

Screening for impaired vision in community-dwelling adults aged 65 years and older in primary care settings

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■ Cite as: *CMAJ* 2018 May 14;190:E588-94. doi: 10.1503/cmaj.171430

This guideline is available in French at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.171430/-/DC2

Podcasts: author interview at <https://soundcloud.com/cmajpodcasts/171430-guide>

Impaired vision is an important health burden in both developed and developing countries, particularly among older adults.¹ The 2006 *Participation and Activity Limitation Survey* found that 13% of Canadians aged 75 years and older had a “seeing limitation,” with 31% described as severe, compared with 0.5% of those aged 15 to 24 years, with 17% described as severe.^{2,3} The proportion of adults with vision impairment is expected to double in Canada by 2032, as the population ages.^{1,2}

A measured visual acuity of worse than 20/40 is often observed as the threshold at which impaired vision results in functional limitations.⁴ Reduced visual acuity is the result of a poor or distorted image reaching the retina because of refractive errors, corneal opacities or cataracts, retinal disease, or problems with the central processing of visual neural signals.⁵ Impaired vision from refractive error or cataracts can be addressed by corrective lenses or other vision-related treatment, including surgical correction of cataracts, whereas interventions for retinal disease or processing of neural signals depend on the specific nature of the disorder.⁵

Among older adults, impaired vision can have a negative impact on vision-related functioning and quality of life, which may be manifested by decreased participation in social, work or leisure activities, as well as difficulties in family relationships; symptoms of depression; injuries from accidents, including falls; or the loss of driving privileges.⁶⁻⁹

Many people with impaired vision become aware of it and obtain help on their own. Self-reported data on vision care from the 2005 *Canadian Community Health Survey*¹⁰ showed that 59% of adults aged 65 years and older had consulted an eye care professional in the previous year. Comprehensive eye examinations for adults aged 65 years and older are covered by most provincial governments across Canada and are usually free at point of care.

It is plausible that screening for impaired vision in primary care settings could be beneficial to individuals who do not recognize that they have a vision-related problem or who recognize a problem but do not seek treatment.

KEY POINTS

- Impaired vision is a risk factor for functional limitations, fall-related injuries and quality of life in older people.
- Most provincial governments in Canada cover comprehensive eye examinations by eye care practitioners for adults aged 65 years and older.⁶
- A systematic review found low-quality evidence that screening in primary health care settings for impaired vision in adults aged 65 years and older does not appear to improve vision-related functional limitations or quality of life.⁵
- The task force recommends against screening in primary health care settings for impaired vision in community-dwelling adults aged 65 years or older.

Scope

This guideline presents evidence-based recommendations for preventing vision-related functional limitations in community-dwelling adults aged 65 years and older by screening them for impaired vision in primary care settings such as physicians’ offices or clinics. It updates the previous Canadian Task Force on the Periodic Health Examination 1995 guideline on vision screening, which made a grade B recommendation in support of screening for visual impairment in older adults with diabetes of at least five years’ duration.¹¹

This guideline is directed at primary care providers who have a generalist understanding of eye health and vision care, but do not have specialist expertise or access to specialized equipment. It does not seek to address vision screening undertaken by professional groups with specific expertise in primary vision care, such as optometrists.

The screening methods considered included both self-report of vision function and objective vision testing. Self-report included structured survey and questions. For objective testing of visual acuity, although there are several tools available, the

Box 1: Grading of recommendations

Recommendations are graded according to the Grading of Recommendations Assessment, Development and Evaluation system (GRADE).¹⁵ GRADE offers two strengths of recommendation: strong and weak. The strength of recommendations is based on the balance between desirable and undesirable outcomes; the confidence in the magnitude of the estimates of effect of the intervention on outcomes; the confidence in values and preferences and their variability; and whether the intervention represents a wise use of resources.

Strong recommendations are those for which the Canadian Task Force on Preventive Health Care is confident that the desirable effects of an intervention outweigh its undesirable effects (strong recommendation for an intervention) or that the undesirable effects of an intervention outweigh its desirable effects (strong recommendation against an intervention). A strong recommendation implies that most individuals will be best served by the recommended course of action and that the recommendation can be adopted in practice or as policy in most situations.

