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Towards better understanding of workplace factors contributing to hospitalist burden and burnout prior to COVID-19 pandemic

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ABSTRACT

Background: Hospitalists are physicians trained in internal medicine and play a critical role in delivering care in in-patient settings. They work across and interact with a variety of sub-systems of the hospital, collaborate with various specialties, and spend their time exclusively in hospitals. Research shows that hospitalists report burnout rates above the national average for physicians and thus, it is important to understand the key factors contributing to hospitalists’ burnout and identify key priorities for improving hospitalists’ workplace.

Methods: Hospitalists at an academic medical center and a community hospital were recruited to complete a survey that included demographics, rating the extent to which socio-technical (S-T) factors contributed to burnout, and 22-item Maslach Burnout Inventory – Human Services Survey (MBI-HSS). Twelve contextual inquiries (CIs) involving shadowing hospitalists for ~60 h were conducted varied by shift type, length of tenure, age, sex, and location. Using data from the survey and CIs, an affinity diagram was developed and presented during focus groups to 12 hospitalists to validate the model and prioritize improvement efforts.

Results: The overall survey participation rate was 68%. 76% of hospitalists reported elevated levels on at least one sub-component within the MBI. During CIs, key breakdowns were reported in relationships, communication, coordination of care, work processes in electronic healthcare records (EHR), and physical space. Using data from CIs, an affinity diagram was developed. Hospitalists voted the following as key priorities for targeted improvement: improve relationships with other care team members, improve communication systems and prevent interruptions and disruptions, facilitate coordination of care, improve workflows in EHR, and improve physical space.

Conclusions: This mixed-method study utilizes participatory and data-driven approaches to provide evidence-based prioritization of key factors contributing to hospitalists’ burnout. Healthcare systems may utilize this approach to identify workplace factors contributing to provider burnout and consider targeting the factors identified by providers to best optimize scarce resources.

1. Introduction

With an ever-increasingly complex and interdependent healthcare system and corollary organizational and financial stressors, physicians and other healthcare staff are charged with providing more patient care with fewer supporting staff resources. The highly interconnected, interdisciplinary nature of modern healthcare represents an environment vulnerable to breakdowns in communication and hand-offs, challenges in the continuity of care, and frustrations stemming from competing or misaligned goals. Taking all of this into account, it comes as no surprise that healthcare provider burnout has reached and sustained extraordinarily high levels over the last decade (Shanafelt et al., 2012, 2015, 2019). These studies suggest that most specialties have experienced extremely high levels of physician burnout. This trend is exacerbated in the general medicine areas representing the entry points into the healthcare system, including emergency, hospitalist, primary care, internal medicine, etc. Studies have shown that these levels of burnout can exceed 50% (Shanafelt et al., 2019). Specifically, the prevalence of burnout among hospitalists has shown similarly elevated levels of burnout, with 52.3% reporting burnout (Roberts et al., 2014).
With the additional stress that the COVID-19 pandemic has placed on the healthcare system overall, and the hospitalist and general medicine practitioners specifically, the conditions contributing to burnout have grown (Bradley and Chahar, 2020; Shanafelt, Ripp and Trockel, 2020).

In recent years, to mitigate the risks inherent in such a large portion of the profession experiencing such high levels of burnout, the trend has been to turn attention and resources to understanding the contributing factors to burnout and identifying ways to enhance physician wellness (Casalino and Crosseon, 2013; Shanafelt and Noseworthy, 2017; Shannon, 2013; Trockel et al., 2018). The rationale is that the factors contributing to burnout can be removed or reduced, while factors contributing to physician wellness can be built upon and reinforced which would benefit the healthcare industry as a whole and all the key stakeholders. The predictors of provider burnout have been the subject of recent systematic reviews (National Academies of Sciences, Engineering, and Medicine; National Academy of Medicine; Committee on Systems Approaches to Improve Patient Care by Supporting Clinician Well-Being, 2019; Tsawlik et al., 2018; West et al., 2016). Many studies tend to look at the individual characteristics that lead to burnout, that is attributes of the person (e.g., demographics such as age, experience, marital status, gender, personality factors, resilience, etc.). Also frequently studied are the job characteristics, and job attributes that contribute to burnout (e.g., excessive workload, autonomy, amount of time on-service, etc.). The present research builds on this research and incorporates the principles of systems analysis, recognizes the complexity and interdependence of several inter-related systems operating in concert or opposition within the healthcare system (Carayon and Perry, 2020; Carayon et al., 2014; Carayon et al., 2019) in understanding the full context in which hospitalists deliver care. Within this multi-level context, unaligned systems lead to breakdowns in social and technical factors in the workplace and contribute to provider burden and burnout. By focusing on the systems, workplace processes and breakdowns are the focus as opposed to the individual provider’s potential maladaptive response to a given environment circumstance.

This work draws on a Socio-Technical (S-T) framework (National Academies of Sciences, Engineering, and Medicine; National Academy of Medicine; Committee on Systems Approaches to Improve Patient Care by Supporting Clinician Well-Being, 2019; Woolridge et al., 2020), where workplace issues fall into an array of S-T factors (i.e., work-systems interpersonal, culture, technology, physical space, etc.) that impact as either barriers or facilitators of the providers’ work-experience and burnout. Hospitalists provide a critical role in care delivery within the healthcare system (O’Leary et al., 2006; Wachter, 2011). Hospitalists work across and interact with a variety of sub-systems of the hospital, collaborate with various specialties, and spend their time exclusively in hospitals. Therefore, they are an ideal provider group to understand the breakdowns within the system that contribute to frustration and burnout among physicians. Research has also shown that hospitalists (Masters et al., 2018; Roberts et al., 2014), specifically, and general internal medicine providers in general (Shanafelt et al., 2012, 2015, 2019) report high rates (i.e., approximately 50%) and above the national average for at least one manifestation of burnout. The variability and complexity of the hospitalists’ care setting, as well as the role they have in delivering frontline hospital care, made even more so with the onset of COVID-19 (Austin and Kachalia, 2020; Fitzsimons, 2020; Restauri and Sheridan, 2020), has heightened necessity to understand contributors to and mitigating factors of burnout.

