Integrating Organizational Actions Toward Patient Safety & Clinician Wellbeing

Budgeting clinician cognitive resources strategically in healthcare delivery

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The Questions We'll Answer Today

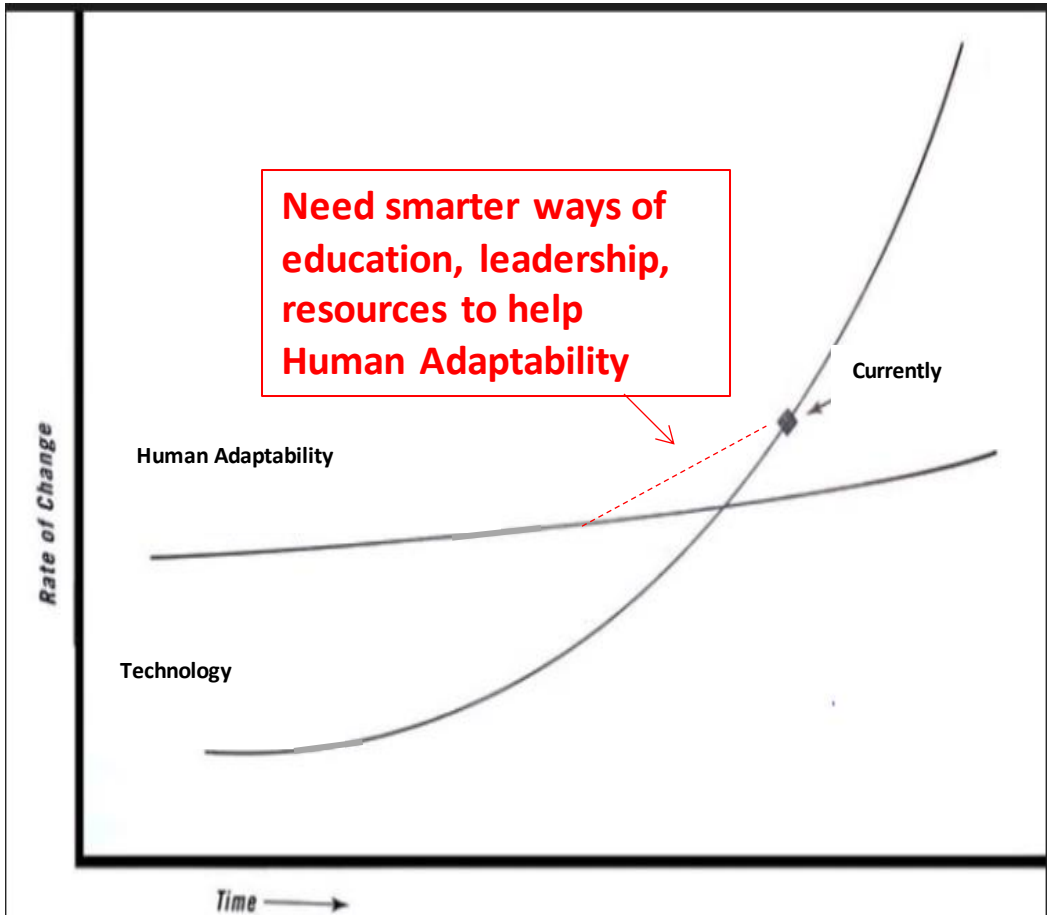
What problems continually occur in clinician brains across hospital systems that affects them personally and potentially their delivery of care?

What are the underlying – or *root* – causes of these issues?

How can hospital leadership and administrators address these issues within their scope of decision-making ?

Technological advancements have already surpassed human cognitive adaptation

- Technological change will continue to out-pace human adaptability
- Technology results in increased connectivity, tracking, accountability, and expectations beyond work hours
- Technology costs are low, personnel costs high, which leads to a decrease in staffing
- Functional, but not usable, technology that replaced people spins off more “shadow work” on remaining employees
- Surrounding culture “normalizes deviance”, dulls internal feedback that we are living in dangerous and unsustainable circumstances



*Adapted from Teller E. and Moore G. in Friedman T. Thank you for being Late. Farrar, Straus Giroux Publishers 2016

Lambert C. Shadow Work. The unpaid, unseen jobs that fill your day. Counterpoint. Berkley. 2015

Medical Error and Clinician Burnout have in common Systemic Contributions

- The Institute of Medicine (IOM) 1999 Report, *To Err is Human: Building a Safer Health System* emphasized that the majority of errors in healthcare are the result of systemic influences.[1]
- The majority of occupational stressors causing burnout are also the result of systemic factors.[2]
- **The quality paradox:** Many of the well-intended interventions to improve specific elements of quality, safety or value, *when taken in total,* are contributing to health system dysfunction by the cumulative impact on workload and burnout at the point of care.[3]
- Stress at work has been increasing over the last decades, as measured by the same instrument over time[4], yet we do not educate leaders and healthcare decision-makers to budget cognitive resource as they might money or personnel.
- The higher the cognitive load the higher the risk of Burnout[5]

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3. Sinsky CA and Privitera MR. Creating a Manageable Cockpit: A Shared Responsibility. JAMA Int. Med . June 2018.; 178(6):741-42
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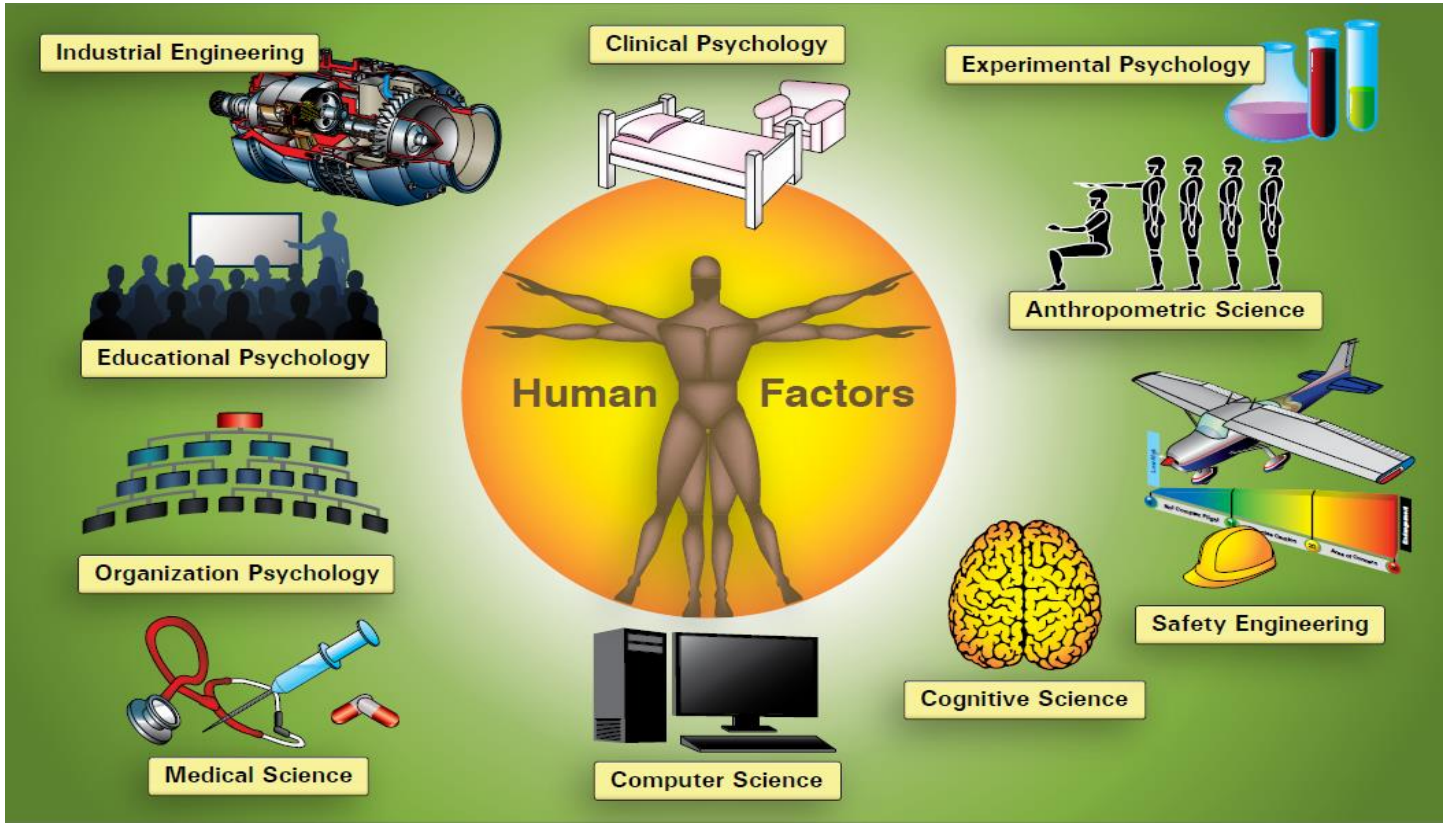
What Are Human Factors / Ergonomics (HFE)?



