JAMA | US Preventive Services Task Force | RECOMMENDATION STATEMENT

Screening for Impaired Visual Acuity in Older Adults
US Preventive Services Task Force Recommendation Statement

US Preventive Services Task Force

IMPORTANCE Impairment of visual acuity is a serious public health problem in older adults. The number of persons 60 years or older with impaired visual acuity (defined as best corrected visual acuity worse than 20/40 but better than 20/200) was estimated at 2.91 million in 2015, and the number who are blind (defined as best corrected visual acuity of 20/200 or worse) was estimated at 760 000. Impaired visual acuity is consistently associated with decreased quality of life in older persons, including reduced ability to perform activities of daily living, work, and drive safely, as well as increased risk of falls and other unintentional injuries.

OBJECTIVE To update its 2016 recommendation, the US Preventive Services Task Force (USPSTF) commissioned a systematic review to evaluate the benefits and harms of screening for impaired visual acuity in older adults.

POPULATION Asymptomatic adults 65 years or older who present in primary care without known impaired visual acuity and are not seeking care for vision problems.

EVIDENCE ASSESSMENT The USPSTF concludes that the evidence is insufficient to assess the balance of benefits and harms of screening for impaired visual acuity in asymptomatic older adults. The evidence is lacking, and the balance of benefits and harms cannot be determined. More research is needed.

RECOMMENDATION The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for impaired visual acuity in older adults. (I statement)

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Group Information: A complete list of the members of the US Preventive Services Task Force appears at the end of this article.

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Summary of Recommendation

Asymptomatic adults 65 years or older	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for impaired visual acuity in older adults.	I

USPSTF indicates US Preventive Services Task Force.

See the Summary of Recommendation Figure.

Importance

Impairment of visual acuity is a serious public health problem in older adults. The number of persons 60 years or older with impaired visual acuity (defined as best corrected visual acuity worse than 20/40 but better than 20/200) was estimated at 2.91 million in 2015, and the number who are blind (defined as best corrected visual acuity of 20/200 or worse) was estimated at 760 000.[1] Impaired visual acuity is consistently associated with decreased quality of life in older persons, including reduced ability to perform activities of daily living, work, and drive safely, as well as increased risk of falls and other unintentional injuries.[2-6]

USPSTF Assessment of Magnitude of Net Benefit

The US Preventive Services Task Force (USPSTF) concludes that the evidence is insufficient to assess the balance of benefits and harms of screening for impaired visual acuity in asymptomatic older adults. The evidence is lacking, and the balance of benefits and harms cannot be determined. More research is needed.

Table. Summary of USPSTF Rationale

Rationale	Assessment
Detection	• Adequate evidence that primary care-based visual acuity tests had poorer diagnostic accuracy than a complete ophthalmological examination for identifying visual conditions. • Adequate evidence that screening questions are not accurate for identifying patients at higher risk of impaired visual acuity because of uncorrected refractive error, cataracts, or age-related macular degeneration.
Benefits of early detection and intervention and treatment	• Inadequate evidence that screening for visual impairment improves health outcomes. • Adequate evidence that treatment of age-related macular degeneration improves or prevents loss of visual acuity. • Limited evidence that treatment of age-related macular degeneration improves health outcomes such as visual impairment, vision-related function, and quality of life.
Harms of early detection and intervention and treatment	• Inadequate evidence to determine the harms of screening for vision impairment in asymptomatic older adults. • Adequate evidence that the harms related to treatment of age-related macular degeneration are small.
USPSTF assessment	The limitations of the direct evidence and the inconsistency of the indirect evidence prevent the USPSTF from developing a coherent assessment of the overall net benefit; therefore, the USPSTF found the evidence insufficient to determine the balance of benefits and harms.

Abbreviation: USPSTF, US Preventive Services Task Force.

See the **Table** for more information on the USPSTF recommendation rationale and assessment and the eFigure in the Supplement for information on the recommendation grade. See the **Figure** for a summary of the recommendation for clinicians. For more details on the methods the USPSTF uses to determine the net benefit, see the USPSTF Procedure Manual.[7]

Practice Considerations

Patient Population Under Consideration

This recommendation applies to asymptomatic adults 65 years or older who present in primary care settings without known impaired visual acuity and are not seeking care for vision problems.

