US Preventive Services Task Force

Screening for Asymptomatic Carotid Artery Stenosis
US Preventive Services Task Force Recommendation Statement

**Importance** Carotid artery stenosis is atherosclerotic disease that affects extracranial carotid arteries. Asymptomatic carotid artery stenosis refers to stenosis in persons without a history of ischemic stroke, transient ischemic attack, or other neurologic symptoms referable to the carotid arteries. The prevalence of asymptomatic carotid artery stenosis is low in the general population but increases with age.

**Objective** To determine if its 2014 recommendation should be reaffirmed, the US Preventive Services Task Force (USPSTF) commissioned a reaffirmation evidence review. The reaffirmation update focused on the targeted key questions on the potential benefits and harms of screening and interventions, including revascularization procedures designed to improve carotid artery blood flow, in persons with asymptomatic carotid artery stenosis.

**Population** This recommendation statement applies to adults without a history of transient ischemic attack, stroke, or other neurologic signs or symptoms referable to the carotid arteries.

**Evidence Assessment** The USPSTF found no new substantial evidence that could change its recommendation and therefore concludes with moderate certainty that the harms of screening for asymptomatic carotid artery stenosis outweigh the benefits.

**Recommendation** The USPSTF recommends against screening for asymptomatic carotid artery stenosis in the general adult population. (D recommendation)


---

**Summary of Recommendation**

| The USPSTF recommends against screening for asymptomatic carotid artery stenosis in the general adult population. | D |

See the Figure for a more detailed summary of the recommendations for clinicians. See the Practice Considerations section for a description of adults at increased risk. USPSTF indicates US Preventive Services Task Force.

---

Carotid artery stenosis is atherosclerotic disease that affects extracranial carotid arteries. Asymptomatic carotid artery stenosis refers to stenosis in persons without a history of ischemic stroke, transient ischemic attack, or other neurologic symptoms referable to the carotid arteries. The prevalence of asymptomatic carotid artery stenosis is low in the general population but increases with age. Although asymptomatic carotid artery stenosis is a risk factor for stroke and a marker for increased risk for myocardial infarction, it causes a relatively small proportion of strokes. Stroke is a leading cause of death and disability in the US.

USPSTF Assessment of Magnitude of Net Benefit

**Reaffirmation**
In 2014, the US Preventive Services Task Force (USPSTF) reviewed the evidence for screening for carotid artery stenosis and issued a D recommendation. The USPSTF has decided to use a reaffirmation deliberation process to update this recommendation. The USPSTF uses the reaffirmation process for well-established, evidence-based standards of practice in current primary care practice for which only a very high level of evidence would justify a change in the grade of the recommendation. In its deliberation of the evidence, the USPSTF considers whether the new evidence is of sufficient strength and quality to change its previous conclusions about the evidence.

Using a reaffirmation process, the USPSTF concludes with moderate certainty that the harms of screening for asymptomatic carotid artery stenosis outweigh the benefits.

See the Figure, Table, and eFigure in the Supplement for more information on the USPSTF recommendation rationale and assessment. For more details on the methods the USPSTF uses to determine the net benefit, see the USPSTF Procedure Manual.
Abbreviations: CAS, carotid artery angioplasty and stenting; CEA, carotid endarterectomy; USPSTF, US Preventive Services Task Force.

This recommendation applies to adults without a history of stroke or neurologic signs or symptoms of a transient ischemic attack. This recommendation is consistent with the 2014 USPSTF recommendation. The USPSTF continues to recommend against screening for carotid artery stenosis in asymptomatic adults.

**USPSTF Recommendation: Screening for Asymptomatic Carotid Artery Stenosis**

**Table. Summary of USPSTF Rationale: Screening for Asymptomatic Carotid Artery Stenosis**

<table>
<thead>
<tr>
<th>Rationale</th>
<th>General adult population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection</td>
<td>Adequate evidence that duplex ultrasonography has reasonable sensitivity and specificity for detecting clinically relevant carotid artery stenosis. However, duplex ultrasonography yields many false-positive results when screening the general population. Adequate evidence that auscultating the neck for carotid bruits has poor accuracy for detecting clinically relevant carotid artery stenosis.</td>
</tr>
<tr>
<td>Benefits of early detection, intervention and treatment</td>
<td>Adequate direct evidence that screening for asymptomatic carotid artery stenosis reduces adverse health outcomes such as stroke or mortality. Adequate evidence that treating asymptomatic patients with carotid artery stenosis using CEA or CAS provides no to small benefit in reducing adverse health outcomes, including stroke, myocardial infarction, or mortality, compared with current medical therapy.</td>
</tr>
<tr>
<td>Harms of early detection and intervention and treatment</td>
<td>Inadequate direct evidence that screening for asymptomatic carotid artery stenosis can cause harms. However, there are known harms associated with confirmatory testing and interventions. Adequate direct evidence that treating asymptomatic patients with carotid artery stenosis using CEA or CAS can cause harms, including stroke or death. The overall magnitude of harms of screening for and treatment of asymptomatic carotid artery stenosis is small to moderate.</td>
</tr>
<tr>
<td>USPSTF assessment</td>
<td>Using a reaffirmation process, the USPSTF concludes with moderate certainty that screening for asymptomatic carotid artery stenosis in the general population has no benefit and may be harmful.</td>
</tr>
</tbody>
</table>

**Practice Considerations**

**Patient Population Under Consideration**

This recommendation applies to adults without a history of transient ischemic attack, stroke, or other neurologic signs or symptoms referable to the carotid arteries.

