JOHNS HOPKINS MEDICINE

Managing team dynamics in routine and crisis situations: Evidence-based strategies

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Agenda

- Some context
  - Teamwork and the US healthcare system
- What determines team effectiveness?
- How do we get better teamwork?
- How do we encourage team self-regulation?
- How do teams manage non-routine events?

The Patient Safety Journey

Institute of Medicine report *To Err is Human*
•**98,000 lives a year** lost due to preventable medical errors

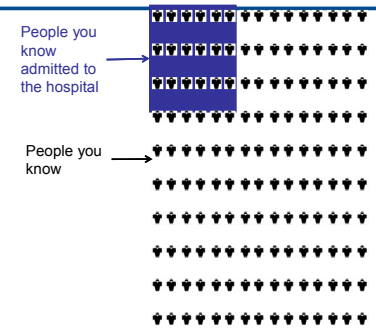
Report from the Office of the Inspector General, DHHS
•**13.5%** of CMS beneficiaries **experienced adverse events** during hospitalization
•Estimated cost of **15,000 lives** and **$324 million per month**

2000 Abbreviated Patient Safety Timeline 2010

Why are we here?

Dunbar's Number: We have a maximum of ~150 meaningful personal relationships

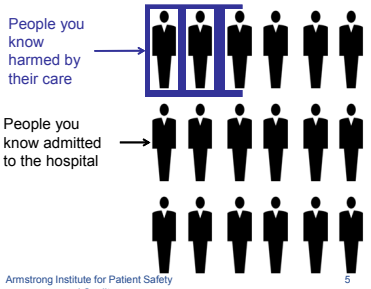
~18 people you know well will be admitted to the hospital each year



Why are we here?

Between 2 and 3 people you know will be harmed by medical error each year

Over the course of four years, someone you know will die from medical error

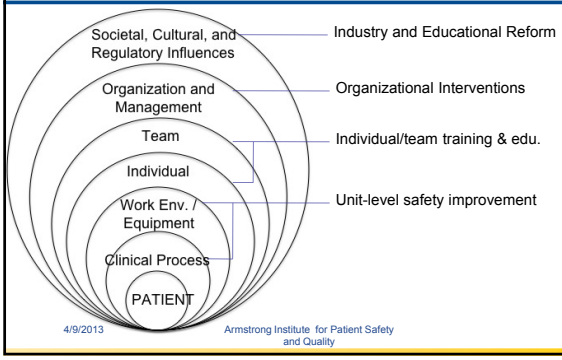


What role does communication and teamwork play?

- **70-80% of sentinel events**[1]
- **Twice as many preventable deaths** as issues of technical competency[2]
- **~30% of all communication events in the OR were failures** [3]
- **~37% of error reports in the ICU included some type of communication failure** between nurses and physicians[4]
- **Lack of communication** was the most frequently occurring 'behavioral failure' in a review of **closed claims** against surgeons[6]

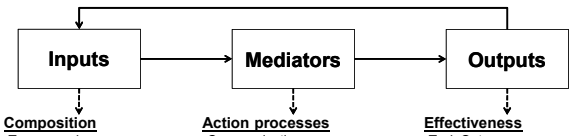
1Joint Commission, 2006, 2011
2Wilson et al., 1995
3Lingard et al., 2004)
4Donchin et al, 1995
5Gawande et al., 2003
6Griffen et al., 2008

The Awkward Adolescence of T² in Healthcare



WHAT DETERMINES TEAM EFFECTIVENESS?

Frameworks for understanding communication and teamwork



Composition
- Team member
  - Knowledge
  - Skill
  - Attitudes

Team / task characteristics
- Interdependence
- Standardization

Org. context
- Culture

Action processes
- Communication
- Leadership
- Performance Monitoring
- Back-up behavior
- Adaptation & learning