Definitions of Impaired Visual Acuity

Impaired visual acuity refers to decreased clarity or sharpness of vision and is affected by a number of factors. These include changes in low-light vision, color vision, binocularity (ability to focus on an object with both eyes), contrast sensitivity, accommodation (ability to change focus), and stereopsis (depth perception), as well as visual field loss (areas in the field of view in which objects cannot be seen). For the purposes of this recommendation, impaired visual acuity is defined as best corrected vision worse than 20/40 (cutoff for many states for an unrestricted driver's license) and blindness is defined as best corrected vision less than 20/200 or a visual field of 20 degrees or less.[8]

Refractive errors, presbyopia, age-related macular degeneration (AMD), and cataracts are common causes of impaired visual acuity in older adults.[9-12] Refractive errors, such as myopia (nearsightedness) or hyperopia (farsightedness), occur when the eye is unable to bring parallel rays of light into focus on the fovea.[11] Presbyopia, which occurs as part of the natural aging process of the eye, is the loss of the eye's ability to change its focus to see objects that are near. This occurs as the eyes' lenses begin to lose flexibility around age 45 years and affects most individuals at some point in life.[13]

AMD is a progressive deterioration of the retina that leads to blurred vision and loss of central vision. It is usually classified into "wet" or "dry" forms. The dry form of AMD is more common and associated with atrophy of the retinal layers and retinal pigmented epithelial cells. The wet form of AMD is associated with the development of abnormal blood vessels in the choroid layer underneath the retina.[13,14]

Cataracts are a clouding of the lens of the eye that leads to impaired visual acuity, increased sensitivity to glare, and loss of sensitivity to differences in contrast.[13]

Treatment or Interventions

Although not evaluated in screen-detected populations, several types of treatment are effective for improving visual acuity once visual impairment has been identified. Corrective lenses improve visual acuity in patients with a refractive error. Treatment of cataracts through surgical removal of the natural lens followed by intraocular lens implantation is effective for improving visual acuity.[15] The most common treatment for wet AMD is intravitreal injections of vascular endothelial growth factor (VEGF) inhibitors. Photodynamic therapy, a treatment combining verteporfin (a photoreactive agent) and low-level laser light, is also used.[13] Laser photocoagulation, an older treatment for wet AMD, is associated with blind spots in the treatment area and is no longer in common use.[14] Treatments to reduce progression of dry AMD include antioxidant vitamins and minerals.[14]

Suggestions for Practice Regarding the I Statement

Potential Preventable Burden

In 2011, an estimated 12% of US adults aged 65 to 74 years and 15% of those 75 years or older reported having problems seeing, even with glasses or contact lenses.[16] Refractive errors are the most common cause of impaired visual acuity in the US and worldwide.[10,17] The prevalence of hyperopia (including presbyopia) increases with age, while the prevalence of myopia tends to decrease with age.[10,12] About half of all cases of bilateral low vision (ie, best-corrected visual acuity worse than 20/40) in adults 40 years or older are caused by cataracts.[18] The prevalence of cataracts increases sharply with age; an estimated 50% of US adults 75 years or older have cataracts.[19] The prevalence of AMD is 6.5% in adults 40 years or older and increases with age (2.8% in adults aged 40 to 59 years and 13.4% in those 60 years or older).[20] AMD is the leading cause of blindness in adults older than 65 years.[13]

Older age is an important risk factor for most types of visual impairment. However, there are known risk factors for specific conditions causing impaired visual acuity that vary by condition. A positive family history strongly correlates with myopia and hyperopia.[21,22] Risk factors for cataracts include older age, smoking, alcohol use, exposure to UV light, diabetes, and exposure to oral or inhaled corticosteroids.[23,24] Risk factors for AMD are not completely understood but are thought to include older age, smoking, obesity, diet low in green leafy vegetables, elevated cholesterol levels, cardiovascular disease, and family history.[14,25,26] The prevalence of impaired visual acuity is higher among persons of lower socioeconomic or educational status and those without private health insurance.[13]

