

Human Factors and Ergonomics (HFE) in Preventing Harm to Workers: Designing Healthy Work Systems

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My perspective on healthcare work systems

➤ Engineering:

- Work is designed.
 - *How do we design work (system) to enhance healthcare worker well-being?*
 - *Who makes decisions about work (system) design?*

*Engineering is a systematic and often iterative approach to **designing** objects, processes, and systems to meet human needs and wants. (NAE)*



My perspective on healthcare work systems

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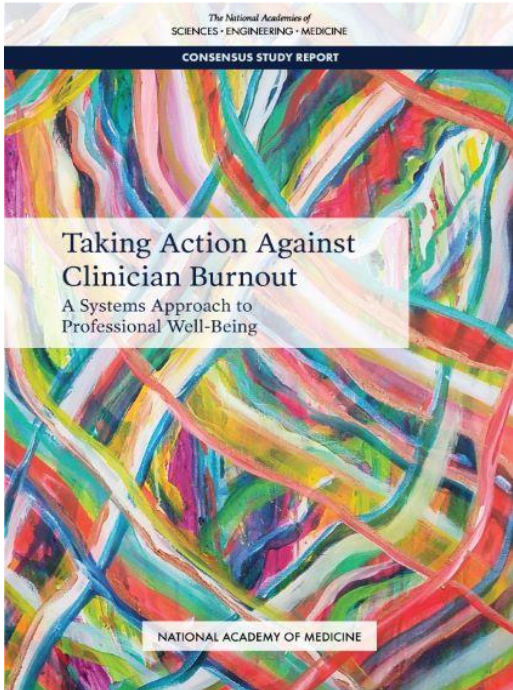
➤ Human factors and ergonomics (HFE):

- Work occurs in a system.
 - *What are the elements of the work system? How do we know whether a work system is well or poorly designed?*
- Work affects two outcomes: (1) performance, and (2) well-being.
 - *How do we optimize work system design to achieve both outcomes?*

*Ergonomics (or human factors) is the scientific discipline concerned with the understanding of interactions among humans and other elements of a **system**, and the profession that applies theory, principles, data, and methods to design in order to **optimize human well-being and overall system performance**. (IEA)*



National Academies' Report on Clinician Well-Being



(NASEM, 2019)

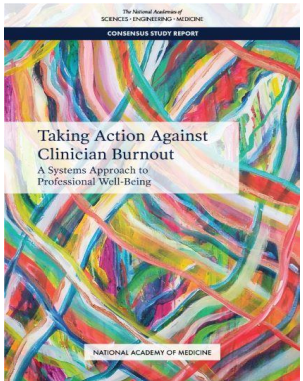
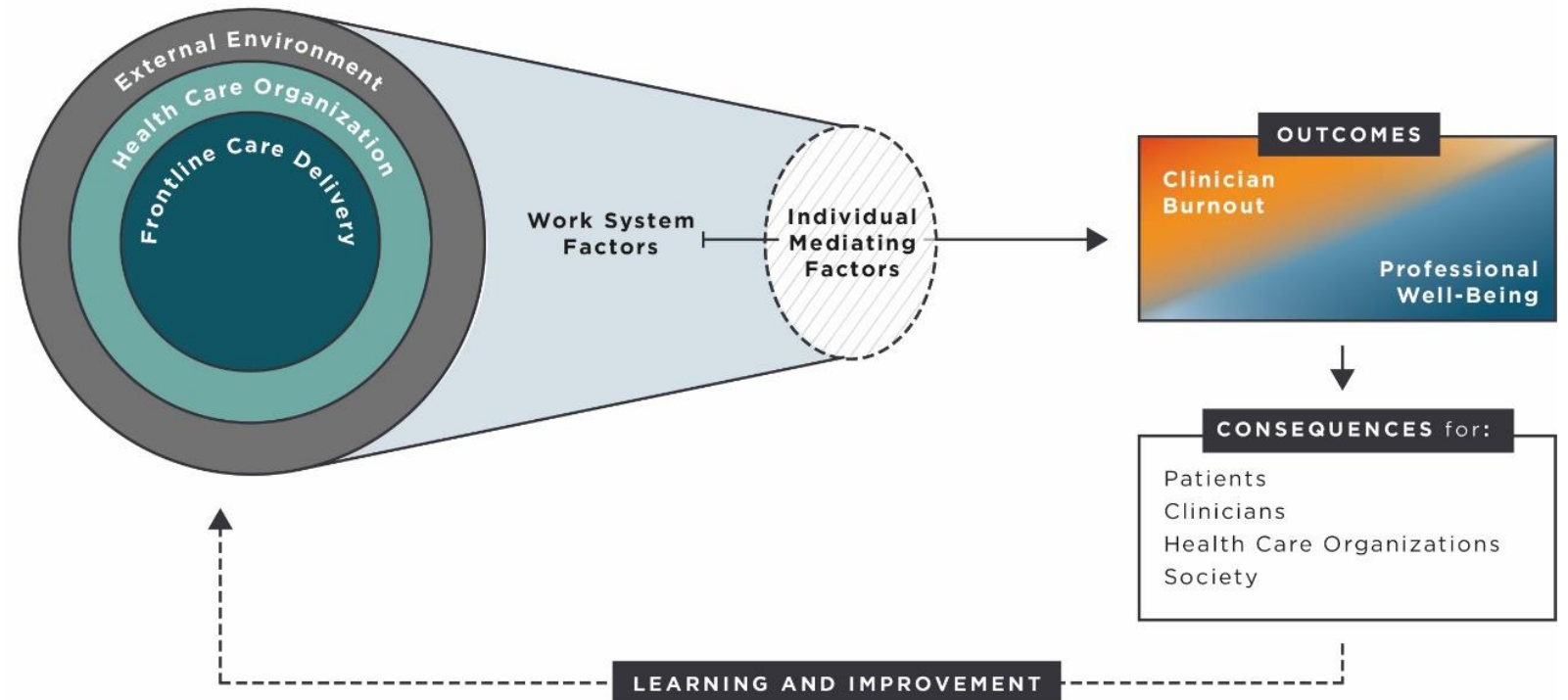
<https://nap.nationalacademies.org/catalog/25521/taking-action-against-clinician-burnout-a-systems-approach-to-professional>



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Clinician Well-Being

A SYSTEMS MODEL OF CLINICIAN BURNOUT AND PROFESSIONAL WELL-BEING



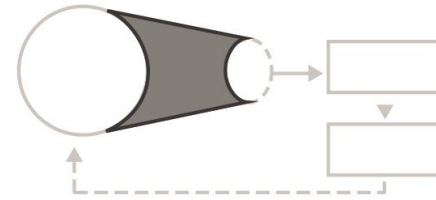
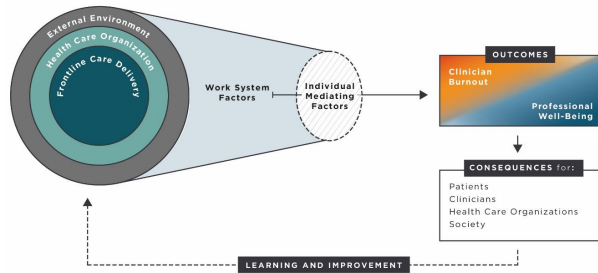
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A SYSTEMS MODEL OF CLINICIAN BURNOUT AND PROFESSIONAL WELL-BEING



