

# Biopsychosocial Approach to Wellness, Safety and Quality

## Module 2. Integrative Model: Patient Safety and Clinician Wellbeing Series

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Professor of Psychiatry

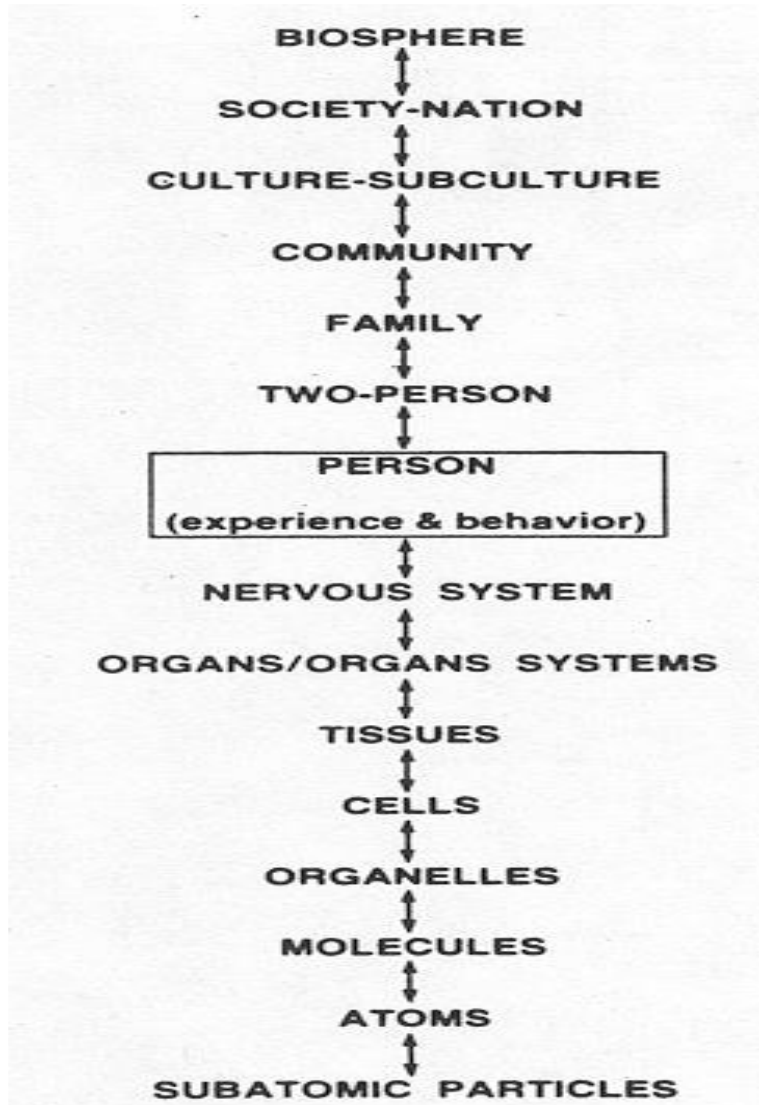
Director, Medical Faculty and Clinician Wellness Program

University of Rochester Medical Center

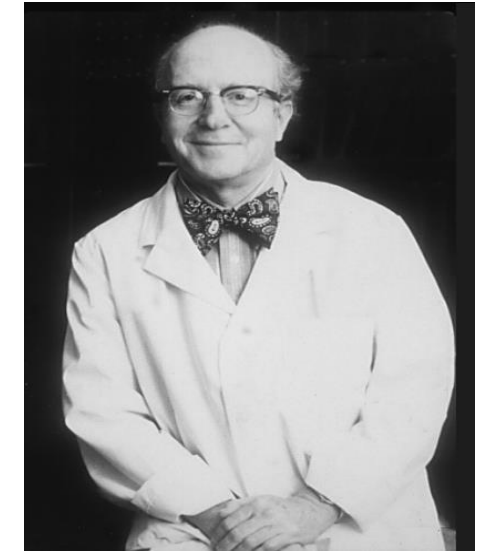
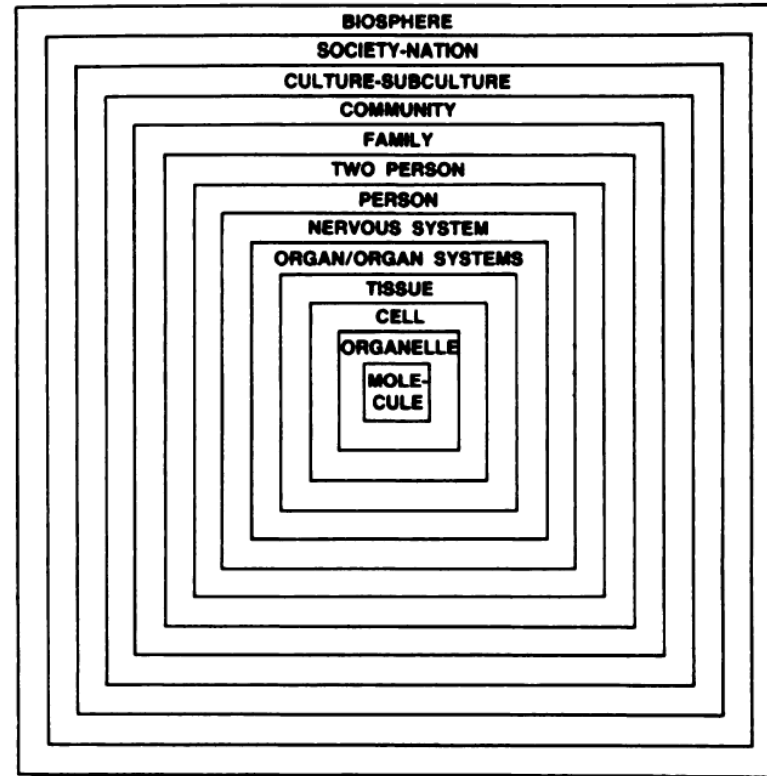
Chair, MSSNY Task Force on Physician Stress and Burnout.

# Biopsychosocial Model

## Hierarchy of Natural Systems



## Continuum of Natural Systems



George Engel MD  
1913-1999

Am J Psychiatry May 1980

# Occupational Stressors that Contribute to Burnout

## Six categories of Work Stress that can contribute to Burnout

1. **Excessive workload**-physical, cognitive and emotional
2. **Lack of control**- being able to influence work environment
3. **Poor balance between effort and reward** –material and intangible rewards.
4. **Lack of community**- culture of mutual appreciation and teamwork
5. **Lack of fairness**- resources and justice
6. **Value conflict**- moral distress of having to participate in suboptimal, unethical circumstances.

Maslach C, Leiter MP. The Truth About Burnout: How Organizations Cause Personal Stress and What to Do About It. San Francisco, Calif: Jossey-Bass; 1997.

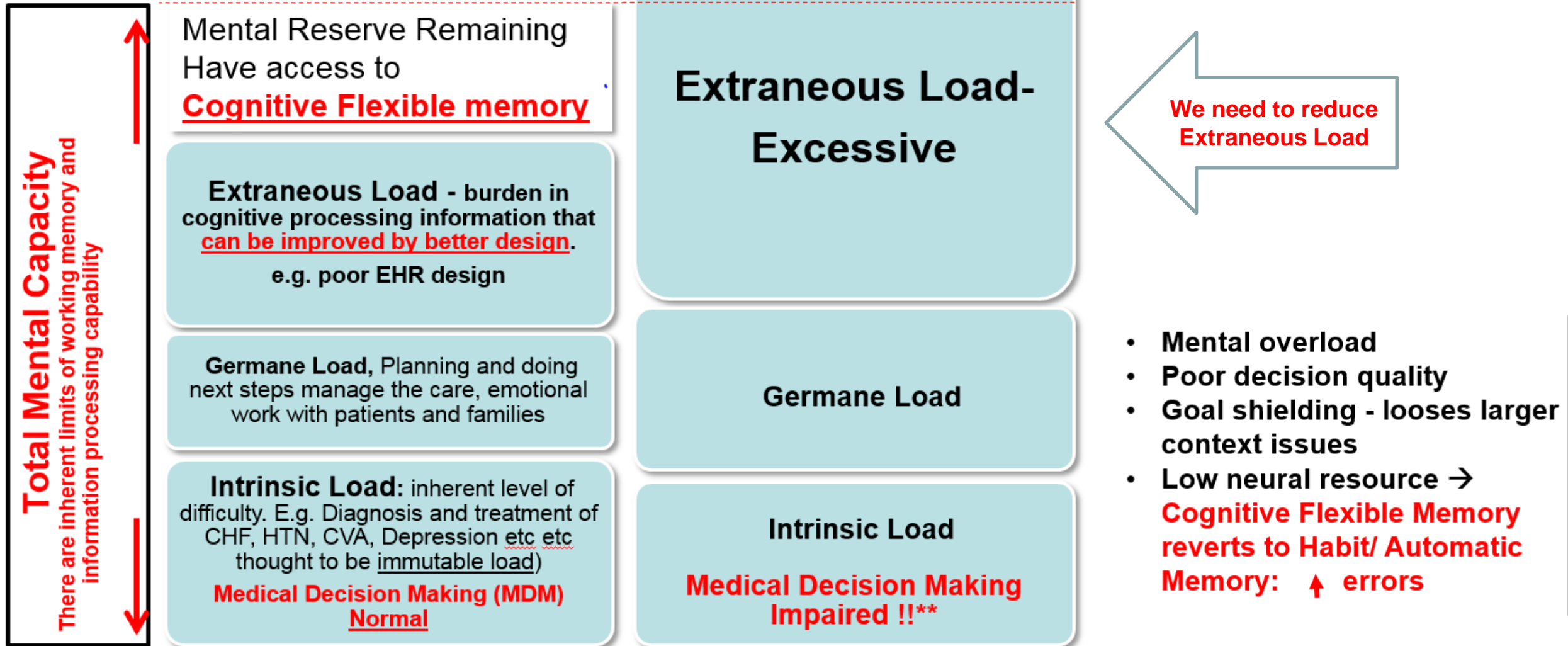
## Top 10 Work Related Stressors in NYS Physicians

Rank Order	Description	% Responses
1	Length and degree of Documentation Requirements	65.99%
2	Extension of Workplace into Home Life (E-mail, completion of records, phone calls)	58.27%
3	Prior Authorizations for: Medications/Procedures/Admissions	54.74%
4	Dealing with difficult patients	51.89%
5	EMR functionality problems	51.05%
6	CMS/State/Federal laws and regulations	44.33%
7	Lack of voice in being able to decide what good care is	40.39%
8	Hospital/ Insurance company imposed Quality Metrics	38.87%
9	Dealing with difficult colleagues	31.49%
10	Requirement for increased CME/ Maintenance of Certification	31.49%

