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CADTH RAPID RESPONSE REPORT: SUMMARY OF ABSTRACTS

Automated Perimetry or Electroretinography for Visual Field Testing in Eye Examinations: Guidelines

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About CADTH: CADTH is an independent, not-for-profit organization responsible for providing Canada's health care decision-makers with objective evidence to help make informed decisions about the optimal use of drugs, medical devices, diagnostics, and procedures in our health care system.

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Questions or requests for information about this report can be directed to **requests@cadth.ca**

Research Questions

1. What are the evidence-based guidelines for administration of automated perimetry or electroretinography in conjunction with a regular eye examination in individuals aged 0 to 19, 20 to 64, or ≥65 years?
2. What are the evidence-based guidelines for administration of automated perimetry or electroretinography in conjunction with a regular eye examination in individuals with a family history of diabetes, hypertension, ocular hypertension, cataract(s), glaucoma, and/or age-related macular degeneration?
3. What are the evidence-based guidelines for administration of automated perimetry or electroretinography in conjunction with a regular eye examination in individuals diagnosed with diabetes, hypertension, ocular hypertension, cataract(s), glaucoma, and/or age-related macular degeneration?

Key Findings

Five evidence-based guidelines were identified regarding automated perimetry or electroretinography for visual field testing in eye examinations.

Methods

This report is an upgrade from a previous CADTH report, and a similar methodology process was undertaken for this report.[6] A limited literature search was conducted on key resources including PubMed, the Cochrane Library, University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. Methodological filters were applied to limit retrieval to guidelines. The search was also limited to English language documents published between January 1, 2014 and April 17, 2019. Internet links were provided, where available. For the current report, limited handsearching was conducted after the completion of the previous report.

Selection Criteria

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

Population	Q1: Individuals aged 0 to 19, 20 to 64, or 65 years or older Q2: Individuals with a family history of diabetes, hypertension, ocular hypertension, cataract(s), glaucoma, and/or age-related macular degeneration Q3: Individuals diagnosed with diabetes, hypertension, ocular hypertension, cataract(s), glaucoma, and/or age-related macular degeneration
Intervention	Automated perimetry (e.g., short wavelength automated perimetry [SWAP], frequency doubling technology perimetry [FDT], high-pass resolution perimetry [HPRP], or motion automated perimetry [MAP]) or electroretinography in combination with a standard eye examination

Comparator	No comparator
Outcomes	Guidelines
Study Designs	Evidence-based guidelines

Results

For the previous CADTH report[6], four evidence-based guidelines were identified regarding automated perimetry or electroretinography for visual field testing in eye examinations.[2-5] Upon further review, one additional reference[1] was included in this report.

Additional references of potential interest are provided in the appendix.

Overall Summary of Findings

Five guidelines[1-5] were identified regarding automated perimetry or electroretinography for visual field testing in eye examinations. Detailed guideline characteristics are included in Table 2, and relevant recommendations are summarized in Table 3.

Table 2: Characteristics of Included Guidelines

Guideline, Year	Intended Users, Target Population	Relevant Outcomes	Evidence Collection	Evidence Quality Assessment	Recommendations Development & Evaluation	Guideline Validation
Pediatric Population						
Comprehensive Pediatric Eye and Vision Examination (AOA), 2017[1]	**Intended users:** Optometrists and ophthalmologists who provide eye and vision examinations to the pediatric population. **Target population:** Patients from 0 to 18 years of age.	Supplemental testing to confirm or rule out differential diagnoses, or enable more in-depth assessment	Clinical questions were identified by the AOA Evidence-Based Optometry Guideline Development group. A systematic review of the literature using PubMed, Medline Plus, Google Scholar, Cochrane Library as well as numerous other electronic databases from January 2005 to October 2016 was completed.	**Quality of Evidence:** • A = data derived from well-designed RCTs, SRs, meta-analyses, or diagnostic studies of relevant populations with a validated reference standard • B = RCTs with weaker designs, cohort studies (retrospective or prospective) or Grade B diagnostic studies. • C = studies of strong design, but with substantial uncertainty (including nonrandomized studies, case control studies or Grade C diagnostic studies. • D = cross sectional	Each selected article was independently reviewed and graded for quality by two clinicians. Evidence-Based Optometry Guideline Development Reading Group reviewed all the evidence and clinical recommendations were developed.	Final draft was made available for peer and public review by numerous stakeholders (individuals and organizations).

