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Abdominal Aortic Aneurysm Screening and Surveillance – can we do better? A QI Project

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Abstract

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Background:

Abdominal aortic aneurysm (AAA) has a global prevalence of about 5% and its first presentation can be acute and fatal. USPSTF recommends one time screening for men aged 65 to 75 years who have ever smoked. We designed a study to evaluate the effect of resident education on AAA screening ordered in our outpatient primary care clinic.

Methods:

All men aged 65 to 75 years of age attending appointments in the resident run clinic were included in the study. Pre-intervention data was collected retrospectively for 5 weeks which included patient demographics and the rates of appropriate AAA screening and surveillance. This was followed by an educational intervention consisting of weekly teaching sessions in the clinic regarding USPSTF guidelines for AAA screening for 5 weeks. We collected post intervention data for five weeks and analyzed the data using SPSS 19.

Results:

107 and 144 patients were studied in the pre-intervention and the post intervention group respectively. The rates of AAA screening did not increase but rather showed a non-significant decrease in the number of abdominal ultrasounds ordered for eligible patients during a clinic visit (9.8% vs 12.7%). However, among patients who qualified for AAA screening, AAA screening was discussed much more during the office visit post intervention as compared to pre intervention (17.4% vs 3.8%).

Discussion:

Our study shows that resident education might not be enough to drive a significant improvement in AAA screening rates however it did improve the rates of discussion of AAA screening during clinic visits. No prior study has evaluated the effect of sole resident education on AAA screening rates. However, a few studies have reported findings after an electronic health reminder intervention but with varied results.

Keywords

Abdominal aortic aneurysm (AAA), Screening guidelines, Resident education

Conflict of Interest Statement

The authors declare that there is no conflict of interest.

ARTICLE

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Abstract

Background: **Abdominal aortic aneurysm (AAA) has a global prevalence of about 5% and its first presentation can be acute and fatal. USPSTF recommends one time screening for men aged 65−75 years who have ever smoked. We designed a study to evaluate the effect of resident education on AAA screening ordered in our outpatient primary care clinic.**

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Abdominal aortic aneurysm (AAA) is typically diagnosed when the abdominal aortic diameter is >3 cm.[1] It has a pooled global prevalence of about 4.8% with the most common age group being men aged greater than 65 years.[1] The risk factors for this disease include hypertension, cigarette smoking, coronary artery disease, dyslipidemia, stroke or renal disease.[1] It is often asymptomatic and its rupture, which is usually acute and fatal, can be its first presentation.[2] A meta-analysis done in 2019[3] for United States Preventive Services Task Force (USPSTF) showed that screening in men older than 65 years of age resulted in AAA related mortality reduction of about half reducing also AAA related ruptures and emergency surgical procedures. However, it did not show any significant reduction in all-cause mortality.[3] These findings along with the meta-analysis done in 2005[4] and 2014[5] are the basis for USPSTF continuing to recommend one time screening for all men aged 65−75 who have ever smoked in their life. Ultrasounds has a high specificity and sensitivity (100% and 95% respectively) for detecting AAA and they are safe and inexpensive.[6] Screening does not seem to be associated with significant physical and psychological harm.[4]

Despite the ease of screening, research indicates a lack of compliance with the advised AAA screening recommendations. One study in 2015 showed that

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rates of screening in 2012 with an ultrasound was 9.2% in all eligible patients and 41% of eligible patients had screening with any other imaging that included the aorta.[7] One recent study in 2022[8] showed that with 1 year of follow up only 7% eligible patients had AAA screening done.

Our study's main aim was to educate the residents regarding the USPSTF guidelines for screening for Abdominal Aortic Aneurysm (AAA) in the male population in the outpatient setting and compare this intervention's effectiveness on the rates of AAA screening.

1. Methods

1.1. Study design

We secured Institutional Review Board approval from our hospital to conduct this study at a community-based urban resident-run clinic. We did a retrospective chart review of male patients aged 65−75 years of age. We compiled a list of all the patients who attended their appointment in the clinic for 5 weeks. The male patients in the age group of 65−75 years were then included in the study from this list. We included patient with any smoking history in the analysis. This was done so that we could also study the ordering rates of AAA surveillance, in addition to AAA screening, for patients with history of AAA based on prior imaging among patients with any smoking history. Subsequently, we conducted weekly teaching sessions in the clinic regarding current USPSTF guidelines for AAA screening and regarding AAA surveillance for known AAA. These sessions, consisting of half-hour lectures held once a week for five weeks, were attended by residents during their clinic block, irrespective of their training year. Our residents cycle for one week in the ambulatory clinic every 5 weeks thus allowing the opportunity for every resident to attend the session at least once. We also conducted a short teaching session during one of our academic half days where most of our residents are present. These teaching sessions were done by the authors of the study i.e., chief residents and senior residents. After five weeks, we collected the post intervention data for five weeks again. We compared the pre- and post-intervention data to compare the effectiveness of academic training on the rates of AAA screening.

