

CADTH RAPID RESPONSE REPORT: SUMMARY OF ABSTRACTS

Frequency of Eye Examinations: Guidelines

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Research Questions

1. What are the evidence-based guidelines regarding the frequency of eye examinations for individuals aged 0 to 19, 20 to 64, or 65 years or older?
2. What are the evidence-based guidelines regarding the frequency of eye examinations for 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 regarding the frequency of eye examinations for individuals diagnosed with diabetes, hypertension, ocular hypertension, cataract(s), glaucoma, and/or age-related macular degeneration?

Key Findings

Thirteen guidelines were identified regarding the frequency of eye examinations for pediatric and adult populations as well as individuals with diabetes or glaucoma.

Methods

A limited literature search was conducted by an information specialist on key resources including Medline via OVID, the Cochrane Library, the University of York Centre for Reviews and Dissemination (CRD) databases, the websites of Canadian and major international health technology agencies, as well as a focused Internet search. The search strategy was comprised of both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were vision tests and frequency. Search filters were applied to limit retrieval to guidelines. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2009 and March 28, 2019. Internet links were provided, where available.

Selection Criteria

One reviewer rescreened 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	Frequency of eye examinations
Comparator	Not Applicable
Outcomes	Guidelines
Study Designs	Evidence-based guidelines

Results

Due to the scope and nature of this rapid response report, only guidelines were included in this report.

Thirteen guidelines¹⁻¹³ were identified regarding the frequency of eye examinations for a variety of patient populations. Upon further review, one reference²² included in the previous CADTH report¹⁴ was excluded as it was a summary of an already included guideline³ by the same authors. Additionally, another reference¹⁷ included in the main body of the previous report¹⁴ was moved to the appendix of this report as the guideline was based on a non-systematic review of the literature.

Additional references of potential interest are provided in the appendix.

Overall Summary of Findings

Thirteen guidelines¹⁻¹³ were identified regarding the frequency of eye examinations for a variety of patient populations. Detailed guideline characteristics are included in Table 2 whilst summaries of relevant recommendations are included in Table 3.

Table 2: Characteristics of Included Guidelines

First Author, Year	Intended Users, Target Population	Relevant Outcomes Considered	Evidence Collection	Evidence Quality Assessment	Recommendations Development and Evaluation	Guideline Validation
Pediatric Population						
American Optometric Association Evidence-based Optometry Guideline Development Group, 2017 ¹	<p>Intended users: Optometrists and ophthalmologists who provide eye and vision examinations to the pediatric population.</p> <p>Target population: Patients from 0 to 18 years of age.</p>	Frequency of eye and vision examinations for the pediatric population (0 to 18 years of age).	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.	<p>Quality of Evidence:</p> <ul style="list-style-type: none"> • A • B • C • D <p>Strength of Clinical Recommendations:</p> <ul style="list-style-type: none"> • Strong recommendation • Recommendation • Option 	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).