HFE Definition: The scientific discipline concerned with the understanding of interactions among humans and other elements of a system.

- **3 Major Types**: Physical, Organizational and Cognitive Ergonomics.
- Applies theory, principles, data, and methods to design in order to:
  - **Optimize human well-being and overall system performance.**
    - **Patient safety** is a component of system performance.
  - **Goal**:

    Fit the system to the people

    instead of

    fitting people to the system

https://www.faasafety.gov/files/gslac/courses/content/258/1097/AMT_Handbook_Addendum_Human_Factors.pdf

Chapter 14 Human Factors FAA Safety

International Ergonomics Association www.iea.cc

Cognitive Ergonomics-

Is concerned with mental processes, such as perception, memory, reasoning and motor response as they affect interactions among humans and other elements of a system. Examples:

- Mental workload-intrinsic, germane, extraneous.
- Strategic usage of neural resource
- Interruptions
- Sorting, classifying
- Decision-making
- Automatic Thought
- Controlled Thought
- Skilled performance
- Circadian issues
- Food, sleep, fatigue, rest effect on thinking
- Human computer interaction
- Intuitive design (from point of view of end-user)
- Device design- should require minimal training, optimal usability
- Human reliability in different environments-light, noise, heat, crowding
- Effect of threat, time pressure, frustration on thinking
- Cognitive biases effect on thinking
- Acute and chronic occupational stress effect on short and long term memory.

Cognitive Load: Mental load or effort required in processing information

- Three forms:
  - **Intrinsic Cognitive Load-** the mental load required from the basic complexity of information to be processed-thought to be immutable.

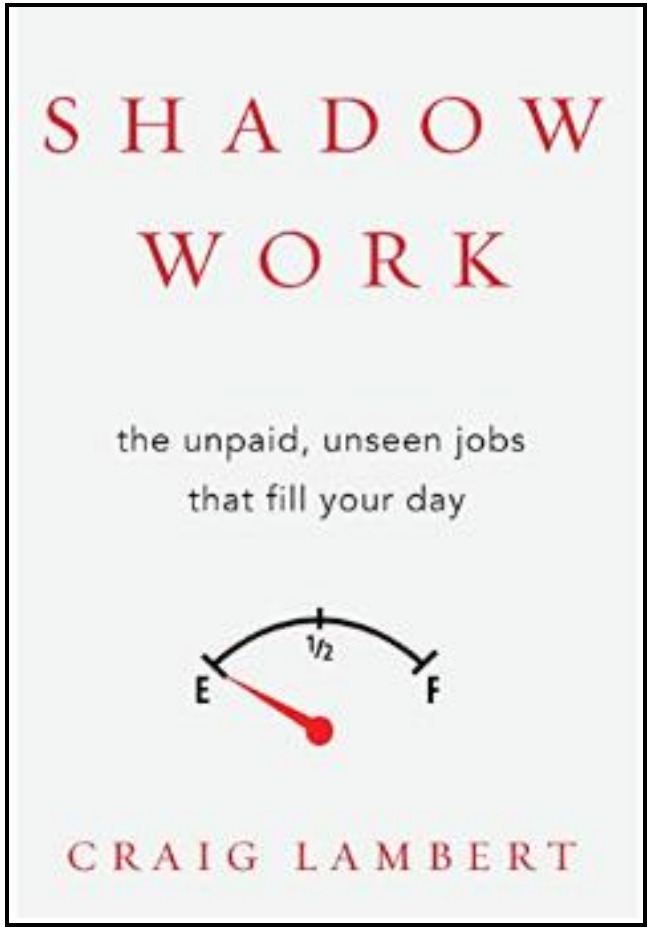
    Goal: Simplify when possible.
  - **Germane Cognitive Load-** Load devoted to processing, construction of mental representations (cognitive schema's) and automation of the these schema's.

    Goal: maximize efforts in this category.
  - **Extraneous Cognitive Load-** The way the information is presented to the person/learner that can be improved by better design.

    Goal: Minimize this type of load.

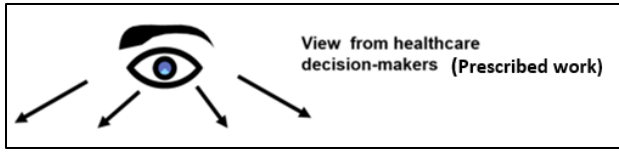
Examples of Systemic Contributors to Burnout and Latent Error

Shadow Work



- Unpaid, unseen jobs that fill your day.
- Described by Harvard sociologist Craig Lambert (2015)
- **Technology increases "disintermediation", i.e., reduction of intermediaries** (humans that were there to help) between producers and consumers
- Increasingly common in business processes (as in healthcare)- more overhead costs & imperfections in usability <u>offloaded</u> on to the consumer/ worker.
- **Time and effort is absorbed by the consumer/worker** out of what was discretionary time/free time/ off work time.
- Due to hierarchy of hospital systems and culture of medicine (endurance and silence), **often not seen or accounted for by senior leader decision-makers** (work is in the shadows).
- **Massive source of Extraneous Cognitive Load.**

Prescribed Work looks manageable on paper to administrator.



Prescribed Work

1. Office Start up

2. Warm up computer Software booting EMR booting

3. Patient Arrive On time, right location

4. Financial Pre-meeting

5. Waiting Room receptionists Clinical based forms given to patient

6. Nursing vs taken and documented

7. EMR record review preparation

Shadow Work

Office environment
- Temperature too warm, too cold
- Window crack- draft,
- Noise outside Grass cutting and trimmer

- New security restrictions longer warm up
- Password expired, think of new one
- New EMR software roll outs, learning curve time
- Software not working, need time on phone with IT support.

- Intro letter to patient about visit printed wrong clinic address
- E mail list serve, missed informing of parking lot problem-> delay in patient parking

- Wrong letter electronically selected from drop down menu about what financial information to bring-> delay with financial counsellor

- Pre-visit clinical rating scales were not given to patient to fill out, as substitute secretary not familiar with customized EMR screen interface for this location.

- Different budget line clinics co-located physically.
- Substitute nurses think not allowed to help on clinic as EMR interface reflected different budget line clinic.
- Vital Signs not obtained before visit

- Old records received but cant find as scanned into non intuitive file tab name coined by EMR vendor.
- Specialized support staff use this file tab regularly, so not occur to them or administrator that clinicians may not understand its purpose.
- Have to call HIM to find it, if time.
- Outside lab and radiology results: Are paper results scanned in somewhere?

"Shadow Work" creates additional mental effort and infiltrates the workflow in real practice

Prescribed Work

8. Patient Interview/ Evaluation/ Procedures

9. Writing Orders and Labs

10. Writing Notes and Diagnosis Billing

Shadow Work

- Meaningful use criteria to be met (regardless of reason for visit)
- Smoking cessation
- Send for old records
- Pain score
- Multiple screening questions

Remember to focus closely on why the patient is here despite these competing demands.

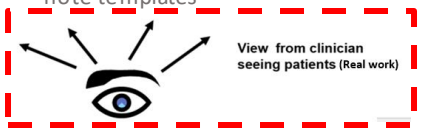
- EMR vender builder decisions on narrow requirement on lab order name.
- No drug synonyms allowed to get to the right order.

E.g.: Patient on Depakote, want to order blood level.
[Depakote= divalproex sodium = sodium valproate + valproic acid]

- Cannot type in "Depakote" level, "divalproex sodium" level, or "sodium valproate" —not recognized.

- ONLY recognizes "Valproic Acid" Level.
- Hunt, trial and error to find out what works.
- Ordering controlled substance: (e.g. NYS Health Commerce System controlled substance check)
- Password expired without warning.
- While patient is with you, must make up new password, never used within the last 50 passwords, complex security requirements. Do not make mistake writing prescription despite these competing demands.

- Choose correct template type (multiple, budget line driven).
- Template operation: F2 to next section, which can be ***, multiple choice drop downs, single choice drop down, or need to access *** wild card & write in.
- Compliance Creep- more documentation expected locally than required by regulation built into electronic note templates



- Voice recognition dictation software not working.
- If I call support will be on phone loosing time to do work. Type without it.
- "Best Practice Alerts", 'Hard stops' —demands an answer before can proceed.
- Interrupts thought while thinking of DDx and Treatment plan.

- Software "Autocorrect" function is working against you.
- Will not stop changing to incorrect word.
- Correct ICD-10 diagnosis with "hard stop" demanding specificity of dx out of fear that may not be covered by insurance.
- Interrupts your train of thought.
- Don't make a mistake that may hurt patient.
- You will be blamed, not the system, if it happens.