Figure. Clinician Summary: Screening for Impaired Visual Acuity in Older Adults

What does the USPSTF recommend?	For asymptomatic adults 65 years or older: The USPSTF found that the **evidence is insufficient** to assess the balance of benefits and harms of screening for impaired visual acuity in older adults. Grade: I statement
To whom does this recommendation apply?	This recommendation applies to asymptomatic older adults (65 years or older) who present in primary care. It does not apply to persons who have reported signs and symptoms of vision loss, seek care for vision problems, or have vision loss related to another medical condition (eg, diabetic retinopathy).
What's new?	This recommendation is consistent with the 2016 USPSTF recommendation statement.
How to implement this recommendation?	• There is insufficient evidence to recommend for or against screening for impaired visual acuity in adults without symptoms of vision impairment. • Clinicians should use their clinical judgement to determine how to evaluate patients who have symptoms of vision loss.
What additional information should clinicians know about this recommendation?	• About 12% of US adults aged 65 to 74 years and 15% of those 75 years or older reported having problems seeing, even with glasses or contact lenses. • Refractive errors are the most common cause of impaired visual acuity. Half of all cases of bilateral low vision in adults 40 years or older are caused by cataracts, and 50% of adults 75 years or older in the US have cataracts. Age-related macular degeneration (AMD) is the leading cause of blindness in adults older than 65 years; the prevalence of AMD is 13.4% in adults 60 years or older. • The prevalence of impaired visual acuity is higher among persons of lower socioeconomic or educational status and those without private health insurance. • Older age is an important risk factor for most types of visual impairment. Family history strongly correlates with myopia and hyperopia. Risk factors for cataracts include older age, smoking, alcohol use, exposure to ultraviolet light, diabetes, and exposure to oral or inhaled corticosteroids. Risk factors for AMD are not completely understood but are thought to include older age, smoking, obesity, diet low in green leafy vegetables, elevated cholesterol levels, cardiovascular disease, and family history. • However, there is limited evidence that primary care–based screening for impaired visual acuity is beneficial in persons who have not reported symptoms.
Why is this recommendation and topic important?	Impaired visual acuity is associated with decreased quality of life in older persons, including reduced ability to perform activities of daily living, work, and drive safely, as well as increased risk of falls and other accidental injuries.
What are other relevant USPSTF recommendations?	The USPSTF has a recommendation on screening for glaucoma, which can be found on the USPSTF website (https://www.uspreventiveservicestaskforce.org/uspstf/).
Where to read the full recommendation statement?	Visit the USPSTF website (https://www.uspreventiveservicestaskforce.org/uspstf/) or the *JAMA* website (https://jamanetwork.com/collections/44068/united-states-preventive-services-task-force) to read the full recommendation statement. This includes more details on the rationale of the recommendation, including benefits and harms; supporting evidence; and recommendations of others.

The USPSTF recognizes that clinical decisions involve more considerations than evidence alone. Clinicians should understand the evidence but individualize decision-making to the specific patient or situation.

USPSTF indicates US Preventive Services Task Force.

Potential Harms

The harms of screening in a primary care setting have not been adequately studied. Harms of treatment of refractive error may include a potential for increased falls with the use of multifocal lenses; infectious keratitis with the use of contact lenses, LASIK (laser-assisted in situ keratomileusis), or LASEK (laser-assisted subepithelial keratectomy); and corneal ectasia with LASIK.[27] Harms of cataract surgery include posterior lens opacification and endophthalmitis.[27] Antioxidant vitamins and mineral supplements (for dry AMD) and VEGF inhibitors (for wet AMD) are not associated with increased risk of most serious adverse events.[13] Laser photocoagulation and photodynamic therapy for treatment of wet AMD have been associated with risk of acute loss of visual acuity.[13,28,29]

Current Practice

About half of US adults older than 65 years reported having an eye examination within the last 12 months in a 2007 study.[30] The Snellen eye chart or the Early Treatment Diabetic Retinopathy Study (ETDRS) chart are the most common methods used in primary care settings to detect changes in visual acuity. Other tests available for vision screening in primary care include the pinhole test (a test for refractive error), the Amsler grid (a test of central field of vision to detect AMD), or fundoscopy (visual inspection of the interior of the eye).[13,15,31,32] Clinically significant cataracts can be visualized on physical examination as change of color or opacities in the eye lens.

Impaired visual acuity in older adults may not be recognized by the individual or may remain unreported because vision changes can be relatively subtle, occur in more advanced stages of the condition, progress slowly over time, or occur in persons with cognitive dysfunction or other comorbid conditions.[13]

Other Related USPSTF Recommendations

The USPSTF has a separate recommendation on screening for glaucoma (I statement).

Update of Previous USPSTF Recommendation

In 2016, the USPSTF concluded that the evidence was insufficient to assess the balance of benefits and harms of screening for impaired visual acuity in older adults (I statement).[27] This recommendation concurs with the previous I statement.

Supporting Evidence

Scope of Review

The USPSTF commissioned a systematic review to evaluate the benefits and harms of screening for impaired visual acuity in older adults.[13,33] This review focused on screening for impaired visual acuity associated with uncorrected refractive errors, cataracts, and AMD, as well as treatment of AMD. The benefits and harms related to treatment of uncorrected refractive errors and cataracts has been previously established and is not addressed here.[27] Screening for diabetic retinopathy, another common cause of impaired visual acuity, is not addressed in this recommendation because it is considered part of diabetes follow-up and management.