First Author, Year	Intended Users, Target Population	Relevant Outcomes Considered	Evidence Collection	Evidence Quality Assessment	Recommendations Development and Evaluation	Guideline Validation
Adult Population						
American Optometric Association Evidence-based Optometry Guideline Development Group, 2015 ²	<p>Intended users: Eye doctors who provide eye and vision care to the adult population.</p> <p>Target population: Adults aged 18 years or older.</p>	Frequency of eye and vision examinations for the adult population (18 years of age or older).	<p>Clinical questions were identified by the AOA Evidence-Based Optometry Guideline Development group.</p> <p>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 December 2014 was completed.</p>	<p>Quality of Evidence:</p> <ul style="list-style-type: none"> • A • B • C • D <p>Strength of Clinical Recommendations:</p> <ul style="list-style-type: none"> • Strong recommendation • Recommendation • Consensus recommendation 	<p>Each selected article was independently reviewed and graded for quality by two clinicians.</p> <p>Evidence-Based Optometry Guideline Development Reading Group reviewed all the evidence and clinical recommendations were developed.</p>	Final draft was made available for peer and public review by numerous stakeholders (individuals and organizations).
All Age Groups						
Robinson B, 2012 ³	<p>Intended users: Asymptomatic individuals or symptomatic individuals who do not recognize their symptoms as being eye related.</p> <p>Target population: All patients (0 to 65+ years of age).</p>	Frequency of eye and vision examinations for all patients (0 to 65+ years of age).	Extensive review of the literature including journals and grey literature.	<p>Grade of Evidence:</p> <ul style="list-style-type: none"> • 1= Good evidence • 2= Fair evidence • 3= Poor evidence 	<p>Each selected article was independently reviewed and graded for quality by three individuals.</p> <p>An expert workshop of 14 optometrists and one eye disease epidemiology specialist reviewed all the evidence and clinical recommendations were developed.</p>	Guideline reviewed by expert panel made up of six practitioners/experts in the field.
People with Diabetes						
Altomare, 2018 ⁴	Intended users: Healthcare professionals involved in the treatment of	Frequency of screening for retinopathy in patients with	Committee members define clinically important questions which	Grade of evidence:	Each selected article was critically appraised based on prespecified criteria.	Guideline underwent external peer review by

First Author, Year	Intended Users, Target Population	Relevant Outcomes Considered	Evidence Collection	Evidence Quality Assessment	Recommendations Development and Evaluation	Guideline Validation
	diabetic or pre-diabetic patients. Target population: Patients with type 1 or type 2 diabetes.	type 1 or type 2 diabetes.	are used to guide the literature search. A systematic review of the literature using a variety of electronic databases was completed.	• D • E Strength of Evidence: <ul style="list-style-type: none">• Level 1• Level 2• Level 3• Level 4	An expert committee reviewed all the evidence and clinical recommendations were developed.	numerous stakeholders.
Hooper, 2017 ⁵	Intended users: Canadian ophthalmologists involved in the screening, diagnosis and management of diabetic retinopathy. Target population: Canadian patients with type 1 or type 2 diabetes.	Screening recommendations for diabetic retinopathy in patients with type 1 or type 2 diabetes.	A systematic review of the literature using PubMed, EMBASE, Cochrane Library as well as numerous other electronic databases from 1997- 2010 was completed.	Strength of Evidence: <ul style="list-style-type: none">• Level 1• Level 2• Level 3• Level 4	Two reviewers independently reviewed included articles for acceptable methodological quality. Canadian Ophthalmological Society Diabetic Retinopathy Clinical Practice Guideline Expert Committee reviewed the evidence and developed recommendations.	A draft of the guideline was reviewed by numerous individuals including ophthalmologists, retina specialists, optometrists, and family physicians.
Management of diabetes: a national clinical guideline, 2017 ⁶	Intended users: Healthcare professionals involved in the care of diabetic patients as well as diabetic patients and their carers. Target population: Patients with type 1 or type 2 diabetes.	Screening recommendations for diabetic retinopathy in patients with type 1 or type 2 diabetes.	This guideline was developed in accordance with the SIGN 50: A Guideline Developer's Handbook. A systematic review of the evidence using multiple databases from 2003-2009 was completed	Levels of Evidence: <ul style="list-style-type: none">• 1++• 1+• 1-• 2++• 2+• 2-• 3• 4 Grade of Recommendations: <ul style="list-style-type: none">• A• B• C• D	Two reviewers reviewed included articles for acceptable methodological quality. A multidisciplinary group of practicing clinicians developed the guideline using a standard methodology.	Peer review by independent specialist referees as well as input from public consultation.
Type 1 Diabetes Treatment Guideline, 2017 ⁷	Intended users: NR Target population:	Frequency of screening for diabetic retinopathy in patients with	A systematic review of the literature was completed.	NR	Evidence synthesis involved critical appraisal of the work.	NR

