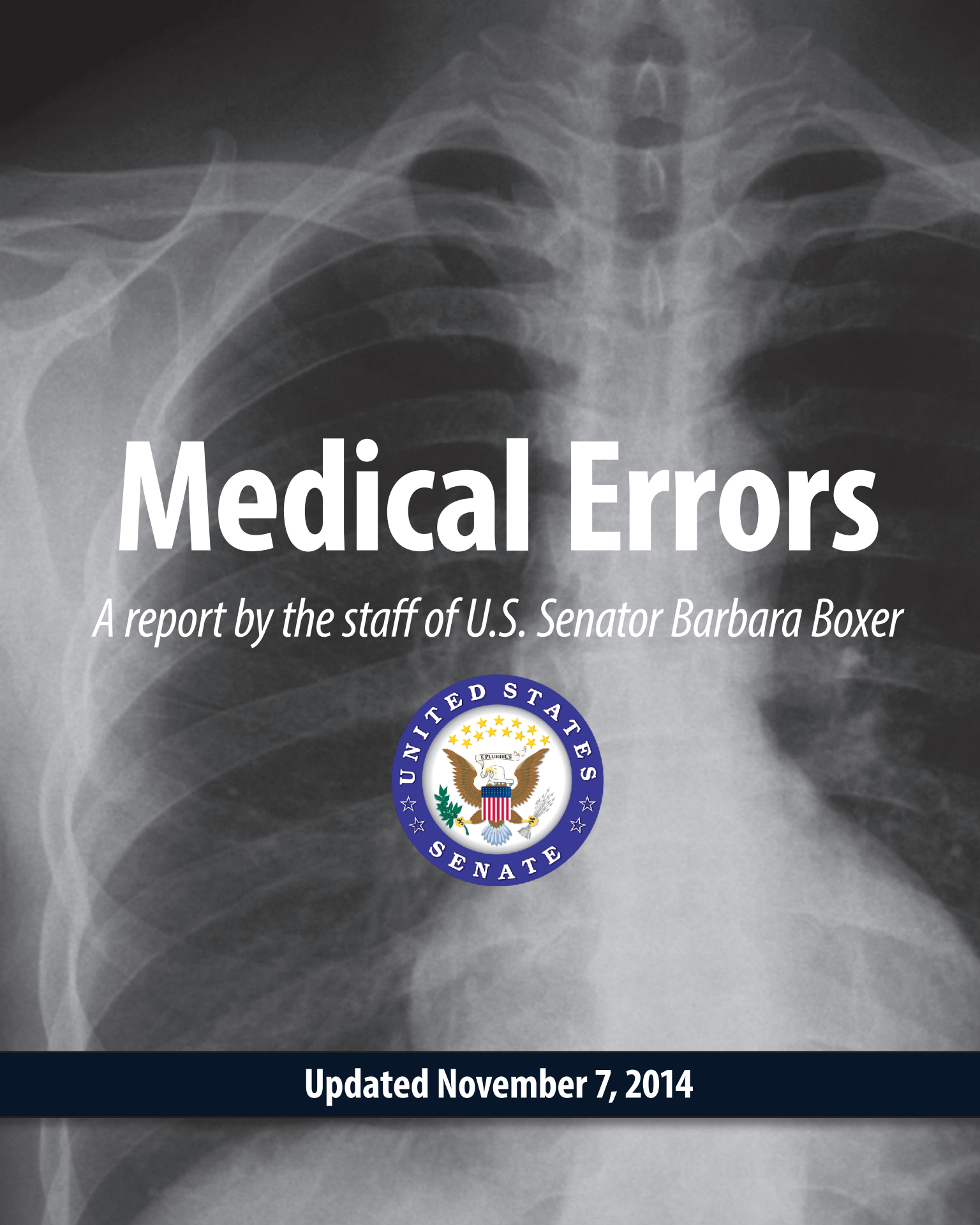

Medical Errors

A report by the staff of U.S. Senator Barbara Boxer

Updated November 7, 2014

I. Executive Summary

Medical errors are a quiet and largely unseen tragedy. Every year between 210,000 and 440,000 Americans die as a result of medical errors and other preventable harm at hospitals, according to researchers.[i] These numbers are equivalent to a jumbo jet crashing every day with no survivors. Based on these figures, medical errors could be considered the third-leading cause of death in America, behind heart disease (nearly 600,000 a year) and cancer (more than 580,000 a year).[ii]

After meeting with a family who lost a child to medical errors, Senator Boxer asked her staff last year to compile a list of the most common and devastating medical errors. What the staff found out was that there was not a single list – there were many lists.