MSSNY Survey Fall 2016

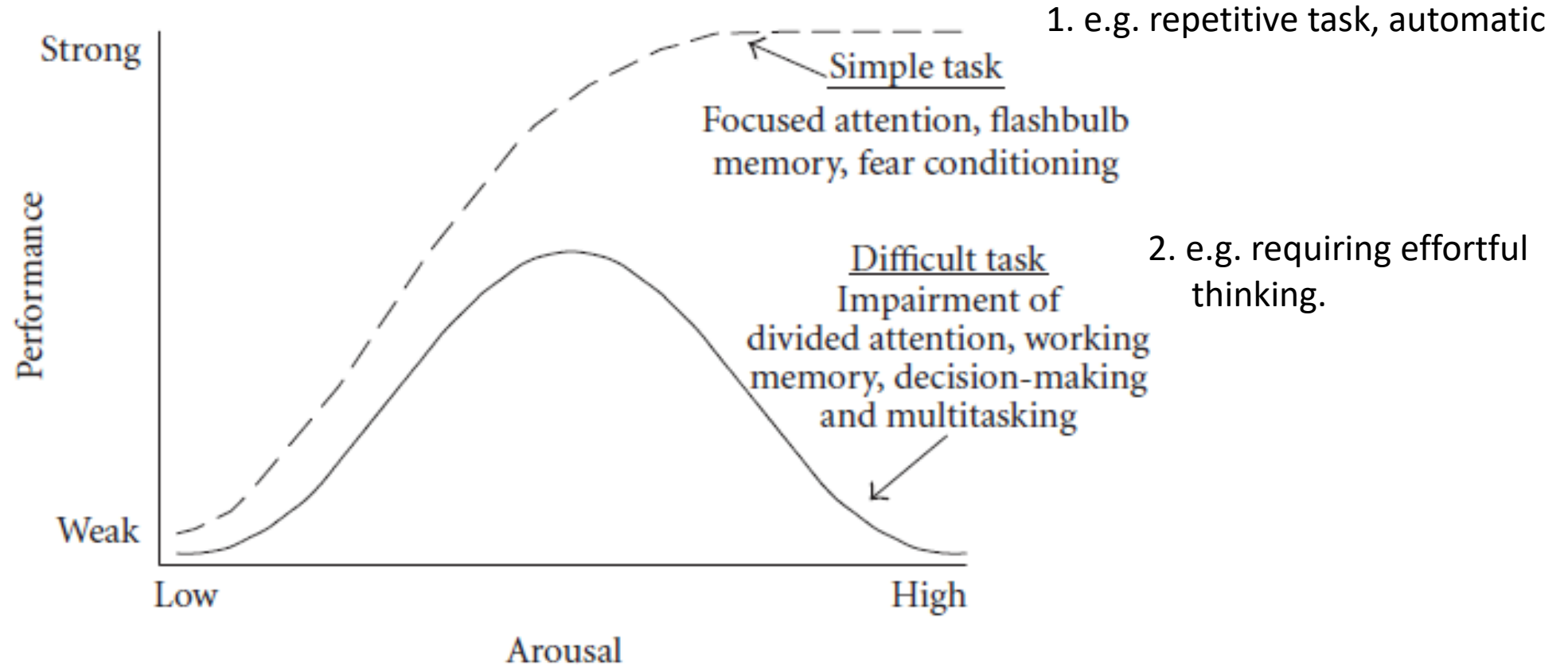
**80% are organizational/systemic**

# Cognitive Load Theory



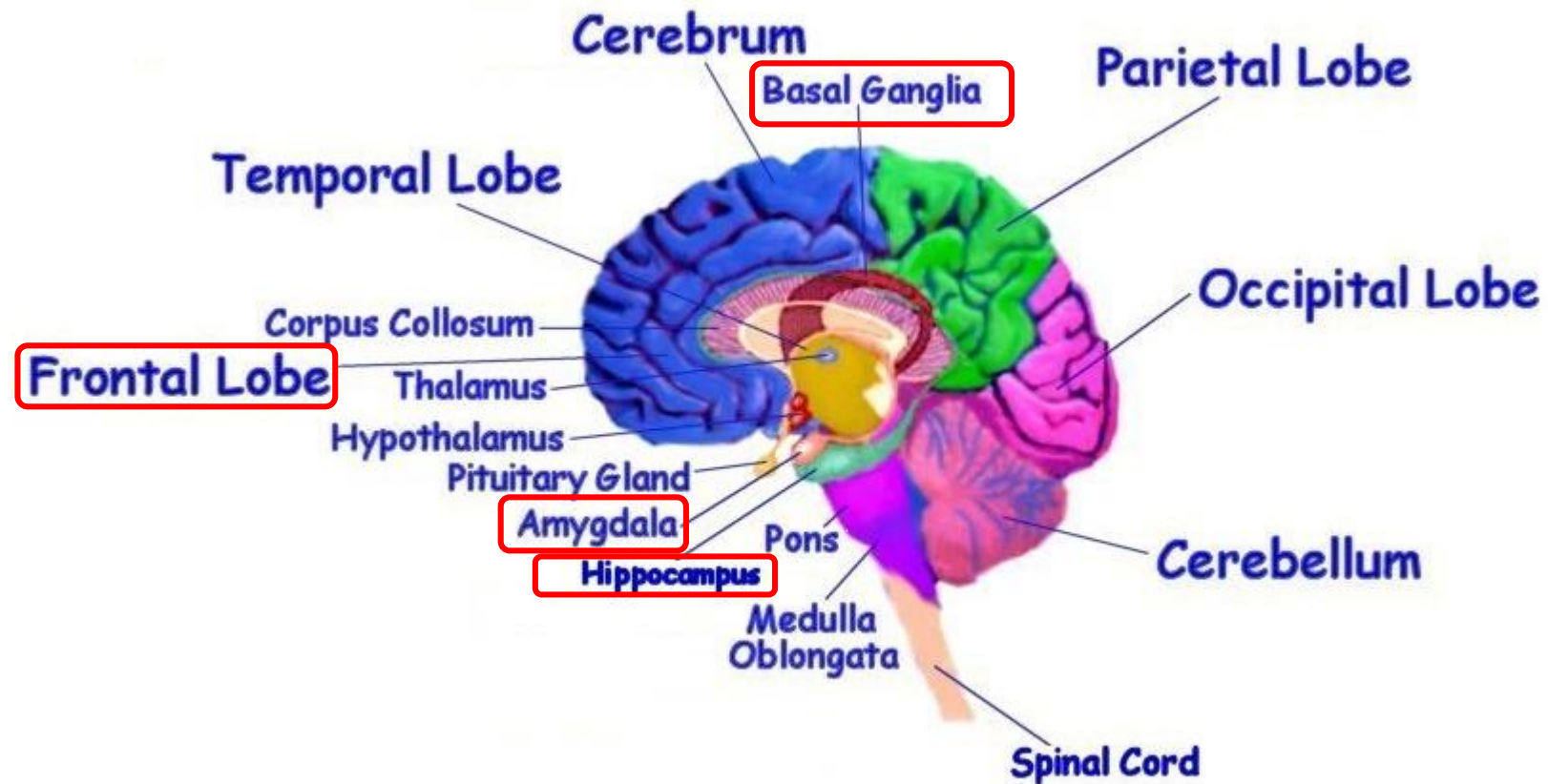
# Yerkes-Dodson Law

(Performance effect when demand goes up)




Diamond DM, Campbell AM, Park CR, Halonen J, Zoladz PR  
Neural Plasticity Article ID 60803, 1-33, 2007.

# Key Relevant Structures of the Clinician's Brain



# Neural Resources (why patients see us)

- **Neural Resources= brain power= synaptical currency= brain capital**
- **Brain comprised of living cells, require glucose and oxygen.**
- **Need to be recharged with use.** 

## Executive Function of Brain

(Controlled through Pre-Frontal Cortex)

Controls the ability to:

- Focus
- Keep attention
- Self-control of behavior and speech
- Planning
- Organizing
- Perspective taking
- Cognitive flexibility
  - (to consider a good differential diagnosis)
- Medical and other decision making
- Ability to defer gratification
- Estimating time
- Working memory

## Other neural resources

(interact with executive function)

From other brain structures

- Memory
- Knowledge base
- Creativity
- Problem solving
- Experience
- Applied wisdom
- Depth perception
- Motor control, fine and gross.

# Executive Function Neural Resource--Used Up in These Processes:

- Focusing of attention
- Decision making ( no matter the size of decision)
- Sorting, classifying
- Multitasking, getting back on track after interruption.
- Re-routing or switching from one mental task to another.
- Maintenance of goals
- Maintenance of information active in working memory
- Updating working memory
- Self-regulation: professionalism, self-effacement despite how treated,  
Maintaining “Aequinimitas” in setting of bleeding, injury, pain, etc.
- Emotion work: dealing with bad outcomes, distressed patients and families