First Author, Year	Intended Users, Target Population	Relevant Outcomes Considered	Evidence Collection	Evidence Quality Assessment	Recommendations Development and Evaluation	Guideline Validation
	Patients with type 1 diabetes.	type 1 diabetes.			The development team reviewed the evidence and developed recommendations. Recommendations from other evidence-based guidelines were also adapted for this guideline.	
Type 2 diabetes in adults: management, 2015⁸	Intended users: Healthcare professionals, commissioners and providers of diabetes services as well as adult patients with type 2 diabetes, their families and their carers. Target population: Adult patients with type 2 diabetes (18 years of age or older).	Screening recommendations for adult patients with type 2 diabetes.	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.	The development team reviewed the evidence and developed recommendations.	Stakeholder feedback.
Type 1 diabetes in adults: diagnosis and management, 2015⁹	Intended users: Healthcare professionals, commissioners and providers of diabetes services as well as adult patients with type 1 diabetes, their families and their carers. Target population: Adult patients with type 1 diabetes (18 years of age or older).	Screening recommendations for adult patients with type 1 diabetes.	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.	The development team reviewed the evidence and developed recommendations.	Stakeholder feedback.

First Author, Year	Intended Users, Target Population	Relevant Outcomes Considered	Evidence Collection	Evidence Quality Assessment	Recommendations Development and Evaluation	Guideline Validation
American Optometric Association Evidence-based Optometry Guideline Development Group, 2014 ¹⁰	Intended users: Optometrists. Target population: Patients with diabetes.	Screening recommendations for patients with diabetes.	Clinical questions were identified by the AOA Evidence-Based Optometry Guideline Development group. A systematic review of the literature using numerous electronic databases from 2009 to 2012 was completed.	Grade of Evidence: <ul style="list-style-type: none"> • A • B • C • D Strength of Recommendation: <ul style="list-style-type: none"> • A • B • C • D 	Each selected article was independently reviewed and graded for quality by two readers. 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).
General practice management of type 2 diabetes, 2014 ¹¹	Intended users: Health professionals. Target population: Patients with type 2 diabetes.	Screening recommendations for patients with type 2 diabetes.	N/A	Level of evidence: <ul style="list-style-type: none"> • I • II • III-1 • III-2 • III-3 • IV • Practice point Grade of Recommendation: <ul style="list-style-type: none"> • A • B • C • D 	Adopted from recommendations from the following organizations: National Health and Medical Research Council, the Scottish Intercollegiate Guidelines Network (SIGN), the American Diabetes Association (ADA), etc.	NR
People with Glaucoma						
Glaucoma: diagnosis and management, 2017 ¹²	Intended users: Healthcare professionals, commissioners and providers of eye care services as well as adult patients with chronic open angle glaucoma or ocular hypertension, their families and their carers.	Time to next assessment for people being treated for ocular hypertension and suspected chronic open angle glaucoma.	This guideline was developed in accordance with the NICE Guidelines Manual 2012 and 2014. Clinical questions were identified by a guideline development group.	GRADE methodology.	The development team reviewed the evidence and developed recommendations.	Stakeholder feedback.

First Author, Year	Intended Users, Target Population	Relevant Outcomes Considered	Evidence Collection	Evidence Quality Assessment	Recommendations Development and Evaluation	Guideline Validation
	Target population: Adult patients with glaucoma (18 years of age or older).		A systematic review of the literature was completed.			
Glaucoma Referral and Safe Discharge, 2015¹³	Intended users: Optometrists, general practitioners, and healthcare professionals involved in caring for patients with glaucoma. Target population: Patients with glaucoma.	Time to next assessment for people being treated for ocular hypertension and people with a family history of glaucoma.	This guideline was developed in accordance with the SIGN 50: A Guideline Developer's Handbook. A systematic review of the literature was completed.	Levels of Evidence: <ul style="list-style-type: none">• 1++• 1+• 1-• 2++• 2+• 2-• 3• 4 Strength of Recommendations: <ul style="list-style-type: none">• R= Strong or conditional recommendations• ✓= Recommended best practice	A multidisciplinary group of practicing clinicians developed the guideline using a standard methodology.	Peer review by representatives of all specialties relevant to guideline as well as independent expert referees.

