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Tracing Mindfulness through Clinical Knowledge Sharing, Role Development, and Sensemaking

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ABSTRACT

Mindfulness is the dynamic process of building and maintaining awareness of one's environment and paying attention to stimuli (Langer, 1989; Brown, Ryan, & Creswell, 2007). A cognitively effortful endeavor, mindfulness requires "the capacity to respond to unanticipated cues or signals from one's context" (Levinthal & Rerup, 2006, p. 504). Mindful attending to each stimulus is near impossible (Levinthal & Rerup, 2006), as individuals and organizations are often flooded with too many distractions and ambiguous signals to pay sufficient attention to each one (Weick & Sutcliffe, 2006). Originating in the psychological literature around individual ("trait") mindfulness, it has since been expanded in the organizational literature to address more macro lenses (e.g., Vogus & Sutcliffe, 2012). This development was propelled by high-reliability organizations (HROs) and their need to anticipate and guard themselves against potentially harmful unexpected events. Mindfulness has since been applied in less risky contexts (Ray, Baker, & Plowman, 2011; Yu & Zellmer-Bruhn, 2018).

This dissertation explores the role that mindfulness plays in the workplace, especially in its capacity to support employee interactions and professional growth. In Chapter One, I look at how the successful engagement of clinicians requires mindful interactions so that clinicians can co-create research routines. Through the lens of the clinician's perspective, I analyze the mechanisms for successful clinician engagement in translational medicine and introduce the concept of an "interactive holding environment." A nod to the conversation around mindfulness and routines, Chapter Two assesses the extent to which burnout influences routine and role change. It highlights the dynamism of mindfulness and shows it to be strongly tied to burnout during job crafting and role development endeavors.

Finally, Chapter Three switches empirical contexts to explore how nurses anticipate, make sense of, and respond to alerting technology. It identifies key anticipatory mechanisms that guide situational sensemaking (patient personas, time-chunking, and positioning) and discusses "bounded mindfulness" - a concept that individuals are always seeking mindfulness but are bounded by their ability to achieve perfect mindfulness. Together, these three chapters walk through different applications of mindfulness to underscore its widespread influence in the workplace.

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TRACING MINDFULNESS: INTRODUCTION

Mindfulness has historically been divided between Eastern and Western ideologies (Weick & Putnam, 2006). Work by Langer (1989) portrayed mindfulness through a Western perspective anchored on the dichotomy of mindfulness versus routines. In Langer’s work, she claims mindfulness is a practice of “switch[ing] modes of thinking” (Vogus & Sutcliffe, 2007, p. 517) to develop new informational categories, create new interpretations of events, and notice previously ignored or unidentified signals. She inherently centers her analysis on what Vogus & Sutcliffe argue is a ‘behavioral’ interpretation of mindfulness. On the other hand, they promote an Eastern, ‘cognitive’ version of mindfulness around awareness and attention. In their portrayal of mindfulness, Vogus & Sutcliffe use the act of meditating to explain how mindfulness involves focusing on an object and keeping that object front of mind despite external disruptions and internal distractions (2007). In this Eastern or Buddhist view, the practice of awareness includes a commitment to withholding judgment and ignoring the human ego (Vogus & Sutcliffe, 2007; Brown, Ryan, & Creswell, 2007).

While the preceding presents a conceptualization of individual mindfulness, mindfulness can also materialize at the collective (group) and organization levels. Mindfulness at the team level (an underdeveloped area of mindfulness) is defined as “a shared belief among team members that team interactions are characterized by awareness and attention to present events, and by experiential, nonjudgmental processing of within-team experiences” (Yu & Zellmer-Bruhn, 2018, p. 326). In work by Yu and Zellmer-Bruhn, they find that team mindfulness has multi-level impacts on relational and task conflict (2018).

Collective (group) mindfulness, also referred to as mindful organizing, is a fragile, bottom-up process that requires constant attention and recreation (Vogus & Sutcliffe, 2012) compared to organizational mindfulness, a top-down process (Ray, Baker, & Plowman, 2011). Mindfulness in this regard requires organizations to have the "capacity to respond to unanticipated cues or signals from one's context" while understanding the "impossibility of anticipating all problems and events in advance" (Levinthal & Rerup, 2006, p. 504-505). Unlike organizational mindfulness, mindful organizing "represents a dynamic process comprising specific ongoing actions rather than an enduring organizational characteristic" (Vogus & Sutcliffe, 2012, p. 724).

In order to minimize the impact of unanticipated events or deviations, mindful organizing can be supported by five capabilities: the preoccupation with failure (focus on failure more than successes); reluctance to simplify (do not simplify assumptions); sensitivity to operations (analyze the effects of current practices); commitment to resilience (spend time bolstering organization against potential crisis); and deference to expertise (identify and rely on local experts) (Weick & Sutcliffe, 2001). Mindful organizing uses cues (such as alerts, as discussed in Chapter Three) to draw attention to weak signals that anticipate potential hazards and prompt sensemaking. Proper functioning of alerts should improve organizational mindfulness (Roberts, 1990).

Literature has often separated mindful and less mindful (or routine) states (e.g., Brown & Ryan, 2003) where less mindful states function automatically or without careful attention to discriminatory detail. Examples of less mindful states can include cognitive schemas (Brown, Ryan, & Creswell, 2007), scripts (Ashforth & Fried, 1988), or routines (Feldman & Pentland, 2003). As Brown, et al. describes, the mind processes information ("a sensory object") by filtering it through existing schemas or past experiences (2007). The risk of this automatic processing is that it can yield "superficial, incomplete, or distorted pictures of reality." To evoke mindfulness requires the "conceptual filters" be removed and the individual spend more time being aware of and present with the sensory object (Brown, Ryan, & Creswell, 2007, p. 212). In a routines view, the habitual enactment of practices (routines) can reduce the individual's ability to discriminate new information or adapt. However, when organizations experience a change in their environment, they can use existing practices and routines as resources to create their response (Levinthal & Rerup, 2006). Levinthal & Rerup show how routines (Feldman & Pentland, 2003) induce mindfulness as they are performed and recombined (2006). Additionally, an interruption of a routine can incite mindfulness and reduce the less mindful state that the routine was presumed to have been creating (Langer, 1989; Zellmer-Bruhn, 2003).

Recent literature has (1) linked mindfulness to improved work performance, interpersonal relationships, and wellbeing (Good, Lyddy, Glomb et al., 2016) and (2) started to blend elements of mindfulness across individual and organizational divides (Fraher, Branicki, & Grint, 2017). One articulation of this attempt is "mindfulness in action," described as "local, situated, and involves thinking in real time, simultaneous with the execution of action" (Levinthal & Rerup, 2006, p. 505). Fraher, Branicki, & Grint approach mindfulness in action through the context of the US Navy Sea Air and Land (SEALs) commandos (2017). In their paper, they challenge Weick & Sutcliffe's "preoccupation with failure" by finding that teams could become comfortable with ambiguity, employing a learning mindset that didn't paralyze them from potential failure (2006). This paper makes an important contribution to the blending capacity of mindfulness across individual and organizational definitions. Throughout the following dissertation, I attempt to pull from the threads of mindfulness as it is constructed in the literature to show how different levels (individual and collective) and streams (routines, high-reliability, and attention-based) of mindfulness can intersect.

This dissertation traces mindfulness in the workplace through interactions and relationships (Chapter One), task change and role development (Chapter Two), and disruptions and sensemaking in the work environment (Chapter Three). I look at mindfulness through different organizational contexts: the classic high-reliability organization (Chapter Three) and the ‘unusual’ setting (Chapters One and Two). While the empirical setting in Chapters One and Two falls under typified HRO designation as a hospital, the focal interaction occurs within a low-risk, low-ambiguity research capacity.

CHAPTER 1 | MINDFUL INTEGRATION OF THE STAKEHOLDER VOICE

Summary

New shifts in medicine towards co-production call on stakeholder-engaged processes to improve the uptake of medical interventions, yet their application isn't well defined. To explore, I look at the growing field of translational medicine and how we can promote mindful processes to engage and empower stakeholders. The goal of this paper is to consider how mindful organizing can unfold in the co-production of knowledge by making sense of and paying attention to stakeholder perspectives. I find that successful articulations of stakeholder engagement occur as "interactive holding environments" - dynamic team interactions that nurture the development of the stakeholder. As applied to translational research collaborations, an interactive holding environment involves researchers engaging and empowering the clinicians so that they gain confidence and skills in conducting research (engagement phase) and develop the competencies to conduct research themselves outside of the holding environment (empowerment phase). Pulling from research in developmental psychology by D.W. Winnicott (1975), workplace environments (Kahn, 2001; Petriglieri, Ashford, & Wrzesniewski, 2019), and free spaces (Polletta, 1999; Kellogg, 2009), this chapter explores how 'holding space' can generate mindfulness at a collective and individual level.

INTRODUCTION

A core function of translational research is to adapt basic science to patient populations. Part of that process involves researchers learning the pertinent knowledge from stakeholders engaged with the intended patient populations. Stakeholders act as an intermediary role translating knowledge from the patient to the researchers. In this cycle, patients provide cues and knowledge to clinicians, who translate those insights for researchers to conduct more patient-centric treatments. Ideally, the outcome of this research will influence clinical practice change and the clinicians, using the updated practices, will improve patient outcomes. In both paths, clinicians act as a critical intermediary in the translational process. This path follows the tenets of implementation sciences, which acknowledges that for an intervention or evidence-based research to work in an organizational setting, researchers need to gain support from key stakeholders during the development process (Powell et al., 2015). However, the current research on stakeholder engagement is underdeveloped (Concannon et al., 2012). As articulated by Meissner et al., "there is a recognized science of stakeholder engagement, but a general lack of knowledge that matches its strategies and approaches to particular populations" (2020, p. 216).

Often stakeholder engagement is "exploratory" such that a network of investigators shares information and feedback through informal channels (e.g., conferences). In Cannon et al., the authors find that participant engagement differs by research stage, with the heaviest reported engagement "during evidence prioritization and generation" (2014). This paper responds to their call for more "descriptive research on stakeholder-engagement in research" (Cannon et al., 2014, p. 1698). I use mindfulness, a concept with connecting threads to both engagement and empowerment, to explore ways collaborative relationships can "hold space" for the stakeholder voice. Through an analysis of stakeholder engagement, empowerment, and mindfulness, I hope to improve the body of existing literature by making "…efforts for the development of processes for continued communication, decision-making, shared vision, change management, and implementation (at initiation), which are the key elements of an engaged processes" (Goodman & Sanders Thompson, 2017, p. 488).

THEORETICAL DEVELOPMENT

Stakeholder engagement towards co-production

Co-production is the shared decision-making process between stakeholders to improve service delivery based on the stakeholder's lived experiences (Batalden et al., 2016). It is like systems-based participatory research, which advocates for the application of community participation in health systems research (Schmittdiel, 2010). I use an adapted definition of the stakeholder from Concannon et al. (2012) in which one is "an individual or group who is responsible for or affected by [decisions] that can be informed by research evidence" (p. 986).

Implementing models of co-production is challenging, as systems can easily default to the "professional-centric priorities" over the stakeholder experience (Batalden et al., 2016). To combat this recession away from the stakeholder (or end-user), co-production uses processes similar to human-centered design and implementation sciences, which highlight the input and engagement of the stakeholder (in the context of this study, the patients and clinicians) in the discovery and development processes. To co-produce efficient interventions, organizations can use material practices centered around the stakeholder (such as those found in similar concepts like 'design thinking' (Stigliani & Ravasi, 2012)) for effective problem solving. Stakeholders can articulate their frontline experience and "identify key questions" that will shape the research agenda for change (O'Haire et al., 2011).

Stakeholder engagement. Many of the recommended implementation strategies revolve around "stakeholder engagement" (Powell et al., 2015). Engagement is characterized as "a bi-directional relationship between the stakeholder and researcher that results in informed decision-making about the selection, conduct, and use of research" (Concannon et al., 2012). Manetti and Toccafondi describe stakeholder engagement as "a process that creates a dynamic context of interaction, mutual respect, dialogue, and change, not a unilateral management of stakeholders" (2012, p. 365). It is also akin to other concepts, such as "stakeholder collaboration" which focuses on joint problem solving.

In psychology, engagement is a motivational concept that implies a person pouring their whole being (physically, cognitively, emotionally) into a work role or task (Kahn, 1990). When someone is absorbed in work, engagement is considered to increase. When abstracted to the group level, job or group engagement refers to the interactional engagement that occurs between team members focused on the same goals (Metiu & Rothbard, 2013). Research has also shown the crossover effects of group-level engagement and individual-level engagement, such that highly engaged team members can diffuse their optimism to create a positive team climate, which can lead to more engagement across other individual team members (Bakker, Emmerik, & Euwema, 2006).

Models of stakeholder engagement. There are various models depicting the level and depth of stakeholder engagement. Primary is Arnstein's Ladder, which is a foundational model for stakeholder engagement drafted in civil engagement and urban planning (1969). Arnstein breaks stakeholder engagement into three types: non-participation, tokenism, and citizen control. The "non-participation" in Arnstein's ladder implies a level at which governmental entities are trying to garner the support of citizens, but citizens themselves aren't providing insights (or are not provided the opportunities to do so). At the lower level of participation (tokenism) is informing, consultation, and placation. Informing is one-way communication that inhibits stakeholder feedback and participation. Placation is a symbolic show of having stakeholders as part of the decision-making body. The tokenism level allows for some degree of stakeholder participation but doesn't provide adequate avenues for stakeholder feedback or certainty to stakeholders that their feedback will be used.

When participation is at 'placation' and below, stakeholder feedback is filtered through the 'powerholders' (Arnstein, 1969). In these situations, participation is a "window-dressing ritual" in which stakeholders are merely present ("participat[ing] in participation") so 'power holders' can show engagement (Arnstein, 1969). This level is what Bammer refers to as "weak forms of participation" (2021). As the ladder escalates, stakeholder participation bears more weight in decision-making. As we see in the top rungs, participants (citizens) hold power and control in the direction and dissemination of intervention activities. The goal is to reach the level of partnership and above, in which stakeholders are empowered to have equity in decision-making.

A similar model of engagement is put forth by Goodman & Sanders Thompson which classifies engagement efforts as "non-participation" (outreach and education), "symbolic participation" (coordination and cooperation), and "engaged participation" (collaboration) (2017). The latter is when "stakeholders collaborate in decision-making and resource allocation with an equitable balance of power that values input from the community health stakeholders" (p. 487). According to Goodman & Sanders Thompson, engagement should be at the collaborative level in order for stakeholders to meaningfully contribute to the research. As they state: "there is a critical difference between going through the empty ritual of obtaining stakeholder feedback and giving stakeholders the real power needed to affect the research process and resulting outcomes" (p. 8).

Determinants of effective stakeholder engagement. As Tandon (2017) articulates, facilitators to stakeholder engagement include shared mental models around: clearly defined stakeholder roles and responsibilities, goals, and how they will benefit from participation. Other influential factors include the physical location of work, organizational cooperation, and collaborative relationships (Welch et al., 2020). Project members need to create clear messaging around the roles, responsibilities, aims, and stakeholder benefits to gain stakeholder 'buy-in' (Welch et al., 2020). Engagement should not merely be symbolic or intermittent, rather meaningful and consistent throughout the stages of research (Tandon, 2017; Leppin et al., 2019). Early engagement is especially beneficial (Concannon et al., 2012; Hamilton et al., 2017). Without a "line of consistent communication" stakeholder engagement can be inhibited (Welch et al., 2020, p. 7). This implies that the most effective type of stakeholder engagement is one where the stakeholder assumes the role of collaborator, instead of a low-level participant.

Empowerment: having a voice and feeling powerful in the engagement

Empowerment is an important part of engagement as it relates to meaningfulness and intrinsic motivation. Empowerment, "a cognitive state achieved when individuals perceive that they are empowered" can be created through task structures as well as relationships (Maynard, Gilson, & Mathieu, 2012, p. 1235). It is a dynamic adaption of self in response to one's work environment (Spreitzer, 1995). The engagement process should equip stakeholders with skills to take back with them after they have left the project (relates to what they can "gain"); it should train and treat stakeholders as learners as well as collaborators (Welch et al., 2020). As engagement opportunities increase, so does stakeholder empowerment (Willness, Boakye-Danquah, & Nichols, 2023). The bond between the two concepts can be strengthened by leadership encouragement (Zhang & Bartol, 2010). Empowerment increases with social support, role delineation, full information, and participation (Spreitzer, 1996).

Empowerment was initially conceptualized as a structural entity (Kanter, 1993), then a psychological entity (Conger & Kanungo, 1988). With psychological empowerment the dominant form of empowerment, Kanter's structural view (e.g., tasks used to motivate an individual) is now seen as an antecedent to psychological empowerment.

As Spreitzer articulates (1995, p. 1443):

> "Conger and Kanungo (1988) defined empowerment as the motivational concept of self-efficacy. After reviewing relevant research, Thomas and Velthouse (1990) argued that empowerment is multifaceted and that its essence cannot be captured by a single concept. They defined empowerment more broadly as increased intrinsic task motivation manifested in a set of four cognitions reflecting an individual's orientation to his or her work role: meaning, competence (which is synonymous with Conger and Kanungo's self-efficacy), self-determination, and impact."

Thomas & Velthouse expanded on Conger & Kanungo's conceptualization of psychological empowerment by adding meaningfulness, competence, choice, and impact (1990). However, empowerment was still seen as a version of task motivation. Spreitzer elaborated on the Thomas & Velthouse concept, defining four states of empowerment: meaning, competence, self-determination, and impact. In preceding perspectives of organizational and interactional empowerment, employees could gain “empowering tools” but still feel unempowered. In Spreitzer’s view, “rather than focusing on managerial practices that share power with employees at all levels…” psychological empowerment “...is focused on how employees experience their work” (2007, p. 56).

Psychological safety, relationships, and voice. In co-production, empowerment is broken into two things: amplifying the voices of the stakeholders and balancing the power differentials (Thinyane et al, 2020). Empowerment is very similar to engagement in terms of psychological safety, which relates to “a climate in which people feel free to express relevant thoughts and feelings” (Edmondson, 2012, p. 118). Speaking up creates an interruption of routines or ‘autopilot’ processes, generating greater learning and mindfulness (Zellmer-Bruhn, 2003). Psychological safety can be fostered through trust, concern, and respect for others in the team (Edmondson, 1999).

Relationship quality and trust facilitate learning (Levitt & March, 1988; Uzzi, 1996). The more individuals trust their team members, the more likely they are to use them as knowledge resources, find relevance in their input, and increase information transfer (March & Olsen, 1975; Uzzi, 1997). Respect is a core aspect of an adapted model of Maslow’s hierarchy of physician needs (Shapiro, Duquette, Abbott et al., 2019) and respectful engagement is shown to improve the information processing and creativity of a team (Carmeli, Dutton, & Hardin, 2105).

In addition to trust and respect, vulnerability, authentic interest, and openness to feedback also foster research collaborations (Dutton & Dukerich, 2006). These are considered relational practices, defined as “the skilled ways of interrelating that create connections between people”

(p. 21) to generate interesting research (Dutton & Dukerich, 2006).[1] High-quality connections involve both parties feeling understood, mutually engaged, and exhibiting positive energy (Dutton & Heaphy, 2003). Other qualities, such as compassion, can act as tools of relatability within team dynamics (DeCelles & Anteby, 2020) that further psychological safety and valuable connections.

Mindfulness to enhance engagement and empowerment

In order to make engagement and empowerment more effective, I argue that researchers should try to create environments of mindfulness. To engage and empower stakeholders, researchers could promote "receptivity" in which they are open to observing (not ignoring) the present object (stakeholder voice). This is compared to conceptual processing, in which individuals heavily evaluate and try to make sense of the present object. Conceptual processing has an inward, self-preoccupied nature and can lead to rumination (Good, Lyddy, Glomb et al., 2016; Watkins, 2008). Too much looking inward can detract from the stakeholder voice and instead focus on the goals and ego of the researchers. To maintain mindfulness, individuals must stabilize their attention by removing distractions such as the ego (Weick & Sutcliffe, 2006).

Imbued in curiosity, this approach to mindfulness entails "a persistent mindset that admits the possibility that any 'familiar' event is known imperfectly and is capable of novelty. This ongoing wariness is expressed in active, continuous revisiting and revision of assumptions, rather than in hesitant action" (Weick, Sutcliffe, & Obstfeld, 1999, p. 38). Mindfulness at the group or collective level can occur through 'mindful organizing' which "requires respectful

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[1] In the context of this study, 'interesting' can be adapted to view as translational or the ability to be implemented into medical practice.

interaction, heedful interrelations and mindful infrastructure" (Sutcliffe, 2012). Through a cycle of action and reflection, these teams continuously reconfigure sense (Weick, 1995; Weick et al., 1999; Weick & Sutcliffe, 2015). Critical to mindful organizing is environments of psychological safety, in which people are made comfortable enough to ask questions without risk of retribution, trust, and situational awareness. Teams practicing mindful organizing in high-reliability organizations stay alert for unexpected events, focusing on building situational awareness, social relations, attunement to others' reactions, and organizational actor identities (Weick, 2011).

Similarly, mindfulness at the team level is defined as "a shared belief among team members that team interactions are characterized by awareness and attention to present events, and by experiential, nonjudgmental processing of within-team experiences" (Yu & Zellmer-Bruhn, 2018, p. 326). In work by Yu & Zellmer-Bruhn, they find that team mindfulness has multi-level impacts on relational and task conflict (2018). In this study, I argue that the thoughtfulness and allocation of attention on the clinician can be an important part of stakeholder engagement. Next, I introduce translational medicine, the context in which I explore how mindfulness can be generated in co-produced knowledge practices that engage stakeholders.

STUDY CONTEXT: TRANSLATIONAL MEDICINE

In order to study the mindfully collaborative practices between researchers and stakeholders, I look at a burgeoning stakeholder-engaged process in healthcare organizations: translational medicine. Translational medicine has become increasingly popular in health sciences, elevated by the incorporation of a translational medicine center (National Center for Advancing Translational Sciences) as part of the National Institute of Health. It is a discipline to make therapeutic developments more effective for and utilized by intended populations.

Traditionally considered the “bench to bedside” continuum, translational science has two sides: 1) applying lab discoveries to human subject studies and 2) developing research aimed at community health interventions (National Institutes of Health, 2007).

With roots in cancer treatment, translational medicine is evolving medical research from a supply-side market – in which scientists create a product for clinicians to use (the T1 and T2 blocks) – to a demand-side market, integrating treatments with patient and public health needs (T3 block) (Thornicraft et al., 2011). Translational medicine uses clinical observations and patient engagement to develop patient-centric health interventions. By involving patients, the process intends to avoid the usual pitfalls of traditional basic clinical treatments, such as a 10–15-year turnaround time and a ninety-five percent failure rate for new treatments (National Center for Advancing Translational Sciences, 2021).

Since translational medicine is vaguely defined and still developing, many training programs and organizations are not clear on how to create frameworks or systems to teach and implement it (Rubio et al., 2011). As a bridge for research and medical practice, the role of a translational clinician-researcher has thus far only moderate success; scholars have called for better communication between clinicians and researchers along the translational medicine continuum, both to formulate more patient-specific questions, but also to more effectively drive implementation of the evidence-based findings (Backus & Jones, 2013).

Use of clinician as a key stakeholder in translational medicine

I consider translational medicine part of a larger type of stakeholder engagement science in which clinicians are a key population of stakeholders that have been underutilized in academic medicine research. A core aspect of translational medicine is the concept of centering the stakeholder perspective in the research process. Whereas much of the power behind translational medicine has focused on the "biomedical research, education of biomedical scientists, and conventional treatment options" (McGaghie et al., 2012) there is a need to turn attention to the developing role of the clinician as an integral stakeholder in its process. During stages T2 and T3 when basic findings are being translated into practice, clinicians should be actively engaged ("engaged participation" from Goodman & Sanders Thompson, 2017) in work. With this insight, there is growing interest in a stronger operationalization of the role of clinician-research as the conduit between clinic and research (Jones et al., 2013).

CHAPTER ONE AIMS

This paper focuses on engaging the clinician as a key stakeholder in translational medicine. We know this is important, but we don't know how to properly engage clinicians in research; the current research on stakeholder engagement in general is fairly new (Concannon et al., 2012). Ideally, clinicians are engaged as vested collaborators in the research to provide practical insights into how the research being developed can better serve patients. The current literature tells us that stakeholder engagement should happen early and consistently throughout. We also know that there are certain stakeholders that should come into play at different points in the research, and in different types of research projects. My goal with this chapter is to understand how we can provide support for clinicians that allows them to experience easier, more empowering, and more productive communication with researchers in translational medicine.

In the paradigm of my study, the clinician voice is a central part of research.[2] The organization in my fieldwork is structurally integrating translational medicine collaborations to meaningfully incorporate the clinical voice in research projects. To understand how clinicians perceive being engaged and empowered in this dynamic, I will explore:

1. How are clinicians engaged in translational research (co-production) efforts?
2. What does successful integration of the clinical voice look like to clinicians?
3. What mechanisms are used to mindfully hold space for (empower) clinicians in stakeholder engagement?

POSITIONALITY

My role as researcher

In approaching research, I hold a relativist ontology that "the world consists of multiple individual realities influenced by context" (Mills et al., 2006). I favor a subjective epistemology in which myself and participants are "cocreator[s] of knowledge" (Rieger, 2019). Together, I acknowledge that my individuality as a researcher (the values, beliefs, and cultural systems I hold) shapes how I view, collect, and analyze data. It not only impacts the way I see the data, but the types of data I gather.

Unlike objective or realist perspectives, which believe that reality has one universal truth that a researcher can uncover, I believe reality is socially constructed and can vary among individuals. Thus, my interviews posed as a form of meaning co-construction where the participant and I probed and pieced together their lived experiences. By focusing on clinicians as

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[2] As the 'arbiters' of research, researchers might provide a useful perspective on the process of research integration and the metrics used to deem research collaborations successful. However, in this study I chose to focus on the clinician perspective because there is a pressing need to understand more of the stakeholders' perspective and feelings about how they are engaged in these processes.

participants, I intentionally wanted to showcase their “image of a reality” (Charmaz, 2000, p. 523) being involved in translational medicine. During the data collection, I reflected on Young’s description of the outsider-insider dilemma:

> “One or more of a researcher’s multiple selves may become relevant in the interactive dynamics of fieldwork…if they do not appear at first sight, any of them could become visible to respondents and informants during the course of fieldwork…. respondents and informants may react to any of these in ways that foster, hinder, or dramatically affect conversations with the researcher.” (2004, p. 191)

As both a management PhD candidate (outsider) and a seasoned non-clinical contractor at Movement Hospital (insider), I felt the saliency of my ‘multiple selves’ fluctuate over the course of my fieldwork. Sometimes my outsider-research-self reared up, while other times my insider hospital-team-member-self was more prominent. I had been informally part of the Team Knowledge for three years at the time of Stage III interviews, but not all participants knew my role or professional background.

My interviewing approach was informed by my experiences doing qualitative and design-based work in hospitals around environmental factors (e.g., sounds and constructed spaces), team communication, professional wellbeing, and knowledge creation. While I explained my background, there seemed to be varying impressions of whether I had a technical clinical background or not. This seemed to slightly influence the way individuals answered questions or how they described aspects of their experience (e.g., using medical jargon).

Participants and I might be halfway into a lively interview, the clinician articulating an impassioned research story, when I realized they didn’t know I was non-clinical (holding no clinical background). Sometimes their uncertainty of my clinical knowledge generated an interesting disclosure, in which they thought I did have a clinical background and would talk openly to me about their frustrations with researchers. In one interview, a clinician voiced disbelief that one of her researcher peers didn't know about a certain assessment, describing the story in acronyms and jargon as though I understood the meanings. I tried to navigate these moments by creating an "insider" space, in which I provided warm, nonverbal head nods or murmuring without outing myself as a clinical "outsider" to make the participant feel more comfortable.

It wasn't always clear to me when I engaged with a participant if they would view me as an insider or outsider. In framing my identity, I wanted to ensure I was at least not perceived as an 'administrative outsider.' If I had been perceived as a figure of authority at Movement Hospital, I could have not only received less information, but potentially created an inaccurate power differential and less safe space for the participants. Although my dissertation work was supported by Movement Hospital, I explicitly stated in all written outreach to participants that my studies were not requested nor paid by the hospital, and that I, as the researcher, had no authority over the participant. Depending on which roles I was interviewing, I tailored my approach and interactions accordingly to build trust and open lines of communication with my participants.

METHODS

Setting

The data collection for this dissertation took place at Movement Hospital between June 2019 and September 2022. Movement Hospital is a mid-sized specialty hospital in the Midwest. Over the past decade, Movement Hospital has redesigned physical and organizational structures to promote collaboration and organizational-wide research efforts. The organization decentralized its leadership, designated champions of evidence-based practice (EBP) on each unit, and introduced incentives (such as promotions and internal grant mechanisms) to encourage research participation. For additional description of the hospital's physical and organizational structure redesign, **see Appendix A.**

In preparation for the dissertation, I started a role as a non-clinical contractor at Movement Hospital in June 2019 with one of the research labs ("Team Knowledge"). Being a non-clinical contractor required passing a background check, adhering to organizational vaccine requirements, and completing staff orientation and annual human resources competencies. I also received a hospital email address and an authorized badge that provided hospital access. My team, Team Knowledge, was led by a PhD- and clinical-trained Research Scientist (pseudonym: "Julia") with extensive training in implementation science. The team staffed health researchers, as well as clinicians who split their time between treating and conducting research. While on the team, I attended weekly team meetings, outings, and engaged in research related to the organizational changes. I also received organization-wide staff emails and was able to participate in organizational events as appropriate. For a timeline of my fieldwork activities, **see Appendix B.**

Site justification

I initially visited Movement Hospital to explore how it fostered collaboration through physical design; I had yet to learn about the growing institutionalization of translational science in different medical fields. However, while I began preparing for the dissertation, I learned that the hospital's specialty was a relatively young field of medicine and thus newer to translational science than other fields. A field less embedded in translational science methods could be primed to create more innovative practices and routines (Leblebici et al., 1991) before institutional socialization forces their “worldviews and practices” upon them (Zilber, 2002). Thus, I felt studying this specialty site was an interesting choice for exploring how clinicians were making sense of and engaging in translational medicine.

Participants

There were three types of clinician-researchers I could select for this study: clinicians who had a dedicated full-time equivalent (FTE) appointment in a research lab, clinicians who did not have a dedicated FTE in a research lab but participated in research through other capacities (such as leading their own research project), or clinicians who had an FTE treating and were not involved in research. Clinicians with a research FTE were still encouraged by Movement Hospital to apply to the internal grant funding mechanisms to spearhead their own research projects in addition to their work in the research lab.

Phases of research

My fieldwork occurred in three stages: learning the specialty hospital landscape (Stage I); exploring emerging issues around interdisciplinary clinician-researcher collaboration (Stage II); and deeper probing of clinician-researcher engagement, role development, and wellbeing (Stage III). While I gained key information during Stages I and II, most of the analysis for this paper derives from my data in Stage III.

To execute the data collection in these stages sensitively and with respect to the hospital staff, I worked closely with Julia, a research manager (“Lana”), the Chief Officer of Research (“Peter”), and Team Knowledge on the study procedures such as interview and observation scheduling, participant payment, and general staff communication. Julia brokered communication between me and hospital employees, as well as how to structure the payments in line with hospital payment practices. Below is a chart of my data collection and analysis. For further explanation of Stages I and II, **see Appendix C**.

TABLE 1. Data collection and analysis

Stage	Data	Application
Stage I June - September 2019	*Learn the specialty hospital landscape*	
Participant interviews Observations	14 interviews, including clinicians with an FTE in research (n=5), clinicians without an FTE in research (n=6), nurses and nurse leadership (n=2), and non-clinical researchers (n=1) 12 observations, including treatment sessions, clinical leadership meetings, patient rounding, and research spaces	Provided initial insights into how employees operated within the new model at Movement Hospital for Stage II data collection.
Stage II June - September 2020	*Explore emerging issues around interdisciplinary clinician-researcher collaboration*	
Participant interviews	25* interviews, including clinicians with an FTE in research (n=6), clinicians without an FTE in research (n=2), nurses and nurse leadership (n=2), and non-clinical researchers (n=3), postdoctoral students (n=4), Principal Investigators (n=4), and clinician managers (n=3)	Transcribed interviews. Made jottings and memos during and after each interview. Conducted open coding to create themes and refine my research questions for Stage III.
Stage III December 2021 - September 2022	*Focus on clinician-researcher engagement, role development, and wellbeing*	
Participant interviews	60* interviews, including	Transcribed interviews and

	clinicians with an FTE in research (n=20), clinicians without an FTE in research (n=21), and non-clinical researchers (n=2)	field notes from observations. Made jottings and memos during and after each interview, observation, and video presentation. Used initial and focused coding processes informed by my memos to generate themes.
Observations	6 hours of observations, including treatment sessions, research team meetings, and project meetings	
Video analysis	11 video presentations of labs	

**Some interviewees provided second interviews*

Context

For context, the Stage III interviews occurred during the height of the COVID-19 epidemic, when the participants were still working full-time but under strict precautions. This meant that they were wearing goggles, facemasks, as well as PPE (personal protective equipment) when necessary. Our interviews occurred over Zoom, with some wearing facemasks if they were unable to take the call from a private location. While this context placed additional stress on the participants, it also allowed the interviews on wellbeing and burnout to provide a cathartic outlet for those needing human connection or emotional expression. My goal was to create a safe outlet for the participants. Upon reflection, I could have pulled some conversation threads harder, but I tried to monitor the participants' verbal and non-verbal cues for indications that they were losing energy or felt uncomfortable discussing a topic. While I wanted to get the best data possible to accurately depict the participants' experience, I wanted to be deeply mindful of their limits and was therefore overly cautious. I changed (or let the participant change) the subject, ended the interview, or asked clarifying questions when appropriate.

Data collection

Recruitment. For the Stage II interviews, I had worked with Julia to develop a list of the research roles (e.g., clinician-researcher) available at Movement Hospital (for interview protocol, see **Appendix D**). She proposed names of individuals for each category whom I might contact to interview about their experience participating in research at the hospital. These planning conversations oriented me to the research team roles and dynamics. To collect data for Stage III, I used purposive sampling to recruit clinicians who were actively engaged in research projects at Movement Hospital. I sought to recruit at least one clinician from each research lab to increase the heterogeneity and richness of data. Given the different stages of lab development (some labs were still hiring clinician-researchers to build out their team or the lab had recently hired its PI), I hoped a representative sample would provide more generalizable information than focusing on a select few teams.

Julia and I formulated a list of potential participants, receiving feedback and suggestions from our Team Knowledge members. Before I contacted participants, Julia forwarded the IRB-approved Study Information Sheet to the scientific chairs of each research lab, asking if I could invite members of their research teams to participate in my study. She then sent follow-up emails asking the chairs to respond if they *did not* want me to contact their team members for interviews. We received universal support, as well as additional suggestions of individuals to invite. Additionally, I worked with Lana to cull a list of clinicians who have been awarded internal research grants over the past three years. This also included lists of clinicians who applied, but did not receive, the grants.

