PHILIPPINE GUIDELINES on PERIODIC HEALTH EXAMINATION

Vision Disorders

PERIODIC HEALTH EXAMINATION TASK FORCE 2022-2023

As of 16 March 2024

PHILIPPINE PERIODIC HEALTH EXAMINATION

Disclaimer and Contact Information

This clinical practice guideline was developed for the use of primary care providers. Adherence to the guideline is encouraged, but this should not restrict primary care providers from using their clinical judgment in handling individual cases. Variabilities may exist among patients in terms of disease manifestation, characteristics, and values and preferences, and these must also be considered during clinical decision-making.

Payors and policymakers, including hospital administrators and employers, can also utilize this guideline. However, this document should not be the sole basis for evaluating insurance claims. The recommendations and the guidelines herein should also not be treated as strict rules on which to base legal action.

The developers of this guideline are aware of its limitations. The best available evidence at the time of guideline development was used, but new evidence may emerge after finalization of the guideline that may affect its validity and applicability in the future.

Contact Us

Send us an email at carlosnaval@icloud.com for any questions or clarifications on the outputs and process of this CPG.

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List of Abbreviations

AAO	American Academy of Ophthalmology
AMD	Age-Related Macular Degeneration
AUC	Area Under the Curve
AUROC	Area Under the Receiver Operating Characteristic
CDR	Cup-to-Disc Ratio
CI	Confidence Interval
COI	Conflict of Interest
CP	Consensus Panel
CPG	Clinical Practice Guidelines
CTFPHC	Canadian Task Force on Preventive Healthcare
CVS	Computer Vision Screener
DALY	Disability-Adjusted Life-Year
DOH	Department of Health
EtD	Evidence-To-Decision
EUR	Euro
GOR	Generalized Odds Ratio
HFA	Humphrey Field Analyzer
HR	Hazard Ratio
ICER	Incremental Cost-Effectiveness Ratio
ICRB	International Classification of Retinoblastoma
IOP	Intraocular Pressure
LMIC	Low-to-Middle Income Country
logMAR	Log of Minimum Angle of Resolution
MD	Mean Difference
NEI-VFQ	National Eye Institute Visual Function Questionnaire
NPV	Negative Predictive Value
OR	Odds Ratio
PACG	Primary Angle-Closure Glaucoma
PHEX	Philippine Guidelines on Periodic Health Examination
PhilHealth	Philippine Health Insurance Corporation
PHP	Philippine Peso
PICO	Population, Intervention, Comparator, Outcome
POAG	Primary Open-Angle Glaucoma
PPP	Purchasing Power Parity
PPV	Positive Predictive Value
QALY	Quality-Adjusted Life Year
RCT	Randomized Controlled Trial
RD	Risk Difference
RR	Risk Ratio
RRT	Red Reflex Test
SC	Steering Committee
SD	Standard Deviation
SEK	Swedish Krona
SGD	Singaporean Dollar
SICS	Small Incision Cataract Surgery
TWG	Technical Working Group
URE	Uncorrected Refractive Error
USD	United States Dollar
USPSTF	United States Preventive Services Task Force
VEGF	Vascular Endothelial Growth Factor
WHO	World Health Organization

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Executive Summary

This clinical practice guideline contains eight recommendations on screening asymptomatic, apparently healthy children and adults (Table 1) for vision disorders and impairments including amblyopia, retinoblastoma, refractive error, cataract, strabismus, glaucoma, and age-related macular degeneration. The guideline is intended to be used by general practitioners and specialists in the primary care setting, allied health practitioners, policy makers, employers and administrators, funders of healthcare, other stakeholders in the health industry, and even patients. Through these recommendations, we aim to present the best practices in screening and early detection of vision disorders among the general Filipino population.

The guideline development process followed four general steps: (1) identification of priority research questions; (2) evidence synthesis and analysis; (3) formulation of the recommendations based on the balance of benefit, harm, values, and preferences; and (4) implementation and evaluation. The process followed the GRADE approach (Grading of Recommendations, Assessment, Development, and Evaluation) including GRADE Adolopment, a systematic process of adapting evidence summaries, and the GRADE Evidence to Decision framework.

The recommendations in this guideline shall hold and will be updated after 3 years or when new evidence arises.

Summary of Recommendations

Table 1. Recommendations on screening for vision disorders and impairments

Recommendation	Certainty of Evidence	Strength of Recommendation
Amblyopia		
1. Among asymptomatic, apparently healthy children, we **recommend screening** for amblyopia.	Low	STRONG
Ocular abnormalities		
2. Among asymptomatic, apparently healthy infants, we **recommend the use of** red reflex testing using a funduscope or an Arclight to detect ocular abnormalities (i.e., cataract, retinoblastoma, refractive error).	Low	STRONG
Strabismus		
3. Among asymptomatic, apparently healthy children, we **recommend screening** for strabismus using the Hirschberg test.	Low	STRONG
Refraction errors		
4. a. Among asymptomatic, apparently healthy children, we **recommend screening** for refractive errors using age-appropriate visual acuity charts annually for children aged 3–8 years and every 2 years for children aged 9–18 years.	Low	STRONG
4. b. Among asymptomatic, apparently healthy adults, we **recommend screening** for refractive errors using visual acuity determination followed by the pinhole test every 5–10 years for adults aged 18–40 years; every 2–4 years for adults aged 40–54 years; every 1–3 years for adults aged 55–64 years; and every 1–2 years for adults aged ≥65 years.	Moderate	STRONG
Cataract		
5. Among asymptomatic, apparently healthy adults, we **suggest against screening** for cataracts.	Low	WEAK