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

Table 3: Summary of Relevant Recommendations in Included Guidelines

Recommendations	Strength of Evidence and Recommendations
American Optometric Association Evidence-based Optometry Guideline Development Group, 2017 ¹	
<ol style="list-style-type: none"> 1. "Infants should receive an in-person comprehensive eye and vision assessment between 6 and 12 months of age for the prevention and/or early diagnosis and treatment of sight-threatening eye conditions and to evaluate visual development."¹ (p63) 2. "Preschool age children should receive an in-person comprehensive eye and vision examination at least once between the ages of 3 and 5 to prevent and/or diagnose and treat any eye or vision conditions that may affect visual development."¹ (p63) 3. "School-age children should receive an in-person comprehensive eye and vision examination before beginning school to diagnose, treat and manage any eye or vision conditions."¹ (p63) 4. "Children with myopia should have an in-person comprehensive eye and vision examination at least annually, or as frequently as recommended (especially until age 12), because of the potential for rapid myopia progression."¹ (p63) 5. "School-age children should receive an in-person comprehensive eye and vision examination annually to diagnose, treat, and manage eye or vision problems."¹ (p63) 	<ol style="list-style-type: none"> 1. Grade B/ Strong recommendation 2. Grade B/ Strong recommendation 3. Grade B/ Strong recommendation 4. Grade B/ Strong recommendation 5. Consensus recommendation

Recommendations	Strength of Evidence and Recommendations
American Optometric Association Evidence-based Optometry Guideline Development Group, 2015 ²	
<p>1. "Comprehensive eye and vision examinations are recommended at least every two years for asymptomatic, low-risk persons ages 18 through 39 years to evaluate changes in eye and visual function, and provide for early detection of sight-threatening eye and systemic health problems."² (p46)</p> <p>2. "Comprehensive eye and vision examinations are recommended at least every two years for asymptomatic, low-risk persons 40 through 64 years of age to evaluate changes in eye and visual function, and provide for the early detection of eye diseases, which may lead to significant vision loss, and systemic conditions that may affect health or vision."² (p46)</p> <p>3. "Annual comprehensive eye and vision examinations are recommended for persons 65 years of age or older for the diagnosis and treatment of sight-threatening eye conditions and the timely correction of refractive errors."² (p46)</p> <p>4. "Adult patients should be advised by their eye doctor to seek eye care more frequently than the recommended re-examination interval (Table 1) if new ocular, visual, or systemic health problems develop."² (p46)</p>	<p>1. Consensus recommendation</p> <p>2. Grade B/ Recommendation</p> <p>3. Grade B/ Recommendation</p> <p>4. Consensus recommendation</p>
Robinson, 2012 ³	
<p>1. "Infants and toddlers should undergo their first eye examination between the ages of 6 and 9 months."³ (p3)</p> <p>2. "Preschool children should undergo at least one eye examination between the ages of 2 and 5 years."³ (p3)</p> <p>3. "School children aged 6 to 19 years should undergo an eye examination every 2 to 3 years."³ (p3)</p> <p>4. "Adults aged 20 to 39 years should undergo an eye examination every 2 to 3 years."³ (p3)</p> <p>5. "Adults aged 40-64 years should undergo an eye examination every 2 years."³ (p3)</p> <p>6. "Adults aged 65 years or older should undergo an eye examination annually."³ (p3)</p>	<p>1. Good evidence</p> <p>2. Fair evidence</p> <p>3. Fair evidence</p> <p>4. Poor evidence</p> <p>5. Good evidence</p> <p>6. Good evidence</p>
Altomare, 2018 ⁴	
<p>1. "In individuals ≥ 15 years of age with type 1 diabetes, screening and evaluation for retinopathy should be performed annually by an experienced vision care professional (optometrist or ophthalmologist) starting 5 years after the onset of diabetes."⁴ (pS214)</p> <p>2. a) "In individuals with type 2 diabetes, screening and evaluation for diabetic retinopathy should be performed by an experienced vision care professional (optometrist or ophthalmologist) at the time of diagnosis of diabetes."⁴ (pS214)</p> <p>b) "The interval for follow-up assessments should be tailored to the severity of the retinopathy."⁴ (pS214)</p> <p>c) "In those with no or minimal retinopathy, the recommended interval is 1–2 years."⁴ (pS214)</p>	<p>1. Grade A/ Level 1</p> <p>2. a) Grade A/ Level 1</p> <p>b) Grade D/ Consensus</p> <p>c) Grade A/ Level 1</p>
Hooper, 2017 ⁵	
<p>1. a) "For individuals with type 1 diabetes diagnosed after puberty, screening for DR should be initiated 5 years after the diagnosis of diabetes."⁵ (pS50)</p> <p>b) "For individuals diagnosed with type 1 diabetes before puberty, screening for DR should be initiated at puberty, unless there are other considerations that would suggest the need for an earlier exam."⁵ (pS50)</p> <p>2. "Screening for DR in individuals with type 2 diabetes should be initiated at the time of diagnosis of diabetes."⁵ (pS50)</p> <p>3. a) "Subsequent screening for DR in individuals depends on the level of retinopathy. In those who do not show evidence of retinopathy, screening should occur every</p>	<p>1. a) Level 1</p> <p>b) Consensus</p> <p>2. Level 1</p> <p>3. a) Level 2</p>