Guideline, Year	Intended Users, Target Population	Relevant Outcomes	Evidence Collection	Evidence Quality Assessment	Recommendations Development & Evaluation	Guideline Validation
				studies, case reports/series, reviews, position papers, expert opinion, or reasoning from principal. **Strength of Clinical Recommendations:** • Strong recommendation • Recommendation • Option		
Adult Population						
Serious Eye Disorders (NICE), 2019[2]	**Intended users:** Health care professionals (e.g., community optometrists), commissioners (e.g., clinical commissioning groups, NHS England), adults with possible glaucoma **Target population:** Adults with suspected glaucoma	Rates of false-positive referrals for further investigation and diagnosis of COAG or related conditions	This guideline was developed in accordance with the NICE Guidelines Manual 2012. Clinical questions were identified by guideline development group. A systematic review of the literature was completed.	GRADE methodology was used to evaluate the quality of evidence. AGREE II was used to evaluate the strength of recommendations.	The development team reviewed the evidence and developed recommendations.	Stakeholder feedback.
Comprehensive Adult Eye and Vision Examination (AOA), 2015[3]	Intended users: Eye doctors who provide eye and vision care to the adult population. Target population: Adults aged 18 years or older.	Ocular and systemic health assessment to detect visual field defects	Clinical questions were identified by the AOA Evidence-Based Optometry Guideline Development group. A systematic review of the literature using PubMed, Medline Plus, Google Scholar, Cochrane Library	Quality of Evidence: • A • B • C • D (see Comprehensive Pediatric Eye and Vision Examination Guideline above for quality of evidence descriptions) **Strength of Clinical Recommendations:** • Strong recommendation	Each selected article was independently reviewed and graded for quality by two clinicians. Evidence-Based Optometry Guideline Development Reading Group reviewed all the evidence and clinical recommendations	Final draft was made available for peer and public review by numerous stakeholders (individuals and organizations).

Guideline, Year	Intended Users, Target Population	Relevant Outcomes	Evidence Collection	Evidence Quality Assessment	Recommendations Development & Evaluation	Guideline Validation
			as well as numerous other electronic databases from January 2005 to December 2014 was completed.	• Recommendation • Consensus recommendation	were developed.	
Glaucoma or Ocular Hypertension						
Management of Glaucoma (Malaysia MoH), 2017[4]	**Intended users:** Doctors, optometrists, allied health professionals, trainees and medical students, patients and their advocates, professional societies **Target population:** Adult patients (>18 years old) with primary open angle glaucoma, primary angle closure glaucoma, or selected conditions (e.g., ocular hypertension)	Screening, diagnosis, and treatment recommendations in the management of glaucoma	Clinical questions were developed by members of the DG. A literature search, limited to articles published in the last ten years up to January 31, 2017, was completed using Medline via Ovid, Cochrane Database of Systemic Reviews, and others (e.g., Embase, Pubmed, Guidelines International Network).	GRADE methodology was used to evaluate the quality of evidence. AGREE II was used to evaluate the strength of recommendations.	All literature was appraised by at least two DG members using Critical Appraisal Skill Programme checklist. All recommendations were agreed upon by both the DG and multidisciplinary RC.	The draft was reviewed by external reviewers and posted on the MoH Malaysia website for feedback. It was presented to the Technical Advisory Committee for CPG and the HTA & CPG Council MoH Malaysia for review and approval.
Glaucoma Referral and Safe Discharge (SIGN), 2015[5]	**Intended users:** Optometrists, GP's, and hospital-based health care professionals involved in glaucoma care (including ophthalmologists,	Screening, diagnosis, and treatment recommendations in the management of glaucoma	A systematic review was completed using a search strategy devised by a SIGN Evidence and Information Scientist. The search was conducted using Medline and the	**Quality of Evidence:** • 1++ (high-quality meta-analyses, SRs of RCTs, or RCTs with a very low risk of bias) • 1+ (well-conducted meta-analyses, SRs, or RCTs with a low risk of bias) • (meta-analyses, SRs, or RCTs with a high	All literature was evaluated by two members of the group using standard SIGN methodological checklists.	The draft recommendations were presented at a national open meeting attended by 131 representatives of all key specialties relevant to the

