From Headache to Handled: Advanced In-Basket Management System in Primary Care Clinics Reduces Provider Workload Burden and Self-Reported Burnout

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Appl Clin Inform 2024;15:869–876.

Abstract

Background The electronic health record (EHR) has been associated with provider burnout, exacerbated by increasing In-Basket burden.

Objectives We sought to study the impact of implementing a team-based approach to In-Basket management on a series of primary care ambulatory sites.

Methods We performed a workflow analysis of the transition to the Advanced In-Basket Management (AIM) nurse team triage for six family medicine clinic locations in a large health system. We abstracted and analyzed associated provider workflow metrics from our EHR. We conducted a postintervention provider survey on satisfaction with the AIM project and provider burnout.

Results The AIM project was implemented in six family medicine clinics after provider townhalls and workgroup development. A nurse team curriculum was created using the principles of "maturing the message" before sending it to a provider and "only handle it once" to improve response efficiency. Provider workload metrics abstracted from the EHR demonstrated 12.2 fewer In-Basket messages per provider per day ($p < 0.05$), 6.3 fewer minutes per provider per day worked outside scheduled hours ($p < 0.05$), 3.5 fewer minutes spent in the In-Basket per provider per day ($p < 0.05$), but 13.7 more seconds spent per completed message per provider ($p = 0.017$), likely attributable to increased message complexity. Sixty-four percent of providers reported no burnout symptoms in a postintervention survey, 56% agreed that the AIM project reduced their burnout, and approximately 70% of providers agreed that the AIM project was acceptable and appropriate for their clinic.

Conclusion The AIM project demonstrates team-based nurse In-Basket triage is possible to implement across multiple primary care sites, is an acceptable intervention for providers, can reduce provider workload burden and self-reported provider burnout.

Keywords
- family medicine
- practice management
- interdisciplinary workflows
- electronic communication

received
April 25, 2024
accepted after revision
August 1, 2024

DOI https://doi.org/10.1055/s-0044-1789575.
ISSN 1869-0327.

Background and Significance

The electronic health record (EHR) has been associated with provider burnout, intent to leave clinical practice, reduction in full-time equivalent units, and increased provider turnover.[1–3] Patients are negatively impacted because of decreased use of primary care, increased use of subspecialty, urgent, and emergent care, and increased spending on patient care.[4] Further, each physician departure from a health care system has been estimated to cost approximately $1 million in direct and indirect costs from recruitment, onboarding, and loss of revenue.[5] There is a complex interaction between the EHR and burnout characterized by practice inefficiency secondary to the EHR and poor usability exacerbated by the proliferation of inbox messages, notifications, and documentation requirements.[6,7] Physicians have come to spend approximately half of their EHR time on inbox work rather than face-to-face patient care, which imposes additional cognitive load and extends beyond work hours.[8–11] Additionally, there has been a significant and persistent increase in patient-initiated inbox messages (2.07 vs. 2.83 items, adjusted risk ratio [aRR] = 1.27) in the year following the coronavirus disease 2019 (COVID-19) pandemic.[12]

In a study that collected feedback from 2,104 primary care providers on EHR notifications, one of the five themes that emerged related to team support with EHR inbox notification burden; this aligns with recommendations from Sinsky et al to strategically delegate messages in a team-based approach.[6,13] In an adult primary care simulation study, a provider would need 26.7 hours per day, with 3.2 of those hours spent on documentation and inbox management to provide and document all recommended preventative, chronic disease, and acute care for a panel of 2,500 hypothetical patients.[14] This could be reduced to 9.3 hours per day using a team-based approach.

Objectives

Here we describe our health system's efforts to reduce provider inbox (called the "In-Basket" in our EHR) management time and to improve staff and provider satisfaction through a pilot of a protocol-driven, nurse triage team known as the Advanced In-Basket Management (AIM) Team. We summarize the operational process of implementing that pilot study, and we hypothesized that it would positively impact provider workload metrics as captured by our HER's provider efficiency metric functionality.