Recommendation	Certainty of Evidence	Strength of Recommendation
Glaucoma		
6. Among asymptomatic, apparently healthy adults, we **recommend screening** to check for with factors for glaucoma annually; those with risk factors will be referred to higher level of care.	Low	STRONG
Age-related macular degeneration		
7. Among asymptomatic, apparently healthy adults aged >60 years with risk factors for age-related macular degeneration, we **recommend screening** using dilated fundoscopy or color fundus photography, or referral to higher level of care every 1–3 years.	Low	STRONG

1. Introduction

First published in 2004, the Philippine Guidelines on Periodic Health Examination (PHEX) was a comprehensive appraisal and systematic evidence synthesis that focused on providing early prevention among asymptomatic Filipinos through screening [1]. It was initially developed in response to the rapid increase in available information and technology alongside other clinical practice guidelines (CPGs) across disciplines. PHEX has since provided guidelines targeted to primary care providers for conditions with a high burden of disease in the country. Now with the introduction of the Universal Health Care Act, a much-needed realignment of the PHEX is sought to provide Filipinos access to quality and affordable medical services.

Despite great strides in lowering the prevalence of vision disorders and impairments, these conditions are still widespread among the public. According to the Philippine National Blindness Survey and Eye Disease Study, more than a million Filipinos are diagnosed with visual impairment and blindness and an additional four million remain undiagnosed as of the 2018 [2]. The most common visual impairments found included cataracts, uncorrected error of refraction (URE), glaucoma, and maculopathy [3]. The results of this study also showed that among those who were examined as having no visual impairment, some had error of refraction (3.25%), glaucoma (0.69%), and diabetic retinopathy (0.59%).

Aside from preventive measures, these diseases can be treated and corrected with early detection to prevent further complications. Loss of vision and uncorrected vision problems could significantly affect an individual's learning and social growth, and with most cases of blindness in the country being avoidable [4], further strengthening of programs in the screening of vision disorders is needed.

References

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2. Objective, Scope, Target population and Target users

2.1 Objective

This CPG aims to describe best practices on the screening and early detection of vision disorders and impairments based on a comprehensive evaluation of the best available evidence on the associated screening and diagnostic tests and tools.

2.2 Scope and Purpose

The guideline questions and recommendations cover screening and early detection of select vision disorders and impairments (amblyopia, errors of refraction, cataracts, glaucoma, age-related macular degeneration [AMD]) and of specific diagnostic procedures (red reflex test [RRT], Hirschberg reflex test, visual acuity testing) among apparently healthy, asymptomatic individuals. Evidence on screening is directed towards determining the effective management of the condition as a risk factor, while evidence on early detection is focused on the performance of the tests that will be used to detect and subsequently treat that early disease and prevent it from progressing.

While evidence on linked management is cited as part of the evidence summaries, the guideline does not make any recommendations for treatment of the covered vision disorders and impairments.

2.3 Target Population

The guideline recommendations are intended for apparently healthy, asymptomatic individuals (both children and adults). Such individuals have no reported impairment, blurred vision, or physical manifestations (e.g., clouding in the lens, etc.) along with no modifiable lifestyle changes such as smoking.

2.4 Intended Users

The target users of this CPG include general practitioners and healthcare workers in the primary care setting, allied health professionals, policy makers, employers and administrators, funders of healthcare, other stakeholders in the health industry, and patients. Clinicians may use this CPG as a guide for physical examination of the covered vision disorders and impairments. Training and academic institutions may refer to this guideline in educating students and trainees on the best practices in screening and early detection of vision disorders. The CPG may also be used as basis for determining which conditions need to be included in annual medical examinations of students, employees, and other populations. Lastly, regulatory agencies, policy makers in the Philippine government, and private financial and health delivery institutions in the healthcare industry may base the development of screening programs or health benefit packages for vision disorders and impairments on the findings of this CPG.

2.5 Key Clinical Issues and Questions

1. Should screening for the risk of amblyopia be performed in asymptomatic children?
2. Should the RRT be performed in asymptomatic children to detect ocular pathology?
3. Should the Hirschberg reflex test be done in asymptomatic children to detect childhood ocular disease?
4. Should visual acuity testing be done to detect errors of refraction (and other visual disorders) in asymptomatic individuals?
5. Should screening for cataracts be done among asymptomatic adults?
6. Should screening for glaucoma be done among asymptomatic adults?
7. Should screening be done for AMD in asymptomatic adults?

3. CPG Development Methodology

3.1 Organization of the Process

Convening the Steering Committee, Technical Working Group, Consensus Panel and COI Committee

The Vision Disorders CPG Task Force was composed of several committees: the Task Force Steering Committee (SC), the Technical Working Group (TWG), the Consensus Panel (CP), and the Conflict of Interest (COI) Review Committee (Appendix 9.1 and 9.2).

