

TITLE PAGE

Title: Electronic Health Record Availability and Anxiety Treatment in Office Based Practices

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ABSTRACT

Objective: This study compared the probability of receiving anxiety treatment during a physician visit between primary care practices with and without an electronic health record (EHR).

Methods: The 2007-2010 National Ambulatory Medical Care Surveys (NAMCS) was used to identify visits for anxiety based on reason for visit and diagnosis codes (N=290). The outcome was receipt of anxiety treatment. The independent variable was the presence of a fully functioning EHR. Logistic regression was used to conduct the analysis.

Results: Patients who were seen in EHR practices had lower odds of being offered antianxiety medication (AOR=.37, 95% CI=.15-.90, p=.028, mental health counseling (AOR=.43, 95% CI=.18-1.04, p=.061) and any anxiety treatment (AOR=.40, 95% CI=.15-1.05, p=.062).

Conclusions: EHRs may have a negative impact on the delivery of care for anxiety during primary care visits. Future studies should continue to monitor the impact of EHRs on delivery and quality of care.

INTRODUCTION

Nearly a third of all individuals experience an anxiety disorder during their lifetime (1). Anxiety disorders have a significant negative impact on psychosocial functioning, work productivity, overall quality of life, and impose a substantial economic burden (2). Despite the availability of effective treatments for anxiety disorders, more than a third of the individuals diagnosed with this condition are not offered treatment. Moreover, no significant increase in overall rates of treatment were observed between 1998 and 2009 (3). However, due to the recent growth in use of electronic health records (EHR's) by physician practices, the potential exists to increase rates of treatment for anxiety disorders. EHR's may provide this opportunity through their capacity to collect structured information relating to anxiety symptoms, and cue physicians to offer treatments, such as counseling or medication.

While the prevailing thought is EHRs may improve quality of care (4), empirical evidence does not provide universal support for this proposition. There is even some evidence of a negative association between EHR use and care quality (5). One of the potential reasons for these unintended consequences is that EHRs may replace physician-patient interactions with physician-computer interactions (6). More broadly, physicians' cognitive performance and use of information may be affected, positively or negatively, by EHRs and the clinical work processes in which they are implemented (7, 8). For example, EHR systems may be designed in a way that focuses physician's attention on treating general medical conditions rather than mental health conditions. Several studies have demonstrated that EHRs are associated with more frequent discussions between patients and physicians about biomedical issues but may lead to reduced psychosocial exchanges (9, 10). The purpose of this study is to test the association, at a visit level, between the receipt of anxiety treatment and the presence of EHRs in a physician practice. Accordingly the research question we examine is: Does the probability of receiving anxiety treatment during visits where the patient indicated the visit was for anxiety and the physician recorded

an anxiety diagnosis differ between visits made to a primary care practice with and without an EHR? We hypothesized that anxiety treatment would be less likely to be offered during visits to primary care practices with a fully implemented EHR compared to visits to primary care practices without a fully functioning EHR.

METHODS

The study uses data from the 2007-2010 National Ambulatory Medical Care Surveys (NAMCS), a nationally representative probability sample survey of physician office visits in the United States conducted annually by the National Center for Health Statistics (11). Physician office visits included in NAMCS are those delivered as outpatient care in freestanding, office-based practices including HMOs and non-federal government clinics. In this study we limited visits to primary care practices because this setting, in which physicians must manage numerous health concerns, may be particularly vulnerable to poor anxiety care (12). The NAMCS uses a three-stage sampling design selecting primary sampling units (PSUs), physician practices within PSUs, and patient visits within practices. Physicians were asked to record information on a standardized form for sampled office visits made over a randomly-selected one-week period during the year. This form contains up to three patient-reported reasons for the visit and up to three physician diagnoses per visit based on International Classification of Diseases codes, Ninth Revision (ICD-9), as well as medications and other treatment provided, ordered, or continued. During the 3 year period for this study, physician participation rates averaged 61.3%. In this study, visits for anxiety disorders (N=290) were identified as all visits where the reason for visit code was for anxiety (11000, 11050, 11301, 11305) and the physician recorded a diagnosis of 300.0 (anxiety state, unspecified), 300.01 (panic disorder), 300.02 (generalized anxiety disorder), 300.09 (other anxiety state), 300.2x (phobic disorders), 300.3 (obsessive compulsive disorder), 308.0 (acute stress reaction), 309.24 (transient adjustment reaction), 309.28 (adjustment reaction with mixed emotional features), and

309.81 (prolonged posttraumatic stress disorder). Characteristics of the weighted sample stratified by presence of an EHR are shown in supplemental online appendix Table 1.