Strong recommendations are normally based on high-quality evidence (i.e., high confidence in the estimate of the effect of an intervention). Strong recommendations may recommend in favour of an intervention (when there is high confidence of benefit) or against an intervention (when there is high confidence of harm). However, there are five circumstances in which the task force may consider a strong recommendation based on low- or very low-quality evidence:

- When low-quality evidence suggests benefit in a life-threatening situation (evidence regarding harms can be low or high);
- When low-quality evidence suggests benefit, and high-quality evidence suggests harm or a very high cost;
- When low-quality evidence suggests equivalence of two alternatives, but high-quality evidence of less harm for one of the competing alternatives;
- When high-quality evidence suggests equivalence of two alternatives, and low-quality evidence suggests harm in one alternative; and
- When high-quality evidence suggests modest benefits, and low- or very low-quality evidence suggests possibility of catastrophic harm.

Weak recommendations are those for which the desirable effects probably outweigh the undesirable effects (weak recommendation for an intervention) or undesirable effects probably outweigh the desirable effects (weak recommendation against an intervention), but appreciable uncertainty exists. Weak recommendations result when the balance between desirable and undesirable effects is small, the quality of evidence is lower, or there is more variability in the values and preferences of patients. Cases in which the balance of cost and benefits is ambiguous, key stakeholders differ about the acceptability or feasibility of the implementation, and the effect on health equity is unclear are likely to result in a weak recommendation. A weak recommendation for a prevention service implies that most people would want the recommended course of action but many would not. For clinicians, this means they must recognize that different choices will be appropriate for each individual, and they must help each patient arrive at a management decision consistent with the patient's values and preferences. Policy-making will require substantial debate and involvement of various stakeholders.

Evidence is graded as high, moderate, low or very low, based on how likely further research is to change our confidence in the estimate of effect.¹⁵

most frequently used are the Snellen and Early Treatment Diabetic Retinopathy Study charts.¹²

It is expected that patients identified through screening as having potentially impaired vision would be referred to an optometrist or ophthalmologist for assessment and intervention as appropriate.

This guideline does not apply to people with a condition known to predispose to vision impairment, such as glaucoma or diabetes; those who live in full-time residential care; or those who have a diagnosis of dementia.

Methods

The task force is an independent panel of clinicians and methodologists that makes recommendations on primary and secondary prevention in primary care (www.canadiantaskforce.ca). A working group of five voting task force members developed this recommendation with scientific support from the Public Health Agency of Canada.¹³

The systematic review⁵ on which the recommendation is based was conducted by the Evidence Review and Synthesis Centre at the University of Alberta (Edmonton, Alberta). The working group established the research questions and the analytical framework for the systematic review (Appendix 1, available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.171430/-/DC1). The protocol¹⁴ (PROSPERO 2016: CRD42016053088), systematic review and draft guideline were reviewed by content experts, including ophthalmologists, optometrists and epidemiologists, as well as health care stakeholders. Clinical and content experts engage with task force working group members to help them address technical issues and understand important clinical issues, by participating in working group meetings, reviewing key supporting documents for accuracy, and by reviewing the final guideline. Clinical and content experts do not have input into task force recommendations and do not vote on recommendations. Outcomes of screening for impaired vision addressed by the review were mortality, fractures, loss of independence, vision-related function, changes in visual acuity, quality of life, major adverse effects from treatment, and anxiety.

To capitalize on earlier work, the evidence review examined good-quality published systematic reviews to identify studies that met the criteria, and also conducted a new search of the MEDLINE, Embase, Cochrane Library, CINAHL and PubMed databases from 2012 to September 2016 to identify studies published since the earlier reviews. Supplementary searches for grey literature were also conducted. A prepublication search update was performed in October 2017 and evidence updated accordingly.

The task force used the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) approach¹⁵ to determine the quality of evidence and strength of recommendation (Box 1). The evidence-to-decision framework is provided in Appendix 2 (available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.171430/-/DC1).

