** Medical Errors -- Introduction

** With the release of the IOM report “To Err is Human” in 1999 that estimated between 44,000 and 98,000 persons died each year as a result of medical errors, the issue of patient safety began to receive the attention the it had long needed but never had.

** Even based on the more conservative side of this range (44,000 deaths per year), medical errors is the eighth leading cause of death in the U.S. each year, killing more people than AIDS, breast cancer, and motor vehicle accidents.

** Estimates of the costs associated with medical errors range from $17 to $37 billion per year according to the IOM.

** Medical Errors – Terminology and Taxonomy

** Per the “To Err is Human” report, a medical error is defined as the failure of a planned action to be completed as intended or the use of a wrong plan to achieve a given aim.

** There are many possible ways to categorize medical errors including, but not limited to, the following:

** Type of service being provided (e.g. surgical services)
** Severity of the resulting adverse outcome (e.g. sentinel event)
** Legal definition (e.g. negligence-based events)
** Type of setting (e.g. ICU)
** Type of individual implicated (e.g. physician)

** The term “patient safety” describes any initiative or series of interventions that are designed for the purpose of preventing adverse outcomes associated with medical errors, encompassing three complementary sets of activities: (1) preventing errors; (2) making errors more visible; (3) mitigating the adverse effects of errors.

** It should be noted that not all adverse patient outcomes/events are the result of medical error. Many adverse events, termed non-preventable, are caused by something other than the commission of a medical error, such as an underlying disease process or a normal side effect of an accepted diagnostic or treatment approach. (e.g. chemotherapy-induced nausea).
** The Epidemiology of Medical Errors

** What does the research literature tell us about the causes, frequency, severity, preventability, and impact of medical errors on patient outcomes in various health care settings?

** A few studies that looked at error rates and adverse event rates associated with hospital admissions found that approximately 3-4% of all admissions was associated with a significant adverse event. In one specific study of adverse events in NY hospitals, medical errors were determined to have been implicated in fully half of all reported adverse events.

** A number of studies have also looked at rates of adverse events related to the inappropriate prescription, administration, and use of pharmaceuticals in a variety of settings.

** Some research has suggested that as much of 50% of all prescribed drugs are used incorrectly, increasing the potential risk for a drug-related adverse event.

** Other research has attributed drug-related adverse events to 10% of all hospital admissions.

** One landmark study in this area – the Harvard Medical Practices Study of Adverse Medical Events – documented the following findings: (1) drug-related adverse events comprised about 20% of all such events in a hospital setting; (2) approximately 60% of all such drug-related adverse events were mostly preventable, with about 28% being due to simple negligence.

** Error Reduction – Lessons from other Industries

** As noted in the IOM report from 1999, health care is at least a decade or more behind other industries in terms of its efforts to promote basic safety.

** Many other industries, such as aviation and manufacturing, have made impressive gains in error reduction and basic safety assurances during the last 30-50 years, mostly as a result of the implementation of Total Quality Management tools and techniques as espoused by Deming and others.

** A review of the mostly successful experiences in non-healthcare industries related to error reduction and basic safety improvement initiatives suggests that such industries have the following common characteristics:
** They do not tolerate high error rates and set ambitious targets for error-reduction initiatives (e.g. six-sigma quality goals)

** They develop systematic tracking mechanisms that expose errors of all types, including near misses.

** They rely upon and obtain essentially 100% error reporting rates.

** They thoroughly investigate all errors using techniques such as root cause analysis.

** They utilize a systems approach to error reduction that embrace a wide array of human factors, technical, and organizational remedies.

** They focus on developing and implementing systems solutions to error reduction and DO NOT seek to assign individual fault/blame.

** They also focus on changing organizational culture so that it enhances safety and error reduction.

** They allocate sufficient resources to error reduction initiatives and the knowledge base to support them.

** Medical Errors – Drivers and Determinants

** Voluminous research to date clearly documents that error rates in health care are far greater than in many other industries. Such disparities in error rates beg the question “Why/how is health care different from these other product/service industries that may explain some/all of the disparities in error rates observed?”