So last spring, Senator Boxer wrote to federal officials urging them to put together a single, unified list. In July 2013, the Partnership for Patients – a new public-private partnership funded through the Affordable Care Act – responded by releasing a list of the 9 most common medical errors:[iii]

1. Adverse Drug Events
2. Catheter-Associated Urinary Tract Infections
3. Central Line-Associated Blood Stream Infections
4. Injuries from Falls and Immobility
5. Obstetrical Adverse Events
6. Pressure Ulcers (Bedsores)
7. Surgical Site Infections
8. Venous Thromboembolism (Blood Clots)
9. Ventilator-Associated Pneumonia

On February 4, 2014, Senator Boxer wrote to 283 California acute care hospitals asking them to respond with the actions they are taking to reduce these 9 most common medical errors, leading to the first publication of this report on April 25, 2014. Since then, an additional 100 hospitals have replied[iv], and an updated report was reissued on November 7, 2014 to include those responses. To date, more than 90 percent of hospitals have responded to the inquiry, and Senator Boxer will continue to seek answers from those that failed to reply.[v]

Here are some of the major findings:

- All of the hospitals that responded reported taking at least some steps to address the most common medical errors.

- Many hospitals agree on common approaches to reducing these errors, which are outlined in this report.

- Some hospitals are stepping out and pursuing unique approaches to preventing these errors.

- For example, Kaiser Permanente requires nurses to wear colored sashes or vests when dispensing medication to patients to prevent interruptions and distractions that could lead to errors.

- UCLA Medical Center disinfects hospital rooms using ultraviolet technology, prohibits the use of home-laundered scrubs, and bans doctors and other staff with open wounds, bandages or casts from scrubbing into surgeries to help prevent infection.

- And Desert Valley Hospital in Victorville reported that it reduced the number of surgical site infections from 16 in 2009 to 2 in 2013 after starting an innovative program that rewards medical staff who are observed practicing good hand hygiene by entering them into a drawing for a chance to win a prize.

Many more examples of how hospitals are responding to this epidemic are contained in this report. Senator Boxer believes that publicizing these best practices will save lives and encourage other hospitals to take these and other common-sense steps to reduce medical errors.

Senator Boxer thanks all the hospitals that participated, as well as the Patient Safety Movement Foundation and the family of Leah Alexander, who helped to bring this issue to her attention. She has pledged to continue to focus attention on this issue to help prevent these needless tragedies.

II. Taking Action to Prevent Medical Errors

Based on the hospitals' responses to Senator Boxer's letter, the Senator's staff identified some common themes in how hospitals are addressing medical errors, as well as some of the challenges they face:

Checklists
Several of the 9 preventable medical errors have well-known interventions and "checklists" that many hospitals follow. Many hospitals indicated that they use these uniform checklists and "bundle" systems for Ventilator-Associated Pneumonia, Catheter-Associated Urinary Tract Infection, and Central Line Blood Stream Infection. However, hospitals did not cite the use of similar interventions in the cases of Falls, Adverse Drug Events and Obstetrical Adverse Events.

Identifying safe practices
Implementing safe practices under one set of preventable medical errors often has beneficial effects in reducing another type of medical error. For example, venous thrombosis prevention was cited as an intervention to reduce ventilator-associated pneumonia.

Changing the culture
General responses by the hospitals include a cultural change to focus on system-wide fixes rather than assigning blame, peer review committees to review cases of medical errors, weekly "harm reports," daily safety huddles, and creating new bonds of collaboration both inside and outside of an organization.

Alarm fatigue
Many hospitals cited "Alarm Fatigue" as a top patient safety concern, when health care workers become desensitized to a large volume of equipment alarms.

Stopping infections
For infection control, use of chlorhexidine antiseptic on the skin was the most common intervention cited.