Lambert C. Shadow Work: The unpaid Unseen jobs that fill your day. Counterpoint Press 2015

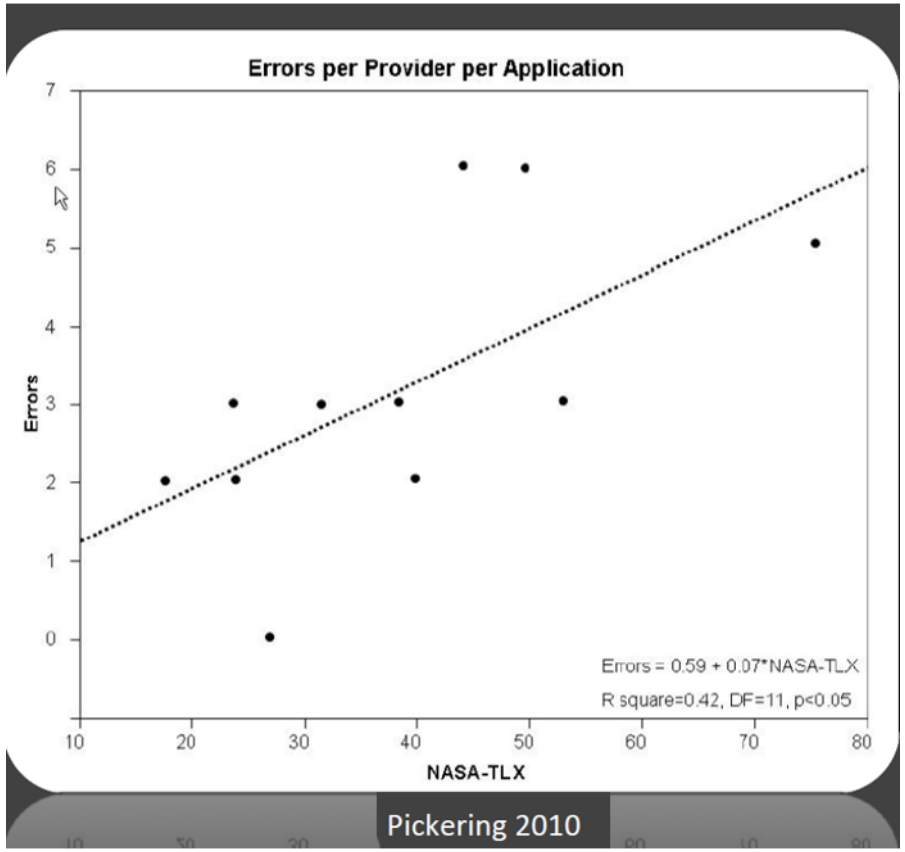
Cognitive Load and Medical Error

- Even highly intelligent people can reach their cognitive load threshold very quickly, and your best staff can create medical error as a result.

NASA TLX Cognitive Load

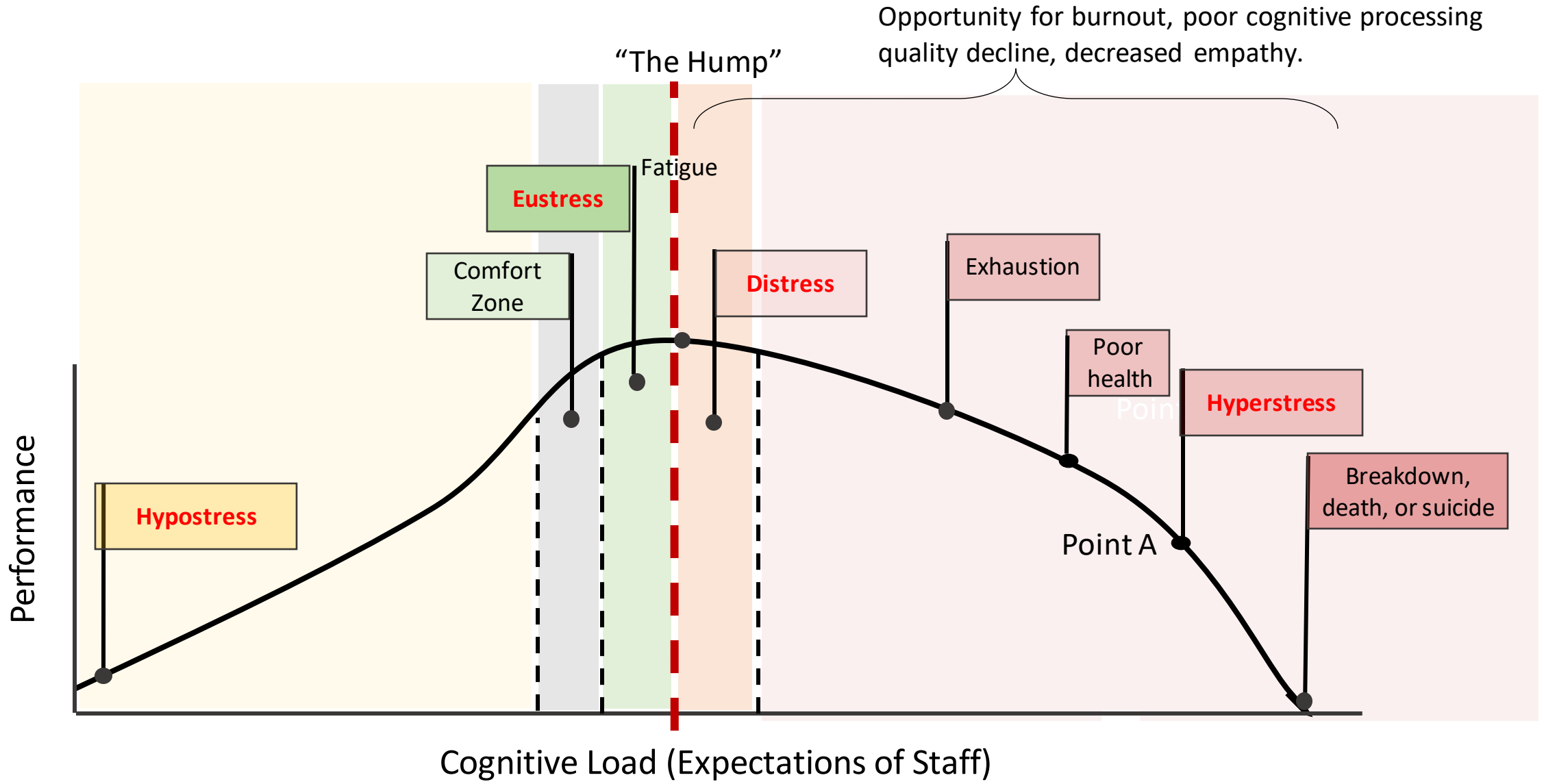
Demand	Rating Question	Rating 0 (very low) - 100 (very high)	X Weight	= Product
Mental Demand	How mentally demanding was the task?		3	
Physical Demand	How physically demanding was the task?		0	
Temporal Demand	How hurried or rushed was the pace of the task?		5	
Performance	How successful were you in accomplishing what you were asked to do?		1	
Effort	How hard did you have to work to accomplish what you were asked to do?		3	
Frustration	How insecure, discourages, irritated, stressed, and annoyed were you?		3	
			Total Weights = 15	Subtotal
				÷ 15
				Mean Score =

Cognitive Load and Medical Error



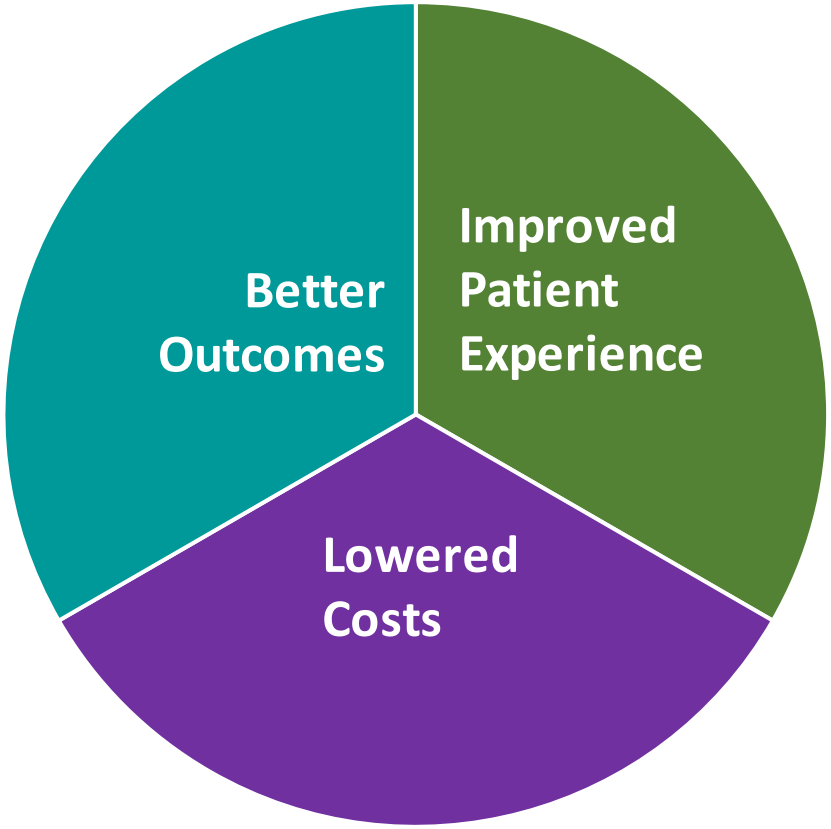
Human Function Curve for Average Clinician

Four Levels of "Stress"



Need to augment the Triple Aim and establish a National Healthcare Delivery Framework that can be followed by all stakeholders.