# Human Function Curve in Average Provider/Staff

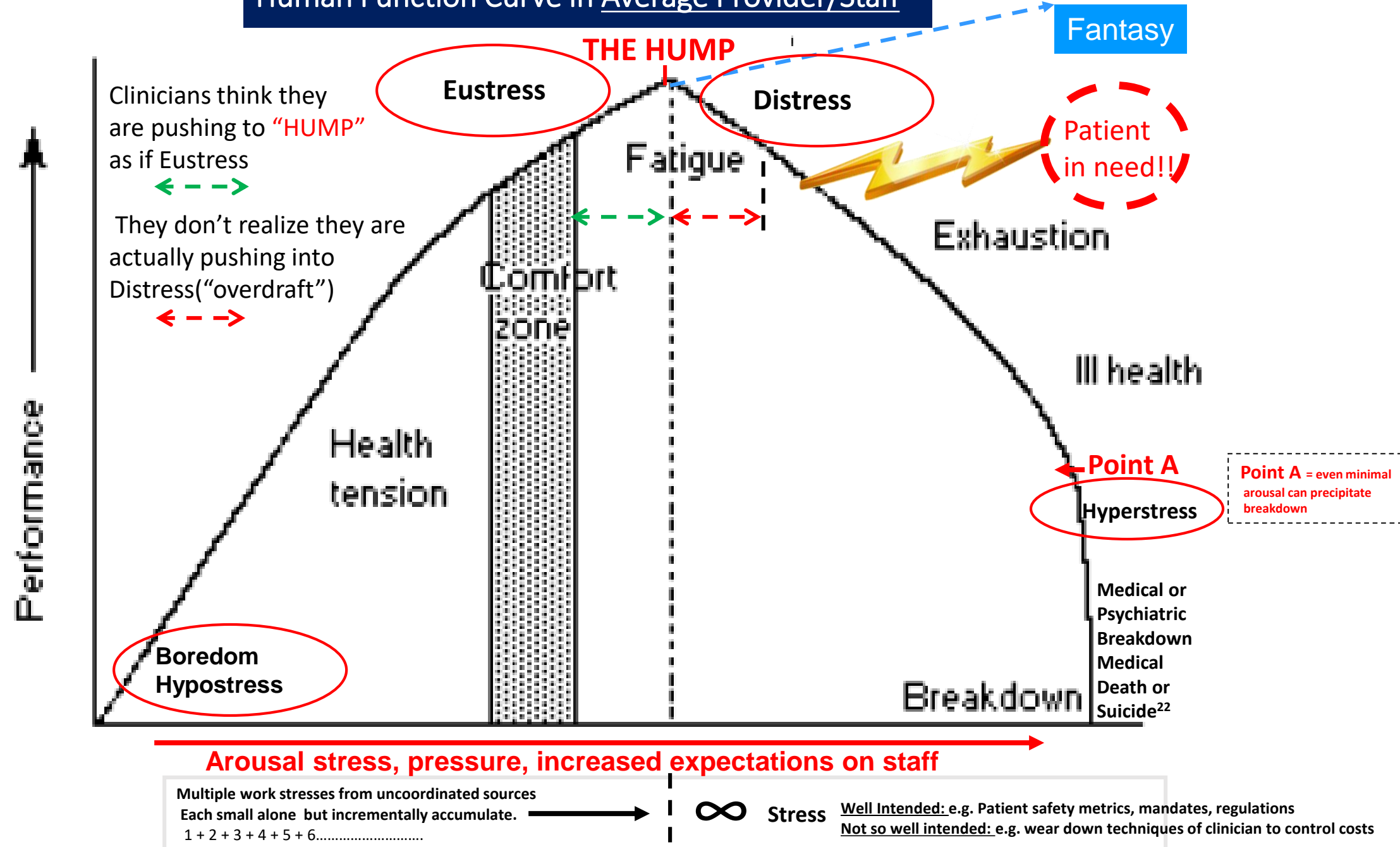
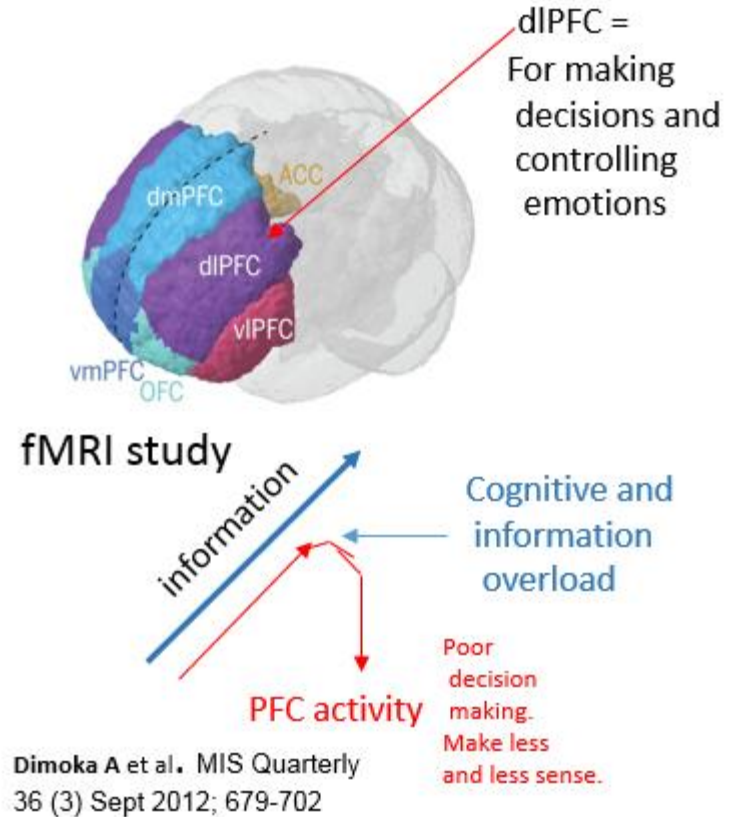
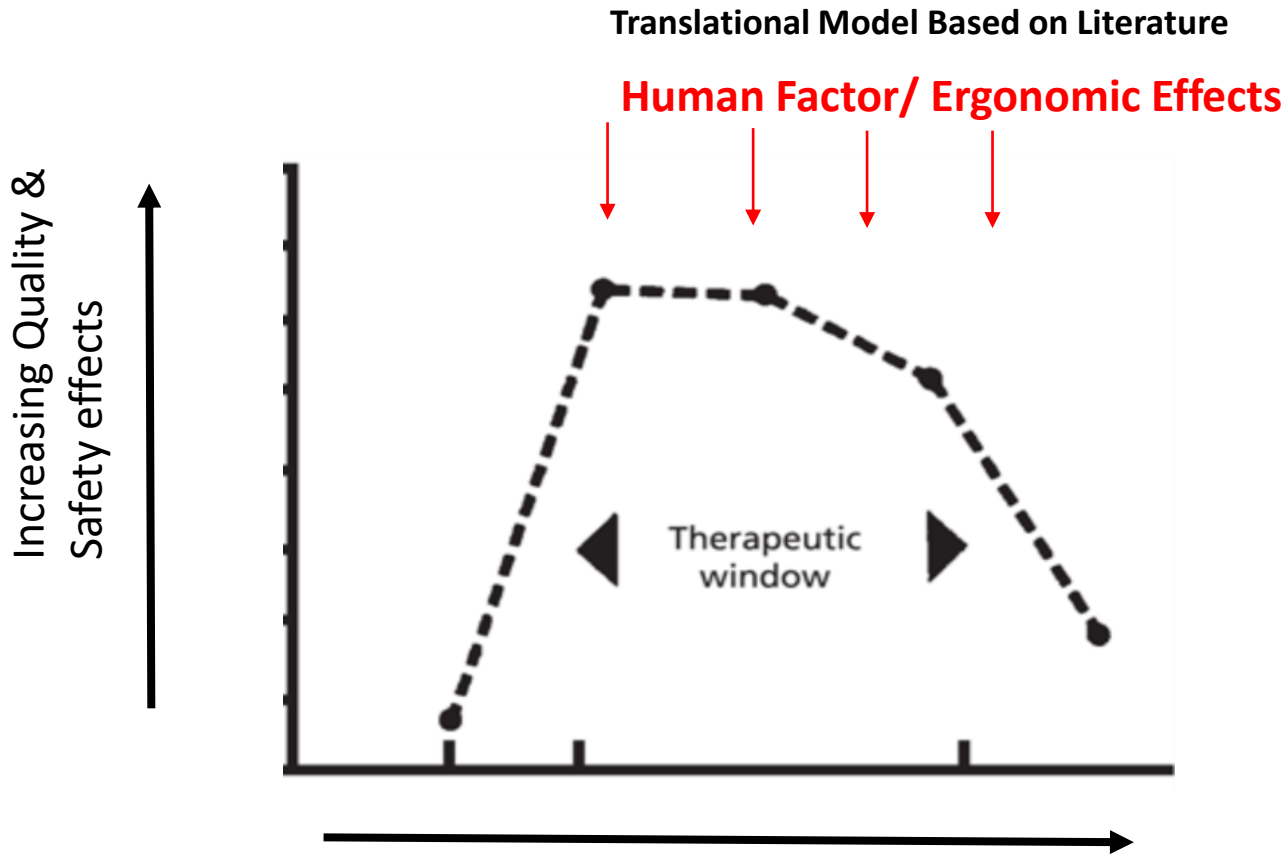


Figure 1. Adapted from: Nixon PGF. The Practitioner. (217):765-770. 1976<sup>23</sup>

# 'Therapeutic Window' for Optimal Quality and Safety



Numeric increase of quality metrics, mandates, regulations, laws, "guardrails", policies, requirements, certifications.

Model built from:

- Friedberg, M.W., et al., *Factors Affecting Physician Professional Satisfaction and Their Implications for Patient Care, Health Systems, and Health Policy*. RAND Corporation, 2013.
- Salyers, M.P., et al., *The Relationship Between Professional Burnout and Quality and Safety in Healthcare: A Meta-Analysis*. J Gen Intern Med. 2017. 32(4): p. 475-482.
- Oie K.S. and McDowell K, *Neurocognitive engineering for systems development*. Synesis: A Journal of Science, Technology, Ethics and Policy, 2011. 2: p. T26-37.

- Privitera MR, Plessow F, Rosenstein AH. , *Burnout as a Safety Issue: How Physician Cognitive Workload Impacts Care*. National Patient Safety Foundation e-News. August 24, 2015.
- Berwick, D.M., S. Loehrer, and C. Gunther-Murphy, *Breaking the Rules for Better Care*. JAMA, 2017. 317(21): p. 2161-2162.
- Friedberg, M.W., *Relationships between physician professional satisfaction and patient safety*. Rand Corporation Blog post, 2016.
- Erickson SM, Rockwern B, Koltov M, McLean RM.; for the Medical Practice and Quality Committee of the American College of Physicians. *Annals of Internal Medicine*.166: 659-661. 2 May 2017

# Health Profession Human Limitation Dangers Recognized

## Nurses

NY STATE NEWS

February 6, 2016

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**New York Nurses Urge State Staffing Law.**

NYS nurses calling on state legislature to set **minimum staffing levels** for hospitals and nursing homes to “improve patient outcomes by addressing a chronic staffing problem”

## Pharmacists

Campbell J. **North Carolina** Supreme Court holds that board of pharmacy may regulate pharmacist working conditions. *Rx Ipsa Loquitur*. 2006;33:1,10-11.

- **Recommend no more than 10-20 prescriptions filled per hour/150 in a shift.**
- Sends a message to ownership that it has a responsibility for reasonable employee scheduling and can share in the consequence of high-volume dispensing which produces errors.