Recommendations	Strength of Evidence and Recommendations
<p>year in those with type 1 diabetes..."⁵ (pS50)</p> <p>b) "...and every 1–2 years in those with type 2 diabetes depending on anticipated compliance."⁵ (pS50)</p> <p>4. "Once NPDR is detected, examination should be conducted at least annually for mild NPDR, or more frequently (at 3- to 6-month intervals), for moderate or severe NPDR based on the DR severity level."⁵ (pS50)</p>	<p>b) Level 2</p> <p>4. Level 2</p>
Management of diabetes: a national clinical guideline, 2017 ⁶	
<p>1. "Patients with type 1 diabetes should be screened from age 12 years."⁶ (p98)</p> <p>2. "Patients with type 2 diabetes should be screened from diagnosis."⁶ (p98)</p> <p>3. "Patients with diabetes with no diabetic retinopathy could be screened every two years. All others should be screened at least annually."⁶ (p98)</p>	<p>1. Grade C</p> <p>2. Grade A</p> <p>3. Grade B</p>
Type 1 Diabetes Treatment Guideline, 2017 ⁷	
<p>1. "Patients with evidence of retinopathy should be screened annually."⁷ (p7)</p> <p>2. "Patients without evidence of retinopathy should be screened every 2 years."⁷ (p7)</p>	<p>NR</p>
Type 2 diabetes in adults: management, 2015 ⁸	
<p>1. "On diagnosis, GPs should immediately refer adults with type 2 diabetes to the local eye screening service. Perform screening as soon as possible and no later than 3 months from referral. Arrange repeat structured screening annually."⁸ (p29)</p> <p>2. "Depending on the findings, follow structured eye screening by: routine review in 1 year or earlier review or referral to an ophthalmologist."⁸ (p29)</p>	<p>NR</p>
Type 1 diabetes in adults: diagnosis and management, 2015 ⁹	
<p>1. "On diagnosis, GPs should immediately refer adults with type 1 diabetes to the local eye screening service. Perform screening as soon as possible and no later than 3 months from referral. Arrange repeat structured eye screening annually."⁹ (p38)</p> <p>2. "Depending on findings, follow structured eye screening by: routine review annually or earlier review or referral to an ophthalmologist."⁹ (p38)</p>	<p>NR</p>
American Optometric Association Evidence-based Optometry Guideline Development Group, 2014 ¹⁰	
<p>1. "As diabetes may go undiagnosed for many years, any individual with type 2 diabetes should have a comprehensive dilated eye examination soon after the diagnosis of diabetes."¹⁰ (p78)</p> <p>2. "Individuals with diabetes should receive at least annual dilated eye examinations. More frequent examination may be needed depending on changes in vision and the severity and progression of the diabetic retinopathy."¹⁰ (p78)</p>	<p>NR</p>
General practice management of type 2 diabetes, 2014 ¹¹	
<p>1. "Ensure that all people with diabetes have a dilated fundus examination and visual acuity assessment at the diagnosis of diabetes and at least every 2 years."¹¹ (p63)</p> <p>2. "Examine higher risk patients (longer duration of diabetes, poor glycaemic control, BP or blood lipid control) without diabetic retinopathy at least annually."¹¹ (p63)</p> <p>3. "Conduct annual screening for Aboriginal or Torres Strait Islander peoples with diabetes."¹¹ (p63)</p>	<p>1. Level I evidence</p> <p>2. Level I evidence</p> <p>3. Level IV evidence</p>

