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Authors

Tai-Seale, Ming

Walker, Amanda

Cheng, Yuwei

et al.

Publication Date

2025

DOI

BRIEF REPORT

Learning health system research as a catalyst for promoting physician wellness: EHR InBasket Spring cleaning and team-based compassion practice

Ming Tai-Seale[1] | Amanda Walker[2] | Yuwei Cheng[3] | Nathan Yung[4] | Sophie Webb[5] | Ottar Lunde[4] | David Bazzo[2] | Ammar Mandvi[2] | Neal Doran[6] | Gene Kallenberg[2] | Christopher A. Longhurst[7] | Sidney Zisook[6] | Thomas J. Savides[4] | Marlene Millen[4] | Lin Liu[3]

[1]Family Medicine and Medicine, University of California San Diego, San Diego, California, USA

[2]Family Medicine, University of California San Diego, San Diego, California, USA

[3]HWSPHLS, University of California San Diego, San Diego, California, USA

[4]Medicine, University of California San Diego, San Diego, California, USA

[5]Sociology, University of California San Diego, San Diego, California, USA

[6]Psychiatry, University of California San Diego, San Diego, California, USA

[7]Pediatrics and Medicine University of California San Diego, San Diego, California, USA

Correspondence
Ming Tai-Seale, Family Medicine and Medicine University of California San Diego, 9500 Gilman Drive, La Jolla, CA 93094, USA.
Email: mtaiseale@health.ucsd.edu

Abstract

Introduction: Addressing physician burnout is critical for healthcare systems. As electronic health record (EHR) workload and teamwork have been identified as major contributing factors to physician well-being, we aimed to mitigate burnout through EHR-based interventions and a compassion team practice (CTP), targeting EHR workload and team cohesion.

Methods: A modified stepped wedge-clustered randomized trial was conducted, involving specialties with heavy InBasket workloads. EHR interventions included quick-action shortcuts and recommended practice for secure chats. The CTP comprised 30-s practice between physicians and their dyad partners. Survey and EHR data were collected over four assessment periods. Linear and generalized mixed-effects models assessed intervention effects, accounting for covariates.

Results: Forty-four physicians participated (20% participation rate). While burnout prevalence decreased from 58.5% at baseline to 50.0% at the end of the study, burnout reduction was not statistically significant after EHR (OR 0.43, 95% CI 0.12 to 1.61, $p = 0.21$) or EHR + CTP (OR 0.60, 95% CI 0.17 to 2.10, $p = 0.42$) interventions. Statistically significant greater perceived ease of EHR work resulted from both the EHR intervention (coefficient 0.76, 95% CI 0.22 to 1.29, $p = 0.01$) and EHR + CTP intervention (coefficient 0.80, 95% CI 0.26 to 1.35, $p < 0.01$). EHR + CTP increased perceived workplace supportiveness (coefficient 0.61, 95% CI −0.04 to 1.26, $p = 0.07$). Total number of InBasket messages/week increased significantly after EHR interventions (coefficient = 27.4, 95% CI 6.69 to 48.1, $p = 0.011$) and increased after EHR + CTP (18.5, 95% CI −3.15 to 40.2, $p = 0.097$).

Conclusion: While burnout reduction was not statistically significant, EHR interventions positively impacted workload perceptions. CTP showed potential for improving perceived workplace supportiveness. Further research is needed to explore the efficacy of CTP with more participants. The interventions gained interest beyond our institution and prompted consideration for broader implementation.

KEYWORDS
compassion practice, EHR InBasket, organizational compassion, physician burnout

1 | INTRODUCTION

Targeting the exigencies of health systems is a hallmark of learning health systems research. Physician burnout has become a priority for many health systems.[1,2] Interactions with electronic health records (EHRs), particularly the physicians' inbox or "InBasket", and suboptimal teamwork are some contributors to physician burnout.[2–8] Unabated growth in InBasket messages[9] and spikes in physician burnout during the COVID-19 pandemic[10] reignited attention on improving management of electronic communication with patients and other clinicians, and strengthening care teams.