Receipt of medication to treat anxiety was defined as physician notation that the patient was prescribed, ordered, supplied, administered, or continued on an antianxiety agent (benzodiazepines or buspirone) or any antidepressant used to treat anxiety disorders. Drugs included in the class of antianxiety agents were alprazolam, buspirone, chlordiazepoxide, clorazepate, diazepam, halazepam, lorazepam, and oxazepam. Antidepressant medications included amitriptyline, amoxapine, bupropion, citalopram, clomipramine, desipramine, doxepin, duloxetine, escitalopram, fluoxetine, fluvoxamine, imipramine, isocarboxazid, maprotiline, mirtazapine, nefazodone, nortriptyline, paroxetine, phenelzine, protriptyline, sertraline, tranylcypromine, trazodone, trimipramine, and venlafaxine. Receipt of mental health counseling was defined as physician notation that psychotherapy or mental health counseling was provided or ordered at the visit, which includes referrals. Therefore, any ongoing treatment of anxiety, regardless of whether it was initiated during the sampled visit, was captured in the visit data. Three dummy variables were created to indicate if the patient was currently being prescribed an antianxiety or antidepressant medication, was receiving any mental health counseling, and was receiving any anxiety treatment defined as either receiving medication or mental health counseling.

The NAMCS includes information about practice characteristics, EHR use and other computerized capabilities. Physicians were asked if their practice had an EHR, and if so, whether it was partially (i.e., some paper records) or fully (i.e., no paper records) implemented. In EHR implementation the final component implemented is physician functionality (13), therefore only practices that indicated full implementation of an EHR were defined as an EHR practice. Practices that reported partial EHR implementation or no EHR were defined as a non-EHR practice.

Among those visits included in this study's sample, we used multivariate logistic regression to compare the odds of being treated with antianxiety medication, mental health counseling, or a combined measure of anxiety treatment (medication and/or mental health counseling) in a practice with a fully implemented EHR system to non EHR practices. In the logistic regressions models we control for patient age, gender, race and ethnicity, type of insurance, the number of physician visits in the previous year, region, median income in the patient's zip code and the number of chronic conditions. The analyses also control for whether the practice is physician/privately owned, a community health center, HMO owned, or part of an academic medical center. All analyses use the survey procedures of Stata 13.0 to allow for estimates to be nationally representative and for standard errors to correctly account for the complex sampling strategy of the NAMCS, with 95% confidence intervals (95% CI) calculated using these weights for all estimated odds ratios. This study was certified by the University of Florida Institutional Review Board as exempt.

RESULTS

Of the 290 patient visits to a primary care practice that met the inclusion criteria, 38.8% (95% CI=29.3% - 48.3%) were to practices with a fully functioning EHR. Antianxiety/antidepressant medication was offered or provided during 77.0% of visits (95% CI=70.5% -83.5%), mental health counseling was offered or provided during 29.4% of visits (95% CI=21.5%-37.4%), and any treatment (medication and/or mental health counseling) was offered during 81.5% (95% CI=75.0%-88.0%) of visits. For details regarding visit characteristics refer to the online supplemental appendices.

Multivariate results for each outcome are shown in table 1. After controlling for patient and visit characteristics the odds of a patient being prescribed an antianxiety/antidepressant medication in an EHR practice were 63% lower compared to practices with no EHR (AOR = .37, 95% CI=.15-.91, p=.028). Patients seen in EHR practices had less than half of the odds of being offering mental health counseling

(AOR=.43, 95% CI=.18-.1.04, p=.061), as well as any anxiety treatment (AOR=.40, 95% CI=.15-.1.05, p=.062).

