To Better is Human®

Adding the Human Factors Tool Set to the Infection Prevention Toolbox

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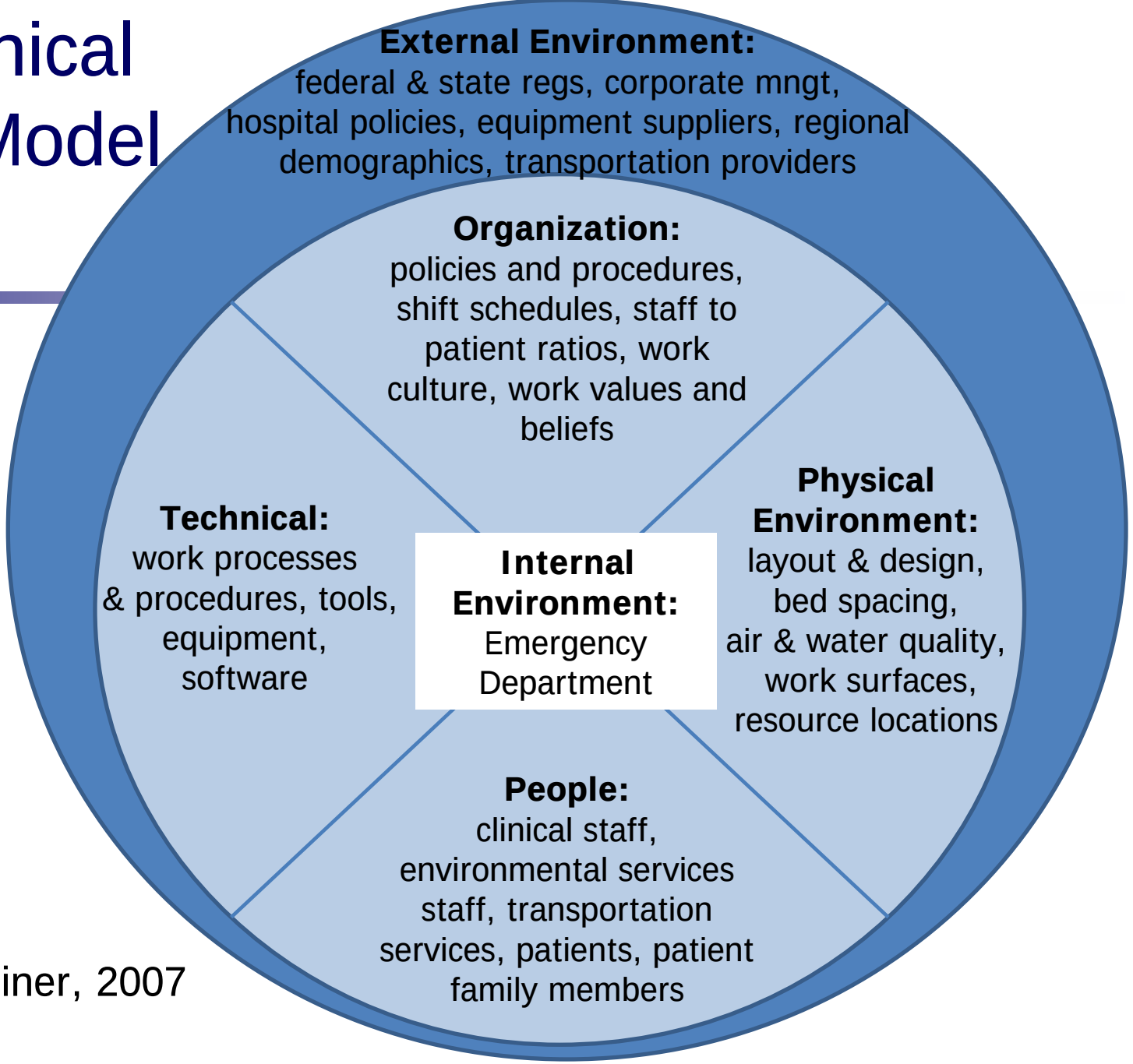
What is Human Factors Engineering (HFE)?