The selection of S-T factors data presented in this study is based on the Contextual Inquiry (CI) methodology (Holzblatt and Beyer, 2016). CI is based on the importance of understanding the specific context under which behavior occurs, in this case, hospitalist care-delivery. CI is a user-centered research method. It involves observing users in their real-world settings as they go about their everyday tasks. This helps in identifying breakdowns in the system from the specific user’s perspective and the factors that impact their work burden. Historically, this methodology has been used in technology design but has since found use in various other domains (Bleichner et al., 2003; Curtis et al., 1999; Khoo and Ribes, 2005; McDonald et al., 2006). Within healthcare, CI has primarily been employed to design and maximize the usability of technological solutions such as EHRs (Segall et al., 2011), medical devices (Privitera and Culverhouse, 2019; Shah and Robinson, 2006), and other technology solutions such as Smart Bed Stations (Yoo et al., 2015).

However, the present research represents the first time CI has been used to identify, understand, and assess S-T factors contributing to provider burnout in healthcare settings. This methodology goes beyond user interviews, potentially influenced by the user’s own biases. In CI, the observational data collected reveals breakdowns that may not be apparent, sometimes even to the users themselves, an effective strategy, especially in a highly complex system, as is healthcare. Explicit in CI work is that understanding the context in which work occurs is critical in identifying what and why specific attributes are contributing to breakdowns and frustrations (Coles et al., 2017).

The objectives of this mixed-methods study were threefold: i) to assess and understand the extent of burnout in the hospitalist population, ii) to associate the S-T factors that contribute most to hospitalist burnout, and iii) to incorporate the ‘voice’ of the hospitalists in the prioritization of S-T factors for selection for targeted improvement activities. To the extent that we can efficiently identify high-impact S-T factors for improvement, there is a potential to effectively mitigate burden and alleviate burnout.

2. Method

This research was conducted as an innovative quality improvement program under the direction and support of the System-wide Well-Being Program – an integrated network of programs focused on improving and supporting the emotional health and wellness of all healthcare staff at a large healthcare system. The project was reviewed and approved by the internal review board (IRB). Rigorous attention was paid to ensure the confidentiality of the participants given the potential sensitivity of the findings. All data were de-identified to protect the identity of the participants and results are only reported in aggregate.

The criteria for the target population of this study were: i) the study group needed to be large, ii) the findings should be generalizable across all system-wide entities, and iii) there was an evidence-based record of burnout expressed by population members across time. Hospitalists are trained in internal medicine, treat a wide range of conditions, and work exclusively in inpatient settings. They are a large provider group existing within each entity across large healthcare systems. The hospitalist groups at two of the largest system inpatient entities were selected as the target population. Selecting two participating entities afforded an embedded replication within the design. However participating entities differed in structure and mission; one entity serves as a community-based hospital, the other an academic medical center also serving as the state’s safety-net healthcare option.

Having participants from across different entity types allows for a deeper understanding of the systemic factors and how the care setting contributes to the provider burden. For example, responsibilities within an academic medical center involve research and teaching, whereas, in a community hospital, responsibilities are primarily focused on patient treatment and care. These differences may lead to variations in factors being identified that contribute to the physician’s burden.

Research Design. A mixed-method methodology was employed (see Fig. 1), capturing both quantitative and qualitative data, to understand the multi-layered systems providers work within as they engage in clinical patient care within an inpatient hospital setting. The overarching goal was to understand the interconnected socio-technical environment represented by the inpatient care setting and identify the factors, macro, and micro, that contribute to provider burnout. These factors would subsequently be considered as candidates for targeted quality and/or process improvement activities. This program of research involved 3 broad data-collection and analysis phases comprising 1)

Fig. 1, capturing both quantitative and qualitative data, to understand the multi-layered systems providers work within as they engage in clinical patient care within an inpatient hospital setting. The overarching goal was to understand the interconnected socio-technical environment represented by the inpatient care setting and identify the factors, macro, and micro, that contribute to provider burnout. These factors would subsequently be considered as candidates for targeted quality and/or process improvement activities. This program of research involved 3 broad data-collection and analysis phases comprising 1)
workplace assessment survey administration and analysis, ii) CI-data-collection (field observation) and modeling activities, and iii) focus-group led validation, prioritization, and selection of factors to be addressed through system-wide improvements.

Survey data collection. The workplace assessment survey served to gather quantitative data about the target population. It consisted of questions relating to demographics (e.g., personal demographics including age, sex, marital and family status, etc.) and professional demographics (e.g., length of time since degree, length of time in the current setting, etc.). The survey also captured provider ratings on 25 items broadly based on the National Academy of Medicine’s system approach to provider burnout (National Academy of Medicine; Committee on Systems Approaches to Improve Patient Care by Supporting Clinician Well-Being, 2019) and included various evidence-based S-T workplace factors (e.g., interruptions and disruptions (e.g., frequent pages or interruptions for non-emergent issues (Witherspoon et al., 2019)), work-life integration (e.g., lack of time to exercise, and or engage in enjoyable activities outside of work (Olson et al., 2014)), patient-related factors (e.g., difficult interactions with patients and their families (An et al., 2013)), organizational culture, technology (e.g., efficiency and usability of EHR and other technologies (Melnick et al., 2020)) and communications and relationships within and outside groups). Participants were asked to rate the extent to which they felt the specific workplace factor contributed to burnout, with higher values representing stronger agreement that the factor did contribute to burnout (1 = strongly disagree and 7 = strongly agree). They were provided open-ended free-text responses to share any additional workplace factors that contributed to their burnout and were not covered in the survey.