Methods

We initially performed a postimplementation workflow analysis of the AIM team pilot project for multiple community family medicine clinical sites across one region of a large health system. Providers in these clinics include full-time and part-time physicians and advanced practice providers. Narrative data regarding the project planning and implementation process were collected from local ambulatory practice leaders over a series of two 1-hour interviews for six of their clinic sites in this region. Following narrative data collection, workload metric data abstraction and analysis was performed for only full-time providers.

Project Planning and Implementation

Before implementation, providers would receive various In-Basket messages including direct patient messages, results, notifications, order requests, consolidated care documents, appointment and other administrative inquiries, and staff/provider messages. Clinical and operational leaders were concerned about provider turnover and staff dissatisfaction. In March 2020, brainstorming sessions were held with local provider and nursing leadership about how to improve the staff experience. Additionally, multiple townhall-style meetings between the regional provider clinics and department leadership were held for operational decision-making. The participants in the townhall meetings were not consented for study participation and the content was reserved for operational decision-making. A recurring theme was In-Basket burden, and there were requests for reductions in workload to accommodate required In-Basket management time. Using a compelling idea of nursing team-based message triage, a plan was developed for process improvement.

First, clinic leadership devised an In-Basket workgroup. Historically, In-Basket messages would go to a shared clinic support staff pool. This was reimaged through the workgroup to have additional nursing team support. This group approached the senior clinic nursing staff to compile and standardize workflows and responses for routine result notes, refill requests, and paperwork requests. Input was received from licensed vocational nurses (LVNs), registered nurses (RNs), and physicians to further refine this process. This effort led to the development of the "AIM messaging" team and an associated training curriculum. Existing clinic nurses were selected for the AIM team based on their interest and expertise with the EHR.

Training for the AIM team consisted of a 2-week curriculum in which a RN manager and LVN expert trainer provided a 1-week lecture-based session and 1 week practical In-Basket triage experience. Trainees received a curriculum binder describing the In-Basket workflows. The curriculum reaffirmed appropriate scope of practice, which included scheduling appointments for laboratories, virtual visits, same-day visits and answering basic patient result questions, sometimes before the provider has had a chance to review them. Three groups of LVNs (15 nurses total) completed the training curriculum. On the AIM team, participating LVNs worked exclusively on In-Basket management for their respective clinics. Team members were excused from routine clinical duties, except for a few LVNs that continued to provide cross-clinic remote coverage. During the initial 8 weeks of participation, each LVN's In-Basket management was monitored for quality. The AIM team created a skills checklist for which each nurse was required to submit In-Basket message examples to show competency.

Two key principles of the AIM team's process are (1) "maturing the message" and (2) "only handle it once."

LVNs focused on gathering all appropriate information (e.g., questions, data, history) to determine whether the message can be resolved in their scope of practice or if it must be routed to a provider for management. LVNs fully address one message through completion rather than diverting attention between several different messages at once. To ensure the AIM team adhered to these two principles, ambulatory visit and In-Basket documentation was made clear and robust. The team utilized shared templated texts (generated using Epic SmartTools) in combination with the curriculum binder to aid In-Basket management. The AIM team created an internal secure messaging group for ongoing communication and issue resolution.

Workload Metric Analysis

Provider data for 11 workload metrics were abstracted from our EHR system (Epic Systems Corporation, "Epic") for each clinic involved in the program implementation. Data were collected for the interval between 1 year prior to the first clinic's AIM team implementation (July 2021) until February 2023. "Total observations" refer to total weeks of observation for all providers. Data were collected for up to 63 full-time providers per workload metric (►Table 1).[15] Based on provider weekly schedules and how data are extracted from the EHR, total providers per workload metric and total observations for provider-weeks varied across metrics. Metric data were categorized into "preintervention" and "postintervention," based on each clinic's AIM go-live date, grouped and summarized by week. Descriptive analysis of these data was performed using SAS software (SAS Institute, Inc.). We characterized the data by percentiles and performed box-plot comparisons. A mixed-effects linear regression analysis was performed to account for differences in pre- and postintervention by matching on provider and clinic locations. A two-sided *p*-value was calculated using an α of 0.05.