Transition processes
- Planning
- Goal specification

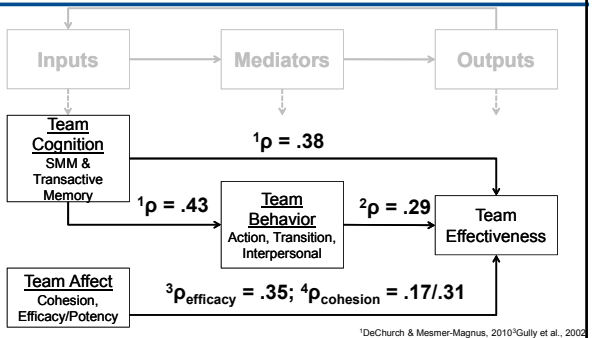
Interpersonal processes
- Conflict management

Effectiveness
- Task Outcomes
- Member Satisfaction
- Viability

Team Learning Outcomes
- Δ Knowledge
- Δ Skill
- Δ Attitudes

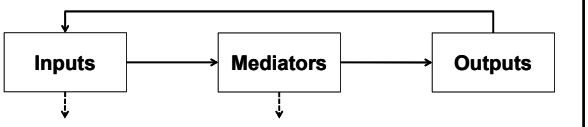
Salas et al., 2008

Some Key Findings From Recent Meta-analytic Synthesis



[1]DeChurch & Mesmer-Magnus, 2010 [2]Lepine et al., 2008 [3]Gully et al., 2002 [4]Beal et al., 2003

Frameworks for improving communication and teamwork



- **Organizational interventions:** *Work Redesign*
- **Structured tools:** *Standardize critical interactions*
- **Training & Coaching interventions:** *Improve teamwork interaction / processes*

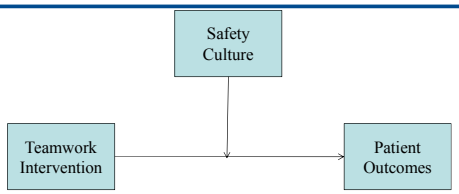
Buljac-Samardzic et al., 2010

Do teamwork interventions work in healthcare?

- Learner **reactions are positive** [1,2]
- **Learning occurs** [1,2]
- **Behavior change** in transfer environment **occurs.**[1,2]
- **Safety culture improves**[2]
- **Improved efficiency and effectiveness of clinical processes**[3-6]
- **Improved clinical outcomes**[7,8]

[1]Rabøl et al., 2010 [2]Weaver et al., 2010 [3]Siassakos et al., 2009 [4]Wolf et al., 2010 [5]Capella et al., 2010 [6]Deering et al., 2011 [7]Mann et al., 2006 [8]Neily et al., 2010

But… It's a tough crowd / transfer environment

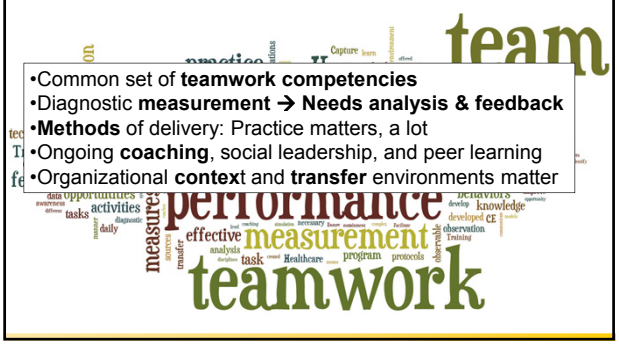


- Safety culture moderates the effectiveness of teamwork improvement efforts
  - Safety climate scores correlated with the degree of reduction in mortality and morbidity achieved in the implementation of a surgical team checklist (r = .71, p < .05)

Haynes et al., 2011

HOW DO WE GET BETTER TEAMWORK?

The Science of Teams & Team Training



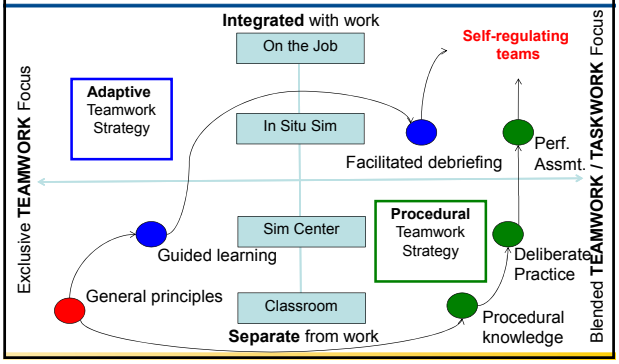
- Common set of **teamwork competencies**
- Diagnostic **measurement → Needs analysis & feedback**
- **Methods** of delivery: Practice matters, a lot
- Ongoing **coaching**, social leadership, and peer learning
- Organizational **contex**t and **transfer** environments matter