The Knowledge Translation team at St. Michael's Hospital (Toronto, Ontario) engaged members of the public on behalf of the task force at two stages of guideline development. In the first phase, 15 participants aged 58 to 78 years rated outcomes to inform the systematic review, by means of an online survey and a focus group.¹⁶ In the second phase, 20 participants aged 65 to

74 years were asked to provide their perspective on the guideline recommendations.¹⁷

A knowledge translation tool for the guideline was informed by feedback from clinicians and patients and is provided on the task force website (www.canadiantaskforce.ca).

The recommendation was approved by the entire task force and underwent external review by content experts and stakeholders. The Feasibility, Acceptability, Cost, and Equity (FACE) tool¹⁸ was used by health care stakeholders to gain their perspective on the recommendation (Appendix 3, available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.171430/-/DC1).

Management of competing interests

Funding for the Canadian Task Force on Preventive Health Care is provided by the Public Health Agency of Canada. The views of the funding body have not influenced the content of the guideline. All task force members are required to disclose financial and nonfinancial conflicts of interest. These conflict of interest statements are made available publicly on the task force website. All task force members declared that they had no conflicts of interest for this guideline. Clinical experts and content experts do not have input into or vote on recommendations and are required to disclose any conflicts of interest at the outset of their participation and annually thereafter. All clinical experts declared that they had no conflicts of interest for this guideline.

Recommendation

For community-dwelling adults aged 65 years and older, we recommend against screening for impaired vision in primary care settings (weak recommendation; low-quality evidence).

We defined screening as either structured enquiry about vision impairment or objective vision testing, with the expectation of further assessment, referral and possible intervention, as indicated by screening test results and subsequent assessment (Box 2).

The evidence review⁵ identified 15 randomized controlled trials (RCTs) of screening for impaired vision using tests or strategies relevant to primary care settings with study participants of community-dwelling adults aged 65 years or older.^{19–33} The RCTs were conducted in Norway,¹⁹ Germany,²⁰ the United Kingdom,^{21–25} Australia^{26–29} the Netherlands^{30,31} and the United States.^{32,33}

Participants were recruited from general practice lists,^{12,20–25,29,31–35} community settings,^{28,30} an aged care assessment list,²⁶ a home care list¹⁹ and an insurance company registry.²⁷ The number of participants in the trials ranged from 93 to 4340. In the 11 RCTs in which age was reported, the average age of partici-

pants was 78.5 years. In the remaining 4 RCTs, participant eligibility was specified as at least 70 years of age,^{23,24} at least 75 years of age,²⁰ or 74 to 84 years of age.³⁰ In the 11 RCTs^{19,20,22,25–28,30–33} that reported sex, 63% of participants were female.

In 13 RCTs,^{19–25,27,29–33} vision screening took place within a broader assessment of multiple health and functional domains, whereas in two RCTs,^{26,28} vision screening was the only intervention provided. The two types of screening approaches (used alone or in combination) were self-report of visual function using a questionnaire and objective vision testing using one or more charts. In three RCTs,^{20,25,33} the screening test consisted of a questionnaire-based impairment test. In two RCTs,^{29,30} a questionnaire was followed by eye testing with a Snellen chart for patients who reported a problem. In seven RCTs,^{19,21–24,29,30} screening was done by a nurse; in four,^{25–28,32} by another trained individual; and in one,³¹ by a physician. In the three remaining RCTs,^{20,25,33} patients were asked to mail in a questionnaire designed to identify indicators of potential visual impairment.

In all RCTs, following a positive screening result, the patient's physician was notified or a direct referral was made to an eye care professional. In one RCT, specific advice on improving vision was offered to the patient,²⁹ and in two others, advice on home lighting improvements was provided.^{21,27} The maximum duration of follow-up, or ongoing interactions after screening, was 2.5 to 47 months (mean 19 mo) after the initial screen. In 10 RCTs,^{21,23–26,28–30,34,35} the control group received some form of vision assessment without active follow-up.

The systematic review identified no evidence on the impact of vision screening on mortality, loss of independence, serious adverse effects from treatment, or on anxiety or stress from positive screen results.