# Sources of Emotional influence on Clinical Performance

- **Ambient-induced**

1. *Transitory affective state*: mood states which are not caused by a single stimulus but an accumulation of experiences.
2. *Environmental*-heat, cold, noise
3. *Stress*, time pressure, fatigue, under threat (happens also if overwhelmed)
4. *Other*- unapproachable, rude or demeaning colleague

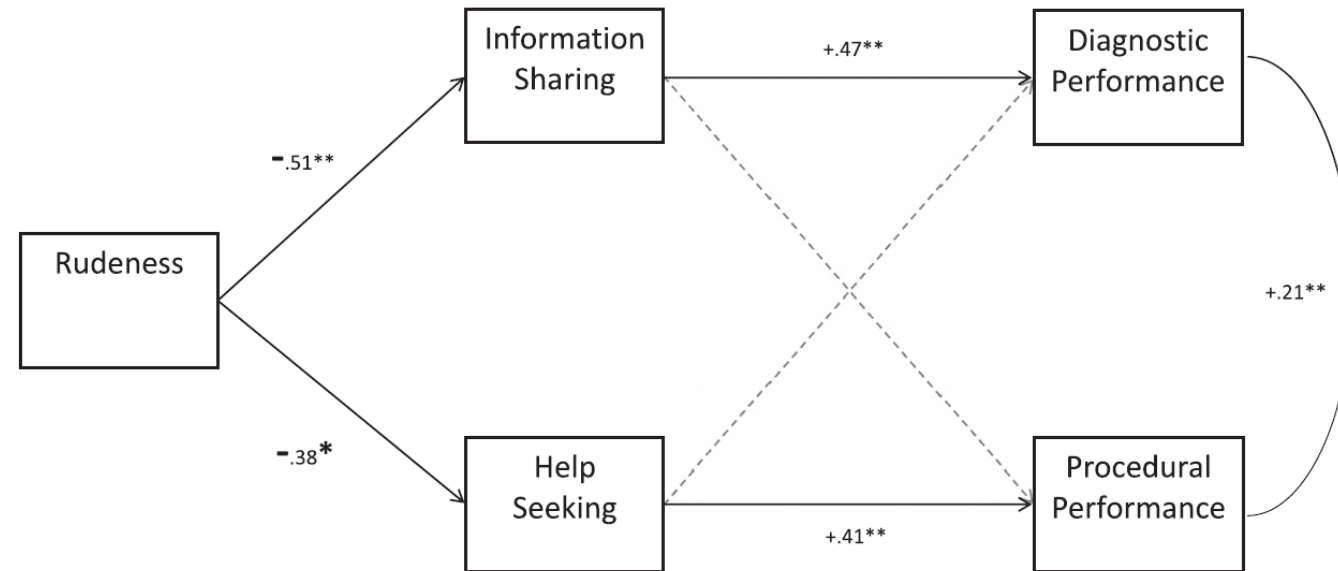
- **Clinical situation-induced**

1. *Counter transference*: feelings induced in you that color your perceptions of someone
2. *Fundamental Attribution error*: Overemphasize personal characteristics and ignore situational factors in judging others' behavior.
3. *Specific affective biases*: Mood state of individual affects interpretation of incoming information.

- **Endogenous**

1. *Circadian, number of hours awake, seasonal mood variation*
2. *Mood and Anxiety Disorders*
3. *Emotional dysregulatory states*- frustration, anger.

# Effect of Rudeness in Healthcare Delivery



**FIGURE 1**

Path model of the effect of rudeness on performance, mediated by information-sharing and help-seeking. Numbers denote standardized coefficients for the mediation path shown by the arrow. The relationship between information-sharing and help-seeking was 0.37.\* The relationships between information-sharing and procedural performance and between help-seeking and diagnostic performance were not significant. \* $P < .05$ , \*\* $P < .01$ .

PEDIATRICS Volume 136, number 3, September 2015

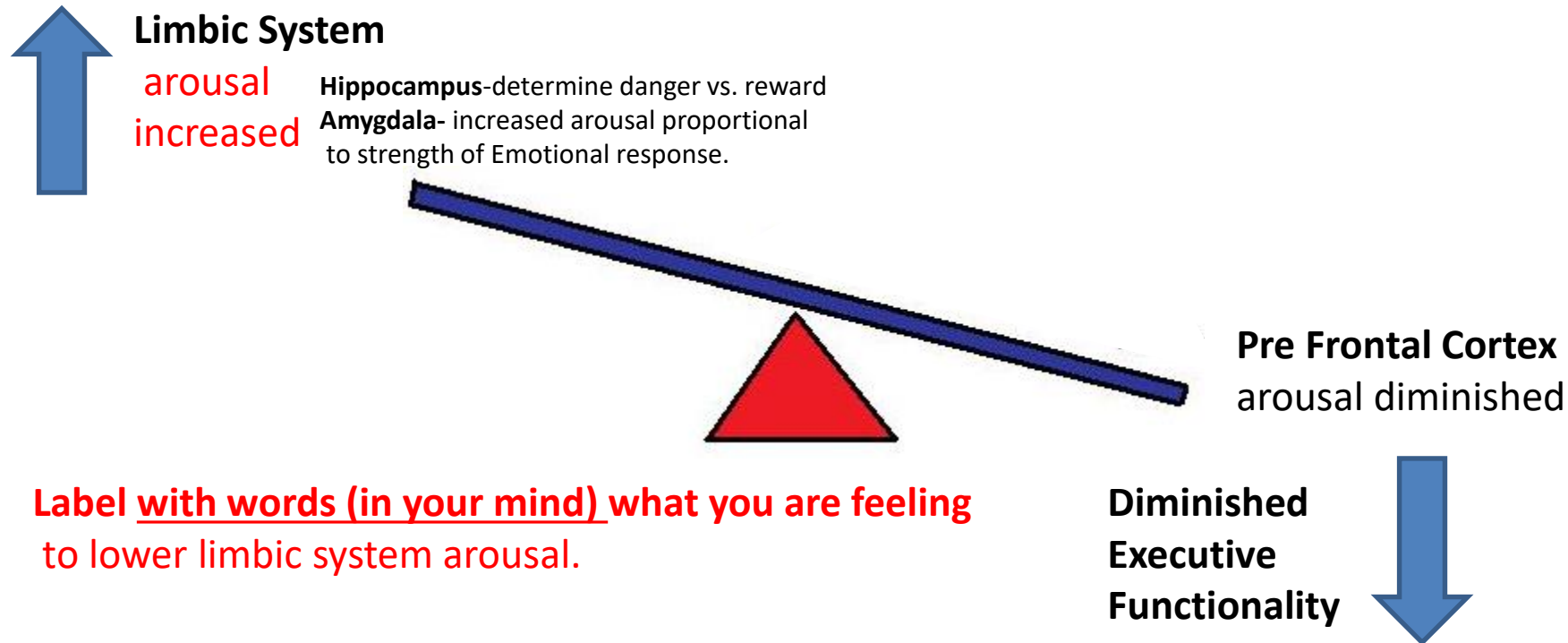
## The Impact of Rudeness on Medical Team Performance: A Randomized Trial

Arieh Riskin, MD, MHA<sup>a,b</sup>, Amir Erez, PhD<sup>c</sup>, Trevor A. Foulk, BBA<sup>c</sup>, Amir Kugelman, MD<sup>b</sup>, Ayala Gover, MD<sup>d</sup>, Irit Shoris, RN, BA<sup>e</sup>, Kinneret S. Riskin<sup>e</sup>, Peter A. Bamberger, PhD<sup>a</sup>

**Have you ever been on the receiving end of rudeness from a colleague, patient or family of patient?  
How did it effect your thinking at the time?**

# Chronic Stress Leading to Perception of Threat to Wellbeing

1. Cognitive overload, emotion work, other forms of “shadow work”\*
2. Frustration from over expectations
3. Continued demands but not enough internal and external resources
4. Chronic elevated Allostatic load #.



\* **Shadow work** -- Unseen, unmeasured, unpaid jobs that fill your day.

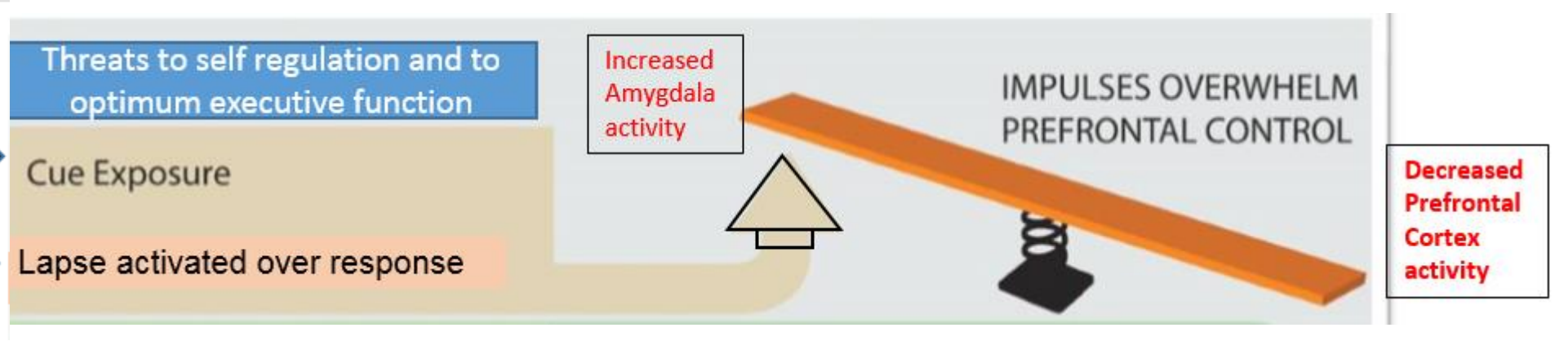
# **Allostatic load**—wear and tear physiologically from chronic or repeated exposure to stress.

# Struggle Between the Emotional Brain and the Wise Brain

## Examples:

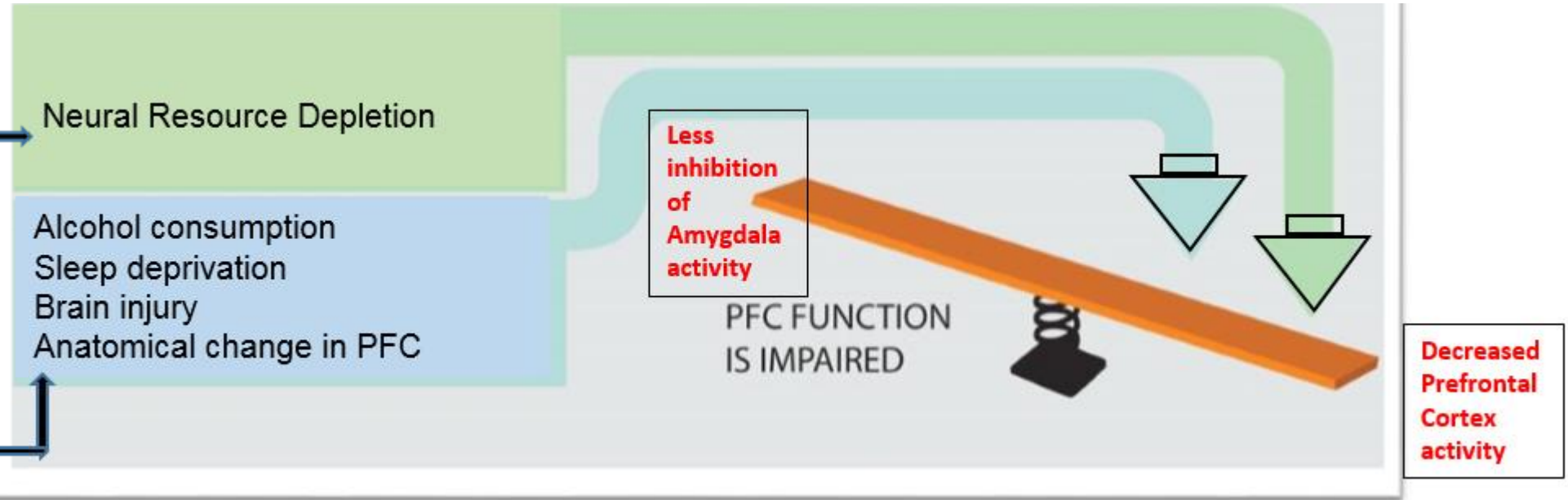
Difficult patient, violence staff bullying, disruptive behavior. EMR frustration

Self effacement, professional self control. Over time leading to resource depletion that decreases PFC control.



