Conscientious EKG Use During Annual Screening Physicals in Multiple Primary Care Offices in Connecticut

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Abstract

Purpose:
To evaluate whether primary care physicians in Connecticut order EKGs conscientiously based on ASCVD risk scores during annual screening exams.

Methods:
Retrospective design. Last ten annual physicals at seven primary care sites were analyzed for EKG use and ASCVD risk scores. Results were analyzed using Fisher's Exact test.

Results:
Fifty-two subjects included. No-EKG group had ten subjects (six female), mean age 51.3. EKG group had 42 subjects (27 female), mean age 56.8. Mean 10-year ASCVD Risk Score was 17.34% and 11.30%, for No-EKG and EKG groups respectively. No significant differences between EKG and No-EKG groups when grouped by 10% ASCVD risk (Exact p=0.725). No significant differences when EKG and No-EKG groups were grouped by No-Risk-Factors and Any-Risk-Factors (Exact p=0.190).

Discussion:
At observed sites, 60% of all EKGs obtained at annual physicals were performed on low-risk patients. Substantial variation in ordering patterns exists between practices. Continued physician and patient education is needed to improve adherence to Choosing Wisely recommendations.

Introduction

The Choosing Wisely Program has provided much needed guidance and leadership regarding the use of unnecessary testing in medical practice. In 2010, Dr. Howard Brody called for a list of procedures from specialty societies that "the most money could be saved…without depriving any patient of meaningful medical benefit [1]." Such cost-cutting measures reflected the spirit of healthcare reform surrounding the Affordable Care Act (ACA). About 2 years after Dr. Brody's plea, in 2012 the Choosing Wisely camping was formally launched by the American Board of Internal Medicine Foundation, Consumer Reports, and nine specialty societies [2]. The recommendations from Choosing Wisely have not only cut costs in the healthcare system, but also have improved communication between physicians and patients. One recommendation from the American Academy of Family Physicians (AAFP) in Choosing Wisely campaign advises against ordering resting or exercise electrocardiogram (EKG) to screen for coronary heart disease in low-risk patients (USPSTF D recommendation).

Choosing Wisely: EKGs and Exercise Stress Tests

Scan this QR Code to go to the link

http://www.choosingwisely.org/patient-resources/ekgs-and-exercise-stress-tests/

An EKG is a commonly ordered test that is safe, quick, and relatively inexpensive (around $50), making it a common procedure performed in the outpatient setting. Although EKGs may be cheap and safe, errors in EKG testing can lead to further cardiac imaging that may be harmful to the patient. According to one study done in the UK, coronary angiography may cause up to 280 cases of cancer per million examinations performed [3]. One potential source for unnecessary EKG testing is during an annual physical examination. With more access to healthcare through legislation such as the Affordable Care Act, it remains possible that physicians could be ordering EKGs out of habit as the number of their respective patients potentially increases. Using an atherosclerotic cardiovascular disease (ASCVD) risk calculator, with low-risk defined as 10-year ASCVD score <10%, we determined whether physicians at multiple primary care sites in Connecticut were ordering unnecessary EKGs during annual physical exams.

Purpose

To evaluate whether primary care physicians in Connecticut are ordering EKGs appropriately during annual screening exams based on ASCVD risk scores as outlined by the Choosing Wisely campaign.

Methods

This was a community retrospective study. Data was collected from seven primary care physician offices in Connecticut. Data from the last ten annual physicals at each practice was collected via electronic medical health records and paper charts. A total of 65 annual physicals were analyzed. Data gathered included information on whether or not a patient received an EKG, African-American race, history of hypertension, coronary artery disease, diabetes, smoking status, HDL, and LDL levels. The ASCVD risk score is used to assess the 10-year risk for developing cardiovascular disease. Patients were excluded if the information obtained was insufficient to calculate an ASCVD score. Data entry and statistical analysis was performed on Prism 7 (GraphPad Software, LaJolla, CA). ASCVD risk score was calculated using the Pooled Cohort Equations. Fisher's exact test was used to determine statistically significant differences in EKG testing between groups that had a greater than 10% ASCVD score and groups with a less than 10% ASCVD score. Additionally, subjects were split into groups with no identifiable risk factors that warrant EKGs and groups with any risk factors.