As indicated in Table 1, two RCTs^{28,29} provided very low-quality evidence of an uncertain effect of vision screening on reducing fractures,⁵ using falls as a surrogate outcome. One RCT²⁸ reported an absolute risk reduction (ARR) in the intervention group of 163 fewer falls per 1000 people screened (ARR 16.3%; 95% confidence interval [CI] 28 to 292 fewer) and an ARR of falls requiring medical treatment of 48 fewer per 1000 people screened (ARR 4.8%; 95% CI 12 to 75 fewer), but the authors reported that very few people participated in the vision intervention and indicated that the effect was more likely attributable to the exercise component of the intervention. The other RCT²⁹ indicated a nonstatistically significant absolute risk increase of 20 more falls per 1000 people screened (absolute risk increase 2.0%; 95% CI 48 fewer to 305 more).

A single RCT²² provided low-quality evidence of no net benefit of screening on long-term vision-related functioning: a mean difference was observed of +0.4 units on a 0–100 point scale, where higher scores indicate better functioning (95% CI 1.25 lower to 2.05 higher).

A range of metrics were reported that quantified changes in visual acuity after screening. Four RCTs^{19,26–28} provided moderate-quality evidence of no overall benefit of screening on mean change in high-contrast visual acuity over a median of 12 months of follow-up: the mean difference observed did not meet the threshold for the minimally important difference set for this outcome. A secondary analysis of individual participant data from one of these RCTs²⁷ suggested that, in the intervention group, 126 fewer participants

Box 2: Recommendation for clinicians and policy-makers

For community-dwelling adults aged 65 years and older, we recommend against screening for impaired vision in primary care settings (weak recommendation; low-quality evidence).

Screening was defined to include questionnaire-based impairment tests or objective vision testing, with the expectation of further assessment and possible intervention, as indicated by screening test results.

per 1000 people screened had worse visual acuity (from 62 to 171 fewer), and 73 more per 1000 people screened (from 7 to 185 more) had better visual acuity at six-month follow-up. In addition, low-quality evidence from two RCTs^{22,26} reported that screening was not significantly associated with distance visual acuity over 12 to 47 months of follow-up: an ARR was observed of 67 fewer people per 1000 screened with distance visual acuity of < 20/40 (bilateral) (ARR 6.7%; 95% CI 7 more to 127 fewer). Moderate-quality evidence from 10 RCTs^{20,21,23–25,29–33} showed no net benefit of screening on self-reported vision outcomes over a median of 20 months of follow-up: an ARR was observed of nine fewer people reporting vision issues per 1000 people screened (ARR 0.9%; 95% CI 16 more to 31 fewer).

The seven RCTs^{19,22,26,28,29,31,32} that reported on rates of referrals for those with a positive screen indicated that 29% to 75% (median 35%)

of patients were offered a referral. Of these, five^{19,22,26,29,31} reported that 18% to 96% (median 68%) of patients agreed to a referral. None of the studies reported the proportion of participants already under the care of an eye care professional at the time of screening.

Patient values and preferences

Focus group and survey participants generally articulated a preference for screening for impaired vision, even though likelihood of benefit is unclear.¹⁶ However, some expressed concerns about the availability of screening at a population level and worried that a country-wide screening program might waste health care resources. Participants also indicated concerns about the limited time available to complete vision screening tests during appointments with primary care physicians, especially if the individual already accessed care from an eye

Table 1: Outcomes of screening for impaired vision in community-dwelling adults aged 65 years and older in primary care settings

