

Screening for Abdominal Aortic Aneurysms in Outpatient Primary Care Clinics



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ABSTRACT

BACKGROUND: The US Preventive Services Task Force (USPSTF) guidelines recommend one-time abdominal aortic aneurysm ultrasound screening for men aged 65 to 75 years who ever smoked. Reported screening rates have been 13% to 26% but did not include computed tomography, magnetic resonance imaging, and nonaortic abdominal ultrasound, which provide adequate visualization of the aorta. The objective of this study was to evaluate rates of screening performed intentionally with ultrasound and incidentally with other abdominal imaging, determine rates of redundant screening, and evaluate patient and physician characteristics associated with screening.

METHODS: Cross-sectional study of patient encounters in 2007 and 2012 to determine abdominal aortic aneurysm screening trends in primary care practices. Participants included all patients who were seen in a primary care office and were eligible for screening by USPSTF guidelines. The primary outcome was percentage of eligible patients screened for abdominal aortic aneurysm by ultrasound or other abdominal imaging.

RESULTS: There were 15,120 patients eligible for screening in 2007, and 22,355 in 2012. Screening with ultrasounds increased from 3.6% in 2007 to 9.2% in 2012. Screening with any imaging that included the aorta increased from 31% in 2007 to 41% in 2012. Of 2595 screening ultrasounds performed in either cohort, 800 (31%) were performed on patients who had already undergone another imaging modality. Of 153 physicians who had >50 eligible patients, rates of abdominal aortic aneurysm screening ranged from 7.5% to 79% (median 39%, interquartile range 31%-47%), and rates of ultrasound screening ranged from 0% to 47% (median 6.3%, interquartile range 3.6%-11.4%). Physician characteristics positively associated with screened patients included female sex (odds ratio [OR] 1.32; 95% confidence interval [CI], 1.12-1.54), specialty (Internal Medicine vs Family Medicine: OR 1.32; 95% CI, 1.14-1.54), and location (academic medical center vs family health center: OR 1.30; 95% CI, 1.04-1.62).

CONCLUSIONS: Abdominal aortic aneurysm screening rates remain below 50%, but are improving over time. Screening by individual physicians varied widely, indicating substantial opportunity for educational interventions. Most abdominal aortic aneurysm screening is completed incidentally, and some patients later undergo unnecessary ultrasound screening. Before ordering screening, physicians and electronic health record-based reminder tools should ensure that the aorta has not been previously visualized.

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Abdominal aortic aneurysm affects 1.4% of the US population aged 50-84 years, with 9000-14,000 deaths attributed

annually.^{1,2} Once an abdominal aortic aneurysm ruptures, estimated mortality is 80%.³ Therefore, management

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Authorship: MBR and ALR had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of

the data analysis. All authors had access to the data and a role in writing the manuscript.

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strategies focus on early detection through screening, which has been shown to reduce mortality from abdominal aortic aneurysm rupture.⁴

In 2005, the US Preventive Services Task Force (USPSTF) recommended one-time abdominal aortic aneurysm ultrasound screening for all men aged 65 to 75 years who have ever smoked, made no recommendation for men aged 65 to 75 who have never smoked, and recommended against screening women for abdominal aortic aneurysm.⁵ The preferred screening test for abdominal aortic aneurysm is an abdominal ultrasound, which is 95% sensitive and nearly 100% specific for detecting abdominal aortic aneurysm in asymptomatic patients.⁶⁻¹⁰

Despite insurance coverage for screening under the Screening Abdominal Aortic Aneurysms Very Efficiently (SAAAVE) Act of 2006, observed rates of ultrasound screening range from 8.2% to 12.9%.¹¹⁻¹³ Potential explanations for low screening rates include lack of familiarity with abdominal aortic aneurysm screening and the large number of other screening examinations recommended to this same cohort of patients. As a result, physicians or patients may prioritize other screening examinations (eg, colorectal cancer screening) over screening for abdominal aortic aneurysm.

Although ultrasound is the recommended screening test, a number of other imaging modalities, including computed tomography (CT) and magnetic resonance imaging (MRI), can adequately assess the aorta for abdominal aortic aneurysm. If the definition of screening includes imaging of the abdomen performed for any indication, screening rates may be higher than previously reported. Moreover, some patients may be screened intentionally with ultrasound after having already had their aorta imaged previously.

Knowledge of both physician and patient characteristics associated with screening may assist in targeted approaches to increase screening and decrease duplicate testing. The objective of this study was to determine trends in abdominal aortic aneurysm screening at a large integrated health care system and to identify patient and physician characteristics associated with abdominal aortic aneurysm screening.

METHODS

We performed a retrospective chart review of all patients who had visited a primary care physician at the Cleveland Clinic main campus and family health centers in northeast Ohio (Internal Medicine or Family Medicine) in the calendar years of 2007 (Cohort 1) or 2012 (Cohort 2) and met

screening criteria by the 2005 USPSTF guidelines. This included all men age 65-75 years that had ever smoked. At the time of this study, the Cleveland Clinic did not employ any electronic health record-based reminder system for abdominal aortic aneurysm screening. We queried the electronic health record for the following data to assess patient factors associated with screening: age, smoking status (current or former), number of physician visits during the calendar year, record of a periodic health examination in the calendar year, family history of abdominal aortic aneurysm, and other age-appropriate preventive care including lipid panel within 5 years of visit, colonoscopy within 10 years of visit, and pneumococcal vaccine. We also recorded the following physician-level data: years in practice, sex, practice setting (academic or community), and specialty (Internal or Family Medicine). All radiographic studies performed after the age of 50 years were noted. The primary outcome was completion of abdominal aortic aneurysm screening

by the end of the calendar year in 2007 and 2012 in order to assess trends in screening over time. Patients were considered to have been screened if they underwent a CT scan of the abdomen or pelvis, MRI study of the abdomen or pelvis, or a renal or mesenteric vascular ultrasound, all of which visualize the aorta. The secondary outcome was completion of abdominal aortic aneurysm screening with a designated screening ultrasound. Redundant screening was defined as screening with ultrasound subsequent to another abdominal imaging test.

Statistical Analysis

Screening rates were summarized as proportions along with 95% confidence intervals overall and for each cohort. Patient characteristics were summarized as frequencies and percentages by screening status, and the chi-squared test was used by different screening groups to compare these characteristics. For physician characteristics, analysis was limited to physicians with >50 eligible patients in the data set.

To determine the relationship between screening and physician-level or patient-level characteristics, the generalized linear mixed-effects models were used. Each model contained one characteristic as a covariate and random intercept to account for potential correlation among data from patients seen by the same provider. All analyses were conducted in SAS 9.2 (SAS Institute Inc, Cary, NC) and statistical significance was established with a 2-sided *P*-value < .05.

CLINICAL SIGNIFICANCE

- Seven years after publication of the US Preventive Services Task Force guidelines, abdominal aortic aneurysm screening rates remain low (9.2% in 2012), although they are higher when considering all studies that visualize the aorta (41.2%).
- Rates are increasing with time. Thirty-one percent of patients who were screened had already had a study that would have visualized this finding.
- Repeat screening may become a problem as organizations implement information technology solutions that prompt physicians to screen.

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