1.2. Statistical analysis

Comparisons of the descriptive and AAA screening data for the pre-intervention and post-intervention phases were made using t-tests, chi-square tests, 95%CI, and OR. Statistical significance was based on independent two-sided tests with an alpha error of 5%. Statistical analyses were conducted using IBM SPSS Statistics version 19.0.

2. Results

One hundred seven patients were studied in the pre-intervention group, and one hundred and forty-four in the post-intervention group. The baseline characteristics of these patients are in Table 1. The most notable difference was in the racial categories with the most prominent race being Latino/Hispanic (40.4%) in the pre-intervention group while in the post intervention group an almost equal percentage of White (36.6%) and African American (35.9%) were prominent. More patients in the post-intervention group had a history of prior abdominal

Table 1. Demographic characteristics of the study.

	Pre-intervention (N = 107) (N (%)*)	Post-Intervention (N = 144) (N (%)*)	P value
Age, Mean (SD)	69.5 (SD = 3.182) (65−75)	65.6 (SD = 2.979) (65−75)	0.173
Ethnicity (%)			<0.01
White	22 (20.2)	53 (36.8)	
African American	25 (22.9)	51 (35.4)	
Latino	44 (40.4)	31 (21.5)	
Asian	4 (3.7)	4 (2.8)	
Others	12 (11)	5 (3.5)	
Smoking status			0.052
Any smoking history	80 (74.7)	91 (63.2)	
Non-Smokers/Never Smokers	27 (25.2)	53 (36.8)	
History of Previous Abdominal Imaging			0.022
Yes	33 (30.8)	65 (45.1)	
No	74 (69.2)	79 (54.9)	
History of Previous AAA			0.305
Yes	2 (1.9)	6 (4.2)	
No	105 (98.1)	138 (95.8)	

*N%: Percentage

imaging (45% vs 31%). One of the few interesting findings in our study was that about 98/251 (39%) of patients had gotten abdominal imaging in the past commenting on the aorta.

2.1. AAA screening/surveillance

During our pre-intervention phase about 73.8% of patients qualified for AAA screening while 63.9% of patients were eligible for AAA screening in the post-intervention phase. Most of the patients who did not qualify for AAA screening were never smokers except for one patient who did not qualify as he had abdominal imaging recently commenting on the size of the abdominal aorta. The rates of AAA screening and surveillance did not increase but rather showed a non-significant decrease in the number of abdominal ultrasounds ordered for eligible patients during a clinic visit (9.8% vs 12.7% OR: 0.76 (0.29−1.97)). (Table 2). However, among patients who qualified for AAA screening, AAA screening was discussed much more during the office visit post intervention as compared to pre-intervention (17.4% vs 3.8%). In contrast, other health care maintenance (excluding AAA screening/surveillance) discussion regarding all recommended screenings was held more during the post-intervention phase significantly (71% vs 49%). This enumerates all patients whose clinic visit notes indicated that any other healthcare maintenance screening such as colonoscopy, PAP smears, DEXA scan or Mammograms was discussed during the visit. These patients did not have extra appointment time nor were these specifically annual physical visits. This points to a fact that overall other healthcare maintenance and AAA screening/surveillance was discussed more frequently in the post intervention group even though the rate of AAA screening/surveillance orders shows a non-significant decrease.

In our study only 8 patients had a prior diagnosis of AAA out of which 3 qualified for AAA surveillance exam at the time of office visit however it was discussed and ordered only in 1 patient.

3. Discussion

In our study, the results show that resident education might not be enough to drive a significant change in improving screening rates for AAA. AAA screening discussions during office visits are even more important right now. The COVID pandemic has affected the AAA screening rates as in a survey in 2020[9] showed that only 59% of men stated that they would definitely attend their surveillance scan appointments compared to greater than 90% rate before COVID 19. Only 19/171 patients in our study who qualified for AAA screening had ultrasounds ordered which is comparable to rates in the literature.[8,10]. One study[7] suggested that the rate of AAA screening is higher in academic centers than family health centers suggesting that our reported rate might be even higher than the general community in our area. However, an important finding to keep in mind is that the rate of discussion of AAA screening or surveillance did improve significantly from 3.8% to 17.4%. This might hint that other factors, despite having a discussion about AAA screening/surveillance during clinic visit, might also be responsible for the low rate of AAA screening/surveillance ordering.

