

Electronic Health Record Effects on Work-Life Balance and Burnout Within the I³ Population Collaborative

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ABSTRACT

Background Physician burnout is a problem that often is attributed to the use of the electronic health record (EHR).

Objective To estimate the prevalence of burnout and work-life balance satisfaction in primary care residents and teaching physicians, and to examine the relationship between these outcomes, EHR use, and other practice and individual factors.

Methods Residents and faculty in 19 primary care programs were anonymously surveyed about burnout, work-life balance satisfaction, and EHR use. Additional items included practice size, specialty, EHR characteristics, and demographics. A logistic regression model identified independent factors associated with burnout and work-life balance satisfaction.

Results In total, 585 of 866 surveys (68%) were completed, and 216 (37%) respondents indicated 1 or more symptoms of burnout, with 162 (75%) attributing burnout to the EHR. A total of 310 of 585 (53%) reported dissatisfaction with work-life balance, and 497 (85%) indicated that use of the EHR affected their work-life balance. Respondents who spent more than 6 hours weekly after hours in EHR work were 2.9 times (95% confidence interval [CI] 1.9–4.4) more likely to report burnout and 3.9 times (95% CI 1.9–8.2) more likely to attribute burnout to the EHR. They were 0.33 times (95% CI 0.22–0.49) as likely to report work-life balance satisfaction, and 3.7 times (95% CI 2.1–6.7) more likely to attribute their work-life balance satisfaction to the EHR.

Conclusions More after-hours time spent on the EHR was associated with burnout and less work-life satisfaction in primary care residents and faculty.

Introduction

Growing awareness of burnout among physicians and its negative effect on patient outcomes^{1–3} has resulted in a call to expand the Triple Aim to the Quadruple Aim, which includes the physician's experience, along with patient experience, quality, and cost of care.⁴ Symptoms of burnout can begin early in a physician's career, with published burnout rates among primary care residents varying from 40% to 78%.^{5–8} Few studies have assessed burnout rates among faculty in US residency programs.⁵

One potential contributor to burnout is the rapid expansion of the electronic health record (EHR),^{9,10} as physicians who use the highest number of both EHR features and functions report more time pressure associated with significantly more burnout, dissatisfaction, and intent to leave medicine.¹¹ The purpose of this study was to estimate the prevalence of burnout among primary care residents and faculty, estimate work-life balance satisfaction for both groups, and examine the relationship between these

2 outcomes and EHR and other practice and individual factors.

Methods

Participants for this study were drawn from primary care residency programs in the I³ Population Health Collaborative. The I³ Collaborative comprises 24 primary care residency practices (20 family medicine, 2 internal medicine, and 2 pediatrics practices) across Virginia, North Carolina, South Carolina, and Florida. It seeks to achieve practice transformation around the Triple Aim.¹²

Designated faculty at each program completed a practice characteristics survey, and distributed physician surveys to faculty and residents in January and February 2015. Practice characteristics surveyed included the number of physicians, the EHR used in the practice, the amount of time the EHR had been in place, and the number of different EHRs over the previous 10 years. The physician survey (provided as online supplemental material) included 4 outcome items: a single item, 5-point burnout scale with some prior evidence of validity¹³; an added item (presented only to respondents who indicated burnout) that asked respondents to categorize the extent

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to which they believed the EHR contributed to their burnout; a question about respondents' satisfaction with their ability to maintain a healthy work-life balance; and an item on the effect of the EHR on work-life balance. Respondents were asked to estimate the number of hours they spend in a typical week performing EHR-related tasks outside of normal work hours. We also collected demographic data for respondents. The survey instrument was reviewed and pilot tested by 20 faculty members of the I³ Collaborative. No formal validity testing was performed.

The study protocol was approved by the Carolinas Healthcare System Institutional Review Board.