Triple Aim



Quadruple Aim

Quadruple Aim especially important to guide technical device companies, regulators, legislature and other decision-makers who may not have direct experience of providing care to patients.

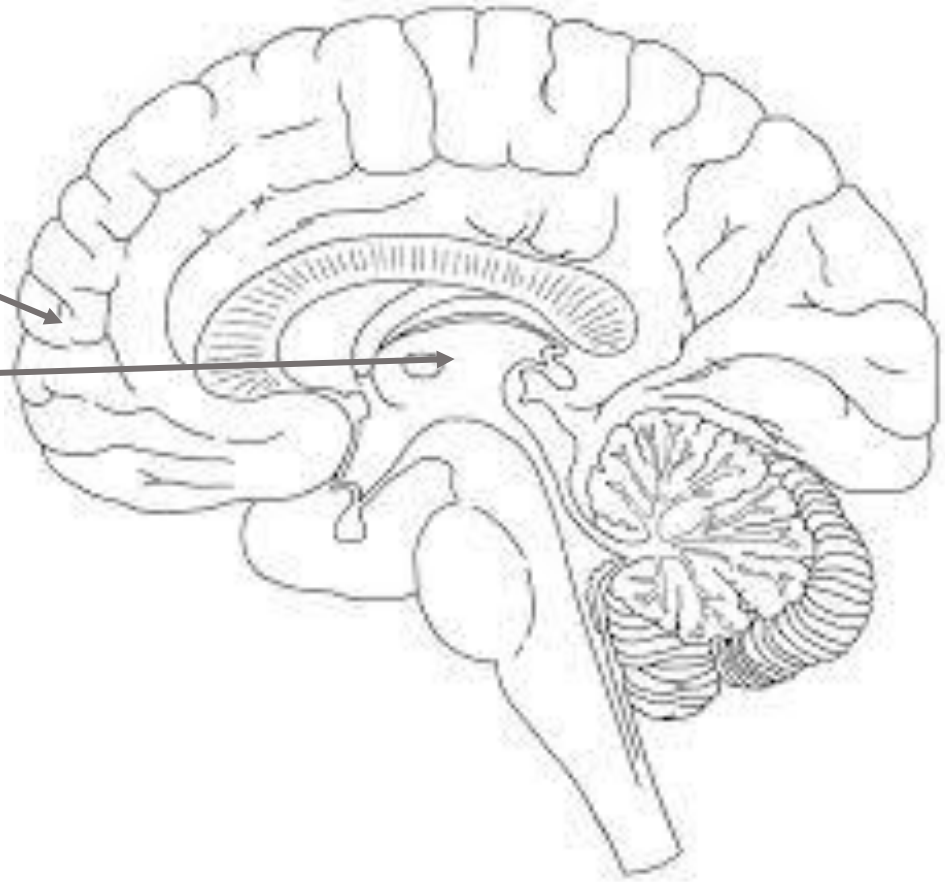
Mechanisms behind Burnout and Latent Medical Error

Cognition can be Controlled or Automatic

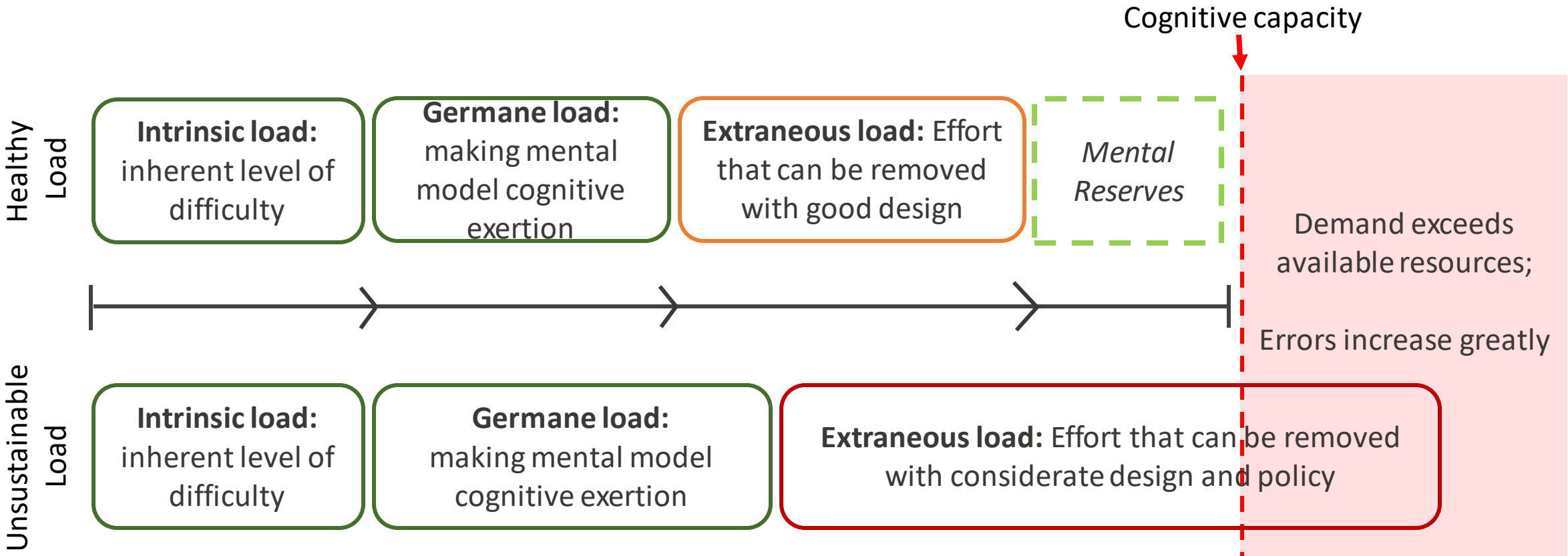
- **Controlled Thought in the prefrontal cortex:**
  - Uses up cognitive resources (glucose)
  - Limited and expensive neural resource
  - Used for high level functions

- **Automatic thought in basal ganglia**
  - Conserves resources, burning far less glucose.
  - Habitual memory, energetically far less expensive
  - Used when neural resources are low.

  - HOWEVER automatic thought is not appropriate in dynamic, complex situations.
  - When incorrectly applied, leads to errors



