Canadian Collaboration for Immigrant and Refugee Health (CCIRH)
Full Text

GUIDELINES FOR IMMIGRANT HEALTH

Appendix 17: Vision health: evidence review for newly arriving immigrants and refugees

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ABSTRACT

Background: Vision loss is an important public health issue. It can profoundly affect a person's ability to work or carry out day-to-day activities. Even modest visual impairment (< 6/12) is associated with substantial morbidity. The leading causes of vision loss are largely amenable to timely diagnosis and treatment. We conducted an evidence review to assess the role of primary care practitioners in giving immigrants and refugees screening tests for common vision disorders.

Methods: We systematically examined evidence on screening tests and referral for vision loss that included benefits and harms, applicability, clinical considerations, and implementation issues. Quality of evidence was assessed using the Grading of Recommendations Assessment, Development and Evaluation approach.

Results: Vision loss appears to be more common in new immigrants than in the Canadian-born population. This review highlights the often unrecognized risk and morbidity of uncorrected refractive error and undiagnosed sight-threatening eye disease for new adult immigrants. Other evidence-based guidelines applicable to immigrant populations recommend age-appropriate assessment of vision for neonates, infants, children and adolescents and recommend referral of people with diabetes or at increased risk of vision loss from glaucoma.

Interpretation: This evidence review supports age-appropriate screening tests in primary care for vision loss in immigrants and refugees to Canada within the first year of their arrival and referral (if vision < 6/12) to an optometrist or ophthalmologist for a comprehensive ophthalmic evaluation.

Competing interests: None declared.

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Box 1: Recommendations on vision health from the Canadian Collaboration for Immigrant and Refugee Health

Perform age-appropriate screening tests for visual impairment* to reduce associated functional limitation and morbidity. If presenting vision < 6/12 (with habitual correction in place) refer patients to optometrist or ophthalmologist for comprehensive ophthalmic evaluation.

Basis of recommendation

- **Balance of benefits and harms:** Uncorrected refractive error, the most common cause of visual impairment, is amenable to correction with eyeglasses (number needed to screen to find one person with vision worse than 6/15 or 20/50 due to uncorrected refractive error = 19). Prevalence of uncorrected refractive error in immigrant populations is higher than in the general population; however, economic and cultural barriers could reduce rates of referral and use of corrective eyeglasses. Harms are minimal and can include out-of-pocket costs.
- **Quality of evidence:** Very Low
- **Values and preferences:** The guideline committee attributed more value to ensuring visual acuity is adequate for daily functioning and employment and to detect serious underlying ocular disease. Less value was attributed to the burden of screening and the cost of eyeglasses.

*Visual acuity should be measured with distance glasses or contact lenses in place if worn habitually. Age-appropriate measurement in children is required at 0-3 months (infant should react to light), at 6-12 months (baby's eyes should fix and follow light) and at 3-5 years (child should use visual acuity chart where possible). Additional screening manoeuvres are useful for children: at each screening interval, assess for red reflex and inspect external ocular structures. For patients 6 months and older, also assess for strabismus.

The cases

Anand is a 65-year-old unilingual Hindi-speaking grandfather from India who was recently reunited with his family in Canada. He does not read and denies visual complaints. His family, however, confides that he seems to have difficultly recognizing faces across the room.

Sharise, a black 41-year old mother, and her two children, aged four and eight, recently emigrated from Jamaica. All deny visual complaints, but Sharise notes that the eldest daughter is not performing well at school.

Introduction

Vision loss is an important public health issue. At least 36.8 million persons worldwide are estimated to be blind; another 124 million have substantially impaired vision.[1] These estimates are projected to more than double in the next two decades.[2] Together, the serious blinding disorders are the seventh leading cause of burden of disease, ahead of diabetes and cancer.[3,4] Vision loss can limit the ability to work, drive and complete other activities of daily living. Even modest visual impairment (visual acuity < 6/12) is associated with substantial morbidity.[5-7] Thus, tremendous benefit can be gained by timely assessment and treatment of blinding eye diseases that, as their final common pathway, lead to vision loss.