I was either introduced to these participants via email from Julia or I cold emailed them directly. The introductory emails included a brief description of the study and appended the

Study Information Sheet. I was responsible for following up, providing the electronic consent form link, and scheduling interviews. To ensure participants met the requirements of the study and were properly informed of its aims, the procedure, and their rights (such as their control over stopping the interview or declining consent at any time), I set up fifteen-minute introductory calls with each participant prior to the interview. These calls were not audio or video recorded. As interviews progressed, I used snowball sampling to include more participants. At the end of each interview, I asked for suggestions of other researchers who might like to participate in the study. I also asked if they had opportunities where I could observe them treating or participating in a research meeting. I then sent suggested participants information about the study to set up introductory calls. Two individuals I contacted declined an interview, citing a lack of time.

Consent. Once I connected with a participant over email, I provided them a link to the online Qualtrics consent survey. The consent form asked whether the individual consented to being interviewed and audio and/or video recorded. Participants were informed that this was a study for my dissertation and that they would be compensated for their time. This information was also discussed at each introductory call. I used the beginning of each interview to also reiterate the purpose of the study and how their interview data would be in the analysis. I reminded all participants that the interview and audio and/or video recording was optional and that we could pause or end at any time.

Semi-structured interviews. My advisor (KW) and I co-created interview questions for two interview guides through multiple brainstorming meetings. We inductively designed open-ended questions to generate participant narratives. The semi-structured interview guides assessed (1) participants' roles in research, experiences learning the research process, methods of communicating with their research team, barriers and facilitators to research engagement (**Appendix E**); and (2) factors related to career navigation, wellbeing and burnout, and research motivations (**Appendix F**). While the interview guides were not pilot tested, they were reviewed with my dissertation committee and Julia for feedback. I made slight modifications to the interview guides after conducting an initial set of interviews.

Interviews were conducted over the phone or on Zoom based on the participant's preference. Phone calls were audio recorded using an encrypted and password-protected recording device. Zoom calls were audio and video recorded to the Zoom platform and the recordings were transcribed verbatim. During the interviews, I took handwritten notes (Emerson, 2011) on the participant's role in research, their body language or tone of voice (Lareau, 2021), memorable quotes, and questions I wanted to explore further. An example of a jotting during my interview is:

> *Learning from others in the lab (now a little fish in a big pond); "learn and absorb from them." **Ask: What have you learned? What do you think they've learned from you?*

I put the participant's language in quotes next to my jotting and signal my own questions with stars or question marks. At the end of each interview, I spent a few minutes finalizing my notes and processing the transcript. Usually within forty-eight hours of an interview I would type up the notes, pulling in quotes from the interview transcript as much as possible. I used the notes to make memos, drawing connections between interviews and elaborating on any patterns or recurring themes I was seeing. I continued interviewing participants until I felt thematic saturation was reached and no new information was learned. Interviews ranged from 30 to 90 minutes with the average interview lasting approximately 44 minutes.

Observations. To support my interview findings, I conducted observations of clinical sessions, research team meetings, and organizational research presentations. I conducted six hours of clinical sessions and team meetings and eleven hours of virtual research presentations. The goals of these sessions were to better understand how clinicians communicate with patients and their clinical and research peers. During observations of the treatment sessions, patients were present but not included in the study. The observations focused on the modalities and language clinicians used to communicate with the patient.

Movement Hospital instituted two platforms for employees to share research ideas and receive feedback. The first, Think Labs, is for any hospital employee (clinician, researcher, or staff) to present an unpolished idea for feedback from their peers. The second, Test Labs, is a similar concept in which employees present more developed research projects in hopes for feedback. Any employee is welcome to attend Think Labs, which are held bimonthly. I virtually attended the Labs and took notes on types of modality clinicians used to describe their research (including gestures, PowerPoint images or videos, and verbiage), the types of questions they received from the audience, and how they responded to those questions. I observed eleven one-hour sessions.

Data analysis

In analyzing my data, I took a qualitative “smorgasbord” approach (Strauss & Corbin, 1998) intentionally selecting elements of interpretive grounded theory (Strauss & Corbin 1998), constructivist grounded theory (Charmaz, 2017), and thematic analysis (Braun & Clark, 2006) that fit my data and epistemological view of the data. As mentioned above, I epistemologically align with Charmaz’s pragmatist-constructivist view in which knowledge is co-created between researchers and participants and the “knowledge” generated is subjective to each individual (although patterns can arise). To note, I did not employ a full grounded theory approach in this paper, as I veered towards “grounded theory lite” (2017) and used the tools of CGT to explore my research questions. I did not attempt to undergo a full development of a grounded theory, rather analyzed a process.

I mindfully analyzed and reflected on my data throughout all stages of data collection. Thus, the “analysis” started from my initial interview, not once I had sufficiently collected all data. During each interview I would take handwritten notes about the participant’s roles, research involvement, and any key quotes or surprising comments (Emerson, 2011). After the interview, usually within twenty-four to forty-eight hours, I would revise the notes into short memos and transcribe the interviews. I began “attribute coding” in these memos, to help me keep track of participants’ roles, disciplines, teams, and topics covered to help organize my thoughts before coding (Miles, Huberman, & Saldana, 2014). The memos were used to highlight any main takeaways from the interview and helped me start seeing initial themes across the data. I continued to familiarize myself with the data (Braun & Clark, 2006) through constant rereading of interviews and additional thematic memoing.

After a series of interviews, I created a map of initial themes. I started mapping how the clinical perspective was communicated in translational medicine by: the environmental context (conditions surrounding research, e.g., development of situational awareness); clinician assumptions about research (e.g., ‘PIs are the leader of the protocol’ and ‘the IRB wants more clinical than research-based language’); research opportunity structures (e.g., Labs and team meetings); research stages (e.g., grant writing); and communication strategies (e.g., demonstrating their adaptation to the protocol). This exercise did not reveal any patterns in the data but drew my interest towards how clinicians were involved in different "points" in the research process. I started to think about how the clinical perspective could be incorporated in various ways at different times in the research process.

Data immersion. Upon completion of the interviews, I printed and immersed myself in the data (interviews, notes, memos) for two weeks. During this I reread all the transcripts and made jottings of ideas and possible codes. My goal of the 'immersion' period was to absorb and reflect on the data before starting to code it. After these two weeks, I developed a set of initial codes that responded to my research question. This approach to early and iterative data collection allowed me to review the literature as new ideas formed and revise my research questions accordingly. At this stage I hadn't started coding using my MAXQDA software but went through transcripts making notes and writing memos to cluster general ideas. I read "actively" (Braun & Clark, 2006), was not selective, and paid attention to each piece of data with detail.

During the immersion in the data, I started to construct multiple themes from the clinician interviews. Primarily, I saw that involvement in research activities helped strengthen clinicians' communication skills through recurrent interactions with non-clinical collaborators. One perceived benefit of working in research was that clinicians learned how to hone their clinical reasoning. As one clinician said, they had the chance to "explain why I'm doing what I'm doing and why I care about measuring or paying attention to a certain thing. It's almost like a development of my own clinical reasoning." Research engagement liberated clinicians from their 'autopilot' clinical routines and engendered them to reflect. Another clinician explained, "...here in research, you have to take a step back, and you have to explain why you're doing what you're doing and the reasoning behind it, and why you didn't choose a different approach." Research activities seemed to require a meditative period where the clinician evaluated their responses and assessed their reasonings behind these responses. The routines of stepping back and homing in prescribed in research positively challenged clinicians, insinuating that research was a mechanism for clinicians to reflect on and develop their 'why.'

Second, I saw that clinicians were brought in at protocol generation and development to help make the theoretical proposal in the grant more practical to the clinic. As one clinician explained:

> "So a lot of times the grant is like super general and it's like, 'oh, we're going to do this over five years. And within that project, we're going to try to do blank.' And in that sense, we have a lot of say in the protocol, and that's where our clinical side comes in, I think, the protocol generation and development. It's like what makes sense? What's theoretical versus practical? And in research, you get to do a little bit more of the theoretical implementation than like clinically, well, their insurance cut them off after 12 visits. So it's done. I would say that protocol development is largely where the clinical side comes in because we, as clinicians, also don't want to see research that comes out that's like 79 sessions over 400 days in 900 hours resulted in this. That's fine, but that's not how clinic works." *Luke, Clinician-Researcher*

Also, clinicians felt more inclined to increase their engagement in research when they were cross-trained and research opportunities started growing. The former refers to getting trained on the background and approach to other teams' research projects. This "cross-training" allowed others to provide assistance if the core team required it. It also provided a pathway for those outside of the project (but who had been trained in it) to give richer, more relevant feedback during team meetings. As one clinician said, "if I need help with a project, the other [clinicians] can help me and vice versa. If I have open time and I'm not working on my project, I can lend a hand to them, just so that we're all kind of helping each other get everything done." The latter implied a pattern in which an escalation in research opportunities related to an escalation of commitment to a research role. The more a clinician learned about research and got involved started shifting their cognitive framing of research and their goals with it. As a prosthetist-orthotist recounted, "...the roles just kind of fluctuated over time…I just became heavier and heavier in research until basically I'm here full time."

Initial coding. With this background laid, I began my coding in five waves. I initially conducted a first cycle coding of my transcripts and memos using MAXQDA coding software. I conducted inductive, first cycle coding (Miles, Huberman, & Saldana, 2014) of four transcripts purposively selected to represent a sample of my participants by discipline, role, and team. I used in-vivo codes when applicable, but primarily relied on descriptive coding. I decided to use inductive coding during this phase so my codes were derived from the data and stayed as true to a "grounded" approach as possible. While I did my initial coding, I simultaneously created sub-codes as needed. Subcoding (Miles, Huberman, & Saldana, 2014) allowed me to identify more nuance in my primary codes (e.g., "Treatment versus research"). After this first cycle coding, I went back and refined the codes.

Focused coding. At this time, I realized I needed to move from my initial coding to focused coding (Charmaz, 2017). With my research questions and a review of the literature on engagement and empowerment as my guides, I decided to narrow down my coding to five areas: stages of research, empowerment, engagement, successful and unsuccessful integration of the clinician voice, and positive and negative clinician experiences with research engagement.

During the coding process, I decided to categorize the different stages of research in which clinicians participated. Early in the interviews I realized that clinicians were brought on later in the research process. They also took on roles, such as blind assessors, where they weren't informed about the research question. Clinicians seemed to be a tool for the research team to either do manual labor (assessing a patient) or provide feedback on an exercise prescribed in the protocol. I wanted to understand more concretely how clinicians were used at each stage of the research project. Thus, I coded for research activities and stages.

I derived twelve research activities from the data and member-checked with a clinician-researcher on Team Knowledge to ensure validity of research activities. The activities included: project ideation, grant writing, protocol development, IRB (initial drafting), protocol modifications, IRB (amendments), recruitment and scheduling, assessments and outcome measures, intervention delivery, protocol amendments, IRB amendments, data analysis, and manuscript writing. From these activities, I constructed four translational medicine stages in which clinicians provide feedback to enhance clinical relevance: conception (project ideation and grant writing), approval and planning (protocol development and IRB submission), adaptation (ongoing changes to the protocol), and synthesis (data analysis and manuscript drafting).

I compared my stages to Concannon's taxonomy of stakeholder engagement, which breaks the research process down into six stages (Concannon et al., 2012). In reviewing the taxonomy, I added codes for organizational feedback or input (e.g., Think Labs) to the research activities that can apply to multiple stages. For example, organizational feedback can occur during multiple points in the research process: Think Labs (conception and approval and planning), Do Labs (approval and planning and adaptation), and Test Labs (synthesis).

TABLE 2. Qualitative codes

Focused coding	**Code definitions**
Stages of research Subcodes: input, project coordinator, project ideation, grant writing, protocol developments, protocol amendments, IRB (initial drafting), IRB (amendments), recruitment and scheduling, assessments and outcome measures, intervention delivery, data analysis, manuscript writing	Clusters of tasks or assigned roles conducted in the translational research process.
Successful integration	If the clinician felt their voice was included in the research; how/what made them feel their voice was included.
Unsuccessful integration	If the clinician felt their voice was not included in the research; how/what made them feel their voice wasn't included.
Positive experience/benefits	If the clinician felt there was a benefit to them or generally had a good experience; what were the benefits? What was the description of what made it a positive experience?
Negative experience/frustrations	If the clinician voiced frustrations with the research experience; descriptions of what made it a frustrating or negative experience.
Engagement mechanisms	How a participant describes being brought into a project, finding meaning in a project, or is made to feel safe participating in a project.
Empowerment mechanisms Subcode: disempowering	How a participant describes experiencing their research involvement and "sense of control" (more than just the ways PIs and managers structurally engage clinicians in research) (Spreitzer, 2007).

In my interviews, I probed participants to provide examples of research experiences they thought were successful or unsuccessful. Rather than eliciting feedback on general experiences with research, I tried to delve into specific episodes for greater insights. I thought this was important considering my limited ability to gather observational data of clinician-researcher interactions. Some participants reflected on specific projects, while others (usually those who recently entered a part-time research position on a team) attributed experiences to the team. Regardless of whether they reflected on a team or project, I found similar practices across positive and negative experiences.

FINDINGS

Types and stages of clinical engagement in research

In tabulating the research activities for each interviewee that shared a research experience, I found that most clinicians engaged in middle-stage activities in the Approval & Planning and Enactment & Adaptation stages (**Table 3**). This type of engagement aligns with what I would have expected based on the academic calls for greater inclusion of clinicians at earlier stages in the research process (Concannon et al., 2014). For the most part, clinicians feel like they're brought in after the research question and funding have been concretized. While this can oftentimes make logistical sense (it's hard to compensate clinicians before a grant or funding mechanism has been obtained), it could mean that the research questions or aims of the research aren't appropriate to the clinical setting. In this situation, it might be too late for clinicians to help alter the course of the project.

TABLE 3. Clinician engagement in research stages and tasks

Project Stage	Stage Tasks	Clinician Engagement	Total
Conception			**9**
	Project ideation	6	
	Grant writing	8	
Approval and planning			**21**
	Protocol development	10	
	IRB submission	13	
	Recruitment	15	
Enactment and adaptation			**25**
	Assessor and outcome measures	25	
	Intervention delivery	15	
	Changes to protocol	14	
	IRB amendments	11	
Synthesis			**12**
	Data analysis	11	
	Manuscript writing	10	

However, I learned that a grant can often act as a large umbrella, in which the language of the grant is written intentionally vague, leaving ample room for clinicians to make changes in the protocol. Clinicians feel like they're brought in at the protocol development to help make the theoretical proposal in the grant more practical to the clinic. They are more poised to provide feedback on the protocol since it usually describes sets of patient exercises or interventions. In other words, the protocol reflects work that clinicians do daily in their treatments. It outlines the exercises, how they will be delivered, how they will be measured, and any hypothesized outcomes. Thus, developing and refining the protocol requires the insights and practice knowledge of clinicians to craft usable interventions.

Without clinical insight in the protocol development and adaptation stages, researchers might test interventions or assessments that clinicians wouldn't typically use during patient treatment or cannot be reimbursed by Medicare. As a clinician researcher explained:

> "...Clinically, [the patient's] insurance cuts them off after 12 visits. So it's done. I would say that protocol development is largely where the clinical side comes in because we, as clinicians, don't want to see research that comes out that's like, '79 [visits] over 400 days in 900 hours resulted in this.' That's fine, but that's not how [the] clinic works." *Luke, Clinician-Researcher*

While having a clinical voice in the middle stages of research has numerous benefits, the stakeholder engagement literature has called for earlier and more consistent uses of stakeholders throughout the research process. This sentiment was echoed by clinicians in my interviews as well who felt earlier inclusion of clinicians in the grant or ideation stages could help "anticipating some of those things." One senior clinician explained how she was brought onto a project to be an assessor for "this one little piece," but felt slightly offended that the researchers hadn’t thought to use her insights in earlier aspects of developing the project. She viewed the situation as:

> “But this is where I think a lot of the times researchers come up with their ideas on their own. They go to the research articles and find like what seems to make sense, create this protocol and then recruit clinicians to be assessors, whereas I feel like sometimes it may be more beneficial to treat your clinicians as stakeholders and pull them in a little bit earlier on to figure out what would maybe be a more effective strategy or effective approach.” *Sam, clinician*

She continued explaining how sometimes researchers miss the mark by not including clinicians during idea development:

> “I feel like there's a lot of breakdowns when researchers will say, ‘we've come up with this really good solution for this problem!’ And we're like, ‘that's great. That's funny. **That problem never really was a problem that we thought needed to get fixed**. But we've got ten other problems over here.’ And they're like, ‘oh no, I have your solution right here.’ But that device or that doohickey or that something you've created - the engineering thing that you've just manifested - doesn't really fix my issues. It doesn't really help me at all.”

Another clinician elaborated:

> “What I see a lot that happens is that clinicians get brought on, like, ‘I need a blinded assessor, so we've got to get [a clinician] who can do this assessment’ or ‘we need someone who could administer this treatment.’ And that's when clinicians are sort of plucked out…that gives you a very minimal exposure to the research process as a clinician…I think that if we were truly achieving goals as a translational medicine hospital, we would integrate clinicians and patients much earlier in the process, when it comes to the study design, when it comes to the grant application, when it comes to the protocol development. I think both clinicians and patients need to be involved.”

It seems like it would be more effective (and often in the researchers’ interest) to be brought on earlier in the project. Engagement earlier on in the research allows team members to get a better sense of the project so that they can understand how they can contribute and feel more confident in contributing.[3] On the other hand, a clinician might not have an interest or the capacity to do more than their specific role or task set. And even then, they can still contribute a clinician voice to the project in whichever stage they are delegated.

Clinician emotions around research: power dynamics and intimidation

Clinicians intimate that researchers have higher situational power. From the interviews, I surmised that clinicians hold two feelings about research: (1) researchers hold more situational power than clinicians and (2) clinicians are intimidated by research. In terms of situational power, I noticed a few organizational dynamics during my time at Movement Hospital that I felt potentially reinforced the indirect power that researchers hold over clinicians. First, Movement Hospital has created an environment in which research involvement is revered. From my insider/outsider perspective (Young, 2004), I feel like this 'ideal role' is held as a trophy that clinicians are encouraged to seek. But, since the process of research and how to get involved is still ambiguous to many clinicians, being involved as a full- or part-time researcher can feel out of reach.

Secondly, within the new physical structure, researcher desks were placed in an open floor area with clinicians who were treating patients. When I first came to Movement Hospital, I visited each floor to see how clinicians and researchers interacted in this space, sketching diagrams of each treatment floor's layout and how it changed over time. Within the treatment space, researchers had moveable walls, pods, and headphones that they used to create physical

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[3] Clinicians reported sometimes feeling like if they are only assigned to the project as an assessor, then they can only provide feedback to researchers about the assessment. They might not learn about the study, receive updates on the study outcomes, or know if they are allowed to comment on other parts of the study. In a way, a strict identity with their assigned role curtails the potential contributions clinicians have as collaborators in the study.

and audio barriers to the noise occurring during the patient treatment sessions. After a few years, some of the research groups, attendings, and research scientists successfully petitioned to be moved off the clinical floor. While clinicians in the same space could play music for patients, walk around the large treatment area, and use any equipment available, they had less autonomy over relocating their work environment and often admitted to feeling hesitant about approaching or interrupting researchers.

Although the researcher-clinician dynamic presented at Movement Hospital did not seem to fit within a traditional healthcare hierarchy, there were certain cues that came up in the interviews that led me to believe that researchers held (or were perceived by clinicians to hold) more organizational and interactional power when clinicians entered the researcher domain to participate in a study. A clinician explicitly references this power dynamic:

> “I think that there's a power dynamic there, whether it's said or unsaid, I think there's a power differential. And so I do think that a lot of **clinicians are a little bit differential to the research process**. Whereas I think that we have enough training just at baseline to have conversations…and ask questions that are relevant to [our] own practice.” *Sam, clinician*

As other clinicians stated, researchers held the authority to “let the voice and the opinions of the people in the lab come through the research article.”

Clinicians feel intimidated by research. In framing this paper, I kept thinking about how clinicians described feeling overwhelmed and intimidated by the research process. For many clinicians, they either had never participated in research or had basic encounters with it during undergraduate or graduate school. Many would hear about their peers’ research experiences at Movement Hospital, but still felt unclear what it would be like - or if they had the ability - to conduct research. Even with organization-wide presentations on research and the availability of research mentors, some clinicians still felt intimidated to “take the leap” into research. Throughout the interviews clinicians would say “my brain doesn't work the same way as a researcher's brain,” using distancing language to describe how they problem-solved versus researchers. In some comments like this, clinicians portrayed research to be outside the bounds of their abilities as clinicians.

One of the clinicians I met through my interviews was Quinn, a pediatric clinician who recently transitioned to a role of clinical manager where she oversaw the inpatient and the outpatient pediatric programs. She had been working with one of Movement Hospital’s research scientists, Jeffrey, on an internally-funded project transitioning pediatric patients off ventilators. Quinn still was “uneasy” about conducting research but felt buoyed by Jeffrey’s supportive and validating collaboration style. As Quinn explained to me:

> “If I were to tag an emotion to the research realm, **it's still uneasiness**. I'm still like, ‘I don't know.’ The things I'm learning in outpatient, are like ‘okay, this makes sense to me. This is how my brain works. These numbers.’ And then I get back to research, I'm like - I still don't have a clear vision as to what steps I need to take to get to where I want to be…I guess intimidated is the right word...”

Quinn had started the project by herself initially, but, like other clinicians I interviewed who started independent research, hit a plateau where she felt she didn’t have the knowledge resources to move the project forward:

> “Starting with our project, I knew I had twelve patients who've gone through this program. I knew that there were three different categories of assessments that I wanted to collect. And so that was all easy. I knew what I had, I knew where I wanted to go with that, but now I'm at this juncture [where I’m] like, ‘okay, now I don't know where to go with this.’ I have all this data, but do I even have enough patients to make any statistical analysis? I don't even know the questions to ask at this point. And I think that's where I knew I would be at this point too, where I know I have this information and I know that I want it to tell me if it's predictive or maybe not predictive of success or readiness for ventilator weaning. But it's just now I'm like, ‘oh, someone else needs to help me, because this is not where my brain works at all.’”

Reflecting sentiments of other interviewees, Quinn explained how more positive interactions with researchers could help erode that fear:

> "[Jeffrey] is very approachable. He will have conversations with you that don't make you feel like you don't know what you're talking about. That's like a huge barrier I think for clinicians speaking to researchers. Right? I feel like I'm an intelligent person when I'm speaking amongst my peers, but then when I go and speak to somebody who does something totally different than me, I'm intimidated. Right?"

In order to ameliorate this fear, clinicians wished that there were more opportunities within the organization to "get their feet wet" in research. Two clinicians, June and Lacy recounted a valuable experience they had with one of their research mentors. Their mentor, Felix, helped lessen the fear and intimidation of research by advocating for them to 'start small' when applying for grants. While Felix acknowledged that without adequate funding the project might not yield practice-changing results, he still encouraged them to seek "even $1000" in funding. He told them not to try to tackle a huge issue or create "a groundbreaking new [clinical] technique." With this type of guidance and support, June and Lacy were able to move the project forward with more confidence. June describes this issue at large:

> "I know a lot of people are like, 'we want to know what's going on. **We want to know how we can get involved in research, but it can be really intimidating**'...if there are opportunities to get more clinicians involved in research without having to give a dedicated FTE. Because that's kind of scary. Think about fully switching a job and committing to something…I understand managers are tied, but just protected time to do a smaller project or just get involved at the beginning or help out. It just really doesn't happen or it's hard to get approval consistently. So **there's no middle ground between either being involved and not being involved**. You know what I'm saying?...for clinicians who just want to get their toes wet, I don't think there is a really big opportunity for that."

> And Lacy mentioned;

> "I think **jumping into research in the beginning for us was daunting**, but having the right support, having the right education... Educating [clinicians] like, 'okay, you can get

> involved by just doing this to start'...Just say, 'hey, let's just start by this, or start with something small.' And getting them involved, **just getting their feet wet**."

Clinician perspectives on successful stakeholder engagement

As I gleaned from my interviews, clinicians proceeded into research with varying levels of research skills, knowledge of the project at hand, and relationships with the team members. The research environment appeared at times as a sea of ambiguity as clinicians adjusted from clinical to research norms, discerned the aims of the project, deciphered the responsibilities of their new role, and learned the research process. Successful experiences were enacted by the implicitly "powerful" group holding space for clinicians to share their voice and creating safe environments for the clinician to develop into a confident clinician-researcher. Importantly, successful researcher-clinician collaborations involved a fostering of bidirectional learning in which both parties were open to learning from one another. Overall, I found the mechanisms that created successful engagements included researchers: owning responsibility of the project, acting mindfully, demonstrating empathetic concern, providing clinicians affirmation, and creating psychological safety. Integral to a successful engagement was also both parties (clinicians and researchers) being open to bidirectional learning.

Researchers "owning" and taking responsibility for engagement. One of my takeaways from the interviews and the observations was that researchers, or clinicians who are comfortable with research, can create environments that make clinicians feel comfortable enough to learn about research and share their voice in the research process. Clinicians often felt the onus to engage in research fell on them, but I saw how successful interactions occurred when researchers took the responsibility of leading and directing clinicians. This required the researchers to acknowledge their power and 'own' the advancement of clinicians into research.

Successful engagement happened when researchers either took full ownership of the project or at least took the sole responsibility off clinicians; researchers assumed authority over clinician outreach and the project.

First, clinicians reported feeling the burden of outreach and communication unfairly fall on them. They wanted researchers to initiate the outreach, by either contacting them to ask questions or enroll in research studies. Many clinicians reported that they wished they could abdicate some of the responsibility of proactively approaching researchers and felt researchers were in a better position to lead the collaborative efforts. In the words of one clinician researcher, “the whole point of Movement Hospital is that the researchers should be kind of bridging this gap with clinicians.”

Despite the co-location of researchers and clinicians on treatment floors together, many clinicians assumed the responsibility of approaching researchers fell on their shoulders. As mentioned earlier, the initial approach could be imbued with intimidation as clinicians crossed the threshold into the researchers’ territory and sometimes felt as if they were interrupting. Similarly, some felt that they didn’t have the proper research ‘language’ to know what questions to ask. By acknowledging their upper hand in research and heavier institutional power, researchers could lead a greater integration of clinicians into research.

Successful examples that came up during my discussions often involved researchers coming up to clinicians or emailing them after lunch presentations; even greater outreach to introduce themselves or check-in could have bolstered these relationships, clinicians said. In an early conversation with a new principal investigator (without a clinical background), he said his first few months at Movement Hospital were spent actively emailing and visiting with clinicians to get to know what they were working on and what problems they were facing. He assumed this as part of his researcher identity and integrated this into his work routines. This type of proactive communication could be integrated effectively across more research teams.

Second, clinicians felt successful when their teams did not make them feel responsible for the project. By absconding this responsibility, clinicians reported feeling more liberated to provide feedback to and communicate with researchers. In successful cases, teams were reported to actively foster cultures in which the clinician wasn't made to feel solely responsible for the project. In describing their new research team, one clinician talked about how the team approached projects as a unit such that team members felt like the burden of research responsibility was shared. Mechanisms like "cross-training" helped develop this sense of shared responsibility, diffusing ownership across the team and taking away the intimidation or pressure factors clinicians sometimes negatively associated with conducting research. Cross-training, the purposeful coaching of outside team members on the aims and design of your project, empowered clinicians to help on other projects. As one clinician described it:

> "...he has all the [clinicians] be cross trained on all the projects that are running, or most of them, so that if I need help with a project, the other [clinicians] can help me and vice versa, If I have open time and I'm not working on my project, I can lend a hand to them, just so that we're all kind of helping each other get everything done." *Clinician researcher*

Researchers acting mindfully. The successful integration of the clinical voice required a collaborative approach where clinicians and researchers together created the research - this co-creation did not necessarily have to start at the inception of the project (counter to many tenets in implementation science), rather the clinicians had to feel that their stakeholder perspective was fully considered while the project was created. This involved researchers mindfully selecting which clinicians to include (e.g., the type of clinical practice and the appropriately representative number of clinicians) and at which stages, having the right assessments or resources for clinicians, and finding the right ways to make the clinician feel validated. To achieve this, researchers had to develop a situational awareness around the clinical experience, the skills and knowledge that clinicians had (or did not have), and better insight when to shine light on and be highly attuned to the clinical voice.

Balancing mindfulness (or the allocation of attention) between the researcher purview and clinical integration could be challenging. Understanding how to include clinicians in a meaningful way proved even more so. Sam, a clinician with experience in research and leadership, described her experience in which she felt the researchers weren't thoughtfully incorporating her into the research project. She describes being pulled into the 'wrong part' of the process in which she was not brought on early enough, a result she describes as the researchers not realizing the value that her contributions could have had at an earlier stage.

As she explains:

> "I was pulled in to be an assessor, but they chose an assessment that they didn't know. And so as a result, I was brought in to be an assessor for this one little piece, but it seemed like it was without necessarily thinking about how maybe my insight could have been valuable earlier on…I will say it leaves me feeling a little, I don't want to say defeated, but a little bit like my opinion doesn't matter as much and I don't have as much that I can contribute to the bigger question." *Sam, clinician*

Sam also described how one of her clinicians was asked to join a project as an assessor, but the researchers selected an obscure assessment that their clinical group wasn't trained in. The training then fell on the clinician to learn. Sam used this example to illustrate another way that researchers could be mindful of what the clinicians will need in participating in research: if clinicians won't be involved in every step of the way, at least ensure the roles in which they are participating are well thought out for them to step into (i.e., creating a protocol that they can follow so they don't require additional outside training).

Overall, I found this construction of researcher 'mindfulness' fell along the lines of mindful organizing; while the collaboration between clinicians and researchers was not a typical high-reliability state requiring team resilience, consciously attuning to clinicians as key stakeholders, yielding to their authority in relevant cases, and dynamically acting to incorporate their perspective and avoid the pitfalls of non-translatable research followed the general premise.

Researchers demonstrating empathy. If there is a lack of situational awareness or shared mental models around who knows what, it can create the appearance of different research goals or clinician-researcher tension. During my interviews, I noticed a theme around 'tension' around the goals that clinicians had when engaging in research, versus the goals that non-clinical researchers had when engaging in research. For some clinical participants, they felt like researchers were focused more heavily on creating or testing a product to publish to an academic audience than to improve the patient experience. Within that framework, the research goal seemed misaligned with the clinician goal of using research to advance clinical practices. For clinicians who felt this tension in goals, it could add to their level of mistrust in or intimidation by research.

Clinicians felt researchers created successful collaborations when they posed thoughtful questions and actively learned about the other side, demonstrating empathy. Like mindfulness, empathy seeks to find cognitive and emotional meaning while being non-judgmental (Heaphy, 2017). It is like the concept of "humble inquiry" in that it requires asking intentional, open-ended questions and being mindful in accepting the response (Schein, 2013). As Schein explains, utilizing questions with a genuine interest in the other person's answer "temporarily empowers the other person in the conversation and temporarily makes me vulnerable" (p. 9). This type of empathy requires "an attitude of interest and curiosity" (p. 19).

By fostering more understanding of each person's roles (what does a clinician do in the clinic and how can they contribute to the research lab), it could ameliorate those perceptions that clinicians and researchers are focused on different things. Even if clinicians and researchers effectively do have their own goals (a clinician might not be as concerned with creating a high-quality publication as a researcher is due to their different incentives or outcome needs), strengthening situational awareness and exercising empathy could help ease any cultural divides that can develop. As June, a clinician with a split-role in research, described:

> "I don't even know if it's tension, I think it's just a lack of experience or something like that or what their specialty is versus kind of what my specialty is. I like to always say, 'You only know what you know.' So I think [researchers] are actually really appreciative of the support that I have been in this process because they want the IRBs approved as much as I do to get their project started, to get it going. We have timelines. So if anything, I think it's more appreciative." *June, clinician-researcher*

The goals that each other has in the project might not exactly align, but by directly asking questions (a key component of empathy building about the clinicians' goals and insights, researchers can make the clinicians' feel their perspective is included. As one clinician said, "[Clinicians] have the answers, I think. Sometimes people just don't really know what they're seeking from us." Her colleague expanded by saying, "The main questions [at the beginning of the project] were kind like, 'what is this for?,' 'how is this going to be used?' 'what do they need?' So they could kind of understand the knowledge gap that we're trying to fill."

One of the research teams ("Red's Lab") is fairly new and has tried to implement team mechanisms to make the clinicians feel more engaged in the research process. Part of this development includes a series of one-on-one, smaller, and larger team meetings to discuss the research projects. Within each of these meetings, the PI “Red” uses her power to pose questions to the clinicians, directly engaging them and eliciting their feedback. As a clincal assistant, Annie, described:

> “When we have the in-person meeting, Red asks us one on one, ‘how did it go with you? Do you have anything to report? What is your idea?’ I would say the main reason, like the thing that I like the most about working research is that when you have the one on one you can report if there was any change with the participant.” *Annie, clinical assistant*

All of Red’s team members I interviewed felt similarly about how Red structured the team meetings. By asking clinicians direct questions, it invited the clinicians into the conversation in a way they might not have felt comfortable to dive in without. As further example, Sam provided a thorough description of one of her most successful research engagements that exemplified these aspects of empathy development:

> “I didn't really expect this going into the collaboration, but [the researcher] took the opportunity to get to know my interests as well. So he was like, "We're working on this together, what do you hope to get out of it? What's something that you're interested in? Why are you collaborating with this?" And so he had some insight, it was just helpful to talk about my professional interests and goals with somebody else, with another person who, with researchers, I feel like there's this, you got to get your publications, you got to get your presentations, you got to get promoted, like there's a... You got to get your grant funding. So it was also helpful that we became friends and colleagues on more of a personal level, so that I got a glimpse in what it's like to be a researcher where simultaneously, he's working on multiple projects that he's trying to wrap up, but also applying for grants in the future. You don't finish one thing and then start something new, there has to be a lot of overlap. So I think that by him sharing some of those things, it was helpful…He also helped me understand what he was learning about the technology and some of the data collection we needed. So there was a little bit of training on my end too, which was helpful, because I felt like I then gained and learned something from the whole process.” *Sam, clinician*

Researchers providing affirmation. As mentioned earlier, researchers can foster successful engagements with clinicians by validating them through a recognition of their expertise and asking for their project input. These actions can provide clinicians with the confidence that they have expertise that is valued and needed in research.

> “When I first came on the team these two - and I actually don't know their specific titles they're not clinicians - but they had reached out because they wanted to use a very specific outcome measure that I had experience with. It was just nice that, you know, they don't really know who I am, but they were...they felt like they could come to me and I could provide some information that was helpful to them. *Sheila, clinician*

One clinician, Luke, who had recently transitioned to an almost full-time research role (he was still treating about twenty percent of his time in the clinic), described how he as a “researcher” was adamant about giving clinicians the confidence to give feedback. In the one example he described, he was prototyping a new technology with clinicians and needed their raw insights on whether the device was functioning properly during treatment. As Luke said:

> **“**I think at first people were maybe a little hesitant to be like, "Oh, maybe I did some wrong." And that's why this happened. And the passive voice kind of thing was like, "Well, it could have been my error, but this happened." And you're like, "No, it's not your error. You did everything you could have. It's a machine, and it broke." It had nothing to do with you. So I think a little bit at the beginning was people thinking, second guessing themselves or questioning themselves and maybe a little bit more hesitant to reach out, but kind of when they do assure them, like "No, nothing you did wrong. Just the device broke. And it was not a big deal." Kind of helped some of that.”