Train & Coach Adaptive Team Behaviors

- **Leadership**
  - Delegation
  - Resource management
  - Modeling good teamwork skills
- **Communication**
  - Closed-loop communication
  - Using clear, structured communication
- **Mutual Support**
  - Task assistance
  - Conflict resolution
  - Feedback
- **Situation Monitoring**
  - Shared mental models
  - Cross-monitoring
- **Team Structure**
  - Role clarity

TeamSTEPPS® Competency Framework
Teamstepps.ahrq.gov

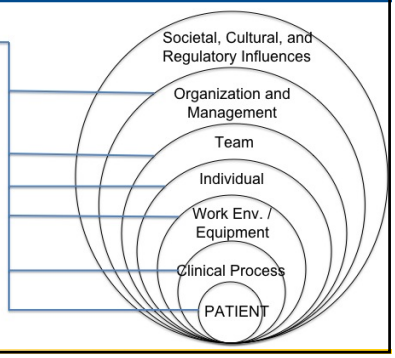
Improving Teamwork through Training & Education



The role of in situ simulation

Why Simulate?

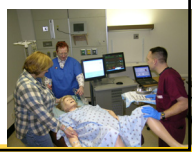
- **Individual & Team Level:**
  - Learning / training
- **Unit Level:**
  - Prospective hazard identification and mitigation
- **System Level:**
  - Needs analysis & research



An Example: Mobile Obstetric Emergencies Simulator (MOES)

- Standardized simulators, curriculum (teamwork & technical), and debrief process.
- Implemented in every L&D unit in the DoD (> 50 sites)
- 10 key obstetric emergencies
  - E.g., shoulder dystocia, postpartum hem., eclampsia, cord prolapse

Mobile OBstetric Emergencies Simulator



Deering, S., Rosen, M. A., Salas, E., & King, H. B. (2009). Building team and technical competency for obstetric emergencies: The Mobile Obstetric Emergency Simulator (MOES) System. *Simulation in Healthcare, 4*(3), 166.

An Example: Mobile Obstetric Emergencies Simulator (MOES)

- Debrief and Measurement Tool
- Observers & Learners Ratings of:
  - Team performance
  - Technical performance
  - Systems issues
  - Training eval. items

MOES Trends: Teamwork and System Performance

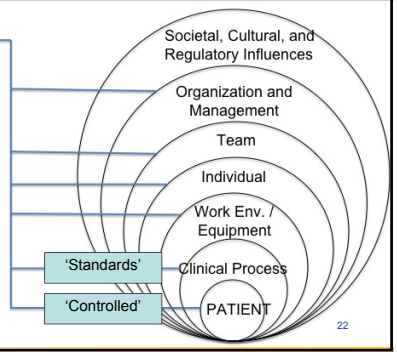
- **2558** ratings of performance at **32** L&D wards on **3** continents using **10** scenario types, representing **260** learning activities.

	Location	*Scenario Type*	*Location X Scenario Type*
Overall Teamwork R^2 = .64	F(30, 1884) = 8.70 **partial η^2 = .247**	F(8, 1884) = 5.39 **partial η^2 = .051**	F(8, 1884) = 3.05 **partial η^2 = .202**
Response Time R^2 = .62	F(30, 1870) = 7.76 **partial η^2 = .228**	F(8, 1870) = 3.31 **partial η^2 = .033**	F(65, 1870) = 2.74 **partial η^2 = .184**

$p < .01$ for all

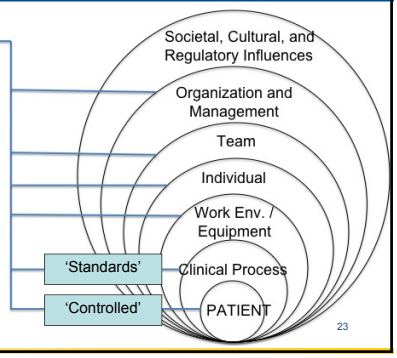
Local context ≈ 25% of variance

- **Where is that coming from?**
  - Culture?
  - Policies or management practices?
  - Physical design of facility?
  - Equipment availability and location?
  - Communication structures?