Uncorrected refractive error is the leading cause of visual impairment worldwide.[8] The most common causes of blindness in developed countries are age-related macular degeneration, glaucoma and diabetic retinopathy, while cataract rises to the fore in developing countries. Vision loss from most of these conditions is largely preventable with timely diagnosis and treatment; even age-related macular degeneration is yielding somewhat to interventions.[9,10] However access to even basic vision care is often limited in developing countries.[11]

In light of evidence that source countries for new immigrants and refugees to Canada[12] have higher burdens of vision loss,[1] we reviewed evidence on screening tests for vision loss in primary care and reviewed guidelines for primary care interventions to prevent vision loss from glaucoma and diabetic retinopathy. We assessed evidence on prevalence, screening of asymptomatic populations, treatment effectiveness, population-specific concerns and implementation.

Methods

We used the 14-step method developed by the Canadian Collaboration for Immigrant and Refugee Health team.[13] Both a clinician summary table (Appendix 2) and a logic model were constructed to define the clinical preventive action and relevant clinical outcomes, updated and refined as search information became available. With prevention as our focus, our search concentrated on the body of evidence for screening tests for vision loss (Box 1).

Search strategy for systematic reviews, guidelines and population-specific literature

A systematic search strategy was developed (Appendix 1) in consultation with a librarian to identify systematic reviews and guidelines relevant to population vision

screening tests in both the general population and the specific subpopulation of immigrants and refugees. We initially searched MEDLINE and modified the strategy for the Cochrane Database of Systematic Reviews, Database of Reviews of Effectiveness, EMBASE and CINAHL, 1996–2007 inclusive. Eligible systematic reviews were screened by two reviewers and were included on the basis of relevance to key questions.

We conducted subsequent literature searches to assess studies that could update the evidence represented in the identified guidelines. We also expanded our search to include screening tests for diabetic retinopathy and glaucoma. A bibliographic review of selected articles identified further relevant articles. Adults and children differ in ocular disorders and screening procedures, so are considered separately. In the absence of direct evidence, we examined the evidence used by the relevant guidelines and considered this evidence in the context of newly arrived immigrants and refugees.

A separate targeted literature search for population-specific concerns was conducted in several categories: baseline risk or prevalence, risk of clinically important outcomes, genetic and cultural factors (e.g., preferences, values, knowledge) and variation in adherence (including at the primary care practitioner or patient level). The evidence from this search allowed reviewers to assess the applicability of evidence identified for the general population. An updating search, focusing on randomized controlled trials and systematic reviews during the period Jan. 1, 2007, to Jan. 1, 2010, was conducted to determine whether any recent publications would change the recommendation.

Synthesis of evidence and values

We compiled evidence from systematic reviews and pertinent clinical trials using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) summary of findings tables, which assess both relative and absolute effects of interventions. We appraised quality of evidence (Box 2) for each outcome using the GRADE quality-assessment tool, which assesses study limitations, directness, precision, consistency and publication bias across studies. In the clinical considerations data synthesis, we reported implementation issues. Finally, we identified gaps in the research evidence.

Results

Our search did not find any systematic reviews or guidelines related to vision screening tests in immigrants or refugees. However, we identified 23 systematic reviews and guidelines related to screening tests for vision loss in the general population. Our review identified four clinical trials of screening tests for vision loss in community-dwelling elderly.[14] These failed to demonstrate a benefit, but none of the studies could be generalized to newly arrived immigrants and refugees. Eight guidelines for adults and one article focusing on amblyopia in children were identified; all recommended vision screening tests in varying forms and frequency.

What is the burden of vision loss in immigrant populations?