WORK SYSTEM FACTORS OF THE SYSTEMS MODEL OF CLINICIAN BURNOUT AND PROFESSIONAL WELL-BEING

Work System Factors include:

Job Demands

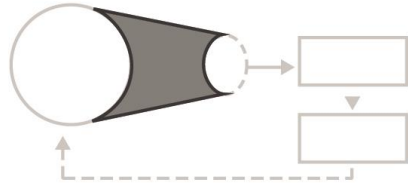
- Excessive workload, unmanageable work schedules, and inadequate staffing
- Administrative burden
- Workflow, interruptions, and distractions
- Inadequate technology usability
- Time pressure and encroachment on personal time
- Moral distress
- Patient factors

Job Resources

- Meaning and purpose in work
- Organizational culture
- Alignment of values and expectations
- Job control, flexibility, and autonomy
- Rewards
- Professional relationships and social support
- Work-life integration



Work System Factors



WORK SYSTEM FACTORS OF THE SYSTEMS MODEL OF CLINICIAN BURNOUT AND PROFESSIONAL WELL-BEING

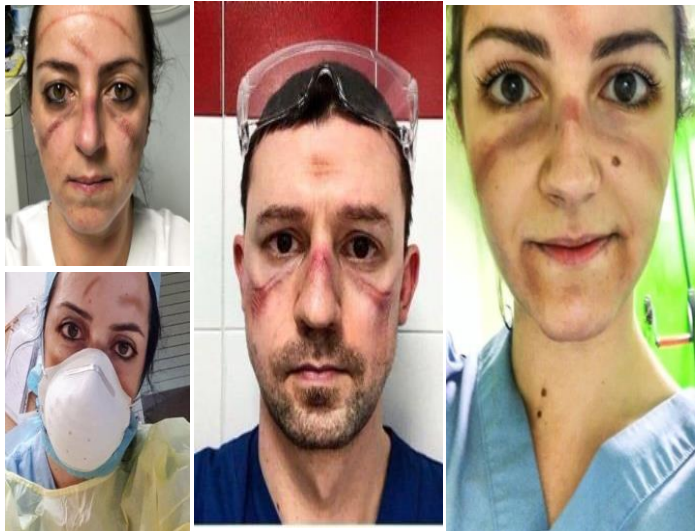
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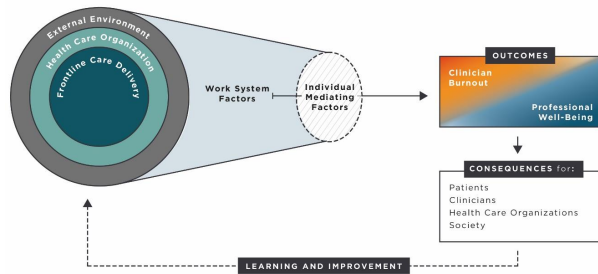


We sewed buttons on our headbands because our ears were breaking down. It helps alot.

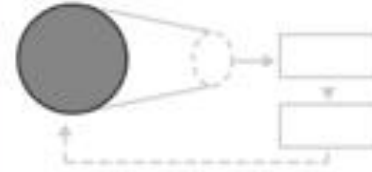


Clinician Well-Being

A SYSTEMS MODEL OF CLINICIAN BURNOUT AND PROFESSIONAL WELL-BEING



“The first locus of responsibility is health systems and other employers of clinicians.” (Dzau et al., 2020)



THE THREE LEVELS OF THE SYSTEMS MODEL OF CLINICIAN BURNOUT AND PROFESSIONAL WELL-BEING



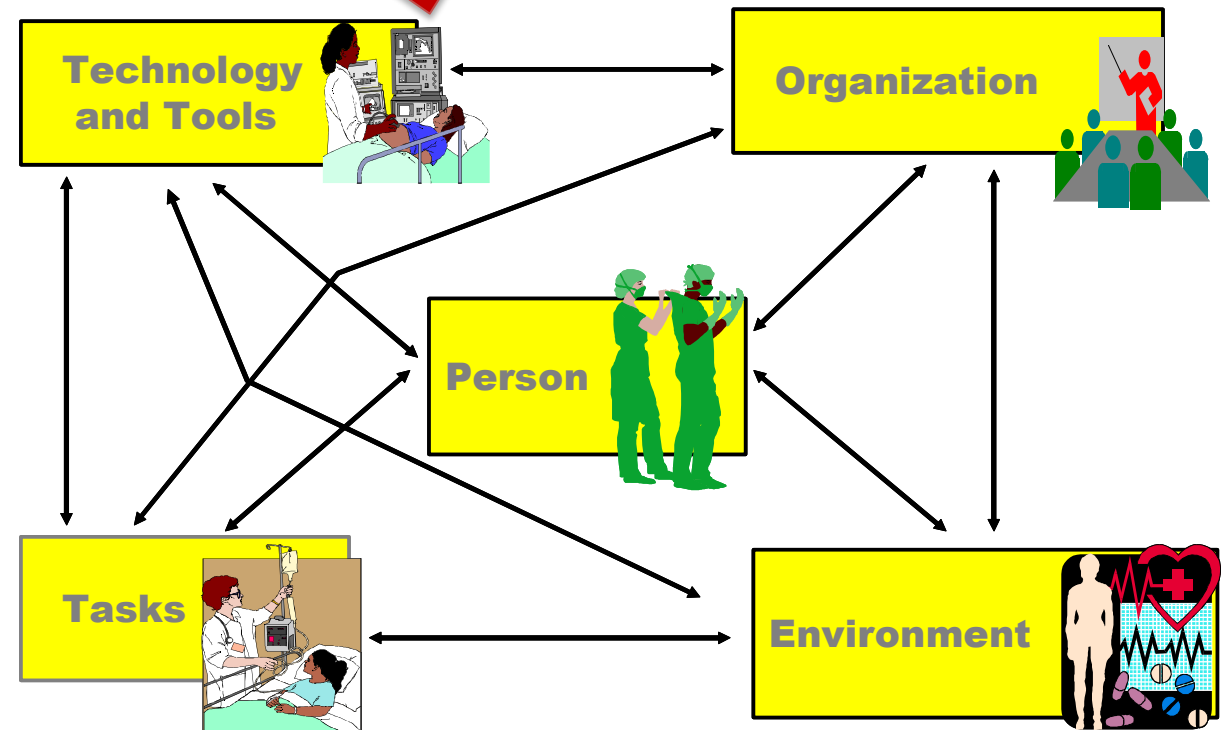
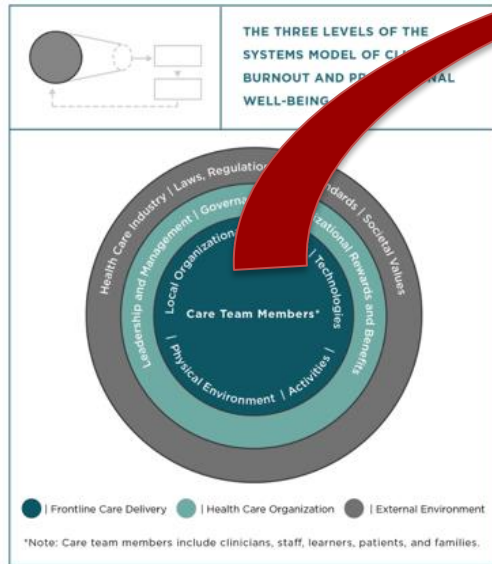
● | Frontline Care Delivery ● | Health Care Organization ● | External Environment