**Coping** with multiple factors that thwart good care. Emotion work with death, illness, families grieving. Work arounds from poor functionality. Poor EMR interface design. Organizational problems requiring extra work as result.

**Chronic occupational stress & Burnout, Depression**



# Biologic Changes of Burned Out Individual

1. Hormonal: Chronic **cortisol** changes lead to **plaques on coronary arteries**.
2. Neurotransmitter: Excess **glutamate** decreases grey matter of Basal ganglia which **decreases fine motor control**
3. Anatomical changes:
  - Thinning of **Pre-frontal cortex** affects **ability to focus, attention, quality of medical decision-making**
  - Enlargement of **Amygdala** creates **increased reactivity to stress**
  - **Hippocampus** shrinking **reduces short term memory, then long term memory**

→ Creates head MRI findings **similar to early life trauma individuals**



# Odds Ratio for Major Depression, by Degree of Burnout Symptoms <sup>[1]</sup>

Burnout* Level	None	Mild	Moderate	Severe
Odds ratio for having Major Depression#	<b>2.99</b> (95% CI: 2.21-4.06)	<b>10.14</b> (95% CI: 7.58-13.59)	<b>46.84</b> (95% CI: 35.25-62.24)	<b>92.78</b> (95% CI: 62.96-136.74)
CI = confidence interval				

- **Burnout\*** is a **work related condition** in the context of a work setting. Intimates job strain and high occupational stress. **This term helps focus solutions that need to be organizational and individual.**
- Occupational stress: **"the harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources or needs of the worker. Job stress can lead to poor health and even injury."**<sup>[2]</sup>
- **Major Depression#** is a **clinical condition**, is considered Personal Health Information (PHI) that is confidential.

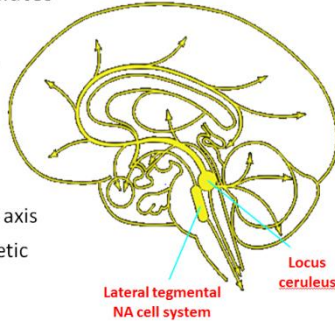
1. From: Privitera MR. Is Burnout a form of Depression? It's not that simple. Medscape Psychiatry. May 16, 2018. Table built from data in: Wurm W, Vogel K, Holl A, et al. Depression-burnout overlap in physicians. PLoS One. 2016;11:e0149913.  
 2. Exposure to stress: occupational hazards in hospitals. Centers for Disease Control and Prevention. July 2008. [Source](#) Accessed April 12, 2018.

# Several Neurotransmitters Are Involved in Coping: With Deficits showing in Behavior and Mood

## Role of Norepinephrine in the CNS

Norepinephrine modulates

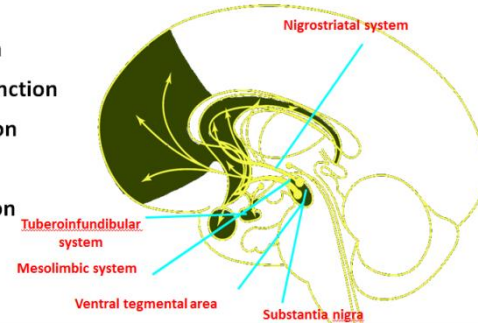
- Mood
- Learning and memory
- Arousal
- Regulation of sleep-wake cycle
- Regulation of hypothalamic-pituitary axis
- Regulation of sympathetic nervous system



## Role of Dopamine in the CNS

Dopamine modulates various brain functions

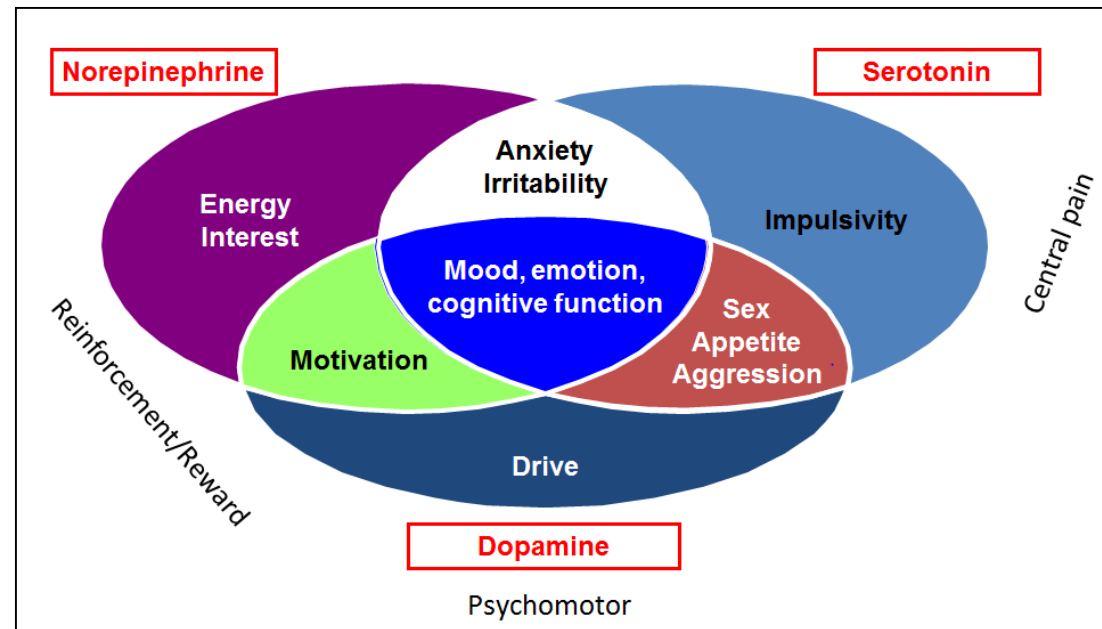
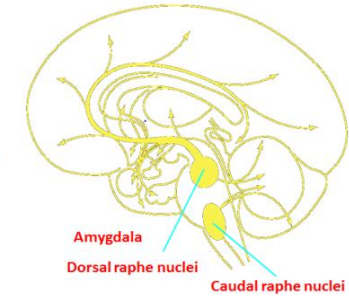
- Mood
- Cognition
- Motor function
- Motivation
- Drive
- Aggression
- Pleasure



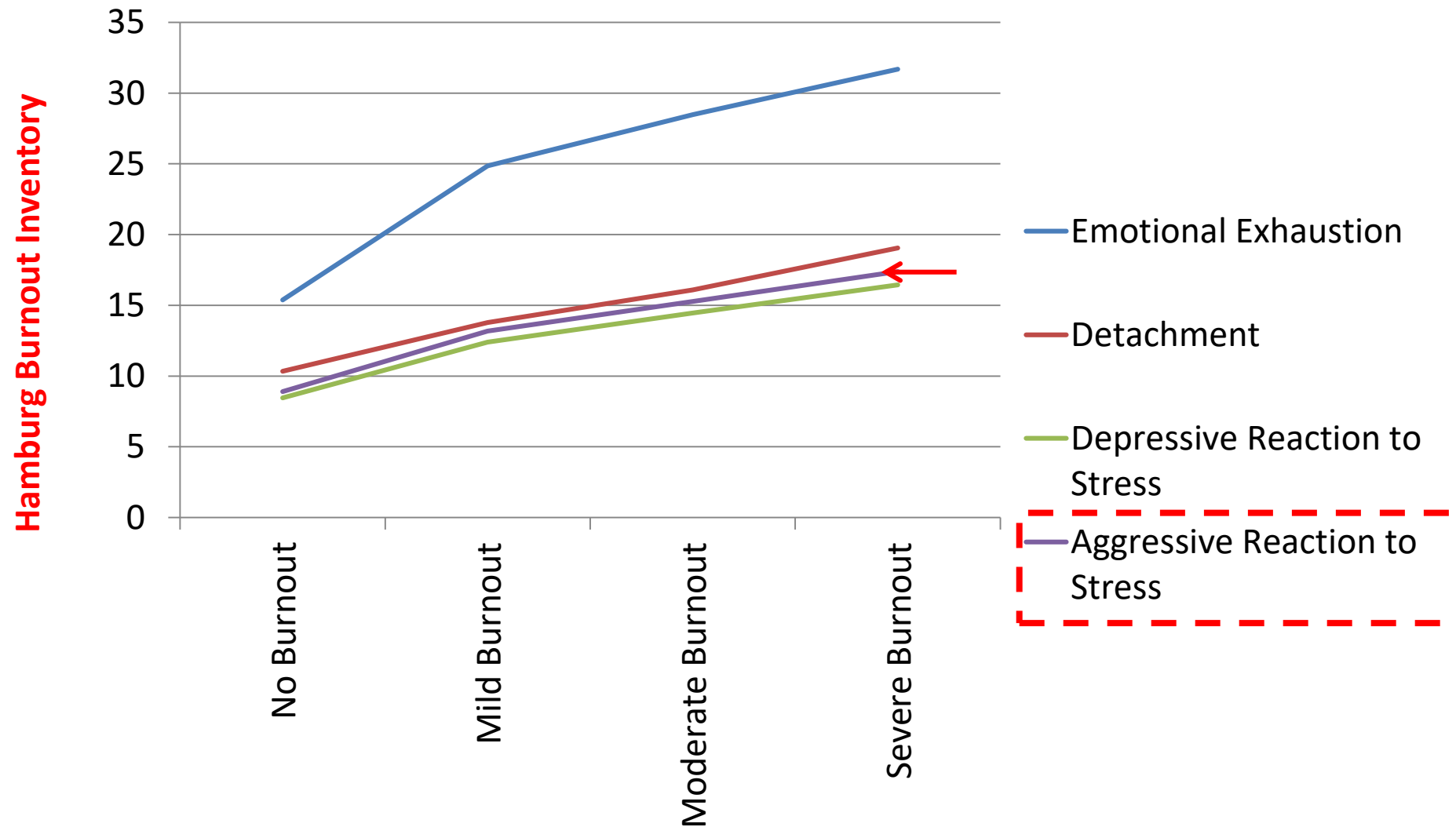
## Role of Serotonin in the CNS

Serotonin modulates various brain functions

- Mood
- Sleep
- Cognition
- Anxiety
- Sensory perception
- Temperature regulation
- Nociception (eg, migraine headache)
- Irritability
- Appetite
- Sexual behavior

