Crew Resource Management

- Steven K. Howard, M.D.
  - Staff Anesthesiologist, VA Palo Alto
  - Associate Professor of Anesthesia, Stanford University School of Medicine

Objectives

- Discuss the utility of crew resource management in improving safety and quality in the operating room
- Describe the resources required in providing crew resource management for operating room personnel
- Discuss current and future JC regulations regarding CRM

Disclosures

- I have no financial disclosures that are relevant to this presentation
- I am not Dave Gaba but we have worked together for 20 years

Lecture Disclosure

- This is mostly my perspective on history helping to develop and teach CRM
- CRM and simulation
- This is not a complete history of CRM
- It will be “Stanford-centric”
- I am NOT purposefully leaving out the important work of MANY others!

Final Disclosure

- I am not a pediatric anesthesiologist
- Pediatric Vets are those fresh from boot camp!

Birth of Crew Resource Management

AVIATION

- First workshop: 1979
- Developed by aviation psychologists and pilots in response to accident and near miss analysis
  - Accidents occurred with “able” planes
  - “Behavioral” problems within the team
    - Helmreich, Lauber, Foushee, Weiner

Stanford Simulation Facility

- "Our goal: make a difference in the world!"

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Developed Special Training on Decision Making & Teamwork  
Crew Resource Management (CRM)

Mid-1980’s VA/Stanford

- APSF funds simulator development
- Gaba’s work on theory (patient safety, accident evolution)
- Early research on decision-making in anesthesiology using simulation

Re-invention of Mannequin-based Interactive Patient Simulation

CASE 0.5

Pre-prototype Simulator — 5/1986

Gaba & DeAnda, VA/Stanford

1988-1989 CASE 1.3

Which eventually led to:

1991 CASE 2.0

Gaba & Williams, VA/Stanford

How Do Clinicians (e.g., anesthesiologists) Make Time-Critical Decisions?

- In a 1987 paper about “accident evolution” — based on Perrow’s Normal Accidents model, we made conjectures about anesthesiologists’ cognition

Gaba & V.A./Stanford

2009 Steven K. Howard, M.D.
Models of Cognition in Healthcare
(circa 1987)
• Decision-theory
• Abstract causal reasoning
• Pattern recognition of radiologists/pathologists

...All slow & static....

Key Characteristics of Complex Dynamic Worlds
(Cook & Woods; Orasanu & Connolly)
• Ill-structured problems
• Complexity & uncertainty
  - Humans don’t have an instruction manual
• Dynamism & time stress
• Complex action/feedback loops
• Intrinsic risk & high-stakes
• Shifting, ill-defined, competing goals
  Multiple players (from different “tribes”)

Human Performance & Safety in Anesthesia
• Publication of NASA TM on CRM (1984)
• NOVA program: Why Planes Crash (1987)
• APSF grant to create ACRM curricula
  - Analogous to aviation CRM
  - As in aviation, simulators used to train
  - Two successful pilot courses (1990)

Crisis Resource Management
• Modeled after Crew Resource Management in aviation (Foushee, Homersick, Lauber)
• Made sense to clinicians
  - Medical/technical skills not enough
  - Behavioral skills necessary and teachable
  - Simulation settings = teaching moment

1989-1991
• Steve’s anesthesia odyssey begins
• APSF grant to develop Anesthesia Crisis Resource Management course
  - ACRM “transferred” to Harvard in 1992
• Instructor Consortium
  - VA, Harvard, Toronto
ACRM

• Syllabus published in 1994
• Early ACRM Instructor Courses -- US, Australia, New Zealand, UK
• Similar courses crop up around the world

CRM/Teamwork Training in Multiple Dynamic Medical Domains

• CRM-based curricula for:
  - OR - ICU
  - Emergency Dept. - Cardiac arrest teams
  - Delivery room/NICU - Cath lab / radiology
  - Field responders - Military medicine
  - Ward emergencies - Heart Room

Team Management - A Prototypical Picture

Key Principles of Dynamic Decision Making and Teamwork (CRM)

• Cognitive Components:
  - Know the Environment
  - Anticipate and Plan
  - Use All Available Information & Cross Check
  - Prevent / Manage Fixation Errors
  - Use Cognitive Aids

Key Principles of Dynamic Decision Making and Teamwork (CRM)

• Team Management Components:
  - Leadership & followership
  - Communication & sharing mental model with rest of team
  - Distributing the workload
  - Calling for help early

Why Use Simulation For Training CRM?