- "The scientific discipline concerning understanding of interactions **among humans and other elements of a system**, and applying theory, principles, data, and other methods to design in order to optimize human well-being and overall system performance."
- As defined by the Human Factors and Ergonomics Society.

What is Human Factors Engineering (HFE)?

- The design of OPTIMALLY EFFECTIVE systems
- Five components
  - External Environment
  - Organization
  - People
  - Technology
  - Physical Environment
- Prominent in aviation, nuclear industry, automotive industry, and the military

Sociotechnical Systems Model



Adapted from Kleiner, 2007

Systems Approach

- Truly integrated systems result in higher performance, higher reliability, improved safety
  - Humans are one component in a larger system
  - Focus on the interaction or interface between people and the equipment and environment.
  - Fit the tools and environment to the person; not the person to the tools and environment
- Safe systems are achieved by considering the entire system to enable performance specifications to be met.

Example

- Applying a systems approach to identifying and addressing risk factors for HAIs in an ambulatory dialysis unit (AHRQ-funded study)
- Ambulatory dialysis and EDs have several things in common
  - Patients coming in and going out all day
  - High degree of variability of health of patient
  - Large number of staff who are all multitasking
  - Large number of policies and processes in place

Identified “Variances”

- Variance is a “non-optimal” situation
  - Something that works against your goal.
- Safety culture was NOT a variance

Identified Variances

Domains	#	Example
External Environment	5	There is a fistula-first policy but not all patients are eligible for a fistula or graft
Organizational Factor	8	Discrepancy between 5 hr put-on window and protocol to put on 3 patients in 30 minutes
Technical Factor	6	Work processes do not support early wound detection
Physical Environment	10	Surface contamination on high touch areas
People Factor – clinical staff, environmental services staff, patients	28	Knowledge of ES staff regarding types of infections in the Dialysis Unit

Grouped Variances by Six Risk Factors Identified in Literature

- Surface contamination
- Workflow/Work Stress
- Hemodialysis-specific risk factors
- Feedback
- Patient education
- Standard of care

Interventions

- Developed 10 interventions in collaboration with ADU physicians, nurses, technicians, and environmental services that addressed the five of the six risk factors.

Interventions by Risk Factor

Risk Factor	Recommended Intervention
Surface contamination	•Provide dedicated ES resources to the dialysis unit •ES staff communication regarding the types of infections in the dialysis unit and provide *C. diff* notices •Add self-cleaning materials to high touch areas.
Workflow/ Work stress	•Put curtains on Main unit window from waiting area into room •Enforce policy of keeping patients out of unit until scheduled time to dialyze by posting a person at the door for admission.
Wound- & BSI-Specific Factors	•Identify patients who have not washed their arm prior to put on. •Perform arm/leg/foot exams for patients at each visit •Use chlorahexidine impregnated patch at catheter exit site
Feedback/ Patient Education	•Optimize HAI surveillance system to quality assessment •Post monthly HAI rates in waiting rooms and staff areas •Educate patients on how they can protect themselves

Note about “HF Interventions”

- There is not a set of interventions that belong to HF. Instead, HF brings way of thinking about the problem to make sure that the interventions selected are really addressing the problem.
- Even teaching hand hygiene can be an HF intervention if the problem is truly that people do not know how to wash their hands
  - It isn’t an HF intervention if the real problem is that the work environment doesn’t support the hand washing process.

The Advantage of the Approach

- This is a systematic method to identify many “variances” contributing to many risk factors.
- Identifies what is working (great culture).
- Identifies a comprehensive set of problems.
- Provides a means to develop a comprehensive set of solutions.
- Allows one to understand how a change in one domain will affect other domains to avoid unintended consequences.

Contacts for HF Advisement

- Human Factors and Ergonomics Society
  - HFES.org
  - Consultant directory
  - 1 (310) 394-1811
  - info@hfes.org
    - Ask to be put in contact with the Chair of the “Health Care Technical Group” (HCTG)
- If you have a specific workflow/process problem, a person trained in Lean Six Sigma could be helpful.

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