

Opening Plenary Session

- Conveners:
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- This emphasis on systems needs to, and hasn't yet, diffused across the healthcare industries more generally. The good performers (about 5%) are doing well, but the gap between them and other organizations is widening.
 - Dr Angood suggests this focus needs to come from the board level and be distilled down throughout the organization.
 - In addition to senior level management, attention should be paid at the staff levels. Poor teamwork and high turnover continue to challenge the reliability of healthcare delivery. An improved culture could improve this. Physicians can be resistant to such interventions, according to data presented by Dr Angood.
 - In addition, training and education could serve to further diffuse and sustain this focus on interactive systems in healthcare delivery.
- Changing demographics of patients in the healthcare system (increasing migration, cross-cultural diversity) create a broader cultural environment that should be acknowledged, as they add complexity to the healthcare delivery system. These overlie an already complex system with many internal barriers to patient safety.
- The Joint Commission on Accreditation of Healthcare Organizations (JCAHO)
 - Accreditation is usually a voluntary process that grants recognition to healthcare organizations. It is based in standards and depends on precision of standards and relevance. JCAHO is focusing on and attempting to develop standardized sets of performance criteria and evaluation standards, which are difficult in such a complex and multifaceted system.
 - JCAHO is focusing on accreditation as a continuous process (through unannounced and periodic site visits), performance measurement, patient safety improvement, public policy initiatives, and information products & dissemination.
 - As an organization, JCAHO is learning how to use its platform to influence public policy in a variety of areas such as personnel issues, hospital organization design, healthcare information technology and management. They are also in the process of furthering the dissemination and distribution of information regarding healthcare institutions.
 - They are developing a sentinel event review policy, which focuses on adverse events. Events resulting in unanticipated death or major loss of function unrelated to natural course of disease, or involving suicides/abductions/assault/unintended retention of foreign bodies after surgery/and a variety of other antecedents, are tracked by JCAHO. This organization is focusing on reducing the number and rate of sentinel events.
 - The root causes of these sentinel events, according to the affected organization (and after review by JCAHO): the top root cause is poor communication. Other causes include orientation and team training, patient assessment, and a variety of other issues.

- To respond to poor communication problems, JCAHO set up universal protocols including preoperative verifications, alerts, and other policies.
 - Patient safety goals are also being examined internationally and across healthcare contexts by JCAHO.

- **R. Bruce Matthews, PhD.** Member, Defense Nuclear Facilities Safety Board. Title: *“Nuclear Safety: Expect the Unexpected”*
 - The Board is facing issues on preventing a high-consequence low-probability event in nuclear safety. It is very difficult, according to Dr Matthews, to apply the lessons and principles in the literature to practice in nuclear safety.
 - Several inter-organizational issues complicate this implementation. Several organizations are responsible for overseeing safety and management of hazardous nuclear materials. These agencies and organizations all have different though overlapping purposes, and distinct cultures, which makes the implementation and dissemination of high reliability principles very difficult.
 - Lessons learned from other industries:
 - The Columbia Accident Investigation Board identified that poor organizational structure can be just as dangerous to a system as technical and operational failures. Safety efforts must focus on preventing instead of solving mishaps. Leaders should demand minority opinions and healthy pessimism. Past successes may be the first step toward future failures.
 - The near-miss at the Davis-Besse (2002); someone discovered a football-sized hole in a pressure vessel at this nuclear reactor. Boric acid leakage was leaking and corroded the steel vessel. Organizationally, neither the reactor operator self-assessment nor the NRC oversight identified the corrosion as a safety issue beforehand; productivity was driving the decisions.
 - Tokai-Mura criticality incident (1999): operators were taking shortcuts to maximize productivity by dissolving enriched uranium fuel in stainless steel buckets. Two operators died. Poor oversight was identified as a key problem.
 - Problems common to each of these:
 - all these were initiated by human errors, but have their roots in complex systems
 - safety was reprimanded and productivity was rewarded
 - According to Dr Matthews, the Department of Energy has a pretty good safety record, but must learn lessons from these accidents and near-misses to retain this performance record, and to measure performance in a variety of ways (e.g., lost work days is also used as a proxy performance measure).

- Close calls should also receive attention: Broken arrows, fires in nuclear facilities; waste tanks, criticality incidents. A good record is no excuse for complacency.
- This record, along with the complexity of systems in nuclear materials management, turns attention to theories of the management of hazardous systems. Dr Matthews takes 4 points from HRO theory:
 - 1) Develop extraordinary technical competence,
 - 2) Flexible decision making,
 - 3) Reward the discovery of errors
 - 4) Place equal value on production and safety.
- The problem with what experts say about catastrophic accidents, according to Dr Matthews:
 - Normal accident theory is pessimistic and short on solutions
 - Human error theory assumes the elimination of human error will improve reliability, but it ignores complex systems
 - High Reliability theory suggests that good organizational design, flexible decision making, and effective management can enhance reliability, but the implementation in change-resistant organizations is difficult.
 - The engineered approach to safety:
 - Engineered controls are certified to withstand predicted accidents, but complex systems fail in unpredictable ways.
 - Regulatory compliance defines boundaries that you cannot exceed, but compliance can also be burdensome, expensive, and harsh.
 - Rigorous adherence to formal procedures can control accidents, but workers can develop 'practical' approaches to work that are not appropriate for non-normal events
 - A commonsense systems-engineering approach to doing work safely is unable to handle uncertainties and random or unpredictable events.
- Nuclear safety requires a fundamental understanding of nuclear technologies, but expert-based safety can lead to complacency and practical drift. Rigorous safety standards are needed but may not always be followed (pressures for productivity tend to conflict with these standards). Centralized oversight could be incomplete oversight, since workers may take shortcuts or particular standards may be inappropriate and circumvented.
- Managing high-hazard operations requires defense in depth, technical strength and competence, rigorous standards, clear procedures, and independent oversight.