DISCUSSION

The results of this study revealed that having a fully implemented EHR was associated with a statistically significant, 63% reduction in the odds of receiving antianxiety medication. Moreover, our findings also show that having a fully implemented EHR was associated with a 57% and 60% reduction in odds for receiving mental health counseling or any anxiety treatment respectively, however, these results were only significant at the p=.06 level. Given the magnitude of the effect sizes and the negative consequences associated with anxiety disorders (2), our study highlights an important opportunity to improve health outcomes at a population level.

Although it was not possible with NAMCS data to ascertain why this phenomenon was occurring, clinical workflows embedded in EHRs may encourage physicians to focus on biomedical concerns, decreasing the likelihood that mental health counseling is offered or referred. Unintended consequences of EHRs and other health information technologies have been documented previously (6). Studies have also shown that EHR interfaces create additional work for physicians by forcing them to click through multiple options and screens and requires them to perform tasks that had previously been handled by other office staff, such as placing orders (8, 14). These changes in tasks and workflow can not only reduce the amount of time that physicians look at and interact with patients, but could also reduce a physician's cognitive performance as they are thinking about interacting with the computer instead of the patient's clinical condition. Regardless of the underlying mechanism, as this and other studies (15) continue to show national-level differences in care delivery between EHR and non-EHR practices, there is a compelling need for more rigorous EHR design, implementation, and evaluation to ensure EHRs' widely-promoted benefits to care quality and outcomes are achieved. Moreover, as EHR systems

are implemented in other countries, these nations should consider the implications of evidence from this and other studies (15) highlighting the potential for disparate clinical decision making and care quality between practices with and without EHRs.

Given the study's non-experimental design we are unable to draw a causal inference between EHR's and reduced rates of psychosocial treatment. It is possible that other unobserved differences between EHR and non-EHR practices may be driving the results. For example, patient treatment preference or disease severity could potentially be confounding the results. Specifically, it is possible that patients who prefer not to be treated with mental health counseling or who have lower levels of anxiety severity self-select into EHR practices, but this explanation seems unlikely. Another limitation arises due to the likelihood that patients with a previous diagnosis of an anxiety disorder were not identified due to coding errors or missed diagnoses. However this study sought to assess the relationship using visits where the patient indicated the visit was for anxiety and the physician clearly identified the patient as having an anxiety disorder. Finally the ability to control for patient complexity and severity was restricted because the NAMCS data has limited clinical measures. Despite the NAMCS limitations, the data NAMCS does provide is the most comprehensive national survey of EHR use in physician office settings available.

CONCLUSIONS

Findings from this study provide additional evidence highlighting the potential negative consequences associated with the use of EHRs, particularly for patients with mental health conditions. While there are many probable advantages to EHR use, there remains a need to better understand how EHRs impact workflow and provision of clinical care so that EHRs can be designed to avoid unintended negative consequences. In the case of anxiety, adding guideline-based screening and treatment tools into EHRs in the form of decision support that aligns with clinicians' workflows and decision making process could

help increase appropriate treatment in EHR practices. Adding screening measures may also be particularly valuable in improving care delivery for anxiety disorders in primary care practices. Finally, given that a large majority of physician practices now use EHRs, future studies should continue to monitor the impact of EHRs on the provision and quality of care while also identifying the most appropriate EHR design features and implementation strategies that maximize positive impacts on clinical care.

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Table 1

Table 1 Association of EHR use with Odds of receiving Antianxiety/antidepressant medication, Mental health counseling, or Any anxiety treatment, among 290 persons with self-reported and provider diagnosed anxiety ^a

| Variable | OR | 95% CI | p |
|---|-----------|---------------|----------|
| Antianxiety/antidepressant medication (reference: no antianxiety/antidepressant medication) | .37 | .15-.90 | .028 |
| Mental health counseling (reference: no mental health counseling) | .43 | .18-1.04 | .061 |
| Any anxiety treatment (reference: no anxiety treatment) | .40 | .15-1.05 | .062 |

^a Analysis limited to visits at a primary care practice by patients with a reason visit code and a physician diagnosis of anxiety. Controlling for patient age, gender, race/ethnicity, type of insurance, number of previous primary care visits, number of chronic conditions, region, median income in patient's zip code