III. Update on the Affordable Care Act

On May 7, 2014, the Department of Health and Human Services released a report that shows a 9 percent decrease in hospital-acquired conditions nationally during 2011 and 2012.[vi] The Department also announced that reductions in adverse drug events, falls, infections, and other forms of hospital-based medical errors are estimated to have prevented nearly 15,000 deaths in hospitals, 560,000 patient injuries, and approximately $4 billion in health spending over the same period.

According to the Health and Human Services report, "The efforts by HHS and its partners to improve care while achieving savings, including the Partnership for Patients and in conjunction with new tools provided by the Affordable Care Act, show that we are well on the way towards increasing patient safety, reducing healthcare costs, providing a more sustainable healthcare system for providers, all while bringing the best, safest possible care to patients."

IV. Detailed Findings from Hospital Responses

To better understand how California hospitals are addressing these challenges, we broke down their responses to each of the most common medical errors identified by the Partnership for Patients:

Adverse Drug Events

A preventable adverse drug event is a harm experienced by a patient as a result of exposure to a medication through medical error. Adverse drug events affect nearly 5% of hospitalized patients, making them one of the most common types of medical error.[vii]

Common Approaches	*Unique Approaches*
➤ Use barcode technologies and electronic health records with computerized prescriber order entry, which helps to eliminate errors due to illegible handwriting and works to promote standardization of medications and dosages	➤ Require all inpatient nurses to wear a colored sash or vest to prevent interruptions and distractions during medication administration
➤ Actively involve pharmacists throughout a patient's hospitalization, from reviewing the medications a patient is on at admission to reviewing a patient's electronic health record for prescribing errors	➤ Independently verify high-risk medications and doses by at least two clinicians prior to administration
	➤ Employ smart IV infusion pumps that use drug libraries to warn the clinicians when they have programmed the infusion pump outside safe parameters

Example of Hospitals Using Unique Approaches

Sutter Health reports a 59% improvement overall in Adverse Drug Events with Harm since joining the Partnership for Patients in 2012. As part of that effort, Sutter Health has employed smart IV infusion pumps. According to Sutter Health, "In 2013, the smart pump technology led to 2778 severe harms averted system wide."

Catheter-Associated Urinary Tract Infections

A urinary tract infection is "an infection involving any part of the urinary system, including urethra, bladder, ureters, and kidney."[viii] According to the Centers for Disease Control and Prevention (CDC), among urinary tract infections acquired in the hospital, approximately 75% are associated with a urinary catheter, which is a tube inserted into the bladder through the urethra to drain urine. Between 15-25% of hospitalized patients receive urinary catheters during their hospital stay.

Common Approaches	*Unique Approaches*
➤ Use sterile or "clean" technique during insertion and during catheter care	➤ Allow nurses to remove catheters using approved guidelines without a physician order to expedite the removal of unnecessary catheters
➤ Assess catheter necessity daily	➤ Set a standing time to remove catheters post operatively (e.g., two days after surgery) unless a surgeon directs otherwise
➤ Maintain hand hygiene	

Example of Hospitals Using Unique Approaches

Hemet Valley Medical Center has reduced its catheter-associated urinary tract infection rate in the ICU from 2.28 per 1000 catheter-days in 2011 to 1.72 per 1000 catheter-days in 2013. The hospital reported, "We have also drafted a standing order to allow nurses to remove foley catheters per approved guidelines in order to expedite the removal of foley catheters. This is in the process of being approved by our medical staff and the expectation is that this will further reduce our rate of infections."

Central Line-Associated Blood Stream Infections

A central line is a catheter placed into a large vein in the neck, chest, or groin. According to the CDC, "an estimated 41,000 central line-associated bloodstream infections occur in U.S. hospitals each year. These infections are usually serious infections typically causing a prolongation of hospital stay and increased cost and risk of mortality."[ix]

Common Approaches	*Unique Approaches*
➤ Use disinfection caps or central line anti-microbial IV port covers	➤ Include a checklist in the patient's electronic health record
➤ Use maximal sterile barriers: Cap, mask, gown, gloves, drape	➤ Train staff how to insert a central line in a simulation center
➤ Maintain hand hygiene	➤ Have an infection control specialist check a patient's line multiple times a week and/or watch during placement to ensure that the sterile technique is followed
➤ Use appropriate skin preparation agent and allow it to dry	
➤ Use chlorhexidine baths and cloths	

Examples of Hospitals Using Unique Approaches

Olympia Medical Center reports that it has achieved zero central line infections over the last 6 months. Olympia Medical Centers writes that part of its efforts include that an "Infection Control Practitioner checks each line 3 times a week, as well as watching during placement for sterile technique."