Like Gas, Controlled thought is a finite resource

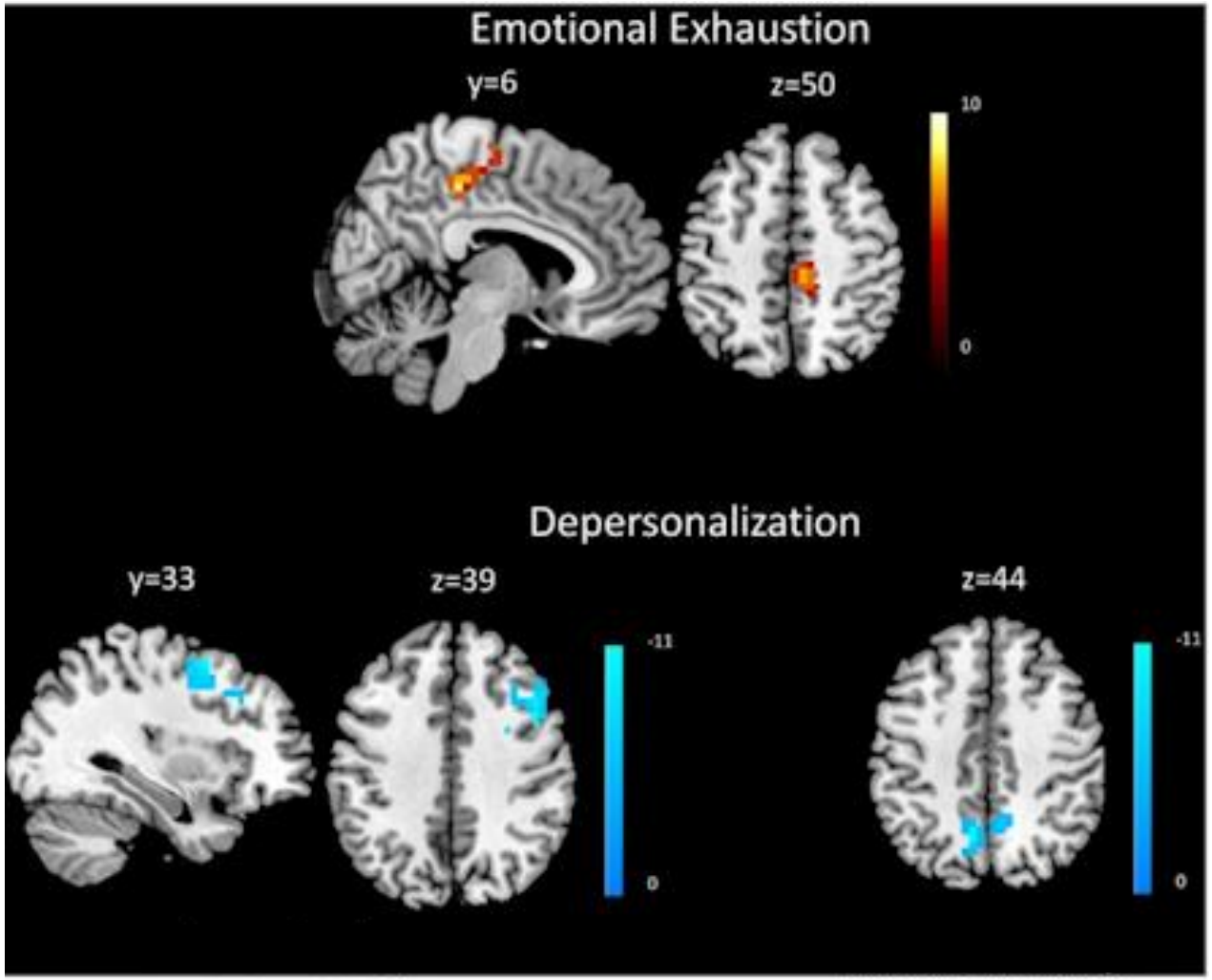


Once cognitive capacity is reached, the brain is depleted of resources required for controlled thought. Then automatic thought, load shedding and goal shielding occur.

Automatic thought- learned response from stimulus. No differential diagnosis
Load shedding- offload information, first low risk, then random shedding
Goal shielding- not allow new information into brain processing

Burnout is associated with biologic changes

- Hormonal
  - Cortisol fluctuations (high then low over time)
  - Coronary artery plaques
- Genetic
  - Telomere shortening (hastened cellular aging)
- Neurochemical
  - Excess glutamate leading to decreased grey matter in basal ganglia (decreasing fine motor control)
- Neuroanatomical
  - Thinning pre-frontal cortex (lowers attention span, poorer quality decision making)
  - Enlarged amygdala (increased reactivity to stress)
  - Hippocampal shrinking (memory reduction – short and long term)



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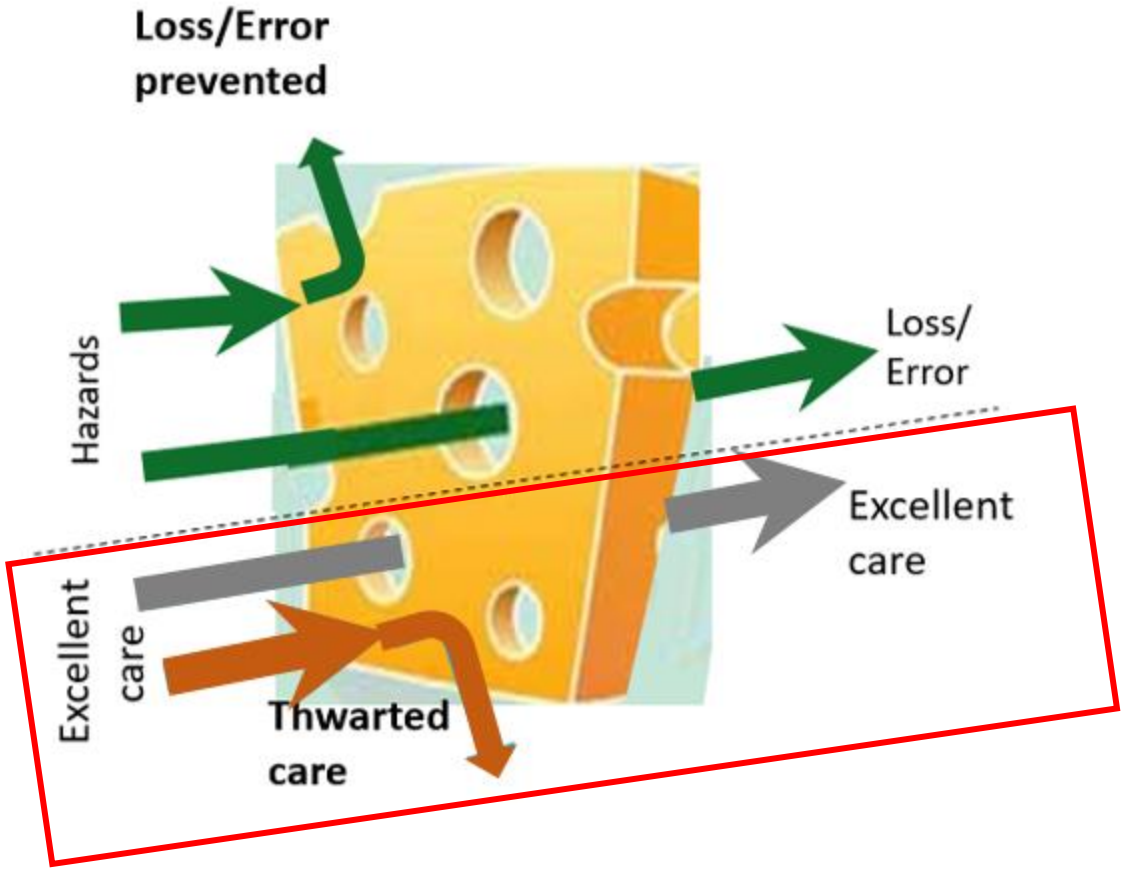
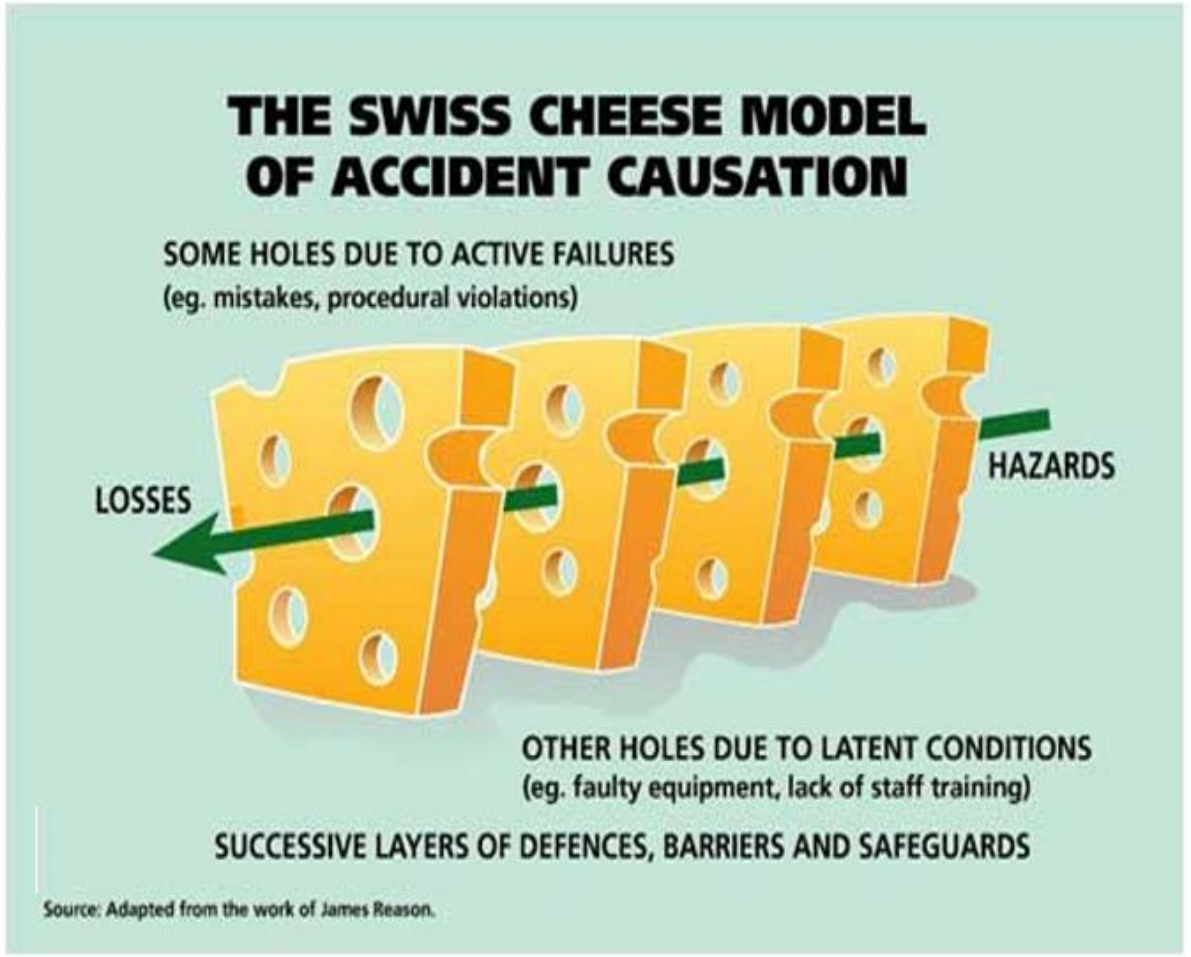
Traditional models of error prevention "Swiss Cheese Model" include a system of protective barriers , "holes" that prevent the barrier from being effective are to be reduced.