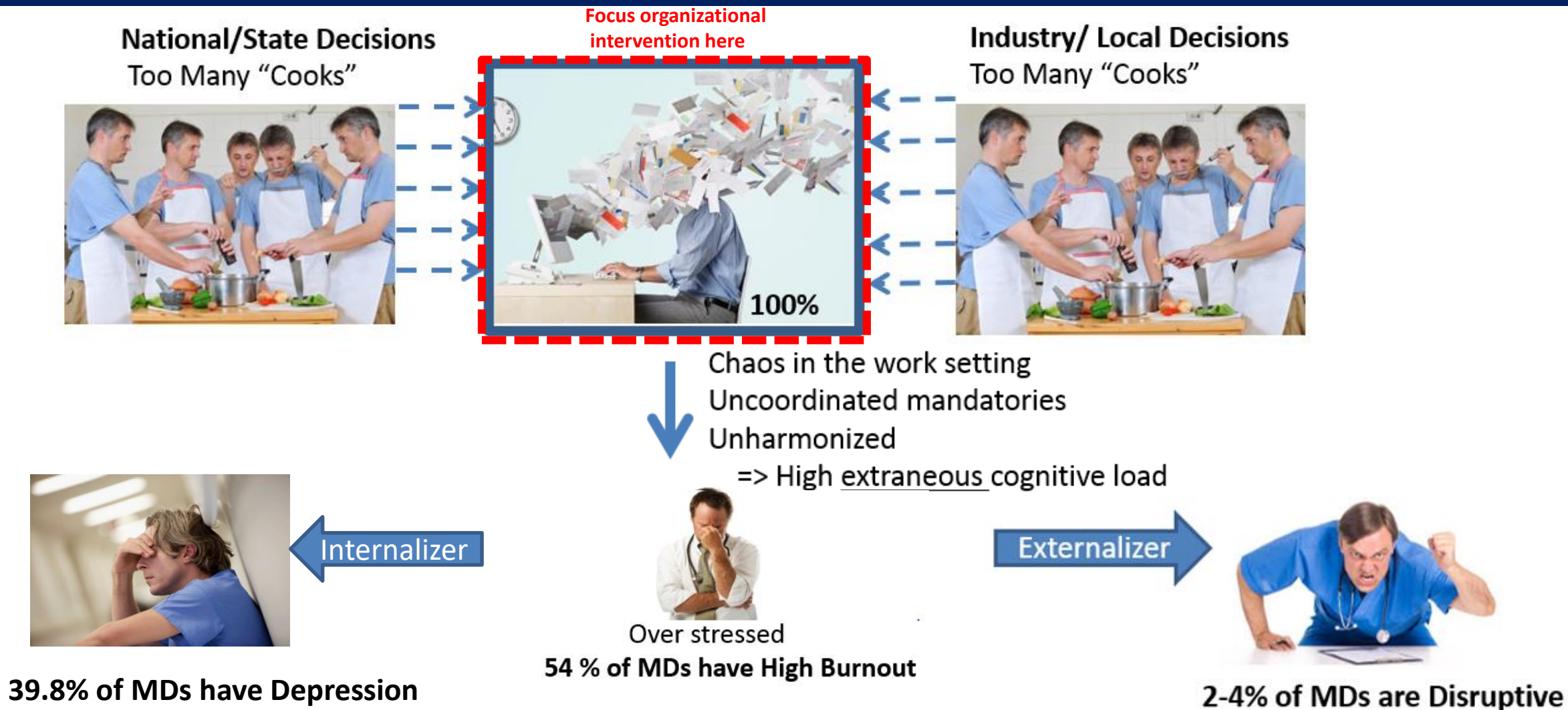


# Depressive and Aggressive Reactions to Stress in Burnout (Dose-Related)



# Burnout, Depression, Disruptive Behavior

(MD population example).



# Decision Fatigue

## Consequences of Using Up Neural Resources (Despite adequate fund of knowledge)

Antibiotic Stewardship Program (ASP)

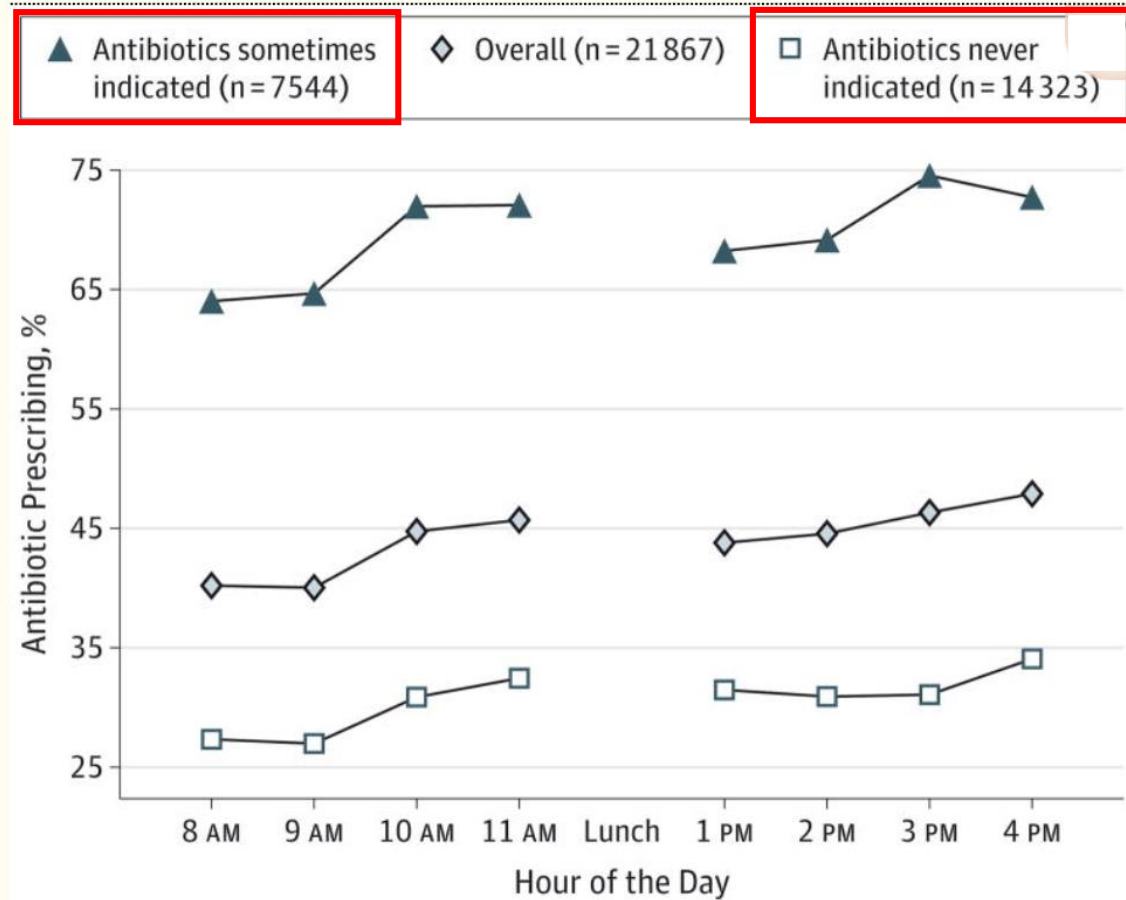
### Risks of inappropriate antibiotic use:

- Increased morbidity, mortality, length of stay
- Antibiotic resistance
- Adverse events, including *C. difficile* infections
- Increased direct and indirect costs of care

Human factors effect on quality of clinical decision making.

# Decision Fatigue and Quality of Later Decisions.

Decision fatigue progressively impairs clinician's ability to resist ordering inappropriate treatments