Guideline, Year	Intended Users, Target Population	Relevant Outcomes	Evidence Collection	Evidence Quality Assessment	Recommendations Development & Evaluation	Guideline Validation
	optometrists, specialist nurses and orthoptists). It is also intended for patients and carers. **Target population:** Adults with suspected glaucoma		Cochrane Library with a year range of 2007 to 2014.	risk of bias) • 2++ (high-quality SRs of case-control or cohort studies; high-quality case-control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal) • 2+ (well-conducted case-control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal) • 3 (non-analytic studies [e.g., case reports, case series]) • 4 (expert opinion) **Strength of Clinical Recommendations:** • Strong recommendation • Conditional recommendation		guideline. The draft guideline was also posted on the SIGN website. Finally, it was reviewed by external specialist reviewers.

AOA = American Optometric Association; COAG = chronic open angle glaucoma; CPG = clinical practice guideline; DG = Development Group; GP = general practitioner; GRADE = Grading of Recommendations Assessment, Development and Evaluation; MoH = Ministry of Health; NICE = National Institute for Health and Care Excellence; RC = Review Committee; RCT = randomized clinical trial; SIGN = Scottish Intercollegiate Guidelines Network; SR = systematic review

Table 3: Summary of Relevant Recommendations in Included Guidelines

Recommendations	Strength of Evidence and Recommendations
Comprehensive Pediatric Eye and Vision Examination (AOA), 2017[1]	
"Electrophysiological techniques may be used to assess children with unexplained reduced vision. Testing may include an electroretinogram (ERG) or measurement of visual evoked potential (VEP)."[1] (p.25)	NR
Serious Eye Disorders (NICE), 2019[2]	
"If a routine sight test suggests signs of possible glaucoma, all of the following additional tests should be undertaken before referral: • *central visual field assessment using standard automated perimetry (full threshold or supra-threshold)* • *optic nerve assessment and fundus examination using stereoscopic slit lamp biomicroscopy (with pupil dilatation if necessary), and optical coherence tomography (OCT) or optic nerve head image if available* • *intraocular pressure measurement using Goldmann-type applanation tonometry* • *peripheral anterior chamber configuration and depth assessments using gonioscopy or, if not available or the person prefers, the van Herick test or OCT."*[2] *(p.9)*	NR
Comprehensive Adult Eye and Vision Examination (AOA), 2015[3]	
"*The diagnostic accuracy of confrontation visual field testing is low for mild to moderate visual field defects and when performed as a standalone test. The sensitivity of confrontation testing can be improved by using two testing procedures (e.g., kinetic testing with a 5mm red target along with static finger wiggle testing). Formal perimetry should be conducted if there is a suspicion of a visual field defect."3 (p.19)*	Grade B / Recommendation
Management of Glaucoma (Malaysia MoH), 2017[4]	
1. Standard Automated Perimetry (SAP) • *"Automated static threshold perimetry is currently the gold standard for VF assessment.* • *Commonly used threshold algorithms are Swedish Interactive Threshold Algorithm (SITA) Standard and SITA Fast in the Humphrey perimeter. Other available algorithms such as "Dynamic Strategy" in the Octopus perimeter may be used.* • *For those with very advanced disease, it may be necessary to consider:* - *Goldmann size V stimulus rather than size III* - *a perimetric strategy which focuses more closely on the remaining area of VF (Octopus M1 or M2 or the Humphrey 10-2)"*[4] *(p.10)* 2. *Non-conventional perimetry* • *"There is insufficient evidence that Short Wave Automated Perimetry and Frequency Doubling Threshold Perimetry has any advantage over SAP."*[4] *(p.10)*	1. NR 2. NR
Glaucoma Referral and Safe Discharge (SIGN), 2015[5]	
1. "For patients with ocular hypertension or suspected glaucoma, standard automated perimetry is recommended for visual field testing. Frequency doubling technology is also acceptable."[5] *(p14)* *2. "For patients with ocular hypertension, treated or untreated, a reliable baseline based on repeated measurement of IOP and perimetry should be established. Repeat glaucoma testing every two years is recommended."*[5] *(p18)*	1. 2+ / Strong recommendation 2. 2++ / Strong recommendation

AOA = American Optometric Association; GRADE = Grading of Recommendations Assessment, Development and Evaluation; MoH = Ministry of Health; NICE = National Institute for Health and Care Excellence; NR = not reported; SIGN = Scottish Intercollegiate Guidelines Network