Local context x Emergency Type ≈ 20% of variance

- **Where is that coming from?**
  - Unique teamwork, technical, and systems demands of dealing with different types of emergencies.



HOW DO WE ENCOURAGE TEAM SELF-REGULATION?

Team reflective practices

- Debriefing
- Learning from Communication Failures
- Team Interaction Mirror

The Armstrong Institute Model to Improve Care

Translating Evidence Into Practice (TRiP)	Reducing Surgical Site Infections	Comprehensive Unit based Safety Program (CUSP)
1. Summarize the evidence in a checklist 2. Identify local barriers to implementation 3. Measure performance 4. Ensure all patients get the evidence • Engage • Educate	• Emerging Evidence • Local Opportunities to Improve • Collaborative learning	1. Educate staff on science of safety 2. Identify defects 3. Assign executive to adopt unit 4. Learn from one defect per quarter 5. Implement teamwork tools
Technical Work		Adaptive Work

http://www.hopkinsmedicine.org/armstrong_institute

CUSP & Teamwork

- ***Teamwork tools:***
  - Handoffs
  - Briefings / Debriefings
  - Call list
  - Daily goals
  - AM briefing / huddle
  - Shadowing
  - Cross unit collaboration
  - *Learning from defects**

Comprehensive Unit based Safety Program (CUSP)

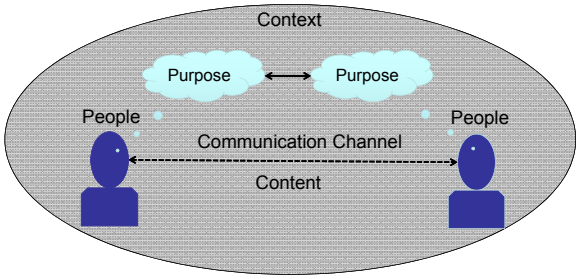
1. Educate staff on science of safety
2. Identify defects
3. Assign executive to adopt unit
4. Learn from one defect per quarter
5. Implement teamwork tools

Learning from Communication Failures

1. ***Description***: What happened?
2. ***Diagnosis***: Why did it happen?
3. ***Intervention***: What is the best approach for addressing the underlying problems?
4. ***Evaluation***: How do you know the underlying problems were fixed?

Descriptive Framework

- The basic elements…



Content: *What were people communicating about?*

Descriptive Questions *What happened?*	Diagnostic Questions *Why was it happening?*
• Was communication about the patient status, background, and basic clinical information? • Was the communication about the plan of care? • Was the communication about material resources or coordination with other units, services, or specialists? • Was the communication about staff resources?	• Was information omitted, incomplete, incorrect, or untimely? (*communication slip or lapse*) • Was information transferred, but misunderstood in terms of meaning or accountability for acting on the information? (*communication mistake*) • Was information transferred and understood, but actively dismissed? (*communication violation*)

Armstrong Institute for Patient Safety and Quality 30

People: *Who was involved in the communication?*

Descriptive Questions *What happened?*	Diagnostic Questions *Why was it happening?*

• How many people where involved?
• What were their…
  ○ Roles (in general and in this situation)?
  ○ Expertise types and levels?
  ○ Status?
  ○ Familiarity with others and the context?
  ○ History and existing relationships with other participants?
	• Did the size of the group or length of the communication 'chain' corrupt the message?
	• Did unclear roles and responsibilities interfere with information transfer or understanding?
	• Were the right parties involved? Or, was the right information going to the wrong people?
	• Were there differences (or assumptions about differences) in expertise types or levels that led to misunderstandings?
	• Were there differences in status or power?
	• Was there interpersonal conflict between participants?

