A Human Factors and Systems Engineering Approach to Diagnostic Process

Pascale Carayon, Ph.D.
Procter & Gamble Bascom Professor in Total Quality,
Department of Industrial and Systems Engineering
Director, Center for Quality and Productivity Improvement
University of Wisconsin-Madison

http://cqpi.engr.wisc.edu/

"too little appreciation of system knowledge among clinicians and organizations, leading them to suboptimize the components of the system with which they are most familiar, at the expense of the whole" (Berwick et al., 2008)

A Human Factors and Systems Engineering Lens

- Process, process, process...
- Process is embedded in a work system:
  - A system is a set of interrelated components working together towards some goal.

**Diagnostic process Outcomes**
SEIPS Model of Work System and Patient Safety

(SEIPS = Systems Engineering Initiative for Patient Safety)

One example: VTE diagnosis in the ED
- Diagnostic team members
- H&P, physical exam, ordering test
- EHR, access to pt information
- Physical environment
- Team interactions, roles, triage

Human Factors and Ergonomics (HFE)
- System from the viewpoint of users
- Users have physical, cognitive and psychosocial needs
- User-centered design

Accurate and timely diagnosis Impact on patients, healthcare professionals and HCOs

The Outcomes from the Diagnostic Process

(Balogh et al., 2015 - Improving Diagnosis in Health Care)

If you can't describe what you are doing as a process, you don't know what you're doing.
- V. Starbuck

Need to understand work system in which diagnostic process takes place
Systems in which they work

http://www.cincinnatichildrens.org/professionals/referrals/patient-family-rounds/default/
Conclusion

- Need to understand the work system in which diagnostic process takes place
  - Diagnostic team members
  - Role of patients and caregivers
  - Interactions between system elements
  - Dynamic and adaptive work system with emergent behaviors
  - Actual diagnostic process

What can you do?
Use “Human Factors Engineering” thinking
(modified from Sanders and McCormick 1993)

- Systems (e.g., machines or hospitals) need to be designed for and to work with people.
- Systems must be designed to accommodate the range of users.
- How systems are designed will influence human behavior and therefore system performance.
- Design needs to be evidence-based, not "common sense" or designer driven.
- All design must take into account the system (context) of use.