Finally, burnout was assessed using the Maslach Burnout Inventory – Human Services Survey (MBI-HSS) considered the gold standard in measuring professional burnout (Maslach et al., 2001; Maslach et al., 1996; Rafferty et al., 1986). The MBI-HSS is comprised of a 22-item survey, with three distinct sub-scales of burnout: emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA). In this study, to understand the extent of hospitalist burnout we employed three dichotomous definitions of burnout (least, moderate, and highly restrictive): i) least restrictive (i.e., burnout is defined as experiencing high levels on at least one sub-component of MBI; EE ≥ 27, DP ≥ 10, PA ≤ 33), ii) moderately restrictive (i.e., burnout defined as experiencing high levels on 2 sub-components of MBI), and iii) most restrictive (i.e., burnout defined as experiencing all three manifestations of burnout: high on EE and DP, low on PA) (Rostenstein et al., 2018). To explore the association between burnout and the perception of socio-technical factors, we used an independent two-sample t-test (two-tailed) to identify factors differing significantly as a function of burnout level. The significance level was set at 0.05.

The quantitative data from the workplace assessment of S-T and professional factors provided insight into the major factors contributing to hospitalists’ burnout. During the CIs, researchers, in addition to collecting information on general areas of focus (see supplementary materials pages 2–6), also paid special attention to the survey identified workplace factors. The goal of CIs was to collect more detailed contextual information about the key workplace factors contributing to provider burnout. For example, we focused our attention on the frequent pages and interruptions for non-emergent issues. The qualitative data from CIs, modeling, and focus group validation and prioritization were integrated to identify S-T factors to be prioritized for improvement.

Thus, the final recommendations for targeted efforts to improve hospitalists’ workplace were based on integrating the quantitative data from surveys and qualitative data from CIs and focus groups.

Contextual Inquiry data-collection. During the CI phase (see Fig. 2), members of the research team shadowed the hospitalists, both MDs and mid-level providers, in their work setting (i.e., the hospital), as they engaged in clinical care for patients. Twelve hospitalists were selected by the provider-group leadership and spanned a range of several professional and demographic characteristics including shift-type (e.g., full rounding, admitting, night, etc.), length of tenure (early, mid, and late-career), license/degree (MD, NP, PA), age, sex, location (Academic medical center, Community Hospital), etc. All the CI observations followed a consistent and standard procedure. A complete guide to the CI process is available as supplementary material. Before shadowing, participants were briefed on what to expect. During these 4–6-h shadowing sessions, they were encouraged to engage in a think-aloud protocol wherein they verbally articulated what they were doing and how they felt about the task. While shadowing, researchers recorded observations with simple notetaking, focusing on sequences (e.g., in what order was the participant performing tasks? Were there interruptions? Were they doing more than one thing at a time?), tools (e.g., what kind of electronic and non-electronic tools was the participant using to perform their work), mental models (e.g., how does the participant think about their work? What expectations do they have?), and interactions (e.g., how do hospitalists interact with other members of the care team and breakdowns and frustrations). The breakdowns and frustrations were those activities identified by participants as contributing to their burnout or resulting in frustration due to a breakdown in the workflow. For example, if the participant found a specific module or functionality within electronic health records (EHR) extremely frustrating, the researcher requested the participant to provide a running description of how the EHR interface caused burnout or frustration or breakdown of the workflow, how they tried to reach out to colleagues and other resources to overcome the problem related to workflow and how those results in delayed care to the patient. We also recorded positive actions and feelings. Thus, the researchers’ goal was to observe the behavior quietly and unobtrusively, capturing both negative and positive “events” in real-time, rather than relying on recollections and beliefs, potentially subject to gaps and biases in the recall. However, if the action (and reaction) was unclear or incomplete, the researcher would gently probe for clarification, to ensure that the meaning was precise and accurately represented in the observations. Observations were annotated with details surrounding the “event,” in an attempt to capture the setting, as well as the words, language, and quotes to illustrate the context of the “event” (Holtzblatt and Beyer, 2016)).

At the end of shadowing, researchers asked participants follow-up
questions to confirm if the breakdowns and frustrations were captured accurately, and fine-tuned their interpretations to collect reliable data (Holtzblatt and Beyer, 2016). The questions were meant to understand if there were any gaps in the process, understand parts of the process that were unclear to the researcher and if there were any instances where the researcher had a question but did not ask because it would adversely interrupt the participants, such questions are asked at the end. Researchers have an average experience of ~10 years in conducting CI in healthcare settings and teaching CI methodology to graduate students.

**Modelling the provider experience.** After shadowing sessions, the process moved into individual and consolidated modeling during interpretation sessions. During interpretation sessions, the research team reviewed each provider-shadowing experience and created a variety of models conveying different detailed aspects of the providers’ work experience. The modeling process is iterative in that a model is generated based on each shadowing experience, and then these individual models are consolidated into a model that represents the aggregated provider experiences. Two model types were selected as the primary models, the Roles & Relationship model (R&R) and the Affinity Model, as they capture the nature of the broad range of S-T factors within the work-setting (e.g., roles, relationships, responsibilities) and the breakdowns and frustrations in interpersonal, culture, work-systems, technology, and setting factors.