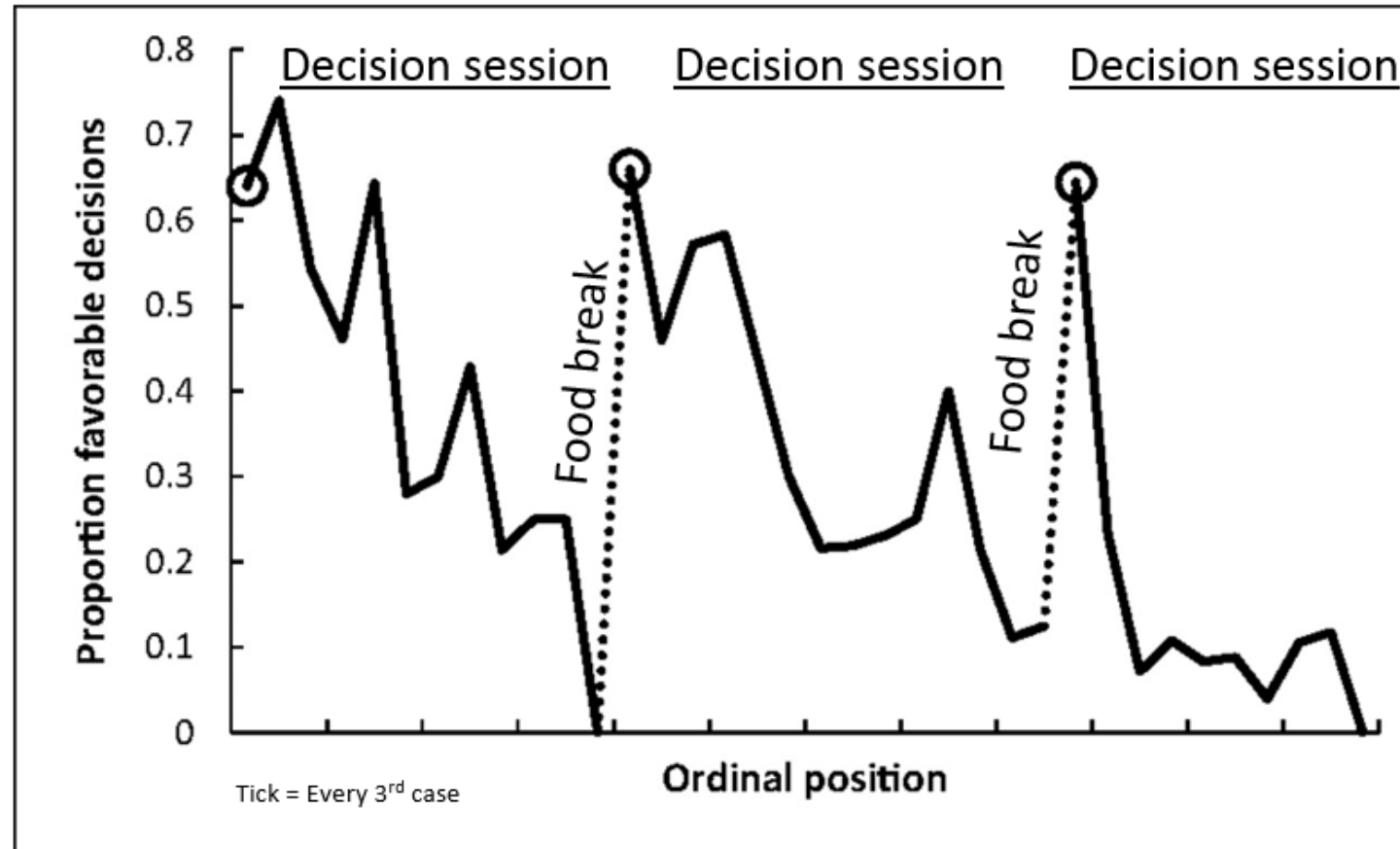


**Antibiotic Prescribing by Hour of the Day**

- **Antibiotics never indicated:** Acute Bronchitis, non-specific respiratory infection, influenza and non streptococcal pharyngitis.  $P < 0.002$  for antibiotics never indicated.
- **Antibiotics sometimes indicated:** Otitis Media, sinusitis, Pneumonia, and streptococcal pharyngitis.  $P < 0.001$  for antibiotics sometimes indicated

# Does the outcome of legal cases depend solely on laws and facts?

Do judges apply legal reasons to the facts of a case with rational, mechanical, and machine-like logic?



**Proportion of rulings in favor of the prisoners by ordinal position.**

**What kind of remedies may help this decision fatigue?**



# Remedies for Decision Fatigue

- Time-dependent decision support
- Modified schedules
- Shorter sessions
- Mandatory breaks
- Snacks\*

\*Danziger S, Levav J, Avnaim-Pesso L. Extraneous factors in judicial decisions. *Proc Natl Acad Sci U S A*. 2011;108(17):6889-6892.

# Burnout Effect on Cognitive Function

Cognitive Function	Greatest impact Cohen's d value/ Effect Size	Cohen's d range <sup>a</sup>	Definition
<b>Switching</b>	-1.06 <sup>1</sup> / <b>Large</b>	0 to -1.06	<b>Kind of cognitive flexibility that involves the ability to shift attention between one task and another</b>
<b>Updating</b>	-0.93 <sup>2</sup> / <b>Medium</b>	-0.39 to -0.93	<b>Ability to respond in a flexible and adaptive manner in order to keep up with the changes in the environment</b>
<b>Inhibition</b>	-0.78 <sup>3</sup> / <b>Medium</b>	0 to -0.78	<b>The mind's ability to tune out stimuli that are irrelevant to the task/process at hand or to the mind's current state</b>
<b>Sustained Attention</b>	-1.17 <sup>4</sup> / <b>Large</b>	0 to -1.17	<b>Readiness to detect rarely and unpredictably occurring signals over prolonged periods of time</b>
<b>Control Attention</b>	-0.93 <sup>5</sup> / <b>Medium</b>	0 to -0.93	<b>An individual's capacity to choose what they pay attention to and what they ignore (concentration).</b>
<b>LT Memory</b>	-1.49 <sup>2</sup> / <b>Large</b>	0 to -1.49	<b>Information stored in the brain and retrievable over a <i>long</i> period of time, often over the entire life span of the individual</b>
<b>ST Memory</b>	-0.74 <sup>6</sup> / <b>Medium</b>	0.03 to -0.74	<b>System for temporarily storing and managing information required to carry out complex cognitive tasks such as learning, reasoning, and comprehension. Involved in the selection, initiation, and termination of information-processing functions such as encoding, storing, and retrieving data.</b>
<b>Working Memory</b>	-0.16 <sup>7</sup> / <b>Small</b>	0.13 to -0.16	<b>Not completely distinct from short-term memory. Especially refers to attentional component of ST memory. Combination of multiple components working together used to plan and carry out behavior</b>

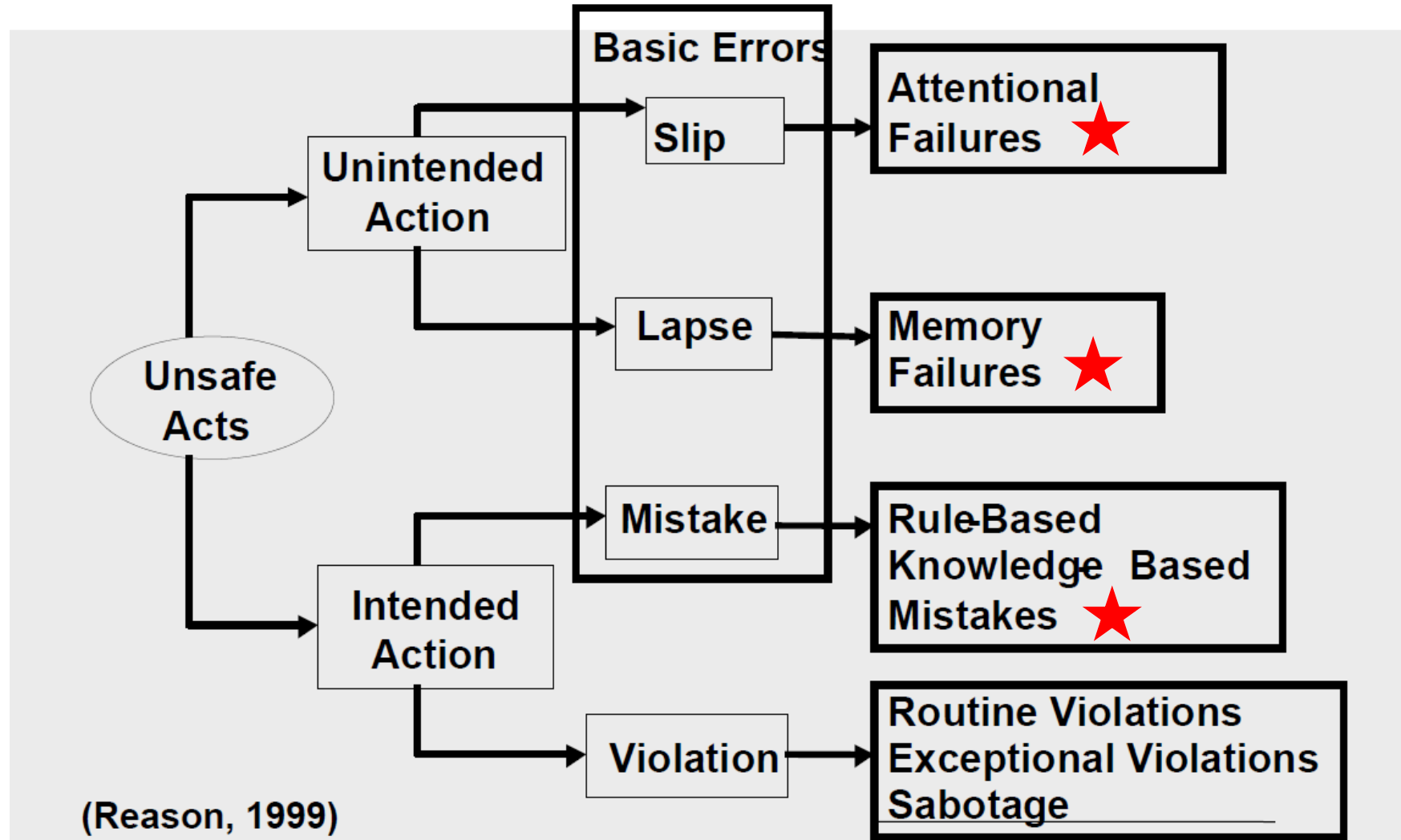
Negative Cohen's values reflect associations between **Burnout** and **cognitive impairment**.

1. Oosterholt et al 2012  
 2. Sandstrom et al 2011  
 3. Diestel et al 2013  
 4. Orena et al 2013

5. Morgan et al 2011  
 6. Ohman et al 2007  
 7. Johnsdottir et al 2013

8. Pavlos Deligkaris, Efharis Panagopoulou, Anthony J. Montgomery & Elvira Masoura (2014) Job burnout and cognitive functioning: A systematic review, *Work & Stress: An International Journal of Work, Health & Organisations*, 28:2, 107-123

# Taxonomy of Human Error

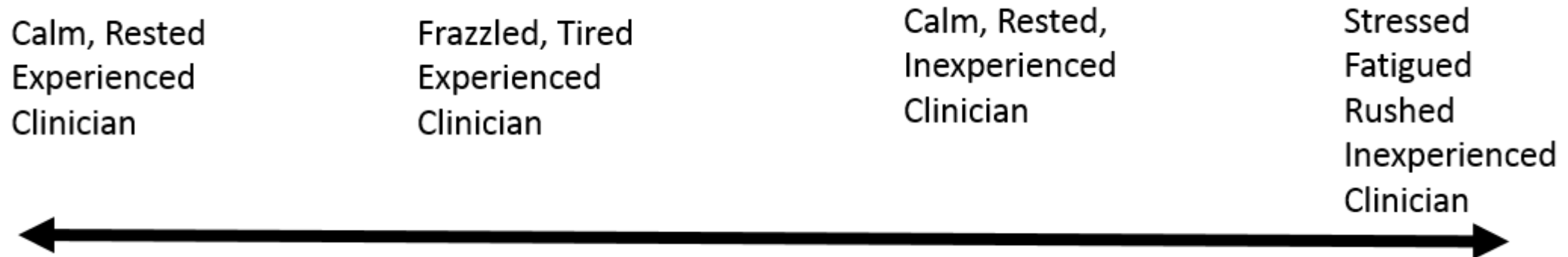


(Reason, 1999)

Affected by Neurocognitive effects of Burnout = ★

# Are “All Staff Trained and at Full Efficacy” **vs.** Continuum of Individual, Task and Environmental Factors Affecting Individual and Patient Safety

## How Can Leadership Awareness of Human Factors Improve Staff and Patient Safety?



Group together, each group pick one of four scenarios above.  
Reconvene and discuss ideas relevant to improving  
or maintaining clinician wellbeing and patient safety.