For analysis, all 4 outcomes were tabulated and dichotomized. We considered burnout to be positive if the respondent selected choice 3, 4, or 5 (BOX). We considered satisfaction with work-life balance to be positive if the response was *satisfied* or *very satisfied*. The perceived effect of the EHR on burnout or work-life balance was coded positive if *some* or *a lot* was selected. Scaled independent variables were similarly dichotomized. Continuous variables were found to be not normally distributed (using the Shapiro-Wilk test). We summarized them using medians, and we used the Kruskal-Wallis test to assess the significance of differences. We estimated the maximum likelihood odds ratio (OR) for the outcome variable, given dichotomous categories or median splits. Bivariate relationships with $P \leq .05$ were entered into a multivariate logistic regression model. All tests were performed using Stata version 10.1 (StataCorp LLC, College Station, TX).

Results

Of 22 practices initially surveyed, 3 used a unique EHR; these practices collectively represented less than 5% of responses, and were insufficient to draw valid inferences. We excluded them from further analysis. Of 866 surveys disseminated to the remaining 19 locations, 585 (68%) were returned. Respondent and program characteristics are described in TABLE 1.

The 4 EHRs used by respondents are enumerated in TABLE 2, along with their years of use, and median weekly hours that providers devoted to EHR-related tasks outside of normal clinic hours. We found no statistically significant differences in self-reported outside-of-work hours among different EHRs ($P = .69$). We did find an impact of the time the EHR had been in use on after-hours time spent on the EHR. Users in practices where the current EHR had been in place 1 to 3 years spent a median of 7 outside-of-work hours, while those with the current EHR in

What was known and gap

Use of the electronic health record (EHR) has been associated with a negative work-life balance and physician burnout.

What is new

A study that assessed burnout and work-life balance in primary care residents and faculty as well as the impact of EHR use on both.

Limitations

Survey research, using a tool without validity evidence, and a single-item measure of burnout.

Bottom line

A sizable proportion of primary care residents and faculty reported burnout and dissatisfaction with work-life balance. More after-hours EHR use was associated with burnout and lower work-life satisfaction.

place less than 1 year or more than 3 years spent a median of 6 and 5 outside-of-work hours, respectively ($P = .001$).

EHR and Work-Life Balance

Overall, 53% of respondents (310 of 585) indicated that they were *dissatisfied* or *very dissatisfied* with their work-life balance. A total of 85% of respondents (497 of 585) indicated that the EHR affected their work-life balance.

TABLE 3A shows the association between the factors we surveyed and respondents' satisfaction with work-life balance, as well as the impact of EHR use. Only out-of-work hours spent with the EHR was significantly related to satisfaction with work-life balance and EHR effect on work-life balance. Compared to respondents who spent the median 6 hours or fewer per week on EHR work outside of normal clinic hours, respondents who spent more time were one-third as likely to report satisfaction with work-life balance (OR = 0.33, 95% confidence interval [CI]

BOX Single-Item Burnout Scale¹³

Burnout is generally understood to involve emotional exhaustion, depersonalization, and low sense of personal accomplishment.

Considering your experience of burnout, select the statement below that best describes your situation at work.

1. I enjoy my work. I have no symptoms of burnout.
2. Occasionally I am under stress, and I don't always have as much energy as I once did, but I don't feel burned out.
3. I am definitely burning out and have 1 or more symptoms of burnout, such as physical and emotional exhaustion.
4. The symptoms of burnout that I'm experiencing won't go away. I think about frustration at work a lot.
5. I feel completely burned out and often wonder if I can go on. I am at the point where I may need some changes or may need to seek some sort of help.

TABLE 1
Demographic Characteristics of Residency Programs and Respondents

Characteristics	Residents	Teaching Physicians	Programs
Total number of respondents	340	245	19
Family medicine	278	220	16
Internal medicine	27	6	1
Pediatrics	35	19	2
University-based	112	90	6
Community-based	228	155	13
Median age, y	29	42	
Percentage female	58	50	
Clinical FTE, %			
≤ 50%		29	
> 50%		71	
Overall, %			
Satisfied with work-life balance	51	41	47
Attributes work-life balance to EHR	83	88	85
Burnout	34	42	37
Attributes experience of burnout to EHR	67	83	75

Abbreviations: FTE, full-time equivalent; EHR, electronic health record.