We were not able to find any previous study that evaluated that effect of only resident education on the screening rates for AAA. One of the other methods that have been implemented in this

Table 2. Results of the study.

	Pre-intervention (N = 107) (N (%))	Post-Intervention (N = 144) (N (%))	P value
Patients qualifying for AAA Screening/Surveillance			0.094
Yes	79 (73.8)	92 (63.9)	
No	28 (26.2)	52 (36.1)	
Other Healthcare maintenance discussed during office visit			<0.01
Yes	52 (48.6)	103 (71.5%)	
No	55 (51.4)	41 (28.5%)	
AAA screening/surveillance discussed during office visit of the patients who qualified			<0.01
Yes	3 (3.8)	16 (17.4)	
No	61 (77.2)	44 (47.8)	
Discussed during previous visit	15 (19.0)	32 (34.8)	
AAA screening/surveillance ordered during office visit of the patient who qualified	79 total	92 total	0.567
Yes	10 (12.7)	9 (9.8)	
No	69 (87.3%)	82 (90.2)	

endeavor is the use of electronic health care reminders. One of the earlier studies evaluating the effect of electronic health care reminders in improving AAA screening was done in 2010[11] and it showed a remarkable improvement in screening rates to 56%. However, in one study done by Eaton el al.,[12] they found that even with the use of physician reminders the screening rate for eligible patients was only 12.9%. Another study by Sypert et al.[10] compared the effectiveness of electronic reminders in residents showed that the screening rate improved by 27.8% after 1 year. Thus, the use of electronic reminders continues to show somewhat of a mixed response.

Another set of interesting findings in one of the studies[12] was that the screening was more likely to be ordered if the total duration of the visit was longer. This suggests that preventative services are more likely to be addressed if more time is spent per patient. Another barrier that was mentioned was that AAA screening is usually once in a lifetime and other screenings which might be more pivotal and regular might take precedence over it. Our study, as previously mentioned, does however report increased discussion during clinic visits regarding AAA screening/surveillance. However, this did not translate into a higher rate of appropriate AAA screening/surveillance orders. The healthcare maintenance discussion during visits increased in the post-intervention group which could suggest that maybe other screening tests took precedence over AAA screening resulting in lower AAA screening order rates despite increased AAA screening discussion. The patients in our study did not have extra appointment time nor were they specifically coming for annual physical visits.

Racial disparities can also play a role here and in the study by Anjorin et al.,[8] blacks were 27% less likely to receive AAA screening than white patients. Our post intervention population did have a higher African American population and it is unclear if that led to an attrition of the positive effects of resident education.

Incidental imaging of the abdominal aorta appears to have a meaningful contribution to overall AAA screening as many patients will get routine imaging of the abdomen at least once in their life. These used to be the primary method of detection of AAAs before the guideline recommended ultrasound was suggested. In one study in 2022[13] almost 18% of eligible patients had undergone incidental imaging of their abdominal aorta as compared to 39% of patients in our study. Ruff et al.[7] reported that 31% of screening ultrasounds performed in their study were unnecessary as these patients had already undergone imaging in other modalities that included the abdominal aorta. These findings urge to keep in mind the effect of prior imaging and its role in ordering AAA screening.

It is also worth exploring the involvement of ancillary staff in screening programs in improving the screening practices for abdominal aortic aneurysm. In fact, in the study by Eaton et al.[12] up to 70% of the providers indicated that a nurse directed ordering system would improve the rates of AAA screening. Another interesting idea is the use of telemedicine in screening programs for abdominal aortic aneurysms.[14]

There is a clear area of improvement in the rates of AAA screening in our community, and we are currently planning to conduct a second phase of this study, where we will implement an electronic health reminder to help residents improve screening rates.

Our study has multiple limitations. Firstly, it was performed over the 3-month period in one tertiary care center in the outpatient clinic hence the results might not be something we can generalize. It is also possible that the screening rates would improve over a longer study period as it evident in the study done in a VA hospital[15] where the screening rate improved to 73.7% when the patients were followed up for their full 10 year eligibility period. There was no control group in this study that also limits generalizability. Resident knowledge and comfort in counselling patients on AAA screening was also not studied in our study.

4. Conclusion

Continued efforts are required to augment AAA screening rates in our society. Our study showed that robust educational interventions might not be sufficient. Electronic reminders explored in other studies in the past might be one way of increasing AAA screening rates. We are planning to do a second phase of this study after implementing an electronic reminder in our system to study its effect.

