Perspective

Feeling and thinking: can theories of human motivation explain how EHR design impacts clinician burnout?

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ABSTRACT

The psychology of motivation can help us understand the impact of electronic health records (EHRs) on clinician burnout both directly and indirectly. Informatics approaches to EHR usability tend to focus on the extrinsic motivation associated with successful completion of clearly defined tasks in clinical workflows. Intrinsic motivation, which includes the need for autonomy, sense-making, creativity, connectedness, and mastery is not well supported by current designs and workflows. This piece examines existing research on the importance of 3 psychological drives in relation to healthcare technology: goal-based decision-making, sense-making, and agency/autonomy. Because these motives are ubiquitous, foundational to human functioning, automatic, and unconscious, they may be overlooked in technological interventions. The results are increased cognitive load, emotional distress, and unfulfilling workplace environments. Ultimately, we hope to stimulate new research on EHR design focused on expanding functionality to support intrinsic motivation, which, in turn, would decrease burnout and improve care.

Key words: motivation, clinician burnout, electronic health records, usability, cognitive load

INTRODUCTION

Clinician burnout is pervasive, persistent,¹ and multifactorial. The role of the electronic health record (EHR) is modest, explaining 12%–20% of variance in burnout symptoms.² However, the mechanisms by which the EHR contributes to burnout are not well specified. They include increased time,³ documentation burden,^{4–6} usability difficulties,^{7–9} and general fatigue.^{2,10} In 1 study, measures of EHR-related fatigue increased significantly over 9 years.¹¹ In a study using eye-tracking, results revealed increased fatigue from the EHR,¹² and another study found substantial increases in task-switching using an EHR.¹³ Complaints of cognitive load are common.¹⁴ These findings suggest a global impact of the EHR on the clinical information environment with substantial time in front of the computer.¹⁵

Work can often provide a sense of competence, involvement, and even enjoyment if the tools are appropriate. Loewenstein (1994) noted that the philosopher J. S. Mill referred to the “higher pleasures,” of work, such as meaning-making, exploration, and creativity.¹⁶ Supporting these experiences in EHR design may mitigate burnout by increasing the pleasure of work—an idea that has been mentioned by others.^{17–19} Here, we argue that the current design of most EHRs negatively impacts 3 key areas of motivation critical to both cognitive functioning and work satisfaction. They were chosen because they illustrate the key intersection between cognition and motivation: 1) goal-based decision-making²⁰; 2) drive for sense-making and meaning²¹; and 3) need for agency, autonomy, and control.^{22,23} In this article, we review each of these topics, link each to

implications related to EHR design, and conclude with a section on methodologies that can assist researchers interested in these issues.

What happens if we do not address these 3 motivations? First, we experience excessive demands on the limited capacity of working memory (cognitive load). Working memory is required for complex cognitive tasks, such as reasoning, decision-making, and language comprehension.²⁴ Second, we become anxious, distressed, and frustrated because human cognition is goal-oriented²⁵ and because limitations on individual agency elicit negative affect.²⁶ Third, we miss an opportunity to foster increased engagement at work by providing a sense of mastery, pleasure, and satisfaction.²⁷

GOAL-BASED DECISION-MAKING AND ACTION

From the cognitive perspective, goals are complex mental representations that include desired outcomes and associated actions. They are, by definition, motivated cognition.²⁸ Activated goals drive perception,²⁹ direct attention (attentional resources are conserved for activated goals),^{30–32} and control knowledge-based retrieval from memory.³³ We attend to goal-based information and fail to attend to nongoal information, a situation known as “attention-blindness.”^{32,34–36}

There are 2 important points to consider regarding goal-based processing. First, goals are “activated” by specific environmental cues and the overall situation³⁷ and may be unconscious.^{38–41} As Gibson has noted, we attend to those aspects of the environment that offer “affordances” to act based on our current goals.⁴² For example, seeing that a patient’s Hemoglobin A1c has increased to 8.2 will activate many subgoals for a provider, such as assessing medication compliance, weight, and interest in a diabetic educator. However, in the same visit the clinician may fail to notice the patient’s recent severe rash acquired from a trip abroad.