InBasket messages include communications from patients, other providers, and alert messages generated by EHR algorithms—importantly for this research, EHR-generated alerts can account for almost half of all weekly InBasket messages.[11] The connection between a heavy EHR workload and burnout indicates the need to provide care teams efficient EHR management strategies that can alleviate some of the desktop medicine workload.[8] Prior research has shown a positive association between increasing the amount of clerical and scribe support to aid providers with their documentation workload and optimization of EHR workflows on reducing physician burnout.[2,12,13] More research that examines the efficacy of EHR-based interventions on clinician workload and on reducing their stress is needed.[11,13–16]

Physician burnout happens in the context of the workplace. Evidence supports the notion that better team culture is associated with less clinician exhaustion and burnout as strong care teams share the burden of work more evenly across the team.[17] Several case studies have found highly communicative and collaborative healthcare teams are associated with greater career satisfaction among physicians as well as greater patient satisfaction and improved quality of care.[18,19] For example, strategies such as mindfulness training, assertiveness training, and facilitated discussion groups have been associated with enhanced team cohesion and collaboration.[3] The positive effect of self-compassion as a mindfulness technique has been reported among psychotherapists and medical students.[20,21] Despite these promising findings, the literature is relatively silent on the effect of implementing team-based compassion practices on promoting a healthy work environment and reducing burnout in busy medical practices, specifically for physicians. Therefore, addressing this gap in literature could contribute to knowledge on how compassion team practices (CTPs) may enhance care team culture and reduce clinician burnout.

2 | QUESTION OF INTEREST

We developed and implemented a dual-focused intervention aimed at alleviating physician burnout, with a focus on reducing EHR (Epic, Verona, WI) workload and enhancing cohesion within the healthcare team. The EHR-based efforts included the implementation of quick-action shortcuts to prompt staff scheduling for appointments in response to extensive patient MyChart messages, training medical assistants or nurses on appropriately addressing InBasket messages, and recommending physicians to message staff instead of patients to schedule appointments. Best practices for managing secure chat were demonstrated, including techniques such as setting oneself as 'unavailable' for a specified period and minimizing or relocating the secure chat window to minimize distractions. Complementing the EHR-based interventions, we designed and implemented a 30-second CTP during daily physician–nurse dyad huddles, encouraging verbal expressions of kindness among team members. A badge-size card for CTP was distributed to all participants who were encouraged to place the card in their badge and use it to guide the practice with their dyad partner. The card contained the following language: "1. Acknowledge each other, state 'It is so good to see you.' 2. Take 3 deep breaths. 3. Gently say to each other a. May you be well, b. may you feel at ease, c. may you experience moments of peace and joy. 4. Ask each other: 'how may I support you today?'" Our study sought to evaluate the effectiveness of both the EHR and CTP interventions in mitigating physician burnout.

3 | METHODS

A modified stepped wedge-clustered randomized trial used survey and EHR data to evaluate the intervention's effectiveness among specialties with heavy InBasket workloads based on Epic Signal[22] data. The trial included four 4-week assessment periods (labeled as T0, T1, T2, and T3). After the baseline (standard work) assessment of workload in T0, cluster randomization was conducted in which 12 clinics were randomly assigned to two groups (Arm A vs. Arm B). In Arm A, the interventions were EHR-only for 4 weeks (T1), followed by EHR + CTP for 8 weeks (T2 and T3). Arm B's interventions were EHR-only for 8 weeks (T1 and T2), followed by EHR + CTP for 4 weeks (T3). Baseline (T0) assessment began in October 2021, whereas the last (T3) assessment ended in April 2022. Because the design involved the sequential transition of clusters (each clinic) from control to one (EHR)

then two (EHR + CTP) intervention conditions, we described it as a modified stepped wedge. This design allowed us to assess not only the potential impact of each individual intervention but also the cumulative effect of combined interventions over time. Given the complex[23] interacting multidimensionality of the issues, this approach provided a potentially more nuanced understanding of the interventions' collective impact on reducing physician burnout and enhancing team relationships within the context of a learning health system.

The study outcomes included the dichotomized 1-item burnout measure,[24] a perceived ease of EHR work scale,[10] the Mini Z subscale for supportive workplace,[25] and the number of InBasket messages. Following the intent-to-treat framework, linear and generalized linear mixed-effects models were used to examine the effect of EHR intervention and the effect of EHR + CTP intervention on the outcomes, respectively. Random effects were included to account for the cluster effects of clinics and physicians, and intervention (standard work, EHR-only, EHR + CTP) was included as a fixed effect. Participant characteristics at baseline (self-reported race and ethnicity, age range, gender, faculty rank, range of years in medical practice, sleep quality measured by the PROMIS Sleep Disturbance scale, v1.0, 8a,[26] and mindfulness practice) were considered as potential covariates in examining the intervention effect on outcomes. The covariates were pre-screened by including each covariate to the models individually and only variables that were significant with $p < 0.15$ were considered in the multivariable model. Backward elimination was used to exclude non-significant covariates. Given the pilot study's limited sample size, a less stringent significance threshold is acceptable.[27] Therefore, only covariates with $p < 0.10$ were included in the final multivariable models. All analyses were performed using statistical software R, version 4.1.2.