The R&R model represented the work universe of the provider as the central figure, surrounded by the roles and services with which the provider regularly interacts, including the nature of the relationship. These ‘roles’ can have a positive influence on the provider’s productivity when the nature of the relationship/collaboration is positive, or negative if there are conflicts and issues in the relationship/collaboration. This model also presented the responsibilities of the provider and the other roles/services from the perspective of the provider (e.g., the unit pharmacist has many responsibilities, however, the model presented those responsibilities where the pharmacist and provider interact). The R&R modeled the larger picture of the environment the provider has to navigate as they deliver care. It also identified key areas of breakdowns from the perspective of roles, responsibilities, and relationships. R&R models were not the primary focus of this study and were a key interim step essential to understanding and contextualizing the breakdowns within the various areas and aspects of the provider’s work environment.

The Affinity Model is a representation of the breakdowns/frustrations observed during shadowing sessions, organized into categories, and conveys the inter-relatedness of these categories. Creating the Affinity Model involves taking the breakdown observations as data points, and organizing them into organically determined meaningful categorizations, using an iterative process where researchers group breakdowns into natural sub- and super-ordinate categories based on their perceived similarity. By grouping like items into thematic categories, and grouping categories with related (at times overlapping) features along dimensions, an overarching structure emerges which conveys how the breakdowns inter-relate. The Affinity Model also conveys how actions are taken to improve factors in one category that may contribute to improvements in related categories. We used the methodology described by Holtzblatt & Beyer to build the Affinity Model (Holtzblatt and Beyer, 2016). The detailed procedure used for developing the Affinity Model is available as supplementary material.

**Validation and Prioritization.** The Affinity Model was presented during focus groups held at each of the locations with the participating providers. Although the focus groups represent a deviation from the traditional CI methodology use of the wall-walk, they provided a practical and efficient way to gather similar information regarding the complex, multi-layered system context experienced by hospitalists. The focus groups were conducted to serve two specific purposes:

1) **Validation:** Researchers shared the models with the participating providers to obtain their feedback (i.e., validate the contributing factors, make changes to the description of the contributing factors, and include any missing factors). Providers were split into teams, paired with a member of the research team, and had small group discussions regarding the models. These models were displayed on the wall and providers were given sticky notes to suggest the changes to the model. One researcher moderated the validation session, one researcher answered questions that participants had about the models and another researcher took notes.

2) **Prioritization:** In this phase, the goal was to gather providers’ priorities through an iterative voting process. Providers were given the Affinity Model printed on A3-size paper (i.e., their “ballot”). During four rounds of voting, they were to mark the 3 issues/factors they believed had the biggest impact on provider burden and should, therefore, be candidates for targeted improvement activities. They were instructed to mark the 3 factors considered the highest priority, followed by 3 more iterations of issue selection. Each provider cast their own “ballots” working alone. Afterward, the research team facilitated a group discussion with all provider participants to gather further insights as to which factors captured their priority and urgency. Based on the iterative “votes” gathered during the focus-group prioritization task, a prioritization score was calculated, allowing breakdowns (i.e., candidate factors for improvement efforts) to be ranked according to hospitalists’ aggregated priorities. This prioritization score was calculated by assigning points to each

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**Fig. 2.** The contextual inquiry process: Comparison of classic and modified process.
vote received, in descending value per vote-iteration (i.e., each vote received 4 points per the number of times selected during the first round representing the highest priority, 3 points for selection during the second round, etc.; factors that were not selected did not receive any points). This allowed for variability in scoring issue selection, with higher priority factors receiving higher scores. Analysis of the prioritization results shows the selection of the workplace breakdowns that hospitalists intentionally (consciously) identified as being of the highest priority in targeted improvement efforts. The outcome of this activity provides leadership/administration quantifiable data regarding the factors most critical from the provider’s perspective to be considered when determining improvement project selection and action-planning.

After these three phases, the final results were shared, including both quantitative (e.g., survey) and qualitative (e.g., observations, models, prioritizations) with the entire provider group. Based on these results, improvement interventions/efforts to effectively mitigate burden and alleviate burnout were identified.

3. Results

3.1. Survey results

Demographics: Of the 85 eligible hospitalists, 58 responded to the survey with a response rate of 68%. Overall, 34 participants (59%) identified as females and 24 (41%) as males. 26 (45%) participants were in the age group of 35–44 years, 16 (28%) in the age group of <35 years, 12 (21%) in the age group of 45–54 years, and 4 (7%) in the age group of ≥55 years. 34 participants (59%) worked in the academic medical center and 24 (41%) in the community hospital. 25 (43%) participants worked as hospitalists for 0–4 years, 20 (35%) worked for 5–9 years, 9 (16%) worked for 10–14 years and 4 (5%) worked for >15 years (Table 1).