Providing affirmation or validation like Luke above also helped reinforce or develop confidence in what the clinicians felt like they could bring to the table. Clinicians underscored how vital this clinical confidence in voice was for clinician engagement:

> “I think one of the barriers is that clinicians aren't sure of what it is about their clinical expertise should inform the research process, and researchers ... And, so, they don't know how much value they bring to the table, I would say. So, they might kind of go along with, and I've seen this happen, they kind of go along with a researcher, who's like, "This is a great idea. Let's do all of this, X, Y, Z." And then, at the end of the day, we just can't even do that. We can't do that in clinical practice. And it would've been great for the clinician to say, "I can't take 40 minutes of my time to set the patient up with this device. I have to treat other patients. Who's going to set them up? Who's going to spend 40 minutes setting up and calibrating this cool, sophisticated technology?" That's something

> that I think clinicians can offer, is being a voice for the feasibility of some of the research innovations, and also what it would take for them to be usable in clinical practice. I mean, I think clinicians really have a voice to share there and often don't realize that they have that valuable input." *Jade, clinician with research and management roles*

Researchers creating psychological safety. During successful incidents of clinician engagement, participants shared a curiosity and desire to learn from one another, were mindful of their actions towards each other, and provided affirmation to those new to research. Another key component reported was the establishment of psychological safety within the confines of the research experience, specifically in promoting a supportive and non-judgmental team culture. One clinician described her transition from one research team (that was smaller and required more independent work) to a larger, more collaborative team.

> It's…just the energy that I feel from this lab group. I just think it's very bright people who are just really passionate about learning more. And it's even in the lab meeting, like the opportunity to provide some feedback...they'll do journal clubs right where you can get up and present what you have so far and it's you know, then you have a whole room of people who are part of your team that can then provide some feedback for you. I don't know, it's just **this energy that you...it's like, it's encouraging it's not penalized or anything like that. It's like, we're here to help you, and how can we help you**. Which is pretty neat. And then even for myself, coming in thinking I was going to be doing this all by myself, that I, I really do have like a team that I can...a team of folks that I can reach out to if I need some help with certain things. *Sheila, clinician*

For the latter, successful engagements replaced criticism with curiosity and withheld judgment on clinicians. As my conversation with Annie went:

> Annie: Red really appreciates questions and input, and it doesn't matter your background. She really makes me feel comfortable asking the question because sometimes when we are in this big meeting and [researchers] are presenting these scientific papers, I have a question. But, I also don't know as much as them. So you don't want to ask the question because you don't want to sound [wrong]. When I actually asked Red, [she said]: 'so, you know, Annie, you are saying this and it is not totally wrong, it is a good question.' And she gives me a much deeper explanation...
>
> She would never throw the question out of the way. She will keep it in consideration. So that makes you feel better, and say, 'okay, I can actually ask you that question.'

> Carmen: When you say she keeps in consideration, what do you mean by that?
>
> Annie: I mean that she would make other people look into the question and the response. She will look into it and be like, ‘I [will send] you this paper after.

On the other hand, Sam described a negative experience in which she tried to engage with researchers, but they offered what she deemed unnecessary and unhelpful criticism:

> “Early on, I met up with a couple researchers just to find out about their research practice and what they were interested in. And I remember the researcher being like, ‘no, this is not going to work, you need to totally change what you're going to do.’ That may have been true, but that's not the right time...I wasn't coming to ask advice and yet they felt very willing to give me advice to change things.” *Sam, clinician*

Researchers opening channels to learning for both clinicians and researchers. One final key element to successful engagements was a sense of clinicians and researchers learning from one another. In my interviews, I found clinicians wanted researchers to admit what they didn’t know in terms of the project; they wanted to feel like researchers were learning from them as much as clinicians want to be learning from researchers.

> “Through the process you're learning…those discussions make you realize what you both know or the common language that you can both speak….I might say something that I'm so used to - that is almost second nature to me - or they might say something second nature to them and we'll be like ‘wait, what does that mean?’ It's like, ‘oh I don't realize you don't know what that means.’ So you're seeing where there is the common language and then, if there's things you don't know, just ask and learn along the way.” *Charlie, clinician recently in a split-research role*

To further promote learning between researchers and clinicians, researchers could allow (1) research roles to be flexible and (2) clinicians to receive more holistic knowledge and background of the project, regardless of role (with the exception of blind assessors when needed). By encouraging role flexibility and providing clinicians with complete knowledge of the project, researchers can hold structural space for clinicians to provide their voice. The first, role flexibility, means that researchers support clinicians in operating outside the scope of their assigned research role. For example, researchers could prompt a clinician assigned to conduct assessments (an assessor) to provide feedback on the assessments in the protocol, instead of only conducting the assessments. The research process can be perceived as very strict, but in holding space for clinicians, researchers can show that there is malleability in the research and that it can change with clinician feedback.

> "And I shouldn't say that they're like, no, no, no, but it's just that they were not, we weren't involved in the right process because... So I was pulled in to be an assessor, but they chose an assessment that they didn't know. And so as a result, I was brought in to be an assessor for this one little piece, but without, it seemed like it was without necessarily thinking about how maybe my insight could have been more valuable earlier on. But this is where I think a lot of the times researchers come up with their ideas on their own. They go to the research articles and find like what seems to make sense, create this protocol and then recruit clinicians to be assessors, whereas I feel like sometimes it may be more beneficial to treat your clinicians as stakeholders and pull them in a little bit earlier on to figure out what would maybe be a more effective strategy or effective approach." *Sam, clinician*

Those who are tasked with running assessments can use the results of the assessments to determine inclusion criteria ("screening assessments"). Clinicians conducting assessments sometimes mentioned that their work included recruiting patients for the assessments. One successful example was from a clinician who was tasked to run assessments for a project. She said that "...prior to actually running the assessments for these participants, I did help to discuss with the director of the lab as well as the PhD student that is primarily working on the study, helped advise on assessments that might be appropriate, why they may or may not be, what might be a little bit more clinically relevant, and just finding particular screening or assessments that are appropriate to what they are looking at, and maybe will give them some more appropriate information." In this example they used the assessments as a guide for what the clinicians think will be "appropriate information" for the researchers to collect.

Assessors can provide feedback on assessments to provide a more robust application of real-life measures.

> "So [the researcher is] wondering what's a good way to test that, like what kind of outcome measure, clinical assessment, or functional assessment? June…she's the one that said instead of just doing this one measurement that tests, why don't we do more functional assessments in addition, ones that we use as clinicians that are more function-based in addition to like an objective measure-based? So …I'm thinking…not just testing…like that objective measure, but is there an outcome measure up there that's more function-based…?" *Charlie*

While ambiguity can focus attention and facilitate social and cognitive engagement (McMahan & Evans, 2018), participants reported a desire for holistic understanding of the project. By having full knowledge of a project, clinicians can understand where and how they can better provide feedback. They can be utilized in more ways than their structural role, compounding the value of the clinical voice in the engagement.

> "They had a rough outline, but then narrowing down more of the specifics is where I came in. But they spent some time explaining. I read the other study before I met with them that they were basing, looking at this on. I read that other study and understood the principle and why they did it and the design, and then they discussed their design or thoughts, but were very open to all the input I had." *Bea, clinician*

DEVELOPMENT OF INTERACTIVE HOLDING ENVIRONMENTS

To understand the findings more deeply, I conceptualized the environments that yielded "successful" interactions (as perceived by the clinician) as "interactive holding environments," which I will refer to as "IHEs" in the subsequent analysis. I structured IHEs around holding environments, a concept put forth by psychologist D.W. Winnicott (1975). Inspired by recent research in work environments, yoga and education studies that implement holding spaces as an empowering mindfulness practice (e.g., McClure, 2015), I expand on the concept to consider an interactive teacher-learner dynamic with deeper emphasis on bidirectional learning. Whereas traditional holding environments focus on the promotion and development of the learner (read: clinician), I argue that an interactive version of the concept can include a similar positive development of the teacher (read: researcher). It is within these mindful spaces that collaborations such as translational medicine can flourish.

Holding environments: a conceptualization of engagement, empowerment, and psychological safety

The concept of holding environments was developed by D.W. Winnicott to describe the child-caregiver (mother) relationship that promoted the independent development of the child through an enclosed, bounded 'holding environment.' The holding environment acts as a transitional stage in which the infant moves from dependency on the mother to "a state of being in relation to the mother as something outside and separate" (Winnicott, 1971, p. 14). The concept highlights two power levels - a higher power (mother/caregiver) against a lower power (infant/child). The higher power is tasked with creating a "safe and secure environment…in which…the child's true self is allowed to unfold" (McClure, 2015, p. 22).

Holding environments are geared towards the development of the child and in this process should not include the needs and interests of the caregiver (Winnicott, 1975). These environments are grounding experiences where the child is grounded in the body and is comfortable to signal its needs to the caregiver and continue developing. The caregiver then must provide adequate empathy and affirmation to the child. If successful, these environments help the child develop "a more enlarged, more conscious sense of self…creating a proper therapeutic container or holding environment is key to promoting deep innermost change" (McClure, 2015, p. 21). If the environment fails by not adapting for the child's needs, the child goes back to a state of isolation (Winnicott, 1960).

Holding environments have been applied in the school setting (e.g., Hyman, 2012) and in medicine (Thomas & McGinnis, 1991), but can be effectively demonstrated through the teacher-learner paradigm of yoga instruction. In this context, the yoga instructor acts as the 'mother' figure, providing the student the space and guidance to build their yoga practice and find internal peace through their unique interpretation of the movements. Yoga instructors harness their implicit power "to create safety and maintain predictability" (Justice et al, 2018).

The concept of holding environments is underdeveloped in the organizational literature, with initial research exploring work environments (Kahn, 2001) and identity (Petriglieri & Petriglieri, 2010). As articulated in Kahn (2001), holding environments in the workplace require trust, competent team members, and secure relationships. Mechanisms to drive this include practicing reflexivity, having curiosity for the other, and being both psychologically and physically available. They are psychosocially bounded such that everyone is aware the emotional commitments and content will remain work-related (not discussing or spilling over into personal life). Kahn further describes the application of the holding environment to the workplace:

> "Authorizing others to hold means empowering them as temporary caregivers, that is, permitting them to tend to oneself as one learns within an emotionally difficult situation. People thus place themselves, metaphorically, in the hands of others, retreating to them as ships retreat to safe harbors. Holding environments are marked by a shifting of the task, through the conscious intervention of a member or leader of a dyad or group, toward holding. A manager makes time to support an upset employee. A colleague shares his fear, and another deliberately joins the conversation. The leader of one group makes time at the end to support a member, whereas the leader of another group intervenes to direct a conversation toward rather than away from the group's anxiety. In each case, people deliberately create the psychological space in which the task becomes surfacing and

> working through anxiety. Although less intensive than the holding actions of mothers and analysts, holding environments at work are reasonably safe places in which people may express and examine their experiences in startling situations. Within holding environments, people demonstrate care and concern for others in particularly skillful ways." (Kahn, 2001, p. 265)

In the following conceptualization of interactive holding environments, I show how the application in the workplace can be more than an emotional 'holding of space,' rather collaborations can create holding environments that elevate the project outcomes, increase mindfulness, and develop the stakeholder into a more empowered state.

Interactive holding environments: key concepts and application

> "Although it may seem that the teacher holds the power in this interaction, by providing structure, the teacher is actually a tool in service of the students. Free from planning, the students can focus on meditating." *Hikida, 2018, p. 225*

The above passage inspired how I viewed IHE between the clinicians and researchers, in which the IHEs can transform the interdisciplinary clinician-researcher interaction into a dance where the researcher becomes more of a vessel, refining and developing the clinical voice. By 'holding space' for clinicians, researchers intentionally carve out time, directly ask questions, and approach clinicians. They create structures around the "space" for clinicians to ask questions themselves or provide feedback. In the Winnicott model, the caregiver cannot impart their needs on the child; however, in the collaborative clinician-researcher model, the researchers also need to be able to integrate their perspectives too.

Hikida (2018) continues to describe a type of holding space in education where students and their teachers jointly disrupt the students' identity narratives about being "struggling" readers. Hikida introduces ways in which the literature handles identity disruptions, including "interactional spaces where students and teachers build understandings about text together"

(2018, p. 218). This notion of a team-based development of the context applies to what I heard in successful depictions of clinician-researcher interactions.

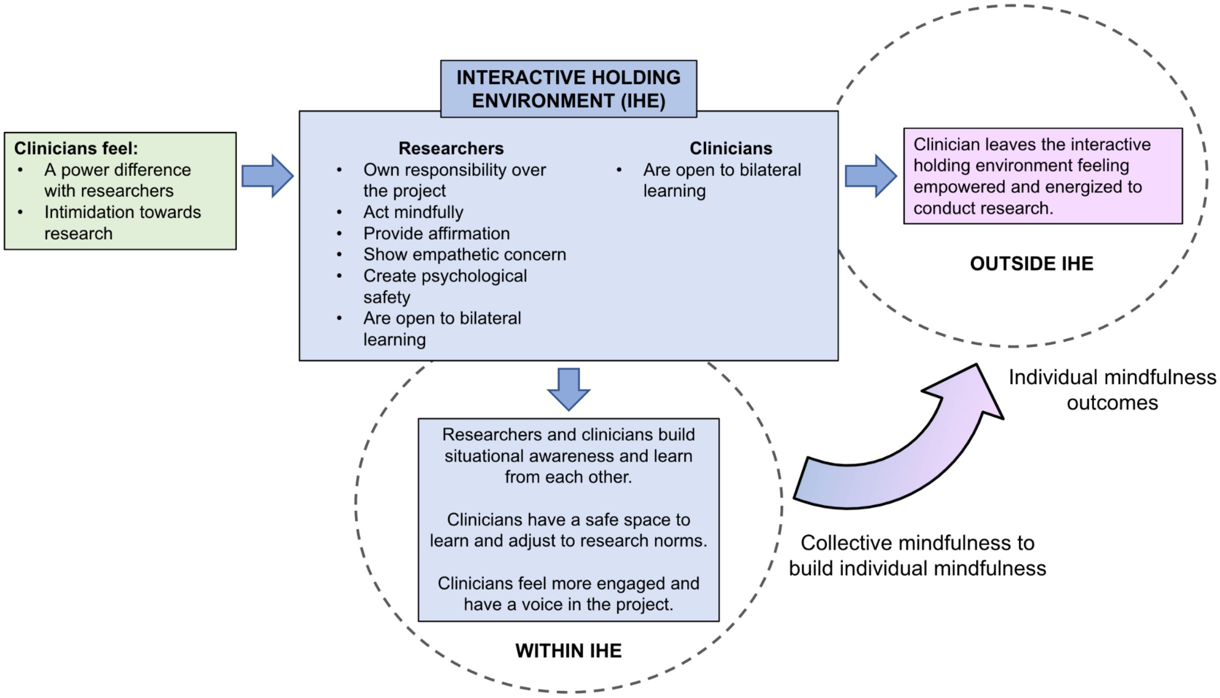
A holding environment promotes change in the sense of developing clinical reasoning, increasing the clinician's holistic viewpoint, and improving their confidence (empowerment). Clinicians felt their voices being heard when they felt that they were making an impact in the direction and outcome of the research. In Winnicott's conceptualization of holding environments, the child learns from the caregiver while the caregiver has a fairly immobile presence; however, in my conceptualization of 'interactive holding environments,' both the 'child and caregiver' roles learn from each other. For this bidirectional dynamic to occur, mindfulness and presence must be exhibited in both groups. Additionally, while the theory addresses physical and mental components of a holding environment, I also see clinicians undergo a temporal (experiencing time) adjustment.

I found that predominantly in these IHEs researchers assumed responsibility over 1) the final project result and 2) structuring the environment in a way that provides clinicians the resources and safety they need to engage in the research, as well as bilateral learning and development of situational awareness. The researcher(s) fostered inclusive, curious environments in which the clinician and researcher could make sense of each other. They created structures in which the clinicians had the mental and temporal space to adjust from clinical routines to research norms. Within these structures, clinicians and researchers could learn about each others' goals and the clinicians could develop the skills to carry out research once they left the environmental encasing. Overall, this period of sensemaking within the interactive holding environment was crucial to building situational awareness between the clinician and researcher.

Unlike the traditional holding environment in which “interpretations are used primarily to support the analytic holding function rather than to convey new information or stimulate insight” (Slochower, 1996, p. 196), IHEs center around the sharing and creation of new knowledge to clinicians and researchers.

Below I elaborate on how researchers took the reins of responsibility and the mechanisms they used to build positive structures to form the interactive holding environment, as illustrated in **Figure 1**. In constructing the IHE model, I designate two levels of outcomes: within the IHE (where clinicians feel engaged, share their voice in the research, and undergo a self-developmental phase in which they build the skills and confidence to conduct research) and outside the IHE (where clinicians now feel empowered to conduct research outside of the specific IHE). As the model shows, it engages the clinician in the research (within the IHE) and empowers the clinician in future research (outside the IHE).

FIGURE 1. Interactive Holding Environments



Within the IHE: Engagement. The primary level is centered around engagement. Within the IHE, researchers and clinicians can build situational awareness together. In this instance, they are able to learn the knowledge and skill sets that their collaborating partners have. Some clinical research collaborations have mismatched knowledge sets where researchers don't know how to use clinicians, and clinicians don't know 'who knows what' or how they can contribute outside of their specific research assignment. As a clinician said, "that's something that is hard. I mean, that's probably the hardest part about it - knowing who to ask. Because once you know who to ask, everything else kind of flows from there, even if it's complicated, I guess." In an IHE, clinicians can develop a working relationship such that researchers are able to understand how to utilize clinicians in the research and clinicians themselves better understand the ability they must contribute.

Similarly, an IHE ensures that clinicians are exposed to more information about the project and can have more flexible roles within it. Instead of being sanctioned as an “assessor,” the clinician can be brought into the protocol development to learn about the study goals, specific exercises, and anticipated outcomes. By understanding their role and the larger project, clinicians might be able to provide (or feel more confident providing) feedback on areas outside their immediate realm of influence. In other words, learning the larger project scope expands the clinician’s potential realm of influence. Additionally, “knowledge of the procedure” can reduce stressors that lead to burnout (Swendiman, Edmondson, & Mahmoud, 2019).

Additionally, researchers provide a safe space for clinicians to professionally develop and adjust to research norms. During the IHE, clinicians begin to lose the fear and intimidation they might have faced leading into the IHE. Once encapsulated in the IHE with clinicians, researchers can use their power to undo and replace the negative emotions with positive, confident emotions similar to Fiol’s leader-led freeze - replace - refreeze process (2002). In transitioning into the research space, clinicians also learn to toggle from one role (clinician) to a new role (researcher). As one of my interviewees, June, illustrates below, making sense of this transition requires grace as you adjust from different cadences and work norms. The adjustments are physical, mental, and emotional.

> “Research?...I remember when I first transitioned, I was like, "Okay, what's next? Where do we need to be next? Blah, blah, blah." [RESEARCHER]’s like, "We can just sit, it's okay. You don't have to be up constantly doing something, you're allowed to take lunch," or "you're allowed to have a coffee," or clinically, we don't even have time to go to the bathroom sometimes. So that was a huge change, and I feel like I've gotten used to it since then.” *June, clinician researcher*

While learning the new norms of the researchers, clinicians are undergoing an active "unlearning" process where they must maintain the tacit knowledge of their professional experience ("what is the patient's perspective or our practical/financial abilities to do this?") while disentangling and diminishing the embodied clinical routines (Bigo & Islam, 2022). With the physical toil that clinic places on clinicians, they go through a mental and physical period of adaptation where they no longer have each minute accounted for. There can still be a necessary adjustment phase even when clinicians are still enacting "treatment-like" practices as part of their research.[4]

One adjustment clinicians make is to the critiquing styles of researchers. Being in an academic role, researchers were reported to have more of a direct, blunt feedback style. Clinicians found this to be much different than how they interacted with their clinical peers, which was usually in a gentler manner, encouraging suggestions or feedback. Some clinicians reported having the confidence to ask questions when intimidated, but others had to build up to it (or just never developed it).

> "I mean, I always asked the questions. I wasn't afraid to ask the questions. Whether I felt a little dumb asking it or not, that probably is half and half. Sometimes, I was like, "I feel really stupid that I don't know this, but I need to know it," so I just would ask." *Tansy, clinician*

Sometimes clinicians felt like researchers were more upfront with unsolicited or abrasive feedback:

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[4] For some, this adaptation process is not always positive, as some participants explained the embodied experience of moving from a clinical to research realm actually adding more physical and mental stress to their bodies, especially when clinicians work in split roles. These concepts will be elaborated on in the following chapter.

> "I think researchers tend to be a little bit more direct in their communication, and they're used to being kind of picked apart and really criticized in their written communication, in their oral presentations, and whatever sort of communication it is. And I think that that is not the way clinicians are used to interacting with their colleagues and their peers and, in fact, is not the way that we train clinicians how to be good mentors...In terms of developing someone's clinical reasoning, we approach that as like a, "Hmm. That's interesting. Tell me why you're thinking that," versus, "I see these flaws in the way that you're thinking," is kind of the researcher's perspective." *Jade*

Additionally, clinicians found that research had "structure" such that there are steps you have to take to conduct research/protocols, as opposed to the autonomy they were used to in the clinic where they could decide how to run a treatment session. They also found that in research one gets delegated tasks or projects to work on.

> "I think two things that would have been helpful for me to know before was how long the IRB process actually is. Like, I had no concept of that, like zero, so having an understanding of that would have helped me to make a better timeline for the project. So I think that's something that if a clinician is newly planning to dive into research, to get an honest opinion on timing, because everything takes longer than you think. And just to not be afraid to ask questions." *Tansy*

Outside the IHE: Empowerment. Most importantly, when executed effectively, the IHE has the potential to act as an incubator for clinicians, supporting their growth into confident researchers. In successful collaborations, clinicians left the project feeling equipped to conduct or lead research moving forward.

> "But by the time I wrote the IRB with #101 for the clinical study, it was approved immediately. But it's because we wrote it as clinicians, you know what I'm saying? And now that I have that experience and kind of the clout, I was a new clinician, I had no idea, I didn't know what I was doing. So I was kind of taking the feedback from these people. I think it's even received better when I collaborate with engineers. I'm like this is what it needs to be. This is how it needs to kind of be, the language we need to use. And they understand because now I have the evidence and experience to back it up." *June*

Ultimately, for a hospital like Movement, their goal was for a larger culture shift in which clinicians would gain the confidence and skills to either move into part- or full-time research roles or participate in research on the side of their clinical roles. While they implemented a variety of HR mechanisms (such as clinician-research tracks), organizational research events, and research grant projects (including mentorship grants for clinicians new to research), a model such as the IHE could be a framework for stronger collaboration experiences that empower the clinician to evolve as a researcher outside of these organizational structures.

DISCUSSION

As described in the findings, some clinicians reported holding two strong emotions when approaching research: intimidation by the ambiguous research process and a power differential with researchers. In reflecting on successful engagements in research, clinicians found it helpful when researchers used their power to "hold space" for the clinical voice to be integrated and for clinicians to develop confidence as researchers. Mechanisms that supported this included researchers relinquishing research responsibility from clinicians, acting mindfully and empathetically, providing affirmation, and empowering clinicians through psychological safety and bidirectional learning. Clinicians equally had to be interested and open to these experiences for them to consider it successful as well. This study looks at a specific delegation of mindfulness to the more powerful group (not just the frontline employees) and finds that a higher amount of within-team mindfulness in terms of non-judgmental attention to stakeholders is meant to enhance the delivery of voice. Through more psychologically safe and high-quality connections (Dutton & Heaphy, 2003), stakeholders might be less worried about their ideas being rejected, but there is still an interest in the ultimate outcome of the collaboration as it relates to the stakeholder's personal development and patient-centric goals.

Contributions to research on mindfulness in organizations

This study attempts to clarify the link between individual and collective mindfulness the way work in sensemaking has tried to bridge individual and group sensemaking, understanding that the individual flows into the group (Stigliani & Ravasi, 2012). It responds to a call in the literature for more mindfulness "infusion" across individual and collective states (Reina et al., 2023). Through a construction of IHEs, I show that mindfulness can be constructed collaboratively (at a group level) such that when individuals leave this space, they are more empowered and more regulated in their workplace emotions (Reina et al., 2023). Prior to undergoing the IHE collaboration, clinicians can be fearful and uncertain about research; in leaving a successful IHE experience, clinicians feel more empowered and less anxious about the research process. They are more attuned and aware in this context than before. According to numerous interviewees, after a successful research experience, they are able to see medicine and research 'more holistically' - they have a better grasp of how both are interrelated and report their treatment practices are improved as a result.

The holding environment portrayed here is interactive to actively foster engagement between the clinicians and researchers. By adapting the concept of a holding environment put forth in the literature, I find it's also important for clinicians to be equally engaged in the process; if they care about the impact on patients but "outsource" the research to non-clinical researchers, they effectively become less involved and less mindful (Weick, Sutcliffe, & Obstfeld, 1999). It challenges the immobile and inactiveness of Winnicott's holding environment. As he describes, it is "an intermediate area of experiencing, to which inner reality and external life both contribute. It is an area which is not challenged because no claim is made on its behalf except that it shall exist as a **resting-place** for the individual engaged" (Winnicott, 1975, p. 230).

In my conceptualization of an IHE, mindfulness helps it progress from a "resting place" to a more active development and engagement of the stakeholder. The sensemaking in IHE is dynamic, and - through enclosed, protected interactions - clinicians and researchers can gain knowledge and make sense of each other. This study builds upon the notion that mindfulness promotes an "attentional vividness" (Sutcliffe, Vogus, & Dane, 2016) by illustrating how it allows one to be more attuned and receptive to their collaborative partner (especially the stakeholder) in an interaction. The IHE provokes mindfulness in helping the researcher better understand what elements and context to pay attention to in the clinician's realm and how to integrate that feedback.

Interactive holding environment's relation to similar concepts

My study contributes to the literature on stakeholder engagement by creating a relational dynamic model. This model relates to similar concepts such as free spaces (Polletta, 1999), relational spaces (Kellogg, 2009), experimental spaces (Zietsma & Lawrence, 2010), reflective spaces (Bucher & Langley, 2016), and interaction scripts (Lee, Mazmanian, & Perlow, 2020). The IHE is like reflective spaces without the physical boundary. Free spaces, as introduced in Polletta (1999) are small, concentrated sites intended for political mobilization, usually embedded in social movements. They "supply the activist networks, skills, and solidarity that assist in launching a movement. They also provide the conceptual space in which dominated groups are able to penetrate the prevailing common sense that keeps most people passive" (Polletta, 1999, p. 3).

Kellogg (2010) builds off free spaces with the introduction of ‘relational spaces.’ In her work, medical practitioners respond to the institutionalization of a movement practice by splitting into factions of supporters and resistors within the organization. Those that wanted to maintain the status quo strived to do so to preserve how they identified as a practitioner. In response to the challenge of their professional identity, the ‘resistors’ pushed back. Her use of ‘relational spaces’ then implies a physical space in which “reformers built a cross-position collective that enabled them to sustain their challenge against fierce resistance by defenders” by “creating the new capacities of relational efficacy, identity, and frames in relational spaces” (Kellogg, 2009, p. 695). Similar to IHEs, Kellogg’s relational spaces build psychological safety so fear of speaking up is mitigated.

Additionally, my IHE has ties to other models influenced by Winnicott’s holding environments. Petriglieri & Petriglieri (2010) introduced identity workspaces that provide a psychologically safe container for employees to use sensemaking to stabilize or transition their work identity. This was further developed by Petriglieri, Ashford, & Wrzesniewski (2019) who showed that workers without an organizationally sanctioned holding environment created their own personal holding environments. These environments were containers’ “for their working selves” built through “four types of connections—to personal routines, to physical places, to significant people, and to the purpose of their work—that helped them stay productive and manage the emotions attendant in their work” (141). While Petriglieri et al. (2019) anchored the personal holding environment on “making space,” my interactive holding environments are developed around the idea of “holding space.” While the “making space” refers to a physical, social, and emotional zone, mine removes the need for a physical boundary. The IHE also extends the idea of a holding environment past the individual (or the dyad as conceptualized in Winnicott's version) to the collective, with an intended impact on the individual unit. Similar to Petriglieri et al. (2019), the containment vessel constructed in my IHE acknowledges the participant's anxieties. The "containment kept emotional tension at bay and let purposeful work continue uninterrupted" (Petriglieri, Ashford, & Wrzesniewski, 2019, p. 153).

Limitations, Boundary Conditions, and Extensions

Limitations. While an intentional choice, my study was limited by its focus on the clinician perspective. By expanding my interviews to include more researchers, as I did in Stages I and II, I could further expand and validate the conceptual relationships I illustrate here. In my articulation of an IHE, I focus on the "success" as expressed by clinicians. While this allowed me to shed light on the stakeholder perspective, it fails to fully address whether enactment of an IHE is positive for researchers as well as clinicians. The benefits of the IHE might be biased towards clinicians (or the lower power entity), as it implies additional work and effort will be required by the researchers to train clinicians in research and direct research conversations. Enactment of an IHE can pose a tradeoff where clinicians gain research mentorship, but it could delay the research process.

One researcher I spoke to expressed frustration at having to spend extra time training their clinical peers when they felt they could have done the work faster themselves. One aspect I did not address in the paper was the role of the organization to train clinicians in research. While instruction can, and is encouraged by the IHE to, be administered by researchers during interactions, organizational leadership should ultimately ensure that clinicians have the proper, basic institutional training they need for these experiences to remove excessive burden from researchers. Movement Hospital had employed multiple tools to help train clinicians in research.

Additionally, I would be remiss not to acknowledge the role my values played in the interpretation of the data presented (Charmaz, 2017). I realized the data crystallized in a way that reflected the world I tried to create for the clinicians during the interviews - a place of safety in which they could acknowledge and be moved by their own experiences. Future development of this paper could be strengthened by enlisting coauthors or contributors to corroborate the coding or themes to ensure consensus in interpretation of the data. While I used the 'grounded theory lite' tools of Charmaz (2014) to robustly analyze the data, additional input could be instrumental in validating the proposed findings.

Boundary conditions. In my approach to research, I believe we cannot generalize about organizational findings at large, rather we must put boundary conditions on our assertions. In my work looking at specific teams in a hospital setting, I understand that these conditions might be contained to the unique setting and what I find amongst team members in the case study's hospital site might not be generalizable outside this context. Primarily, I analyze the IHE through the context of a power dynamic in which there is a situational "lower" power entity and a "higher" power entity. In this relationship, the interaction of engaging and empowering the lower power entity is simply illustrated – the higher power entity, clearly defined by the organizational culture, influences the lower power entity. The IHE as defined here might be too simplistic to apply to interactions that occur between multiple members with varied, unclear, or complex power positions. Thus, the IHE is bounded by a two-party, teacher-learner dynamic.

The IHE also does not work in situations in which both parties are not aligned or committed to collaboration. For clinicians who do not adequately have the time to engage in extensive communication with researchers, the benefits of an IHE will not likely be achieved. Similarly, if the clinician's desired research role is solitary, for example measuring and reporting assessments, an IHE won't apply as an empowerment tool. For an IHE to reach its full potential (empowering clinicians), clinicians and researchers must put effort and time into the process. Specific quantifications of time and effort were not explored in this study but could be considered in future work.

Extensions. Engaging in research was found to have a positive impact on the clinician's treatment when they returned to the clinic and resumed patient interactions. Describing it as an expansive experience, clinicians in successful IHEs felt they returned to the clinic with a more holistic view of healthcare, seeing not only the patient-level, but developing a greater understanding of the macro policy and larger environmental contexts as well. Improved patient outcomes for clinician-researchers were not measured in this study but could provide an interesting focus for future work as well. Similarly, I did not explore the impact that clinician-research collaborations in IHEs had on researcher's outcomes.

The hospital has a uniquely young workforce. Future research could examine more closely how clinicians perceive engagement and integration of their voice based on their tenure in their role or research experience; team; role in research (is there a part of the project they're working on specifically?); type or frequency of interaction with researcher. generalizable for other hospitals or institutions engaging in translational medicine. Future research could also assess whether the stakeholder's view of successful integration is representative of actual engagement effectiveness. Organizationally, what does the stakeholder's view of success mean for intervention development? What is the goal of getting stakeholders to enjoy and/or participate in research if we cannot measure if the engagement translates to practice change?

The enactment of holding space can be challenged if researchers perceive collaboration on research projects as independent work. In speaking with one researcher, they felt that everyone on the team has their own expertise and defined roles and do not necessarily need to collaborate except for the IRB and manuscript. This model fits the organization's version of collaboration (performative) but doesn't make the researchers feel that they're actually working with clinicians, just doing independent work in congress with clinicians. Future research could also further explore the lens of the researcher and the impact their purview has on collaboration success.

CHAPTER 2 | SEEKING MINDFUL MOMENTS: AN EXPLORATION OF ROLE DEVELOPMENT AND BURNOUT IN CLINICIAN-RESEARCHERS

Summary

This chapter explores the role burnout plays in job crafting (as an antecedent or outcome); how employees manage burnout fluctuations during the job crafting process; and what qualities (i.e., mindfulness) are needed to improve this process. In my research, I find that the motivations for individuals to job craft (or role develop) are related to the three elements of burnout: exhaustion, depersonalization, and ineffectiveness. I also find that these three areas map onto the expectations clinicians had about their roles before starting. As clinicians feel burned out, they can job craft and create more mindfulness as long as they maintain a consistent overarching goal (patient-directed) and do not increase their perceived work demands. Within the clinician-to-research transition, clinicians were able to change their routines (sparking mindfulness) while still maintaining a patient connection. By reducing burnout and increasing mindfulness through job crafting, clinicians were reminded of their 'why' and ultimately improved their clinical practice, when applicable.

Flexibly job crafting and developing one's roles are seen as ways to reduce the strain that occurs from job demands. While mindfulness and attention emerge as a component of this, the interaction of these three dynamics is not well understood in the organizational context. This chapter hopes to expand upon the connections between job crafting (role development), burnout, and mindfulness.

INTRODUCTION

Role transformation is often described in positive connotations, because of intrinsic motivation, work engagement, and organizational opportunities. It can provide individuals the means to expand their jurisdiction and level of expertise (Barrett et al., 2012). Research has found that when job demands are high and job resources are low, individuals experience heightened states of stress or burnout, but their wellbeing can be improved if given the ability by their organization to craft their job (Tims, Bakker, & Derks, 2013). Role transformation can also be viewed as a form of routine disruption, such that it shifts an individual's attention from a more 'autopilot' state and generates increased mindfulness (e.g., performative routines in Feldman & Pentland, 2006). However, how burnout is (or could be) managed during the role development or job crafting process is not fully explained by the literature.