** While health care shares certain aspects in common with many other industries - for example, most industries rely on systems that facilitate the interaction of humans with technology to perform a number of pre-determined functions leading to some desired outcome - health care is unique from other industries in several regards:

** Complexity – for example, the average patient in an intensive care unit has approximately 180 activities performed on them every day that relies on the interaction of monitoring, treatment, and support systems (Leape, 1994). Many have argued that the cumulative knowledge base necessary to safely and effectively conduct these 180-odd activities on a consistent basis exceeds the storage capacity of the human brain.
**Organization** – health care remains a significantly decentralized and fragmented industry, relative to others. Such structures are characterized by variably loose linkages between departments, professions, and specialties and mostly poor or nonexistent communication and collaboration to address the issue of medical errors. Such structures likely contribute to the problem of medical errors and most certainly contribute to the inability of the health care industry to adopt a more systems-based approach to dealing with such errors.

**Poor Error Knowledge Base** – unlike many other industries, errors in health care may be particularly difficult to recognize, describe, or explain because of the presence of confounding factors such as individual patient variations in response to treatment. Also, because medical errors usually only affect a single patient at a given point in time, they are treated as isolated incidents, and little or no attention is drawn to these problems, leading to massive underreporting of such errors that has been well documented in previous research.

**The Health Care “Culture”** – the historical approach to dealing with medical errors was to “name, blame, and shame”. The result of such an approach, understandably, has led to a culture of denial and secrecy in health care as it relates to medical errors.

**Potential Solutions to Reduce Medical Errors and Adverse Events**

**Reduce complexity** – implement standardized protocols, policies, and procedures for activities that lend themselves to the commission of medical errors. Rely as much as possible on an evidence-based approach to development.

**Change the organizational structure** – break down organizational barriers, real or perceived, that inhibit collaboration and communication between departments, professions, and specialties to reduce medical errors. Create new structures that facilitate systems thinking and continuous quality improvement efforts to reduce such errors.

**Improve the error knowledge base** – allocate sufficient resources to improve the reporting, analysis, and feedback of results on ALL medical errors and adverse events within the organization.
** Change the organizational culture – do whatever is necessary to facilitate a change in emphasis towards a non-confrontational, non-punitive approach to medical error and adverse event reporting. Emphasize/reinforce the importance of achieving 100% rates of compliance with reporting requirements.

** In sum, effective error reduction/prevention systems need to be built on a foundation of locally directed and managed programs within health care organizations, complemented by coordinated, external support and guidance from federal, state, and non-governmental (e.g. JCAHO) agencies and organizations.

** A comprehensive approach to error reduction requires the designation of dedicated personnel within the HSO working to:

** Identify and monitor the occurrence of errors and adverse events as well as their root causes
** Analyze, interpret, and disseminate results to clinicians and other stakeholders
** Implement error reduction interventions relying on a systems perspective
** Evaluate the impact of such interventions on patient safety

** A number of obstacles remain to the establishment of effective and efficient organizational patient safety/error reduction efforts including:

** Lack of problem awareness
** Traditional medical culture of individual blame for errors
** The primitive state of medical information systems to allow for the systematic collection and analysis of data
** The lack of immunity from legal discovery and liability for medical error reporting
** Inadequate allocation of resources for quality improvement and error prevention/reduction
** Inadequate knowledge base regarding the frequency, cause(s), and impact of medical errors, as well as a general lack of evidence about effective methods for error reduction/prevention
** Lack of knowledge of systems-based approaches to error reduction, such as those used successfully in aviation and manufacturing, and the perceived difficulty of adapting those approaches to health care.

** The difficulties associated with successful error reduction in non-hospital-based settings are even greater, with all of the aforementioned obstacles to contend with as well as a general lack of rudimentary surveillance systems and lack of personnel to collect, analyze, and report results.
** Common Patient Safety/Error Reduction Interventions

** One reason adverse events and medical errors occur is that evidence-based information on what works to prevent them, or reduce the harm they cause, is not available.

** The National Quality Forum, with support from the Agency for Healthcare Research and Quality (AHRQ), identified 30 safe practices that evidence shows can work to reduce or prevent adverse events and medical errors.

** Creating a Culture of Safety -- Recommendation

** Create a health care culture of safety. There is a need to promote a culture that overtly encourages and supports the reporting of any situation or circumstance that threatens, or potentially threatens, the safety of patients or caregivers and that views the occurrence of errors and adverse events as opportunities to make the health care system better.