Provider Survey and Analysis

We also conducted an anonymous postintervention provider survey between May and July 2023, approximately 10 months after initial AIM team clinic implementation, for the acceptability of intervention measure and intervention appropriateness measure as well as to assess burnout symptoms.[16,17] The survey was approved by the Baylor Scott and White Research Institute Institutional Review Board. The survey was distributed via email to all providers with an EHR log-in credential associated with one of the studied clinics. The number of providers in the studied clinics exceeds the number for whom we have EHR workload metrics because the data available for each provider did not always meet the strict metric requirements in the EHR. The survey did not elicit any personally identifiable information. The survey contained 10 questions—one for burnout assessment, nine Likert scale-based—and the option for open-ended feedback.

Table 1 Summary of workload metrics

Workload metric	Metric definition	Number of providers studied
Time in In-Basket per day (min)	Average number of minutes a provider spent in In-Basket per day	62
Time in In-Basket per appointment (min)	Average number of minutes a provider spent in In-Basket per scheduled appointment among providers with at least five appointments per week	63
In-Basket messages received per day	Average number of personal In-Basket messages a provider received per day	52
Turnaround time (d)	Average number of days a provider took to mark a direct message of a specific type as Done	52
Seconds per completed message	Average number of seconds a provider spent in In-Basket per completed message	63
Appointments per day	Average number of appointments per day within a given week	63
Appointments closed same day	The percentage of appointments within a given week that were closed in the same day	62
Pajama time (min)	Among providers with at least 5 weekly appointments, the average number of minutes a provider spent in charting activities on weekdays outside the hours of 7:00 a.m.–5:30 p.m. or outside scheduled hours on weekends or holidays	63
Time on unscheduled days (min)	Among providers with at least 5 weekly appointments, the average number of minutes a provider spent in the system on days with no scheduled patients	63
Time outside of 7A–7P (min)	Average number of minutes a provider spent in the system on scheduled days outside 7 a.m.–7 p.m.	61
Time outside scheduled hours (min)	Among providers with at least 5 weekly appointments, the average number of minutes a provider spent in the system outside of scheduled hours with a 30-min buffer before the start of the first appointment and after the end of the last appointment	63

The intervention appropriateness measure and acceptability of intervention measure were calculated as a sum of four categorical questions on a Likert scale of 1 to 5, with 5 representing "completely agree" (►**Appendix A**). No payment or other incentive was provided to ensure voluntary, earnest, and complete responses. All participants were expected to be proficient in English, as English proficiency is required for employment in our health system. Descriptive analysis and linear regression were performed to evaluate survey data using a calculated two-sided *p*-value of 0.05.

Results

Project Implementation

The AIM team went "live" at its first site July 5, 2022, followed by three more clinics monthly, and two more in November. At the time of the study, six clinics were available for data evaluation. After go-live, an iterative process of training curriculum improvements based on trainee feedback was implemented. The AIM team monitored the number of In-Basket messages completed daily, with the average number of message chains varying between 895 and 1,218 messages over the study period (►**Fig. 1**). Previously, In-Basket messages would go to clinic support staff pools. Following go-live, clinics with support staff pools that had AIM team support were able to resolve 46 to 56% of message chains independently compared with 29 to 34% of messages without AIM teams support over the study period (►**Fig. 2**). Initially, some LVNs were apprehensive about leaving direct patient care to participate on the AIM team, but informal team feedback indicates that even those who were initially reticent now appreciate their participation, because they now have a single focus rather than diverting attention between clinical care and In-Basket duties.

Provider In Basket Metric Assessment

A formal analysis of this pilot project was undertaken after the operational implementation occurred. Retrospective analysis of data from 62 providers across six clinics for the 11 relevant ambulatory Epic workload metrics showed focused improvements in the providers' workflows attributable to the AIM program. The workload metrics analyzed, their Epic definitions, and the corresponding number of providers for which data were available are shown in ►**Fig. 3**.