Outcome and follow-up period	No. of studies	Cases/ screened patients	Cases/ control patients	Relative risk (95% CI)	Absolute difference per 1000 (95% CI)	Quality of evidence
Falls (self-report falls as a proxy for fractures) Follow-up: range 12 mo to 18 mo	2 RCTs					
Day et al. ²⁸						
Any fall*		691/547	757/543	0.88 (0.79 to 0.98)	163 fewer (28 to 292 fewer)	⊕○○○ Very low†
Falls requiring medical treatment*		49/547	75/543	0.65 (0.46 to 0.91)	48 fewer (12 to 75 fewer)	
Newbury et al. ²⁹						
Any fall		4/45	3/44	1.30 (0.31 to 5.49)	20 more (48 fewer to 305 more)	
Vision-related function and quality of life (assessed with NEI-VFQ-25; scale from 0 to 100 ²²) Follow-up: median 3.9 yr	1 RCT	n = 829	n = 978	–	MD 0.4 units higher (1.25 lower to 2.05 higher)	⊕⊕○○ Low‡
Change in visual acuity with objective screening (mean change in high-contrast distance visual acuity) ^{19,26–28} Follow-up: median 12 mo	4 RCTs	n = 764	n = 579	–	MD –0.01 logMAR better (–0.05 better to 0.03 worse)	⊕⊕⊕○ Moderate§
Impaired visual acuity with objective screening (< 20/40 distance visual acuity: bilateral) ^{22,26} Follow-up: range 12 to 47 mo	2 RCTs	290/913	394/1054	0.82 (0.66 to 1.02)	67 fewer (from 7 more to 127 fewer)	⊕⊕○○ Low¶
Self-reported vision problems (primarily questionnaire-based impairment tests) ^{20,21,23–25,29–33} Follow-up: median 20 mo	10 RCTs	1042/3767 (27.7%)	1296/4916 (26.4%)	0.97 (0.90 to 1.05)	8 fewer (from 13 more to 26 fewer)	⊕⊕⊕○ Moderate**

Note: CI = confidence interval, MD = mean difference, NEI-VFQ-25 = National Eye Institute Visual Functioning Questionnaire 25, RCT = randomized controlled trial.

*The authors of the study²⁸ of an intervention to prevent falls in older adults, which included a vision component, showed that only 26 of the 547 participants who were assigned the vision component actually received treatment; therefore, it is unlikely that the vision treatment had the effect on falls quoted in this table. In particular, the authors of this study ascribe differences in the rate of falls to the exercise component of the intervention. In addition, visual acuity improved marginally among the control group and not at all among the intervention group. No other differences were seen in vision measures, which makes the conclusion that vision screening had an impact on falls unlikely.

†Very serious concerns about an unclear risk of bias, owing to inconsistency from reliance on one trial²⁸; about indirectness resulting from surrogate outcomes — 75% of participants received an intervention that could have confounded risk; and about imprecision, as the optimal information size was not met.

‡Serious concerns about high risk of bias for not blinding personnel, patients and outcome assessors; about high and differential attrition [42% v. 32% of those alive]; and about inconsistency arising from unknown effects from other studies.

§Moderate concerns about four RCTs^{19,26–28} with unclear risk of bias that used multiple objective screening tools and indirectness, as two of the RCTs^{19,26} included many patients who were receiving home care, and one¹⁹ provided an additional intervention that may have influenced results.

¶Serious concerns about inconsistency in one trial²⁶ and about imprecision, as the optimal information size of about 200 total events with a control event rate of 0.28 was not met.

**Moderate concerns about risk of bias for not blinding personnel or patients in any study, about attrition in one study,²³ and about allocation concealment. Although there was some inconsistency (2 CIs did not overlap; $I_2 = 29\%$), there were no serious concerns regarding this domain.

care professional. A systematic review of how older adults value benefits versus harms of impaired vision screening was not conducted owing to the considerable uncertainty about benefits of screening.

Resource use

Low-quality evidence on outcomes important to patients suggests that vision screening is not an effective strategy for improving vision-related functioning in older adults. Cost-effectiveness was not assessed because, in the judgment of the task force, resource considerations would not change the direction or strength of the recommendation.

Feasibility, acceptability, cost and equity

Because vision screening for older adults is not currently recommended in Canadian primary care settings, there are no feasibility considerations in relation to the present recommendation. Four health care organizations responded to the FACE survey,¹⁸ three of which represented eye care professionals and indicated the importance of vision screening. In the judgment of the task force, the recommendation is likely to be both feasible and acceptable in Canadian primary care settings and would neither increase nor decrease equity.

Rationale

Overall, low-quality evidence was available on the effect of screening for vision impairment in adults aged 65 years and older in primary care settings. There was evidence of no overall benefit to patients from being screened, with the exception of the outcome of falls, which were slightly fewer among those screened. This was observed in a single study²⁸ that included an exercise intervention designed to prevent falls in older adults, making interpretation of the impact of the vision screening component uncertain. In the judgment of the task force, benefit from screening older adults for impaired vision has not been shown. Despite no evidence of harms associated with screening older adults for impaired vision, delivering an intervention with no benefit carries an opportunity cost. Therefore, the recommendation is against screening.