References Summarized

Guidelines and Recommendations

Pediatric Population

1. AOA Evidence-based Optometry Guideline Development Group. Comprehensive Pediatric Eye and Vision Examination. *(Evidence-based clinical practice guideline).* St. Louis (MO): American Optometric Association; 2017: http://aoa.uberflip.com/i/807465-cpg-pediatric-eye-and-vision-examination. Accessed 2019 Nov 4.
See: 6a. Electrodiagnostic Testing (p.25)

Adult Population

2. National Institute for Health and Care Excellence. Serious eye disorders. *(NICE quality standard QS180).* 2019; https://www.nice.org.uk/guidance/qs180. Accessed 2019 Nov 4.
See: Additional Tests (p.9)

3. AOA Evidence-based Optometry Guideline Development Group. Comprehensive Adult Eye and Vision Examination. (*Evidence-based clinical practice guideline)*. St. Louis (MO): American Optometric Association; 2015: http://aoa.uberflip.com/i/578152-aoa-clinical-practice-guidelines-adult-eye-exam. Accessed 2019 Nov 4.
See: 2f. Ocular and Systemic Health Assessment (p.19)

Glaucoma or Ocular Hypertension

4. Management of glaucoma. *(Clinical practice guidelines).* Putrajaya (MY): Ministry of Health Malaysia; 2017: http://www.acadmed.org.my/index.cfm?&menuid=67#Ophthalmology. Accessed 2019 Nov 04.
See: 4.3.1 Automated visual field analysis (p.10)

5. Glaucoma referral and safe discharge. (*SIGN national clinical guideline 144*). Edinburgh (GB): Scottish Intercollegiate Guidelines Network; 2015: https://www.sign.ac.uk/assets/sign144.pdf. Accessed 2019 Nov 04.
See: Visual field assessment (p.14) and Monitoring patients with ocular hypertension (p.18)

Appendix — Further Information

Previous CADTH Report

6. Automated Perimetry or Electroretinography for Visual Field Testing in Eye Examinations: Guideline. *(CADTH Rapid Response Report: Reference List)*. Ottawa (ON): CADTH; 2019: https://cadth.ca/automated-perimetry-or-electroretinography-visual-field-testing-eye-examinations-guideline. Accessed 2019 Nov 4.

Systematic Reviews and Meta-Analyses – Neurological Conditions

7. Hepworth LR, Rowe FJ. Programme choice for perimetry in neurological conditions (PoPiN): a systematic review of perimetry options and patterns of visual field loss. *BMC Ophthalmol*. 2018 Sep 10;18(1):241.
PubMed: PM30200926

Guidelines and Recommendations – Alternative Population

8. Newman SA, Turbin RE, Bodach ME, et al. Congress of Neurological Surgeons Systematic Review and Evidence-Based Guideline on Pretreatment Ophthalmology Evaluation in Patients With Suspected Nonfunctioning Pituitary Adenomas. Neurosurgery. 2016 Oct;79(4):E530-532.
PubMed: PM27635960

Clinical Practice Guidelines – Methodology Unspecified

Glaucoma in Adults

9. Glaucoma: care for adults. *(HQO Quality Standards).* Toronto (ON): Health Quality Ontario; 2019: https://www.hqontario.ca/Portals/0/documents/evidence/quality-standards/qs-glaucoma-qs-en.pdf. Accessed 2019 Apr 22.

Glaucoma in All Populations

10. Optometric Practice Reference Standards of Practice. Toronto (ON): College of Optometrists of Ontario. 2014.
https://www.collegeoptom.on.ca/wp-content/uploads/2016/06/COO_Standards-of-Practice.pdf. Accessed 2019 Apr 22.

Review Articles

11. Mooney MA, Herro AM, Fintelmann RE, et al. Visual Field Outcome Reporting in Neurosurgery: Lessons Learned from a Prospective, Multicenter Study of Transsphenoidal Pituitary Surgery. *World Neurosurg*. 2018 Dec;120:e326-e332.
PubMed: PM30144606

12. Wu Z, Medeiros FA. Recent developments in visual field testing for glaucoma. *Curr Opin Ophthalmol*. 2018 Mar;29(2):141-146.
PubMed: PM29256895