We found that In-Basket messages were 12.2 fewer per provider per day postintervention ($p = 0.0492$), which is an average of 634.4 fewer messages per day across 52 studied providers. Providers spent an average of 13.7 seconds more per message ($p = 0.017$) across 63 studied providers. Time outside scheduled hours was 6.3 minutes fewer per provider per day ($p = 0.039$) totaling 6.6 hours per day across 63 studied providers. Time in the In-Basket activity decreased 3.5 minutes per provider per day ($p < 0.0001$) totaling 3.7 fewer hours per day for 63 providers. While In-Basket message turnaround time was among our studied metrics, it was excluded from regression analysis because of abundant outliers and insufficient total observations in the post-intervention group to perform a valid comparison.

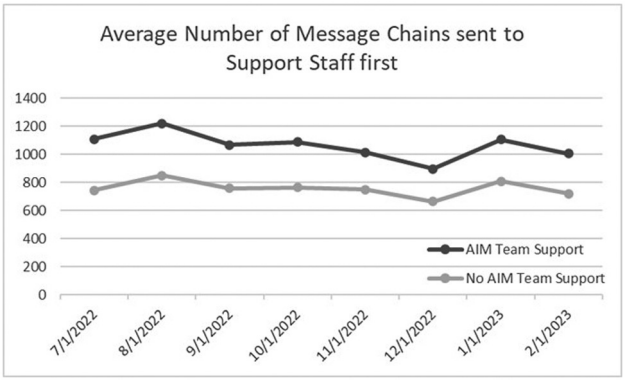

Fig. 1 Average number of In Basket messages sent to the support staff message pools by month, with and without AIM team support. The darker top line indicates the average number of message chains sent to support staff message pools in family medicine clinics with AIM Team support. The bottom lighter line indicates the average number of message changes sent to support staff message pools in family medicine clinics without AIM Team support.

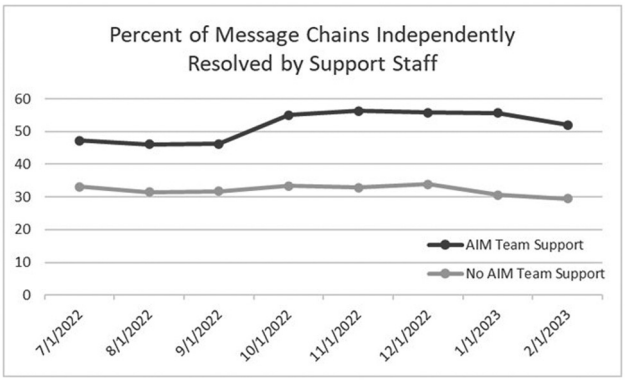

Fig. 2 Percent of In Basket message chains independently resolved by support staff message pools, by month, that do and do not have AIM team support. The darker top line indicates the percent of message chains independently resolved by support staff message pools in family medicine clinics with AIM Team support. The bottom lighter line indicates the percent of message chains independently resolved by support staff message pools in family medicine clinics without AIM Team support.

Postintervention Survey

Of 117 providers queried, we received 56 responses (48%). Of these 56 providers, 36% expressed any symptoms of burnout and one expressed complete burnout (►**Fig. 4**). Fifty-six percent agreed or completely agreed that the AIM project reduced their burnout (►**Fig. 5**). The mean intervention appropriateness measure score was 15.42 (range: 4–20, standard deviation [SD]: 4.83), with 71% of respondents indicating a score of 16 or more. The mean acceptability of intervention measure score was 15.3 (range: 4–20, SD: 4.79), with 66% of respondents indicating a score of 16 or more. An average score of 16 or greater would indicate participants agree or completely agree with the measure questions. A simple linear regression was performed for each of these for any symptoms of burnout, and there was no significant association ($p = 0.26$ and 0.16, respectively). Direct