Visual acuity is the single most important indicator of ocular health. Decreased presenting vision is most frequently due to uncorrected refractive error but can signify underlying sight-threatening eye disease. International data[1] suggests vision loss and undiagnosed sight-threatening eye disease should be more common in new immigrants and refugees to Canada who originate from developing countries, but we could not find any Canadian data to confirm this assertion. Eighty per cent of new immigrants to Canada[12] come from regions with prevalence of blindness up to five times higher (after adjustment for age) than Canada.[1] Much of the high prevalence of blindness in developing countries can be attributed to disparities in access to care.[11] The World Health Organization estimates that 80% of blindness in developing countries is avoidable through cost-effective prevention and treatment. Glaucoma, the leading cause of irreversible blindness worldwide,[1] reflects the global disparity in access to care with only 10% of cases of open-angle glaucoma diagnosed in developing countries compared with 50% in developed countries.[15] Similar global disparities in access are anticipated for other common causes of vision loss.[11]

In the United States, minority populations have higher levels of vision loss and undiagnosed eye disease[16-19] than the general population. Numerous factors contribute to this disparity, including socio-economic status, access to care, societal conventions, and physiologic and anatomic differences.[18] These factors, in turn, influence the prevalence of vision loss from cataract, diabetic retinopathy, glaucoma and uncorrected refractive error.[18,20-22] Recent immigration[16,17] has been identified as a risk factor for vision loss, the most common cause of which is uncorrected refractive error.[16,19,23] The prevalence of vision loss (< 6/15) due to uncorrected refractive error is estimated at 5.4% for those 12 and older in the general population and substantially higher in minority populations.[23] Many immigrants and refugees to Canada are likely to encounter similar issues.

Although trachoma, onchocerciasis (river blindness), and vitamin A deficiency figure prominently as causes of blindness in some low-income countries, these conditions have not been reported among immigrants and refugees in Canada. Anecdotal evidence suggests that the rare cases in immigrants and refugees to Canada most frequently take the form of subconjunctival scarring from cicatrical trachoma (noninfectious) evident on eversion of the upper eyelids. Typically, the threat to vision posed by these conditions in asymptomatic patients dissipates harmlessly on arrival to Canada through a vitamin A–sufficient diet or by breaking the cycle of reinfection that underlies the decades-long descent into blindness from trachoma or onchocerciasis. In the rare event that symptomatic ocular disease would arise from these conditions after immigrants arrive in Canada, the usual course of clinical care and specialty referral should lead to appropriate diagnosis and management.

Do screening tests and treatment for eye disease decrease morbidity?

Screening

Measuring visual acuity is a simple maneuver that can be carried out accurately (sensitivity of 94% and specificity of 89%)[24] in a primary care setting. Presenting visual acuity should be measured; that is, eyeglasses or contact lenses should be left in place if worn habitually for distance vision. Visual acuity is measured one eye at a time while occluding the opposite eye. The patient is asked to identify larger optotypes (type sizes) progressing to smaller ones and visual acuity is taken as the smallest line of which at least half the optotypes are identified correctly.

When measuring vision in immigrants and refugees, a standardized chart with the tumbling E or the Landholt C optotypes could be helpful because familiarity with an alphabet or numbers is not required. In some cases, a cut-out "E" or "C" for the reader to orient to the chart will simplify communication. The ETDRS-type of visual acuity chart is the preferred chart layout and has several advantages including five optotypes on each line.[25] However, an inexpensive Snellen chart using ambient room lighting is adequate for screening purposes.. For valid measurement, the subject should be at the recommended distance from the visual acuity chart. Glare-inducing conditions such as sidelighting or backlighting from an outside window should be avoided. A pinhole viewing device can be added as a simple adjunct to determine whether the visual impairment is due to refractive error (sensitivity 79%, specificity 98%).[26]

Relative benefits and harms of treatment

We did not find direct evidence that routinely screening and treating immigrant children in primary care for visual impairment results in improved visual acuity. However, a randomized clinical trial has shown that intensive screening procedures, compared with usual vision surveillance, leads to improved visual acuity.[27] Amblyopia is present in 1.6% to 3.6% of the population.[28,29] Although typically affecting only one eye, amblyopia limits career choice depending on the severity of vision loss and can be associated with a greater lifetime risk of vision loss in the better-sighted eye.[30] Amblyopia and its leading causes (strabismus, astigmatism and anisometropia) are reversible if diagnosed and treated early after onset within the first seven or eight years of life, after which reversibility is minimal. Timing of screening tests for vision loss is critical in children and is important for new immigrants and refugees within the first year after arrival.