In addition to quantitative outcomes, we asked participants on the frequency of CTP practice to measure the adherence to the intervention. Narrative feedback from some physicians was also reported to provide contextual information on physician experience.

4 | RESULTS

4.1 | Quantitative results

Forty-four physicians participated in the study (20% participation rate), including 15 family physicians, 11 general internists, and 18 subspecialists (endocrinologists, neurologists, obstetrician/gynecologists, infectious disease specialists, and urologists) (Table 1). The median (IQR) FTE was 100% (75%–100%) and median of self-reported working hours were 57.5 (45–61 h) per week. The majority were associate or full professors (77.3%). Comparing other demographic characteristics of respondents with administrative data on School of Medicine faculty, respondents were more often female (61.4% vs. 41.6%), with a higher percentage of non-Hispanic White physicians (72.7% vs. 67.1%) and lower percentage of Asians among respondents and among medical school faculty (22.8%). To lower identification risk of the small number of Asian participants, they were combined with other non-White groups. Early career physicians (practicing for

TABLE 1 Baseline characteristics on study participants (N = 44).

	N (%)/Mean (SD)/ Median (Q1, Q3[a])
Female gender, n (%)	27 (61.4)
White, n (%)	32 (72.7)
Asian or other, n (%)	18 (27.3)
Non-Hispanic, n (%)	42 (95.5)
Weekly work hours	
Mean (SD)	55.9 (15.9)
Median (Q1, Q3)	57.5 (45, 61)
Years in practice, n (%)	
1–5	9 (20.5)
6–10	5 (11.4)
11–15	12 (27.3)
16–20	4 (9.1)
>20	14 (31.8)
Majority of clinical work setting, n (%)	
Outpatient	43 (97.7)
Mindfulness days per week	
Mean (SD)	1.54 (2.07)
Median (Q1, Q3)	1 (0, 2)
Exercise (30 minutes or more) days per week	
Mean (SD)	3.35 (2.08)
Median (Q1, Q3)	3 (2, 4.25)
Sleep quality	
Mean (SD)	17.4 (4.99)
Median (Q1, Q3)	17 (15,19)
Sleep hours, n (%)	
5 h or less	6 (13.6)
6 h	16 (36.4)
7 h	15 (34.1)
8 h or more	3 (6.8)
Prefer not to answer or missing	4 (9.1)

[a](Q1, Q3) are the first and third quartiles.

≤ 15 years) were more represented among respondents (59.2%) than among the faculty (52.6%).

Table 2 displays unadjusted summary statistics for outcomes for each assessment period. Burnout was reported among 24 (58.5%) physicians at baseline (T0) and 21 (50.0%) physicians at T3. The mean (SD) perceived ease of EHR work[10] was 6.17 (2.38) at T0 and 6.88 (2.35) at T3. The mean (SD) Mini Z subscale for supportive workplace was 16.66 (3.08) at T0 and 17.14 (3.06) at T3. The median (IQR) number of total InBasket messages per week was 167 (118–238) at baseline and 186 (126–233) at T3.

Among the 41 participants who had provided information on frequency of CTP, 28 (63.7%) reported most or every workday, 9 (20.4%) reported some or occasional workdays, and 4 (9.1%) reported did not practice (Not tabulated).

TABLE 2 Outcome measures on study participants by study period.

Survey outcomes	Total Participants (N = 44)			
	T0[a]	T1	T2	T3
Burnout from survey	n = 41	n = 35	n = 31	n = 42
Binary scale (yes if < =3), n (%)	24 (58.5)	20 (57.1)	14 (45.2)	21 (50.0)
Perceived ease of EHR workload (sum of scores)	n = 41	n = 35	n = 31	n = 42
Mean (SD)	6.17 (2.38)	6.8 (2.21)	7.35 (2.03)	6.88 (2.35)
Median (Q1, Q3)	6 (4, 8)	7 (5, 8.5)	8 (6, 9)	7 (5, 9)
Workplace supportiveness, sum of scores	n = 41	n = 35	n = 31	n = 42
Mean (SD)	16.66 (3.08)	17.11 (3.50)	18.06 (2.95)	17.14 (3.06)
Median (Q1, Q3)	17 (15, 19)	18 (15.5, 19)	18 (16.5, 20)	18 (16, 19)
Total EHR InBasket messages per week per person	n = 37	n = 37	n = 37	n = 37
Mean (SD)	184 (96.3)	215 (110)	217 (141)	189 (80.7)
Median (Q1, Q3)	167 (118, 238)	187 (130, 251)	183 (129, 284)	186 (126, 233)

[a]T0, T1, T2 and T3 are four study assessment periods.