The recommendation is weak because of low certainty in the evidence and variability noted in patient preferences. A weak recommendation against screening suggests that primary care providers should not routinely offer screening for visual impairment to asymptomatic community-dwelling adults aged 65 years and older.

Considerations for implementation

This recommendation applies to community-dwelling adults aged 65 years and older. Subgroups of the population that are known to be at increased risk for impaired vision are not the focus of this recommendation, such as people with diabetes or glaucoma. The recommendation does not apply to people who live in full-time residential care or who have a diagnosis of dementia. Professionals who care for these patients should be alert to their potential for impaired vision.

Some asymptomatic older adults may be interested in vision screening despite the uncertain benefits. It is appropriate to remain alert to the potential benefits of a case-finding approach and to be open to discussion of vision screening.^{41,42} A knowledge translation tool for professionals is provided on the task force website (www.canadiantaskforce.ca) to support such discussions.

Should a primary care provider and patient consider vision screening, thought should be given to the process of referrals for the patient to access treatment.

There are no specific requirements for monitoring or evaluation in relation to this recommendation.

Other guidelines

This guideline is consistent with the recommendation on vision screening for older adults from the US Preventive Services Task Force, which showed there was insufficient information to evaluate the outcome-based balance of risks and benefits.³⁶ Professional eye care associations generally recommend that adults aged 65 years and older have regular objective vision testing by an optometrist or other eye professional, with frequency based on age and risk factors.³⁷⁻⁴⁰ Table 2 provides additional information on vision screening guidelines relevant to primary care.

Table 2: National and international guidelines on screening for impaired vision in older adults in primary care

Organization	Recommendation
Canadian Task Force on Preventive Health Care (current guideline, 2018)	Recommends <i>against</i> screening community-dwelling adults aged ≥ 65 yr for impaired vision in primary care settings (weak recommendation, low-quality evidence). This recommendation applies only to community-dwelling adults aged ≥ 65 yr who are not known to be at increased risk for impaired vision.
US Preventive Services Task Force (2016) ³⁶	States that current evidence is <i>insufficient</i> to assess the outcome-based balance of risks and benefits of screening for visual acuity in primary care settings for the improvement of outcomes in asymptomatic adults aged ≥ 65 yr who do not present to their primary care clinician with vision problems. No recommendation made for or against screening.
Canadian Ophthalmological Society (2007) ³⁷	Recommends screening in asymptomatic low-risk patients aged > 65 yr at least every two years. Patients aged > 60 yr at higher risk of visual impairment should be assessed more frequently and thoroughly; at least annually.
American Academy of Ophthalmology (2015) ³⁸	Recommends comprehensive eye examination that includes visual acuity testing and dilation every one to two years for all adults aged ≥ 65 yr who are not known to be at increased risk for impaired visual acuity and do not have risk factors, or more frequently if risk factors are present.
Canadian Association of Optometrists (2013) ³⁹	Recommends annual eye examination for adults aged ≥ 65 yr.
American Optometric Association (2015) ⁴⁰	Recommends annual comprehensive eye and vision examinations for persons aged ≥ 65 yr for the diagnosis and treatment of sight-threatening eye conditions and the timely correction of refractive errors.

Gaps in knowledge

Future trials should evaluate the effectiveness of screening older adults for impaired vision in relation to outcomes important to patients. Complex multicomponent screening interventions that include vision screening require clarity about predicted interactions between vision and other components in improving outcomes. The extent to which the effect of vision screening interventions may be modified by age, functional status or other target population characteristics should be considered.

Conclusion

The evidence currently available does not support screening by primary care providers of adults 65 years of age and older for impaired vision as a way to prevent functional limitations or other major consequences of impaired vision. Primary care clinicians may consider confirming that older patients have had their vision checked by an optometrist or other ophthalmic primary care professional.

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This article has been peer reviewed.