0.22–0.49) and 3.7 times more likely to indicate that their EHR affected their work-life balance (OR = 3.7, 95% CI 2.1–6.7).

EHR and Burnout

A total of 37% of respondents (216 of 585) reported burnout. Of these, 75% (162 of 216) attributed their experience of burnout to their EHR to be *some* or *a lot*. TABLE 3B shows the associations between the survey factors, respondents' self-reported burnout, and reported impact of the EHR.

Like work-life balance, the out-of-work hours spent with the EHR was significantly associated with reported burnout, and reports on the effect of the EHR on burnout. Physicians who spent more than the median 6 hours per week on EHR work outside of normal clinic hours were nearly 3 times more likely to report burnout than those who spent 6 hours or less (OR = 2.9, 95% CI 1.9–4.4), and almost 4 times more

likely to attribute it to the EHR (OR = 3.9, 95% CI 1.9–8.2). Male respondents were less likely than female respondents to report burnout (OR = 0.64, 95% CI 0.43–0.95). Specialty, sex, faculty versus resident, or prior EHR experience were not independently associated with reporting that the EHR affected burnout.

Discussion

Overall, 53% of residents and teaching physicians in this study reported dissatisfaction with their work-life balance, and 37% reported burnout, with women more likely to report burnout. Among those who reported burnout, 75% attributed *some* or *a lot* of it to their use of the EHR. Spending more than the median 6 hours a week on after-hours EHR work was strongly associated with less satisfaction with work-life balance, a greater likelihood of burnout, and the perception that the EHR affects both work-life

TABLE 2
Electronic Health Records (EHRs) Used in Surveyed Programs by Years in Place and Weekly Outside-of-Work Hours Spent by Users

EHR	Users, n (%)	Programs, n (%)	Years EHR in Place at Program			Outside-of-Work Hours on EHR/Week		
			< 1	1–3	> 3	Min	Med	Max
EPIC	252 (43)	9 (47)	2	4	3	0	6	30
Cerner	176 (30)	5 (26)		2	3	0	6	25
Allscripts	106 (18)	3 (16)		1	2	0	6	18
Centricity	54 (9)	2 (11)		1	1	0	5	20
Overall			2	8	9	0	6	30

Abbreviations: Min, minimum; Med, median; Max, maximum.

TABLE 3A
Factors Associated With Work-Life Balance

Factor	Outcome: Satisfied With Work-Life Balance				EHR Affects Work-Life Balance			
	Bivariate		Multivariate		Bivariate		Multivariate	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Specialty = family medicine	0.93	0.59–1.4			2.6 ^a	1.5–4.6		
University-based program	1.02	0.72–1.4			1.2	0.78–2.1		
Current EHR in the practice								
< 1 year	1.28	0.77–2.2			0.74	0.38–1.5		
1–3 years	0.80	0.56–1.1			2.1 ^a	1.3–3.5		
> 3 years	1.12	0.81–1.6			0.58 ^a	0.36–0.92		
More than the median number of EHRs in last 10 years (2)	0.89	0.73–1.1			1.4	1.1–1.9		
More than the median out-of-work hours on EHR (6)	0.35 ^b	0.24–0.49	0.33 ^c	0.22–0.49	4.2 ^a	2.3–7.6	3.7 ^d	2.1–6.7
More than the median number of faculty in the practice (18)	0.99	0.97–1.0			1.02	1.0–1.05		
More than the median number of residents in the practice (29)	0.99	0.97–1.0			0.99	0.96–1.0		
Provider type = faculty	0.68 ^b	0.48–0.94			1.4	0.88–2.3		
Gender = male	1.43	1.0–1.9			0.72	0.45–1.1		
Older than the median provider age (32)	0.65 ^b	0.46–0.92			1.5	0.71–1.8		
Clinical FTE > 50%	0.65	0.37–1.2			1.8	0.81–3.9		
More than the median years of provider experience with any EHR (5)	0.95 ^b	0.91–0.99			1.0	0.95–1.1		

Abbreviations: EHR, electronic health record; OR, odds ratio; CI, confidence interval; FTE, full-time equivalent.