In the following study, I examine the interplay between burnout, job crafting (or role development), and mindfulness through the context of translational medicine as traditional clinical roles and professional opportunities are expanding. As the practice of medicine grows more complex, the medical field demands clinicians be relative experts in patient diagnosis and treatment, as well as health policy regulations, business administration, and interprofessional communication. Concurrently, clinicians are also called to be more innovative, more creative (Lee et al., 2019), and more engaged in the co-production of medical knowledge (Batalden et al., 2016). As clinicians undergo role changes and take on new responsibilities, added psychological stress could contribute to burnout (Rassolian et al., 2017). On the other hand, one could surmise that the new set of tasks might ameliorate the clinician's prior levels of burnout (Tims, Bakker, & Derks, 2013).

Translational medicine and clinical role development

Translational research is a discipline to make therapeutic developments more effective for and utilized by intended populations. Traditionally considered the “bench to bedside” continuum, translational medicine has two sides: 1) applying lab discoveries to human subject studies and 2) developing research aimed at community health interventions (National Institutes of Health, 2007). With roots in cancer treatment, translational medicine is evolving medical research from a supply-side market – in which scientists create a product for clinicians to use (the T1 and T2 blocks) – to a demand-side market, integrating treatments with patient and public health needs (T3 block) (Thornicraft et al., 2011). Translational science uses clinical observations and patient engagement to develop patient-centric health interventions. By involving patients, the process intends to avoid the usual pitfalls of traditional basic clinical treatments, such as a 10–15-year turnaround time and a ninety-five percent failure rate for new treatments (National Center for Advancing Translational Sciences, 2021).

Translational medicine is a relatively new evolution from basic, clinical science. In the 60s, an NIH-sponsored program (Medical Science Training Program) was created to train MD/PhDs to conduct translational medicine. However, 20 years later, patient-centric translational medicine efforts had been relatively abandoned for burgeoning careers in basic science (Teo, 2009). In the 90s, a renewed governmental interest in patient-centric research reemerged, and over the following decades the NIH would draft the Roadmap Initiative (a plan for accelerating the translation from basic science to clinical practice) and create a series of translational-focused grants and awards (National Center for Advancing Translational Sciences, 2021), and the Association for American Medical Colleges would also push for translational training across all medical schools (Teo, 2009).

Clinicians taking on new roles. Translational research carves space for clinicians to not only heal patients, but collaboratively produce evidence as “clinician-researchers” to improve their treatment practices. They are intended to experience “boundary cooperation” with researchers, in which clinician and researcher roles have the potential to evolve, with expanded jurisdictions and level of expertise (Barrett et al., 2012). Often, clinicians are learning these new roles in situ, under the usual time and emotional constraints of their clinical work, as education around translational medicine at the university or training level is still nascent (McGaghie et al., 2012). However, these opportunities for traditional role transformation can present an opportunity for clinicians to restructure their roles in a way that best suits their needs and personal goals. These ideals of the new “clinician-researcher” are increasingly embodied by organizations who are restructuring their incentives and responsibilities for traditional clinical roles.

ROLE DEVELOPMENT AND JOB CRAFTING

Through institutionalization of translational medicine, the organization provides clinicians an “alternative” type of clinical role (such as a clinician with dual research capacities). By presenting an alternative role, the organization creates role instability and opens an avenue for role change (Turner, 1990). The challenge of a role identity can cause actors to lose association with their former identity in favor of a new one, leading to a widespread institutional change of a professional role (Rao et al., 2009). These new roles can be defined by an institutional logic of a “clinician-researcher,” which prescribes a set of affects, experiences, and expectations for the clinician taking on the role to assume (Voronov & Weber, 2016). In this concept of role identity, I can tease out the different emotional experiences of a clinician and a researcher.

Role change

According to Turner, role change can be elicited by a "social structural change that modifies the demand for role-relevant services or affects the availability of resources or social support for performance of the role" (1990, p. 106). Role change is then possible if it has an appropriate role-person fit, has a better cost-to-benefit ratio than the existing structure, provides great autonomy, and has appropriate structural support (Turner, 1990). Integral to effective role change is how the value of the new role and its inherent benefits are perceived (Reay et al., 2006). The new organizational push towards translational medicine has opened the door for changing role definitions and job crafting of clinicians. These organizational initiatives provide the raw materials for clinicians to transform their roles in ways that align with the growing field of clinician-researchers (Jones et al., 2013). A push for clinicians to engage in translational medicine challenges how clinicians view their professional identity, and what aspects of a clinical researcher align - or violate - those ideals.

Professional role identity change can be driven by the clinicians themselves (Reay et al., 2016) or their peers, through reinterpretations of logics in interdisciplinary group interactions (Reay et al., 2016), such as those between clinicians and researchers in translational medicine. A shift in potential job responsibilities, such as what is posed at Movement Hospital, offers an opportunity for clinicians to reform their clinical identity to take on research tasks and become more associated with clinician-researcher traits.

Job crafting

Under the wave of translational medicine, clinicians have a script for imagining “alternative futures" within their role (Barrett et al., 2012). Occupational identity change can occur both in terms of meaning (Ashcraft, 2007) and practice (Nelson & Irwin, 2014). We know that when there is a mismatch between the individual’s work tasks and their professional identity, the individual customizes the identity (Pratt et al., 2006). This phase of customization, or “job crafting,” is when individuals recreate the meaning of their work through physical (such as tasks and interactions) and cognitive (such as perceptions of relationships among tasks) changes (Wrzesniewski & Dutton, 2001). In addition to role changes, I also focus on the task changes clinicians can make as part of their role. Adjusting their tasks or perceptions can change the dynamics of the clinician’s traditional job and reshape their professional identity.

The underlying purpose of job crafting or professional role identity change is for the individual to create a more suitable work experience. The movement towards translational medicine is an opening for clinicians to transform, even incrementally, their clinical roles towards more research-focused careers. Job crafting or role change in these conditions can help clinicians receive more meaning in their roles or have an overall improved work experience.

BURNOUT IN MANAGEMENT

In contrast to job crafting, burnout is a sense of depersonalization caused by work stress and professional demands. It is an affective state exhibiting “feelings of being overextended and depleted of one’s emotional and physical resources” (Maslach, 2006, p. 38). This syndrome leads to feelings of depression and both a decrease in job effectiveness and personal sense of fulfillment. In medicine, it can lead to clinical errors and higher rates of turnover (Samra, 2018).There are three key elements of burnout: depersonalization, exhaustion, and ineffectiveness (Maslach, 2006).

While burnout can be attributed to both external and personal factors, it results more from external, organizational and systems level, aspects such as long work hours, loss of job autonomy, and poor professional relationships (Dzau et al., 2018; National Academies, 2020). Burnout increases as dissatisfaction with workload and the amount of time worked increases (Flynn & Ironside, 2018). Dissatisfaction can also come from poor working relationships, which often stems from an institutionalized hierarchy between professions, resulting in hindered communication. Fortunately, positive communication and professional relationships have been shown to reduce clinical burnout in physicians, and thus could be beneficial to other medical professions as well (Swetz et al., 2009).

Cordes, Dougherty, & Blum (1997) found that of the three components of burnout (emotional exhaustion, depersonalization, and personal accomplishment), emotional exhaustion was positively related to personal accomplishment, but depersonalization was not. They showed depersonalization and emotional exhaustion were strongest correlations to burnout and that excessive or unsustainable job tasks and emotional exhaustion were related (1997). In other words, if your role becomes burdensome, it can create emotional exhaustion. In seeking out resources to respond to this, you might change, develop, or craft your role to have renewed job-related resources.

Burnout, Job-Demand Resources model, and mindfulness

According to the Job-Demand Resources model, burnout can be explained through an interaction of job demands and job resources. When their job demands exceed their available resources, individuals will be in a heightened state of stress and become burned out. Job demands relate to 'exhaustion' while a lack of job resources can relate to 'disengagement' (Demerouti, 2001). Therefore, an abundance of exhaustion meets a state of disengagement, amplifying burnout. 'Job demands' according to Bakker & Demerouti are the "physical, psychological, social, or organizational aspects of the job that require sustained physical and/or psychological (cognitive and emotional) effort or skills and are therefore associated with certain physiological and/or psychological costs…job resources refer to those physical, psychological, social, or organizational aspects of the job that are either/or functional in achieving work goals; reduce job demands and the associated physiological and psychological costs; [or] stimulate personal growth, learning, and development" (2006, p. 312).

Mindfulness: Job resources, such as social support, can act as buffers from the strain produced by job demands (Bakker & Demerouti, 2006). Recently, mindfulness has been shown as a potential "resource" against the strain from job demands (Grover et al., 2017). Mindfulness is connected to burnout such that it relates to engagement (a 'foil' to burnout) (Malinowski & Lim, 2015). It has been described as a "self-control-restorative behavior" through which self-compassion can develop (Schabram & Heng, 2021, p. 56). According to Schabram & Heng, compassion creates self-control (among other resources) that reduces burnout (2021). Mindfulness has also been shown to improve job satisfaction and reduce burnout (Mesmer-Magnus et al., 2017; Hülsheger et al., 2013). However, there is debate over how effective individual or personal resources (such as mindfulness depending on its enactment) are in mitigating the negative effects of job demands (Xanthopoulou et al., 2007).

In the following study, I posit that mindfulness acts as a way to manage burnout during job crafting and role development. Since sustaining mindfulness is challenging (Brown, Ryan & Cresswell, 2007), especially in organizations like hospitals that emphasize standard processes and control (Levinthal & Rerup, 2006), I explore the tools and techniques clinicians use to retain mindfulness as they try to reduce burnout and become more engaged in research-related activities.

PRELIMINARY DATA

Motivations for engaging in research

While organizations increasingly encourage clinician engagement in interdisciplinary collaborations and translational medicine projects, the lived experiences of undergoing this process are not well-discussed. Many clinicians in the exploratory interviews mentioned wanting to participate in research to switch up their clinical routines and reduce their burnout (an outcome orthogonal to the organization's interest to improve patient outcomes), but also voiced exhaustion over navigating the research process. My initial interviews show that, in addition to helping their patients, the clinicians were interested in taking on paid research opportunities as a way to alleviate their clinical burnout. Through this paper, I explore the impact role change towards project participation and interdisciplinary knowledge sharing has on clinicians' wellbeing and burnout. During Stage II interviews, participants reported wanting to transition into research because they were burned out from the clinic. It got me wondering what the connection between burnout and role development was - is burnout a predecessor to role development? Can burnout spur role development? If so, why?

Barriers for engaging in research

One aspect critical in considering clinical burnout and translational medicine efforts, is the way clinicians are compensated for their time. For initiatives to be effective, they must pay attention to structural constraints and fit within the existing structures (Harrison & Stephens, 2019; Reay et al., 2006). One of the most established structural constraints that translational medicine interventions must work around is clinical time. Clinicians treating patients in an inpatient setting have strict time requirements to meet in order to get reimbursed. Clinicians have to complete a specific number of minutes with a patient for certain activities in order to bill for that code. Clinicians are usually required to spend a full hour with a patient, time tracking each activity, in order for the hospital to get full reimbursement.

This places an extensive time burden on clinicians and any non-patient interactions they might have. Usually, the opportunities for communication with researchers are limited to non-clinical time, such as the lunch hour. However, many use this time to chart and catch up on patient documentation. If clinicians want to pursue research discussions or opportunities, they need to carve out time outside of their required patient hours, or receive funding (internally or externally) and coordinate with their manager to cover the lost patient coverage.

In my exploratory interviews, clinicians voiced a need to be paid for their time conducting research. As it stands now, clinicians can only get paid for research if they receive or are part of a grant, or if their manager allots some of the small amount of discretionary departmental funding to cover their time. According to clinicians interviewed, managers have the ability to cover a small amount of funding each week but getting permission to use this towards research is challenging. Additionally, even when clinicians get grants, they often don’t understand how to bill their hours to the grant, spending unpaid time conducting the research even in a situation where they could be compensated.

POSITIONALITY

My role as researcher

In approaching research, I hold a relativist ontology that “the world consists of multiple individual realities influenced by context” (Mills et al., 2006). I favor a subjective epistemology in which myself and participants are “cocreator[s] of knowledge” (Rieger, 2019). Together, I acknowledge that my individuality as a researcher (the values, beliefs, and cultural systems I hold) shapes how I view, collect, and analyze data. It not only impacts the way I see the data, but the types of data I gather.

Unlike objective or realist perspectives, which believe that reality has one universal truth that a researcher can uncover, I believe reality is socially constructed and can vary among individuals. Thus, my interviews posed as a form of meaning co-construction where the participant and I probed and pieced together their lived experiences. By focusing on clinicians as participants, I intentionally wanted to showcase their “image of a reality” (Charmaz, 2000, p. 523) being involved in translational medicine. During the data collection, I reflected on Young’s description of the outsider-insider dilemma:

> “One or more of a researcher’s multiple selves may become relevant in the interactive dynamics of fieldwork…if they do not appear at first sight, any of them could become visible to respondents and informants during the course of fieldwork…. respondents and informants may react to any of these in ways that foster, hinder, or dramatically affect conversations with the researcher.” (2004, p. 191)

As both a management PhD candidate (outsider) and a seasoned non-clinical contractor at Movement Hospital (insider), I felt the saliency of my ‘multiple selves’ fluctuate over the course of my fieldwork. Sometimes my outsider-research-self reared up, while other times my insider hospital-team-member-self was more prominent. I had been informally part of the Knowledge Team for three years at the time of Stage III interviews, but not all participants knew my role or professional background.

My interviewing approach was informed by my experiences doing qualitative and design-based work in hospitals around environmental factors (e.g., sounds and constructed spaces), team communication, professional wellbeing, and knowledge creation. While I explained my background, there seemed to be varying impressions of whether I had a technical clinical background or not. This seemed to slightly influence the way individuals answered questions or how they described aspects of their experience (e.g., using medical jargon).

Participants and I might be halfway into a lively interview, the clinician articulating an impassioned research story, when I realized they didn't know I was non-clinical (holding no clinical background). Sometimes their uncertainty of my clinical knowledge generated an interesting disclosure, in which they thought I did have a clinical background and would talk openly to me about their frustrations with researchers. In one interview, a clinician voiced disbelief that one of her researcher peers didn't know about a certain assessment, describing the story in acronyms and jargon as though I understood the meanings. I tried to navigate these moments by creating an "insider" space, in which I provided warm, nonverbal head nods or murmuring without outing myself as a clinical "outsider" to make the participant feel more comfortable.

It wasn't always clear to me when I engaged with a participant if they would view me as an insider or outsider. In framing my identity, I wanted to ensure I was at least not perceived as an ‘administrative outsider.’ If I had been perceived as a figure of authority at Movement Hospital, I could have not only received less information, but potentially created an inaccurate power differential and less safe space for the participants. Although my dissertation work was supported by Movement Hospital, I explicitly stated in all written outreach to participants that my studies were not requested nor paid by the hospital, and that I, as the researcher, had no authority over the participant. Depending on which roles I was interviewing, I tailored my approach and interactions accordingly to build trust and open lines of communication with my participants.

My emotional response

During this series of interviews, I started to feel the gravity of the lived clinical experience sink into me. As a researcher, I experienced a “heartbreak” (Whiteman, 2010) while conducting some of the interviews, especially when participants described struggles balancing motherhood and work or the unrelenting toll of COVID-19. I heard stories from women who left the clinic to take maternity leave and felt no stability that their job - or what they thought might be a more manageable version of it - would be there when they returned. For others, the physical and mental exhaustion of their daily reality preoccupied them. I felt the strain in their faces through Zoom and through my reading of the transcripts. In analyzing the data, I tried not to disconnect from their stories, rather I leveraged my emotions to get a richer understanding of the emerging themes (Whiteman, 2010). Over time and through this process, I was eventually able to shake off the immediacy of my feelings. And while I still struggled, I no longer felt as paralyzed by the weight of my conversations.

I later discovered this to be termed ‘emotional dispersion,’ defined as: the “relational processes through which the effects of difficult emotions and emotional encounters are acknowledged, worked over and defused with a view to restoring well-being” (McMurray, 2022, no page number). By simultaneously working through the data while acknowledging the lingering shadows of their trauma, I was able to move closer to a place of neutrality as a researcher.

But even still, I grappled with a moral and ethical dilemma around my conducting interviews. As participants walked through painful memories with me, sometimes crying on the other side of the screen (and sometimes we cried together), I couldn’t help but question if I was doing enough to help the clinicians I was interviewing. How could I even begin to really help them? A few interviews in, I noticed myself starting to flounder. I was losing focus on the research questions and becoming absorbed with a larger message, that burnout is real and people are suffering. I felt like each interview ended with a defeated promise to use the data for good. I would collapse down my screen and stare into a reality that I couldn’t do anything to take away their pain. And importantly: was I contributing to it?

These questions prompted me to explore trauma-informed or sensitive interviewing techniques. I found this conversation missing from much of my academic dialogue, but believe it to be integral for researchers. In learning about trauma-informed or sensitive interviewing, I reached out to colleagues, attended a course, and led multiple group discussions on how researchers can protect both their participants as well as themselves in the discussion of trauma. I learned that the goal of trauma-informed interviewing is to foster environments that don’t retraumatize the participants (SAMHSA, 2014). The practice espouses six key tenants: safety (physical and psychological), trust, collaboration, peer support, empowerment, and cultural, historical, and gender recognition (SAMHSA, 2014). And, in increasing mindfulness of an individual's trauma, the researcher is more equipped to acknowledge and attend to the effects of these difficult conversations on themselves. Some of these practices I already embodied in my interviews (e.g., easing into conversations, giving the participant autonomy over when the interview and/or recording stops). But others, such as providing updates on the research findings to participants, are things I still strive to strengthen in my future research protocols.

METHODS

Setting

The data collection for this dissertation took place at Movement Hospital between June 2019 and September 2022. Movement Hospital is a mid-sized specialty hospital in the Midwest. Over the past decade, Movement Hospital has redesigned physical and organizational structures to promote collaboration and organizational-wide research efforts. The organization decentralized its leadership, designated champions of evidence-based practice (EBP) on each unit and introduced incentives (such as promotions and internal grant mechanisms) to encourage research participation. When implementing its new care framework, Movement Hospital created an implicit shift in the responsibilities of the clinicians - from clinical treatment to treatment in concert with research collaborations. While participation in research is not mandated for clinicians, it is heavily encouraged by the new organizational culture. For additional description of the hospital's physical and organizational structure redesign, **see Appendix A.**

In preparation for the dissertation, I started a role as a non-clinical contractor at Movement Hospital in June 2019 with one of the research labs ("Team Knowledge"). Being a non-clinical contractor required passing a background check, adhering to organizational vaccine requirements, and completing staff orientation and annual human resources competencies. I also received a hospital email address and an authorized badge that provided hospital access. My team, Team Knowledge, was led by a PhD- and clinical-trained Research Scientist (pseudonym: "Julia") with extensive training in implementation science. The team staffed health researchers, as well as clinicians who split their time between treating and conducting research. While on the team, I attended weekly team meetings, outings, and engaged in research related to the organizational changes. I also received organization-wide staff emails and was able to participate in organizational events as appropriate. For a timeline of my fieldwork activities, **see Appendix B.**

Site justification

I initially visited Movement Hospital to explore how it fostered collaboration through physical design; I had yet to learn about the growing institutionalization of translational science in different medical fields. However, while I began preparing for the dissertation, I learned that the hospital's specialty was a relatively young field of medicine and thus newer to translational science than other fields. A field less embedded in translational science methods could be primed to create more innovative practices and routines (Leblebici et al., 1991) before institutional socialization forces their "worldviews and practices" upon them (Zilber, 2002). Thus, I felt studying this specialty site was an interesting choice for exploring how clinicians were making sense of and engaging in translational medicine.

Participants

There were three types of clinician-researchers I could select for this study: clinicians who had a dedicated full-time equivalent (FTE) appointment in a research lab, clinicians who did not have a dedicated FTE in a research lab but participated in research through other capacities (such as leading their own research project), or clinicians who had an FTE treating and were not involved in research. Clinicians with a research FTE were still encouraged by Movement Hospital to apply to the internal grant funding mechanisms to spearhead their own research projects in addition to their work in the research lab.

Phases of research

My fieldwork occurred in three stages: learning the specialty hospital landscape (Stage I); exploring emerging issues around interdisciplinary clinician-researcher collaboration (Stage II); and deeper probing of clinician-researcher engagement, role development, and wellbeing (Stage III). While I gained key information during Stages I and II, the majority of the analysis for this paper derives from my data in Stage III.

To execute the data collection in these stages sensitively and with respect to the hospital staff, I worked closely with Julia, a research manager ("Lana"), the Chief Officer of Research ("Peter"), and Team Knowledge on the study procedures such as interview and observation scheduling, participant payment, and general staff communication. Julia brokered communication between myself and hospital employees, as well as how to structure the payments in line with hospital payment practices. Below is a chart of my data collection and analysis. For further explanation of Stages I and II, **see Appendix C**.

TABLE 1: Data Collection and Analysis

Stage	Data	Application

Stage I June - September 2019	*Learn the specialty hospital landscape*	
Participant interviews	14 interviews, including clinicians with an FTE in research (n=5), clinicians without an FTE in research (n=6), nurses and nurse leadership (n=2), and non-clinical researchers (n=1)	Provided initial insights into how employees operated within the new model at Movement Hospital for Stage II data collection.
Observations	12 observations, including treatment sessions, clinical leadership meetings, patient rounding, and research spaces	
Stage II June - September 2020	*Explore emerging issues around interdisciplinary clinician-researcher collaboration*	
Participant interviews	25* interviews, including clinicians with an FTE in research (n=6), clinicians without an FTE in research (n=2), nurses and nurse leadership (n=2), and non-clinical researchers (n=3), postdoctoral students (n=4), Principal Investigators (n=4), and clinician managers (n=3)	Transcribed interviews. Made jottings and memos during and after each interview. Conducted open coding to create themes and refine my research questions for Stage III.
Stage III December 2021 - September 2022	*Focus on clinician-researcher engagement, role development, and wellbeing*	
Participant interviews	60* interviews, including clinicians with an FTE in research (n=20), clinicians without an FTE in research (n=21), and non-clinical researchers (n=2)	Transcribed interviews and field notes from observations. Made jottings and memos during and after each interview, observation, and video presentation. Used initial and focused coding processes informed by my memos to generate themes.
Observations	6 hours of observations, including treatment sessions, research team meetings, and	

	project meetings	
Video analysis	11 video presentations of Think Labs (7) and Test Labs (5)	

**Some interviewees provided second interviews*

Context

For context, the Stage III interviews occurred during the height of the COVID-19 epidemic, when the participants were still working full-time but under strict precautions. This meant that they were wearing goggles, facemasks, as well as PPE (personal protective equipment) when necessary. The interviews occurred over Zoom, with some wearing facemasks if they were unable to take the call from a private location. While this context placed additional stress on the participants, it also allowed the interviews on wellbeing and burnout to provide a cathartic outlet for those needing human connection or emotional expression.

In line with the tenants of trauma interviewing mentioned above, my goal was to create a safe outlet for the participants. Upon reflection, I could have pulled some conversation threads harder, but I tried to monitor the participants' verbal and non-verbal cues for indications that they were losing energy or felt uncomfortable discussing a topic. While I wanted to get the best data possible to accurately depict the participants' experience, I wanted to be deeply mindful of their limits and was therefore overly cautious. I changed (or let the participant change) the subject, ended the interview, or asked clarifying questions when appropriate.

Data collection

Recruitment. For the Stage II interviews, I had worked with Julia to develop a list of the research roles (e.g., clinician-researcher) available at Movement Hospital (for interview protocol, see **Appendix D**). She proposed names of individuals for each category whom I might contact to interview about their experience participating in research at the hospital. These planning conversations oriented me to the research team roles and dynamics. To collect data for Stage III, I used purposive sampling to recruit clinicians who were actively engaged in research projects at Movement Hospital. I sought to recruit at least one clinician from each research lab to increase the heterogeneity and richness of data. Given the different stages of lab development (some labs were still hiring clinician-researchers to build out their team or the lab had recently hired its PI), I hoped a representative sample would provide more generalizable information than focusing on a select few teams.

Julia and I formulated a list of potential participants, receiving feedback and suggestions from our Team Knowledge members. Before I contacted participants, Julia forwarded the IRB-approved Study Information Sheet to the scientific chairs of each research lab, asking if I could invite members of their research teams to participate in my study. She then sent follow-up emails asking the chairs to respond if they *did not* want me to contact their team members for interviews. We received universal support, as well as additional suggestions of individuals to invite. Additionally, I worked with Lana to cull a list of clinicians who have been awarded internal research grants over the past three years. This also included lists of clinicians who applied, but did not receive, the grants.

I was either introduced to these participants via email from Julia or I cold emailed them directly. The introductory emails included a brief description of the study and appended the Study Information Sheet. I was responsible for following up, providing the electronic consent form link, and scheduling interviews. To ensure participants met the requirements of the study and were properly informed of its aims, the procedure, and their rights (such as their control over stopping the interview or declining consent at any time), I set up fifteen-minute introductory calls with each participant prior to the interview. These calls were not audio or video recorded. As interviews progressed, I used snowball sampling to include more participants. At the end of each interview, I asked for suggestions of other researchers who might like to participate in the study. I also asked if they had opportunities where I could observe them treating or participating in a research meeting. I then sent suggested participants information about the study to set up introductory calls. Two individuals I contacted declined an interview, citing a lack of time.

Consent. Once I connected with a participant over email, I provided them a link to the online Qualtrics consent survey. The consent form asked whether or not the individual consented to being interviewed and audio and/or video recorded. Participants were informed that this was a study for my dissertation and that they would be compensated for their time. This information was also discussed at each introductory call. I used the beginning of each interview to also reiterate the purpose of the study and how their interview data would be in the analysis. I reminded all participants that the interview and audio and/or video recording was optional and that we could pause or end at any time.

Semi-structured interviews. My advisor (KW) and I co-created interview questions for two interview guides through multiple brainstorming meetings. We inductively designed open-ended questions to generate participant narratives. The semi-structured interview guides assessed (1) participants' roles in research, experiences learning the research process, methods of communicating with their research team, barriers and facilitators to research engagement (**Appendix E**); and (2) factors related to career navigation, wellbeing and burnout, and research motivations (**Appendix F**). While the interview guides were not pilot tested, they were reviewed with my dissertation committee and Julia for feedback. I made slight modifications to the interview guides after conducting an initial set of interviews.

Interviews were conducted over the phone or on Zoom based on the participant's preference. Phone calls were audio recorded using an encrypted and password-protected recording device. Zoom calls were audio and video recorded to the Zoom platform and the recordings were transcribed verbatim. During the interviews, I took handwritten notes (Emerson, 2011) on the participant's role in research, their body language or tone of voice (Lareau, 2021), memorable quotes, and questions I wanted to explore further. An example of a jotting during my interview is:

> *Learning from others in the lab (now a little fish in a big pond); "learn and absorb from them." **Ask: What have you learned? What do you think they've learned from you?*

I put the participant's language in quotes next to my jotting and signal my own questions with stars or question marks. At the end of each interview, I spent a few minutes finalizing my notes and processing the transcript. Usually within forty-eight hours of an interview I would type up the notes, pulling in quotes from the interview transcript as much as possible. I used the notes to make memos, drawing connections between interviews and elaborating on any patterns or recurring themes I was seeing. I continued interviewing participants until I felt thematic saturation was reached and no new information was learned. Interviews ranged from 30 to 90 minutes with the average interview lasting approximately 44 minutes.

Data analysis

In analyzing my data, I took a qualitative "smorgasbord" approach intentionally selecting elements of interpretive grounded theory (Strauss & Corbin, 1998), constructivist grounded theory (Charmaz, 2014), and thematic analysis (Braun & Clark, 2006) that fit my data and epistemological view of the data. As mentioned above, I epistemologically align with Charmaz's pragmatist-constructivist view in which knowledge is co-created between researchers and participants and the "knowledge" generated is subjective to each individual (although patterns can arise). To note, I did not employ a full grounded theory approach in this paper, as I veered towards "grounded theory lite" (Charmaz, 2014) and used the tools of CGT to explore my research questions. I did not attempt to undergo a full development of a grounded theory, rather analyzed a process. I also pulled from Braun and Clark's thematic analysis methodology as a way to understand how interviewees made meaning from their experiences with burnout and participation in research.

I mindfully analyzed and reflected on my data throughout all stages of data collection. Thus, the "analysis" started from my initial interview, not once I had sufficiently collected all data. During each interview I would take handwritten notes about the participant's roles, research motivations, general experiences of burnout, and any key quotes or surprising comments (Emerson, 2011). After the interview, usually within twenty-four to forty-eight hours, I would revise the notes into short memos and transcribe the interviews. I began "attribute coding" in these memos, to help me keep track of participants' roles, disciplines, teams, and topics covered to help organize my thoughts before coding (Miles, Huberman, & Saldana, 2014).

Data immersion. Upon completion of the interviews, I printed and immersed myself in the data (interviews, notes, memos) for two weeks. During this time I reread all the transcripts and made jottings of ideas and possible codes. My goal of the 'immersion' period was to absorb and reflect on the data before starting to code it. After these two weeks, I developed a set of initial codes that responded to my research question. These codes included: treatment versus research, motivations to get involved in research, expectations for what it is like to be in research, and expectations for a career as a clinician. I also added codes for (1) mentorship because it was regularly referred to as a facilitator for clinicians starting research; and (2) burnout as I began to code to understand what situations burnout was mentioned and how it was discussed. I also used the burnout code to capture opposite/reducing factors of burnout (e.g. when they experienced feelings of success in their roles).

I originally planned to use a grounded theory approach of constant comparison across those who received research grants with those who did not receive the grants and/or did not apply for grants. However, when I started to interview participants, I realized some who were listed as grant applicants were either unaware (e.g., they were added to a project but didn't fully understand what they were signing up for) or had forgotten. Additionally, some clinicians who received grants were full-time researchers while others were full-time clinicians, so it felt incongruous to categorize those participants together as "recipients." After consideration, I thought it might be more valuable to compare clinicians by full-time roles than whether they received a research grant.

Thus, when I began analyzing my codes, I created three sheets per code - one for full-time clinician researchers, one for full-time clinicians who participate in research, and one for "other." The "other" captures roles where the clinician might be involved in leadership, education, or administration. Sometimes, but not always, the "other" roles participated in research projects.

Coding. ***Expectations:*** I created three codes around “expectations:” “career expectations,” “clinical expectations,” and “research expectations.” During the interviews, clinicians discussed the expectations they had for their career while training to become a clinician. With it being a physically taxing job, many mentioned that they did not see themselves treating patients forever but didn’t know what that “other thing” might be. Many participants said that when entering the specialty field, they were unclear what their options were for practicing. I gleaned from the interviews that their specialty field is poorly defined in the public, medical, and even its own space. Participants described how the field gets stereotyped as only one type of practice, minimizing the wide range of services clinicians can provide.

Participants also explained how their practice is still ambiguous to other medical practitioners. While physicians and nurses hold well-defined roles inherent to the concept of a “medical team,” these specialty clinicians are newer to medicine and historically less integrated into a medical team. Clinicians struggle to find footing in medical teams because their training and expertise aren’t fully understood by other practitioners. Similarly, since they are relatively new, clinicians have yet to develop and embed alternative (non-frontline) positions into medical team constructs. One clinician explained that there are less hybrid or developed jobs in the field of specialty medicine as there are in, for example, nursing (such as a nurse educator). They gave a great example of this with the clinician working in wound care whose training fully qualified them for the job, but the position was usually only considered for nurses.

Additionally, I created two related codes, “clinical expectations” and “research expectations” to capture what clinicians either assumed would happen in each role (e.g., typing at a computer all day) or the standards they faced in each role (e.g., clinicians go to talks during their lunch hour). These codes helped me understand how clinicians viewed the trajectory of their career, and the embedded assumptions and lived experiences they had working in the clinical and research roles.

Motivations: My research question explores how clinicians navigate a role as a clinician in a translational medicine space. Since the traditional clinician role (being a full-time treating clinician with few or no additional non-clinical responsibilities) is still the status quo within my field site, I was curious what inspired these clinicians to either take on new roles (e.g., a split clinician-researcher role) or new tasks (e.g., remaining a full-time clinician while completing a grant project on the side). Based on my exploratory interviews, I hypothesized some aspect of wellbeing or symptoms of burnout might be mentioned as motivators.

Burnout: In order to analyze my data, I initially created a large "burnout" code. I used this code for any data that discussed burnout explicitly or feelings related to burnout (e.g., passion, joy, overwhelm), as well as well-being more generally. I used the literature to help curate my understanding of burnout and what cues I should look for when coding (cite).

My goal in creating a "burnout" code was to start exploring 1) how people experienced burnout throughout their roles and 2) to what degree people felt burned out when they transitioned into a research role. I was also curious how full-time clinicians experienced the process of filling out grants on their own time (unpaid) and negotiating with their managers to take time from the clinic to conduct their research. I first pulled out data from the burnout code that described feeling more or less burned out around a transition (i.e., are they experiencing more burnout now that they're in research). I re-coded everything that related to a participant's feelings of burnout after taking on non-clinical (e.g. research) activities and called this code "Burnout | After_research."

FINDINGS

In **Table 4**, I group clinician's career expectations and research motivations by the 'heart, hands, head' (H3) framework (Ashforth, 2016). The H3 framework is made of physical, cognitive, and emotional dimensions that, I posit, also correlate to the main components of burnout: depersonalization (heart - emotional), exhaustion (hands - physical),[5] and ineffectiveness (head - cognitive) (Maslach & Leichter, 2016). In further analysis, I realized the way clinicians described their career expectations and motivations for research also related to these three categories. This type of mapping helped me see the multifacetedness of burnout and how it could be embedded in predecessors to role development. In the following section, I will (1) walk through each of these categories and (2) show how burnout and mindfulness can be considered threads woven into actions around job crafting and role development.

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[5] While physical burnout correlates to "emotional" exhaustion, I posit that this is an embodied state compared to the perceptual states of head and heart (cognitive and emotional) (Brown, Ryan, & Creswell, 2007). This delineation will become more clear later, as I explore the role physical or embodied burnout plays in the clinical setting.

TABLE 4. Burnout

	Hands *Physical (Embodied) Burnout*	**Head** *Cognitive (Perceptual) Burnout*	**Heart** *Emotional (Perceptual) Burnout*
Burnout dimension definition	Exhaustion: extreme depletion of energy	Personal accomplishments: inadequate professional/personal success as a clinician	Depersonalization: detachment from and loss of meaning in work (the "why")
Career expectations	Assume physically taxing work will eventually 'burn them out' from clinical treatment	Plan to initially excel at clinical treatment routines	Latent or expressed cynicism about the balance of work effort with institutional and organizational respect or value
Motivations to engage in clinical research	Alleviate (or avoid) burnout	Challenge well-established routines	Ask and answer patient-centric research questions; provide more value to patients

Career expectations

Hands: early assumptions of physical taxation and eventual burnout. Clinicians entered the field with vague and varied career expectations, some assuming to eventually be "burned out" from physically taxing work. During my interviews, I asked participants to describe their early expectations for a career as a clinician and if they had planned to treat indefinitely. While many talked about how they were initially focused on learning to be the best clinician they could be, some also discussed their goals to become involved in research. But noticeably, many mentioned how when they started out as clinicians, they had expectations that they would burn out and leave the clinic at some point.

