

# Screening for Abdominal Aortic Aneurysms

An update on the progress made in identifying patients with AAAs and the work that must still be done.

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Aneurysmal disease is a devastating problem that produces tremendous mortality and morbidity worldwide. In the US alone, large data sets have shown that more than 15,000 people die of ruptured abdominal aortic aneurysms (AAAs) each year. However, this is likely an underestimate of the extent of the problem because yearly, an additional 200,000 individuals in the US die suddenly. Although a cardiac etiology is the culprit in the majority of these patients, autopsy studies have shown that approximately 5 to 7% of individuals who die suddenly do so from a ruptured aneurysm. As a result, the total

number of deaths in the US from ruptured aneurysms likely approaches 30,000 per year. This number can be compared to a death rate of 40,000 per year for breast cancer or prostate cancer. Thus, aneurysmal disease represents a significant health problem, and effective screening for aneurysms has the potential to save many lives.

## EFFICIENT EVALUATION

Death from AAAs is preventable. In fact, all that is required to diagnose this problem is a simple ultrasound. Ultrasound has been used in the diagnosis and evaluation of AAA for many years; a conventional ultrasound AAA evaluation requires 30 to 40 minutes of scanning time, and the cost ranges from \$150 to more than \$250. However, a few years ago, the concept of a "quick screen" was popularized. The ultrasonographer answers "yes" or "no" to the question as to whether an aortic dilation  $>3$  cm is present. With an experienced ultrasonographer and a cooperative patient of appropriate habitus, this question can often be answered in just a few minutes with minor cost and minimal patient discomfort.

When evaluating the utility of a screening test, a number of factors are important. These include (1) the cost of the test, (2) the morbidity associated with the test, (3) the prevalence of disease in the population to be screened, (4) the cost and mortality of the disease if left undiscovered, and (5) the cost and mortality if the disease is diagnosed and appropriately treated. If one applies these criteria to screening for AAAs, the analysis is quite favorable. A quick-screen ultrasound is an inexpensive, convenient study. The prevalence of aneurysmal disease varies with the population chosen for screening. However, in select populations, the prevalence is high. If aneurysms rupture, the mortality rate is  $>85\%$ , and the morbidity rate and cost are tremendous for those who survive. Alternatively, elective repair of aneurysms, either by open or endovascular techniques, is now associated with low rates of mortality and morbidity. By all measures, aneurysmal disease is ideally suited to screening.

Cost-effective analyses have been used to evaluate the appropriateness of screening for aneurysmal disease. A number of investigators have incorporated the previously mentioned factors into Markov models, a methodology used to evaluate the cost-effectiveness of interventions. In one such analysis, screening for aneurysmal disease was associated with a cost per quality-adjusted life year saved of \$11,285. (The cost per quality-adjusted life year saved is the cost required for an intervention to extend a person's life by 1 year.) For comparison, the cost-effective ratio for coronary artery bypass for left main disease is \$9,500. The cost-effectiveness ratios for screening for prostate or breast cancers are \$100,000 and \$20,000, respectively. Alternatively, the cost-effective ratio for liver transplant, a commonly performed and well-accepted intervention, is \$136,900. Thus, in terms of life years saved integrated with cost, AAA screening is an intervention that compares

favorably with other common procedures currently reimbursed by our medical care system.

Additional compelling evidence of the value of AAA screening can be derived from the Multicenter Aneurysm Screening Study (MASS). MASS was a prospective randomized study conducted in England in the late 1990s, in which male patients aged 65 to 74 were randomized to screening. Of approximately 70,000 patients identified, 2,500 were excluded because they were unfit for surgery; even if an aneurysm were to be found, repair would not be recommended. Approximately 34,000 patients were invited for screening and another 34,000 were not. The acceptance rate for the screening invitation was approximately 80%, highlighting that compliance is an important factor when determining the effectiveness of screening tests. In the patients screened, 1,333 aneurysms were identified. Nine hundred forty-four were 3 to 4.4 cm in diameter, 223 were 4.5 to 5.4 cm in diameter, and 166 were >5.5 cm in diameter. The mortality rate associated with elective aneurysm repair was approximately 6%, higher than what might be encountered in current practice. Nevertheless, even with this high perioperative mortality rate, over a 4-year period, the investigators found a 42% reduction in aneurysm-related mortality in patients screened for AAAs.

### ORGANIZED INITIATIVES

Despite seemingly compelling evidence of the effectiveness of screening for AAAs provided by these and many other studies, insurers (including Medicare) until recently did not reimburse for aneurysm screening or, for that matter, screening of any form of vascular disease. In the absence of reimbursement, a number of "for-profit" companies were formed that offered screening for AAAs, as well as carotid artery and lower-extremity vascular disease. These companies have been quite successful and have screened millions of patients at a cost of just over \$100 for all three tests. The most successful of these organizations is Life Line Screening, which has screened more than 6 million individuals for vascular disease since 1993. Despite the progress made by Life Line and other companies, this is still only a fraction of the individuals at risk. Moreover, patients with advanced cardiovascular disease may be less likely to be aware that they are at risk and thus unlikely to personally pay for screening. Widespread screening for AAAs is unlikely to occur without the availability of reimbursement from insurers.