Table 1: Demographic characteristics of study participants.

| Demographics | N (%) |
|--------------|-------|
| Sex          |       |
| Male         | 24 (41%) |
| Female       | 34 (59%) |
| Age, in years|       |
| <35          | 16 (28%) |
| 35-44        | 26 (45%) |
| 45-54        | 12 (21%) |
| ≥55          | 4 (7%)   |
| Location     |       |
| Academic Medical Center | 34 (59%) |
| Community Hospital      | 24 (41%) |
| Number of years as hospitalist, in years |     |
| 0-4          | 25 (43%) |
| 5-9          | 20 (35%) |
| 10-14        | 9 (16%)  |
| >15          | 4 (5%)   |

Ratings of S-T Workplace Factors: First, the data for the ratings of S-T Workplace factors on a 7-point Likert agreement scale (i.e., a rating of 1 representing strong disagreement that the factor contributed to burnout and 7 representing strong agreement) were examined for the relative ranking of perceptions that these factors contributed to the providers’ sense of burden. S-T factors rated as contributing most to provider burnout include i) frequent pages and contributions to the providers to look at the relative ranking of perceptions that these factors

We used the moderately restrictive dichotomous definition to perform correlation analysis with sociotechnical workplace factors as it yielded an appropriate sample size within each group (N = 32 with low burnout vs. N = 26 with high burnout). There was a significant difference in 13 socio-technical factors ratings for the hospitalists with low and high burnout (p < 0.05) (see Table 3).

Table 3: Ratings of S-T Workplace Factors on a 7-point Likert Agreement Scale.

Qualitative modeling of breakdowns: The research team engaged in deep analysis and creation of models that organize and represent the observations recorded from the CIs. The primary result from these modeling exercises was the creation of an Affinity Model that represented the full range of breakdowns and frustrations observed as hospitalists navigated through their clinical shifts. The Affinity Model organized the CI data into a hierarchy of themes, sub-themes, and breakdowns. This model is read from top to bottom. The top labels of the Affinity Model, relationships, communication, documentation, interruptions, and physical space represented the key themes or general workplace categories. The subthemes or specific-issue categories in each main theme were represented at a level below the main theme. For example, respect and coordination of care were the sub-themes or specific-issue categories in the key theme “relationships”. The specific-issue categories were purposefully organized between the general-workplace categories to show that the boundaries between these categories are “fuzzy.” A specific breakdown may be related to two or more general categories (e.g., Technology breakdowns fall under both Documentation and Interruptions, as they are attributed to both; likewise, roles and responsibilities fall between communication and documentation as specific breakdowns can be attributed to both). Below the level of the specific issue categories, rich contextual information on the key frustrations reported by hospitalists were organized as breakdowns. These breakdowns range from macro factors (e.g., perceived lack of administrative support for professional development) to micro frustrations (e.g., lab results are displayed inconsistently depending on on-screen view in EHR). Observational data was categorized with similar observations into categories based on the “affinity” that factors may have with one another (e.g., a cramped office space observed in one session and distance of the physician’s office from exam rooms observed in another session are related to physical space; two different observations made about the frustrations with EHR, and printers are related to technology). In this way, an underlying structure and relationships
among the breakdowns emerged. The resulting Affinity Model became the core visualization of this complex network of frustrations/breakdowns and served as both a communication and a prioritization tool for gathering provider priorities (see Fig. 3) covered in the next section.

The R&R model provided insights to the research team regarding breakdowns in the relationship between hospitalists and members of the care team such as consultants/specialists, emergency department, and nursing. We included the R&R models that were built as supplementary material. We have also included examples of daily activities performed by hospitalists in each work stage as supplementary material. We have also included examples of daily activities performed by hospitalists in each work stage as supplementary material.

### Table 2

| Socio-Technical Factors | Overall (N = 58) | Academic Medical Center (N = 34) | Community Hospital (N = 24) | Difference in Means | T-test Sig. |
|-------------------------|-----------------|---------------------------------|----------------------------|---------------------|------------|
| Frequency of interruptions for non-emergent issues | 5.7 (1.44) | 5.5 (1.59) | 6.1 (1.15) | −0.60 | 0.141 |
| Time spent on tasks related to case management or tasks below my practice | 5.2 (1.67) | 5.0 (1.72) | 5.5 (1.56) | −0.50 | 0.230 |
| Time spent on tasks that are not reflective of working at the top of my license | 5.1 (1.55) | 5.2 (1.51) | 5.1 (1.62) | 0.10 | 0.758 |
| Admissions from the ED | 4.9 (1.71) | 5.0 (1.82) | 4.8 (1.57) | 0.20 | 0.706 |
| Time spent on electronic medical records and documentation | 4.9 (1.49) | 5.1 (1.41) | 4.6 (1.59) | 0.40 | 0.278 |
| Feeling under-appreciated | 4.8 (1.99) | 4.3 (1.97) | 5.4 (1.85) | −1.20 | 0.026 |
| Lack of respect from outside groups | 4.8 (1.84) | 4.2 (1.88) | 5.7 (1.36) | −1.60 | 0.001 |
| Difficult interactions with patients or their families | 4.8 (1.74) | 4.7 (1.91) | 5.0 (1.35) | −0.40 | 0.462 |
| Lack of voice regarding decisions that affect my group/practice | 4.7 (1.90) | 4.0 (1.87) | 5.5 (1.63) | −1.50 | 0.004 |
| Performing duties that should be completed by other personnel (i.e.: entering orders for consultants) | 4.6 (1.90) | 4.7 (1.82) | 4.5 (2.03) | 0.20 | 0.701 |
| Hospital leadership is responsive to my concerns and those of my colleagues | 4.6 (1.80) | 4.1 (1.75) | 5.3 (1.67) | −1.20 | 0.013 |
| Lack of collaborative patient care with outside groups | 4.6 (1.74) | 4.2 (1.84) | 5.2 (1.44) | −0.90 | 0.043 |
| Time spent in EHR on documentation or reading notes | 4.6 (1.71) | 5.0 (1.60) | 4.1 (1.77) | 0.90 | 0.056 |
| Lack of communication with outside groups surrounding patient care | 4.5 (1.73) | 4.4 (1.84) | 4.6 (1.59) | −0.30 | 0.578 |
| Conflicting responsibilities between work, home, and family | 4.4 (1.99) | 4.4 (1.85) | 4.4 (2.22) | 0.00 | 0.967 |
| Inability to reach outside departments in a timely manner | 4.0 (1.66) | 4.0 (1.78) | 4.0 (1.56) | −0.10 | 0.892 |
| Time spent in EHR on orders | 3.9 (1.58) | 3.8 (1.54) | 4.0 (1.67) | 0.20 | 0.665 |
| My group’s compensation plan | 3.8 (1.79) | 3.2 (1.61) | 4.6 (1.74) | −1.40 | 0.003 |
| Lack of time to exercise, to take care of oneself, and/or engage in enjoyable activities outside of work | 3.8 (1.75) | 3.8 (1.72) | 3.7 (1.82) | 0.10 | 0.774 |
| Scheduling conflicts/challenges | 3.7 (1.65) | 4.0 (1.71) | 3.2 (1.48) | 0.70 | 0.119 |
| Difficulty with staff/peers in other departments | 3.3 (1.87) | 3.4 (1.81) | 3.2 (1.98) | 0.20 | 0.635 |
| Worries about childcare | 3.1 (1.98) | 3.0 (1.74) | 3.3 (2.30) | −0.30 | 0.583 |
| The leadership of my division/department is responsive to my concerns and those of my colleagues | 3.0 (1.52) | 2.9 (1.57) | 3.1 (1.46) | 0.20 | 0.506 |
| Communication with colleagues in my group | 2.2 (1.30) | 2.1 (1.16) | 2.3 (1.54) | −0.20 | 0.544 |
| Difficulty with staff/peers in my department | 1.9 (1.34) | 2.0 (1.21) | 1.8 (1.53) | 0.20 | 0.577 |