*Note: Care team members include clinicians, staff, learners, patients, and families.



Model of work system

Human factors and ergonomics (HFE)
= design of work system (and working conditions)

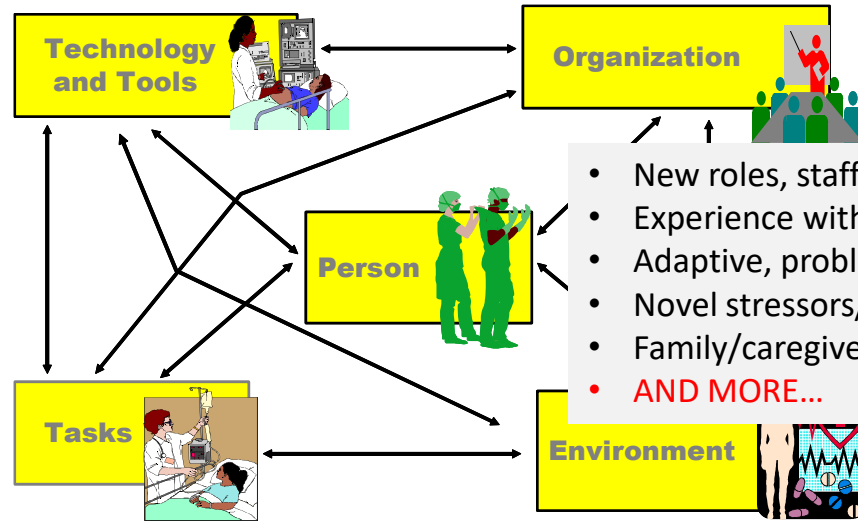


(Smith & Carayon-Sainfort, 1989; Carayon, 2009)



Work System Barriers & Facilitators – COVID-19

- PPE: access, usability, fit, disposal
- Telehealth
- “New” tools
- Technology breakdowns
- **AND MORE...**



- Intubation: from task to process
- Enhanced “performance pressure”
- Additional tasks: e.g. specimen collection, decontamination
- **AND MORE...**

- Information/communication overload & underload
- Leadership/management support
- Training: just-in-time, on your own
- Onboarding of new staff
- Supply chain management (meds, equipment, hand soap)
- **AND MORE...**

- New roles, staffing issues
- Experience with PPE
- Adaptive, problem-solver,
- Novel stressors/strain
- Family/caregiver needs
- **AND MORE...**

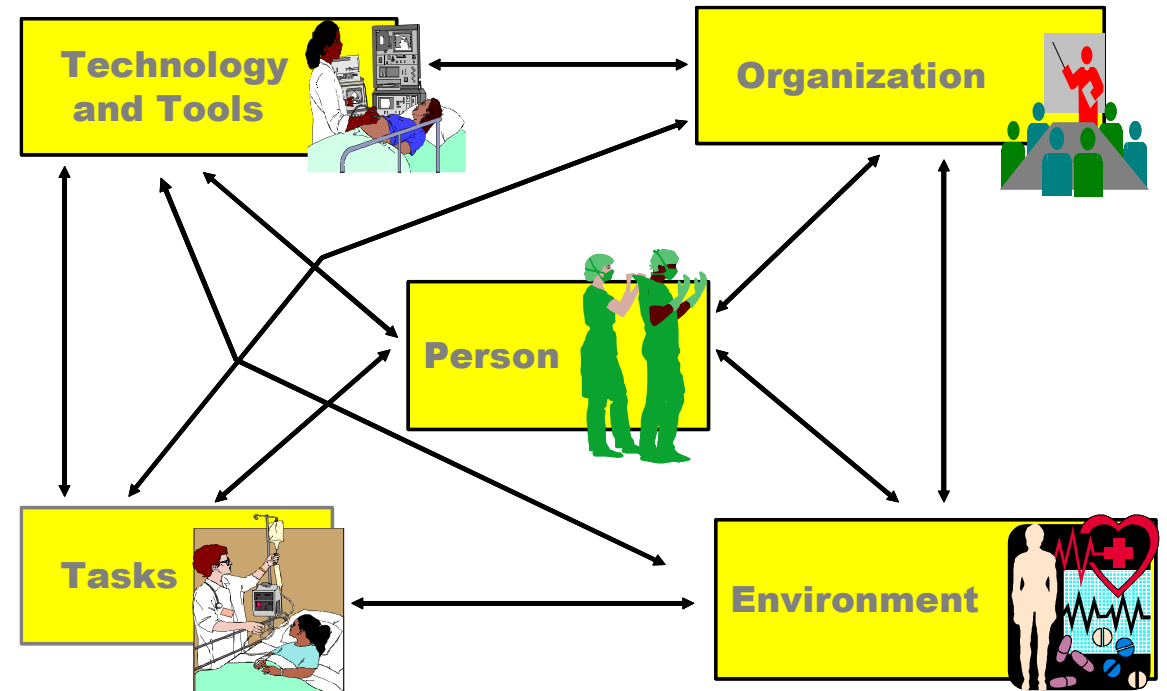
- COVID units
- Isolation rooms
- Visibility through patient windows,
- Access to PPE materials
- Signage & security
- Home, transportation, stores,..
- **AND MORE...**

(Carayon & Perry, 2020)

Special Issue of the International Journal for Quality in Health Care on Human Factors

There are many examples of work system barriers and facilitators in healthcare settings and jobs.

Think about
your own work
system!