# URMC 3 Department and all APP Survey Fall 2015

At URMC-Three Department and all APP Survey October 2015

## Components of Burnout by Degree

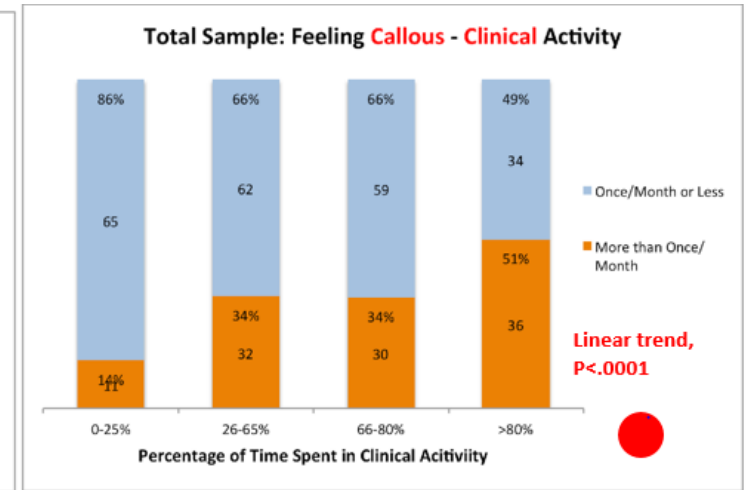
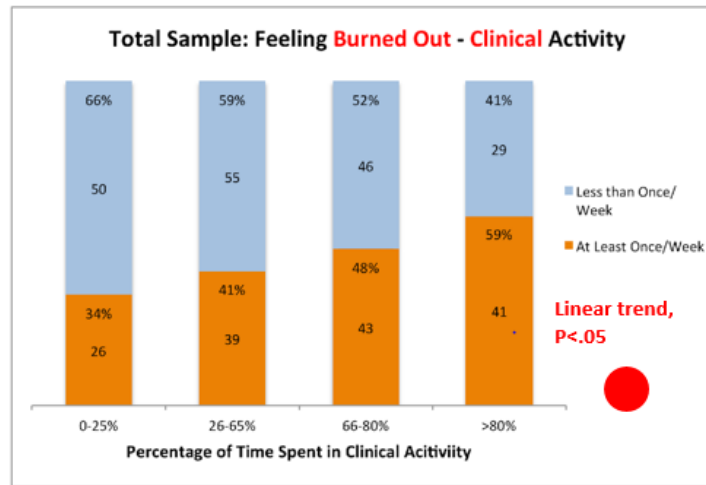
“High Burnout” Percentages

“I feel burned out from my work”  
(High Emotional Exhaustion)

MD/DO	PhD/PsyD	APP	MS/MA
42%	46%	52%	50%

“I’ve become more callous toward people since I took this job”  
(High Depersonalization)

MD/DO	PhD/PsyD	APP	MS/MA
32%	16%	45%	33%



↑ Increased burnout & callousness with increased clinical FTE + clinical/ patient work sustains meaning:  
**Something is in the way of clinicians taking care of their patients!!**

What are the top two factors that most sustain your sense of meaning in your professional work?

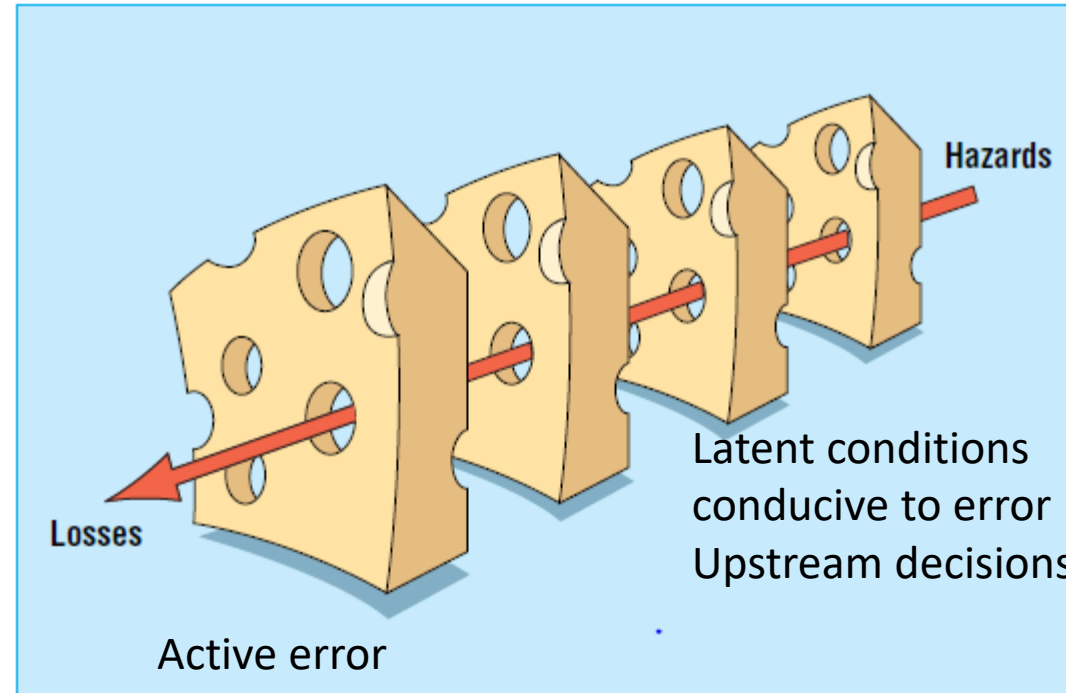
“Sustaining” Themes Mentioned by Percentage of Respondents



# Reason's Swiss Cheese Model of Defenses Against Error

## Current System's approach to error:

Humans are fallible and errors are to be expected. Central idea is countermeasures, system defenses (layers of Swiss cheese). If all holes in the defenses line up in an unfortunate way, error occurs.



The Swiss cheese model of how defences, barriers, and safeguards may be penetrated by an accident trajectory

# Measure Madness

Swiss Cheese Model  
On Steroids !



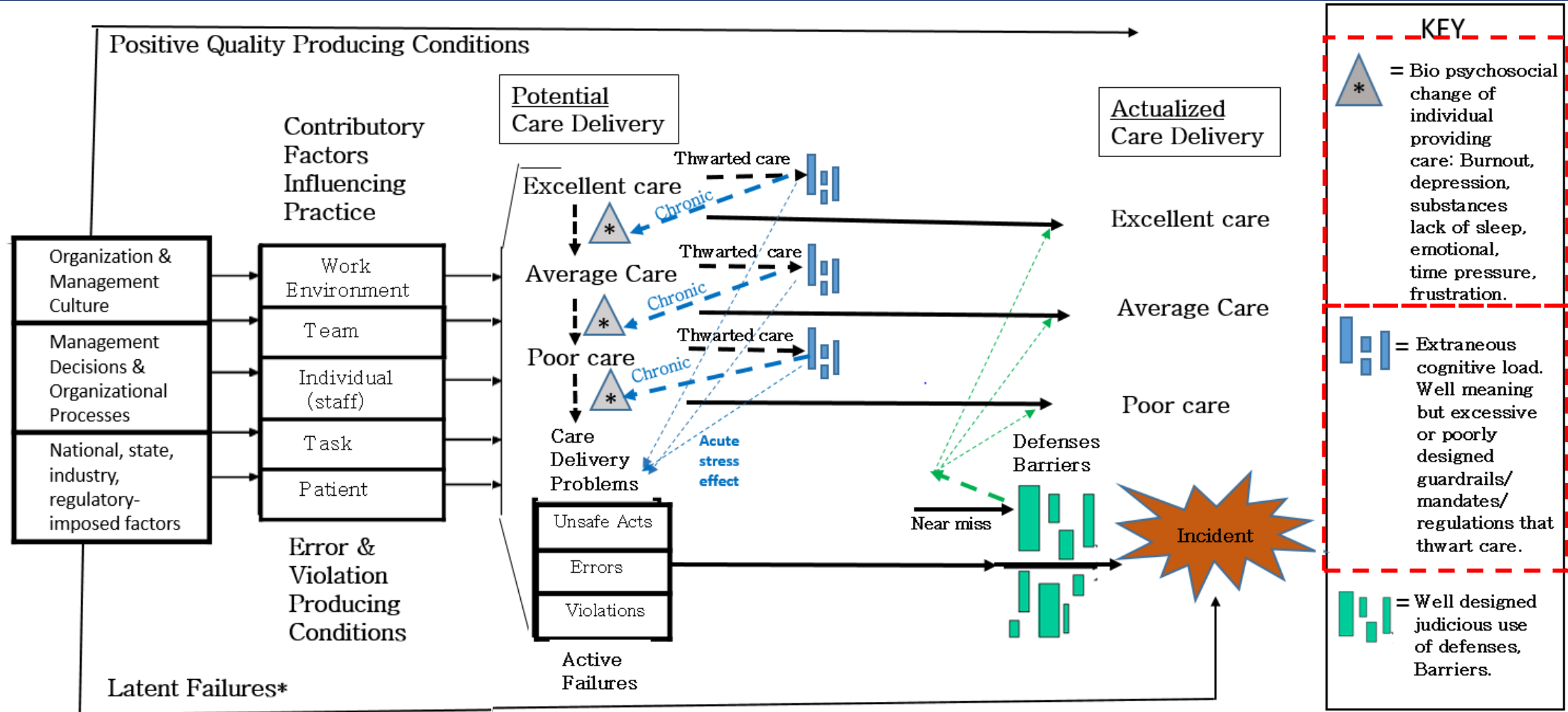
## LEGEND

ONE BAR REPRESENTS 5 MEASURES

- | 33 Accountable Care Organization (ACO) Measures
- | 100+ Delivery System Reform Incentive Payment (DSRIP) Measures
- | 546 Private Health Plan Measures
- | 635 National Quality Forum (NQF) Endorsed Measures
- | 850 Centers for Medicare & Medicaid Services (CMS) Measures

← (850 measures from CMS)

# Integrative Model: Patient Safety and Staff Wellbeing



\*Latent Failures include poor design, installation, and maintenance of equipment, management decisions, and organizational functioning, and thwarted care leading to acute high stress and chronic high stress.

Lower portion of figure adapted from: Taylor-Adams S, Vincent C. Systems Analysis of Clinical Incidents. The London Protocol. Mar 17, 2001 Clinical Safety Research Unit. Imperial College London.

Privitera, M.R (2018) Addressing Human Factors in Burnout and the Delivery of Healthcare: Quality & Safety Imperative of the Quadruple Aim. Health, 10, 629-644.



1. What are some examples of **well-meaning initiatives** in healthcare that thwart good care?

- What are potential pathways to solutions?

2. What are examples of **not-so-well-meaning initiatives** in healthcare that thwart good care?

- What are potential pathways to solutions?

Group together, pick either #1 or #2 above. Discuss with neighbor and reconvene to share findings. Discuss ideas and potential pathways to solutions for each.