UC San Diego Health System formed a task force to address Central Line-Associated Blood Stream Infections. According to its response letter, UC San Diego Health System "built a tool within the electronic medical record (EMR) for documenting Central Line Insertion Practice (CLIP) bundle performance at the time of central line insertions placed in inpatient care sites as well as the emergency departments. This tool prompts providers to comply with required bundle elements and facilitates accurate data abstraction."

Injuries from Falls and Immobility

Each year, between 700,000 and 1 million people in the United States fall in the hospital. A fall may result in fractures, lacerations, or internal bleeding, leading to increased hospital stays and healthcare costs. According to the AHRQ, research shows that close to one-third of falls can be prevented.[x]

Common Approaches	*Unique Approaches*
➤ Educate patients and their families	➤ Use bed, chair, and portable alarms for high-risk patients
➤ Assign risk to patients based on a scoring system	➤ Use "fall bands" on the arms of patients or colored socks to identify that these patients are high risk
	➤ Place high-risk patients in rooms closer to nursing stations
	➤ Establish an early mobility plan in the ICU to help mobilize patients earlier and prevent muscle weakness
	➤ Incorporate fall prevention education in new employee orientation

Examples of Hospitals Using Unique Approaches

Riverside County Regional Medical Center has taken numerous steps to reduce the number of injuries from falls. According to the Riverside County Regional Medical Center, "Some of these were the assigning of a 'fall score' to patients, placing patients closer to the nursing stations and utilizing a 'sitter' if necessary. Also colored arm bands are used to identify those patients that are a high fall risk. There is also the 'Early Mobility' plan in the ICU to mobilize patients earlier to prevent muscle weakness and assist in the prevention of ventilator associated pneumonia."

Glendale Adventist Medical Center reduced falls by 28% in 2012 and an additional 7% in 2013. Its approach includes using "'Call don't Fall' signage in 4 languages to meet the needs of our multi-cultural population" as well as painted brake pedals on patient beds, non-slide footwear, a "sensory cart to provide distractions to calm and comfort our patients (music, tactile therapy)," dedicated training on high-risk detox patients, and a fall risk custom list that accompanies the patient whenever they are off unit for diagnostic tests.

Obstetrical Adverse Events

One of the most common obstetrical adverse events involves early elective delivery. According to the Leapfrog Group, "A recent review of the evidence has shown that these elective deliveries can have serious negative consequences for the mother and baby."[xi] Ways that obstetrical medical errors can harm the mother include a higher risk of having a cesarean section as well as a higher risk of postpartum complications, such as anemia and endometriosis. Babies born at 37-38 weeks are at much higher risk of death. They are also at a far higher risk for harms like respiratory problems and admission to the neonatal intensive care unit (NICU).

Common Approaches	*Unique Approaches*
• Establish a "hard-stop" policy (e.g., 39 weeks) to allow low-risk pregnant patients to go into spontaneous labor in order to reduce the rate of early elective deliveries	Initiate drills and training using simulation equipment and specialty-trained teams Conduct emergency drills for situations like postpartum hemorrhage Debrief after emergency situations with multidisciplinary team Reduce cesarean delivery among first-time moms

Example of Hospitals Using Unique Approaches

Kaiser Permanente implemented a Perinatal Patient Safety Program in 2003. Kaiser writes that this program includes "implementation of the National Institute of Child Health and Human Development (NICHD) fetal monitoring nomenclature and standardized simulation-based education to address high-risk adverse events (e.g., shoulder dystocia, instrument assisted deliveries, postpartum hemorrhage, etc.)"