Work System Barriers & Facilitators – Tele-ICU Nurses

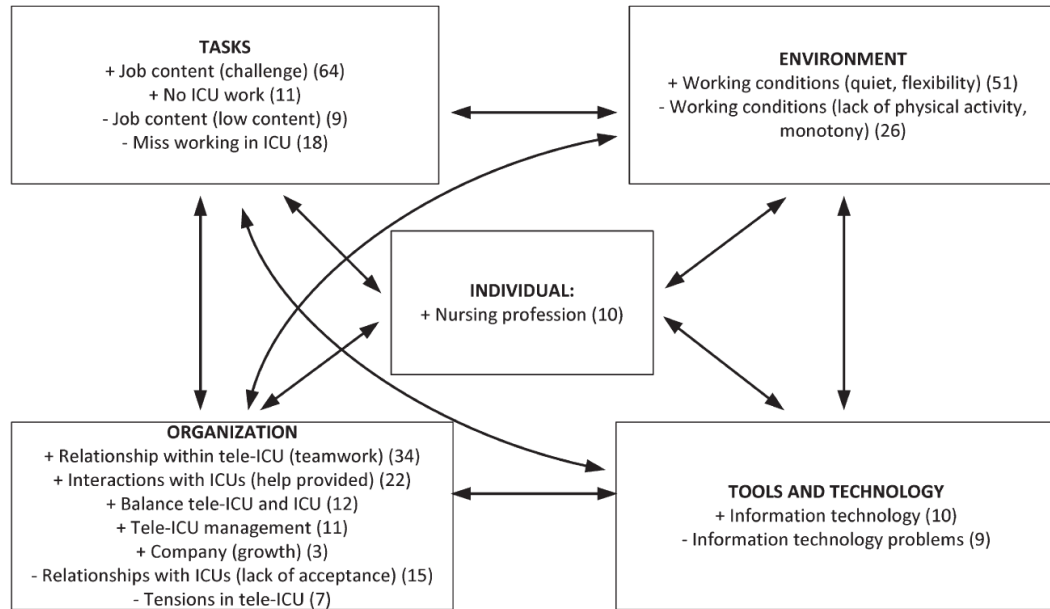
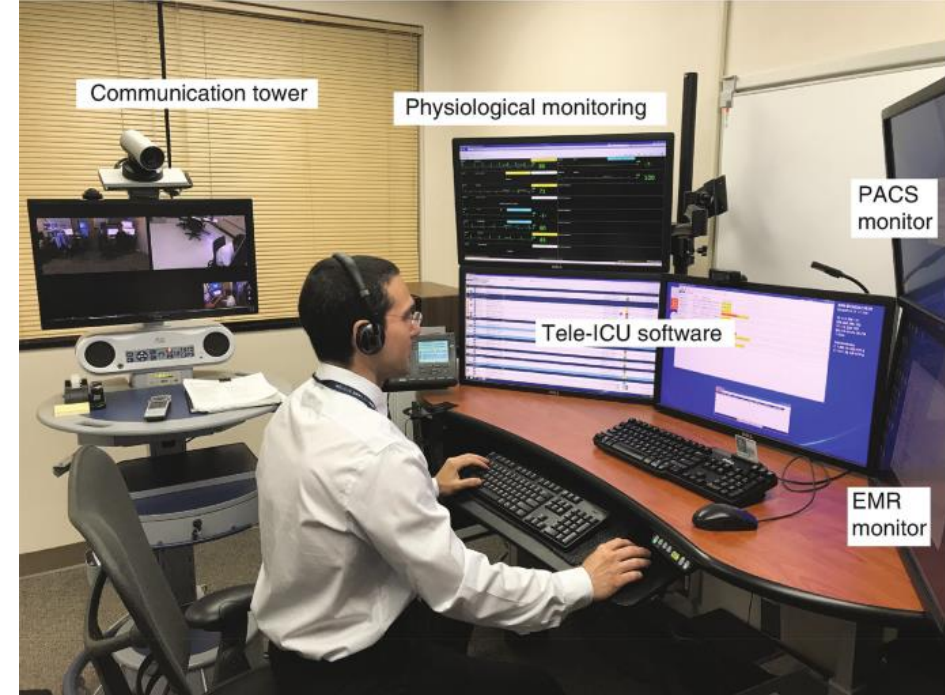


Fig. 2 Work system satisfiers and dissatisfiers experienced by tele-ICU nurses.

(Hoonakker et al., 2012 – Work system barriers/facilitators of tele-ICU nurses)



(Fortis & Goede, 2019)

Analysis of work system barriers and facilitators with multiple data from:

- Interviews
- Focus groups
- Observation
- Survey

Analysis of the “actual work done”

Taking Action: Health Care Organizations

“The first locus of responsibility is health systems and other employers of clinicians.” (Dzau et al., 2020)



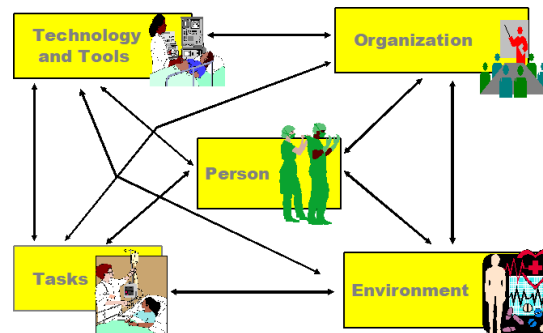
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What?

Work system redesign



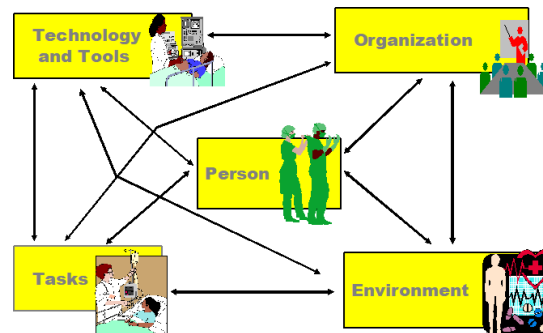
Taking Action: Health Care Organizations



- Redesign should target all work system elements:
- Technologies and equipment: access, usability, fit, disposal
 - Safe activities: e.g. intubation
 - Adequate physical environment
 - Teamwork, collaboration
 - Peer support
 - Organizational support, e.g. for work-life balance
 - Organizational communication: underload/overload
 - etc...

What?

Work system redesign



... and their interactions



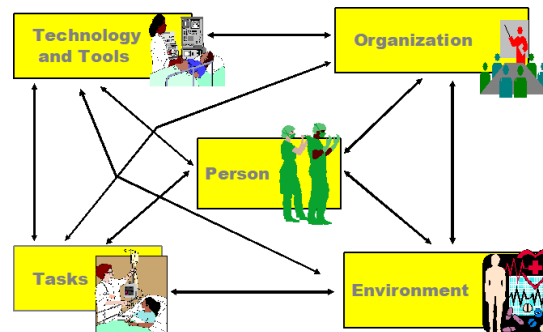
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 - etc...

What?

Work system redesign



HFE design principles:
meaning, job control, balanced workload, teamwork, adequate resources, usability, physical ergonomics





What should we do?