a Scores were assigned on a 7-point Likert Scale ranging from 1 (strongly disagree) to 7 (strongly agree), with 4 being the score for a neutral response. 
b Except for two statements, all statements in the survey asked participants to rate their level of agreement as to whether a given stressor contributed to their burnout. The two exceptional statements were reverse scored.

3.2. Prioritization

The prioritization score results for the socio-technical factors selected for improvement efforts are presented separately for the academic medical center and the community hospital setting (see Table 4). The prioritized S-T factors are organized under general workplace categories, with the greatest number of high-priority factors generally described by roles and relationships, followed by communication systems, coordination of care, EHR work processes, and physical space. It is noteworthy that the roles and relationship factors were the highest priority for both the academic medical center and the community hospital (receiving 33 out of a possible 40 highest-priority votes). These factors describe work-culture breakdowns occurring in sub-optimally defined and/or executed work roles, and care-team and interdepartmental relationships. Although factors related to EHR work processes were selected, their perceived priority (received 6 out of 40 highest-priority votes) was below the relationship, role, communication, and coordination of care factors. Finally, given the inherent differences in work settings between Academic Medical Center and the Community Hospital, it was striking that the selection and ranking of factors were remarkably similar.

4. Discussion

In this study, the varied methodologies that were employed and the rich quantitative and qualitative data gathered (i.e., survey of S-T workplace factors, burnout, real-time observations, and focus-groups with iterative-voting identifying priorities), produced a remarkably vivid picture of the factors contributing to hospitalist burden and burnout. The survey data provided a high-level overview of the key S-T factors contributing most to provider burnout. After CIs, modeling, validation, and prioritization, the participants could identify key priorities for targeted improvement from many breakdowns presented in the affinity diagram. Thus, the varied data sources and methods (survey, CIs and validation, and prioritization) supported by the active involvement of participants provided a deeper understanding of the context in which the breakdowns were occurring. Thus, using multiple methods resulted in a deeper explanation of the underlying factors contributing to hospitalists’ burnout and also identifying priorities for targeted improvements. (Carayon et al., 2019; Holtzblatt and Beyer, 2016; Wooldridge et al., 2020; Wooldridge et al., 2019).

The results from the survey provided the ability to look at the quantitative association between perceptions of S-T workplace factors and levels of burnout. Our study findings highlight that there is a significant difference between hospitalists with low and high burnout for 13 socio-technical factors. These results offer insights to healthcare system leaders on socio-technical factors that contribute to high burnout in hospitalists and thus, improvements may be targeted to these socio-
Table 3
Association between socio-technical factors and levels of burnout.