Pressure Ulcers

A pressure ulcer, or bed sore, is an injury usually caused by unrelieved pressure that damages the skin and underlying tissue.[xii] They can range from mild (minor skin reddening) to severe (deep craters down to muscle and bone). According to the AHRQ, "The estimated cost to treat a pressure ulcer is between $500 and $40,000. Yet, pressure ulcers can be managed and prevented."[xiii]

Common Approaches	*Unique Approaches*
➤ Assess all patients for pressure ulcers prior to and upon admission	➤ Use of low air loss surfaces (e.g., using air mattresses on emergency stretchers for high risk patients)
➤ Nursing staff should discuss pressure ulcers during shift reports	➤ Use of turn logs and turn clocks as a reminder to reposition the patient
	➤ Employ a wound care team

Examples of Hospitals Using Unique Approaches

Cedars-Sinai reports a 74% reduction in pressure ulcers, to less than a dozen annually. Cedars-Sinai notes, "The nursing department lead the effort to achieve this reduction in pressure ulcers by executing the following list of actions: 1) improved clinician education, 2) standardized pressure ulcer assessment, staging, and reporting, 3) implemented triggers for additional interventions such as nutrition consults, 4) and improved the procurement and distribution of appropriate support surfaces and skin care products throughout the facility."

UCSF Medical Center reports that pressure ulcers are down by more than 75% between fiscal year 2008 and the 2013 fiscal year. UCSF notes, "All patient care providers also are trained in pressure ulcer prevention, with many techniques such as providing good skin care, regularly assisting patients to change position in bed, and using pressure-reducing cushions and other devices."

Surgical Site Infections

According to the CDC, a recent study found that surgical site infections were the most common healthcare-associated infection, accounting for 31% of all of these infections among hospitalized patients. In addition, one study found 16,147 surgical site infections following 849,659 operative procedures.[xiv]

Common Approaches	*Unique Approaches*
➤ Use chlorhexidine baths or showers in lieu of regular tub baths	➤ Prohibit staff with open wounds, bandages, or casts from scrubbing in to surgical cases
➤ Maintain normal blood sugar post-operatively	➤ Conduct black light inspections on a random sample of operating rooms after cleaning
➤ Eliminate unnecessary foot traffic during the surgical period that ranges from anesthesia administration through recovery	➤ Minimize blood transfusions
➤ Use proper hair removal techniques and ensure minimal skin trauma related to hair removal	➤ Use rotating staff and "secret shoppers" for hand hygiene observations (i.e. the more times staff are observed washing their hands, the more likely they are to win a prize)

Examples of Hospitals Using Unique Approaches

UCLA Health System has seen an 18% improvement in surgical site infections from 2010 to 2013. Part of the UCLA effort to reduce medical errors includes an enhanced operating room attire policy which prohibits the use of home-laundered scrubs. Additionally, "MDs and staff with open wounds, bandages or casts on their hands may not scrub in to surgical cases as their hands are not able to be adequately decontaminated."

Desert Valley Hospital reports that it reduced number of surgical site infections from 16 in 2009 down to 2 in 2013. Desert Valley Hospital attributes part of this success to an effort that "created the CSI (control the spread of infection) Program house wide." The CSI program runs the "secret shopper" and staff prize model for rewarding hand hygiene.

Venous Thromboembolism

Venous thromboembolism is a condition that includes both deep vein thrombosis and pulmonary embolism. Deep vein thrombosis is the formation of a blood clot in a deep vein, usually in the leg or pelvis. The most serious potential complication of a deep vein thrombosis is the possibility that the clot could dislodge and travel to the lungs, becoming a pulmonary embolism.[xv] According to AHRQ, venous thromboembolism is the most common preventable cause of hospital death.[xvi]

Common Approaches	*Unique Approaches*
➤ Employ wound care specialists	➤ Have pharmacy department follow all patients with venous thromboembolism
➤ Assess patients for risk pre-operatively	➤ Reduce unnecessary central venous catheter days and minimize the size of these catheters
	➤ Have the electronic health record prompt the clinician to order deep-vein thrombosis prevention (mechanical intervention or pharmaceutical intervention) or to document the reasons why it was not ordered

Example of Hospitals Using Unique Approaches

UC San Diego Health System reports that central venous catheters are frequently associated with deep vein thrombosis of the upper limbs. So the hospital system reports that it is "striving to reduce unnecessary central venous catheter (CVC) days, minimize the size of CVCs, and ensure proper CVC insertion technique."