Improving EHR technology and reducing workload:

- “Getting rid of stupid stuff” (Ashton, 2018)

APNs to support and coach trainees facilitated physician-nurse collaboration, and reduced trainee stress-anxiety (Johnson et al., 2017)

Peer support improves meaning and engagement in work, and reduces burnout among physicians (West et al., 2014)

Improving EHR technology usability leads to reduced cognitive workload (Mazur et al., 2019; Carayon et al., 2020)

Nurses in Magnet hospitals are less burned out and more satisfied with their jobs (Kelly et al., 2011; Lake et al., 2019)

etc...

“... nominate anything in the EHR that they thought was poorly designed, unnecessary, or just plain stupid”

Organizational Evidence-Based and Promising Practices for Improving Clinician Well-Being

Christine A. Sinsky, MD, American Medical Association; **Lee Daugherty Biddison, MD, MPH**, Johns Hopkins Medicine; **Aditi Mallick, MD**, George Washington University; **Anna Legreid Dopp, PharmD**, American Society of Health-System Pharmacists; **Jessica Perlo, MPH**, Institute for Healthcare Improvement; **Lorna Lynn, MD**, American Board of Internal Medicine; and **Cynthia D. Smith, MD, FACP**, American College of Physicians



How to do it?

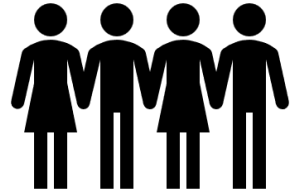


Taking Action: Health Care Organizations

Infrastructure & organization



Organizational culture



Organizational learning



How?

1. (Genuine) participation of clinicians
“Nothing about me without me”

Participatory ergonomics

Implementation

(Noro & Imada, 1991; Xie et al., 2015)

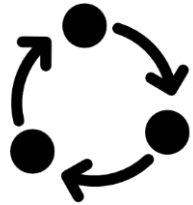
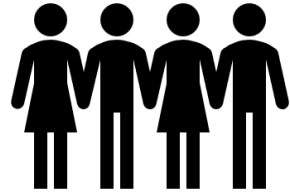


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How?

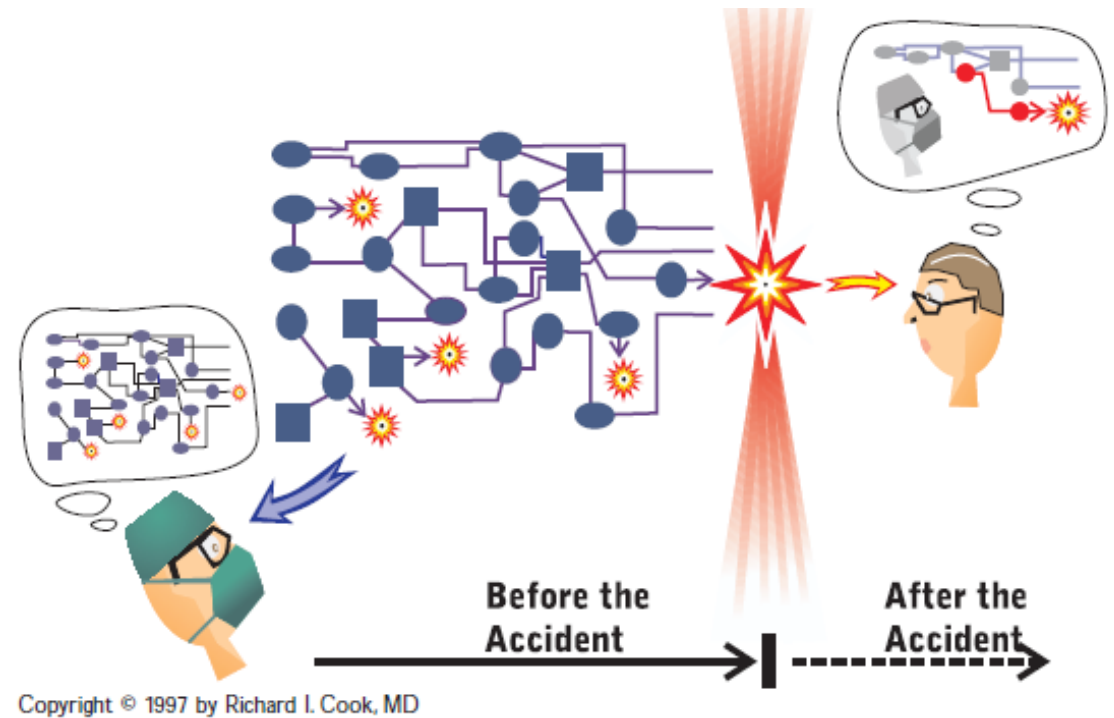
Implementation

1. (Genuine) participation of clinicians
“Nothing about me without me”
2. Work-as-done versus work-as-imagined



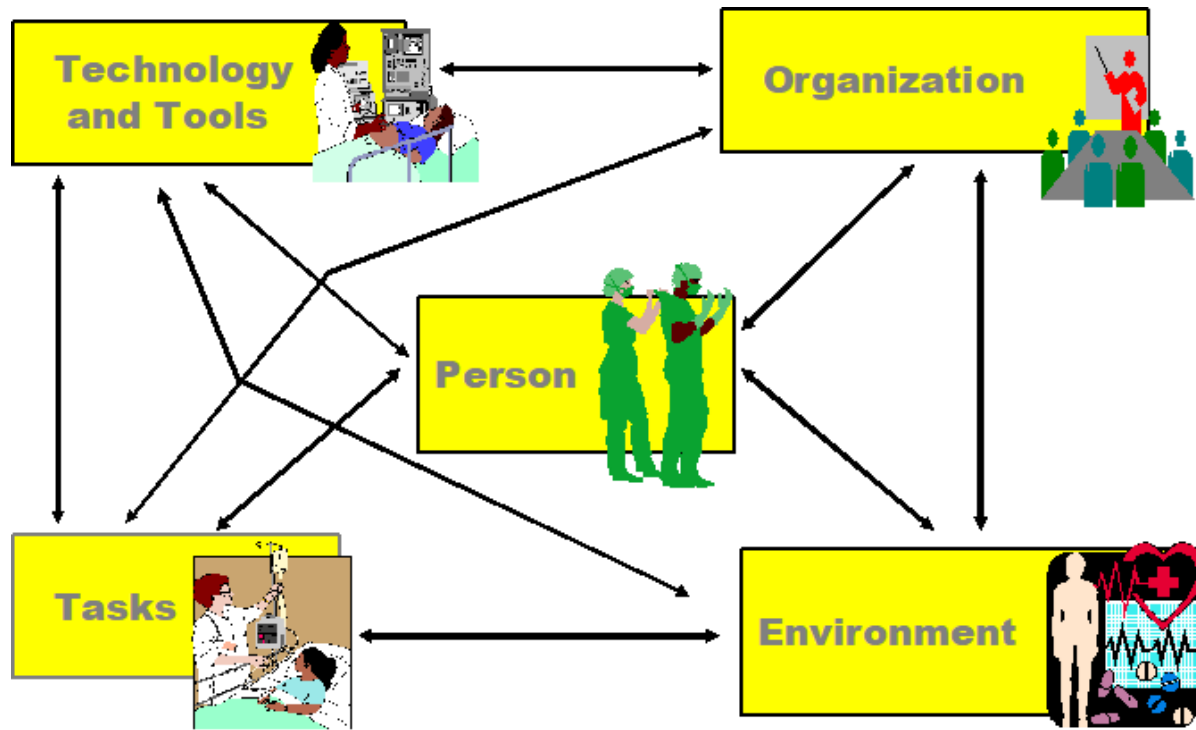
Activity versus Task (Leplat, 1979)

Work-as-done versus Work-as-imagined
(Hollnagel, Shorrock, etc...)