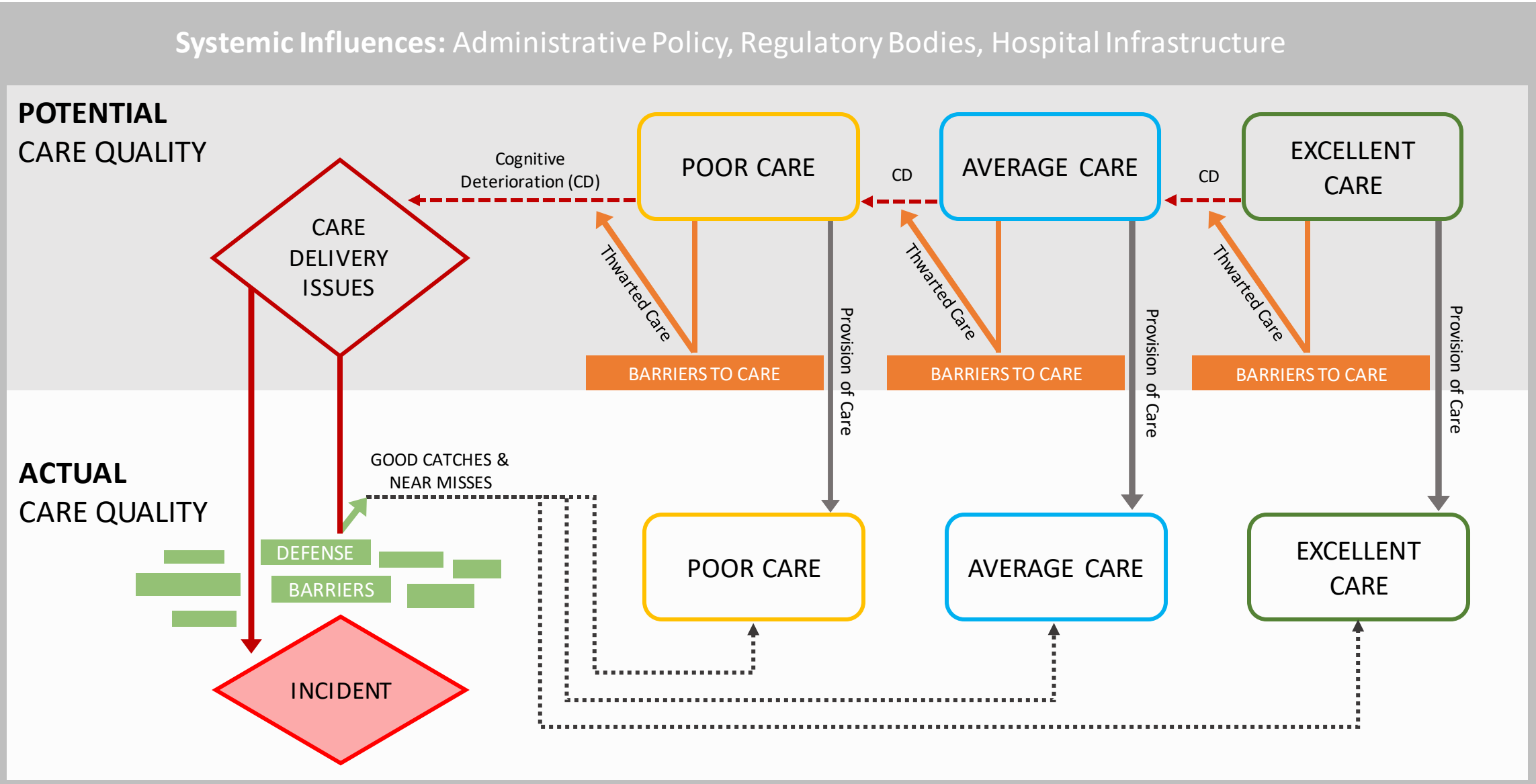
- However, Swiss Cheese Layers (barriers) need to be strategic and well designed.
- Potential unintended negative consequences of "slices" (thwarted care) to be avoided





https://cursos.campusvirtualsp.org/repository/coursefilearea/file.php/19/Content2015/12_Patient_Safety/Patient_safety2015.html

Non-strategic incident barriers increase cognitive load and cause incidents



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Causes of Medical Errors

- Most safety interventions focus on training clinicians
- Root cause analyses show extraneous cognitive load accounts for **87.1%** of medical errors
- Leadership has the potential to change a majority of system-level causes to improve individual-level rates

Individual-level causes	% of Errors	System-level causes	% of Errors
Knowledge and skill	12.8%	Structure (job design)	12.2%
Attention on task	14.5%	Culture (decisions and interactions)	57.7%
Information processing	6.1%	Process	18.0%
Critical thinking	34.3%	Policy and Protocol	6.6%
Non-compliance	26.5%	Technology and Environment	5.6%
Normalized deviance	5.7%		

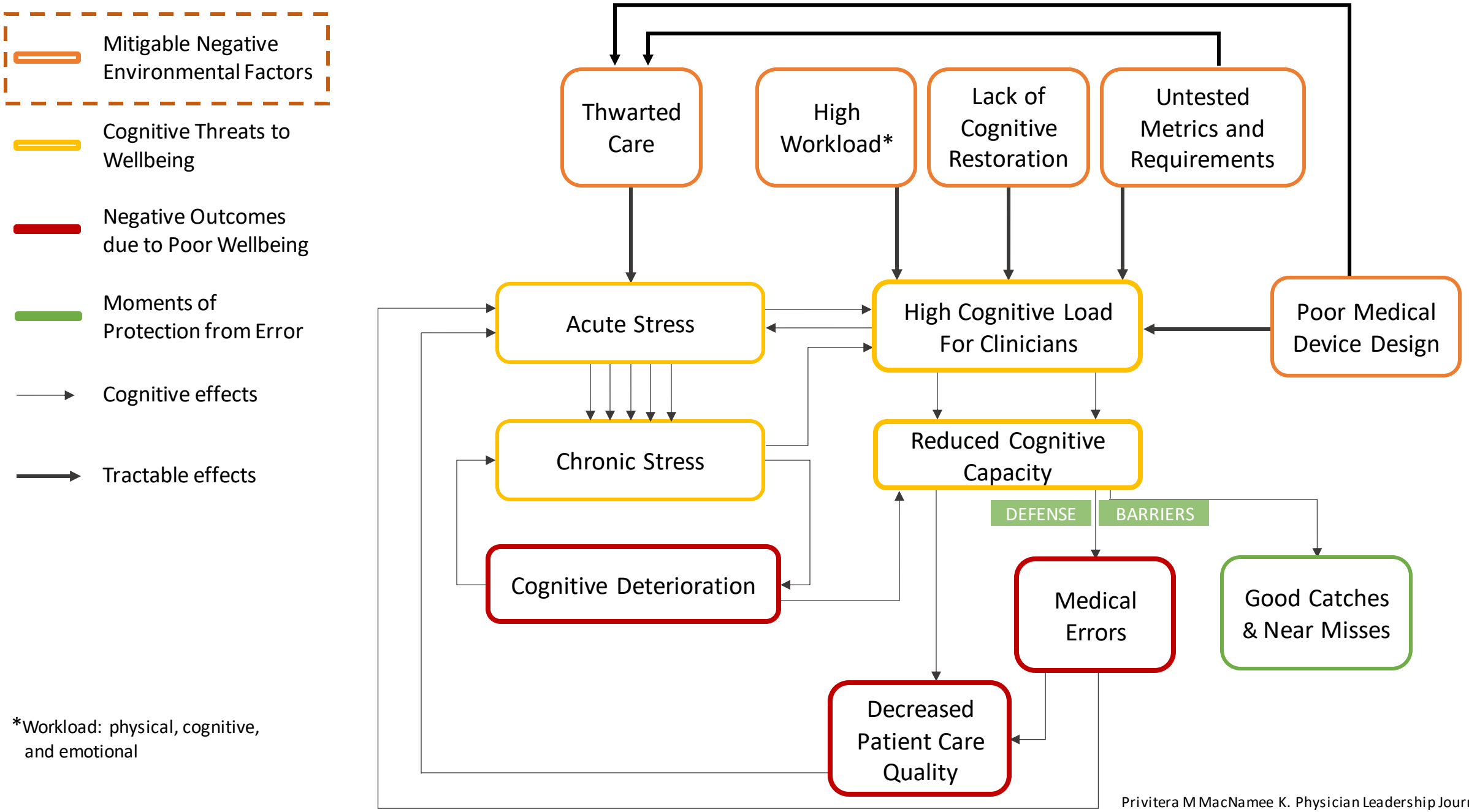
Directly caused by Cognitive Load

Indirectly Caused by Cognitive Load

Suggests a vast number of medical errors are preventable, given that extraneous load is inherently reducible.