| Socio-Technical Factors | Low Burnout (N=32) | High Burnout (N=28) | Difference in Means | p-value |
|-------------------------|--------------------|---------------------|---------------------|---------|
| Frequent pages or interruptions for non-emergent issues | 5.2 (1.57) | 6.3 (0.97) | 1.1 | 0.003 |
| Lack of time to exercise, take care of oneself, and/or engage in enjoyable activities outside of work | 3.2 (1.32) | 4.4 (2.01) | 1.2 | 0.008 |
| Difficult interactions with patients or their families | 4.2 (1.71) | 5.5 (1.59) | 1.3 | 0.008 |
| Time spent on tasks that are not reflective of working at the top of my license | 4.7 (1.52) | 5.7 (1.39) | 1.0 | 0.011 |
| Lack of voice regarding decisions that affect my group/practice | 4.0 (2.03) | 5.4 (1.51) | 1.3 | 0.014 |
| Hospital leadership is responsive to my concerns and those of my colleagues | 3.9 (1.86) | 2.7 (1.54) | −1.2 | 0.015 |
| Time spent in Epic on documentation or reading notes | 4.2 (1.63) | 5.2 (1.71) | 1.1 | 0.021 |
| Lack of respect from outside groups | 4.4 (1.83) | 5.5 (1.70) | 1.1 | 0.025 |
| Time spent on tasks related to case management or tasks below my practice | 4.8 (1.69) | 5.8 (1.52) | 1.0 | 0.027 |
| The leadership of my division/department is responsive to my concerns and those of my colleagues | 5.4 (1.32) | 4.5 (1.67) | −0.9 | 0.033 |
| Lack of collaborative patient care with outside groups | 4.2 (1.87) | 5.2 (1.44) | 1.0 | 0.036 |
| Admissions from the ED | 4.5 (1.72) | 5.4 (1.56) | 1.0 | 0.036 |
| Communication with colleagues in my group | 1.8 (1.11) | 2.6 (1.45) | 0.8 | 0.047 |
| Difficulty with staff/peers in other departments | 2.9 (1.66) | 3.8 (2.00) | 0.9 | 0.056 |
| Performing duties that should be completed by other personnel (i.e.: entering orders for consultants) | 4.1 (1.84) | 5.1 (1.87) | 0.9 | 0.063 |
| My group’s compensation plan | 3.5 (1.78) | 4.3 (1.73) | 0.8 | 0.085 |
| Feeling under-appreciated | 4.4 (2.19) | 5.2 (1.68) | 0.8 | 0.125 |
| Lack of communication with outside groups surrounding patient care | 4.2 (1.85) | 4.8 (1.57) | 0.7 | 0.158 |
| Difficulty with staff/peers in my department | 1.7 (1.08) | 2.2 (1.62) | 0.5 | 0.171 |
| Time spent on electronic medical records and documentation | 4.7 (1.42) | 5.1 (1.58) | 0.5 | 0.23 |
| Inability to reach outside departments in a timely manner | 3.8 (1.65) | 4.2 (1.75) | 0.3 | 0.452 |
| Scheduling conflicts/challenges | 3.6 (1.66) | 3.8 (1.65) | 0.2 | 0.554 |
| Worries about childcare | 3.3 (1.98) | 2.9 (2.00) | −0.3 | 0.563 |
| Time spent in Epic on orders | 3.8 (1.54) | 4.0 (1.65) | 0.3 | 0.568 |
| Conflicting responsibilities between work, home, and family | 4.3 (2.00) | 4.4 (2.00) | 0.1 | 0.883 |

* Scores were assigned on a 7-point Likert Scale ranging from 1 (strongly disagree) to 7 (strongly agree), with 4 being the score for a neutral response.

** Burnout Level classification of Low Burnout and High Burnout is based on the following definition of High Burnout: Scoring “High” on 2 or more symptoms of burnout as measured by the 22-item MBI (Rotenstein et al., 2018).

Technical factors. Our study results are consistent with prior studies that have identified S-T workplace factors such as lack of time to exercise (Olson et al., 2014), time spent on EHR documentation (Adler-Milstein et al., 2020; Rotenstein et al., 2018), time spent on tasks related to case management (Moy et al., 2021) and lack of collaborative patient care as determinants (Zubatsky et al., 2018) of provider burnout. Furthermore, some S-T workplace factors like frequent pages or interruptions for non-emergent issues (Witherspoon et al., 2019) and difficult interactions with patients or families (Goldsmeik and Krebs, 2017; Wolkenstein and Moffic, 2019) have been explored in previous studies but their association with burn out in hospitalists hasn’t been firmly established.

Contrary to expectations and recent literature (Alexander and Ballo, 2018; Fred and Scheid, 2018; Micek et al., 2020), work processes associated with EHRs were not highly prioritized. To understand this lower prioritization of EHR-related breakdowns, hospitalists expanded on this result during focus group post-prioritization discussion and follow-up interviews. Anecdotally, comments included the following sentiments: “we know there are problems with the EHR system, but if I were to make a list of my top-10 biggest frustrations, the EHR wouldn’t even make the list”, “I’m probably not the most efficient or proficient user – but I’ve figured out what I need to do and how”, and also “it’s a billing tool and here to stay, it’s never going to change”. Meanwhile, comments regarding relationships highlighted the importance hospitalists attributed to improving collaboration. Overall, the data suggest that hospitalists’ burnout is mostly related to cultural factors requiring long-term organizational interventions focused on building trust and collegiality (West et al., 2018).

Study results were shared with hospitalists and organizational leadership and high priority breakdowns were selected for action plan development and targeted improvement activities. Numerous improvement projects were implemented across affected areas, including technology hardware and software, EHR, inter-role and inter-departmental communication, and work-process flows.

### 4.1. Local prioritizations

In our reporting, we have at times focused on viewing the results taking into account the two locations, one being an academic medical center, the other a community hospital. Given the overwhelming similarities in the results in both the academic medical center and community hospital, we find it noteworthy that both hospitals had more in common than had been expected. Even the presentation of the prioritisations yielded a picture relatively more similar than different. However, given that this was the point in the process where issue-identification and selection for targeted improvement efforts, we felt it was important to maintain the local detail in priorities, lending credibility and leading to local ownership of these improvement efforts. For example, paging was a problem in both settings, however, the underlying problem was different: the academic medical center had old (telcom) infrastructure with network holes and breakdowns, whereas the community hospital needed better paging protocols identifying when emergent issues occurred and active collaborations with colleagues in other departments (i.e.: entering orders for consultants) have been explored in previous studies but their association with burn out in hospitalists hasn’t been firmly established.