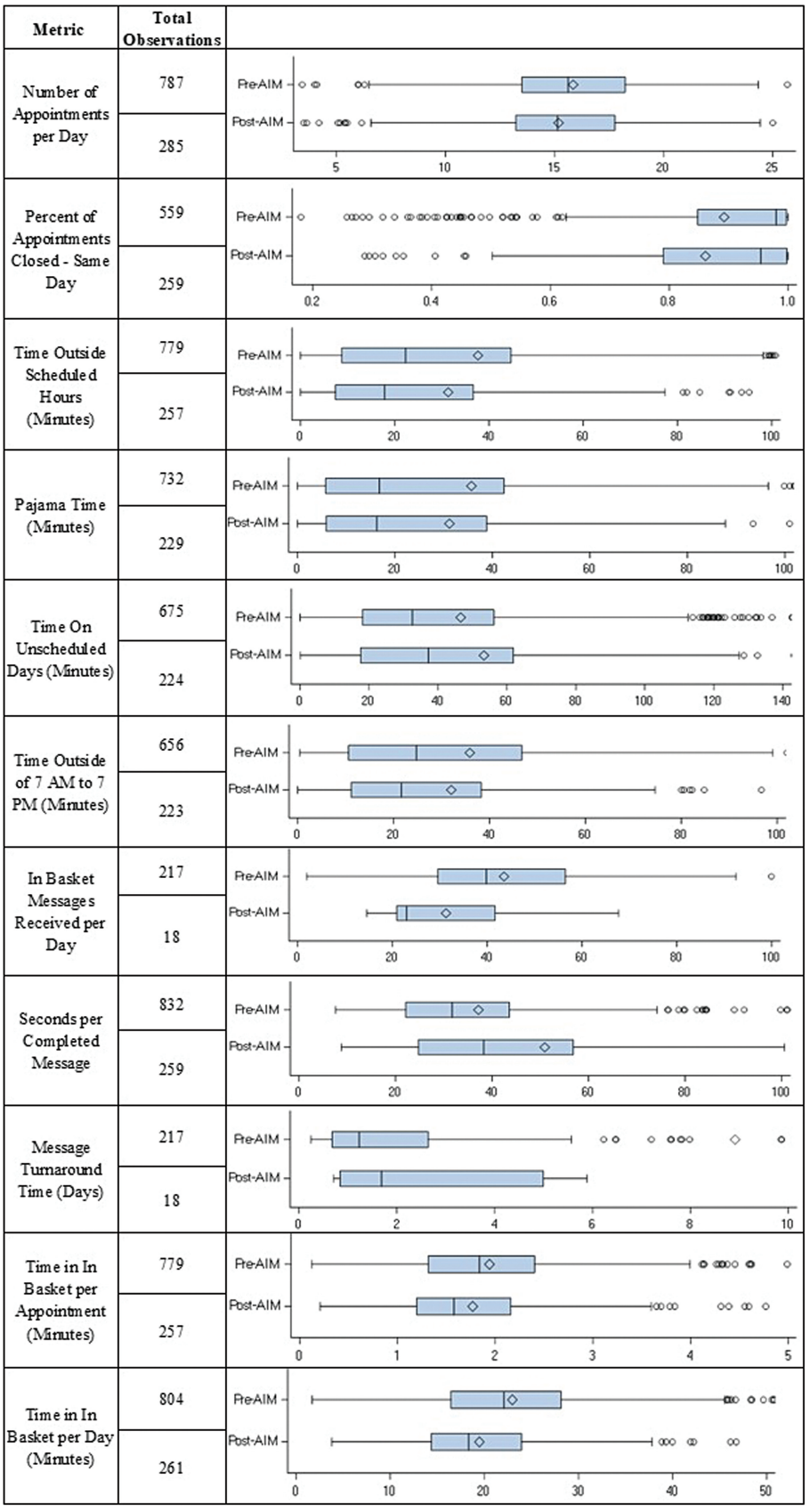

Fig. 3 Descriptive Summary of Workload Metrics Data. "Metric" refers to the provider workload metric for which data was abstracted from our system. "Total Observations" refers to the number of provider-weeks of observation data for each metric. The box plots are a comparison of metrics abstracted before "pre-AIM" and after "post-AIM" implementation.