For adults, we focused our effectiveness synthesis on the prevalence of vision loss from uncorrected refractive error, which is amenable to simple correction with eyeglasses. Population-based evidence from the National Health and Nutrition Examination Survey in the US[23] reports that the prevalence of visual impairment less than 6/15 from uncorrected refractive error was 5.3% in people 12 and older (Table 1).[23] We were unable to identify any evidence to estimate adherence to recommendations for an eye examination by an ophthalmologist or optometrist, or on whether subsequent prescriptions for eyeglasses are filled. Using the GRADE rating system, we rated the quality of this evidence as very low.

Our evidence review found no data on harm to the patient for measuring vision, inquiring about risk factors for blinding eye disease, or referring to an optometrist or ophthalmologist outside of the time and cost often involved in accessing a comprehensive ophthalmic evaluation (Table 1).

Clinical considerations

Is vision assessed during migration?

The Citizenship and Immigration Canada Immigrant Medical Examination requires an "appropriate functional inquiry" related to the visual system and the measurement of visual acuity along with a basic external eye examination and funduscopy (or simply a red reflex as appropriate). An ophthalmologist's report is required

if the patient's best visual acuity measures worse than 6/12 in either eye (with corrective lenses or a pinhole in place if appropriate), or if there is a history of serious eye conditions or disease. This examination process, however, is not formally linked to vision-related treatment.

What are potential implementation issues for vision screening tests?

seeking, obtaining and complying with appropriate vision care. Beyond issues of financial access, age and sex can be influential. Age can influence the decision to seek care or to treat, a decision that is sometimes beyond the control of elderly patients with vision loss. Female patients appear to face greater barriers to assessment and treatment, and sex discrimination is more influential in low- and middle-income countries than in high-income

Table 1: Summary of findings for vision screening and correction for reducing visual impairment

Patient or population: General US population: ages 12+
Setting: Household study of general US population of adolescents and adults
Intervention: Screening and correction of visual impairment
Comparison: Usual care
Source: Vitale S, Cotch MF, Sperduto RD. Prevalence of visual impairment in the United States. *JAMA* 2006;295:2158-63.

	Absolute effect (95% CI)		Relative effect (95% CI)	No of participants (studies)	GRADE quality of evidence	Comments
Outcomes	Presenting vision, %*	Best corrected vision, %*	Prevalence difference			
Visual impairment < 6/15	6.4 (6.0–6.8)	1.1 (0.7–1.5)	5.3 (4.9–5.7)	14 203 (1)	Very low	NNS = 19. Acceptance of correction through eyeglasses can only be inferred†

Note: CI = confidence interval; GRADE = Grading of Recommendations Assessment, Development and Evaluation; NNS = number need to screen to find one person with vision worse than 6/15 or 20/50 due to uncorrected refractive error.
*Presenting visual impairment is based on vision with habitual correction, if worn, in place. Best-corrected visual impairment based on vision with best-possible refractive correction in place.
†Study was a large population-based examination survey, not a treatment study. Proportion of participants who would benefit from correction using eyeglasses was estimated by change in prevalence of visual impairment based on refraction compared with presenting vision. In practice NNS to improve vision would be greater because not everyone improving to better than 20/50 would accept the cost and inconvenience of eyeglasses.

Comprehensive ophthalmic examination is not covered for those aged 18 to 64 in any Canadian province.[31] However, specific nonrefractive indications for performing an evaluation—such as being at increased risk for glaucoma, screening for diabetic retinopathy or excluding clinically evident cataract as a cause of vision loss—are typically covered by provincial health plans. In view of changing regulations and provincial differences, primary care practitioners are encouraged to speak to the consultant optometrist or ophthalmologist to determine how to most effectively word a referral request. Convention refugees, covered under the Interim Federal Health Program, receive coverage for correction using eyeglasses and other urgent care for up to one year after arrival.