TABLE 3 Multivariable analysis results on effects of interventions.

Outcomes Generalized linear mixed-effects model	EHR vs. standard work		EHR plus CTP vs. standard work		EHR plus CTP vs. EHR	
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
Burnout[a]	0.43 (0.12, 1.61)	0.21	0.60 (0.17, 2.10)	0.42	1.37 (0.39, 4.77)	0.62
Linear mixed-effects model	**Coefficient (95% CI)**	**p-value**	**Coefficient (95% CI)**	**p-value**	**Coefficient (95% CI)**	**p-value**
Perceived ease of EHR workload[b]	0.76 (0.22, 1.29)	0.007	0.80 (0.26, 1.35)	0.005	0.04 (−0.48, 0.57)	0.87
Supportive work environment[c]	0.51 (−0.13, 1.15)	0.12	0.61 (−0.04, 1.26)	0.07	0.10 (−0.52, 0.73)	0.74
Total InBasket message[d]	27.4 (6.69, 48.1)	0.011	18.5 (−3.15, 40.2)	0.097	−8.85 (−28.3, 10.6)	0.37

[a]Model adjusted for gender, % of FTE, baseline exercise days and baseline compassion practice.
[b]Model adjusted for baseline exercise days and baseline compassion practice.
[c]Model adjusted for gender, sleep quality and baseline exercise days per week.
[d]Model with only intervention.

Multivariable regression analyses (Table 3) showed no significant evidence of an effect in the proportion of burnout after the EHR (odds ratio [OR 0.43, 95% CI 0.12 to 1.61, p = 0.21]) or EHR + CTP interventions (OR 0.60, 95% CI 0.17 to 2.10, p = 0.42) compared with standard work. Both the EHR intervention (coefficient 0.76, 95% CI 0.22 to 1.29, p = 0.01) and EHR + CTP intervention (coefficient 0.80, 95% CI 0.26 to 1.35, p < 0.01) were associated with statistically significant higher perceived ease of EHR work. The Mini Z supportive work environment subscale increased with EHR + CTP (coefficient 0.61, 95% CI −0.04 to 1.26, p = 0.07), signaling an increase in perceived supportiveness in the workplace.[27] Total number of InBasket messages per week significantly increased (coefficient = 27.4, 95% CI 6.69 to 48.1, p = 0.011) after EHR interventions, and also increased after EHR + CTP (coefficient = 18,5, 95% CI −3.15 to 40.2, p = 0.097).

4.2 | Limitations

This study has limitations. Besides the potentially biased self-reported use of the CTP, there was no other formal evaluation of the adoption of the CTP intervention. The 1-item burnout measure may not be sensitive to short-term changes in physician burnout associated with the interventions. The limited number of participants in the pilot suggests that the findings should be interpreted with caution due to possible selection biases. Besides, seven of the participants were not clinically active during the study period, limiting the contributions of their data to the study. Furthermore, because most of the participants work in the outpatient setting, findings may only be relevant to outpatient physicians. Due to the study design that all participants were on the same intervention in two assessment periods, we could not estimate the intervention effect with appropriate adjustment for assessment periods. An additional limitation relates to the generalizability of the interventions to other health systems. We are grateful to have received a $100 000 research grant from the Sanford Institute on Compassion and Empathy which enabled us to cover expenses related to research design, survey administration, modest participant incentives, EHR data extraction, statistical analyses, and manuscript preparation. Other health systems may not have such research resources. The development and implementation of EHR interventions were carried out in collaboration with the Information Services Department, however.