Work-as-done versus work-as-imagined:

- **The actual work that health care workers do**
- *What you think they are doing*



HFE:

- multiple methods (e.g. observation, interview, survey)
- multiple perspectives
- multiple data sources,...

- *Work system barriers/facilitators*
- *Job demands/job resources*

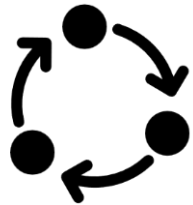
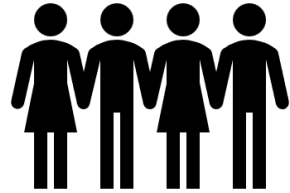


Taking Action: Health Care Organizations

Infrastructure & organization



Organizational culture



Organizational learning



How?

1. (Genuine) participation of clinicians
“Nothing about me without me”
2. Work-as-done versus work-as-imagined
3. Create solutions for your context!

Toolkits, websites, ...
National Academies,
professional associations, ...

Implementation



<https://nam.edu/compendium-of-key-resources-for-improving-clinician-well-being/>

RESOURCE COMPENDIUM FOR HEALTH CARE WORKER WELL-BEING

If you are a health care worker or leading a health care organization, we have well-being resources for you.

The National Academy of Medicine Action Collaborative on Clinician Well-Being and Resilience offers this collection of resources that highlight strategies and tools that health care leaders and workers can use across practice settings to take action toward decreasing burnout and improving clinician well-being.

Resources are organized into six essential elements, based on *Organizational Evidence-Based and Promising Best Practices for Clinician Well-Being*.

Resources for Health Care Worker Well-Being: 6 Essential Elements





Please, please.... Not another siloed approach!

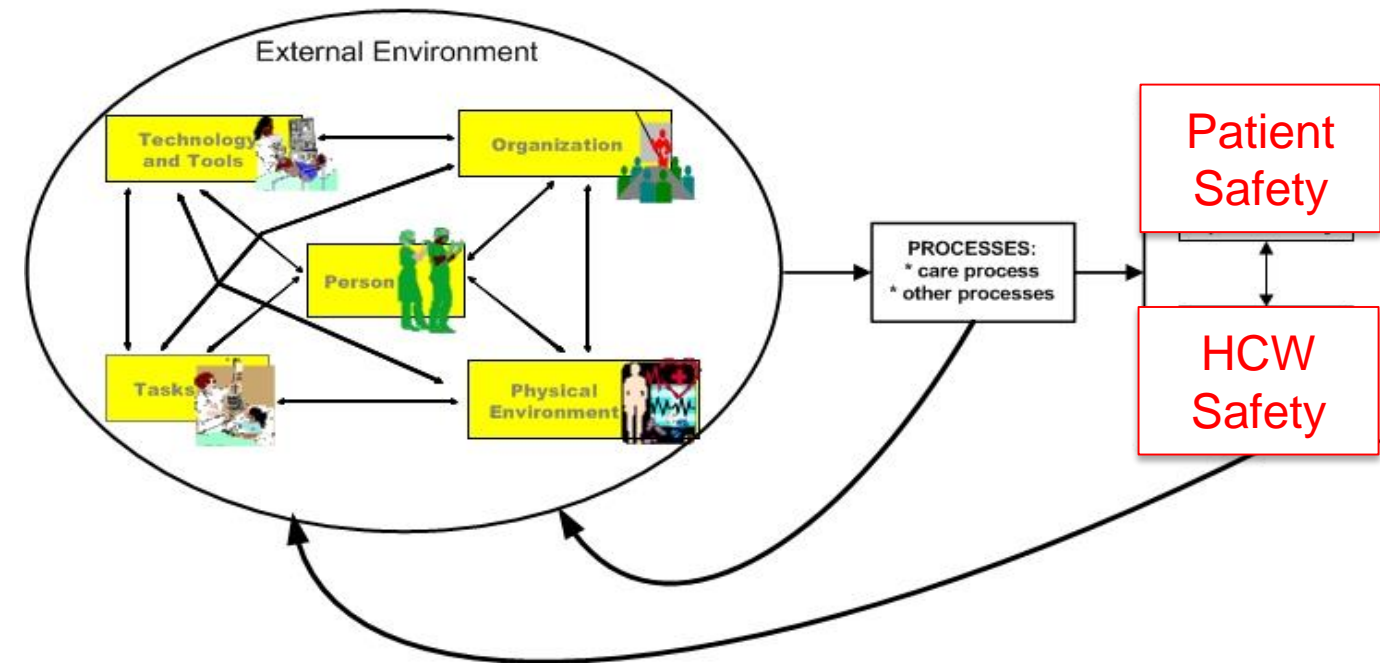
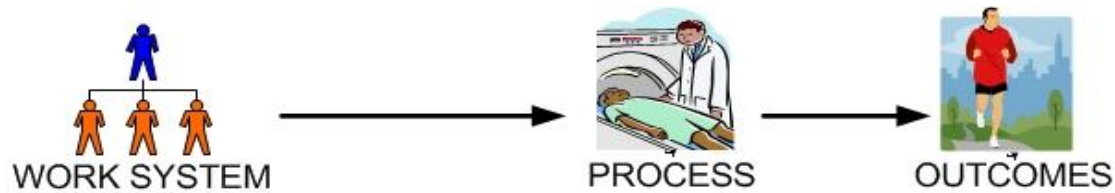
(systems approach)

Well-being of physicians, nurses,
nursing assistants, clerks,
environmental services,....
(Rotenstein et al., JAMA, 2022)

Health care workers
AND
Patients



Patient Safety & Healthcare Worker Safety

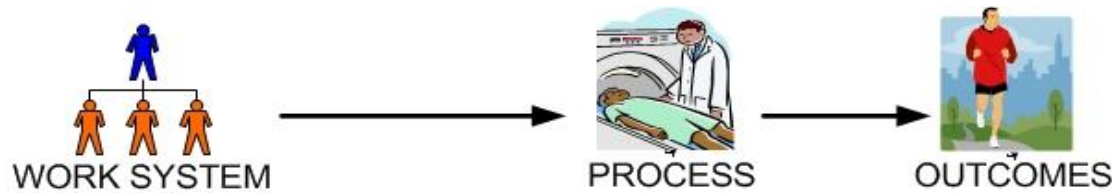


SEIPS (Systems Engineering Initiative for Patient Safety) Model (Carayon et al., 2006, 2014)