Consequently, in 2004, the National Aneurysm Alliance was organized by the Society for Vascular Surgery (SVS) with the participation of multiple professional and private organizations, as well as industry. What ensued was an aggressive lobbying campaign that resulted in the introduction of a bill in Congress to provide Medicare-funded screening for aneurysms in appropriately targeted benefi-

aries. One of the important steps in encouraging Congress to consider payment for AAA screening was the favorable assessment rendered by the United States Preventive Services Task Force (USPSTF). After an extensive evaluation, the USPSTF recommended screening for the subpopulation of patients that includes ever-smoking males aged 65 to 74. With the USPSTF recommendations in hand, the SVS led its coalition members in an aggressive, targeted lobbying campaign throughout 2005. As a result of these efforts, and in recognition of the obvious beneficial impact of AAA screening in at-risk beneficiaries, Congress passed the SAAAVE Act (Screen Abdominal Aortic Aneurysms Very Efficiently) in late 2005 with implementation targeted for 2007. Ironically, this measure was included as a provision within the much larger Deficit Reduction Act of 2005 (DRA). Because Congress was not in a spending mood when it passed the DRA, there are tight restrictions associated with SAAAVE. Medicare-funded AAA screening is limited to male ever-smokers and to men and women with a positive family history of AAA. Unfortunately, the physical examination is available to beneficiaries only during their first 6 months in the Medicare program. The AAA screening benefit was implemented in January 2007, and we will have the initial year's uptake numbers by mid-2008. In addition to the CMS benefit, several private insurers have followed suit with the creation of AAA screening programs for targeted policyholders.

### LIMITATIONS OF SAAAVE

Some advocates of screening, the authors of this article included, feel that the ruling by the USPSTF was too conservative. The task force rejected screening males younger than 65 or older than 75. Additionally, it did not recommend AAA screening for any women, for any male nonsmokers, or for individuals with a family history of AAAs. Admittedly, studies have shown that the vast majority of patients who develop aneurysmal disease have a history of smoking, although this is not exclusively the case. Somewhat surprisingly, the USPSTF assigned screening for AAAs in women a D rating, meaning that they believe the potential harms of AAA screening exceed the potential benefits.

Although the ruling by the USPSTF and the bill passed by Congress were victories for advocates of AAA screening, there are several issues that have limited the success of this effort. As noted, Congress limited screening to new beneficiaries, effectively reducing the window of opportunity to individuals who are just turning 65. Consequently, hundreds of thousands of at-risk individuals who are currently older than 65 have not been allowed to participate in this benefit. Equally important is that the newness of the Welcome to Medicare physical has very much dampened participation. For example, in 2005, the year the Welcome to Medicare Physical was introduced, only

30,000 patients participated in this program, which is less than 1.5% of individuals in this country turning 65 and eligible for Medicare. The frequency increased to 72,000 in 2006, or still less than 3% of new beneficiaries. However, it is clear that large numbers of patients at risk for aneurysmal disease remain unscreened.

### ADDRESSING SUBSET VARIATIONS

The issue of screening for AAAs in women is complex. Without a doubt, the prevalence of AAAs in women is lower than in males, by approximately a 4:1 ratio. However, rupture of aneurysms in women is not a remote event, and the likelihood exists that subsets of women are at high risk for the development of aneurysms. The epidemiology and behavior of AAAs in women clearly varies from that of men. Women develop aneurysms at an older age than men, albeit women on average live 5.7 years longer than men. Thus, because of their increased longevity, perhaps women should be considered for aneurysm repair at an age greater than what would seem appropriate in men. Women also experience AAA rupture at a size smaller than men; it has therefore been suggested that repair be considered in women at a size of up to 0.5 cm less than what is considered appropriate for men. Two recent studies have shed further light on this issue. Anders Wanhainen et al recently published an elegant cost-effectiveness analysis related to aneurysmal screening in women. Considering these and other factors, these investigators found that screening was cost-effective in women. A recent study of more than 10,000 women screened for AAAs also demonstrated that a cohort of women with multiple cardiovascular risk factors is at high risk for the development of aneurysmal disease. Although more data are necessary, it seems reasonable to assume that AAA screening will be applicable to a subset of women. The specific identification of this cohort will need to be the focus of future investigations.

It could be argued that because AAA screening is inexpensive, it might not matter if it is reimbursed by insurance. The cost of an AAA screening ultrasound is somewhere in the range of the cost of a large family meal at McDonald's. As evidenced by the success of Life Line Screening, there are many individuals willing to pay to be screened. However, without reimbursement, it is likely that only individuals who are motivated and aware of their health issues will seek out screening for AAAs disease. Unfortunately, these individuals may be the ones who are least likely to be at risk.

### QUESTIONS TO BE ADDRESSED

Although tremendous progress has been made over the past several years regarding screening for AAAs, there is still a great amount to be learned. Is there a subset of women that should be screened? Can we better

define the population of nonsmoking males whose AAA risk is sufficient to merit screening? Should screening be expanded to other forms of vascular disease? Despite recent progress, patient access to screening remains limited. All ever-smoking men in the Medicare program greater than age 65 should have coverage for aneurysm screening, not just those who have turned 65. At a minimum, AAA screening should be uncoupled from the Welcome to Medicare physical exam until that benefit achieves wider acceptance.

There is little doubt that more research is necessary. Recently, the SVS developed a partnership with Life Line Screening that will allow the analysis of screening data from more than 5 million individuals. All of these people were screened for AAAs, carotid artery disease, and lower-extremity vascular disease. It is likely that the findings of this analysis will allow a clearer definition of the cohort that will achieve the greatest benefit from screening for each of the forms of vascular disease.

It is important to note that the mere availability of the test does not ensure that patients at risk will be screened. In MASS, only 80% of patients were eventually evaluated for AAAs, despite being contacted twice by their primary physicians. Screening, even if reimbursed, will not be widely performed unless there is increased awareness of AAA incidence and the benefit of screening among patients and their primary care physicians. Whereas most individuals in this country are aware of the risks of breast and prostate cancer, there are very few who know what an aneurysm is, let alone who needs to be screened for one. Thus, public awareness is a necessary component of any effort to increase the number of individuals screened. All of these issues aside, there is little doubt that the efforts of the SVS and other interested organizations over the past several years have yielded significant progress in screening for vascular disease. ■

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