Immigrants and refugees to Canada from developing countries could face unique cultural considerations in countries.[32,33] Finally, stigma associated with wearing glasses can also influence eye care for refugees and immigrants to Canada.[34] The desire to conform with societal norms and beauty standards is often stronger than the desire for treatment.[35,36]

Other recommendations

Screening tests for visual impairment in children

The Canadian Task Force on the Periodic Health Examination[37,38] (now the Canadian Task Force on Preventive Health Care) and the US Preventive Services Task Force recommend screening tests for visual impairment and strabismus for children younger than five years (grade B) in the general population but do not commit to any specific timetable. The joint recommendations of the American Academy of Ophthalmology,[39] the American Academy of Pediatrics[40]

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and the American Academy of Family Physicians[41] call for age-appropriate vision screening tests at all well-child visits beginning with newborns and continuing until the age of five, with introduction of visual acuity testing at age three (see clinician summary table). These recommendations are reflected in the 2006 version of the influential Rourke Baby Record used by more than 78% of family physicians in Ontario for well-child care.[42] Additional maneuvers recommended for children include assessing for a red reflex and inspecting the external eye beginning with newborns.[40]

Screening tests for visual impairment in adults

In adults, both the Canadian Task Force on the Periodic Health Examination[43] and the US Preventive Services Task Force[44] recommend screening tests for visual impairment by primary care practitioners (grade B) but limited these tests to those older than 65. However, since these influential guidelines were published over a decade ago they do not address uncorrected refractive error,[45] now recognized as the leading cause of vision loss worldwide.[8] Visual impairment from uncorrected refractive error is common across all adult age groups.[23]

Other conditions

In the case of glaucoma and diabetic retinopathy patients do not typically present with vision impairment until damage has become irreversible. The Canadian Task Force on the Periodic Health Examination and the US Preventive Services Task Force present compelling evidence that supports recommendations for referral of asymptomatic adults at high risk for glaucoma.[43,46] Similarly, the Canadian Diabetic Association Clinical Practice Guidelines make a compelling case for periodic screening tests for diabetic retinopathy in persons with diabetes.[47] These recommendations regarding vision health, specific to primary care, are also applicable to immigrants and refugees.

1. Refer patients with diabetes for screening tests for diabetic retinopathy (or screen in primary care).[47]
2. Identify and refer those with risk factors for glaucoma (older than 65, blacks older than 40, glaucoma in a first-degree relative and myopia exceeding -6 diopters).[43,46]

The cases revisited

Using a tumbling E acuity chart, Anand's presenting visual acuity is measured as 6/30 OD and 6/60 OS. He is referred to an optometrist who diagnoses hyperopia in both eyes with a visually significant cataract in the left eye. He is sent to an ophthalmologist who performs cataract surgery OS. On his final postoperative refraction, his optometrist notes the visual acuity now improves to 6/7.5 OD and 6/6 OS with glasses.

Sharise's bright and cooperative four-year-old is coaxed into playing the "E-game" using a cut-out "E." Her presenting distance acuity measures 6/9 OD and OS. Her eight-year-old sister, however, can see only 6/24 in both eyes. She is referred to an optometrist who diagnoses myopia correctable to 6/6 with eyeglasses. Sharise's distance vision measures 6/6 in both eyes but she is also referred to an optometrist because of her increased risk of glaucoma (blacks older than 40). The optometrist identifies high intraocular pressures of 26 in both eyes along with suspect visual fields and optic nerve cupping. Sharise is referred to an ophthalmologist who confirms the diagnosis of early open-angle glaucoma and successfully lowers her intraocular pressure to target in both eyes with selective laser trabeculoplasty.

Conclusion and research needs

Vision loss and undiagnosed sight-threatening eye disease are more common among new immigrants and refugees than in the Canadian-born population. Immigrant populations also face socio-economic and cultural barriers to accessing vision health care. Screening tests and referral for vision impairment is warranted for all adult immigrants and refugees. Existing vision screening guidelines for neonates, infants, children and adolescents can also reasonably be applied to immigrant populations. Similarly, current recommendations for referring patients at increased risk of vision loss from diabetic retinopathy and glaucoma can be reasonably applied to this population, many of whom are predisposed to develop these sight-threatening diseases. Vision health initiatives for immigrant and refugee populations would benefit from research on the prevalence of vision loss and undiagnosed sight-threatening eye disease in this population, on the effectiveness of primary care screening tests and referral, and on strategies to overcome barriers to ophthalmic care (Appendix 1).