> "I had only been seven years in the field. I think it was an earlier time that I was making the transition [from full-time treatment] than I would've expected in my brain. I think, especially being an inpatient [clinician], it's a very physically taxing position. So, I knew that I wouldn't be doing this when I was fifty [years old] full-time, treating full-time, but I expected maybe fifteen-ish years of full-time treatment before I phased out the treatment aspect." *Clinical manager*

This was not always accurate for one branch of the specialty clinicians, who self-described as experiencing less physical burnout than their specialty counterparts. Across these roles, the concept of burnout was less salient in their descriptions of early career plans.

> "And then I got the opportunity to work at Movement Hospital and I was like, 'oh, well I can't say no to Movement Hospital…' So as I started to work in inpatient [clinic], I was like, 'oh, I'm probably going to be a clinician in a hospital forever' just because I really liked the population. I never actually really thought about going into research because, I don't know, I went to [specialty] school to become a clinician. I thought I didn't want to be sitting at a computer. I wanted to be on my feet, interacting with people, and making the day go by faster. But I didn't really consider how much burnout would play into what I wanted to do. The 20th floor, where I work, became the COVID unit during 2020."
> *Clinician recently transitioned into part-time research*

Head: wanting to be foremost a 'good clinician.' Even for those who voiced an interest in research, how to get involved or participate in research wasn't clear within the field's traditional career paths. Fellowship or residency opportunities were limited but served as a direction for some. Research interests in general seemed to depend on whether the clinician was exposed to research during their undergraduate or graduate degrees. Participants explained that the level of academic exposure varied based on the clinician's university. As one clinician said, she had participated in research labs as an undergrad and debated going straight into a PhD or treating in the clinic after receiving her clinical degree. Eventually, she opted to pursue a residency before starting a full-time job at Movement Hospital treating patients. She has since moved into a split clinician-researcher role.

> “I think I've always known that just treating full-time was never just in my plan. I think I've always, because I've had the exposure to research and teaching, knew I wanted to pursue something else, something a little bit further on, and I think I just didn't know when. I think I wanted to take advantage of being exposed to my patients here, learning, but I always knew [research and teaching] was in my future, something I wanted to pursue.” *Clinician with a part-time role in research (June)*

Regarding their expectations for a career at Movement Hospital, many clinicians assumed they would become involved in research at some point while there. A few of the clinicians I interviewed, especially those who were now in full- or part-time research roles, mentioned explicit goals to conduct research as part of their career. For those, the clinician-researcher pathways at Movement Hospital aligned with their desired career trajectories. Others however, didn’t necessarily have research goals, but were seeking that “other thing” they could do with their training and skills. Overall, the career trajectory for a clinician seemed fairly undefined, as the field continues to develop and alternative ideas about what a clinician can do emerge. Many interviewees expressed gratitude for the developmental opportunities at Movement Hospital, which provided them exposure to different branches of a clinician career path they didn’t know existed previously.

Heart: cynicism with the role’s institutional and organizational respect. As we saw during COVID-19, society is starting to acknowledge the high-stress and undervalued context clinicians work in on a regular basis. It also seemed that the notion of eventual burnout can pass from word of mouth as well, as the field itself starts to question whether it’s worth pursuing a career in this specialty. I spent a while talking to a fellow at Movement Hospital about this dilemma. The clinician, Tara, had been at Movement Hospital for about nine months and was in the final stages of her fellowship. She had previously worked for hospitals on the West Coast treating in-patients. She recounted:

> “I think something I'll add that I’ve heard of recently - and it sucks and it's sad - is just a lot of [clinicians] that work in the field are like, ‘I wouldn't advise somebody else to go into this field.’ And it's really sad. I mean, in the end I'm like, ‘maybe it is true.’ You go through all this schooling and you come out and you don't make necessarily what you should for the amount of work that you do, or the amount of study or education that you had. You probably don't get the level of respect that you should necessarily get.” *Tara, fellow at Movement Hospital*

While many young clinicians expected to take a turn in their career once they were burned out, many had not known at that time what that “other thing” would be or could look like. As Tara continued explaining:

> “I don't think [clinicians] even understand if there is a typical career trajectory. I don't know that there is. I mean, essentially there's like, okay, you come out of school and you're like, ‘okay, now I'm going to work as a [clinician],’ and you're going to pick basically... Essentially, you're going to pick a population or a setting…I'm sure there's people who are maybe thinking like ‘yeah, I want to do research.’ There's probably a select handful, but most people, they're thinking about, ‘do I want to work with kids or adults or this or that …?’ There's no standardized career growth.” *Tara, fellow at Movement Hospital*

Motivations to engage in research

Clinicians are driven by three patient-centric motivations to engage in research: answer clinical questions, alleviate or avoid burnout, and challenge themselves. Clinicians expressed three core motivations for engaging in research: wanting to ask empirical, treatment-related questions; reducing clinical time to alleviate or avoid burnout; and challenging their normal routines (“activating their brains”). While only one motivator was explicitly burnout related, I read the other two - asking treatment-related questions and challenging themselves - as implicitly burnout related. In other words, I could see how asking treatment-related questions and challenging themselves posed as reasons to preserve their personal attachment to the job, feelings of accomplishment and worth as a clinician, and engagement in the work.

Heart: clinicians want to ask questions and learn how to have the best practices for patients. Some clinicians were explicit in the patient-centricity of their motivations. One clinician recounted a patient who he specifically thought about when working on research, explaining "I'm motivated by thinking about him. [He] can't communicate. That's pretty hard." The ability to work with a patient, witness one of their struggles, then empirically design and test a solution - was the root of clinician motivations. In pursuing clinical questions, clinicians hoped that they could provide better treatments for their patients. By engaging in research and getting an opportunity to ask "big questions" clinicians felt like they could improve how they treated in service of the patient.

> "And we were seeing a lot of trends…wondering, 'if I did a study on all of this, what would I find?' Because you're seeing so many of these patients and so many trends that people are seeing the exact same thing over and over and over again, that it would be neat if you just did a research project on some of these clinical questions." *Clinician-researcher*

> "And then I think there's the emotional layer of it as well, which I think we also talked about is just that like depending on where you work or what you do, you are constantly seeing, hopefully people progress, but sometimes people not. And that can also, I think, exacerbate your burnout if you're not being able to have the time to take care of yourself or do whatever it is because then you're just like, 'Oh, it's just one more thing that sucks, you know?' *Tara, fellow*

One of the barriers to getting involved in research and getting to ask questions is the emotional feelings of guilt that clinicians have about asking for time off from the clinic to participate in research activities. While the research time was "covered" (paid for), it fell upon the clinicians to work with their managers and team members to figure out when they could take the time off from the clinic and who would cover them. It also posed a dilemma for clinicians who were the primary [clinician] for their patients, as they couldn't oversee the patient's full treatment if they had a peer clinician help cover them. In a way, clinicians found this somewhat incongruent with their aim of improving the patient treatment by solving big research questions. A clinician I spoke with describes how she feels about taking time off from the clinic to conduct research:

> "It's feeling bad that my patient isn't getting the kind of care that I would want to provide them. And I value my colleagues so much, it's just I can only send you so much information about this patient in an email and hope that's what's executed…and then they send me a follow up email and they're like, 'oh, this goal looks like it got met' and I'm like, okay - what would be the next appropriate goal? I haven't seen this patient in three days. It's just this constant keeping up with a plan of care. You see a patient once or twice a week but then you're responsible for their goal development and their progression and all of that. You just get tired and so you just feel out of touch, but you're also their primary [clinician] and it just feels like this battle between the two: your professional growth and then your patients. *Elyse, clinician who participates in research on the side*

Clinicians interviewed also expressed guilt around trying to be a good colleague but also needing their managers and peer clinicians to make accommodations for them. They explained that you can feel like you're burdening already overworked clinicians and clinical managers, even though the hospital has tried to normalize this process of clinicians taking off clinical time to do research.

Hands: clinicians want to reduce clinical time to mitigate or avoid burnout. In maintaining "hands," clinicians want to reduce their treatment time in order to stay in top shape as a clinician. The physicality of burnout is particularly relevant to clinicians who spend their time physically interacting with patients. This repetitive physical routine, with little to no breaks throughout the day, can cause intensive exhaustion for clinicians. Interviewees described two issues that reduced clinical time could solve: burnout avoidance and burnout mitigation. In terms of burnout avoidance, interviewees recognized that they were either already heading down a path of burnout or felt like they would become burned out soon.

> “I think that the reason I gravitate towards doing other things is because **I don't want to burn out from clinical care…**I think the worst feeling is feeling you're not motivated as a clinician to do the best for the patients. I think that is a result of the burnout that a lot of clinicians feel and then you really are mad at yourself and you, it sucks, but you're just like, ‘I'm tired. I don't care anymore.’ And that's the worst and no clinician wants that…So in order to not get to that, I do think a lot of people seek these other types of roles. In addition to being curious and all that, I think it's like, "Okay, if I can do some research or something where I don't have to care for these, do the progress notes and do all that stuff. Yeah, maybe I will burn out less…” *Tara, fellow*

Others mentioned seeking research roles as a way to help calm the already overwhelming physical burnout. However, clinicians don’t necessarily want to fully disengage from the physical aspect of treatment. Rather, they want to find a way to still have the intimate patient-provider connections, but with reduced physical burnout. Interviewees described how treating patients helped them maintain a “why” and drive for their work. As seen in Tara’s interview, reducing physical burnout is a way for clinicians to take care of themselves in order to take care of a patient. Stepping away from full-time treatment allows you to be a better clinician and appreciate it more.

> “My quality of life has just greatly improved since I've been able to take some space from treating. I still get to do it and I actually feel like I enjoy it more now because I don't have to do it all the time. I think that I have better, I don't know, appreciation for it. And I have more capacity for empathy for the people I'm actually treating because I don't have to do it six to six and a half hours a day.” *Clinician who recently moved into a split clinical-research role*

In their treatment capacity, clinicians are accustomed to ‘owning’ a patient and the full scale of responsibilities that comes with that. As the main clinician for a patient in the hospital, the clinician is in charge of the patient’s treatment plan, as well as all the documentation required by law. This involves documenting certain assessments and measures during each treatment session. The clinician also has a professional responsibility to ensure the patient is equipped with the right support at home (which can often be burdensome on the clinician as they navigate what items Medicare will cover) and is capable of maintaining activities to reduce their chance of readmission. As the primary clinician, they also handle all family communication. Moving into research, some clinicians experienced a welcome release of responsibility from direct patient ownership.

Head: clinicians wanted to challenge themselves. Lastly, clinicians sought a way to "activate their brains" by switching up the clinical routines that were ingrained in them. As clinicians, they had a very structured schedule in which every minute is monitored and billed. When beginning their career as clinicians, the interviewees described wanting to be the best clinician possible and learning as much as they could. Once they began to master the clinical treatment, they found their daily actions becoming routine and less mindful over time. As Sam said, "it is easy to go into autopilot every now and then just because there's a lot of other things. And so, when you get good at something, you can kind of let that slack a little bit."

In my interviews, participants explained that each clinician had their own 'style' and treated slightly differently. Individual differences in treating resulted from the clinician's former training, interpretation of the literature, and exercise preferences. While clinicians have a degree of flexibility over their selected treatments and practices, their overall routines are constrained by the organizational context (Howard-Grenville, 2005) that requires clinicians to treat on every hour, document each patient, and have billable services for Medicare reimbursement. As one clinician who recently transitioned into research explained, "the day to day was almost getting a little monotonous, even though this is a dynamic job where no two days look alike. So I was just kind of ready for a new challenge and looking to kind of expand who I was as a [clinician]."

While having a rotation of patients added a degree of variety, the overall daily routines became fairly habitual without a lot of room for professional creativity or growth.

Thus, the task monotony left them craving diversity and change. By taking on new research opportunities, clinicians transform their routines from mindless to more mindful and reignite the energy they had early on as novice clinicians.

> “It's nice to have a break from full-time clinical care. It's just in a different way to **use my brain** because I feel like I was doing the same job for so long that I needed something to challenge me a little bit and to be a little bit different.” *Clinician who recently moved into a split clinical-research role*

> “I've been a [clinician] for a long time so it's kind of nice to look for different avenues to sort of **keep challenging yourself and get something different** than just the day-to-day patient, patient, patient all day long sort of thing. So yeah, I think more so in the last few years, but it's definitely always been something of interest to me.” *Clinician-researcher*

Quinn even took it a step further, by saying that the transition from becoming comfortable as a clinician to seeking out a ‘next step’ wasn’t happenstance, rather patterned and expected within the profession’s trajectory.

> "So then I think it's kind of like that sweet spot of our [clinicians] hit that five to seven plus years of experience and things are becoming a little bit more routine. We see these similar populations over and over. That's I think a perfect part of our career, is to then kind of sprinkle in that research on top of it. Right? Now that you have seen this population a lot, you're very comfortable with how we typically treat this population. Now start to use your brain differently.” *Quinn, clinician manager*

Underscoring the motivations to engage in research is the goal to help patients. Clinicians are job crafting within the bounds of a career that allows them to still be in a space that has an impact on the patient. While clinicians don’t know how much their physical interactions with patients will be in a research role, they seek the role knowing it will have a beneficial impact on their patient population.

Effect of the research experience

For the most part, I noticed a trend that clinicians experienced either less or no change in burnout once they left the clinic. However, interviewees described that burnout was experienced as an ‘ebb and flow’ where sometimes the work in the clinic would be harder, and other times the work in research would be more taxing. The experience of burnout would transform from physical, to cognitive, to emotional as clinicians proceeded from the clinic to research spheres. While research participation didn’t entirely dampen or eliminate the waves of burnout, with the right support it could provide clinicians the space and time to think, breathe, and invoke mindfulness. Overall, a revitalization of the clinical routine provided opportunities for clinicians to have renewed and redirected attention. Below, I walk through key experiences of the journey from clinic to research.

Unpaid research burnout ameliorated by one’s mentorship and career goals. When clinicians first transitioned from the clinic to research, they faced a challenging sensemaking period. The research realm required that they adjust to a new pace, productivity standards, levels of autonomy, and work practices. One question that I had going into this study was how burnout was experienced for clinicians during this transition. In particular, I was curious how clinicians felt about the unpaid “prep work” they had to do before beginning research and how that did (or did not) contribute to perceptions of burnout. When a clinician was working on a grant (either with a team or alone) and it wasn’t already funded, they were often doing it on their own, unfunded time. I assumed that clinicians would experience heightened levels of burnout during this period in which they were tackling a new project (grant writing) and not receiving any compensation for it, while still maintaining an already taxing clinical workload.

However, in talking with clinicians, they explained that if they had broader goals for engaging in research, they were able to better see the purpose behind the additional unpaid work. Even if it was difficult or took up ample time outside of work, clinicians who had been able to define a “why” for engaging in the research said that it didn’t add extra burnout. They could acknowledge and experience the stress without feeling it spiral into a period of exhaustion. Some interviewees mentioned that key to this was their managers and/or mentors instituting early “newcomer” conversations when they joined the team and having regular goal-setting conversations with the clinicians. By keeping research goals front of mind, managers (or mentors) were able to keep the clinician’s attention focused on the ‘why’ behind research instead of succumbing to the added stressors in undergoing unpaid, supplemental research work.

Research allowed clinicians to reshape their patient connection. Many clinicians reported that they didn’t expect to get similar patient gratification from research as treating. As one clinician remarked, they expected that research would be “just this thing I was going to do on the side.” According to clinicians, research often ended up feeling like treating without the negative demands of treatment. In the clinic, patients were receiving treatment while hospitalized and were often coming to sessions in a very acute state. The goal of inpatient treatment was to get the patient to a state where they could return home in a safe way. However, when clinicians treated patients under the guise of research, it often involved former patients coming back into the hospital to try more novel treatments. This meant that the patient’s demeanor and abilities were often different inside and outside the clinic setting.

Even for those patients that participated in research while they were hospitalized, the patient experience was highly different for clinicans. When they treated the patient in the clinic, they were fully responsible for the patient. This responsibility included full documentation, family communication, and any hospital and discharge care coordination. When clinicians worked with patients under the guise of research however, they were not the patient's 'primary clinician' and thus were able to abdicate that set of responsibilities. As a new clinician-researcher said, "doing research (up until data analysis) is still just treating a patient like you treat a patient in the clinic, but with a 'different mindset on how you're approaching it.'" The interactions were thus more casual, sparse, and pointed. The change in dynamics allowed clinicians to maintain a patient connection, but create a new kind of relationship with them.

> "So I feel like I'm not losing the…patient connection. Because my projects are clinical, and so I do interact with patients or participants. I interact with them pretty much all of my sessions. I mean, it's basically one-to-one. So I have the interaction, which I do like the interaction of patients, but I don't have to do the documentation, or it's minimal. And so I get that part about it." *Clinician-researcher*

> "And if we're talking about research, I think, I touched on that a little bit, but just **seeing how these people have progressed and they're out in the community and functioning out in the community**, that part is really cool to see people either working or whatever they're doing and you talk to them and hear their stories and **how they now have meaningful lives well after their…injury is really awesome**. So that I would say provides gratification that I didn't expect from research. It was just this thing I was going to do on the side, but it is nice. So I enjoy that." *Tara, fellow*

One fear clinicians mentioned when starting research was that they would miss treating. However, early experiences in research made them realize that they could still get the patient-facing benefits of clinic time, just in a different way. As Luke, a clinician who recently transitioned into a full-time research role said:

> "I don't know. I was thinking kind of like [a] 60/40 or 70/30 [percent research/clinic split]. I mean, hindsight, I don't know that it would've... Would I have eventually just ended up in this position again? I don't know. There's times that I miss treating a little bit more, but for the most part, I'm pretty happy with the amount of time I spend in patient care versus here."

Clinicians experience the paradox of the "split clinician-researcher model." While many interviewees reported feeling the same or lower levels of burnout from engaging in research, the burnout alleviation was diminished when dual clinician-researcher role responsibilities and managerial expectations increased. Throughout the interviews, many full-time clinicians said that their ideal role would be one in which they treat fifty-percent of the time and participate in research fifty-percent of the time. This fifty-fifty split was assumed by participants to be the ideal situation for clinicians looking for "balance" in a medical career. While these fifty-fifty roles can be challenging to find in Movement Hospital, many seek them out as an opportunity to maintain one foot in the clinical space while still getting the break from treatment that they desire. They want to maintain working with patients, but in a way that feels more sustainable.

However, clinicians who had held these hybrid roles reported experiencing high levels of burnout. When taking on a split-level role, some clinicians maintained a full caseload (in other words, they were the primary clinician responsible for a weekly set of patients) while also engaging in part-time work as a researcher. This arrangement created a situation in which the clinician maintained two identities and faced the organizational expectations of both roles (a clinician with patient ownership and a researcher with project ownership). As one clinician with a part-time role in research explained, "as much as I am 0.5 and 0.5, I don't feel like I'm 0.5 and 0.5, [to be] brutally honest."

The clinical expectations clinicians tried to abdicate by taking on a hybrid role did not seem to diminish as much as they assumed. In a few cases of individuals I spoke to in split roles, this increase in burnout caused them to push for full-time or nearly full-time (e.g., 0.8 FTE) roles in research. While some reported feeling physically “invigorated” by having less clinical time, they said that there was a noticeable increase in their mental load and cognitive burnout trying to maintain two split roles.

Clinicians seeking out positions like this mentioned wanting the time in research to “breathe and think” (which I discuss more in depth below). However, clinicians who spent time in a fifty-fifty role reported it as perhaps more “chaotic.” Some clinicians in these roles mentioned having to “own” their patients as well as the research projects they worked on. One of the cited benefits to moving from the clinical to the research space was the ability to have a different type of patient interaction. Essentially, clinicians could have the opportunity to treat patients, but no longer be their primary clinician. This meant that while the clinician still engaged with a patient and had to send notes to the patient’s primary clinician, they were not responsible for the documentation, follow-ups, discharge, coordination, or family communication. However, when clinicians were still the primary clinician for a set of patients, as well as had responsibility over leading a research project, they felt the burden of responsibility increase as their managers expected them to still be as available and efficient as a full-time clinician.

Additionally, as clinicians transitioned from doing research on the side to joining a lab, the amount of ownership they had over the projects usually increased as well. As one clinician who recently left a fifty-fifty role said,

> “I think it was definitely as chaotic [as being a full-time clinician doing research on the side], if not more, because there was more responsibility on me as opposed to the other projects I wasn't in charge of…So it just, it felt very different as far as responsibility goes. That added stress, of course, because if something didn't go well or wasn't done, it fell on me. Versus when you're just helping with a project, I needed to get the task done that I was assigned, but otherwise I wasn't planning things, and making sure things were

> done, and scheduling them, and all that. So just a very different feeling." *Clinician full-time researcher*

The managerial expectations above could also extend to research managers who held clinicians in their lab to the same productivity standards as non-treating team members. As one clinician researcher described:

> "I also have the added thing of the clinic, and I just feel of course I would be much more productive [in the research lab] if I didn't have the 20% [in the clinic], but I'm still judged like [researchers] are, and I feel it's completely unfair." *Clinician-researcher*

When clinicians were working on research grant work or holding a part-time position in research, the onus often fell on them to coordinate a division of time between their clinical manager and their research manager. While clinical managers were well aware of the hospital's commitment to translational medicine, and its strong desire to enroll clinicians in these projects, clinical managers had their own regulatory policies and a patient census to answer to. Thus, even if they wanted to help one of their clinicians spend more time in research, it meant they would have to arrange coverage or create new arrangements for a time split with their other existing (or float pool) clinicians.

Based on the interviewee stories, effectiveness of these clinician-manager conversations varied drastically from manager to manager. Some clinicians reported feeling fully supported by their manager, while others remarked at the heavy burden of negotiating and not getting enough time off from their clinical demands to properly engage in the research. The burden of these types of negotiations could escalate when clinicians had to conduct them on a regular basis. As one clinician in a hybrid role described:

> "Yeah, that was a discussion with my supervisor in research and my manager on inpatient, clinical care, but overall was decided by my manager's manager and more of the demands that he expects out of a [clinician]. So I was required to attend patient

> meetings or what we call a conference, three days a week, and the other demand was that I was present on a clinical floor five days a week. So I think ideally what the research team and I had discussed being beneficial was me being present two full days and a half day, but the clinical expectation was that I'm present five days." *Clinician-researcher*

Physical burnout can decrease, but mental burnout can become more acute. With the additional responsibilities, comes new opportunities as well. Clinicians mentioned how once they start becoming involved in research, other doors start opening. For these clinicians, the opportunities coming from the research and mentorship side can begin to blossom while the clinician is still maintaining a case load. One clinician researcher describes this experience as being able to "try on a lot of different hats." She said she's had great experiences and has gotten to sample various roles but wants to reduce the tasks that she's acquired over time and narrow her focus. In taking on the additional opportunities and expanding her set of clinical and research responsibilities, the clinician has started to notice her work decline. She describes it as:

> "I see physically, actually the transition [to research] has helped my body…so this is more of a mental fatigue. I also think it's starting to catch up to me because I am so busy. I don't like not being 100% invested and really good at my job, and sometimes when I take on too many roles, it's hard for me to be really good at... It's hard for anyone to be really good at everything, and so that's why I just started to realize, 'Okay, I definitely need to take a step back…'" *June, clinician-researcher*

In having more opportunities, perhaps beneficial for professional development, the hybrid clinician-researcher can be exposed to additional mental burnout. By staying in this cycle - taking on more work, getting more opportunities, not catching up on other work - she has felt the burnout transform from mostly physical to more mental and cognitive.

Latent desire for and achievement of mindfulness

Mindfulness in this study was shown to be a resetting tool. In other words, if you experience cognitive burnout from a research-intensive role, allow for a period of 'mindfulness' where you reconnect to your ‘why’ by seeing patients. As I explain below, moments of mindfulness allowed the clinician to reflect (time to “breathe”) and transitioning to a more mindful state (such as participating in research) made burnout in former clinical work more salient.

Research participation granted clinicians the time to “breathe.” One phrase that kept coming up in interviews was the ability to ‘think and breathe’ when clinicians left the full-time treatment space. The experience of stepping out of the clinic became analogous to ‘catching your breath’ and having time to think instead of following a rapid routine. One clinician I spoke with, Piper, had recently made the transition from the clinic to full-time research. She said COVID-19 helped her realize how burned out she felt in the clinic. She had also tried on other ‘hats’ (being in an administrative role) but had greater research ambitions. When looking for a new position, she spoke with June, who had also switched over to doing more research. As Piper noted:

> “She said that she felt like she could breathe. She kind of put it like that. This is a job where you could think about what you're doing.”

The ability to breathe comes in part from a reduction in patient responsibility and billing for time. As one clinician said, “especially with research…the patient doesn’t rely one hundred percent on me” and “although my time is important, I don't need to bill for my time.” Overall, research provided a break from the clinic that clinicians craved on a deeper level, one that sometimes didn’t need to be research-related. In my interviews, I came across a few mothers that had recently experienced (or were about to experience) maternity leave and pumping at work. For the latter, they are given thirty minutes a day to pump in a private room. While they eventually have to make that time up later on, the ability to have the quite space to be alone and think was described as instrumental by many clinicians.

> "Just that 30 minute break I get every day, and even then, I have to make up a unit of that every day, but that 30 minute break every day, if everybody got 30 minutes a day, which I know that won't happen, but it's something that small that can make a big difference I think in burnout, productivity, and all these other things." *Clinician*

Thus the transition from clinic to research generated "mindful moments" for clinician-researchers through temporally-bounded, structured relief from the determinants of physical burnout - also known as "time to breathe." I found these mindful moments that can be replicated in other work structures (e.g., lactation breaks). Mindfulness moments enabled clinicians to reflect on next steps in their career or create a break in their routine that wasn't accompanied by the 'burdens' of their role set.

Transitioning into research can make clinical burnout more salient. Noticeably, no one I spoke to who sought a different arrangement from their fifty-fifty split wanted to increase their clinical hours. In fact, interviewees said that once they started to take time off from the clinic to work on research, they were more acutely aware of how much harder their clinical days were when they returned. If they spent a day doing research, the next day in the clinic felt even more taxing than before. As Angela - a new mom, clinician, and clinical researcher - described:

> "And I was doing this fifty-fifty role up until the end of 2020, when I went on maternity leave. And that was working, but I did notice that my clinical days were much more stressful than my research days. I could see a difference in my emotional wellbeing on those days…The clinical days would sometimes give me more anxiety, for whatever reason. I mean, I felt competent as a clinician because I've been doing this for a while. But for some reason, just the whole flow of things sometimes would just give me more anxiety. The days would feel...They would just feel harder."
>
> She continued: "And so I guess seeing the other side of things... You don't know what you don't know until you experience it and you're like, 'wow, this is really a nice side of things.' I feel like I have my own autonomy."

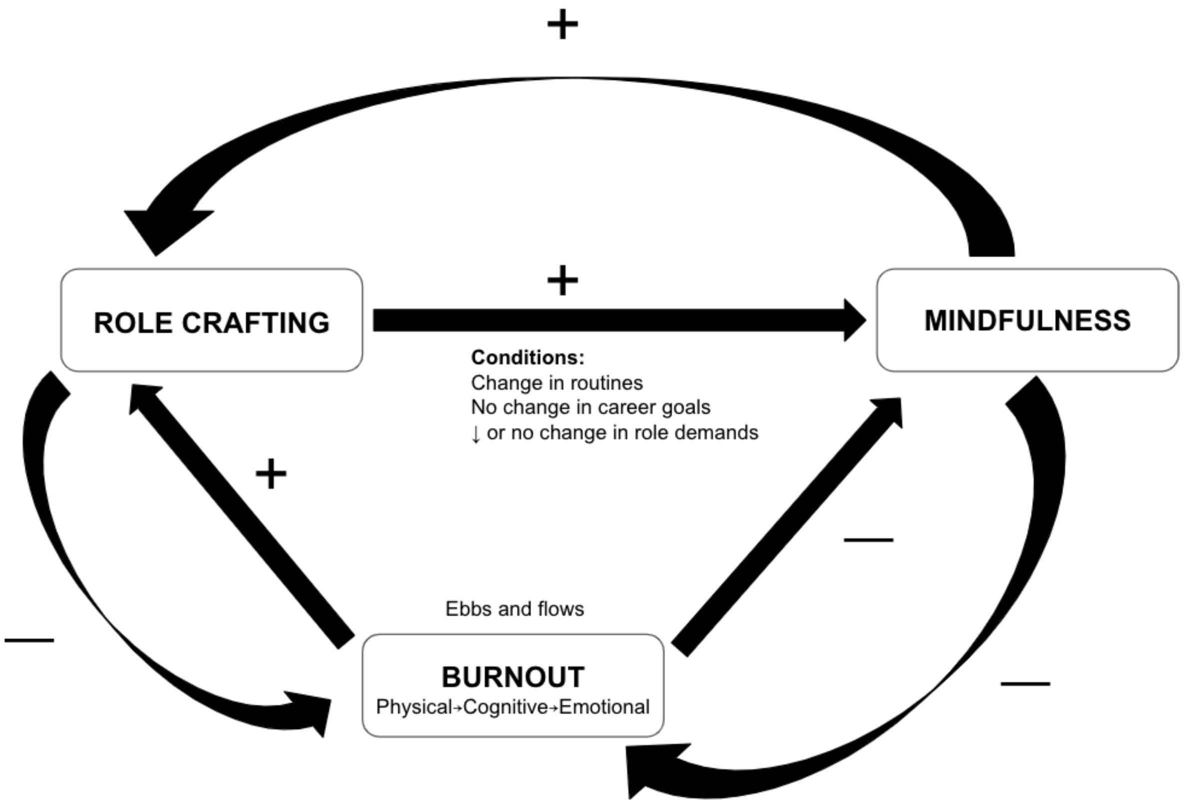
I cannot definitely say that clinicians who take on more research responsibility are not inclined to move back into a full-time clinical capacity, but from my data it seems unlikely (or less desired) once they've achieved the elusive time to "breathe and think." This was confirmed for my interviewees who participated in research but were not interested in research careers. Once they experienced an ample amount of time outside the clinic, it opened their eyes to different ways they could transform their career (such as through educational or administrative roles). Looking at it another way, one could surmise that a change in the routine, moving from autopilot in the clinic to a new field of research, reactivated mindfulness. With greater mindfulness, an individual is able to be more attuned to the retrospective sensemaking of their time in the clinic in which the situated burnout is more salient.

DEVELOPMENT OF A CONCEPTUAL MODEL

This study looks at clinicians developing within the confines of a patient-centric role, instead of leaving the profession to pursue a different job entirely. The findings show that clinician motivations for research engagement are anchored in burnout and aims of reducing burnout to better assist - or maintain a type of role in which they can continue to assist - the patient. Burnout and mindfulness are motivators for job crafting in so much that the incremental role development is bounded by patient-centric goals and keeps the clinician's demands at a lower or status quo threshold. In exploring a transition into research, clinicians begin laying the groundwork for role development that is related to an attempt to increase mindfulness.

The role development and job crafting portrayed in this study show the clinician's (conscious or unconscious) attempts to construct and pursue mindful conditions. By seeking opportunities to challenge their brains, alleviate physical burnout, and ask patient-centric questions, they present incomplete attempts towards more mindful situations. All together, these attempts undergird holistic burnout alleviation. The motivations towards engaging in research ultimately become developmental contingencies for the desired role, in which mindfulness increases.

FIGURE 2. Burnout and mindfulness in role development



Mindfulness makes burnout in the clinic more salient but better equips clinicians to cope with and handle burnout (e.g., asking for more resources, more confidence and skills in job crafting) (Weinstein, Brown, & Ryan, 2009). I consider mindfulness to be a dynamic job crafting outcome in which floating between roles, environments, and tasks can break up the monotony that pervades less mindful (and potentially more burnout-prone) circumstances. However, we see that the dance between burnout and mindfulness is delicate as well - for some, straddling both the clinical and research jobs in managerially and cognitively demanding. In these cases, burnout spikes back up as individuals carry the weight of two whole roles (research and clinic) and the initial alleviation from job crafting is reduced.

This paper then supports a strong link between burnout, mindfulness, and role crafting (what I deem the interplay between role development and job crafting). The developmental model outlines the connections between these three entities. The negative sign ("-") indicates more of one and less of the other, while the positive sign ("+") indicates more of both one and the other. More burnout leads to more role crafting; more role crafting (under the designated contingencies) leads to more mindfulness; and more burnout leads to less mindfulness. More mindfulness in return increases role crafting (one is more aware of the resources they need moving forward) and decreases burnout. More role crafting - as a result of this cycle - leads to less burnout. However, burnout is not static, rather ebbs and flows so will never be fully controllable.

DISCUSSION

This study explores underpinnings that shape what people want out of work in the clinical space. Instead of shifting to focus more or less on meaning, people who begin to feel elements of burnout (e.g., depersonalization, exhaustion), desire to assume new challenges and relight the fire of meaning that brought them into the profession initially. The transition from clinic into research didn't always provide a simple reduction in burnout however. Burnout was instead described as a state that occurred in "ebbs and flows," where it morphed from physical to cognitive and emotional throughout different points in the clinic and research. Certain roles, such as a fifty-fifty clinician-researcher split, increased demands of the clinician and increased burnout. Mechanisms like sufficient mentorship could help buffer clinicians from added burnout while developing their roles. I also find that burnout is a multifaceted motivator for role development that can engender an increased state of mindfulness. Mindfulness in this situation can be viewed through the Feldman and Pentland routines perspective, such that mindfulness is created through the interruption and evolution of routinized roles.

Contributions to research on mindfulness in organizations

In the organizational literature, burnout is posited as the opposite of mindfulness (or that it is hard to maintain mindfulness in the face of burnout). By following the thread of mindfulness as clinicians role developed and job crafted in response to burnout, I found the relationship to be more complex. This study responds to the call for more work on workplace mindfulness and organizational outcomes (Dane & Brummel, 2014) by showing how mindfulness can increase role satisfaction through saliency of burnout and which resources individuals need to mitigate burnout in their roles. Mindful systems have flexible routines (Weick, Sutcliffe, & Obstfeld, 1999), which I extend to include role crafting.

By bringing in elements of the Job Demands-Resources Model (Bakker & Demerouti, 1996), I show how mindfulness can enhance the link between burnout, job crafting, and role resources. Bakker & Demerouti state that "employees who are motivated by their work are likely to use job crafting behaviors, which lead to higher levels of job and personal resources and even higher levels of motivation." (1996, p. 276). Bakker & Demerouti illustrate how intrinsic motivation drives the desire to job craft, which in turn increases the amount of job resources available to the employee. Job crafting appears to be a mechanism "by which mindfulness provides an alternative way to negotiate stressful situations" (Good, Lyddy, Glomb et al., 2016, p. 131). Good et al. (2016, p. 128) posited that:

> "From the standpoint of employees, mindfulness may increase voice by creating separation between events and outcomes and the self. Mindful employees may be less worried about how organizational leaders will react to their ideas since acceptance or rejection of the idea does not imply rejection of the person. Research associating mindfulness and climate aspects, such as the expression of and reactions to voice behavior, would be insightful."