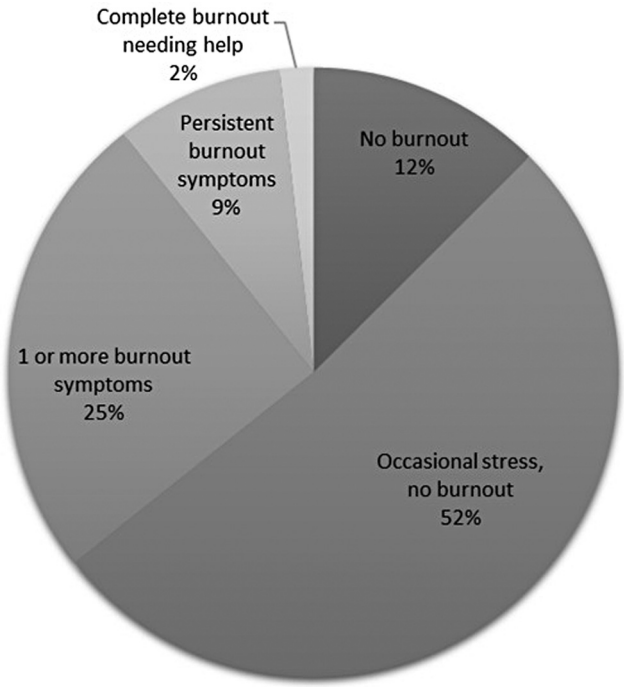

Fig. 4 Pie graph of burnout symptoms among providers in clinics with AIM Team support.

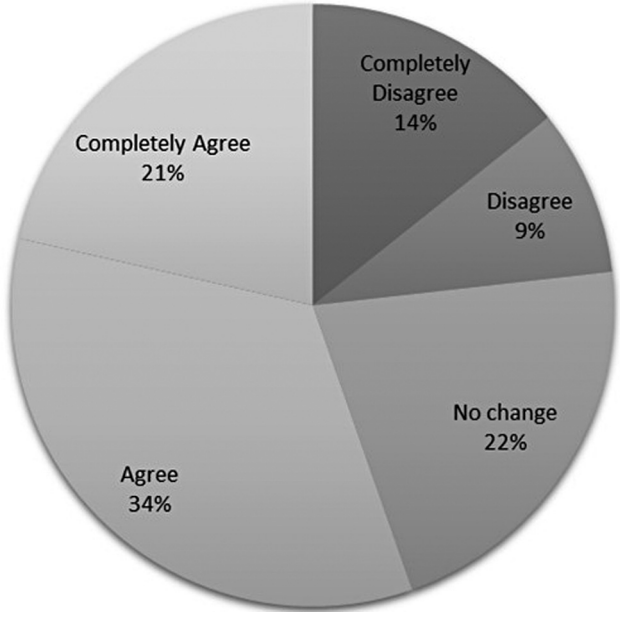

Fig. 5 Pie graph of responses to the question "Did the AIM project reduce by burnout?" from providers in clinics with AIM Team support using a Likert scale from completely disagree to completely agree.

suggestions from the study included creating more personalized AIM nurse responses and increasing awareness of the AIM project among providers and staff.

Discussion

The AIM project had several benefits. It allows nursing staff to maximize the utility of their knowledge and skills, and a greater percentage of messages were routed to and resolved by AIM nurses without involving providers than in clinics without the AIM project. The AIM project resulted in fewer provider In-Basket messages per day, less provider time spent outside of scheduled hours, and less provider time spent in the In-Basket per day. There was a slight increase in seconds per message by providers; we hypothesize that this is because the nurse triage process results in forwarding more complex messages that required more effort for the provider to address. While the magnitude of the changes we observed were relatively small at the individual provider level, such cumulative daily savings and may improve provider well-being, an assertion supported by our finding that 56% of survey respondents found the AIM project helpful in reducing burnout. If the observed time savings were generalized across all our system's regional clinics, the cumulative reduction in provider workload would be substantial.