Key points

- Vision loss and undiagnosed sight-threatening eye diseases are more common among new immigrants and refugees.
- New immigrants should be screened for vision loss within their first year in Canada, and should be referred to an optometrist or ophthalmologist if their presenting vision (habitual correction in place) is <6/12 (<20/40).

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- Referral for assessment is also warranted for other risk factors for blinding eye disease including: diabetes, age>65; blacks over 40; glaucoma in a first degree relative; and myopia exceeding -6 diopters.
- Regionally prominent "tropical" eye diseases such as onchocerciasis (river blindness), active trachoma and xerophthalmia have not been reported in immigrants or refugees to Canada. Asymptomatic disease should resolve or stabilize away from endemic conditions after arrival.

Box 2: Grading of Recommendations Assessment, Development and Evaluation Working Group grades of evidence (www.gradeworkinggroup.org)

High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and could change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

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Clinical preventive guidelines for newly arrived immigrants and refugees

This document provides the review details for the CMAJ CCIRH Vision Health paper. The series was developed by the Canadian Collaboration for Immigrant and Refugee Health and published at www.cmaj.ca.

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Appendix 1: Figure 1

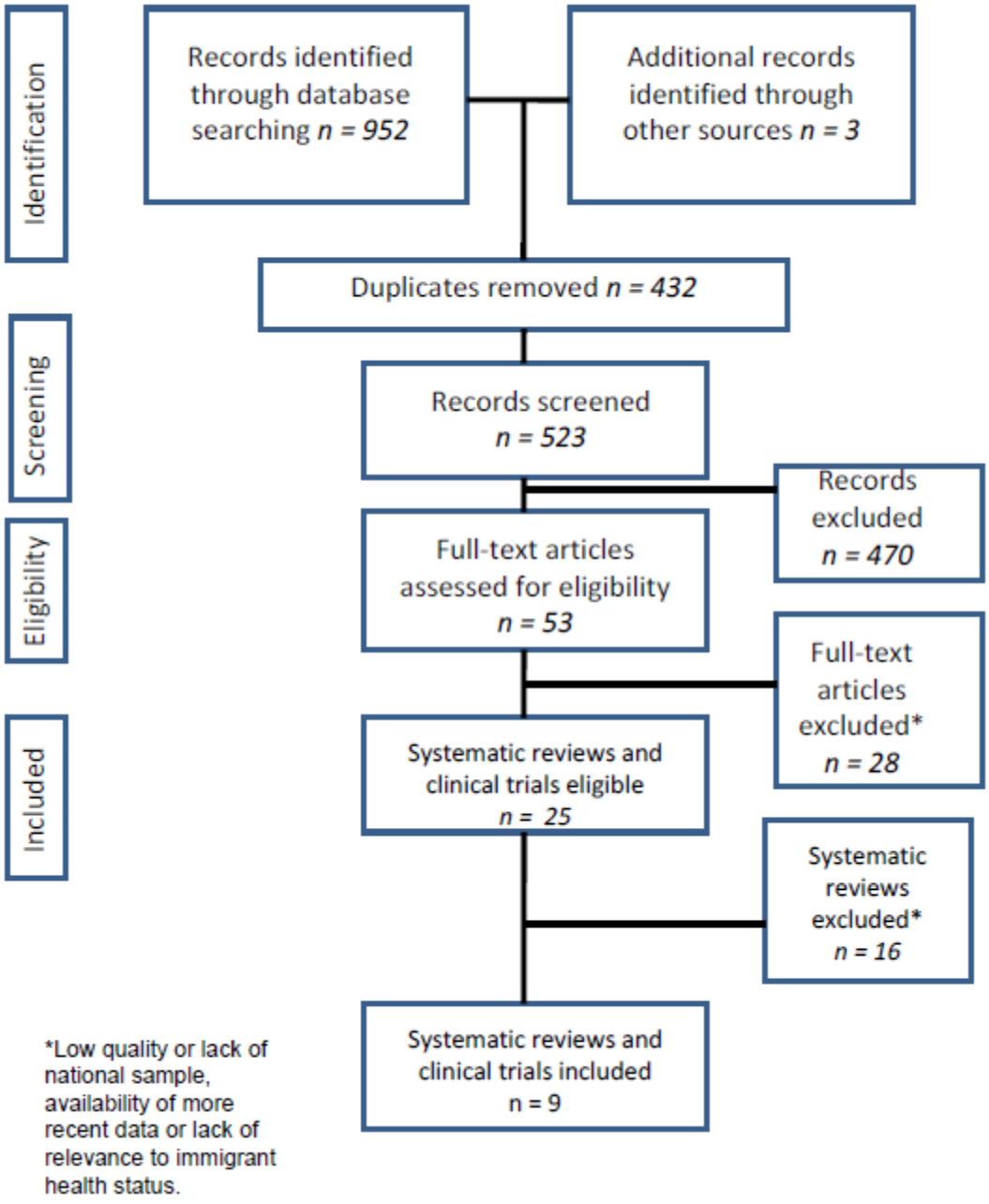

Figure 1: Search and selection of data on screening tests for vision loss among adults and children.

Appendix 2: Vision Health Evidence Based Clinician Summary Table

Perform age-appropriate screening tests for visual impairment to reduce associated functional limitation and morbidity. If presenting vision <6/12 (with habitual correction in place) refer patients to optometrist or ophthalmologist for comprehensive ophthalmic evaluation.

Prevalence: The prevalence of vision loss (< 6/15) due to uncorrected refractive error is estimated at 5.4% for those 12 and older in the general population, based on US estimates. Recent immigration has been identified as a risk factor for vision loss, the most common cause of which is uncorrected refractive error.

Burden: Vision loss can limit the ability to work, drive and complete activities of daily living. Even modest visual impairment (visual acuity < 6/12) is associated with substantial morbidity. For instance, visual impairment doubles the risk of falls, triples the risk for depression, and quadruples the risk for hip fracture in older adults.