The mindfulness also found in "mindful moments" are similar to "relational pauses (Barton & Khan, 2019)" such as teams taking time to stop work, meet collectively, and assess wellbeing. While relational pauses can be seen in collective efforts such as team huddles (Goldenhar et al., 2013), the ones I describe explore an individual "window into the emotional and relational realities of work" (Barton et al., 2022). The emphasis of relational pauses does not have to be on the collective, rather it can be an employee's break from their peers, tasks, and or routines where they don't have to face the expectations or think about the needs of others. During the mindful moments described at Movement Hospital, employees had a chance to long-term career plan, finish their notes, or even daydream about what they'd like to do at work in the near future. In this way, the idea of relational pauses transforms into a self-relational state where individuals can be less mindful about their peers and present or anxiety-inducing tasks. It can be a break from building situational awareness and noticing cues in a "burned out role," but also a chance to be more mindful of what they'd like to focus on ('craft'). Moving into a new task (research study) or role (research day) can break up the routines of one role and increase mindfulness. Or, as I discuss in the practical contributions below, it can even be as incremental as a 30-minute lactation break.

Practical contributions

For a healthcare organization, clinician burnout can lead to high turnover and cause barriers in patient-clinician communication. For organizations like Movement Hospital, focused on improving professional development and translational medicine, burnout is an important factor to monitor. Clinician burnout ultimately has a detrimental effect on patient outcomes, the opposite intention of undergoing patient-centric translational medicine. Thus, burnout can effectively undermine the positive intentions of translational efforts. By exploring how clinician participation in research relates to wellbeing and burnout, I hope to provide more pathways for organizations to systematically address burnout factors and aid clinicians in their professional growth.

My study revealed a few ways that organizations can begin addressing burnout and wellbeing-related factors for clinicians: career mentorship and managerial training, covered “creative” time, and paid “attendance” time. While these solutions are geared towards clinicians engaging in research, they can also be applied more broadly to clinicians as a form of professional development within their respective fields.

First, clinicians desired more mentorship, both around planning their career trajectory as well as the nuances of performing research. Movement Hospital has already taken steps to form templates for research grants and implement programs connecting clinicians to researchers. However, clinicians still felt that it was challenging to schedule time with a research mentor. By continuing to build out these platforms, the burden of clinicians navigating their career and taking on research responsibilities might be lessened. Part of this involves bolstering the role of the manager as a broker for clinicians spanning from the clinical to the research world. While clinical managers often understand the clinic landscape, there are opportunities to further coach managers to be career mentors for younger clinicians.

Similarly, clinicians also wanted time in their day where they could think about their next steps. As I mentioned earlier, the hallowed 30-minute pumping break proved a respite for breastfeeding clinicians. Even though they eventually had to recoup this 30-minute break at later points in their schedule, having a small window of time carved out during their day to process their patient plans, think about next steps, or just have a window of creative quiet, provided a mindful moment of relaxation and reflexivity for clinicians. Having similar 30-minute professional development zones throughout the week (or a shift) could give clinicians a space to actively participate in their career development. As a clinician noted, “I don't think I've had [time to think about my career] that's been part of my clinical day. I think those were always things that I've always done on my own time.”

Finally, clinicians want organizational or team meetings to be part of their paid time, not part of their free time. As it stands, many meetings or presentations will occur over the clinicians’ lunch break, when they’re already spending that time charting for their patients. As one clinician said, “you have these committees, or there's updates in documentation, which I'm not saying they're not important - they are. But then, if there's something that's mandated, it should be covered, and it shouldn't just be expected to be built into our lunch.”

Limitations, Boundary Conditions, and Extensions

Limitations. There are a few limitations to address in this study. First, Movement Hospital is a unique organization, providing a relatively high number of resources and organizational support for clinicians to engage in research and develop their roles as clinician-researchers. The understanding, as emphasized by many clinicians in my interviews, is that to be a clinician at Movement Hospital means you will likely participate in research at some point in your work there. I learned this is not common among other specialty hospitals, thus the findings might not be generalizable to other clinicians. However, I found consistencies between clinicians who engaged in research and clinicians who engaged in other, but non-research tasks (such as educational development). Even if other clinicians do not have access to the type of research role development that those at Movement Hospital do, I believe they face similar dilemmas transitioning into other (e.g, education) types of roles and hope I "put in the right values of the variables" (Becker, 1998) to apply to those in other settings.

Additionally, I would be remiss if I failed to mention the enormous impact COVID-19 had on this study. Throughout my interviews, participants mentioned how COVID-19 either made their burnout more apparent or "sped up" their feeling burned out. As one participant said:

> "If COVID never happened, I probably would still be a full-time clinician. I think that maybe two or three years from now, I would be like, 'I need something else.' I think COVID just accelerated what was eventually going to happen anyway." *Clinician with a part-time research role*

By conducting my interviews during and after the peak of COVID-19, I captured a picture of healthcare providers at arguably higher levels of perceived burnout. While this could color some of my findings, I also feel like it is more accurate for the lens through which healthcare providers see their roles and emotions in a "post-COVID" world. Thus, while it can be considered a limitation, I feel the findings of the study still reflect central views of clinicians, albeit possibly slightly heightened. This limitation could be remedied by conducting follow up interviews in subsequent years to see if the burnout findings were conditional on peak COVID-19 conditions, or applicable to clinicians regardless of that context.

Boundary conditions. It is worth noting that **Figure 2** is meant to be understand in its pairs instead of an overall systems model. As a whole, it could appear that the system is reinforcing itself such that it continues in an endless cycle without a switch to counteract this movement. However, I would like to address some of these ‘switches’ that exist in the system. Primarily, as burnout is an ebbing and flowing entity, it can develop regardless of the model proposition throughout individuals’ work. As I discussed earlier, a big transition between higher burnout and reduced burnout is moving from the clinic to the research space, but burnout can appear over time in either the clinic or research space. Some weeks the patient load will be heavier or more acute (clinic) or grant deadlines or high participant assessments (research) will occur. This enduring tension between mindfulness and burnout temporally fluctuates given unexpected and uncontrollable contexts, sending one to swell higher or dip lower than the other and activate the systemic response.

In addition to the naturally occurring moments of burnout that can act as switches in the system, I also pose some necessary conditions within the model during the transition from role crafting to mindfulness. These include not changing career goals, change in routines, and lowered or no change in role demands. After one role develops and becomes more mindful, they realize how burned out they were prior. A risk of this is that saliency of burnout will lead to more burnout. A condition to avoid this in the system is that individuals must have access to adequate resources to make role changes if needed. If these conditions are not met, the system does not function to provide more mindfulness. While mindfulness is the goal of this system, I posit that burnout can never be fully eradicated.

In terms of disconfirming evidence, I did talk to a couple clinicians who held split-role positions (evenly spending time between the clinic and research) who did not experience the burdens mentioned earlier. There were a few similarities across these individuals worth highlighting. First, they were relatively new to their position, so the responsibilities and expectations that some seasoned split-role clinicians felt were not as apparent to those clinicians newer to the role. While I did find the additional burnout to be a pattern across seasoned split-role clinicians, it would be worth exploring in a more longitudinal study to see if it was an error of sampling in my population or more universal across clinicians. Thus, an additional boundary condition for the current study is a level of tenure in a split-role (more than would be deemed 'novice,' about six months based on the participants in my study).

Extensions. I see three relevant avenues for future research in this area. First, is the possibility to explore to what extent tenure impacts burnout. Given the tenure of those in Movement Hospital that I interviewed, I was not able to confidently capture a correlation between tenure and burnout. However, participants commented about how their level of seniority influenced the way they experienced their roles. For example, one clinician I interviewed described how being senior in her role allowed her to take on other tasks, such as mentoring, which brought her renewed "passion and joy" in her clinical work. A senior clinician discussed how she discovered she loved being part of a senior clinical research team because she could have more elevated conversations. When she talked about this in the interview, her voice was awash in emotion, indicating to me that the transition to the team of senior clinicians was of welcome relief.

An additional extension of this work could explore if the well-being and mindfulness connection is impacted by the research tasks or level of research involvement adopted in the 'role development' step. Originally, I planned to include survey data in this study, in which I would capture the different research tasks that individuals did, such as conducting assessments or acting as the project PI. I would also record their weekly average level of research involvement by hours. Based on feedback from Julia and Team Knowledge, I had structured it to range from light (zero to five hours), medium (five to nine hours) or heavy (ten or more hours). While I was not able to get a robust enough sample of participants to include in this study, I believe a similar tool would be effective to draw conclusions around the impact of research task or level of involvement on wellbeing and burnout. The survey could also be bolstered with additional questions from Schaufeli and Bakker's engagements scales (2003) to explore if more "research" intensive tasks or time spent in a research capacity led to a greater decrease in burnout. The assumptions tested here would be that more absorption in research (considered a 'positive') would lead to less burnout or being surrounded by those more absorbed in their work (colleagues engaged in a more mindful, less burned out research role) would also lower burnout.

CHAPTER 3 | CLINICAL RESPONSE TO ALARMING TECHNOLOGY IN HIGH-RELIABILITY ORGANIZATIONS (joint with Klaus Weber)

Summary

High-reliability organizations (HROs) increasingly use alarming technology to disrupt routines and draw attention to potential problems. However, HROs also require individuals and teams to reduce disruptions in order to maintain the organizational stability and mindfulness necessary in an HRO. This paper aims to explore the paradoxical relationship of disruptive alarming technology and organizational mindfulness by analyzing how an ICU nursing team anticipates, processes, and responds to alarms. Through a series of interviews and participant observations, we find that the nurses studied reduced the alarming stimuli to two types of alarms: ambiguous (alarms that did not have routinized responses and required sensemaking; the action implied was ambiguous) and unambiguous (alarms that had routinized responses and required little to no sensemaking; the action required was unambiguous).

In order to avoid having to process each alarm, nurses only focused their attention on ambiguous alarms. Nurses were able to filter the severity of ambiguous alarms through their anticipations for how each patient would alarm that shift (what we define in the paper as "patient personas"). Patient personas were supplemented with information nurses gleaned from elements of embodied sensemaking – primarily in the form of physical positioning and sensory cues. Body language of other nurses, physical positioning of the nurse and their peers, time-chunking of their tasks, as well as visual information from the alarming technology all contributed to how nurses anticipated, interpreted, and responded to alarms for their patients, as well as for those patients in their vicinity.

In our field work, we found that nurses created patient personas to help 1) anticipate alarming patterns for patients and 2) assess how and when they would address the ambiguous alarms. These future-thinking sensemaking mechanisms created a vision for sensemaking against which nurses compared incoming alarming stimuli. Our paper draws on the notion of ‘anticipation’ in mindfulness, such that for an entity to be aware of the context and flexible in responding to unanticipated events, they must first have developed a set of anticipated events. We propose a concept called “bounded mindfulness” inferring that since one cannot be mindful of everything all the time, they must reduce stimuli and create space for mindful attention.

INTRODUCTION

High-reliability organizations (HROs) strive to limit errors in performing potentially hazardous tasks and avoid larger, catastrophic system failure (Williams et al., 2017). Examples of such organizations include commercial aviation, nuclear power plants, hospitals, and electrical power grids (Christianson et al., 2011). Because of their focus on reliability, these organizations are often characterized by elaborate administrative and technological control systems that are designed to standardize action routines. And yet, the complexity and variability of tasks means that full routinization remains elusive and unexpected events that require quick adjustments do occur. To achieve reliability through making sense of unexpected deviations, HROs therefore also emphasize situational awareness, social relations, attunement to others' reactions, and organizational actor identities (Weick, 2011). HROs especially prioritize the detection of weak environmental cues they can respond to and prevent escalating problems (Christianson, 2019). As Matlis and Christianson explain, in doing so "understandings are constantly adjusted in response to new information or changing circumstances" (2014) through a cycle of action and reflection as teams continuously reconfigure sense (Weick, 1995; Weick et al., 1999; Weick & Sutcliffe, 2015).

A central tension for HROs is to establish standardized processes and systems to prevent accidental deviations, and at the same time to address disruptions to these processes through ongoing awareness or "mindfulness" (Levinthal & Rerup, 2006). Mindfulness is the "awareness and attention…which may be reflected in a more regular or sustained consciousness of ongoing events and experiences" (Brown & Ryan, 2003, p. 823). It hinges on an organization's ability to effectively anticipate events, such that it requires a mindful organization to have the "capacity to respond to unanticipated cues or signals from one’s context” while understanding the “impossibility of anticipating all problems and events in advance” (Levinthal & Rerup, 2006, p. 505).

In order to minimize the impact of unanticipated events or deviations, mindful organizing can be supported by five capabilities: the preoccupation with failure (focus on failure more than successes); reluctance to simplify (do not simplify assumptions); sensitivity to operations (analyze the effects of current practices); commitment to resilience (spend time bolstering organization against potential crisis); and deference to expertise (identify and rely on local experts) (Weick & Sutcliffe, 2001). Yet, sustaining mindfulness may be difficult in general (Brown, Ryan & Cresswell, 2007), and especially in the organizational context of HROs that emphasize standard processes and control (Levinthal & Rerup, 2006).

One way that HROs intend to maintain mindfulness is through the use of alerting technology that draws attention to weak signals that anticipate potential hazards and prompt sensemaking. Proper functioning of technological devices such as alarms should, in theory, improve organizational mindfulness (Roberts, 1990). However, as we describe below, the rapid increase of alerting technology in HROs, such as hospitals, can lead to a desensitization to the signals known as “alarm fatigue.” In a state of alarm fatigue, individuals lose the discriminatory capacity to recognize and decipher different auditory signals. The repetitive surplus of alerts can cause individuals to no longer hear them. Thus, the tools intended to enhance mindfulness and situational awareness can - in amounts that exceed the capacity to process them - lead to less mindful conditions. Intentional, mindful organizing around alerting technologies is then necessary to maintain awareness and detect unanticipated events.

There are two main schools of thought around the implementation of technology in HROs. In the first, technology is a fixed organizational component around which organizational actors must operate (Perrow, 1994). In the second, technology is a “controllable option” that can be manipulated by mindful actors (Weick, Sutcliffe, & Obstfeld, 1999, p. 51). Much is known about the reasons for HROs to maintain reliability and the power of their technological systems, but little is known about how individuals make sense of and act upon (exert control over) alarming technologies, which provide multiple and sometimes overwhelming sensory cues. This becomes critical as we think about the potentially paradoxical nature of alarming technology employed in HROs: alarms are intended to disrupt routines in order to direct an individual’s attention to a potential issue; but in order to maintain organizational resiliency and mindfulness, individuals must stabilize their attention by removing distractions (Weick & Sutcliffe, 2006).

This paper seeks to understand how individuals make sense of and respond to alarming technology in a high-reliability context. To understand this phenomenon, we conduct an eight-month ethnographic study of a nursing team in a hospital intensive care unit (ICU). As there are many sources of technological noise in an ICU, we focus on alert-based sounds (alarms) that emit sonic and/or visual cues to indicate a medical event. We conceptualize alarms not as the unplanned events themselves, rather indicators to events - planned or unplanned as defined by the nurse. We find that nurses create anticipations that provide the lens through which they can interpret the alarming cues (is the indicated event planned or unplanned?) and appropriately respond (does it require an immediate response? Can the alarm be ignored?). Ultimately, the success of maintaining mindfulness around alarming technology is achieved when nurses 1) appropriately update the anticipations and 2) apply them to their own, as well as other, patients.

This paper aims to contribute to the literature on organizational mindfulness and mindful organizing, such that we look at the allocation and preservation of attention in HROs. We portray mindfulness as a guarded form of anticipation: nurses develop expectations around alarms that are open to change; they cast some level of judgment on whether or not the alarms should go off. With these judgements formed, nurses proceed cautiously within the range of the anticipations. Our paper alludes to the fragility of mindful organizing and the need for its processes to be "continuously reconstituted" (Weick & Sutcliffe, 2006).

THEORETICAL BACKGROUND

Alarming technology in HROs

Critical to HRO functioning is the direction of attention to potential hazards. HROs implement numerous controls to ensure organizational safety and continuity. Included in these controls are various technological alerting devices to help guide individuals and teams to situations that might arise in a local-level or systematic failure. Technology can be both a blessing and burden for high-reliability organizations. As complexities of the organization increase, new advanced technology is often seen as the solution. However, as Roberts paraphrases Perrow (1984):

> The United States has opted for technological rather than more conventional fixes to problems of increased demand on high reliability systems. But operators are wary of technological fixes because they result in far more interdependent systems in which problems can propagate, and in which even the high reliabilities of independent parts may not aggregate to yield a high reliability system (Roberts, 1989).

As Perrow explains, adding more technologies increases the complexity of a system, making more interdependent ties and adding greater risk to a system if failure were to occur. Often, more technology does not equate to a safer, more reliable system. This is especially true for one specific type of technology prevalent in high-reliability organizations: alarming technology. Many high-reliability organizations have seen a proliferation of alarming technologies as operators try to expand organizational attention to potential issues. Alarming technologies often go off the most during events where risk of failure is highest and individuals must be executing and paying attention the best (Woods, 1995). Alarming technologies are intended to guide individuals during these stressful, complicated events, but can end up overwhelming them with "nuisance alarms." Nuisance alarms, according to Woods, are "a consistently false signal for an attention shift" (1995, p. 15).

Alarming technology in hospitals. There are generally two types of alarms: monitoring (e.g., for blood pressure, heart rhythms, and pulse oxide) and non-monitoring (e.g., for ventilators and IV pumps). Monitoring alarm sounds are designed to indicate severity of event; as the number of beeps and frequency increases, the event is theoretically more urgent. Monitoring alarms with single beeps signify a low priority warning (such as the patient's blood pressure did not take correctly), while double beeps are more urgent (the patient's heart rhythm might have missed a beat). A triple beep is the most severe, alerting nurses to a critical incident (such as cardiac arrest). Non-monitoring alarms each have their own single frequency and tone. Unlike monitoring alarms they do not indicate levels of severity.

In hospitals, alarming technology includes physiological monitoring alarms, staff pagers and cell phones, patient call lights, and non-monitoring alarms attached to medical devices such as ventilators and IV pumps. This institutional interest in directing attention to all potential issues has led to a plethora of alarming technology in hospitals. As a result, clinicians are routinely bombarded with a cacophony of noise. In 1991, researchers recorded one alarm once every thirty minutes (Cvach, 2012). However, by the late 2010s, researchers began to see an average of one alarm per minute, with rates escalating to four a minute in the intensive care unit (Philips, 2013). The Joint Commission found that in certain units, nurses were exposed to up to 400 alarms per patient, per day multiplied by the number of patients in the unit (2011). In a test I conducted at my study site, the patient monitor emitted 600 beeps, emanating from 74 separate alarms, in under one hour.

In many hospitals, alarm management policies are created on a unit-by-unit basis, but generally place the expectation that the primary patient clinician will respond promptly to all patient-centric alarms. This is a factor of patient safety (ensuring the patient physical needs are met in a timely manner), as well as patient satisfaction (a financial incentive for the hospital to ensure their patients feel heard by a quick staff response). Given the overwhelming amount of alarms occurring throughout a shift, it is unlikely that clinicians have the capacity to interpret or respond to all alarms. They instead are forced to employ various sensemaking mechanisms to help them discern which alarm to respond to and in what manner.

Sensemaking of sensory cues

Since the purpose of alarming technology in HROs is to shift an individual's attention to a potential problem, clinicians must be able to process cues from the alarming technology. The underlying assumption of alarming technology systems is that each alarm will trigger a stimulatory response from the individual. This trigger would then elicit sensemaking, the process by which individuals, teams, and organizations cognitively respond to sensory cues or changes in their experience of the environment (Maitlis & Sonenshein, 2010). The anticipation or expectations of these signals "connect with cues to create meanings" and condition how individuals remake meaning from subsequent cues (Maitlis & Sonenshein, 2010). Here, we use Emirbayer's understanding of expectation and anticipation: "expectation, the memory-sustained anticipation that past patterns of experience will repeat themselves in successive interactions, allowing relationships to be sustained and reproduced over time" (1998).

Experiencing and ascribing meaning to the environment through senses is one form of sensemaking often referred to as "embodied sensemaking" (Cunliffe & Coupland, 2012; Sandberg & Tsoukas, 2020). Embodied sensemaking provides a framework for individuals to address their responses to stimuli and is a large part of how we make sense of our "world" (Goodman, 1978; Starbuck & Milliken, 1988). It includes "the felt senses, the physicality of material cues and artifacts" (Matlis & Christianson, 2014). Embodied sensemaking seems to fit well with the socio-materiality of technology, especially alarming technology, which employs audio and visual cues for sensemaking. The material elements of alarming technology, particularly that of sound and noise, are socially constructed. How individuals experience sound "is inscribed in broader social structures, routines, technologies, norms, and conventions" (Patriotta, 2016).

Sensemaking allows us to notice and make sense of cues that might signal unexpected events. By anticipating and processing cues, individuals can decide how to allocate their mindfulness. In order to preserve mindfulness, individuals need to continuously update their initial sensemaking. According to Christianson, updating is "the process of revising provisional sensemaking to incorporate new cues" (2019). After the process of sensemaking starts, updating is used to refine and remake the sense of the initial perspective. The initial baseline created through sensemaking influences the type of sensemaking made in the updating phase (Kaplan &

Orlikowski, 2013). Updating can be challenging, but can occur if the participant updating them is both open to the new situational cues and finds the new perspective more accurate than the former (Rudolph, et al. 2009; Christianson, 2019).

There is a dearth in the literature both in embodied sensemaking and how sensemaking addresses the "deeply constitutive entanglement of humans and organizations with materiality" (Orlikowski & Scott, 2008). In this research, we use ethnographic methods to analyze how to effectively use mindfulness in a bounded way when operating in a sociotechnical, highly-reliable system. Using the case of alarm fatigue, we look at how individuals maintain mindfulness while simultaneously relying on the rote nature of technological systems. Specifically, we look at how ICU nurses make sense of the alarming events of patients.

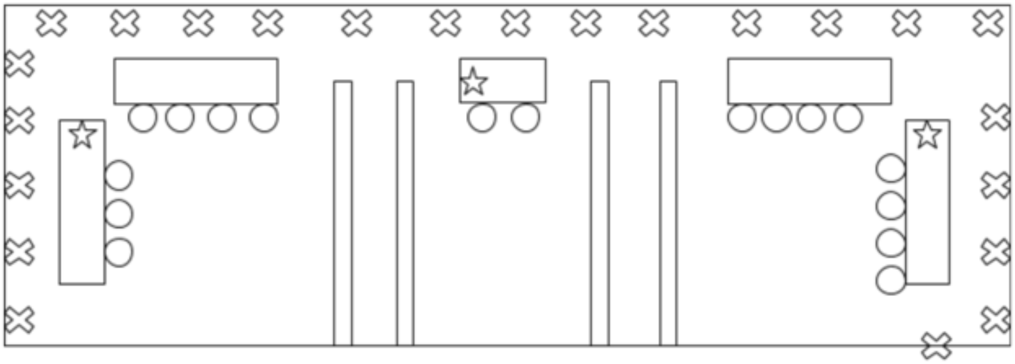
METHODS

Research site overview

My study takes place at a large urban academic medical center in the Midwest. It is recognized for its Magnet status, which indicates a supreme quality of nursing as defined by the American Nurses' Credentialing Center (ANCC). The focus of my study is on one of the hospital's five specialty intensive care units (ICUs). The ICU has approximately 20 beds and employs approximately 80 nurses, who are staffed across two 12-hour (one day and one evening) shifts and in charge of one-to-two patients per shift. Nurses are required to conduct and chart hourly assessments of patients. Nurse/patient pairings are updated at the beginning of each shift and can change during the shift. When a patient leaves the floor, their nurse will usually receive a new patient. Throughout my observations, I noticed an average of 2-6 patient handoffs on the floor each day.

As depicted in **Figure 3** below, the unit is laid out in a rectangular fashion. Along three sides of the unit are spacious, private patient rooms with glass sliding doors and individual bedside monitors. Each end of the unit has a large, patient-facing nurses station. In between the unit's two hallways is a third, smaller nurses station (colloquially referred to as "the crack"). The two large stations each have a set of) patient monitors, showing vitals for all patients on the unit, and a call light display showing the rooms pertaining to that side of the unit. The smaller, middle station has two patient monitors displaying a limited range of patient vitals and no call light display. Each large station has seven computer screens for EMR charting, whereas the middle station has two.

FIGURE 3. ICU floor map



Data collection

My data collection started with a broad research question of *how do nurses respond to alarms*? Alarms in this context are the sonic signals that indicate special clinical attention is needed. In order to better capture the audio-material environment from all alarms as a whole, I do not focus on one specific type of alarm, such as a bedside physiologic monitor or IV pump. I used an inductive, grounded theory approach, which allowed me to begin with the phenomenon (roughly considered "alarm fatigue"), then explore the relationships and patterns within that phenomenon (Glaser & Strauss, 1965; Charmaz, 1995). In order to best answer my guiding question, I decided to take an ethnographic approach using participant observations and interviews. This allowed me to use interpretive modes of understanding the data, moving from general explorative questions to open and theoretical coding in iterative ways.

Prior to starting the data collection, I held two informal “coffee and conversations” for all nurses at the unit, as organized by the unit manager. During these sessions, I explained the aims of the study, what I planned to do during my time on the unit, and answered questions potential nurse participants had. The staff were also made aware of my research through multiple emails and flyers around the unit.

Interviews. I began my data collection by conducting a series of interviews with staff. The purpose of the interviews was to further explore the impact of alarms on clinician social interactions, routines, and wellbeing. I conducted the interviews with nurses during their shift in congruence with my observations, with the exception of one phone interview with a night shift nurse. Due to the limited availability of nurses, I originally proposed conducting two short (15-minute) interviews with the same nurses over time. I ended up receiving individual interviews that averaged 30-minutes each. Due to the sensitive nature of the data recorded, information for all participants and participant shifts was de-identified at the time of collection.

At the beginning of each interview, I explained the purpose of the study and how the participant’s interview data would be used in the analysis. Interviews were recorded with participant consent and all recordings promptly transferred to a secure platform and deleted from the device. I continued interviewing practitioners until I felt saturation was reached and no new information about nurse response to alarms was learned (at approximately 30 interviews).

Observations. For the observations, I positioned myself either at a nurses' station or in the hallway. At no time did I enter the patient rooms. During the observations, I took handwritten notes on: general staff social behavior and routines; alarms and alarming devices (type, duration, amount); the manner in which staff appear when they respond to alarms (before and after); and any coordinating actions or interactions between staff regarding alarms, notifications, or other disruptions.

I started the observations in the morning, sitting near the monitors. I usually positioned myself on one side of the unit, but on the days I stayed longer I often ventured over to the other side as well. I started out broadly observing what nurses would do (or wouldn't do) when alarms went off. This involved two to three weeks of learning how to read monitors and identify different pitches for non-monitoring alarms. Once more comfortable in the general interactions around alarms, I began narrowing in on different related aspects: amount of alarms during different parts of the day, coordination at shift change, nurse location during alarming events.

To make robust observational data on the interactions with alarms, I created jottings while in the field (Emerson et al., 1995) and promptly rewrote my field notes in narrative form afterwards, elaborating on events that related back to my initial research questions (Calarco, 2018). I continued to observe in 4-6 hour stretches until I saw repeating patterns between different iterations of staff each shift, for a total of 20 observations yielding approximately 100 pages of field notes.

In addition to the semi-formal interviews, I also held informal conversations with select nurses to ask them clarifying questions throughout the observations. Most of these conversations were captured, verbatim when possible, in my field notes. These nurses helped explain the purpose and patterning of certain alarms, walked me through various work tasks (including charting and reporting during shift change), and other questions that came up during observations.

Review of archival data and monitor data. To get a clearer picture on the unit's specific alarm management context, I reviewed their training materials for new staff, outlining alarm management policies and team expectations. I also worked with the IT team to gather historical data from the nurse station monitors, showing which alarms occurred at which time. The purpose of reviewing this alarm data was to quantitatively analyze the nurses' sonic environment. By learning which portions of the shift experienced more condensed patterns of alarms, I was able to tailor the remainder of my observations and interviews to probe this dynamic.

Data analysis

From the start of my data collection, I drafted memos on the fieldnotes to triangulate and make connections between the different observation periods and interviews. These memos allowed me to start processing different themes emerging from the data. I then began coding the fieldnotes and transcript data, following Miles, Huberman, and Saldana in a line-by-line manner (2014). I selected line-by-line (in-vivo) coding to capture and preserve the wording of nurses in my transcripts and observational notes. Since I conducted fairly conversational participant observations, I was able to get many verbatim quotes throughout my observations. These codes generated more themes and findings, from which I created additional memos (Charmaz, 1995).

After analyzing the memos and findings, I reviewed the sensemaking literature and began re-coding the data by themes that had emerged through the literature as well as my findings. At this point in the analysis, the concepts of “personas,” “time chunking,” “embodied sensemaking,” and “updating” became central to my study.

FINDINGS

Categorizing alarms: ambiguous and unambiguous signals

I found that in processing and allocating attention to alarms, nurses conceptualize alarms as two kinds of signals: unambiguous and ambiguous.[6] Unambiguous alarms are signals that elicit routine responses from nurses, whereas ambiguous alarms require additional sensemaking to decide the best course of action. Instead of responding to alarms by their monitoring and non-monitoring functions (as described earlier), nurses treated all alarms as either ambiguous or unambiguous.

Figure 4 illustrates this spectrum, from a single beep (unambiguous monitoring alarm) to a code alarm, a special emergency alarm such as Code Blue (unambiguous non-monitoring alarm). Both a single beep and code alarms are unambiguous and what we consider “routinized” in that there are automatic scripts that nurses follow upon hearing the alarms. However, the routines for these two types of alarms differ drastically – nurses habitually ignore single beeps but will immediately attend to a Code Blue. This is due in part to the difference in severity and frequency; unlike code alarms, single beeps are highly frequent but indicate little to no immediate action. In an effort to eliminate perceived unnecessary noise, nurses gradually start ignoring (and eventually tuning out) single beeps. Even though the nurse manager clarified that nurses were trained within their first month to respond to single beeps, many “outgrew” that

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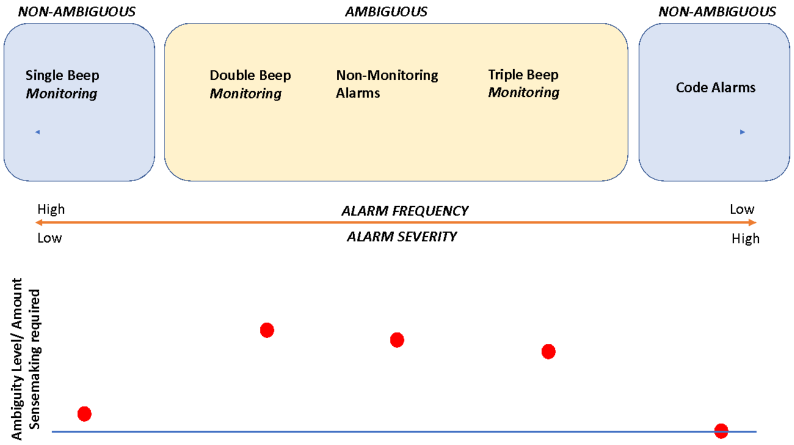
[6] ‘Ambiguous’ and ‘unambiguous’ are terms I use in describing the sensemaking of alarms; they are not phrases extracted from the data.

habit. As one senior nurse said, “I was ignoring the [single beep] alarm, because it wasn't an alarm that I would pay attention to.”

FIGURE 4. Alarm classifications and sensemaking



Unambiguous alarms generally do not elicit a cognitive response from nurses to figure out how to respond; they are mindless in practice. Single beeps are routine (and routinely ignored), rarely acting as an ambiguous signal to nurses to make sense.

The “ambiguous” alarms shown in **Figure 4** tend to be the double and triple beep monitoring alarms, as well as non-monitoring “non-code” alarms such as those for ventilators and IV pumps. Double beep alarms are less frequent than single beeps, with triple beeps (the “red” alarms) acting even less frequent and highest priority of monitoring alarms. However, like double beeps, triple beep monitoring alarms require cognitive processing to understand if the alarm is accurate and how it fits into the patient’s behavioral and alarming patterns. Similarly, non-monitoring (non-code) alarms require nurses to assess which room is emitting the alarm and what the potential issues with the machine and/or patient could be. I found that after hearing double beep, triple beep, and non-monitoring (non-code) alarms, most nurses engage sensemaking practices to decide how and when to respond to alarms.

Interpreting ambiguous alarms

Nurses have conditioned responses to unambiguous alarms (ignore or silence a single beep and immediately address a code alarm). However, there is ambiguity in how a nurse should address the double and triple monitoring alarms as well as the non-code, non-monitoring alarms. In this section, I discuss how nurses routinize the timing of their day into "chunks" in which they clump tasks together periodically throughout the day to minimize disruptions and improve efficiency. I then explore how this process inherently affects the patterns of noticing, interpreting, and acting on alarms. In addition to the temporal boundaries, I then pose a cognitive boundary nurses create: patient personas. Patient personas act as both a sensemaking restraint and map for assessing alarming events. Finally, I look at the role physicality and positioning play on nurses' attending to alarms and sensemaking updating.

Time-chunking. Immediately following the shift report, the incoming nurse situated themselves at a computer at the nurses station and reviewed key artifacts in the patient's electronic medical record: a list of their medications for the day, physician notes and orders, as well as a "work list." The work list is a suggested daily timeline for the nurse, including at what time they should provide certain medications, feedings, bed checks, and patient adjustments. Nurses have the ability to slightly alter how they view the work list (sorting by medication or time of day), but most generally follow its "clock time" and recommended tasks (Ancona et al., 2001). There is certain flexibility with the work list since the medication has a window of time in which it can be given, either an hour earlier or later than the time prescribed. As noted in the work list and instilled through the organizational norms of the ICU structure, nurses are required to assess the patient hourly at the bedside for neurological changes. With this policy, nurses know that they will be in the patient room at least once every hour during their twelve-hour shift.

With this in mind, I found that nurses coordinate their tasks in “chunks” - constructing their day so that they do a set of tasks periodically instead of one task at a time. Nurses “chunk” their shift segments as a way to impose boundaries around when they will not only expect to conduct tasks, but also to provide structure for when they might be able to respond to an alarm in relation to those tasks. One nurse describes the time-chunking method:

> “That's kind of when nursing judgment comes in, sometimes it'll say a lab is due at 4:00 AM and 6:00 AM so I'm like, okay, I'm not going to go in and poke them once for this lab and then poke them again to get this lab at six. So, I'd just be like, I'm going to draw all of them at five because that's one poke. So, things like that, it's kind of flexible but it provides a good blueprint I would say.”