Channel / Mode: *How were people communicating*?

Descriptive Questions *What happened?*	Diagnostic Questions *Why was it happening?*

• Were people communicating…
  ○ Face to face?
  ○ Synchronously distributed?
  ▪ phone, chat
  ○ Asynchronously distributed?
  ▪ Email, paging, electronic records, paper records, cognitive artifacts
	• Were asynchronous modes of communication not updated quickly enough?
	• Were there usability or accessibility issues with information systems contributing to the error (difficulty finding or reading information, inappropriate alerts)?
	• Did environmental factors interfere with face to face communication?
	• Did communication technology otherwise interfere with completeness of information or interpretation?
	• Was the channel used appropriate for the type of communication?

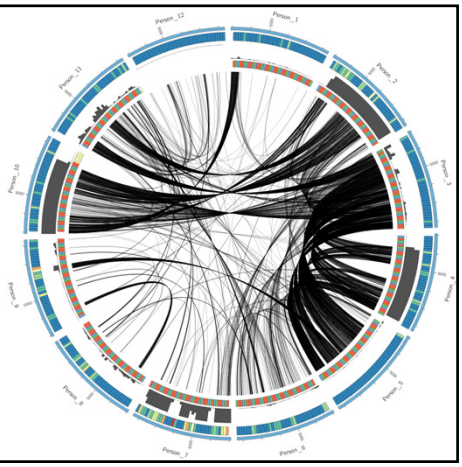
Context: *What was the situation and environment surrounding the communication?*

Descriptive Questions *What happened?*	Diagnostic Questions *Why was it happening?*
• What was the environment like where communication was occurring? • What was happening with the patient when the communication failure occurred? • Were there other major events occurring at the time of the error? • Were there workload or staffing issues?	• Did high workload, distractions, or other competing attentional demands interfere with effective communication? • Did environmental issues such as noise levels or the physical design of the facility interfere with effective communication? • Did patient flow issues such as direct admissions contribute to communication breakdowns? • Did a shift change, location change, or transition of care interfere with communication?

Purpose: *Why were people communicating?*

Descriptive Questions *What happened?*	Diagnostic Questions *Why was it happening?*
• What goals was each of the participants attempting to achieve with the communication? • What were other critical goals being pursued?	• Did participants have different or conflicting goals for the interaction? • Did participants have competing priorities that directly impacted communication?

Team Interaction Mirror.
A work in progress.



Reflective practice summary

TEAMWORK IN NON-ROUTINE EVENTS

Commonsense Understandings of Team Cognition

Winning is about having the whole team on the same page.

-Bill Walton

If everyone is thinking alike, then somebody isn't thinking.

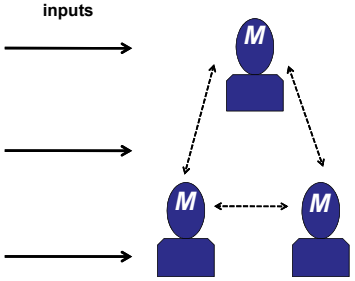
-George Patton

Homogeneity of Cognition ↔ **Heterogeneity** of Cognition

Rule-based Performance in Teams

Stable / routine task inputs

Individual + Team cognition
M = Meaning-making



Drivers of Effectiveness
- Shared (compatible) mental models
- *Information* exchange

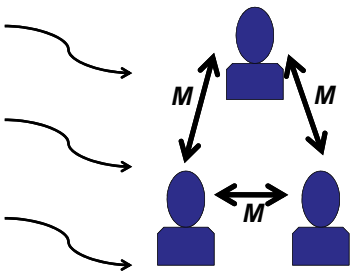
Adaptive Capacity
- Ability to detect and correct deviations from normal/optimal

Implications for Meas.
- Mental model quality
- Information exchange quality
  - Accuracy, timeliness, clarity, *structure*

Knowledge-based Performance in Teams

Unstable / novel task inputs

Individual + Team cognition
M = Meaning-making



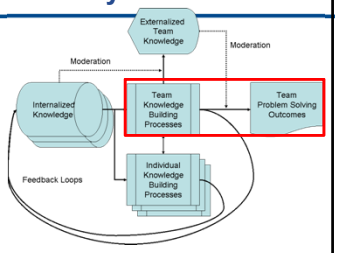
Drivers of Effectiveness
- Diverse expertise types / levels
- Explicit knowledge building at team level