Second, uncompleted goals remain activated until resolved, causing a burden on working memory and anxiety. When resolved, interest in goal-related information returns to baseline as demonstrated experimentally^{43–45} and by fMRI studies.²¹

Goal-based processing and EHR design

We suggest 3 approaches to support goal-based cognition in EHR design. First, *goals of care* should have a prime place in the EHR, as they serve to coordinate the team and to remind clinicians of important data.⁴⁶ Second, *information displays* should match the task at hand, whether for an individual or for a team. Substitutable Medical Applications and Reusable Technologies (SMART) on Fast Healthcare Interoperability Resources (FHIR) applications may facilitate those designs.⁴⁷ Task-tracking tools could reduce alerts and support handovers and transfers. If linked to the EHR problem list, these tools could also support diagnostic workup. This recommendation parallels Cimino’s work on integrating the medical record around clinical goals.^{48,49}

Third, EHR designs should include explicit *planning spaces*. These virtual temporary work areas could include simulation “what-if” tools, infobuttons,^{50,51} “patients like mine” comparisons⁵² or other search tools. Because explicit forward planning takes up working memory and is often reserved for urgent or impending tasks, it is often avoided.⁵³ Better technological support for planning would minimize this cognitive load and assist clinicians in titrating attentional resources.

SENSE-MAKING AND MEANING

As Klein, et al, note “Sensemaking is a motivated, continuous effort to understand connections. . . in order to anticipate their trajectories and act effectively.”⁵⁴ (p71) In other words, sense-making is the act of making meaning. It is, in many ways, a drive.²¹ Individuals may surf the web, read books, search their memory, or ask friends in order to satisfy their need for coherence and meaning.⁴⁰ The question then becomes, “what” is the sense that people are trying to make and how can the EHR support this drive? We discuss some possibilities below.

Causal representations in thinking

People are *designed* to reason with causal representations. We attend intensely to invariant structures in every event, data sequence, or action. Often, these invariances are causal.⁵⁵ Seeking causal explanations to patterns of data and events is the prototypical act of sense-making.

Yet, EHRs often lack key causal representations. Problem lists are known to be poorly used.⁵⁶ Flow sheets may be harder to use in the electronic setting than with paper.⁵⁷ Many EHRs still do not display weight over time. Sittig et al found significant violations of principles of visualization for lab displays across 8 institutions.⁵⁸ Others have noted that information is not organized by clinical problem or episode of care, forcing clinicians to search extensively to get a sense of the patient.⁵⁹

Curiosity and exploration

Psychologists define curiosity as an intrinsically motivated information search, just for the “fun” of it.¹⁶ Berlyne’s early work on epistemic curiosity⁶⁰ distinguished between specific curiosity (desire for a unit of information) versus diversive curiosity, which refers to the pleasure that we get from general exploration.⁶⁰ Affective experiences can range from frustration at not finding specific information to pleasure at the excitement of learning something new.^{61,62}

Substantial research has been done on identifying the information needs of clinicians and building tools to assist them (eg, Infobuttons).⁵¹ However, they have had limited implementation. EHR decision support tools that try to provide “the right information at the right time” may not have the flexibility required to satisfy diversive curiosity. The result may be frustration with the inability to find specific information as well as a lack of pleasure in the act of exploration.

The importance of narrative

The early cognitive psychologist, Jerome Bruner viewed stories as the organizing principle of the mind.⁶³ More recently, psychologists have experimentally demonstrated the power of narrative on understanding, sense-making, and memory.⁶⁴ Stories are often stored in both visual and verbal memory, making them easier to retrieve.⁶⁵ “Gist,” or a highly abstract sense of a situation, is 1 form of narrative that particularly impacts sense-making, encoding, and retrieval from memory.⁶⁶

In the EHR, clinicians strongly prefer narrative for communication and documentation.^{67,68} In qualitative work on electronic documentation in the VA, nurses and physicians frequently complained of “losing the storyline” in the copy and paste environment of current electronic documentation.⁶⁹

Sense-making and EHR design

Causal interpretation would be greatly assisted if the connections between data elements were saliently displayed, searchable, and customizable. Particularly important are timelines that display multiple variables (eg, hemoglobin A1c and medication changes) linked to episodes or problems. Examples from our work is a bilirubin display that links newborn, mother, and lab data to support discharge decisions⁷⁰ and a simulation study of a problem-based display for hypertension that linked medication problems with metrics and goals in 1 “at a glance” display.⁷¹

The use of narrative in a variety of forms—from “tweets” to annotations of problems, to full episodic stories—would highly enrich collective understanding. Handoffs and transfers could be automatically transcribed and stored. Natural language processing can “tag” narratives, and build summaries in conjunction with structured data. The result would be a truly integrated EHR.