Results

Table 1: Demographics

	No EKG	EKG
Patients	10	42
Male	4 (40.0%)	15 (35.7%)
Female	6 (60.0%)	27 (64.3%)
Age (Mean)	51.3	56.8
African American (%)	1 (10.0%)	7 (16.7%)
Mean Total Cholesterol	187.4	194.5
Mean HDL	51	58.6
Mean Systolic Blood Pressure	137.4	128
Receiving treatment for HTN (%)	5 (50.0%)	22 (52.4%)
Diagnosed with Diabetes (%)	2 (20.0%)	3 (7.1%)
Current smoker (%)	2 (20.0%)	9 (21.4%)
10-year ASCVD risk score	17.34%	11.30%
Optimal 10-year ASCVD Score	4.96%	5.22%
< 10 % Risk (%)	5 (50.0%)	25 (59.5%)
>10% Risk (%)	5 (50.0%)	17 (40.5%)

A total of 52 subjects were included in our study. The 13 participants with inadequate data to calculate ASCVD Risk Scores were excluded. The No-EKG group had ten subjects, mean age 51.3, four (40.0%) male, six (60.0%) female, and mean 10-year ASCVD risk score of 17.34%. Five (50.0%) subjects in the No-EKG group had less-than 10% 10-year ASCVD risk score and five (50.0%) had greater than 10% risk. The EKG group consistent of 42 subjects, mean age was 56.8, 15 (35.7%) male, 27 (64.3%) female, and mean 10-year ASCVD risk score of 11.30%. The EKG group had 25 subjects (59.5%) with less-than 10% 10-year ASCVD risk score and 17 subjects (40.5%) with greater than 10% risk. There were no statistically significant differences between groups that received an EKG versus those that did not when ASCVD risk was cut-off at 10% risk (Exact p=0.725). When EKG and No-EKG groups were separated by No-Risk-Factors and Any-Risk-Factors, there were no statistically significant differences between the groups (Exact p=0.190).

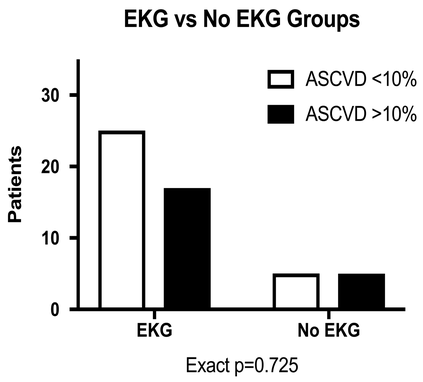

Figure 1

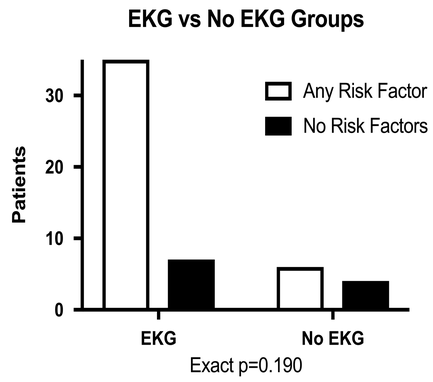

Figure 2

Discussion

In this study of primary care offices in Connecticut, we found that 60% of all EKGs obtained at annual physicals were performed on low-risk patients and were unnecessary per ASCVD risk criteria. Expressed differently, 83% of low-risk patients received an EKG. These findings support previous work showing high rates nationally of EKGs in low-risk patients despite recommendations against this practice. Previous studies have found the rate of EKGs in low-risk patients to be between 9% and 22% [4-6]. The frequency of potentially non-indicated EKG use was noticeably higher in our study; however, previous studies did not use ASCVD < 10% as their criterion for low-risk, instead classifying patients with hypertension or diabetes as high-risk.

This high rate of testing may signify a lack of understanding of the true cost of an unnecessary EKG. A 2011 study estimated $16.6 million in direct costs due to unnecessary annual EKGs [5]. The costs associated with downstream cardiac care are even more significant. A recent study found that annual EKGs in a low-risk population are associated with increased rate of cardiac consultations (OR 5.4), transthoracic echocardiogram (OR 7.1), stress test (OR 6.5), and nuclear stress test (OR 4.2) within 90 days [4]. A 2014 study estimated $502 million in costs associated with unnecessary stress tests with and without imaging, although not all of these resulted from unnecessary EKGs [7].

Our results suggest that physicians were ordering EKGs based on the presence of discrete risk factors instead of the calculated risk of coronary disease. This may reflect a lack of awareness of the recommendation to use ASCVD risk scores or difficulty in implementing this recommendation into practice. There was also substantial variation in ordering patterns between practices, with several physicians that ordered EKGs on all of their patients. This indicates that future interventions may be most effective if they can target high-volume physicians. Electronic health record alerts have been implemented in primary care setting to increase hepatitis c screening by five-fold [8]. Future studies should focus on the impact of electronic health record alerts on screening EKG ordering in the primary care setting.

Our analysis is subject to several limitations. Small sample size reduced the power of the study. We were unable to determine whether EKGs were obtained for screening or for an alternate indication. Patients with inadequate data to calculate ASCVD risk score were not included. Some patients also may have received an EKG in the year preceding the annual physical that was not captured.

In conclusion, our study shows a high rate of low-risk patients receiving screening EKGs in multiple Connecticut primary care practices. Continued physician and patient education and other interventions will be needed to improve adherence to Choosing Wisely recommendations.

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Author Contribution

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Conflict of Interest

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