There are several important limitations in our study. The current study was designed after the business decision to implement the pilot was underway, so we agree there were some practical limitations to our design. The studied workload metrics were not available for equivalent time periods for each clinic after go-live, and our EHR did not consistently retain the same number of accessible weekly data points for each provider. Clinic AIM go-live dates did not exactly align with weekly workload abstraction dates in three instances; scheduled data abstraction started 2 days after go-live for two clinics. One clinic's workload data abstraction started 1 day prior to the start of go-live. This limitation was acceptable for us in this pilot study and adjusted for in the analysis.

We also cannot assume work in the AIM project targeted at In-Basket messages is the only factor contributing to work outside of scheduled hours in the EHR. There are other confounding reasons that providers may be spending time in the EHR after scheduled hours such as encounter documentation. The utility of our survey data was limited by the relatively low response and the absence of a preintervention survey assessment for comparison. This makes it difficult to ascertain whether the project itself reduced burnout in a meaningful way. However, the project was initiated in the height of the COVID-19 pandemic, where we have data from other institutions that burnout was significant, and our own internal feedback that burnout was substantial enough to prompt this project.[18] By not directly accounting for preintervention burnout amid a general increase in provider burnout related to the COVID-19 pandemic, our findings may underestimate the perceived benefit of the AIM project and its impact on provider burnout.[19] Despite these limitations, we believe that it is meaningful to share our institution's experience with this pilot and the provider survey feedback.

Conclusion

The AIM project demonstrates that a team-based nurse In-Basket triage is possible to implement across multiple primary care ambulatory sites, is viewed as an acceptable intervention by providers, can significantly reduce provider

workload burden, and is perceived to reduce provider burnout. A team-based system like our AIM project could be readily extended to other primary care clinic settings, especially in a large health care system. This adds to the literature on the use of team-based EHR inbox management in the primary care setting.[20,21] We postulate that a subsequent study with a larger dataset may find more substantial benefits at the individual and system level than in our pilot study. A valuable area for our subsequent study would be an assessment of the AIM nursing team satisfaction and burnout. Further studies may include evaluation of additional workload metrics such as the turnaround time for the whole message lifecycle, subgroup analysis based on provider demographics, conducting pre-/postintervention surveys on future clinics, and gathering survey input from nursing staff and patients on perceptions of and satisfaction with clinics AIM team support.

There are different approaches to tackle In-Basket volume such as focusing on EHR configuration for inbox optimization and utilizing artificial intelligence for aiding message response.[22,23] We believe that we demonstrate there is value to provider–nurse team-based primary care for administrative EHR tasks, like In-Basket messages, that could potentially be utilized additively with the aforementioned approaches to improve patient care and staff satisfaction.

Clinical Relevance Statement

EHR workload is a source of provider burnout and dissatisfaction. Efforts to reduce EHR workload, such as the In-Basket, are necessary. Team-based nurse triage of the In-Basket is one approach that has demonstrated meaningful benefit in our ambulatory practices.

Multiple-Choice Questions

1. Where does team-based inbox management demonstrate benefit?
   a. In reducing provider burnout
   b. In reducing pajama time
   c. In reducing message turnaround time
   d. In reducing time spent per message

   Correct Answer: The correct answer is option a. The other selections did not demonstrate significant benefit from team-based management in our study.

2. What percent of additional messages were able to be independently resolved without provider input by clinics with AIM team nurses?
   a. 5–12
   b. 10–17
   c. 17–22
   d. 22–26

   Correct Answer: The correct answer is option c. Support staff pools that had AIM team support were able to resolve 46 to 56% of message chains independently compared with 29 to 34% of messages without AIM team support over the study period.

Protection of Human and Animal Subjects

The study was performed in compliance with the World Medical Association Declaration of Helsinki on Ethical Principles for Medical Research Involving Human Subjects and was reviewed and approved by the Baylor Scott and White Research Institute Institutional Review Board.

Conflict of Interest

None declared.

Acknowledgments

We acknowledge the contributions of our nursing and provider staff in transitioning to the AIM project. We appreciate the contributions of Elisa Priest, DrPH, MPH; Michael Quinton, MD; Sharon Reece, MD.

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