Problem-solving in a complex clinical environment is multi-phased and nuanced. It includes the cognitive effort of understanding the problem, exploring the constraints and options, and identifying the metric of success. Understanding how clinical problems are solved requires an ethnographic approach in a distributed cognition frame.^{37,72,73}

AGENCY, CONTROL, AND AUTONOMY

The drive for autonomy is 1 of the 3 key constructs of intrinsic motivation.²³ Loss of autonomy may be the most frequent complaint of clinicians related to the EHR. Inability to control the documentation process, the pace of work, time-consuming data entry, interference with face-to-face patient care, and lack of control over data are common complaints.⁷⁴ The current high rates of alert overrides is a prototypical response to threats to control.⁷⁵ In contrast, the experience of flow⁷⁶—a form of intrinsic motivation—is characterized by powerful positive feelings of involvement and freedom, a loss of the sense of time, and a feeling of mastery as our skills fully match the demands of an activity.

Self-efficacy and feedback

Self-efficacy is defined as “the belief that one can control the outcome of an activity.”⁷⁷ Self-efficacy is critical to performance, motivation, and creativity.^{78,79} Performance feedback enhances intrinsic motivation and promotes deliberate practice associated with expertise.⁸⁰ However, not all feedback is the same motivationally: *task-based* feedback given at the time of decision-making is more motivating and less controlling, whereas *normative feedback* (comparison to peers) is less informative and more anxiety-producing.^{81,82}

Autonomy, control, and EHR design

Currently, healthcare settings are fragmented, and clinicians are expected to deliver care with a narrow focus on a patient’s course, with increasing distance from the outcomes of their decisions.⁸³ An opportunity exists to provide more information to clinicians about their patients in a noncontrolling manner that would foster learning.⁸⁴ Organizations currently heavily rely on normative feedback aggregated across clinics or teams and disconnected from actual patient care. The result is both minimal impact on self-efficacy and increased evaluation anxiety.

Modern EHRs should substantially increase customizable feedback tools, such as being able to select lab results to track, when referrals are picked up, or patient compliance with treatments. Cus-

tomizing feedback, such as setting a flag for certain thresholds unique to the patient, would maximize control and improve sense-making.

METHODOLOGICAL CONSIDERATIONS

How do we research these questions? Researchers have begun to develop standardized research methods that can systemize how the EHR is designed and implemented. Zheng et al have developed a promising example, the STAMP (Suggested Time and Motion Procedures) checklist, which includes specific generalizable metrics on workflow.⁸⁵ In addition, much can be learned from cognitive science. Measuring motivation involves assessing choice, affect, persistence, and behavior.

We also lack a taxonomy of tasks that is psychologically meaningful. Mental representations of goals and actions have many levels of abstraction and are integrated into schema-like neuro structures. For example, a task could be conceptualized as entering in an antibiotic order, deciding on the correct dosage for the antibiotic, deciding on the patient’s diagnosis, or discharging the patient as soon as possible. There are many cognitive approaches to assessing the mental representation of action—but an experimentally based theory is needed. Vallacher and Wegner’s theory (action identification theory)⁸⁶ is an example of experimentally validated theory that has provided evidence of how human action is controlled at an optimal level of abstraction that minimizes cognitive load.

The key to any approach in a clinical setting is the need to “capture” data as close to real life (in situ) as possible. Simulation studies, eye-tracking studies with retrospective think-alouds,⁸⁷ “beeper” methods,⁸⁸ unitizing actions,⁸⁹ and ethnographic observation all maximize our ability to see and measure behavior with minimum bias.⁹⁰

CONCLUSION

The relationship between burnout and the EHR is complicated. In many ways, the EHR is simply not the tool for the job that we think it should be. Thinking, exploring, and sense-making are intrinsically motivated and underappreciated motivations in current EHR designs. What happens if we do not address them? When we cannot work with ease, competence, and autonomy, we become stressed, distracted, and avoidant. These needs are unconscious, but they are visible behaviorally. In essence, designing the EHR to support the “higher pleasures” would not only decrease burnout, but improve care. There is much future work that could be done.

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AUTHOR CONTRIBUTIONS

All authors made substantial contributions to the conception and writing of the work, including assisting with the relevant literature review, writing and revising the written work, and participating intellectually. They worked together as a team and agree to be accountable for all aspects of the work.

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CONFLICT OF INTEREST STATEMENT

None declared.

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