Ventilator-Associated Pneumonia

According to the CDC, "Ventilator-associated pneumonia is a lung infection that develops in a person who is on a ventilator. A ventilator is a machine that is used to help a patient breathe by giving oxygen through a tube placed in a patient's mouth or nose, or through a hole in the front of the neck. An infection may occur if germs enter through the tube and get into the patient's lungs."[xvii] The CDC also notes that in 2002, 250,000 healthcare-associated pneumonias developed in hospitals and were connected to 36,000 deaths.[xviii]

Common Approaches	*Unique Approaches*
➤ Elevate the patient's head 30-45 degrees	➤ Use percussion vest in the ICU to help wean patients off of the ventilator more quickly
➤ Institute a daily "sedation vacation"	➤ Make effort to keep patients extubated if they have removed their own tube for any reason
➤ Assess the patient's readiness to extubate daily	➤ Avoid gastric over-distention, when too much air is allowed into the stomach
➤ Maintain oral hygiene regularly	
➤ Prevent deep vein thrombosis	

Examples of Hospitals Using Unique Approaches

University of California, Davis Medical Center reports that it has achieved a 76% reduction in ventilator-associated pneumonia from 2009-2013. According to the UC Davis Medical Center response letter, this effort includes "Quality and Safety Champions" who "attend multidisciplinary rounds, monitor bundle compliance at the bedside for healthcare practitioners at all levels and provide 'just-in-time' coaching."

Contra Costa Regional Medical Center reports that it has reduced rates of ventilator-associated pneumonia from 11.8 per 1,000 patients in 2003 down to 0 for 2012 and 2013. CCRMC notes, "We use a process called 'wake up and breathe effectively' in which mechanical ventilation is not seen as a barrier to physical activity of the patient, if the underlying medical condition allows."

IV. Congressional and Administrative Actions to Reduce Medical Errors

The 2010 health reform law, the Affordable Care Act, is saving lives and reducing medical errors. The law led to the creation of the Partnership for Patients, which is dedicating $1 billion to prevent hospital-acquired conditions. The Affordable Care Act has also created three new pay-for-performance programs, which will reward hospitals that deliver high-quality care and penalize those that fail to reduce medical errors.

Outlined below are recent Congressional actions aimed at reducing medical errors, including those enacted by the health reform law.

- Since 2003, as a condition of participation in the Medicare program, federal regulations require that hospitals maintain a Quality Assessment and Performance Improvement (QAPI) program to "track medical errors and adverse patient events, analyze their causes, and implement preventive actions and mechanisms that include feedback and learning throughout the hospital."[xix] A January 2012 report by the Department of Health and Human Services' Office of the Inspector General found in a survey that staff did not report 86 percent of events to incident reporting systems, partly because of misperceptions about what constitutes patient harm.[xx] In 2011, CMS launched the Hospital Patient Safety initiative, in which they are piloting new surveyor tools for assessing compliance with federal regulations.[xxi]

- The Hospital Inpatient Quality Reporting was originally added to federal law by the Medicare Prescription Drug, Improvement and Modernization Act and was later amended by the Deficit Reduction Act of 2005.[xxii] Under this program, CMS pays hospitals that successfully report designated quality measures a higher annual update, and failure to report the measures results in a payment reduction. Once the data is received from hospitals, CMS publicly reports the data on its "Hospital Compare" website.

- The Deficit Reduction Act of 2005 required CMS to select at least two hospital-acquired conditions for which hospitals would not be paid higher Medicare reimbursement.[xxiii] Since 2008, CMS has maintained a list of hospital-acquired conditions that includes catheter-associated urinary tract infections, falls and trauma, late-stage pressure ulcers, surgical site infections, and deep vein thromboembolism.

[xxiv] Under the Patient Protection and Affordable Care Act of 2009, starting in 2011, CMS has applied this payment policy to the Medicaid program to encourage hospitals to actively prevent these conditions.