• Creates an interactive “immersive” activity that re-creates experiences of a real-world environment
  » To amplify or replace actual experiences
  » Hard to practice CRM “in the moment”
• Traditional didactic CRM is being done
  » VA’s Medical Team Training
Deploy and Practice Teamwork Skills

- Experiential exercises force participants to “Walk the walk” not just “talk the talk”
- This takes practice

Integrating Teamwork & Medical Work

- Team skills executed in context during medical decision & action, with
  - Time pressure
  - Uncertainty
  - Competing goals
  - Perceived risk

Optimal CRM Training

- Engages participants with clinically & behaviorally challenging experiences
- Allows team to actually deploy and practice skills, not just “talk”
  - Integrating behaviors with clinical cognition, decision-making & action
  - Diverse challenges, including behavioral issues

CRM Training Must Be For a Lifetime

- Career-long combination of modalities as individuals & teams, repeatedly cycling through:
  - Didactics & seminars
  - On-screen simulators & “virtual worlds”
  - Courses in dedicated simulation center
  - In-situ simulations & drills

Other Industries With High Intrinsic Hazard Use Continuous & Intensive Training via Simulation

- Maritime
- Law Enforcement
- Fire Fighting
Basic Resources for CRM?

- Learners (all levels & ALL “tribes”)
- Facilitators / teachers
- Space (conference room, in-situ, sim ctr)
- Time (all players in the same space)
- Simulator and an operator (?)
- Disposables (for realistic drills)

Education & Training

- Bringing teacher and learner together
  - Difficult in our system
    - Education & training lacks priority
    - Humans are reactive not proactive
    - Production pressure – throughput trumps all
    - Clinicians (teachers) generate $$
    - Warm bodies in locations providing patient care

Single-Discipline

“Training Crews to Work in Teams”

- Address issues for “crews” from a single discipline (sims do have entire team -- “confederates” play other team members)
  - Logistically simpler
  - Can focus on unique technical, cognitive, and teamwork issues of each discipline
  - Can expose participants to a wide variety of clinical situations & interpersonal challenges
  - BUT…. not real teams

Multi-disciplinary

“Combined Team Training”

- Train complete teams of staff who do or might actually work together (in OR, ICU, ED, Delivery Room, Cath Lab, etc.)
  - Trains actual teams to work as a team
  - Encourages cross-discipline understanding and cross-training
  - But… various barriers…

Significant Barriers to Combined-Team Training in OR

- Hard to provide credible surgical work
  - Surgical simulators are:
    » Limited & available only for a few surgical procedures/fields
    » Crude for “open” surgery
    » These barriers are lowering
  - Logistically complex (entire OR team)

Single Discipline & Combined Team Approaches Are Complementary

- Single-discipline training particularly suited for trainees
- Combined team training particularly suited for experienced clinicians and/or fixed teams
- Techniques are really complementary -- ideally both should be used
Advantages of In-situ Training

- Probes actual team in actual setting
- Can unmask systems issues in actual clinical care areas
- Conducive to short courses & unannounced mock drills
- Available to all, even without dedicated sim center

Disadvantages of In-situ Training

- Limitations to organize, schedule, and control
- Real clinical areas might be occupied or might be needed on short notice
- Distracting to real care; staff vulnerable to being pulled to duty
- Real clinical supplies are costly

Determining if “CRM Works” Will Be Difficult

- Can it present a meaningful, socially contextual experience? YES
- Can it engage learners “as-if” real? USUALLY
- Can it teach/assess the target issues? OFTEN
- Does it change performance or behavior of individuals or teams? MAYBE
- Does it change patient outcome? HARD TO TELL

Does CRM Training Improve Safety?

- For mannequin-based & team simulation
  - High face validity, survey, & anecdotal support, but we do not know “for sure”
  - Level 1A proof for many applications may be impossible due to logistics and cost
  - Real test requires long-term adoption of comprehensive, integrated model of career-long training, with evaluation over long time horizon

Cultural / Organizational Challenges to CRM’s Impact

- The (real) clinical world must reinforce what is taught in training
  - Currently it often does not
- Culture trumps training (always!)
- Much more time spent in real world than in training sessions
- Incentives and disincentives of various kinds play out in the real world
CRM and the Joint Commission

- Sentinel Event Recommendations
  - Perinatal team training
  - Staff team training – ventilated patients
  - Address worker fatigue
- Integration into NPSG’s
  - Teamwork and communication

The End