^a Bivariate significance for EHR effect on outcome.

^b Bivariate significance for outcome.

^c Multivariate significance for outcome.

^d Multivariate significance for EHR effect on outcome.

balance satisfaction and burnout. There were no significant differences in after-hours work among the 4 EHRs in this sample.

The reported burnout and dissatisfaction with work-life balance among the study population are consistent with published literature for primary care residents across the United States and provides information about teaching physicians in residency programs. It is not surprising that increased after-hours EHR work contributes to burnout and decreased work-life balance. The number of reported after-work hours spent on EHR use in this study (0–30 hours per week) reflects significant room for improvement independent of the use of a specific EHR vendor.

EHR proficiency training has been associated with improved job satisfaction and work-life balance.¹⁴ While increasing EHR proficiency may help, there are many potential reasons for physicians to spend after-hours on the EHR, including time management issues, inadequate clinic staffing, patient complexity, lack of scribes, challenges in mastering automatic dictation systems, cosigning resident notes, messaging, and preparing records for the next day. All of these issues

and their impact on burnout and work-life balance are potential areas for future research.

There are several limitations to this study. Our survey instrument lacks established validity evidence, and respondents may not have interpreted questions as we intended. The survey item regarding the effect on work-life balance satisfaction did not allow us to distinguish between the contribution of the EHR to satisfaction or dissatisfaction. Also, EHR systems cannot be compared across institutions. Finally, other factors contribute to burnout such as personality traits, lack of wellness strategies, and environmental factors, and we did not control for these potential confounders.

Conclusion

Our findings offer evidence that EHR work done after hours is negatively associated with self-reported satisfaction with work-life balance, and that physicians in teaching settings substantially attribute work-life balance satisfaction to their after-hours use of EHR. Our data also demonstrate a significant

TABLE 3B
Factors Associated With Burnout

Factor	Outcome: Burnout				EHR Affects Burnout			
	Bivariate		Multivariate		Bivariate		Multivariate	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Specialty = family medicine	0.59 ^a	0.37–0.94			3.2 ^b	1.5–6.6		
University-based program	1.1	0.74–1.5			1.2	0.61–2.3		
Current EHR in the practice								
< 1 year	0.91	0.52–1.6			0.75	0.29–1.9		
1–3 years	1.0	0.72–1.4			2.5 ^b	1.3–5.1		
> 3 years	1.0	0.74–1.4			0.48 ^b	0.26–0.91		
More than the median number of EHRs used in last 10 years (2)	1.0	0.84–1.3			1.3	0.92–1.9		
More than the median out-of-work hours on EHR (6)	2.6 ^a	1.8–3.8	2.9 ^c	1.9–4.4	4.9 ^b	2.3–10.1	3.9 ^d	1.9–8.2
More than the median number of faculty in the practice (18)	1.0	0.99–1.0			1.0	1.0–1.1		
More than the median number of residents in the practice (29)	1.0	0.99–1.0			0.97 ^b	0.94–0.99		
Provider type = faculty	1.4	1.0–2.0			2.5 ^b	1.3–4.9		
Gender = male	0.64 ^a	0.46–0.91	0.64 ^c	0.43–0.95	0.75	0.39–1.4		
Older than the median provider age (32)	1.4	0.99–2.0			1.7	0.89–3.4		
Clinical FTE > 50%	1.5	0.82–2.6			3.5 ^b	1.1–10.8		
More than the median years of provider experience with any EHR (5)	1.1	1.0–1.1			1.1	1.0–1.2		

Abbreviations: EHR, electronic health record; OR, odds ratio; CI, confidence interval; FTE, full-time equivalent.

^a Bivariate significance for outcome.

^b Bivariate significance for EHR effect on outcome.

^c Multivariate significance for outcome.

^d Multivariate significance for EHR effect on outcome.

relationship between after-hours EHR work and self-reported burnout that is attributed to the use of the EHR. Efforts to reduce after-hours time spent on EHR-related activities may reduce burnout and improve work-life balance for primary care residents and faculty.

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