5 | DISCUSSION

Embedded learning health system researchers and informatics leaders in our institution collaborated to catalyze multiple changes in InBasket management and team relationship during the COVID pandemic. We are privileged to progress from documenting pain points in physician work in the EHR[11,28] to designing and implementing interventions aimed at addressing them. While adjusted analyses did not reveal a significant impact on burnout, promising results were observed regarding the perception of ease of EHR work and a more supportive workplace environment. The number of InBasket messages was found to have increased, however. This may suggest that stronger interventions to reduce InBasket volume would be needed, given the drastic surge—up to 157% of pre-pandemic levels—in InBasket message volumes nationwide during the first year of the pandemic.[9]

Although our initial intention was to begin suppressing certain system-generated messages at the outset of the pilot, approval from various stakeholders was ultimately secured toward the conclusion of the pilot. This pilot project served as a catalyst for several enhancements in message management within our health system. Implemented in May 2022 following the conclusion of the pilot, the changes included the suppression of various system-generated messages (such as automatic CC charts from specialists), the implementation of a 30-day automatic expiration for certain information-only messages, and a 180-day automatic expiration for messages in actionable folders. Worries about missing out on information following the suppression of CC charts are unfounded, as primary care physicians retain access to specialist notes and actions through the EHR. Besides, specialists can communicate with primary care physicians using direct provider-to-provider messages or secure chat for time-sensitive information exchange. Furthermore, specialists assume the responsibility for addressing referred issues until resolution, thereby eliminating the need for chart copying. Moreover, other organizations have successfully suppressed CC charts without reports of patient safety or provider experience issues.[2] By removing accumulated outdated messages, the EHR system's response time has improved, resulting in quicker loading of physicians' InBaskets and an enhanced user experience. Ongoing efforts for continuous improvement are focused on systematically managing InBasket volume within our organization.

This study represents an innovative effort in implementing and assessing the CTP within clinical settings. The badge card, which contains compassion statements, has garnered significant interest from physicians, nursing staff, and senior organizational leaders within our institution and beyond. Positive feedback from users underscored its acceptability after initial skepticism gave way to a gradual shift of mindsets as physician leaders engaged firsthand and conveyed their genuine enthusiasm and personal positive experiences with the CTP to their teams. For example, one leader shared "my nurse and I went through the exercise and afterwards we both just had a smile on our face, and she said, 'that was great!' It was just a really nice way to start our clinic day and we both felt pretty good about it. A nice little timeout to show some gratitude and to kind of be mindful in that moment." "Seeing us doing the compassion practice and looking happy, other nurses and medical assistants in the clinic joined us to practice together." Another leader stated "my nurse, [name], and I frequently keep up with the refreshing message and habit of using the greetings and care for each other we learned from your project. I have the card right in front of me at my desk. [Nurse name] sometimes starts the secure chat with the message when she updates me about the daily urgent InBasket issues and others. Thank you for a great project! It has contributed to meaning, calm and humor in our dyad collaborating between [nurse name] and myself in a busy primary care setting."

The pilot program has influenced our approach to other initiatives within the organization. For instance, we have integrated compassion practices into teamwork dynamics and have incorporated them into EHR training sessions conducted by members of our informatics team, including the Chief Medical Information Officer, especially when introducing new physicians (inpatient and outpatient) to the system. There is now a heightened emphasis on ensuring the well-being of our team members; it is no longer acceptable to inundate them with messages. This emphasis on communication and empathy is a notable departure from past approaches and underscores the importance of making individuals feel genuinely listened to and understood, factors documented to be associated with lower burnout risk.[10] As mindfulness gains traction and workplaces increasingly endorse cultures of compassion and empathy, strategic collaboration with physician wellness advocates in deliberate change management holds promise for aligning efforts with the pivotal priority of physician well-being across health systems.

As we navigate this transformative process, our aim is to contribute to collective learning. By sharing our journey and preliminary findings in this journal, we aspire to inspire more learning health systems to embrace changes that alleviate EHR work stress and cultivate a more supportive work environment.

CONFLICT OF INTEREST STATEMENT
The authors declare no potential conflict of interest.

ORCID
Ming Tai-Seale https://orcid.org/0000-0001-9272-066X
Amanda Walker https://orcid.org/0000-0001-5777-6684
Yuwei Cheng https://orcid.org/0009-0002-4481-2177
Nathan Yung https://orcid.org/0009-0008-9779-2302
Sophie Webb https://orcid.org/0000-0001-9821-3298
Ottar Lunde https://orcid.org/0000-0003-2357-1271
David Bazzo https://orcid.org/0000-0002-0978-2884
Ammar Mandvi https://orcid.org/0009-0008-4097-8720
Neal Doran https://orcid.org/0000-0003-2825-6318

Gene Kallenberg https://orcid.org/0000-0003-3515-2672

Christopher A. Longhurst https://orcid.org/0000-0003-4908-6856

Sidney Zisook https://orcid.org/0000-0003-3341-9185

Thomas J. Savides https://orcid.org/0000-0001-5585-5979

Marlene Millen https://orcid.org/0000-0002-2671-5755

Lin Liu https://orcid.org/0000-0002-6332-3064

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