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Conflicts of interest

The authors declare that there is no conflict of interest.

References

1. Li X, Zhao G, Zhang J, Duan Z, Xin S. Prevalence and trends of the abdominal aortic aneurysms epidemic in general population–a meta-analysis. *PLoS One*. 2013;8(12):e81260. Published 2013 Dec 2. https://doi.org/10.1371/journal.pone.0081260.
2. Chaikof EL, Brewster DC, Dalman RL, et al. The care of patients with an abdominal aortic aneurysm: the Society for Vascular Surgery practice guidelines. *J Vasc Surg*. 2009;50(4 Suppl):S2–S49. https://doi.org/10.1016/j.jvs.2009.07.002.
3. Guirguis-Blake JM, Beil TL, Senger CA, Coppola EL. Primary care screening for abdominal aortic aneurysm: updated evidence report and systematic review for the US preventive services Task Force. *JAMA*. 2019;322(22):2219–2238. https://doi.org/10.1001/jama.2019.17021.
4. Fleming C, Whitlock EP, Beil TL, Lederle FA. Screening for abdominal aortic aneurysm: a best-evidence systematic review for the U.S. Preventive Services Task Force. *Ann Intern Med*. 2005;142(3):203–211. https://doi.org/10.7326/0003-4819-142-3-200502010-00012.
5. Guirguis-Blake JM, Beil TL, Senger CA, Whitlock EP. Ultrasonography screening for abdominal aortic aneurysms: a systematic evidence review for the U.S. Preventive Services Task Force [published correction appears in Ann Intern Med. 2016 Jan 5;164(1):70-2]. *Ann Intern Med*. 2014;160(5):321–329. https://doi.org/10.7326/M13-1844.
6. Bains P, Oliffe JL, Mackay MH, Kelly MT. Screening older adult men for abdominal aortic aneurysm: a scoping review. *Am J Men's Health*. 2021;15(2):15579883211001204. https://doi.org/10.1177/15579883211001204.
7. Ruff AL, Teng K, Hu B, Rothberg MB. Screening for abdominal aortic aneurysms in outpatient primary care clinics. *Am J Med*. 2015;128(3):283–288. https://doi.org/10.1016/j.amjmed.2014.10.036.
8. Anjorin AC, Greiner MA, Vemulapalli S, Svetkey L, Southerland KW, Bosworth HB. Underutilization of guideline-based abdominal aortic aneurysm screening in an academic health system. *Ann Vasc Surg*. 2022;83:184–194. https://doi.org/10.1016/j.avsg.2021.11.022.
9. Selway WG, Stenson KM, Holt PJ, Loftus IM. Willingness of patients to attend abdominal aortic aneurysm surveillance: the implications of COVID-19 on restarting the National Abdominal Aortic Aneurysm Screening Programme. *Br J Surg*. 2020;107(13):e646–e647. https://doi.org/10.1002/bjs.12059.
10. Sypert D, Van Dyke K, Dhillon N, Elliott JO, Jordan K. Improved resident adherence to AAA screening guidelines via an electronic reminder. *J Healthc Qual*. 2017;39(1):e1–e9. https://doi.org/10.1097/JHQ.0000000000000072.
11. Kravetz JD, Carbone VG, Federman DG. Improving abdominal aortic aneurysm screening with an electronic clinical reminder. *Am J Med*. 2010;123(10):899–901. https://doi.org/10.1016/j.amjmed.2010.04.028.
12. Eaton J, Reed D, Angstman KB, et al. Effect of visit length and a clinical decision support tool on abdominal aortic aneurysm screening rates in a primary care practice. *J Eval Clin Pract*. 2012;18(3):593–598. https://doi.org/10.1111/j.1365-2753.2010.01625.x.
13. Olmstead C, Wakabayashi AT, Freeman TR, Cejic SS. Abdominal aortic aneurysm screening in an academic family practice: short-term impact of guideline changes. *Can Fam Physician*. 2022;68(12):899–904. https://doi.org/10.46747/cfp.6812899.
14. Sterpetti AV. Telemedicine for screening and follow-up of abdominal aortic aneurysm. *J Vasc Surg*. 2022;75(4):1497. https://doi.org/10.1016/j.jvs.2021.11.080.
15. Leach JR, Shen H, Huo E, et al. Impact of implicit abdominal aortic aneurysm screening in the veterans affairs health care system over 10 years. *J Am Heart Assoc*. 2022;11(7):e024571. https://doi.org/10.1161/JAHA.121.024571.