** Matching Health Care Needs with Service Delivery Capability – Recommendations

** For designated high-risk, elective surgical procedures or other specified care, patients should be clearly informed of the likely reduced risk of an adverse outcome at treatment facilities that have demonstrated superior outcomes and should be referred to such facilities in accordance with the patient's stated preference.

** Specify an explicit protocol to be used to ensure an adequate level of nursing based on the institution's usual patient mix and the experience and training of its nursing staff.

** All patients in general intensive care units (both adult and pediatric) should be managed by physicians having specific training and certification in critical care medicine ("critical care certified").

** Pharmacists should actively participate in the medication-use process, including, at a minimum, being available for consultation with prescribers on medication ordering, interpretation and review of medication orders, preparation of medications, dispensing of medications, and administration and monitoring of medications.
Facilitating Information Transfer and Clear Communication -- recommendations

- Verbal orders should be recorded whenever possible and immediately read back to the prescriber; that is, a health care provider receiving a verbal order should read or repeat back the information that the prescriber conveys in order to verify the accuracy of what was heard.

- Use only standardized abbreviations and dose designations.

- Patient care summaries or other similar records should not be prepared from memory.

- Ensure that care information, especially changes in orders and new diagnostic information, is transmitted in a timely and clearly understandable form to all of the patient's current health care providers who need that information to provide care.

- Ask each patient or legal surrogate to recount what he or she has been told during the informed consent discussion.

- Ensure that written documentation of the patient's preference for life-sustaining treatments is prominently displayed in his or her chart.

- Implement a computerized prescriber-order entry system.

- Implement a standardized protocol to prevent the mislabeling of radiographs.

- Implement standardized protocols to prevent the occurrence of wrong-site or wrong-patient procedures.

Specific Setting or Processes of Care -- recommendations

- Evaluate each patient undergoing elective surgery for risk of an acute ischemic cardiac event during surgery, and provide prophylactic treatment for high-risk patients with beta blockers.

- Evaluate each patient upon admission, and regularly thereafter, for the risk of developing pressure ulcers. This evaluation should be repeated at regular intervals during care. Clinically appropriate preventive methods should be implemented consequent to the evaluation.
** Evaluate each patient upon admission, and regularly thereafter, for the risk of developing deep vein thrombosis/venous thromboembolism. Utilize clinically appropriate methods to prevent both.

** Utilize dedicated anti-thrombotic (anti-coagulation) services that facilitate coordinated care management.

** Upon admission, and regularly thereafter, evaluate each patient for the risk of aspiration.

** Adhere to effective methods of preventing central venous catheter-associated bloodstream infections.

** Evaluate each pre-operative patient in light of his or her planned surgical procedure for the risk of surgical site infection, and implement appropriate antibiotic prophylaxis and other preventive measures based on that evaluation.

** Utilize validated protocols to evaluate patients who are at risk for contrast media-induced renal failure, and utilize a clinically appropriate method for reducing risk of renal injury based on the patient's kidney function evaluation.

** Evaluate each patient upon admission, and regularly thereafter, for risk of malnutrition. Employ clinically appropriate strategies to prevent malnutrition.

** Whenever a pneumatic tourniquet is used, evaluate the patient for the risk of an ischemic and/or thrombotic complication, and utilize appropriate prophylactic measures.

** Decontaminate hands with either a hygienic hand rub or by washing with a disinfectant soap prior to, and after, direct contact with the patient or objects immediately around the patient.

** Vaccinate health care workers against influenza to protect both them and patients.

** Increasing Safe Medication Use --recommendations

** Keep workspaces where medications are prepared clean, orderly, well lit, and free of clutter, distraction, and noise.

** Standardize the methods for labeling, packaging, and storing medications.
Identify all "high alert" drugs (for example, intravenous adrenergic agonists and antagonists, chemotherapy agents, anti-coagulants and anti-thrombotics, concentrated parenteral electrolytes, general anesthetics, neuromuscular blockers, insulin and oral hypoglycemics, narcotics, and opiates).

Dispense medications in unit-dose or, when appropriate, unit-of-use form, whenever possible.