The time period that appears most critical for nurses is the beginning of their shift, primarily at the start of shift report until a few hours into their care. With time chunking, nurses plan to do a large portion of their work during the first or second “chunk” of their shift. Often this time is when the nurse tries to focus their attention solely on their individual patients and is thus more alert towards their patients’ alarms. It is also when most medication is delivered, so nurses plan to perform more hands-on care. In my interviews, nurses acknowledged that if they do not perform certain tasks in the initial chunks of time, those tasks will get pushed aside until near the end of the shift.

Construction of patient personas. At the beginning of each shift, incoming nurses meet with outgoing nurses and conduct “shift reports,” a brief meeting where the outgoing nurse provides an introduction of the patient and his or her diagnosis, the patient’s neurological assessment, and any high-level updates to the incoming nurse. These meetings include a bedside assessment where both the outgoing and incoming nurse evaluate the patient together. During the knowledge sharing in the shift report, nurses begin formulating what I define as “patient personas.”

Patient personas are cognitive archetypes nurses use to anticipate how a patient will behave and alarm throughout the day. Often, these personas are developed based on the nurse’s prior experience with or knowledge about the medical diagnosis. This diagnostic information can be augmented with the nurse’s previous experience with the patient themselves (for example, if the nurse has worked with the patient in an earlier shift); initial impressions of the patient’s physical attributes or behaviors (for example, if the patient is shivering, electrodes will be more likely to emit continuous, erroneous alarm readings); and feedback from the outgoing nurse. Patient personas can also be cast in relation to the nurse’s *other* patient assigned for that shift, in which Patient 1’s behaviors and acuity are perceived in light of Patient 2.

With this cognitive mechanism in place, nurses anticipate how the course of the day will likely unfold. Patient personas are usually formulated in the first few hours of the nurse’s shift - after the shift report, reading of the patient’s medical record, and any initial alarming patterns in the first few hours. In my interviews, some nurses claimed to begin this anticipatory process within the first 30-60 minutes of working with a patient. Nurses were confident that they “know” a patient’s behavioral and alarming patterns after this brief period. Within a few hours into a shift I repeatedly heard the phrases “oh yeah, that’s normal for them” and “they do that,” referring to patients whose alarms were going off. The patient personas provided a foundation for expectation-setting for the nurse’s shift. The personas also conditioned how the nurses processed and made sense of alarming disruptions throughout the rest of the day.

> “If I know if I have a really, really sick patient, and I feel like they're unstable, and we've been in there a lot. If they alarm I'll be a lot faster to go in there.”

Nurses not only create these predictions for their own patients, but for patients of nurses situated nearby as well. Nurses create patient personas for their own patients based on information from the shift report and initial alarming patterns; nurses create patient personas for the patients of nearby nurses based on a few different factors. Primarily, nurses will watch the behaviors and body language of the attending nurse in conjunction with their patients’ observable alarming patterns. An attending nurse lingering in a patient’s room or rushing across the hall might indicate a higher-acuity patient.

Nurses incorporate verbal cues from a neighboring primary nurse, such as audible sighs or unsolicited comments in response to their patient’s alarm, to fill in the knowledge gaps about the patient personas. Finally, nurses also use their understanding of the primary nurse themselves to filter the patient persona. For example, if a nurse is known by their peer nurses to prefer to run between rooms, it might not necessarily reflect the patient’s health status. Similarly, some nurses are known to prefer larger parameters on patient alarms (set to be more sensitive). Thus, the peer nurses can expect that these patients’ alarms will in general go off more frequently for non-critical readings.

Physical positioning and embodied sensemaking. In our field work, we found that the anticipations created through patient personas and time-chunking were influenced by visual cues from physical positioning and alarming technology. In particular, the information a nurse used to create and update patient personas and their schedule was conditioned by the physical location of the nurse and the visual aids from the physical devices they were able to see from their location.

The physical placement (embodiment) of the nurse determines the type, quality, and quantity of visual cues that they can process to adapt their expectations.

We found that starting at the beginning (and running throughout the shift) nurses try to strategically place themselves closer to their patients, the nurses station monitoring devices, and in social proximity of peers. Physical positioning of the nurses underscores how they expect to engage in help-giving and help-receiving throughout the day based on their patients' needs. If they have a sicker patient who needs more care, the nurse will likely position themselves either in the patient's room or at a spot in the nurses station facing the patient's bedside monitors with the curtains pulled aside for easier visual access to the patient. I found that when positioning themselves in one space (the patient room), nurses plan to act more individualistically, especially in responding to an alarm. When in the other space (nursing station), the nurse expects to engage in more team-level responses.

This occurs because nurses know that when they are at the nurses station, they are naturally more aware of team-level events than when in a patient room. As numerous nurses described, when they are in the patient room, they are solely focused on that patient and less likely to leave the room to respond to an outside alarm. The physical space also cuts them off from hearing many alarms. As nurses noted:

> "If I'm in my patient's room, I'm not going to respond to an alarm unless it's a code."

> "The only alarms you really hear from a patient's room are the emergency alarms...it is hard to hear any other alarms."

In addition to monitoring their own alarms, placement at the nurses station allows nurses to address other nurses' alarms as well. As one nurse described:

> “You just usually glance at the monitor and then I usually try and count the rooms to see if it's mine that's beeping. Or even if it's something that's continued, if it's not addressed, then look at it and then walk over and see if the nurses in there, if they need help.”

Being near the central station allows nurses to expand their attention from just one or two patients to twelve or more. Visual awareness and proximity to the central stations increase nurses ability to receive and provide help to other nurses during alarming events. The physical positioning of a nurse is a signal to other nurses whether or not they are open to or have the bandwidth for helping others; physical positioning of their teammates helps nurses create their own expectations of who they can turn to for help or who they might need to help. For example, if a nurse expects a patient to be more acute, he or she will likely position themselves in the patient’s room or directly in front of their room with visual access to the bedside monitors. This also signals their expectations to their peers and conveys they might not have the ability to monitor other patients. In my fieldwork, I found physical positioning to be a powerful non-verbal tool for nurses to use to communicate their patient load, ability to help, and alarming situations to nearby peers.

Physical placement impacts the nurse’s visual proximity to the alarming technology; closer proximity allows nurses to better assess whether monitoring alarms going off were real or “artifact” (false). As I will discuss below, the first step nurses take after hearing ambiguous monitoring alarms is to diagnose the authenticity of the alarm via the monitor waveforms. As one nurse described, the practice of responding to an alarm first requires “looking at [the beep], especially if you’re near the alarm.” This can occur either at the bedside, where the nurse reads the patient monitor, or at the nurses station, where the nurses read the central monitors.

Clustering around the central monitors to read the waveform outputs often prompted staff discussions around whether or not the alarms are “real” or “artifact.”

Additionally, nurses visually assess the location of their peers when alarms go off to help interpret the alarming event and make sense of how they should coordinate their response. This concept of embodied sensemaking is enacted by nurses visually tracking one another throughout the day. Throughout my observations I noticed cues supporting this. If a nurse popped her head out of a room and asked for a specific nurse, others at the station would usually respond immediately with his or her location. This was usually a method nurses used to quickly tell who was around for support or help, or where specific nurses were in case a patient, family member, or other clinician needed them.

Subconscious visual tracking was a habit developed since oftentimes the nurse cell phones, which could be used to find a nurse as well, were dead or unconnected. If a nurse didn’t change the battery (which needed to happen at least once during a shift due to the short battery lifespan) or sign into their phone correctly, he or she wouldn’t be able to receive calls. I found that visual tracking was a heuristic used to quickly assess where individuals are and what they’re doing when an alarm is signaled. Visual tracking offered a type of “situational awareness” method congruous with the HRO mindset.

In processing an ambiguous beep (a double or triple beep), the nurse will perceive relative severity and location of the alarm. Once they have determined what type of alarm it is, nurses engage in embodied sensemaking to further understand the urgency of the alarming event and how they can contribute to its resolution. They look to see from where the alarm is coming by glancing at the monitor at the nurses station, monitor at the bedside, lights above the room, or in the general direction of the alarm. There are a series of lights above each patient room that will go off when the call light or ventilator alarm is triggered. Non-monitoring alarms, such as the IV pump, are not signaled by a light or alert, rather they emit from the device. In these situations, nurses use geographic awareness to detect where the alarm is coming.

DEVELOPING A CONCEPTUAL MODEL

Responding to and updating anticipations of alarms

We ascertained that in making sense of the alarm, nurses have three potential action pathways through which they can respond: an immediate action, a delayed action, or no action (ignoring the alarm). As we learned from the observations, when a nurse responds (either immediately or delayed), they take one, multiple, or all of the following steps: going to the patient; silencing the alarm (at the technological device or patient monitor); adjusting alarm parameters; asking the primary nurse if they need help; and/or asking the primary nurse if it is okay to adjust the parameters or silence the alarm. An immediate (not delayed) response to an alarm signals urgency to those operating around the primary nurse. These, often physical, cues of attending to the monitor and/or patient provide information to the primary and peer nurses.

By enacting an immediate response, the primary nurse reinforces to themself the severity of the alarm and may habitualize their need to continue to respond to this type of alarming event. As sensemaking requires dynamic “cycles of interpretation and actions” (Maitlis & Christianson, 2014), inputs such as this act as information that shape the anticipations. If the alarm event falls in line with the nurse’s anticipations, they will not need to update it; if it is urgent and does not fit with what the nurse anticipated, they will respond immediately and update their anticipations. The hypothesized conditions for updating the anticipations are further elaborated in **Table 5.**

A delayed action is when the nurse intends to respond to the alarm, but consciously decides to wait until it's either a more convenient time or that they've determined no one else is responding. As one nurse described during the interview, "typically we'll kind of wait and see if…[the patient's nurse is] around. And then if no one is, check it out and see what's happening." Finally, nurses can also choose to ignore the alarm, with no intent to respond.

Nurses will often ignore (with no intent to respond) the alarm in situations where the alarm is false.[7] Depending on the nurse and context, they might verbalize that the alarm is "artifact" so that other nurses are conditioned to ignore it as well. A nurse ignoring their patient's alarm (through verbal or physical cues) can be a form of sense-giving from one nurse to another, indicating that the alarm does not require action. It also indicates that this false alarm might be a pattern in-line with the nurse's anticipations. The act of not responding to an ambiguous alarm provides a signal to others that this is a cue they can become less mindful of; a nuisance cue that indicates a technological error and does not require discriminatory attention.

However, depending on the relationships between nurses, one nurse's ignoring of an alarm can signal to others that the primary nurse might be experiencing fatigue and does not hear the alarm. Nurses use their knowledge of the primary nurse to decide whether the primary nurse is intentionally ignoring the alarm. Unless nurses verbalize their actions, many delayed responses can be perceived by others as ignoring an alarm. Similar to ignoring the alarm, a delayed response signals that anticipations are not being updated, and the alarm is deemed non-urgent.

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[7] It is also important to note that while the chart explicitly refers to ambiguous alarms, nurses will almost always ignore an unambiguous alarm, as discussed earlier. Depending on the nurse's training or preferences, they might change an unambiguous alarm to a verbal "message," eliminating the beeping alert.

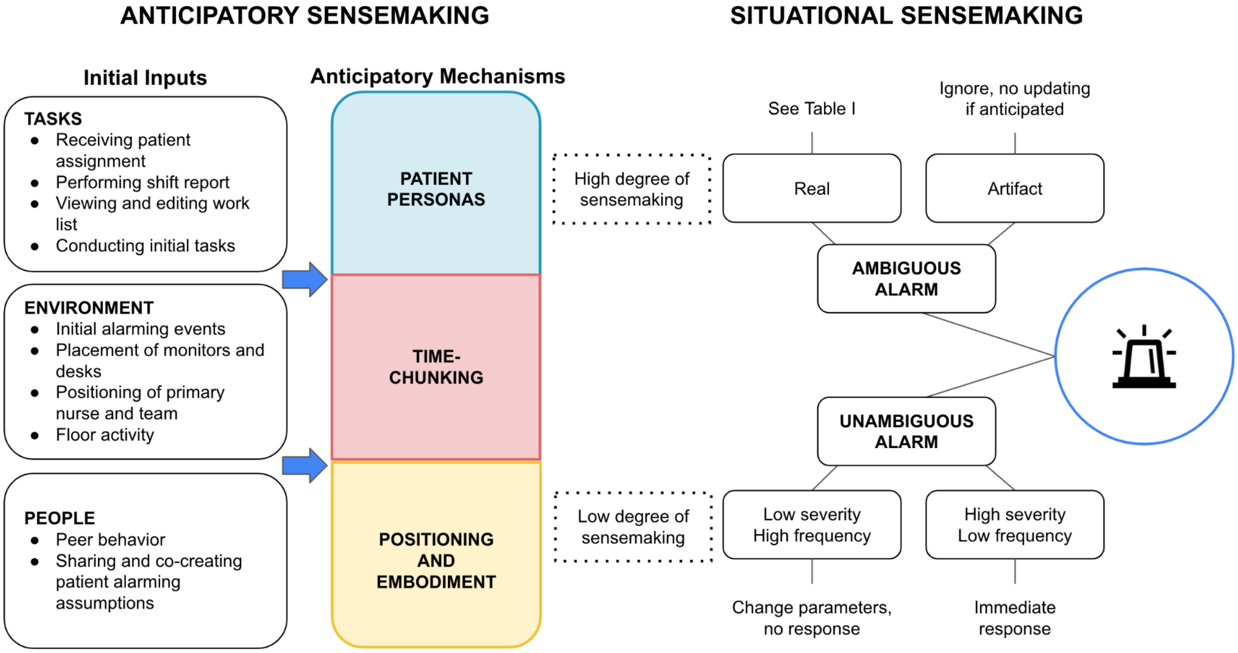
TABLE 5. Alarm responses by anticipation and urgency

	Alarm event is deemed urgent	**Alarm event is deemed non-urgent**
Ambiguous alarm meets expectations	**Your patient:** Immediate response Will not update **Peer patient:** Immediate response (if you're closer than the primary nurse) Will not update	**Your patient:** Ignore or delayed response Will not update **Peer's patient:** Ignore the alarm (unless the primary nurse is missing or busy) Will not update
Ambiguous alarm does not meet expectations	**Your patient:** Immediate response Will update **Peer patient:** Immediate response (if you're closer than the primary nurse) Will update	**Your patient:** Ignore or delayed response Will sometimes update if the alarm becomes reoccurring **Peer patient:** Ignore the alarm (unless the primary nurse is missing or busy) Will not update unless the patient is in physical proximity

Creating a model of bounded mindfulness

Below in **Figure 5**, we use the findings to devise a process model showing how alarming events are anticipated through mechanisms such as patient personas, time-chunking, and embodiment and physical positioning. We introduce the concept of "bounded mindfulness" to explore how nurses preserve mindfulness given the organization and technological constraints in the ICU. In the paradigm of bounded mindfulness, nurses try to be rational within the bounds of the alarming technology, their own skills and experiences, and other data inputs. Yet, they have limited resources and cannot be mindful all the time. Given these constraints (bounds), nurses find ways to direct their attention to areas where it's most needed. In other words, nurses want to be fully mindful in the ICU, but too much is going on; organizational and technical systems can reduce the ability to be mindful, so nurses must take things away to create space for where mindfulness is necessary.

FIGURE 5. Boundedly mindful practice



As shown in **Figure 5**, the initial inputs (tasks, environment, and people) influence the development of the nurses' anticipatory mechanisms (patient personas, time-chunking, and positioning). Inputs such as work lists, patient information, initial alarming events, and monitor placement can all inform how anticipatory sensemaking is built at the beginning of the shift. They determine the aforementioned concepts (patient personas, time-chunking, and embodiment and physical positioning), which we deem "anticipatory mechanisms" because they help nurses reduce the amount of incoming stimuli so they can better anticipate and interpret alarms. Both the initial inputs and the anticipatory mechanisms are part of the 'anticipatory sensemaking' stage and require mindfulness. In terms of the initial inputs, such as performing a shift report, it is vital that nurses allocate and balance attention to their shift-change peer's report while minimizing disruptions or wandering thoughts. The anticipatory sensemaking then influences the situational sensemaking that occurs when an alarm goes off.

The initial inputs and anticipatory mechanisms are important for anticipatory sensemaking as they bound the nurses' need for mindfulness. They help a nurse define what is or is not an ambiguous alarm, then allows the nurse to rapidly discern and create a response to the alarm when it occurs. With the mindful construction occurring during the anticipatory sensemaking phase, it allows the nurse to be less mindful when the alarm goes off. The anticipatory sensemaking bounds the nurses' mindfulness to the ambiguous alarm and aids in the filtering of actions they can take in response. While mindfulness occurs at both the anticipatory and situational sensemaking stages, it is more heavily at play in the former. As indicated in the figure, situational sensemaking is higher to disambiguate an ambiguous alarm than to make sense of and respond to an unambiguous alarm.

After an ambiguous alarm event goes off, an inquisitive cognitive thought process follows, as is shown in **Figure 5**. The first step is to decide whether or not a monitoring alarm is real by observing the waveforms and key visual cues on the monitor interface. For non-monitoring alarms, nurses will assess whether the alarm is real or not through additional cues, often checking on the equipment, patient, or primary nurse. Then, for actionable ("real") alarms, nurses evaluate if the alarm fits their anticipations for the patient. Finally, nurses perceive if the alarm is time sensitive (urgent) based on the alarm type and the patient persona. The key occurrence in this step is the updating occurring for both the primary nurse and peer nurses in the situations in which the alarm is real and unexpected.

At a high level, our findings show how individuals process ambiguous and unambiguous signals. As shown, the unambiguous signal requires less situational sensemaking, while ambiguous signals require more.

DISCUSSION

As expected by the sensemaking literature, each nurse as an autonomous being has a slightly unique, contextualized approach to how they give and receive signals, based on what they “regard as normal or anomalous” (de Rond et al., 2019). Of the possible action options available to nurses in responding to an alarm, individuals will each choose different actions. In my fieldwork I noticed that some nurses were more sensitive to alarms than others, opting to keep tighter parameters on their alarms so as to “not annoy others.” In perhaps a paradoxical way, I discovered that the most mindful practices tended to be nurses keeping sharper, tighter parameters on their alarms with regular evaluation of the patient. Nurses who preferred wider parameters created more opportunities for “ignore” responses and more mindless tendencies.

Adjusting of parameters also occurred when alarms were expected and the nurse decided that an alarming pattern was solidified enough in the patient persona to adjust the parameter, eliminating a swath of potential sonic cues. By being mindful of both the sounds and when to manipulate the technology, the nurse could decrease the potential for alarm fatigue while still maintaining safe patient practices. Another source of mindfulness came from the information gathering from peers. As part of a group, nurses would seek out information from others about their interpretation of alarms. While this could add extra “noise” to the information nurses were processing, it provided additional insights to help them refine what cues they needed to pay attention to. By operating in a team dynamic, nurses were able to engage with more information while maintaining a higher degree of mindfulness for the alarming events of both their and peer patients.

Contributions to research on mindfulness in organizations

Our study contributions to the mindfulness literature by exploring the puzzle of mindfulness in which systems need to be aware for all possible events, but the human capacity is such that "at any given point in the flow of transactions, social actors are able to focus attention upon only a small area of reality" (Emirbayer & Mische, 1998, p. 979). Our study sought to explain how nurses maintain mindfulness while processing disruptions through the paradox of alarm technology in a high-reliability organization. By eliminating a subsect of routine alarms and only focusing on ambiguous alarms, nurses limited the types of alarms they allowed themselves to process and better maintained mindfulness to their tasks at hand. Through "routinization of the unexpected," nurses relieved themselves of having to process and respond to each alarm that occurred. They crafted patient personas to filter the ambiguous alarms and understand their severity levels. They also used physical cues and positioning to interpret the alarm and the context of nearby nurses. The final step of embodied sensemaking conditioned how the nurses perceived their anticipations and those of their peers, and ultimately how they responded to the ambiguous alarm. We conceptualize this attempt to reduce and process stimuli to allocate attention efficiently as "bounded mindfulness." In our conceptualization of bounded mindfulness, the sensemaking response processes are activated using the anticipation of alarms as signals, in addition to nurse's skills and other organizational factors.

Bounded mindfulness has origins in the concept of bounded rationality. According to Simon (2000, p. 25):

> “Bounded rationality is simply the idea that the choices people make are determined not only by some consistent overall goal and the properties of the external world, but also by the knowledge that decision makers do and don't have of the world, their ability or inability to evoke that knowledge when it is relevant, to work out the consequences of their actions, to conjure up possible courses of action, to cope with uncertainty (including uncertainty deriving from the possible responses of other actors), and to adjudicate among their many competing wants. Rationality is bounded because these abilities are severely limited. Consequently, rational behavior in the real world is as much determined by the "inner environment" of people's minds both their memory contents and their processes, as by the "outer environment" of the world on which they act, and which acts on them.”

Bounded rationality implies that while individuals try to make optimal choices, they are restricted in their ability to “implement only beneficial, perfectly coordinated changes” (Yi, Knudsen, & Becker, 2016). Individuals are limited by available data and their cognitive and decision-making capabilities, but try to be rational in pursuit of their goals; they are expected to be rational, but are challenged by uncertainties, which come about through technologies or environment (Thompson, 1967). We draw parallels between bounded rationality and bounded mindfulness such that nurses try to pursue their goal of mindful attention, under challenges from technical and environmental conditions.

Additionally, our study contributes to the “interrelation of mindfulness and sensemaking” by showing how one can “focus on ‘present-moment phenomena’ while also anticipating the future” (Dane, 2011, p. 999). While work has been done on mindfulness and affective forecasting (Emanuel et al., 2010), the connection between mindfulness and future sensemaking is still nascent and underdeveloped (Maitlis & Christianson, 2014). We insinuate that mindfulness can have future-oriented qualities akin with prospective sensemaking. And with our development of anticipatory and situational sensemaking, we hope to show how “mindful individuals may better direct attention to their tasks with greater stability, control, and efficiency, expanding their effective attentional capacity" (Good et al., 2016, p.133).

Our study also illustrates how individual mindful intentions can be used as part of collectively mindful efforts. Each nurse on the unit is responsible for their own set of patients ("me"), but at the same time the entire patient floor ("we"). This dynamic mirrors how mindfulness plays out in this context; each individual tries to mindfully respond to his or her alarms, while processing and acting on them in coordination with the entire unit's alarms. This study shows how mindful organizing can occur without necessarily deliberate coordination between team members Yu & Zellmer-Bruhn, 2018). By using the body language, verbal commentary, and physical positioning and responses of their peers as 'cues,' nurses can create anticipations for alarms and make sense of the situation as it occurs in conjunction with their peers.

How the ICU model generalizes to HROs facing disruptive ambiguity

The first order sensemaking in this paper is situated in the existing literature around sensemaking of the future, anticipatory thinking, and building anticipations to help plan for unexpected events. My findings support the traditional ideas that anticipatory thinking helps individuals in high-reliability organizations disambiguate signals through cognitive and temporal sensemaking mechanisms. This process begins collectively, as my paper shows when the nurses as a whole on the unit cognitively split alarms into ambiguous/non-routine and unambiguous/routine alarms. In line with the sensemaking literature, the subsequent individual creation of patient personas shows the nurses' sensemaking transition from collective into an individual process where individuals interpret and update cues in response to situations (Weick, 1995; Matlis & Sonenshein, 2010).

The second level of ambiguous alarm processes uses embodied sensemaking mechanisms of physical positioning and incorporation of visual cues. In my study, I show that embodied sensemaking is enacted in response to socio-material objects such as alarming technology and acts as the final layer to disambiguate alarms. The physical placement of the body, in conjunction with the material visual cues of the technology, ultimately conditioned the patient personas and time-chunking sensemaking mechanisms nurses relied on to create expectancy frameworks. Embodied sensemaking is usually addressed as a process that occurs as a corporeal response – pain, hunger, physical illness or bodily reactions (Maitlis, 2009). It explores how individuals use the body as a physical tool to interpret and respond to situations (de Rond et al., 2019).

In this study I take Maitlis and Christianson's position on embodied sensemaking, who view it as the act of making meaning through the physical senses (2014). I find that in anticipating and receiving sonic cues, individuals physically respond in terms of bodily positioning around patients and their alarming technology (whether that's in the patient room or nurses station). This step reveals an innate connection between sensory cues in sociomaterial technology and the physical (embodied) response in order to better process the ambiguous sonic cues. In anticipating and acting on alarms, individuals seek out visual cues, and position and reposition bodily elements in ways that influence how their first order sensemaking is perceived.

Sharing and coordination information for collective sensemaking ("attention coherence") is often difficult to achieve (Rerup, 2009). Failure of individuals to properly transfer and merge their individual meaning-making is viewed as a potential risk to complex organizations. However, as this paper highlights, a more nuanced relationship between individual and group expectation setting, updating, and sensemaking. Instead of transferring knowledge to the unit as a whole, the nurses transferred small components of knowledge about their patients to proximal nurses, and often updated their expectancy frameworks of other patients without the primary nurse's interpretations of each alarming event. The process showed ways to share knowledge and instill mindfulness without necessarily involving the whole unit in collective sensemaking.

By sharing knowledge with those nearby, nurses created a safety net for the primary nurse to avoid a "blind spot" (Nickerson, 1998). The presence and convergence of multiple patient personas for one patient provides an interesting context for future research to understand how individuals make sense of alarms, and how one individual's sensemaking can provide a "fail safe" for their peer's interpretation of an alarming event in HROs. This paper points to a potential for intentional grouping and sharing of passive information of alarming events and situational knowledge for peers.

Practical applications

With an appreciation for how individuals engage in embodied sensemaking, this research suggests that HROs should pay more attention to the importance of visual layout and team positioning in relation to peers and alarming technology. While this is an area of interest to hospitals, there are no standard layouts, particularly in the most complex ICU floors. Entwining embodied sensemaking in designing HRO spaces could yield more mindful behaviors and safer outcomes. Additionally, to ensure mindfulness teams must recognize the importance of maintaining a central space for nurses and team alerting technology. By protecting visual access for nurses to see one another as well as alerting technology, medical teams can ensure that nurses are able to engage in the embodied sensemaking cues necessary to act on the alarms and update expectation frameworks as needed.

The research highlights shift change, when the incoming nurse learns about the patient's condition and begins creating their patient persona. At this time, the nurse can update the alarm settings, adjusting them based on how they sense the patient will alarm throughout the day. However, the data shows an initial updating of the alarm settings is not common practice in the field site. By instituting a practice of discussing the patient's alarm parameters during shift change, organizations could increase a nurse's awareness of alarms for the rest of the day. Conducting an initial assessment and periodic parameter checks (once or twice more a shift) of patient alarms could help nurses maintain mindfulness and mitigate incorrect sensemaking. We show that mindfulness has boundaries - one can not be mindful of all inputs simultaneously, but instead has to select how to categorize and frame cues so that some become mindless, leaving the capacity to interpret incoming cues. By using the morning context to set the stage and frame the potential incoming cues (expected alarms), nurses choose a way they will interpret alarms.

Limitations, Boundary Conditions, and Extensions

My study was limited by its single-case nature. While I believe this allowed me to fully develop an understanding for dynamics on this intensive care unit, my data cannot speak to dynamics that might be occurring in other ICUs or similar high-reliability settings with less systemized nurse autonomy with technology. My study follows individuals with high levels of autonomy over the alarming technology, in which they are allowed to adjust the alarm parameters without any documentation or additional consent. Since updating is more likely when individuals have more autonomy, this could be a factor in how the nurses in my study update their expectancy frameworks – perhaps differently than other nurses at different ICUs (who have less autonomy over alarms). For example, cardiac ICU nurses have less control over the telemetry alarms, which are monitored by specialized telemetry teams. In some hospitals, nurses are required to have a physician submit a written order before an alarm parameter can be changed. The level of autonomy over the alarming technology in this study could be creating a different human-nonhuman relationship between the nurses and the alarms that is not representative of other ICU settings.

Further work is needed to understand how the development of expectation frameworks, responses to audio and visual elements of alarming technology, and updating behaviors differ in other ICUs, medical units, or HROs generally. To initially address this limitation, a comparison case study could be used either on a different floor of the hospital (understanding that alarming norms change across certain units) or at an ICU of a different, but comparable (mid-sized academic hospital). A comparison case could shed additional light onto which findings pertain more specifically to this case study or are generalizable across similar cases. As it stands, our findings are bounded by levels of nurse autonomy as well as a ‘donut hole’ (happening more in the middle, not beginning or advanced stages) of nurse tenure, as discussed below.

One counterfactual worth acknowledging is that this pattern did not seem to apply as readily to newer or more seasoned nurses, who were experiencing opposite ends of the sensemaking trajectory. For the former, they reported feeling quite overwhelmed when starting out on the floor, especially in an environment as busy and fast-paced as the ICU. During the initial months of their role, newer nurses said they would try to respond to every alarm they were aware of with the intention of not missing any signals, as well as learning what each alarm indicated. Therefore, there was less of a discerning sensemaking process focused around ‘preservation’ of mindfulness. While they were bounded in how much they could be mindful of, they did not engage in the anticipatory sensemaking mechanisms as regularly as the other majority of nurses. On the opposite side, a couple senior nurses (‘career’ nurses who had been on the floor for over a decade) were reported to often stay in their room and attend to only their patients. Focusing more on their assigned patients instead of the floor as a whole, their geographical location limited the total inputs they received.

REFERENCES

Ancona, D.G., Okhuysen G.A., & Perlow, L.A. (2001). Taking time to integrate temporal research. Acad. Management Rev., 26(4), 512–529.

Arnstein, S. (1969). A Ladder of Citizen Participation, Journal of the American Institute of Planners, 35:4, 216-224.

Ashcraft, K. L. (2007). Appreciating the ‘work’ of discourse: occupational identity and difference as organizing mechanisms in the case of commercial airline pilots. Discourse & Communication, 1(1), 9–36.

Ashforth, B. E., & Fried, Y. (1988). The mindlessness of organizational behaviors. Human Relations, 41(4), 305–329.

Ashforth, B. E., & Schinoff, B. S. (2016). Identity under construction: How individuals come to define themselves in organizations. Annual Review of Organizational Psychology and Organizational Behavior, 3, 111–137.

Bammer, G. (2022, August 30). Stakeholder engagement: Learning from Arnstein’s ladder and the IAP2 spectrum. Integration and Implementation Science. https://i2insights.org/2022/08/30/learning-from-arnsteins-ladder-and-iap2-spectrum/.

Backus, D., & Jones, M. L. (2013). Maximizing research relevance to enhance knowledge translation. Archives of Physical Medicine and Rehabilitation, 94(1), S1-2.

Bakker, A.B., & Demerouti, E. (2007). The job demands-resources model: State of the art. J Manage Psychol., 22(3) 309-328.

Bakker, A. B., van Emmerik, H., & Euwema, M. C. (2006). Crossover of Burnout and Engagement in Work Teams. Work and Occupations, 33(4), 464–489.

Barrett, M., Oborn, E., Orlikowski, W. J., & Yates, J. (2012). Reconfiguring boundary relations: Robotic innovations in pharmacy work. *Organization Science,* 23(5): 1448–1466.

Barton, M. A., & Kahn, W. A. (2019). Group Resilience: The Place and Meaning of Relational Pauses. Organization Studies, 40(9), 1409–1429.

Barton, M.A., Kahn, B., Maitlis, S., & Sutcliffe, K. (2022 April 4). Stop Framing Wellness Programs Around Self-Care, HBR. https://hbr.org/2022/04/stop-framing-wellness-programs-around-self-care.

Batalden, M., Batalden, P., Margolis, P., Seid, M., Armstrong, G., Opipari-Arrigan, L., & Hartung, H. (2016). Coproduction of healthcare service. BMJ quality & safety, 25(7), 509–517.

Becker, H. S. (1998).Trick of the trade. How to think about your research while doing it. Chicago: Universityof Chicago Press.

Bigo, V., Islam, G. (2022). Embodiment and Management Learning: Understanding the Role of Bodily Analogy in a Yoga-Based Learning Model. Academy of Management Learning & Education 21, 648–668.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101.

Brown, K.W., Ryan, R.M. (2003). The benefits of being present: mindfulness and its role in psychological well-being. J Pers Soc Psychol, 84(4), 822-48.

Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness: Theoretical foundations and evidence for its salutary effects. Psychological Inquiry, 18(4), 211–237.

Bucher, S. & Langley, A. (2016). The Interplay of Reflective and Experimental Spaces in Interrupting and Reorienting Routine Dynamics. Organization Science, INFORMS, 27(3), 594-613.

Calarco, J. M. (2018). Negotiating Opportunities: How the Middle Class Secures Advantages in School. Oxford Univ Press.

Carmeli, A., Dutton, J.E., Hardin, A.E. (2015). Respect as an engine for new ideas: Linking respectful engagement, relational information processing and creativity among employees and teams. Human Relations 68, 1021–1047.

Center for Substance Abuse Treatment (US). (2014). Trauma-Informed Care in Behavioral Health Services. Substance Abuse and Mental Health Services Administration (US).

Charmaz, K. (1995). Grounded theory. Rethinking Methods in Psychology, 27-49.

Charmaz, K. (2000). Grounded Theory: Objectivist and Constructivist Methods. 2nd Edition, Sage Publications, London.

Charmaz, K. (2006). Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis.

Charmaz, K. (2014). Grounded Theory in Global Perspective: Reviews by International Researchers. Qualitative Inquiry, 20(9), 1074–1084.

Charmaz, K. (2017). Constructivist grounded theory. The Journal of Positive Psychology, 12(3), 299–300.

Christianson, M. K., Sutcliffe, K., Miller, M., & Iwashyna, T. (2011). Becoming a high reliability organization. Critical Care, 15(314).

Christianson, M. K. (2019). More and Less Effective Updating: The Role of Trajectory Management in Making Sense Again. Administrative Science Quarterly, 64(1), 45–86.

Concannon, T. W., Meissner, P., Grunbaum, J. A., Mcelwee, N., Guise, J.-M., Santa, J., Conway, P. H., Daudelin, D., Morrato, E. H., & Leslie, L. K.. (2012). A New Taxonomy for Stakeholder Engagement in Patient-Centered Outcomes Research. Journal of General Internal Medicine, 27(8), 985–991.

Concannon, T. W., Fuster, M., Saunders, T., Patel, K., Wong, J. B., Leslie, L. K., & Lau, J.. (2014). A Systematic Review of Stakeholder Engagement in Comparative Effectiveness and Patient-Centered Outcomes Research. Journal of General Internal Medicine, 29(12), 1692–1701.

Conger, J. A., & Kanungo, R. N. (1988). The empowerment process: Integrating theory and practice. The Academy of Management Review, 13(3), 471–482.

Cordes, C. L., Dougherty, T. W., & Blum, M. (1997). Patterns of burnout among managers and professionals: A comparison of models. Journal of Organizational Behavior, 18(6), 685–701.

Cunliffe, A., & Coupland, C. (2012). From hero to villain to hero: Making experience sensible through embodied narrative sensemaking. Human Relations, 65(1), 63–88.

Cvach, M., (2012). Monitor Alarm Fatigue: An Integrative Review. Biomedical Instrumentation &Technology, 268-277.