Access to care: Female patients and people of low socio-economic status face barriers to assessment and treatment. Cultural stigma associated with wearing eyeglasses can influence patients' acceptance of eye care.

***Key risk factors for vision loss*:** Vision loss, most frequently caused by uncorrected refractive error, is more common in new immigrants, older groups, and people of lower socio-economic status. Risk factors for asymptomatic blinding eye disease include diabetes, a first-degree relative with glaucoma, age older than 65 or blacks older than 40, or myopia exceeding –6 diopters.

Screening test: Visual acuity should be measured with distance glasses or contact lenses in place if worn habitually. Age-appropriate measurement in children is required: at 0–3 months, infant should react to light; at 6–12 months, baby's eyes should fix and follow light; at 3–5 years, children should use visual acuity chart where possible. Additional screening maneuvers in children are useful; at each screening interval, assess for red reflex and inspect external ocular structures. For patients 6 months and older, also assess for strabismus. See www.ccirh.uottawa.ca for details.

Treatment: Referral for a comprehensive ophthalmic examination by an optometrist or ophthalmologist is recommended to determine the cause of vision loss and rule-out asymptomatic blinding eye disease**.** Refractive error is correctable with eyeglasses, contact lenses or refractive surgery. Immigrants at high risk for blinding eye disease can benefit from referral to eye specialists for timely assessment and treatment.

Special considerations:

- Irreversible vision loss from glaucoma and diabetic retinopathy is largely preventable with early diagnosis.
- Referral for assessment is also warranted for other risk factors for blinding eye disease including diabetes, age older than 65, blacks older than 40, glaucoma in a first-degree relative and myopia exceeding -6 diopters.

Immigrants sometimes experience increased demands of daily vision in Canada. Regionally prominent "tropical" eye diseases, such as onchocerciasis (river blindness), active trachoma and xerophthalmia, have not been reported in immigrants and refugees to Canada. Asymptomatic disease should resolve or stabilize away from local endemic conditions after arrival.

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