The Burden of Inbox Notifications in Commercial Electronic Health Records

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Keywords

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Background

With wider use of electronic health records (EHRs), physicians increasingly receive notifications via EHR-based inboxes (e.g., Epic's "In-Basket" and GE Centricity's "Documents"). Types of notifications include test results, referral responses, medication refill requests, and messages from clinicians, among others.[1,2] In our work within the Department of Veterans Affairs (VA), we found providers receive large quantities of EHR-based notifications, making it harder to discern important vs. irrelevant information and increasing their risk of overlooking abnormal test results.[3–6] Information overload is of emerging concern because new types of EHR-based notifications and 'FYI' messages can be easily created (versus in paper-systems) and this additional workload remains uncompensated[1,2,4] despite reimbursement reductions. Moreover, EHRs make it easier to measure information load. We quantified notifications physicians received via inboxes of commercial EHRs to estimate their burden.

Methods

We obtained electronic logs of all notifications received by all physicians during a 6-month period from 1/1/2015-6/30/2015 at three large practices in Texas (two primary care; one multispecialty). We then tabulated notifications that conveyed new information to physicians

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for the 125 workdays during the study period. Types of notifications were categorized on whether or not they were related to test results. To account for different times each physician spent in the outpatient clinic, we normalized message quantities by percent time worked such that the notification quantity would represent the number of notifications received if the physician was full-time. We excluded physicians working <20% and if they did not work the entire 6 months. We calculated means of normalized notifications each physician would receive each workday, and performed univariate analysis of variance comparisons across sites and between primary care physicians (PCPs, including family medicine, internal medicine, and geriatrics) and specialty physicians at the multispecialty clinic. Additionally, we performed a correlation analysis to determine if an association existed between time worked and normalized number of notifications.

Results

Of 125 physicians, 33 met exclusion criteria, leaving 92 physicians' EHR inboxes for analysis: 19 PCPs and 46 specialists at Site A using Epic, 12 PCPs at Site B also using Epic, and 15 PCPs at Site C using GE Centricity. We analyzed a total of 276,207 notifications (146,521 Site A, 51,090 Site B, and 78,596 Site C).

Across three sites, PCPs (n=46) received a mean of 76.9 (SD=38.0) total notifications/day (65.2, 113.5, and 62.6 at sites A, B, and C respectively; p<0.001) of which 20.2% (15.5 notifications/day; SD=6.0) were test result-related (15.1, 18.7, and 13.4 at sites A, B, and C respectively; p=0.07; Figure 1). In addition to previously-identified types,[2] notifications included messages directly from patients and pharmacies. At site A, we found that specialists received 29.1 total and 10.4 test results notifications/day, significantly fewer than PCPs at the same site (p<0.001 and p=0.03, respectively).

Lastly, there were significant, negative correlations between time worked and normalized daily total notifications received (r=−0.27;p=0.008) suggesting that part-time physicians received more notifications for time spent in clinic than full-time physicians.

Discussion

A large quantity of information is communicated to PCPs each day via commercial EHRs. In our prior VA work, PCPs spent a mean of 49 minutes processing 56.4 notifications of comparable content each day (i.e., mean 52 seconds/notification). Extrapolating this to commercial EHRs suggests clinicians spend an estimated 66.8 minutes/day on processing notifications, which likely adds a substantial burden to their workday. Specialists received less than half this amount, and part-time physicians appeared to receive proportionately more. Because a single notification often contains multiple data points (e.g., metabolic panels contain 7–14 laboratory values), the actual burden and physicians' required cognitive effort is likely greater. Strategies to help filter messages relevant to high-quality care, EHR designs that support team-based care, and staffing models that assist clinicians in managing this influx of information are needed.

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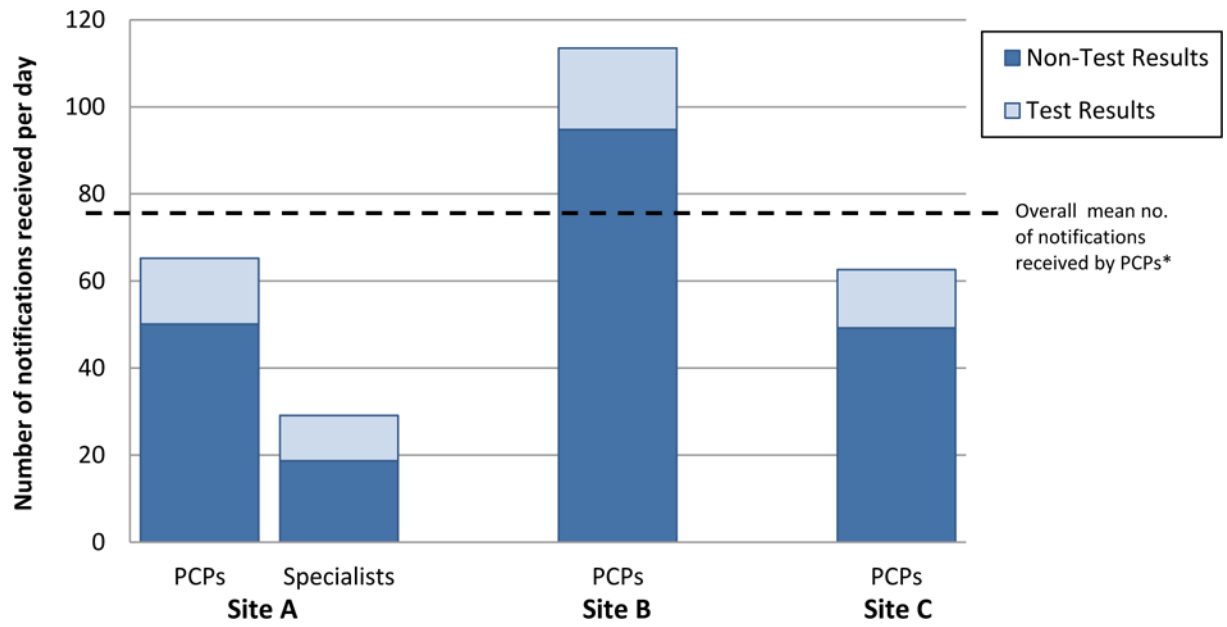
Figure 1. Number and Types of Notifications Received by Physician type
*Primary care providers (PCPs) received a mean of 76.9 notifications/day. Specialists (site A only) received a mean of 29.1 notifications/day ($p<.001$).