Dane, E. (2011). Paying Attention to Mindfulness and Its Effects on Task Performance in the Workplace. Journal of Management, 37(4), 997–1018.

Dane, E., & Brummel, B. J. (2014). Examining workplace mindfulness and its relations to job performance and turnover intention. Human Relations, 67(1), 105–128.

DeCelles, K. A., Anteby, M. (2020). Compassion in the Clink: When and How Human Services Workers Overcome Barriers to Care. Organization Science, 31(6),1408-1431.

Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. The Journal of applied psychology, 86(3), 499–512.

De Rond, M., Holeman, I., & Howard-Grenville, J. (2019). Sensemaking from the Body: An Enactive Ethnography of Rowing the Amazon. Academy of Management, 62(6).

Dutton, J.E., & Dukerich, J.M. (2006). The Relational Foundation Of Research: An Underappreciated Dimension Of Interesting Research. Academy of Management Journal 49, 21–26.

Dutton, J.E. & Heaphy, E.D. (2003) The Power of High-Quality Connections. In: Cameron, K. and Dutton, J., Eds., Positive Organizational Scholarship: Foundations of a New Discipline, Berrett-Koehler Publishers, 262-278.

Dzau, V. J, Kirch, D. G., & Nasca, T. J. (2018). To care is human - collectively confronting the clinician-burnout crisis. *New England Journal of Medicine,* 378: 312-214.

Edmondson, A. (1999). Psychological Safety and Learning Behavior in Work Teams. Administrative Science Quarterly, 44(2), 350–383.

Edmondson, A. (2012). Teaming: How Organizations Learn, Innovate, and Compete in the Knowledge Economy. Jossey-Bass, 2012.

Emanuel, A. S., Updegraff, J. A., Kalmbach, D. A., & Ciesla, J. A. (2010). The role of mindfulness facets in affective forecasting. Personality and Individual Differences, 49(7), 815–818.

Emerson, R.M., Fretz, R.I, & Shaw, L.L. (1995). Writing Ethnographic Fieldnotes. Chicago: University of Chicago Press.

Emirbayer M, & Mische A. (1998). What is agency? The American Journal of Sociology. 103(4), 962-1023.

Feldman, M. S., & Pentland, B. T. (2003). Reconceptualizing Organizational Routines as a Source of Flexibility and Change. Administrative Science Quarterly, 48(1), 94–118.

Fiol, M. C. (2002). “Capitalizing on paradox: the role of language in transforming organizational identities.’ Organization Science, 13, 653-66.

Flynn, L., & Ironside, P. M. (2018). Burnout and its contributing factors among midlevel academic nurse leaders. *Journal of Nursing Education,* 57(1): 28-34

Fraher, A.L., Branicki, L.J., Grint, K. (2017). Mindfulness in Action: Discovering How U.S. Navy Seals Build Capacity for Mindfulness in High-Reliability Organizations (HROs). AMD, 3, 239–261.

Glaser, B. G., & Strauss, A. L. (1965). Awareness of dying. Chicago, IL: Aldine Publishing.

Goldenhar, L.M., Brady, P.W., Sutcliffe, K.M., Muething, S.E. (2013). Huddling for high reliability and situation awareness. BMJ Quality & Safety 22, 899–906.

Good, D. J., Lyddy, C. J., Glomb, T. M., Bono, J. E., Brown, K. W., Duffy, M. K., Baer, R. A., Brewer, J. A., & Lazar, S. W. (2016). Contemplating Mindfulness at Work: An Integrative Review. Journal of Management, 42(1), 114–142.

Goodman, M.S., Sanders Thompson, V.L. (2017). The science of stakeholder engagement in research: classification, implementation, and evaluation. Translational Behavioral Medicine, 7, 486–491.

Goodman, N. (1978). Ways of Worldmaking. Indianapolis, IN: Hackett Publishing Company.

Grover, S. L., Teo, S. T. T., Pick, D., & Roche, M. (2017). Mindfulness as a personal resource to reduce work stress in the job demands-resources model. Stress and Health, 33(4), 426–436.

Hamilton, A.B., Brunner, J., Cain, C., Chuang, E., Luger, T.M., Canelo, I., Rubenstein, L., Yano, E.M. (2017). Engaging multilevel stakeholders in an implementation trial of evidence-based quality improvement in VA women's health primary care. Translational Behavioral Medicine, 7, 478–485.

Harrison, M. A., & Stephens, K. K. (2019). Shifting From Wellness at Work to Wellness in Work: Interrogating the Link Between Stress and Organization While Theorizing a Move Toward Wellness-in-Practice. Management Communication Quarterly, 33(4), 616–649.

Heaphy, E. D. (2017). "Dancing on hot coals": How emotion work facilitates collective sensemaking. Academy of Management Journal, 60(2), 642–670.

Hikida, M. (2018). Holding Space for Literate Identity Co-Construction. Journal of Literacy Research, 50(2), 217–238.

Howard-Grenville, J.A. (2005). The Persistence of Flexible Organizational Routines: The Role of Agency and Organizational Context. Organization Science 16(6), 618-636.

Hülsheger, U. R., Alberts, H. J., Feinholdt, A., & Lang, J. W. (2013). Benefits of mindfulness at work: the role of mindfulness in emotion regulation, emotional exhaustion, and job satisfaction. The Journal of applied psychology, 98(2), 310–325.

Hyman, S. (2012). The School as a Holding Environment, Journal of Infant, Child, and Adolescent Psychotherapy, 11(3), 205-216.

Joint Commission. (2011). Sound the alarm: Managing physiologic monitoring systems [White paper]. Retrieved December 13, 2018 from the Joint Commission: https://www.jointcommission.org/assets/1/6/Perspectives_Alarm.pdf.

Jones, M. L., Cifu, D. X., Backus, D., & Sisto, S. A. 2013. Instilling a research culture in an applied clinical setting. ***Arch Physical Medicine Rehabilitation**,* 94(1 Supp): S49-54.

Justice, L., Brems, C., & Ehlers, K. (2018). Bridging Body and Mind: Considerations for Trauma-Informed Yoga. International journal of yoga therapy, 28(1), 39–50.

Kahn, W. A. (1990). Psychological Conditions of Personal Engagement and Disengagement at Work. Academy of Management Journal, 33(4), 692–724.

Kahn, W. A. (2001). Holding Environments at Work. The Journal of applied behavioral science, 37(3), 260–279.

Kanter, R.M. (1993). Men and women of the corporation (2nd ed.). New York: Basic Books.

Kaplan, S., & Orlikowski, W. J. (2013). Temporal work in strategy making. Organization Science, 24, 965–995.

Kellogg, K. (2009). Operating room: Relational spaces and microinstitutional change in surgery. American Journal of Sociology, 115(3), 657–711.

Langer, E. J. (1989). Mindfulness. Addison-Wesley/Addison Wesley Longman.

Lareau, A. (2021). *Listening to People*. The University of Chicago Press.

Leblebici, H., Salancik, G. R., Copay, A., & King, T. (1991). Institutional change and the transformation of interorganizational fields: An organizational history of the U.S. radio broadcasting industry. Administrative Science Quarterly, 36, 333-36.

Lee, M. Y., Mazmanian, M., & Perlow, L. (2020). Fostering positive relational dynamics: The power of spaces and interaction scripts. Academy of Management Journal, 63(1), 96–123.

Leppin, A. L., Mahoney, J. E., Stevens, K. R., Bartels, S. J., Baldwin, L. M., Dolor, R. J., Proctor, E. K., Scholl, L., Moore, J. B., Baumann, A. A., Rohweder, C. L., Luby, J., & Meissner, P. (2019). Situating dissemination and implementation sciences within and across the translational research spectrum. Journal of clinical and translational science, 4(3), 152–158.

Levinthal, D., & Rerup, C. (2006). Crossing an apparent chasm: Bridging mindful and less-mindful perspectives on organizational learning. Organization Science, 17(4), 502–513.

Levitt, B., & March, J. G. (1988). Organizational Learning. Annual Review of Sociology, 14(1), 319–338.

Maitlis, S. (2009). Who am I now? Sensemaking and identity in posttraumatic growth. Exploring Positive Identities and Organizations: Building A Theoretical and Research Foundation, 47-76.

Maitlis, S., & Christianson, M. (2014). Sensemaking in organizations: Taking stock and moving forward. The Academy of Management Annals, 8(1), 57–125.

Maitlis, S., & Sonenshein, S. (2010). Sensemaking in Crisis and Change: Inspiration and Insights from Weick (1988). Journal of Management Studies, 47(3), 551–580.

Malinowski, P., & Lim, H. J. (2015). Mindfulness at work: Positive affect, hope, and optimism mediate the relationship between dispositional mindfulness, work engagement, and well-being. Mindfulness, 6(6), 1250–1262.

Manetti, G., & Toccafondi, S. (2012). The Role of Stakeholders in Sustainability Reporting Assurance: JBE. Journal of Business Ethics, 107(3), 363-377.

March, J. & Olsen, J. (1975). The Uncertainty of the Past: Organizational Learning under Ambiguity. European Journal of Political Research, 3(2), 147-171.

Maslach, C. (2006). Understanding job burnout. In *Stress and Quality of Working Life: Current Perspectives in Occupational Health,* Edited by: A. M. Rossi, P. Perrewé, & S. Sauter. 37-51. Information Age Publishing.

Maslach, C., & Leiter, M. P. (2016). Understanding the burnout experience: recent research and its implications for psychiatry. World psychiatry : official journal of the World Psychiatric Association (WPA), 15(2), 103–111.

Maynard, M.T., Gilson, L.L., Mathieu, J.E. (2012). Empowerment—Fad or Fab? A Multilevel Review of the Past Two Decades of Research. Journal of Management 38, 1231–1281.

McClure B. (2015). Yoga Therapy: Building a Holding Environment for Somatic and Psyche Change. International journal of yoga therapy, 25(1), 21–26.

McGaghie, W. C., Issenberg, S. B., Cohen, E. R., Barsuk, J. H., & Wayne, D. B. (2012). Translational educational research: a necessity for effective health-care improvement. Chest, 142(5), 1097–1103.

McMahan, P., & Evans, J. (2018). Ambiguity and Engagement. American Journal of Sociology, 124(3), 860–912.

McMurray, Robert (2022): Immersion, drowning, dispersion, and resurfacing: coping with the emotions of ethnographic management learning. Royal College of Surgeons in Ireland. Journal contribution.

Meissner P, Cottler LB, Eder MM, and Michener JL. (2020) Engagement science: The core of dissemination, implementation, and translational research science. Journal of Clinical and Translational Science 4: 216–218.

Mesmer-Magnus, J., Manapragada, A., Viswesvaran, C., & Allen, J. (2017). Trait mindfulness at work: A meta-analysis of the personal and professional correlates of trait mindfulness. Human Performance, 30, 79 - 98.

Metiu, A., & Rothbard, N. P. (2013). Task bubbles, artifacts, shared emotion, and mutual focus of attention: A comparative study of the microprocesses of group engagement. Organization Science, 24(2), 455–475.

Miles, M.B., Huberman, A.M. and Saldana, J. (2014) Qualitative Data Analysis: A Methods Sourcebook. Sage, London.

Mills, J., Bonner, A., & Francis, K. (2006). The development of constructivist grounded theory. International Journal of Qualitative Methods, 5(1).

National Academies of Sciences, Engineering, and Medicine. (2019). *Taking action against clinician burnout: a systems approach to professional well-being*. Washington, DC: The National Academies Press.

National Center for Advancing Translational Sciences (2021). Translational Science Resources. https://ncats.nih.gov/translation/translational-science-resources. Accessed 26 May 2021.

National Institutes of Health. (2007). Definitions under Subsection 1 (Research Objectives), Section I (Funding Opportunity Description), Part II (Full Text of Announcement), of RFA-RM-07-007: Institutional Clinical and Translational Science Award (U54). https://grants.nih.gov/grants/guide/rfa-files/rfa-rm-07-007.html. Accessed 26 May 2021.

Nelson, A. J, & Irwin, J. (2014). "Defining what we do - all over again": occupational identity, technological change, and the librarian/internet-search relationship. *Academy of Management Journal,* 57(3): 892–928.

Nickerson, R. S. (1998). Confirmation Bias: A Ubiquitous Phenomenon in Many Guises. Review of General Psychology, 2(2), 175–220.

O'Haire, C., McPheeters, M., Nakamoto, E., LaBrant, L., Most, C., Lee, K., Graham, E., Cottrell, E., & Guise, J. M. (2011). Engaging Stakeholders to Identify and Prioritize Future Research Needs. Agency for Healthcare Research and Quality (US).

Orlikowski, W. J., & Scott, S. V. (2008). Sociomateriality: Challenging the separation of technology, work, and organization. Academy of Management Annals, 2(1), 433– 474.

Patriotta, G. (2016). Cities of Noise: Sensemaking, Sensemakers, and Organized Worlds Academy of Management Review, 41(3), 557–570.

Perrow, C. (1984) Normal Accidents: Living with High-Risk Technologies. Basic Books, New York.

Perrow, C. (1994). The limits of safety: The enhancement of a theory of accidents. Journal of Contingencies and Crisis Management, 2, 212–220.

Petriglieri, G., Ashford, S. J., & Wrzesniewski, A. (2019). Agony and ecstasy in the Gig economy: Cultivating holding environments for precarious and personalized work identities. Administrative Science Quarterly, 64(1), 124–170.

Petriglieri, G., & Petriglieri, J. L. (2010). Identity Workspaces: The Case of Business Schools. Academy of Management Learning & Education, 9(1), 44–60.

Philips. (2013). Just a nuisance [White paper]? Retrieved December 13, 2018, from Philips Healthcare: https://www.usa.philips.com/healthcare/articles/alarm-system-management.

Polletta, F. (1999). "Free spaces" in collective action. Theory and Society, 28, 1–38.

Powell, B.J., Waltz, T.J., Chinman, M.J. et al. (2015). A refined compilation of implementation strategies: results from the Expert Recommendations for Implementing Change (ERIC) project. Implementation Sci 10, 21.

Pratt, M. G., Rockmann, K. W., & Kaufmann, J. B. (2006). Constructing professional identity: the role of work and identity learning cycles. *Academy of Management Journal,* 49(2): 235-262.

Rao, H., Monin, P., & Durand, R. (2003). Institutional change in Toque Ville: nouvelle cuisine as an identity movement in French gastronomy. *American Journal of Sociology,* 108: 795–843.

Rassolian, M., Peterson, L. E., Fang, B., Knight, H. C., Jr, Peabody, M. R., Baxley, E. G., & Mainous, A. G., 3rd (2017). Workplace Factors Associated With Burnout of Family Physicians. JAMA internal medicine, 177(7), 1036–1038.

Ray, J. L., Baker, L. T., & Plowman, D. A. (2011). Organizational mindfulness in business schools. Academy of Management Learning and Education, 10, 188–203.

Reay, T., Golden-Biddle, K, & Germann, K. (2006). Legitimizing a new role: small wins and microprocesses of change. *Academy of Management Journal,* 49: 977-998.

Reay, T., Goodrick, E., Boch Waldorff, S., & Casebeer, A. (2016). Getting leopards to change their spots: co-creating a new professional role identity. *Academy of Management Journal,* 60(3): 1043-1070.

Reina, C. S., Kreiner, G. E., Rheinhardt, A., & Mihelcic, C. A. (2023). Your Presence Is Requested: Mindfulness Infusion in Workplace Interactions and Relationships. Organization Science, 34(2), 722–753.

Rerup, C. (2009). Attentional triangulation: Learning from unexpected rare crises. Organization Science, 20(5), 876–893.

Rieger, K. L. (2019). Discriminating among grounded theory approaches. Nursing Inquiry, 26(1), e12261.

Roberts, K. H. (1990). Managing High Reliability Organizations. California Management Review, 32(4), 101–113.

Rubio, D.M., Schoenbaum, E.E., Lee, L.S., Schteingart, D.E., Marantz, P.R., Anderson, K. E., Platt, L.D., Baez, A., & Esposito, K. (2010). Defining translational research: implications for training. *Academy Medicine*, 85(3): 470-475.

Rudolph, J. W., Morrison, J. B., & Carroll, J. S. (2009). The dynamics of action-oriented problem solving: Linking interpretation and choice. Academy of Management Review, 34, 733–756.

Samra, R. (2018). Empathy and burnout in medicine - acknowledging risks and opportunities. *Journal of General Internal Medicine*, 33(7): 991-993.

Sandberg, J., & Tsoukas, H. (2020). Sensemaking Reconsidered: Towards a broader understanding through phenomenology. Organization Theory, 1(1), 263178771987993.

Schabram, K., & Heng, Y.T. (2021). How Other- and Self-Compassion Reduce Burnout through Resource Replenishment. Academy of Management Journal.

Schaufeli, W. B., & Bakker, A. B. (2003). The Utrecht Work Engagement Scale (UWES): Testmanual. Utrecht, The Netherlands: Department of Social and Organizational Psychology.

Schein, E. H. (2013). Humble inquiry: the gentle art of asking instead of telling. San Francisco, Berrett-Koehler Publishers.

Schmittdiel, J. A., Grumbach, K., & Selby, J. V. (2010). System-based participatory research in health care: an approach for sustainable translational research and quality improvement. Annals of family medicine, 8(3), 256–259.

Shapiro, D. E., Duquette, C., Abbott, L. M., Babineau, T., Pearl, A., & Haidet, P. (2019). Beyond Burnout: A Physician Wellness Hierarchy Designed to Prioritize Interventions at the Systems Level. The American journal of medicine, 132(5), 556–563.

Simon. (2000). Bounded Rationality in Social Science: Today and Tomorrow. Mind & Society., 1(1), 25–39.

Slochower J. (1996). Holding and the evolving maternal metaphor. Psychoanalytic review, 83(2), 195–218.

Spreitzer, G. M. (1995). Psychological Empowerment in the Workplace: Dimensions, Measurement, and Validation. Academy of Management Journal, 38(5), 1442–1465.

Spreitzer, Gretchen. (2007). Taking Stock: A review of more than twenty years of research on empowerment at work. The Handbook of Organizational Behavior.

Starbuck, W.H., & Milliken, F.J. (1988). Challenger: Fine-Tuning the Odds Until Something Breaks. Journal of Management Studies, 25(4), 319-340.

Stigliani, I., & Ravasi, D. (2012). Organizing Thoughts and Connecting Brains: Material Practices and the Transition from Individual to Group-Level Prospective Sensemaking. Academy of Management Journal, 55(5), 1232–1259.

Strauss, A., & Corbin, J. (1998). Basics of qualitative research: Techniques and procedures for developing grounded theory (2nd ed.). Sage Publications, Inc.

Substance Abuse and Mental Health Services Administration (SAMHSA). (2014). SAMHSA's Concept of Trauma and Guidance for a Trauma-Informed Approach. HHS Publication No. (SMA) 14-4884. Rockville, MD: Substance Abuse and Mental Health Services Administration,.

Sutcliffe, K.M. (2012 June). Organizing for Mindfulness. University of Michigan, Ross School of Business. https://gnssn.iaea.org/NSNI/SC/TMMtU/Presentations/Ms%20Sutcliffe's%20Presentation%202.pdf.

Sutcliffe, K. & Vogus, T. & Dane, E. (2016). Mindfulness in Organizations: A Cross-Level Review. Annual Review of Organizational Psychology and Organizational Behavior. 3.

Swendiman R.A., Edmondson, A.C., Mahmoud, N.N. (2019) Burnout in Surgery Viewed Through the Lens of Psychological Safety. Ann Surg., 269(2), 234-235.

Swetz, K. M., Harrington, S. E., Matsuyama, R. K., Shanafelt, T. D., & Lyckholm, L. J. (2009). Strategies for avoiding burnout in hospice and palliative medicine: peer advice for physicians on achieving longevity and fulfillment. *Journal of Palliative Medicine,* 12(9): 773-777.

Tandon, S.D. (2017, January 17). Engaging patients and stakeholders in dissemination and implementation research [Webinar]. In Prevention Science and Methodology Group Virtual Grand Rounds. Retrieved from http://www.cepim.northwestern.edu/psmg.

Teo, A. R. (2009). The development of clinical research training: past history and current trends in the United States. *Academic Medicine,* 84(4): 433-438.

Thinyane, M., Bhatb, K., Goldkind, L., & Cannanured, V.K. (2020). The messy complexities of democratic engagement and empowerment in participatory design – an illustrative case with a community-based organisation. CODESIGN, 16(1), 29–44.

Thomas, K. R., & McGinnis, J. D. (1991). The psychoanalytic theories of D. W. Winnicott as applied to rehabilitation. Journal of Rehabilitation, 57(3), 63-66.

Thomas, K. W., & Velthouse, B. A. (1990). Cognitive elements of empowerment: An "interpretive" model of intrinsic task motivation. The Academy of Management Review, 15(4), 666–681.

Thompson, J. D. (1967). Organizations in action: Social science bases of administrative theory. McGraw-Hill.

Thornicroft, G., Lempp, H., & Tansella, M. (2011). The place of implementation science in the translational medicine continuum. Psychological medicine, 41(10), 2015–2021.

Tims, M., Bakker, A. B., & Derks, D. (2013). The impact of job crafting on job demands, job resources, and well-being. *Journal of Occupational Health Psychology, 18*(2), 230–240.

Turner, R. (1990). Role change. *Annu. Rev. Sociol.,*16: 87-110.

Uzzi, B. (1996). The Sources and Consequences of Embeddedness for the Economic Performance of Organizations: The Network Effect. American Sociological Review, 61(4), 674-698.

Uzzi, B. (1997). Social structure and competition in interfirm networks: The paradox of embeddedness. Administrative Science Quarterly, 42(1), 35–67.

Vogus, T.J. and Sutcliffe, K.M. (2007) Organizational Resilience: Towards a Theory and Research Agenda. 2007 IEEE International Conference on Systems, Man and Cybernertics, Montreal, 7-10 October 2007, 3418-3422.

Vogus, T. J., & Sutcliffe, K. M. (2012). Organizational Mindfulness and Mindful Organizing: A Reconciliation and Path Forward. Academy of Management Learning & Education, 11(4), 722–735.

Voronov, M., & Weber, K. (2016). The heart of institutions: emotional competence and institutional actorhood. *Academy of Management Review,* 41(3): 456–478.

Watkins, E. R.(2008). Constructive and unconstructive repetitive thought. Psychological Bulletin, 134,163-206.

Weick, K. E. (1993). The collapse of sensemaking in organizations: the Mann Gulch disaster. Administrative Science Quarterly, 38, 628-652.

Weick, K. E. (1995). Sensemaking in Organizations. Thousand Oaks, CA: Sage.

Weick, K. E. (2011). Organizing for Transient Reliability: The Production of Dynamic Non-Events. Journal of Contingencies and Crisis Management, 19(1), 21–27.

Weick, K. E., & Putnam, T. (2006). Organizing for mindfulness: Eastern wisdom and Western knowledge. Journal of Management Inquiry, 15(3), 275–287.

Weick, K. E., & Sutcliffe, K. M. (2001). Managing the unexpected: Assuring high performance in an age of complexity. Jossey-Bass.

Weick, K. E., & Sutcliffe, K. M. (2006). Mindfulness and the quality of organizational attention. Organization Science, 17(4), 514–524.

Weick, K. E., & Sutcliffe, K. M. (2015). Managing the Unexpected: sustained performance in a complex world. Hoboken, NJ: Wiley.

Weick, K.E. & Sutcliffe, K. & Obstfeld, D. (1999). Organizing for high reliability: Processes of collective mindfulness. Research in Organizational Behavior. 3. 81-123.

Weinstein, N., Brown, K. W., & Ryan, R. M. (2009). A multi-method examination of the effects of mindfulness on stress attribution, coping, and emotional well-being. Journal of Research in Personality, 43(3), 374–385.

Welch, L. C., Tomoaia-Cotisel, A., Noubary, F., Chang, H., Mendel, P., Parajulee, A., Fenwood-Hughes, M., Etchegaray, J. M., Qureshi, N., Chandler, R., & Selker, H. P. (2021). Evaluation of initial progress to implement Common Metrics across the NIH Clinical and Translational Science Awards (CTSA) Consortium. Journal of Clinical and Translational Science, 5(1), 1–12.

Whiteman, G. (2010). Management Studies That Break Your Heart. Journal of Management Inquiry, 19(4), 328–337.

Williams, T. A., Gruber, D. A., Sutcliffe, K. M., Shepherd, D. A., & Zhao, E. Y. (2017). Organizational Response to Adversity: Fusing Crisis Management and Resilience Research Streams. Academy of Management Annals, 11(2).

Willness, C.R., Boakye-Danquah, J., Nichols, D.R., 2023. How Arnstein's Ladder of Citizen Participation Can Enhance Community-Engaged Teaching and Learning. Academy of Management Learning & Education 22, 112–131.

Winnicott, D. W. (1960). The theory of the parent-infant relationship. In D. Winnicott, (1965). The maturational processes and the facilitating environment,(pp. 37-55). New York, NY: International Universities Press.

Winnicott, D. W. (1971). Playing and reality. Penguin.

Winnicott, D. W. (1975). Transitional objects and transitional phenomena. In Through paediatrics to psychoanalysis: 229–242. London, UK: Karnac. (Originally published 1953).

Woods, D. D. (1995). The alarm problem and directed attention in dynamic fault management, Ergonomics, 38(11), 2371-2393.

Wrzesniewski, A., & Dutton, J. E. (2001). Crafting a job: revisioning employees as active crafters of their work. *Academy of Management Review,* 26: 179-201.

Xanthopoulou, D., Bakker, A.B., Demerouti, E., et al. (2007) The Role of Personal Resources in the Job Demands-Resources Model. International Journal of Stress Management, 14, 121-141.

Yi, S., Knudsen, T. Becker, M.C. (2016). Inertia in Routines: A Hidden Source of Organizational Variation. Organization Science 27(3), 782-800.

Young, A. (2004). Experiences in Ethnographic Interviewing About Race: The inside and outside of it. 187-203 in Researching Race and Racism, edited by M. B. a. J. Solomos. London: Routledge.

Yu, L., Zellmer-Bruhn, M. (2018). Introducing Team Mindfulness and Considering its Safeguard Role Against Conflict Transformation and Social Undermining. Academy of Management Journal, 61, 324–347.

Zietsma, C., & Lawrence, T. B. (2010). Institutional Work in the Transformation of an Organizational Field: The Interplay of Boundary Work and Practice Work. Administrative Science Quarterly, 55(2), 189–221.

Zellmer-Bruhn, M.E. (2003). Interruptive Events and Team Knowledge Acquisition. Management Science, 49(4),514-528.

Zhang, X., & Bartol, K. M. (2010). Linking Empowering Leadership and Employee Creativity: The Influence of Psychological Empowerment, Intrinsic Motivation, and Creative Process Engagement. Academy of Management Journal, 53(1), 107–128.

Zilber, T. B. (2002). Institutionalization as an interplay between actions, meanings, and actors: the case of a rape crisis center in Israel. Academy of Management Journal, 45(1), 234–254.

APPENDIX A

Physical and organizational redesign

The treatment spaces were designed as open-floor plans where researchers were co-located alongside clinicians as they conducted clinical sessions. The goal with the co-location was to increase visibility of the two roles to one another. In other words, clinicians would have greater physical access to the researchers and researchers would be able to see what types of issues patients faced during treatment sessions. The hospital hoped that by increasing proximity to each other, clinicians and researchers would be more likely to interact and collaborate compared to when they were siloed in the previous building.

In its quest to foster a culture of translational medicine and interdisciplinary collaboration, Movement Hospital implemented a set of internal funding mechanisms to support clinicians engaging in research projects. Movement Hospital created a portfolio of grant opportunities, ranging from smaller projects (with the goal of funding a presentation or implementing a low-cost project) to larger projects (with the goal of publishing a manuscript or applying for federal grant funding). It also instituted three platforms for employees to share research ideas and receive feedback at various stages: Thinking Labs, Doing Labs, and Testing Labs. The first, Thinking Labs, was a bimonthly meeting where any hospital employee (clinician, researcher, or staff) could present an unpolished idea for feedback from their peers. The second, Doing Labs, was a similar concept, but employees presented more developed research projects. Finally, Testing Labs were invitation-only meetings where research teams presented projects in near-complete or completed stages for final review. The goal of these Labs was to create additional conversations around research and share what others across the organization were working on.

APPENDIX B

FIELDWORK AT MOVEMENT HOSPITAL

TIMELINE

1 **INITIAL MEETING**
I had an initial meeting at Movement Hospital with the Chief Officer of Research .
JANUARY 2019

2 **MEETING #2**
I met with the Chief Officer of Research and my future site coordinator about potential research.
FEBRUARY 2019

3 **MEETING #3**
My advisor, the Chief Officer of Research, my future site coordinator, and me met about potential research.
MARCH 2019

4 **APPROVAL**
Movement Hospital leadership approved my work at the hospital.
APRIL 2019

5 **STAFF ONBOARDING**
I onboarded and completed staff orientation.
MAY - JUNE 2019

6 **STAGE I**
I conducted preliminary (Stage I) observations and interviews; I assisted the team as needed with their research.
JUNE - SEPTEMBER 2019

7 **LETTER OF SUPPORT**
I received a letter of support from the hospital to begin my pilot study (Stage II) data collection.
JUNE 2020

8 **IRB APPROVAL**
I received IRB approval to begin Stage II data collection.
SEPTEMBER 2020

9 **STAGE II**
I conducted Stage II data collection.
SEPTEMBER - FEBRUARY 2020 - 2021

10 **IRB APPROVAL**
I received IRB approval to begin Stage III data collection.
DECEMBER 2021

11 **STAGE III**
I conducted Stage III data collection.
MAY - SEPTEMBER 2021 - 2022

APPENDIX C

Stage I: July - September 2019

The goal of the exploratory stage was to learn more about the routines and social norms of the hospital, as well as employee perspectives on the recent structural and organizational changes at Movement Hospital. The data collected here served as pilot data. To acclimate myself with the environment, I conducted 12 days of observations and 14 interviews across eight different floors from June – September 2019. I collected this exploratory data under the institutional support of Julia. I interviewed a postdoctoral student, a medical intern, five clinicians, two clinical (nurse) leaders, and five clinician-researchers (n=14).

During this exploratory stage I mindfully structured my movement across the hospital to attend to all these roles neutrally. From my interviews and observations, I interpreted that employees perceived a culture clash between researchers and clinicians, and that by sharing a working space with other roles (i.e., integration of clinicians and researchers), they assumed the other roles were too busy to interrupt. By integrating clinicians and researchers on each floor in an open-space, participants mentioned feeling a loss of peer support and ability to provide mentorship.

Stage II: September 2020 - February 2021

For Stage II, the goal was to refine my dissertation research question(s) and design by exploring the key themes that emerged during the Stage I exploratory study. At the start of Stage II, an IRB was submitted based on the following research aims:

> (RQ1) How are the physical, structural, and cultural factors under the new organizational model influencing the extent to which clinicians and nurses can collaborate with researchers?

(RQ2) How are clinicians and researchers making sense of the ambiguity surrounding the new structural and physical boundaries in order to collaborate?
(RQ3) What are the different expectations (cues) built into the new hospital design for nurses and how are they reacting to them?

During Stage II, I conducted 25 (primarily virtual) interviews from across different departments, roles, and levels of research interactions to better understand how clinicians and researchers communicated about research and clinical insights (interview protocol: see Appendix D). I interviewed two clinicians treating full-time (and did no research), two nurses (one who gave a second interview), three clinicians full-time in a research lab, three clinicians splitting time treating and in a research lab, three clinician managers, three non-clinical researcher staff members, four postdoctoral students, and four research Principal Investigators.

Initial findings underscore issues clinicians face engaging in interdisciplinary research projects. Often, clinicians described being brought onto a project to help recruit patients, instead of co-creating a hypothesis with researchers. On the other hand, researchers felt that some clinicians didn’t know how to narrow their ideas or create a testable research question; researchers also didn’t feel equipped to help mentor or train clinicians in research practices. The interviews also pointed to potential barriers to knowledge sharing between the two roles. Participants described cultural, language, and goal-based friction between the two roles. In many instances, researchers tended to focus on basic science outcomes, while clinicians focused on clinical practice change outcomes. Finally, clinicians mentioned turning to research as an attempt to alleviate burnout.

APPENDIX D

Interview guide (Stage 2)

1. How would you describe your role and the structure of your team at Movement Hospital?
2. Can you explain what "collaboration" at Movement Hospital means to you?
3. Can you tell me about one of [what you consider] the best collaborative experiences you had at Movement Hospital?
4. Can you tell me about a collaborative experience you had at Movement Hospital that went differently than the previous example? (e.g., more difficult communication)
5. Can you give me an example of what you consider a successful conversation from the past few days?
6. Can you give me an example of what you consider an unsuccessful conversation from the past few days?
7. Can you tell me about a recent time you've helped someone at Movement Hospital (or who has helped you)? (This can be on a personal note, a project, etc.).
8. In your experience, what would make collaborations or communication easier or more likely to happen at Movement Hospital?

APPENDIX E

Interview guide (Stage 3 – A)

1. How would you describe your role at Movement Hospital?
2. Are you currently involved in research?
    a. If so, could you describe why you became involved in it?
    b. If not, could you explain why?
3. Can you describe the current research project(s) you are involved in and who you work with?
4. How has been your experience working on the research project? What is your role on the project?
    a. Does your role/do your tasks on the project meet your expectations of what you thought research would be like?
    b. What is your prior experience with research and how did that shape your expectations of what this project would be like?
5. How do you communicate with researchers during the meeting? Outside of the meetings?
6. How would you describe the communication with researchers – to what extent do you feel like you can express your ideas and communicate them clearly?
7. What would make the communication about your ideas to researchers easier?
8. How do you get ideas for research projects? To what extent do they come from your experience with patients?
9. How is your communication with patient different from researchers? In what ways (verbal, physical, etc.) do you communicate with patients vs. researchers?

APPENDIX F

Interview guide (Stage 3 – B)

Introduction

1. How would you describe your role at Movement Hospital?
2. What is most meaningful to you about your daily work?
3. How do you try to cultivate meaning in your work?
4. Do you feel that your experience as [role] matches your expectations of what you thought it would be like?
    1. Why or why not?
    2. How do you try to increase your satisfaction with your role experience?
5. How do you feel while you're at work? To what extent do you feel:
    1. Emotionally overextended or exhausted by work?
    2. Any disconnection from patients or work tasks?
    3. Competence or success in your work? Do you feel like you get recognized for this success?
    4. That you have control over your work?
    5. That you have adequate time or resources to complete your work?
    6. You have adequate team communication?

Burnout

6. Sometimes people describe their draining or disconnected experiences at work as burnout. Do you feel you have experienced burnout in your role?
    1. If yes, what does burnout look like for you? How would you describe burnout?
    2. How did you reduce burnout? Was this successful?

Research

7. Have you or are you currently involved in research?
    1. If so, could you describe why you became involved in it?
    2. If not, could you explain why?
8. How has research engagement impacted your burnout?
    1. If more burned out, how/why?
    2. If less burned out, how/why?
    3. Was this change in burnout what you anticipated? Why or why not?