- The Patient Safety and Quality Improvement Act of 2005 established Patient Safety Organizations under supervision of the AHRQ. Patient Safety Organizations receive reports of patient safety events from health care providers and provide analyses of these events.[xxv] They also operate under federal privacy protections to encourage providers to report medical errors and to work with health systems to resolve systemic issues.

- The Patient Safety and Quality Improvement Act of 2005 also authorized AHRQ to promulgate "Common Formats" so that hospitals can report adverse events in a uniform, unambiguous manner.[xxvi] The goal of Common Formats is to allow for the "apples to apples" comparison of medical errors across multiple hospital systems.

- The Patient Protection and Affordable Care Act created the CMS Innovation Center for the purpose of testing "innovative payment and service delivery models to reduce program expenditures …while preserving or enhancing the quality of care" for those individuals who receive Medicare, Medicaid, or Children's Health Insurance Program (CHIP) benefits."[xxvii] The CMS Innovation Center, now known as the Center for Medicare & Medicaid Innovation, provided $1 billion in funding for the Partnership for Patients, a public-private partnership to improve the quality of health care. The Partnership has published a list of the 9 most common and harmful medical errors. The goals of the Partnership are to reduce medical errors by 40 percent and readmissions by 20 percent.

- The Patient Protection and Affordable Care Act also authorized three pay-for-performance programs that will adjust Medicare payments to hospitals based on the quality of care delivered. The Hospital Readmission Reduction Program began in October 2012 and penalizes hospitals with higher-than-expected readmissions for beneficiaries initially admitted for selected conditions. The Value Based Purchasing Program[xxviii] began in October 2012 and provides penalties as well as incentive payments based on hospitals' performance on quality measures, including reducing surgical site infections. The Hospital-Acquired Condition Reduction Program[xxix] will reduce payments to hospitals that are in the top quartile for hospital-acquired conditions starting on October 1, 2014. CMS has adopted AHRQ safety indicators encompassing pressure ulcer rate and deep vein thrombosis rate, among others, as well as measures from the CDC, such as central line-associated blood stream infection and catheter-associated urinary tract infections.[xxx]

V. Recommendations

1. All federal programs designed to reduce medical errors should work off a single list where appropriate, specifically the Partnership for Patient's list of the 9 most common medical errors.

2. The Department of Health and Human Services should report to Congress the time it takes for quality measures to be developed, endorsed, and ultimately implemented in programs related to medical error reduction. A strategy for how to accelerate this process should also be included.

3. In the next round of regulations for electronic health records, the Office of the National Coordinator should include a standard way of reporting medical errors, specifically the Common Formats developed by AHRQ. This will allow hospitals and researchers to better collect data on errors, their frequency, and where they are occurring.

4. When assessing whether hospitals are meeting the requirement to track and report adverse events as a condition of participation in the Medicare program, surveyors and accreditors should evaluate the information collected by hospitals using AHRQ's Common Formats.

5. Congress should review the adequacy of whistleblower protections to ensure that health care providers are able to report medical errors without retribution.

6. The Department of Health and Human Services' Office of the Inspector General should examine the Hospital Patient Safety Initiative's new surveyor tools and analyze their impact on increasing staff reporting of medical errors.

VI. Conclusion

Preventing medical errors will not only save lives, it will also improve the quality of health care for all Americans.

And it is not just a moral imperative to act – it is an economic necessity. One study estimated that the direct costs of medical errors totaled $19.5 billion annually.[xxxi] Another study found that all of the costs of medical errors, including lost productivity, could amount to $1 trillion annually.[xxxii] By stopping these errors before they occur, we can save taxpayers, businesses and our health care system billions of dollars each year.

In the Jewish tradition, there is a saying: "Whoever saves a life – it is as if that person has saved the whole world." Today, we have the opportunity to save a life over and over again. We have the chance to save hundreds of thousands of lives and prevent heartbreak and pain for so many families.

If we work together, we can prevent these needless tragedies. If we ensure that doctors, nurses, hospital administrators, medical technology leaders, federal officials and patient advocates are all focused on this common goal, we can make great progress in preventing these avoidable deaths and ending the epidemic of medical errors in this country.

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