2018 HPI/Press Ganey

Mitigable environmental/systemic factors, cognitive decline, and decreased quality of care



*Workload: physical, cognitive, and emotional

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How Can Leadership Make a Difference?

4th Aim =Experience of Providing Care

(Application of Human Factors and Ergonomics in Provision of Care)

National, State, Local, and Industry
Requirements

Conventional Thinking*

"Keep lights on" **Administration** *"Must comply to survive"*

Quality & safety | Finance Compliance | Risk Management | Billing | Health Info Management | Educational Mandatories | Medical Staff Office

Implementation: where healthcare administration has options / control

Integrative thinking* in implementation

Clinician input and **collaboration**

Clinician input and **collaboration**

Work Environment

Healing and Safety Environment

Clinician | Patient and Family | Clinical Team

Conventional Thinking: Make "either-or" choices; settle for best available options provided. * Martin R. HBR 2007

Integrative Thinking: Creatively resolve tensions among opposing ideas: generate innovative outcomes. New idea may have elements of each, but is superior to the original options. *Martin R HBR 2007

Think of your brain as a car, and glucose is the gas needed for optimizing clinician brain function.

Tasks that Drain Resources

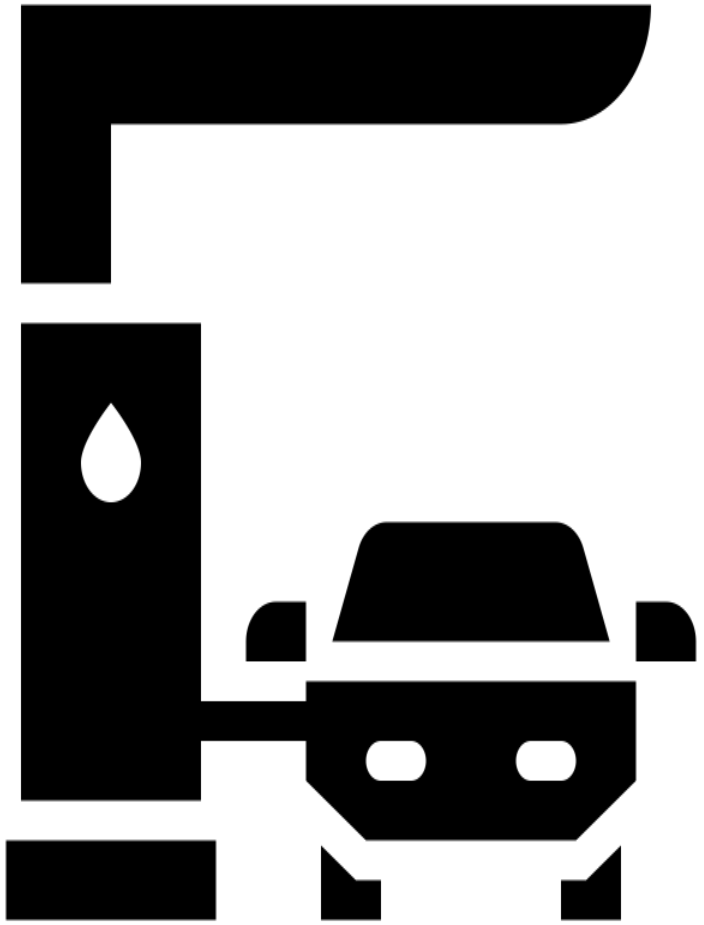
Excessive workload: physical, cognitive, or emotional

Goal maintenance: updating working memory, self-regulation, inhibiting fear and anger, coping with bad outcomes and grief

Focusing attention: decision-making at any scale, sorting and classifying, task switching and interruption, working with ambiguous interfaces (bad design)

Resolving cognitive dissonance: lack of organizational resources and feelings of low justice, value conflicts in the face of necessary deviance

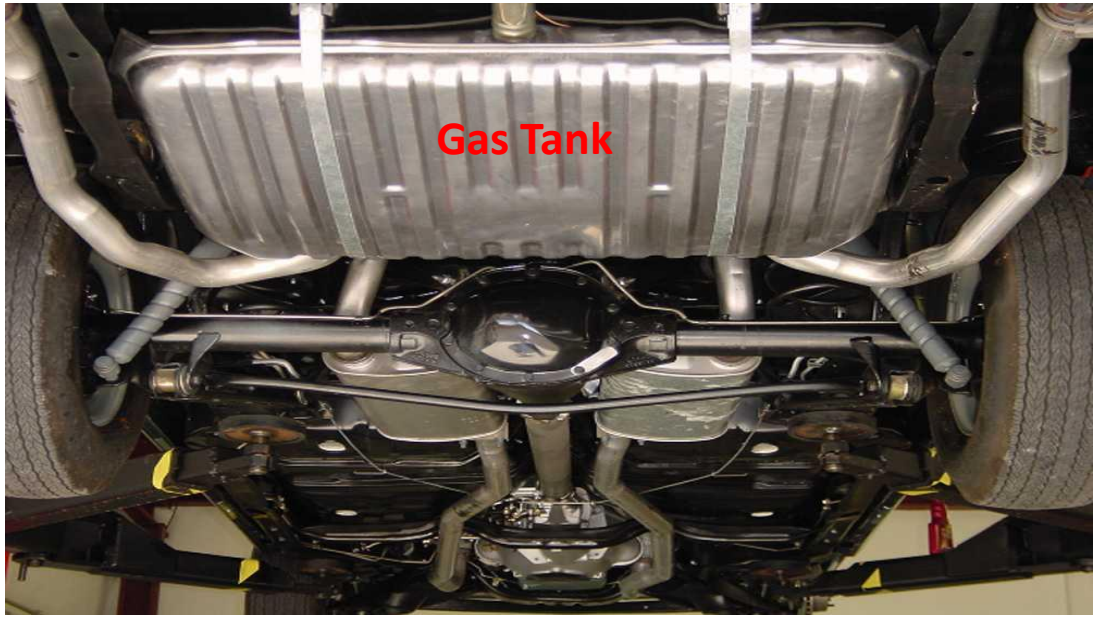
Guilt or argument with family during work/home conflicts



Tasks that Replenish Resources

Cognitive restoration

- Sleep
- Snacks and meals
- Time away from screens
- Walks, particularly in nature
- Environmental change
- Mindfulness and meditation
- Rewarding or satisfying work, including positive patient outcomes
- Appreciation from institution and/or patients and their families
- Time with friends/family and positive socializing
- Spirituality practices
- System-level acknowledgement of contribution or struggle



Gas Tank Metaphor
Rested, fed, healthy human clinician.

Large Gas Tank filled:

- Now having to face high occupational stressor expectations.

Shrunken Gas Tank
Burned out, depressed, anxious, sleep deprived, unfed human clinician.

Smaller capacity created by chronic wear-down. Less neural resource to achieve same expectations, starting out with less yet having to face high occupational stressor expectations.

Broad-stroke interventions to reduce cognitive load

- **Evaluate processes and metrics** currently in place, as well as those to be implemented. Better understand system-level effects of policies and processes
- **Standardization**—across processes, teams, units. Allow for routines. Tension with customization. Don't standardize at the cost of safety; standardize deliberately
- **Consolidate information**. Reducing split attention. Bring data together needed for workflows. Process coupling.
- **Decrease redundancy** in communication of data
- **Prioritize Design** – Procure equipment and implement layouts with deliberate designs that consider HFE.
- **Collaborate** with Human Factors professionals and your clinical staff to identify opportunities for lowing cognitive load.

Adapted from Elizabeth Harry MD. Steps Forward AMA Webinar 3/2/21. "Cognitive workload: a modifiable contributor to physician burnout ?"