**Assessment of Risk**

Although screening for asymptomatic carotid artery stenosis is not recommended for the general adult population, several factors increase risk for carotid artery stenosis, including older age, male sex, hypertension, smoking, hypercholesterolemia, diabetes, and heart disease.6 However, there are no externally validated, reliable methods to determine who is at increased risk for carotid artery stenosis or who is at increased risk of stroke when carotid artery stenosis is present.7,9

**Screening Tests**

Several modalities are proposed for screening for carotid artery stenosis, including carotid duplex ultrasonography (DUS), magnetic resonance angiography, and computed tomography angiography. Auscultation for carotid bruits has been found to have poor accuracy for detecting carotid stenosis or stroke and is
not considered a reasonable screening approach. The USPSTF does not recommend screening adults without a history of transient ischemic attack, stroke, or other neurologic signs or symptoms referable to the carotid arteries.

Treatment
Medical and surgical options are available for treatment of carotid artery stenosis. In general, treatment of asymptomatic carotid artery stenosis is directed at systemic atherosclerotic disease and often includes statins, antiplatelet medications, management of hypertension and diabetes, and lifestyle modification interventions. Surgical procedures designed to improve carotid artery blood flow include carotid endarterectomy (CEA), carotid artery angioplasty and stenting (CAS), or transartery revascularization. Medical therapy can be used alone or with revascularization procedures. For patients with asymptomatic disease, the harms of surgical interventions compared with appropriate medical therapy appear to outweigh the benefits.

Other Related USPSTF Recommendations
The USPSTF has issued other recommendation statements related to stroke prevention and cardiovascular health. These include
- Screening for high blood pressure in adults
- Screening for abdominal aortic aneurysm
- Interventions for tobacco smoking cessation in adults, including pregnant persons
- Interventions to promote a healthy diet and physical activity for the prevention of cardiovascular disease:
  - In adults with cardiovascular risk factors
  - In adults without known cardiovascular risk factors
- Aspirin use to prevent cardiovascular disease and colorectal cancer
- Statin use for the primary prevention of cardiovascular disease in adults

Update of the Previous Recommendation
This recommendation statement is a reaffirmation of the 2014 D recommendation for screening for asymptomatic carotid artery stenosis. The USPSTF issued the D recommendation based on evidence that the harms of screening for carotid artery stenosis in asymptomatic adults outweigh the benefits. The USPSTF found no new substantial evidence that could change its recommendation and therefore reaffirms its recommendation.

Supporting Evidence
Scope of Review
To reaffirm its recommendation, the USPSTF commissioned a reaffirmation evidence review to update the 2014 review. The aim of the evidence update that supports the reaffirmation process is to identify new and substantial evidence sufficient enough to change the prior recommendation. The reaffirmation update focused on the targeted key questions on the potential benefits and harms of screening and interventions, including revascularization procedures designed to improve carotid artery blood flow, in persons with asymptomatic carotid artery stenosis.

Accuracy of Screening Tests and Risk Assessment
The accuracy of screening tests for carotid artery stenosis was evaluated in the 2014 systematic review for the USPSTF, which found 1 good-quality meta-analysis assessing the accuracy of DUS in detecting carotid artery stenosis. It reported that the sensitivity and specificity of DUS for detecting 70% or greater stenosis were 90% (95% CI, 84%-94%) and 94% (95% CI, 88%-97%), respectively, compared with a reference standard of digital subtraction angiography. However, this evidence from 2014 was limited by lack of information on the proportion of patients who were asymptomatic and by clinically important variation in DUS measurement by patient population, equipment, technique, and other factors. For auscultating the neck for carotid bruises, the 2014 evidence review found a wide range in sensitivity (46%-77%) and specificity (71%-98%) for detecting carotid artery stenosis. Of the 4 included studies, none used angiography as a reference standard and only 2 enrolled patients from the general population.

The USPSTF found no externally validated risk stratification tools that could reliably distinguish between asymptomatic persons who have clinically important carotid artery stenosis and persons who do not, or the risk of stroke related to carotid artery stenosis.

