


Not Everything is Automated – How Can Human Factors be Minimized in Teamwork?

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 Center for Quality & Productivity Improvement / SEIPS systems Engineering Initiative For Patient Safety



Not Everything is Automated – How Can Human Factors be Minimized in Teamwork?


- HUH?
- Not sure what title means as everything in “Teamwork” is a “Human Factor”

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“Riddle me this...”

- A team of experts does not make an expert team.
- Why not...what makes a good team?
*Think of teams on which you have participated.
 What made some perform well? What made some perform poorly?*



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What is a team?

- Individuals (a) who see themselves and who are seen by others as a social entity, (b) who are interdependent because of the tasks they perform as members of a group
- Teams generally have...
 - Task interdependence
 - Distributed expertise and roles
 - Hierarchically Organized
 - Common goal

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Knowledge requirements

- Shared Task Models; Situation Assessment
- Teammate Characteristics; Familiarity
- Knowledge of Team Mission; Objectives; Norms; Resources
- Roles and expectations
- Individual-task proficiency

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Is teamwork and communication important?

- Breakdowns in teamwork and communication are one of the most common problems in the operating room and other healthcare settings
- Breakdowns in teamwork and communication are one of the largest contributors to errors and patient harm

Surgical outcome research

Disruptions in surgical flow and their relationship to surgical errors: An exploratory investigation

David C. Chang, MD, MSc, PhD, Department of Surgery, Brigham Young University, Salt Lake City, Utah

Background: Teamwork and communication are essential for successful surgical outcomes. Disruptions in surgical flow, such as interruptions, can lead to errors and patient harm. This study explored the relationship between surgical flow disruptions and surgical errors in an exploratory investigation.

Methods: A retrospective analysis of 100 surgical cases was conducted. Data were collected on surgical flow disruptions, including interruptions, and surgical errors, including patient safety incidents. The relationship between disruptions and errors was explored using statistical analysis.

Results: The study found that surgical flow disruptions were common and often led to surgical errors. Interruptions were the most frequent type of disruption, and they were associated with a higher rate of errors. The most common errors were related to patient safety, including wrong-site surgery and medication errors.

Conclusions: Surgical flow disruptions are a significant problem in the operating room and can lead to errors and patient harm. Understanding the relationship between disruptions and errors is essential for developing strategies to improve surgical outcomes.

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How do we measure teamwork?

- Mayo High Performance Teamwork Scale (MHPTS)
- Observational Teamwork Assessment for Surgery (OTAS)
- Trauma Team Performance Observation Tool (TPOT)
- Non-technical Skills for Surgeons (NOTSS) behavior rating system



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How can teamwork and communication be improved?

- Training
 - Crew Resource Management (CRM)
 - TeamSTEPPS
- Briefings
- Standardization of Communication
- Familiarity

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What about Healthcare?

(McCulloch, Rathbone, & Catchpole, 2011)

Conclusion: "The evidence for technical or clinical benefit from teamwork training in medicine is weak. There is some evidence of benefit from studies with more intensive training programmes [such as simulation], but better quality research and cost-benefit analysis are needed."

Training Guide: Using Simulation in TeamSTEPPS Training
<http://www.ahrq.gov/teamstepp stools/simulation/index.html>



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Understand the “System”

- Large scale issues in sociotechnical systems
- In IP we were trained to break down into parts...but in complex systems – **Relationships** between parts are far greater than the parts alone...

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Examples


- Language
 - The meaning of any element depends on its relationship to other elements
 - Say the following word aloud:

He read the book


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Example

- Termite hill
 - Can't be reduced to the termites
 - Statistically emergent from termite
 - By the way there is no CEO termite or CNO-VP patient services termite etc., just termites that all know their places and tasks in the system
 - We establish order and control through actions of a few top people in the organization – this may be the biggest factor holding back innovation and progress in our organizations




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Complex Adaptive System

- Collection of individual agents (MDs, RNs, patients) with freedom to act in ways that are not always totally predictable...
- NOT A MECHANICAL SYSTEM or MANUFACTURING
 - There the boundaries are fixed and well defined – you know what is part of the Toyota and what is not and it does not have opinions and options!


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Complex Systems – agents actions are based on internalized rules

- Instincts, constructs and mental models
- Internal rules may not be shared, explicit or even logical
- i.e. the doctor, the nurse, the housekeeper – all have different internalized rules
- Is there a “shared mental model” for hand hygiene or is it individual, internalized rules?
- THE SHARED MENTAL MODEL IS THE KEY TO TEAM WORK

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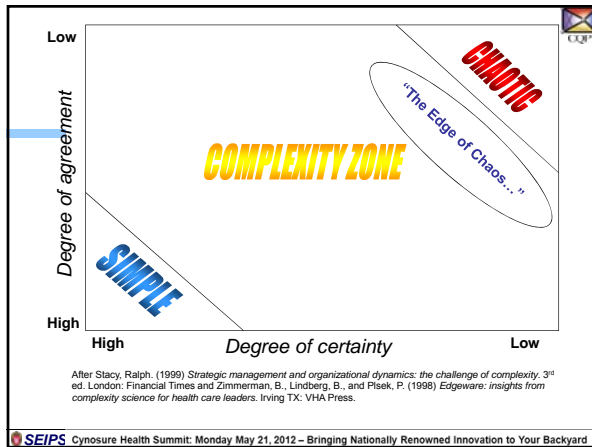
THE SHARED MENTAL MODEL IS THE KEY TO TEAM WORK

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Infection Prevention is a Complex Adaptive System and a Socio-technical System

- Every organization has social (people, values, norms, culture, climate) and technical (tools, equipment, procedures, technologies, facilities) parts, and exists in an external milieu (economics, regulation, law)
- Reciprocal determinism (Bandura)
 - Changes to one aspect cause changes in the other (after varying time delays), which cause changes in the first, etc.
 - Any “simple” change will reverberate thru the system in planned and unplanned ways
- All components need to fit together – joint optimization
- That means the technical issues, such as Patient Safety and especially hand hygiene – are social issues!