Recommendations	Strength of Evidence and Recommendations
Glaucoma: diagnosis and management, 2017 ¹²	
Time to next assessment for people being treated for OHT (p9-10) <ol style="list-style-type: none"> Patients in which conversion from OHT to COAG is not detected or uncertain and in which IOP is not controlled should be reassessed in 1 to 4 months Patients in which conversion from OHT to COAG is uncertain and in which IOP is controlled should be reassessed in 6 to 12 months Patients in which conversion from OHT to COAG is not detected and in which IOP is controlled should be reassessed in 18 to 24 months 	NR
Time to next assessment for people with suspect COAG (p10) <ol style="list-style-type: none"> Patients in which conversion to COAG is not detected or uncertain and in which IOP is not controlled should be reassessed in 1 to 4 months Patients in which conversion to COAG is uncertain and in which IOP is controlled should be reassessed in 6 to 12 months Patients in which conversion to COAG is not detected and in which IOP is controlled should be reassessed in 18 to 24 months 	
Time to next assessment for people with COAG (p11) <ol style="list-style-type: none"> Patients in which progression of COAG is not detected and in which IOP is not controlled should be reassessed in 1 to 4 months Patients in which progression of COAG is detected or uncertain and in which IOP is not controlled should be reassessed in 1-2 months Patients in which progression of COAG is not detected, there is a low clinic risk and in which IOP is controlled should be reassessed in 12 to 18 months Patients in which progression of COAG is not detected, there is a high clinic risk and in which IOP is controlled should be reassessed in 6 to 12 months Patients in which progression of COAG is detected or uncertain and in which IOP is controlled should be reassessed in 2 to 6 months 	
Glaucoma Referral and Safe Discharge, 2015 ¹³	
<ol style="list-style-type: none"> <i>"Where family history of glaucoma in a first-degree relative is the sole risk factor identified at routine eye examination, the patient should be recalled for review every two years. If additional risk factors are present the patient should be reviewed annually or more frequently depending on clinical judgement."</i>¹³ (p18) <i>"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."</i>¹³ (p18) 	<ol style="list-style-type: none"> Recommended best practice Strong or conditional recommendation

BP= blood pressure; COAG= chronic open angle glaucoma; DME= diabetic macular edema; DR= diabetic retinopathy; GP= general practitioner; IOP= intraocular pressure; NPDR= non-proliferative diabetic retinopathy; NR= not reported; OHT= ocular hypertension

References Summarized

Pediatric Population

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Adult Population

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All Age Groups

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People with Diabetes

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