Accuracy of Screening Tests and Risk Assessment

Eight studies (n = 7398) examined the accuracy of screening tests to detect impaired visual acuity. Visual acuity tests had poor diagnostic accuracy when compared with a complete ophthalmological examination for identifying visual conditions (3 studies; n = 6493). Based on a best corrected visual acuity threshold of 20/30 or worse or 20/40 or worse, sensitivity ranged from 27% to 75% and specificity from 51% to 87%. There was limited evidence on the accuracy of other screening methodologies such as computerized screening tools (2 studies; n = 380), Minimum Data Set Vision Patterns scores (1 study; n = 371), a mobile application tool (1 study; n = 104), and geriatric examination (1 study; n = 50).[13,33] Compared with the Snellen or low vision eye chart, screening questions were not accurate for identifying patients at higher risk of impaired visual acuity because of uncorrected refractive error, cataracts, or AMD (3 studies; n = 5203).[13,33]

Benefits of Early Detection and Treatment

Four randomized trials (n = 4819) studied the difference between vision screening in primary care–applicable settings vs no screening, usual care, or delayed screening on vision and other clinical outcomes in older adults.[13] Across all trials, screening was based on visual acuity charts (with or without screening questions), pinhole testing, or visual field testing and was part of a larger multicomponent health screening for older adults. These trials found no difference between vision screening vs no screening, usual care, or delayed screening on visual acuity, likelihood of vision disorders, or vision-related functional impairment.[13]

In its previous recommendation, the USPSTF established that refractive correction (through corrective lens or surgery) and cataract surgery are effective treatments for refractive errors and cataracts.[27]

Four randomized trials (n = 2086) compared VEGF inhibitors for the treatment of wet AMD with placebo or no treatment. Overall, VEGF inhibitors proved effective in improving visual acuity–related outcomes, including likelihood of visual acuity gain (≥15 letters or 3 lines) (relative risk [RR], 2.92 [95% CI, 1.20-7.12]), less than 15 letters of visual acuity loss (RR, 1.46 [95% CI, 1.22-1.75]), and having vision of 20/200 or better (RR, 1.47 [95% CI, 1.30-1.66]).[13] Only 1 trial (n = 716) reported better vision-related function.[13] Three trials (n = 2738) compared the effectiveness of newer (aflibercept) vs older (ranibizumab) VEGF inhibitors for the treatment of wet AMD.[13] Aflibercept was noninferior to ranibizumab (older VEGF inhibitor) in likelihood of less than 15 ETDRS letters of visual acuity loss or more than 15 letters of visual acuity gain (3 trials; n = 2738). Two (of 3) trials (n = 2457) reported on vision-related function and found that aflibercept and ranibizumab were associated with similar improvements.[13]

The benefits of treatment of dry AMD were reviewed in 1 systematic review of 19 trials (n = 11 162) and 2 additional trials (n = 180).[13] The findings were heavily influenced by the Age-Related Eye Disease Study (AREDS) (n = 3640).[34] In that study, patients with dry AMD were randomly assigned to treatment with antioxidants, zinc, antioxidants plus zinc, or placebo. Antioxidant multivitamins were associated with decreased risk of progression to late AMD (odds ratio [OR], 0.72 [95% CI, 0.58-0.90]; 3 trials; n = 2445) and more than 3 lines of visual acuity loss (OR, 0.77 [95% CI, 0.62-0.96]; 1 trial; n = 1791) vs placebo.[13] Zinc was associated with decreased risk of progression to late AMD vs placebo (OR, 0.83 [95% CI, 0.70-0.98]; 3 trials; n = 3790) and decreased risk of less than 3 lines of visual acuity loss (RR, 0.87 [95% CI, 0.75-1.00]; 2 trials; n = 3791); however, the latter finding did not reach statistical significance.[13] The combination of antioxidants and zinc, when compared with placebo, reduced the risk of progression to advanced AMD and visual acuity loss of at least 15 letters in participants with intermediate AMD or advanced AMD in 1 eye (OR, 0.73 [99% CI, 0.54-0.99]).[13] Other potential therapies, including lutein (with or without zeaxanthin), vitamin E, and various antioxidant multivitamin and mineral combinations, showed no clear effects on AMD progression or visual acuity.[13] Evidence on other outcomes associated with the use of antioxidant multivitamins and minerals, such as cognition and vision-related function and quality of life, was limited.