Adaptive Capacity
- Effectively combining diverse expertise types and levels to generate new knowledge

Implications for Meas.
- Distribution & congruence of knowledge structures
- More complex processes

Knowledge-based performance in teams: A simulation study

Team Knowledge Building Processes
- Information Exchange
- Knowledge Sharing
- Solution Option Generation
- Option Evaluation
- Process and Plan Regulation

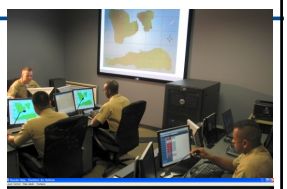


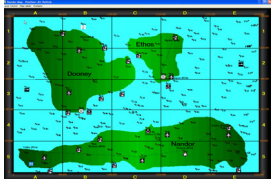
Information vs. Knowledge:
- **Information** = basic task information, no context added
- **Knowledge** = integration of information, value judgments, context added

Fiore, Rosen, Salas, Smith-Jentsch, Letsky, & Warner, 2010

Study Design / Methods

- **Study design**
  - Single group correlational design (model building)
- **Task**
  - Strategic planning simulation
  - Diverse *individual* level *'expertise'*
- **Participants**
  - 69 three person teams
- **Communication analysis**
  1. Transcription
  2. Unitization (≈ 30,000 conversational units)
  3. Coding (kappa = .7)





Time - Min/Sec	Role	Utterance/Action	Codes
14.00	Air	Or B4f sorry not B4h.	IP
14.02	Personnel/Supply	And then	INC/F/EX
			SU/R
			S
			SU/R
			SU/R
			OG-P
			IP
			OG-P
			KP
			Seval
			KP
			OG-P
			OG-P
			KR
			S
			KR
			S
14.43	Land/Sea	Are there- are there 3 medical	IR

Main Communication Coding Variables

1. Information exchange
2. Knowledge sharing
3. Option generation
4. Option evaluation
5. Regulation
6. Acknowledgements

Functional Analysis

•How much process did the team devote to each task function?

•Multiple regression analysis looking for unique effects of each process variable

Sequential Analysis

•What patterns of interaction characterize high and low performers?

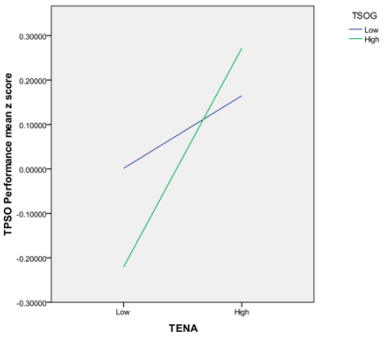
•Multi-way frequency analysis looking at transition

Information Exchange and Knowledge Sharing

- **No significant overall relationship between the amount of information exchange and performance**
  - But, after controlling for acknowledgements…
- **High performing teams shared LESS information.**
  - Negative linear relationship after controlling for acknowledgements ($\beta = -.323$, $p < .05$)
    - $F(2,66) = 7.119$, $p < .01$, Adjusted $R^2 = .153$
- **High performing teams shared MORE knowledge.**
  - Positive linear relationship ($\beta = .324$, $p < .05$)
    - $F(3,65) = 5.215$, $p < .01$, Adjusted $R^2 = .195$

Option Generation and Evaluation

- **Option generation was only useful if accompanied by Evaluation**
  - Significant interaction (β = -.368, p < .05)
    - F(5,46) = 4.029 p .01, Adjusted R^2 = .248



Regulation

- **Moderately performing teams engaged in MORE regulation than high or low performing teams.**
  - Negative curvilinear (inverted U) relationship (β = -1.204, p < .05)
    - F(2,66) = 3.550, p < .05, Adjusted R^2 = .070
  - Need future research to fully explain
    - Potentially moderated by goal / role clarity
  - Implications for measurement: Levels of process are not enough to determine effectiveness