Study results were shared with hospitalists and organizational leadership and high priority breakdowns were selected for action plan development and targeted improvement activities. Numerous improvement projects were implemented across affected areas, including technology hardware and software, EHR, inter-role and inter-departmental communication, and work-process flows.

### 4.2. Limitations

The present research was conducted as a quality improvement project, with rigorous attention to method and analysis. As a practical quality improvement project, the emphasis was on employing an

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innovative, and evidence-based method for identifying improvement projects that would have a high impact. Additionally, emphasis was on efficiently identifying top-priority concerns and developing action plans to address these concerns.

There are a number of ways, however, to enhance the methodological rigor while still achieving the main goals of this work. First, the providers we shadowed during our CI data collection were selected by the hospitalist leadership. We ensured that the selected participants were representative of the hospitalists group by covering a wide range of demographic and professional characteristics of the hospitalists (e.g., length of tenure, shift-type, license/degree, sex, race, age, etc.). Since this work was conducted under the auspices of quality improvement, the providers who participated in the CI gained “service” credit for participating, and this facilitated their participation and scheduling the CI. Randomly selecting participants may have been more scientifically rigorous, however pragmatic considerations allowed the project to proceed relatively quickly.

The survey instrument comprised of several items measuring a variety of S-T workplace and professional factors based on the NAM systems model for burnout (e.g., human resource issues, EHR adoption, workplace satisfaction issues), the MBI, and demographic factors. Given that the content was drawn from different measures, the psychometric properties of the survey were not as cohesive as would be our preference. Different sections of the survey asked for different judgment types making some internal comparisons more challenging. To address this, the results reported were based on computing a transformation of the data to standardize all S-T factors to the same scale, however, issues of scale variability contribute to error in our assessment. The survey was long, including some redundancies; thus, could be trimmed without losing relevant information, and allowing space for additional customized content.

4.3. Future directions of this research

Future research will expand this approach to studying the factors contributing to other specialist groups’ burden and burnout. In this way, we can understand how the stressors and breakdowns for provider groups differ, what might be the challenges specific to a given provider type, as well as understand commonalities among and across these groups. Thus, our goal would be to identify opportunities for improvements in care-team collaboration.

This approach was conceived as an innovative and evidence-based method for identifying the major stressors, providing a roadmap of priorities, and suggesting opportunities for quick-improvements. We hope to contribute further to designing this evidence-based contextual approach to individual and system-level interventions to improve provider burnout. We believe that this methodology, employing both CI (qualitative) and quantitative (survey) methods, provides the data to drive those interventions.

We are also building out more back-end tools and methods to facilitate the maintenance and sustenance of targeted improvement work. Anecdotally, as efforts to improve the hardware, software, connectivity, and paging issues that were a large source of burnout and interruptions led to improved and more integrated communication systems at one location, hospitalists shared that the frustrations and breakdown with the laboratory services became more concerning.

Finally, this work was performed with the hospitalist groups in the months prior to COVID-19. In the during/post-COVID environment, this group has been at the forefront of providing inpatient care to the sickest patients, at great physical risk and personal sacrifice. They have been at...
the forefront of developing real-time methods for treating and saving patients suffering from an unknown and rapidly changing care environment. They have also witnessed and experienced a great deal of suffering and loss. Our society/community owes a debt of gratitude to their effort and sacrifice, and to the extent that we can support and help them break through the barriers and frustrations that they are experiencing in delivering this critical care, they deserve our efforts.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.apergo.2022.103884.

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Table 4

Hospitlalists’ prioritizations of workplace issues for improvement by hospital setting.

| Socio-technical Factors | Socio-technical sub-factors | Priority Score | Avg Score |
|-------------------------|----------------------------|----------------|----------|
| **ACADEMIC MEDICAL CENTER** | Relationships with Specialists/Consults | 40 | 29.0 |
| | Emergency | 27 | |
| | Department | 27 | |
| | Performing tasks below license | 22 | |
| **Communication Systems** | Paging system - technology | 17 | 15.0 |
| | Paging system interruptions | 13 | |
| **Coordination of Care** | Laboratory services | 27 | 15.0 |
| | Other department delays | 15 | |
| | Case Management/ Social Work | 3 | |
| **Work Processes in EHR** | Order sets in EHR | 8 | 7.0 |
| | Medicine | 8 | |
| | Reconciliation | | |
| **Physical Space** | Notes in EHR | 5 | 7.0 |
| | Geographically dispersed | | |
| | Hardware/ Software | 3 | |
| | Observation Unit | 3 | |
| | Hospitalist Office | | |
| **Socio-technical Factors** | Socio-technical sub-factors | Priority Score | Avg Score |
| **COMMUNITY HOSPITAL** | Relationships with Specialists/Consults | 40 | 25.2 |
| | Emergency | 28 | |
| | Department | 23 | |
| | Performing tasks below license | | |
| | Performing others’ tasks | 20 | |
| | Relationship with administration | 15 | |
| **Communication Systems** | Paging system interruptions | 20 | 12.0 |
| | Clinical | 13 | |
| | Communication & Collaboration system | | |
| | Paging system - technology | 3 | |
| **Coordination of Care** | Transfers while rounding | 15 | 11.5 |
| | Case Management/ Social Work | 15 | |
| | Admissions while rounding | 8 | |
| | Other department delays | 8 | |
| **Work Processes in EHR** | Medicine | 15 | 9.3 |
| | Reconciliation | | |
| | Order sets in EHR | 8 | |
| | Notes in EHR | 5 | |
| **Physical Space** | Hardware/ Software | 8 | 8.0 |