Benefits of Early Detection and Treatment
The USPSTF found no studies that directly examined the health benefits of screening with DUS. The 2014 review found 3 randomized clinical trials (n = 5226) that assessed the benefits of treating asymptomatic carotid artery stenosis (defined as stenosis ≥50%) with CEA compared with medical therapy alone over 2.7 to 9 years. These studies included participants with cardiovascular disease risk factors such as diabetes, hypertension, hypercholesterolemia, and coronary artery disease. Pooled analyses found that, compared with patients receiving medical therapy alone, 2.0% fewer patients treated with CEA had perioperative stroke or death and subsequent ipsilateral stroke (combined outcome) and 3.5% fewer patients treated with CEA had perioperative stroke or death and any subsequent stroke (combined outcome). However, none of the trials focused on exclusively asymptomatic populations identified by primary care screening. Between 20% and 32% of trial patients reported a history of contralateral artery transient ischemic attack, stroke, or CEA at baseline. Additionally, requirements for asymptomatic status differed slightly across the trials. For example, 1 study enrolled participants with no transient ischemic attack or stroke attributable to the ipsilateral artery for the past 6 months, while another enrolled participants with no history of cerebrovascular events in the distribution of the ipsilateral carotid artery and no symptoms referable to the contralateral artery for the past 45 days. Medical therapy varied by trial and may not reflect contemporary aggressive risk factor modification, and operators (eg, surgeons and interventionists) were highly selected based on their low morbidity and mortality rates. Because of these limitations, the USPSTF concluded that the magnitude of any benefit would be smaller in asymptomatic persons in the general population than among patients in the trials.
The current review found 2 new fair-quality studies conducted in Europe that were prematurely terminated because of low recruitment or interim analysis showing that patients randomized to best medical therapy had unexpectedly higher rates of ipsilateral stroke or death than patients randomized to CEA. Results from comparative effectiveness studies of CEA plus best medical therapy compared with best medical therapy alone were mixed. The Stent-Protected Angioplasty in Asymptomatic Carotid Artery Stenosis vs Endarterectomy 2 (SPACE-2) trial (n = 316) found no difference between groups in the composite outcome of stroke or death at 30 days of follow-up or ipsilateral ischemic stroke at 1 year of follow-up (unadjusted hazard ratio [HR], 2.82 [95% CI, 0.33-24.07]). The Aggressive Medical Treatment Evaluation for Asymptomatic Carotid Artery Stenosis (AMTEC) trial (n = 55) found that patients who underwent CEA had a significantly lower composite risk of nonfatal ipsilateral stroke or death at 3.3 median years of follow-up than patients who received best medical therapy alone (calculated unadjusted HR, 0.20 [95% CI, 0.06-0.65]).

The 2014 review found no studies that compared CAS with medical therapy. The current review identified 1 trial that compared CAS with best medical therapy; in this trial, there were no significant differences between groups in the composite outcome of stroke or death at 30 days of follow-up or in ipsilateral ischemic stroke at 1 year of follow-up (unadjusted HR, 3.50 [95% CI, 0.42-29.11]).

Harms of Early Detection and Treatment

The USPSTF found no studies that directly examined the harms of screening using DUS.

The 2014 review found that DUS leads to many false-positive results when screening the general population, which has a low prevalence of carotid artery stenosis (0.5%-1%). The 2014 review found 2 studies of angiography, a confirmatory testing method that is less commonly used today than noninvasive magnetic resonance angiography or computed tomography angiography. Of patients who had angiography, 0.4% to 1.2% had strokes as a result. The current review found no new studies on the harms of confirmatory testing methods.

The 2014 review found 3 trials that reported on harms of CEA or CAS, most of which were conducted during the 1990s. Many study participants had hypertension, coronary artery disease, or diabetes. Pooled analysis of data from 6 trials (n = 3435) found that 2.4% (95% CI, 1.7%-3.1%) of patients died or had a stroke within the 30 days after CEA. A meta-analysis of 3 trials (n = 5223) found that 1.9% (95% CI, 1.2%-2.6%) more participants treated with CEA had perioperative (30-day) stroke or death than participants treated with medical therapy. A meta-analysis of 2 trials (n = 6152) found that 3.1% (95% CI, 2.7%-3.6%) of patients died or had a stroke after CAS. Pooled data from 7 cohort studies found that 3.3% (95% CI, 2.7%-3.9%) of patients died or had a stroke within 30 days after CEA. One cohort study found that 3.8% (95% CI, 2.9%-5.1%) of patients had a stroke or died within 30 days after CAS.

The current review found 2 fair-quality trials that assessed perioperative harms. In the SPACE-2 trial, 2.5% of patients who underwent CAS or CEA died or had a stroke within 30 days after their procedure. The AMTEC trial reported 1 patient (3.2%) who had a fatal postoperative stroke after CEA. The current review identified several large national databases and surgical registries that measured postoperative outcomes associated with CEA (n = 1903761) or CAS (n = 332103). The proportion of patients experiencing 30-day postoperative stroke or death after CEA ranged from 1.4% in the Vascular Quality Initiative to 3.5% in a large Medicare database. The proportion that experienced 30-day postoperative stroke or death after CAS ranged from 2.6% to 5.1% (Medicare database).
or other neurologic signs or symptoms referable to the carotid arteries. The American Heart Association and the American Stroke Association jointly recommend against routine screening for carotid artery stenosis in asymptomatic patients using DUS. Joint guidelines from multiple US professional societies conclude that DUS screening is indicated (or reasonable) for asymptomatic patients with a carotid bruit. The Society for Vascular Surgery and joint guidelines from multiple US professional societies recommend consideration of DUS screening in patients with multiple risk factors for stroke and in those with known peripheral artery disease or other cardiovascular disease.

**REFERENCES**