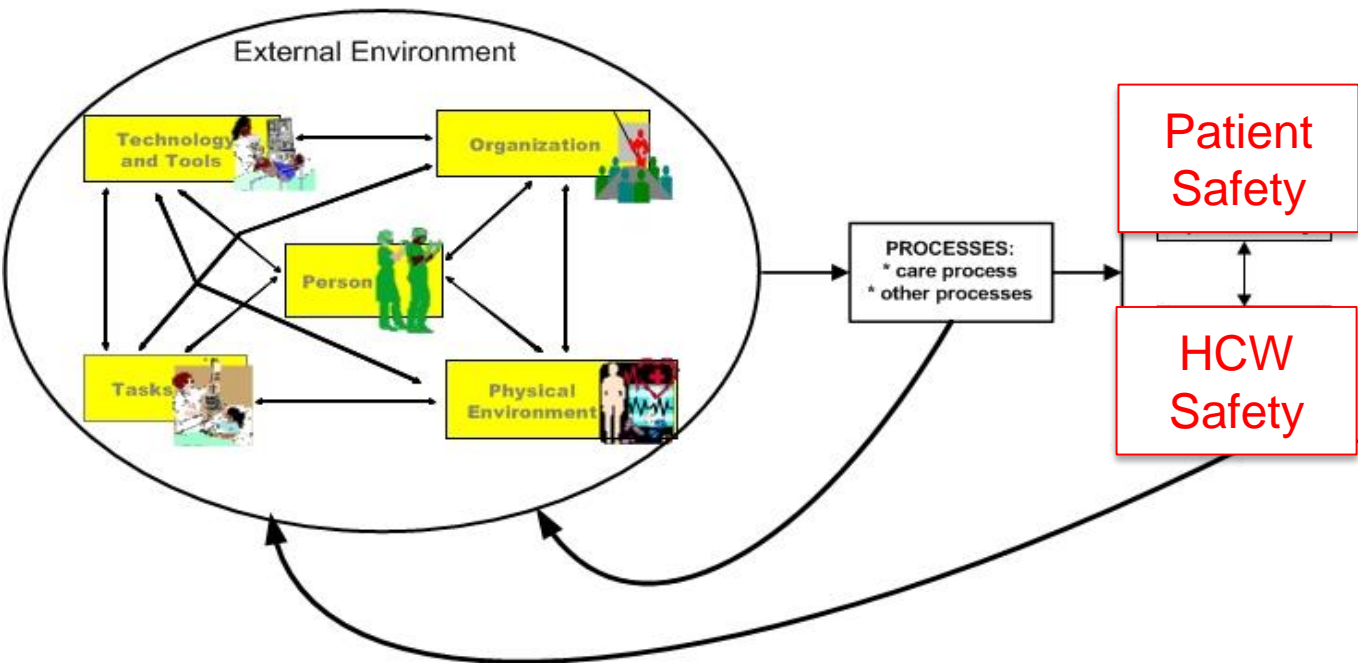


Patient Safety & Healthcare Worker Safety

1. excessive workload,...



1. Similar contributing factors
2. Shared methods and approaches
3. Synergy versus conflict



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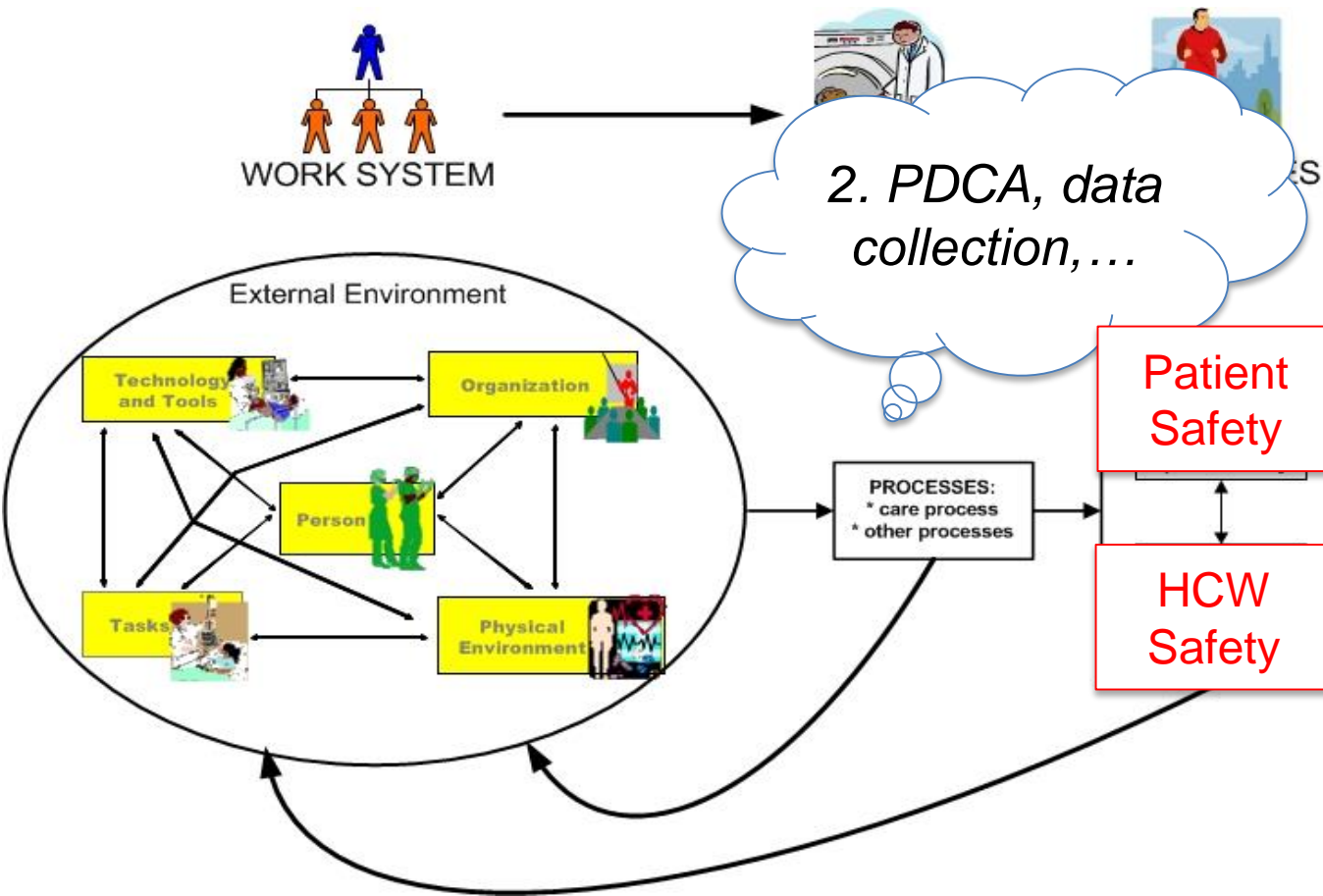


Patient Safety & Healthcare Worker Safety

1. excessive workload, ...