Harms of Screening and Treatment

No studies were available on the harms of screening for visual impairment in a primary care setting.[13]

Potential harms associated with treatment of AMD with intravitreal injections of VEGF inhibitors were studied in several trials. These included endophthalmitis (2 trials; n = 1924), ocular hemorrhage (1 trial; n = 184), and retinal detachment (2 trials; n = 1924), which were found to be similar in VEGF and sham treatment groups. There were no significant differences between VEGF inhibitors and sham treatment in the likelihood of withdrawal due to adverse events.[13] Evidence on the effects of VEGF inhibitors on other harms was limited. Three trials (n = 2738) compared harms related to newer and older VEGF inhibitors for treatment of wet AMD. Serious ocular and cardiovascular adverse events were infrequent and occurred in similar proportions of patients randomized to either aflibercept or ranibizumab.[13]

Pooled data on the harms related to treatment of dry AMD reported no association with withdrawal due to gastrointestinal symptoms. The largest trial (AREDS) reported an increased risk of hospitalization due to genitourinary causes with zinc and an increased risk of yellowing skin with antioxidants. The AREDS2 trial (n = 4203) found that the AREDS formulation (vitamin C, vitamin E, zinc, and copper)

in combination with beta carotene was associated with increased risk of lung cancer vs the AREDS formulation without beta carotene (2.0% vs 0.9%; $P = .04$) in former (but not current) smokers.[13]

Research Needs and Gaps

More studies are needed that address the following areas.

- Studies that evaluate the effect of referrals by primary care professionals to eye care specialists for comprehensive eye examination.
- Well-designed studies in primary care settings that evaluate new vision screening interventions, link screen-positive older adults to appropriate follow-up and care, address barriers to linkage to care, and target higher-risk populations would be useful for clarifying potential benefits of screening.
- Evidence on the effectiveness of antioxidant vitamins and minerals for the treatment of dry AMD remains mainly dependent on 1 large trial (AREDS). Large, well-designed trials of alternative treatment regimens designed to evaluate benefits and harms would be useful.
- Research to understand the effects of treatment of wet and dry AMD on vision-related quality of life and function.
- Head-to-head trials of the recently US Food and Drug Administration–approved VEGF brolucizumab-dbll vs older VEGF inhibitors would be helpful for verifying that benefits and harms are comparable.

Response to Public Comment

A draft version of this recommendation statement was posted for public comment on the USPSTF website from October 26 to November 22, 2021. Comments sought clarification on why the USPSTF review included evidence on screening for uncorrected refractive error, cataracts, and AMD but limited its review on treatment to wet and dry AMD. Because the evidence on treatment of cataracts and refractive error (corrective lenses and surgery, respectively) are well established and unlikely to change, the USPSTF limited this review to the benefits and harms of treatment of wet and dry AMD only. This information has been clarified in the Supporting Evidence section. Clarification was also sought on why other conditions such as diabetic retinopathy and glaucoma were not addressed. Diabetic retinopathy is a common cause of blindness; however, surveillance for this condition is considered part of diabetes management and therefore outside the scope of this recommendation. Screening for glaucoma is covered in a separate recommendation.

Comments also noted that certain populations may be at higher risk for visual impairment and should be considered separately. Additionally, many of those persons at higher risk may also have difficulty accessing vision services. Currently, no risk assessment tools are available to reliably identify persons at increased risk for visual impairment who could benefit from screening. The USPSTF is calling for more research on risk assessment tools and screening interventions that include higher-risk groups, as well as more research on how to address barriers to linkage to care.

Recommendations of Others

The American Academy of Ophthalmology recommends a comprehensive examination conducted by an ophthalmologist every 1 to 2 years in patients 65 years or older.[35] The American Academy of Family Physicians' recommendation on screening for visual acuity in older adults is in agreement with the USPSTF recommendation (I statement).[36,37] The American Optometric Association recommends an annual comprehensive eye and vision examination for all adults older than 65 years.[37]

ARTICLE INFORMATION

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assessment. The USPSTF recognizes that clinical decisions involve more considerations than evidence alone. Clinicians should understand the evidence but individualize decision-making to the specific patient or situation. Similarly, the USPSTF notes that policy and coverage decisions involve considerations in addition to the evidence of clinical benefits and harms. Published by JAMA®—Journal of the American Medical Association under arrangement with the Agency for Healthcare Research and Quality (AHRQ).

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