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Competing interests: None declared.

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Contributors: Brenda Wilson, Susan Courage, Maria Bacchus, James Dickinson, Scott Klarenbach, Nicki Sims-Jones, Alejandra Jaramillo Garcia and Brett Thombs contributed substantially to the study concept and design, interpretation of the evidence, and critical revision of the guideline draft. Susan Courage, Nicki Sims-Jones and Alejandra Jaramillo Garcia provided science and logistical support to the writing group. Heather Colquhoun, James Dickinson, Roland Grad, Stéphane Groulx, Scott Klarenbach, Eddy Lang, John Leblanc, Gabriela A. Lewin, Ainsley Moore,

Donna Reynolds, Harminder Singh, Guylène Thériault, Brett Thombs and Brenda Wilson drafted the recommendations. Brenda Wilson, Susan Courage and Nicki Sims-Jones drafted the guideline statement. All of the named authors gave final approval of the version of the guideline to be published and agreed to be accountable for all aspects of the work. All collaborating members of the Canadian Task Force on Preventive Health Care (Heather Colquhoun, Roland Grad, Stéphane Groulx, Eddy Lang, John Leblanc, Gabriela Lewin, Ainsley Moore, Donna Reynolds, Harminder Singh, Guylène Thériault, Marcello Tonelli) also made contributions to the development of the guideline and all gave final approval of the version of the guideline to be published.

Funding: Funding for the Canadian Task Force on Preventive Health Care is provided by the Public Health Agency of Canada. The views of the funding body have not influenced the content of the guideline. The views expressed in this article are those of the task force and do not necessarily represent those of the Public Health Agency of Canada.

Acknowledgements: The authors would like to thank the Alberta Evidence Review and Synthesis Centre team (Lisa Hartling, Jennifer Pillay, Tara MacGregor, Robin Featherstone, Ben Vandermeer) for its evidence review, which supported this guideline; Marion Doull, Prinon Rahman and Ernesto Delgado of the Global Health and Guidelines Division at the Public Health Agency of Canada, who supported the development of the guideline; and the Knowledge Translation Program, Li Ka Shing Knowledge Institute, St. Michael's Hospital, for their contributions to patient engagement and knowledge translation work related to this guideline. They would like to thank Ellen Freeman (School of Epidemiology and Public Health and Department of Ophthalmol-

ogy, University of Ottawa, Ottawa, Ont.) and Dr. William Hodge (Schulich School of Medicine and Dentistry, Departments of Epidemiology & Biostatistics and Ophthalmology, University of Western Ontario, London, Ont.) for assisting as clinical or content experts during the development of this guideline. (Clinical and content experts who have assisted the task force in the guideline process may or may not agree with the task force recommendations.) Additionally, the authors would like to thank the peer reviewers and organizational stakeholders who reviewed provided feedback on the draft guideline and completed the Feasibility, Acceptability, Cost, and Equity tool, including Mathieu Carignan, Canadian Occupational Therapy Low Vision Rehabilitation Network; Walter T. Delpero, Canadian Ophthalmological Society, Ottawa, Ont.; Julia Foster, OCAD University, Toronto, Ont.; Natacha Kuran, Public Health Agency of Canada, Ottawa, Ont.; Matthieu Lafontaine-Godbout, Faculty of Medicine and Health Sciences, University of Sherbrooke, Sherbrooke, Que.; Susan J. Leat, School of Optometry and Vision Science, University of Waterloo, Waterloo, Ont.; Steven Lord, Neuroscience Research Australia, Sydney, Australia; Nicolette McGuire, BC Ministry of Health, Victoria, BC; Linda S. Petty, Adaptive Technology Resource Centre, University of Toronto, Scarborough, Ont.; Gilles Plourde, Health Canada, Ottawa, Ont.; Dallas Seitz, Queens University, Kingston, Ont.; Kimberley Simmonds, Alberta Health, Edmonton, Alb.; Enitan Sogbesan, McMaster University/St. Joseph's Healthcare, Hamilton, Ont.; and Benoit Tousignant, Canadian Association of Optometrists. We also thank those who contributed comments but did not wish to be acknowledged.

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