2. PDCA, data collection, ...

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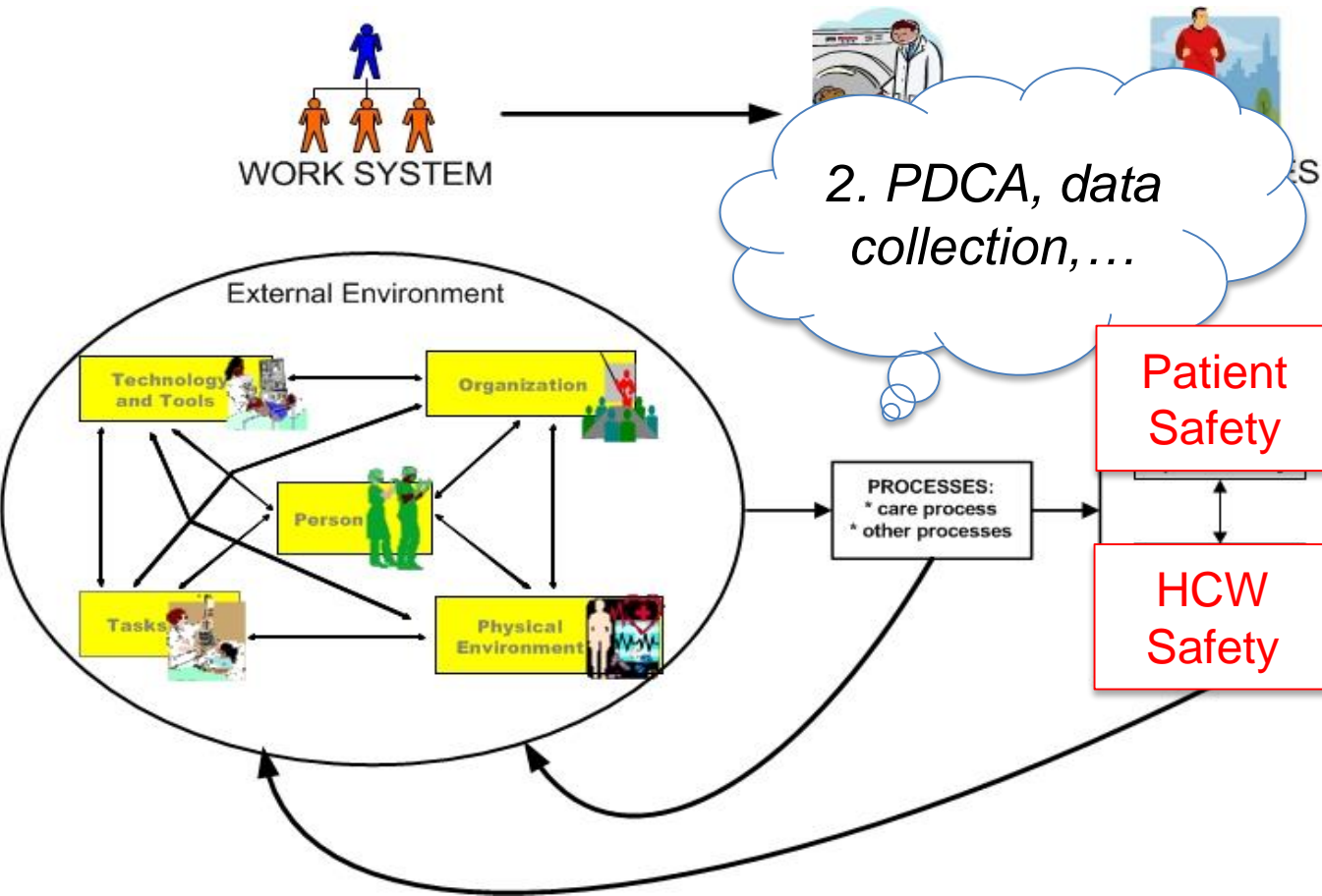
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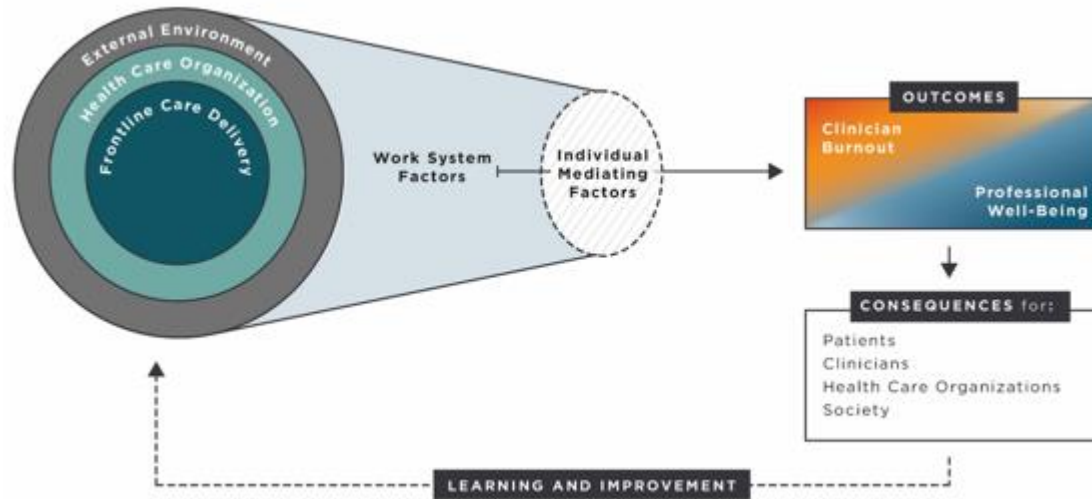


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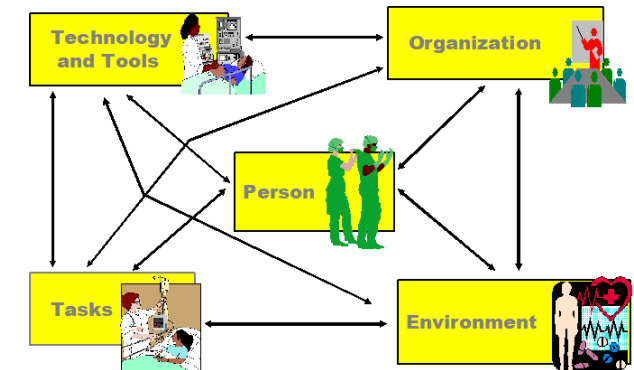


In conclusion...

Human Factors and Ergonomics in Preventing Harm to Workers: Designing Healthy Work Systems – A Shift in our Mental Model –



“The definition of insanity is doing the same thing over and over again, but expecting different results.”



From a physician on Twitter: “Burnout is not letting me do my job”





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