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Why do we care about human factors and systems engineering?

SYMPLFY

- To move infection prevention towards “agreement and certainty” in the task of “targeting zero”
- “It is easier to bend metal than arms...”

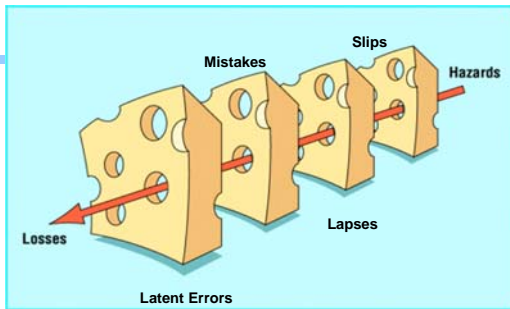
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Person Approach vs. Systems Approach



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Reason J: Human error: models and management.
BMJ 2000;320:768-770.



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Reason states errors arise for two reasons: active failures

- Skill-based errors -
 - Slips – forgetting to start antibiotic infusion before surgery
 - Lapses – starting infusion but entering incorrect infusion rate
- Knowledge-based errors -
 - Mistakes – Perception; judgment; interpretation; i.e. prescribing cephalosporin for MRSA
- Situational factors (fatigue, drugs/alcohol, stress, multi-tasking, noise, lighting, etc.) can divert attention and increase risk of active failures

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Norman D 1988 *The Psychology of Everyday Things*

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and latent conditions...the
“resident pathogens within the system”

- Latent failures occur when individuals make decisions that have unintended consequences in the future.
 - i.e. staffing models that depend on providers to routinely perform clinical duties above and beyond their responsibilities – introducing time pressures, fatigue, low moral

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Species : Adult Canine
Patient :
Client :

Test	Results	Reference Range
ALKP	= 85 U/L	23 - 212
ALT	= 23 U/L	10 - 100
BUN	= 16.6 mg/dl	7.0 - 27.0
CREA	= 0.77 mg/dl	0.50 - 1.80
GLU	= 130.6 mg/dl	77.0 - 125.0
TP	= 6.21 g/dl	5.20 - 8.20
Na	= 149.9 mmol/l	144.0 - 160.0
K	= 4.44 mmol/l	3.50 - 5.80
Cl	= 116.9 mmol/l	109.0 - 122.0

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Test	Results	Reference Range	Indicator		
			LOW	NORMAL	HIGH
ALKP	= 85 U/L	23 - 212	█		
ALT	= 23 U/L	10 - 100	█		
BUN	= 16.6 mg/dl	7.0 - 27.0	█		
CREA	= 0.77 mg/dl	0.50 - 1.80	█		
GLU	= 130.6 mg/dl	77.0 - 125.0			█
TP	= 6.21 g/dl	5.20 - 8.20	█		
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What was the difference?

- The first data presentation was cognitively challenging because you needed to mentally find the lab value, and then interpret whether or not the value was in range. Each comparison was an opportunity for error.
- The second provided what we call a *direct perception* display to answer the cognitive challenge I posed to you.
- Both are typical of types of displays you might encounter every day. Both affected accuracy (quality/safety) and response time (productivity).


What was the patient?

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Problems with the anticipatory model



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Los Angeles Times

Sunday, July 31, 2011

Surveys find widespread violence against nurses and other hospital caregivers

The violence flares most often in emergency rooms and psychiatric wards

Nearly 40% of employees in California emergency rooms said they had been physically assaulted on the job in the previous year


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Interviews indicated that something as seemingly benign as long wait times might lead patients to become violent.

"We have a lot of men who have lost their jobs, lost their homes, 50-year-old men who have worked their whole lives," said Colleen Sichley, a 17-year nurse at Antelope Valley Hospital in Lancaster. "They're angry. Just between the cursing and the bad language, and the physical stuff, and it's anybody who can lash out."


Acutely ill mental patients are landing in general hospitals because many lack consistent outpatient care that might keep them from deteriorating.


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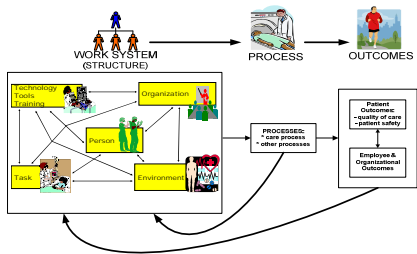
“Le mieux est l'ennemi du bien.”
- Voltaire 1772

We cannot, however, let the perfect be
the enemy of the good.


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SEIPS - Systems Engineering Initiative for Patient Safety




Carayon, P., Hundt, A., Karsh, B-T., Gurses, A., Alvarado, C., Smith, M., and Brennan, P. (2006) Work system design for patient safety: the SEIPS model. *Qual and Safety in Health Care*:15(supp 1):50-58.



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Now what human factors in the video did you recognize and how will you optimize them?

- We are out here now I hope you are happy
- I just think we should of worn out safety vests
- The people don't even see them...they are color blind

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*“Knowing is not enough; we must apply.
Willing is not enough; we must do.”*

— Goethe

...and remember we cannot eliminate human factors in
teamwork...team work is human factors!

Thank you!

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