Initial Steps in Wellness Program

Overall structure

- **Coping**
  - **Primary Control**— fix the problems causing stress
  - **Secondary Control**— ways to adjust to remaining situation
- **Interventions**
  - **Individual-** multiple- such as mindfulness based practice, 3 good things, gratefulness journaling, etc. Wellness seminars 11/year. Count for CE and malpractice reduction
  - **Organizational-** bottom up or top down, but combination best as participatory management.
    - New leadership skills needed to work with work environment of high stress, rapid change, information overload, increasing expectations (Human Factor Based Leadership)
    - New structures to process input from those closest to the problems (clinicians)
    - Wellness Strategic Planning Work Group (WSPWG)-clinicians and administration.

Light blue: Contact MRP if more information desired

- **Senior Leadership** needed in beginning and strategic times. Harness power of leadership
- **Brief presentation** on issues involved in burnout, help align understanding, language, awareness of consequences of no action.
- **Assessment**
  - Leader's cover letter to survey: Commitment to action and encourage honesty, and what plan to do with the information.
  - Good to have a validated tool if measure burnout. However the most rich data will be write in responses. Ask for two answers for each:

1. What gives most meaning in work?
2. What are major stressors ?
3. What are reasonable suggestions?

- First information must be anonymous answers
- Share aggregate data findings to constituents to demonstrate transparency
- After aggregate data, can present in open forum and get more input with Vegas rules:

  a. Forgive hierarchy relationships.
  b. What happens in Vegas stays in Vegas,
  c. One can later say what was discussed but not trace back to person who said it.

  - WSPWG is ongoing structure to address work/life integration, solve hospital level organizational issues. Departments have wellness representatives. Impact vs. Feasibility study to prioritize roll outs.

Comparing Lean and HFE

Each have role of Senior Sponsors to make directional decision remove barrier, minimize risks, dedicate resources, prioritize efforts. Strategic use of their presence, influence and recognition of successes

	Lean Process **Continuous System Improvement**	**Human Factors/Ergonomics (HFE)** **Continuous System Improvement**
Focus	"Customer" (Patient) Experience, satisfaction. Quality Safety, Costs (Triple Aim). Improve efficiencies, and work satisfaction	Experience of providing care Fourth Aim of Quadruple Aim-will improve Triple Aim measure. Both system efficiency **and** clinician wellbeing. Patient safety and quality are a result of system efficiency
Goal	Eliminate waste, improve value to patient	Eliminate Extraneous Cognitive Load, improve ease and efficiency of performing work as primary objective, allowing expected benefits to the patient and the work system.
Ease of discussion	Open, "mainstream" medicine	Culture of medicine to overcome: Endurance, silence, fear of negative effect on career, and not want to be seen as "weak". Need deliberate efforts to normalize this process for clinicians and administrators, weave into hospital structures to address. **Start with anonymous input and move to open discussion.**
Value of employee input	Includes Participatory Management Employee= closest to the problem	Includes Participatory Management Employee = closest to the problem and **lives the problem**
Application	To mitigate existing problems	To mitigate existing problems. Leaders can also apply concepts to prevent problems.

Application of HFE in Healthcare Environments

"Expensive" Cognitive Activity	Definition of Expensive Activity	Situation(s) Forcing Expensive Activity	Solution(s) to Avoid Expensive Activity
Extraneous information processing	Responding to or processing information unrelated to primary diagnostic or procedural goals.	Required screening questions are unrelated to the patient's reason for their visit.	Patient entered data via website or waiting room to help save clinician cognitive resource for key clinical issue.
Unintuitive interface navigation	Resolving conflict between expectation and outcome, regulating frustration, working through confusion and ambiguity.	Medical device not purposefully designed, requires large number of disjointed actions to achieve goals.	Create multiple pathways for clinician input on technology design, workflow problems and purchasing decisions (e.g. Provider Advisory Council or PAC). Clinician builder program to collaborate with non-clinician builders to optimize architecture and workflows.
Goal maintenance and working memory	Maintaining and manipulating information in your head while performing other tasks.	Software design requires multiple pages and pop-ups to complete task. _____ Clinical data stored in unintuitive locations.	Implement software with dashboards that create action pathways accessible from a single location. _____ Health information management team in direct collaboration with active clinician team.
Controlled processing	Cognitive functions associate with paying attention, filtering, and organizing	Poorly labeled storage systems for ancillary tools requiring hunting through storage that is without schema or order.	Organize storage by tool type, brand, models, etc. Label the outside of drawers/containers to prevent the need to open them during search.
Multitasking/ Interruptions	Attempting to perform two tasks in parallel, resulting in rapid switching between tasks, and decreasing either accuracy or efficiency.	Nurse interrupted passing meds. _____ Clinicians asked non urgent question from other during procedures.	Nursing medication room policy implemented to prevent intrusions. System implemented to ensure pended questions for clinician to be addressed between tasks or cases.

Application of HFE in Healthcare Environments

"Expensive" Cognitive Activity	Definition of Expensive Activity	Situation(s) Forcing Expensive Activity	Solution(s) to Avoid Expensive Activity
Inhibition and self-control	The brain self-regulating, making an effort to prevent unwanted signals from becoming behavior. Emotion may be triggered but need to stay logical and on task.	Patient or family member threatening towards clinician. _____ Series of many patients with severe injury or illness.	Close collaboration with Public Safety or Security team coupled with de-escalation training to empower clinician to avoid further violence. _____ Establishing formal culture of esprit de corps, clinicians supporting each other tangibly, emotionally, and informationally.
Emotional labor	Regulating one's own emotions while also counseling grieving families or anxious patients.	Death in Operating Room (OR), next case wheeled in. Giving support to grieving families.	Establish debriefing routines (provide effective communication framework), create peer support groups, build institutional culture of expecting clinician to be able to take a break to recuperate.
Prioritization	The act of determining the importance and value of one or more elements compared to a series of others. Requires deep engagement with concepts/material.	Busywork conflated with virtuous work expected in the calling of going into Medicine.	Acknowledge halo bias on how some requirements may need to be done and termed safety related, but not to lose big picture on what is foremost importance. Leaders and clinicians cooperate to identify effective and ineffective metrics. Organize the increasing number of educational mandates in one place to keep track of total mandatory load. Determine what is satisfactory and sufficient to meet requirement, then other material as voluntary if clinician interested to learn more. Consider enduring material repository to pull up information when clinically needed. Employ human factors experts as part of full-time hospital staff or as consultants collaboratively with clinicians.

Application of HFE in Healthcare Environments

"Expensive" Cognitive Activity	Definition of Expensive Activity	Situation(s) Forcing Expensive Activity	Solution(s) to Avoid Expensive Activity
High stimulus density	Constant information processing and constant need to respond to people or the environment.	Shortened patient visits to increase through-put, push for high Relative Value Units (RVUs) in clinical time.	Leadership work with clinicians to create 'credit' for all missions of the institution: Teaching, patient care, research. Hire additional staff to increase patient volumes, rather than increase load of current staff.
Negative transfer	Incorporating previously learned behaviors while learning new procedures.	Hospital purchased IV pumps from multiple vendors, and key elements of their interfaces conflict.	Standardization of IV pump equipment across the institution. Participatory management of clinician input into device purchasing.
Lack of cognitive restoration	An individual is unable to eat, sleep, or create a restorative cognitive environment between draining events, leaving them less equipped to perform at their peak during the second of the two events.	Writing clinical notes in the evening or on weekends when home, unable to engage with significant other, children, friends or hobbies. Maintenance of Certification (MOC) requirements that require activities over and above what occurs in daily clinical practice.	Implement culture change campaign explicitly discouraging work outside of Work (WOW). Work with Risk Management, Billing, Compliance and Patient Safety efforts to eliminate "note bloat" which adds no clinical value to documentation. As an institution, coordinate activities that count for MOC requirements for conservation of energy, economy of scale.

Key Take Aways

1. Clinician brain power (cognitive resource) is a limited, highly trained resource. Should be budgeted and optimally used, as you would consider budgeting other resources in healthcare delivery.

2. Unnecessary mental (cognitive) load on clinicians, burnout and latent error can be mitigated or prevented by leadership knowledge of basic human factors/ergonomics concepts.

3. Patient safety/ quality improvement efforts and burnout reduction efforts can have greater impact by leadership application of human factors/ergonomic (HFE) principles than over-focus on end result metrics that is current practice in both realms.

Thank you !

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The following AMA resources are available to support your physicians and staff:

- Caring for Caregivers during COVID-19
- AMA COVID-19 Resource Page for Physicians
- JAMA COVID-19 Collection
- Steps Forward™
- Telehealth Implementation Playbook
- Behavioral health integration in physician practices

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Upcoming programming

July 20

Promising practices to support physician well-being during COVID-19: A case study from EvergreenHealth

Betsy Hail and Pratima Sharma, MD

August 10

Implementing innovative solutions with an equity lens

Urmimala Sarkar, MD, and Courtney Lyles, PhD

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For questions, please email:

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