The Task Force SC defined the CPG objectives, its scope, the target audience, and the initial clinical questions. Two subcommittees were formed by the SC: the TWG and the CP.

The SC created the TWG from a list provided by the PHEX Central Committee of academically trained professionals in the CPG process. The TWG included evidence reviewers who reviewed previous CPG recommendations for similar clinical questions, helped formulate the final clinical questions, appraised, and summarized existing evidence, and drafted the preliminary recommendations based on the collected evidence. Each clinical question was assigned to one evidence reviewer. Other members of the TWG included the technical coordinator, the technical facilitator, and the technical writer.

The CP was comprised of multisectoral representatives of stakeholder groups with interest and expertise relevant to the clinical questions. The composition of the Panel was guided by the Department of Health (DOH) manual [1], and invitations were sent to content experts and other key stakeholders (such as policymakers, patient advocates, allied medical practitioners, and physicians from different settings [e.g., public primary care, private practice, occupational health]) to nominate their respective representatives to the Panel. The final CP included ophthalmologists, family medicine and general practitioners, a primary care nurse, an economist, and a nonmedical professional. The latter two also acted as patient advocates. They provided inputs on the clinical questions; rated the critical and important outcomes; review the evidence summaries submitted and presented by the evidence reviewers; discussed relevant considerations revolving around the recommendations, particularly on the aspects of feasibility, acceptability, and equity; and finalized the direction, strength, and wording of the recommendation(s) for each clinical question during *en banc* meetings chaired by the technical facilitator.

The SC provided guidance and direction to both groups but had no direct participation in assessing and synthesizing the evidence, generating the evidence summaries and evidence-based draft recommendations, and voting on the final recommendations during the *en banc* CP meeting.

Finally, the COI Review Committee of the PHEX Central Committee were in-charge of reviewing the COIs of all individuals who participated in CPG development and of suggesting ways to manage the disclosed COIs.

Managing Conflicts of Interest

The COIs of each member of the Task Force were determined based on their respective COI declarations and curriculum vitae (Appendix 9.3). Both potential financial and academic COI were evaluated. The nominees were classified from A to D.

Those classified as “A” had no COIs and were allowed to participate with no constraints. Class “B” nominees had minor COIs that were broadcasted during the *en banc* meetings and were allowed to vote. Class C nominees had manageable COIs needing major constraints, i.e., were allowed to participate in the discussions but not allowed to vote on particular questions. Those with significant potential COI (Class D) were excluded from participating.

Prioritizing the Clinical Questions

The clinical questions were developed using the PICO (Population, Intervention, Comparator, and Outcome) format. Questions that were prioritized for this CPG were chosen because of the incidence and prevalence of their respective conditions among asymptomatic, apparently healthy children or adults according to the National Survey on Blindness [2] and the World Health Organization (WHO). Should these disorders remain undetected and untreated, they would pose a significant detriment on the affected individuals and to the broader Filipino society. Observed differences in practice and the availability of diagnostic tests and treatment were also considered, especially those that have potential adverse consequences on health or resources.

3.2 Creation of the Evidence Summaries

Search Methods and Strategies

A systematic search without language restrictions was performed among international databases (MEDLINE, EMBASE, Google Scholar) and local medical literature (HERDIN, Philippine medical journals, convention proceedings) for data among asymptomatic apparently healthy children and adults (Population) who underwent or not screening for vision disorders and impairments (Intervention and Comparison) to address vision acuity and alignment, quality of life, and loss of vision along with social factors such as bullying (Outcomes). Text words and controlled vocabulary (e.g., MeSH) terms were used, and the specific search strategies could be viewed under Appendix 9.4.

Inclusion and Exclusion Criteria

The evidence reviewers searched and appraised CPGs related to periodic health screening, including but not limited to those developed by the Canadian Task Force on Preventive Health Care (CTFPHC), the United States Preventive Services Task Force (USPSTF), the National Institute for Health and Care Excellence (NICE), and Philippine medical organizations. When a relevant CPG published within the last 5 years was deemed of good quality using the AGREE II tool, its evidence summaries were adapted and updated with recent evidence.

When there were no relevant CPGs, *de novo* evidence summaries for each clinical question were generated. Existing systematic reviews with or without meta-analyses that matched the prespecified PICO were prioritized and evaluated for possible adaptation. The evidence reviewers also searched for randomized trials of screening interventions that reported outcomes on benefit and/or harm. In the absence of direct evidence, quasi-randomized and observational studies were considered for inclusion. For diagnostic test accuracy, observational studies with the appropriate index test and reference standard that reported diagnostic performance (e.g., sensitivity, specificity) or enough information to derive these (e.g., 2x2 table) were included.

In addition to clinical evidence, other information that could facilitate decision-making were also presented in the evidence summaries. These included the burden of disease; the costs associated with screening, early detection, and early treatment; patient values and

preferences; the availability and feasibility of the tests and of treatment; the effects of screening on healthy equity; and related recommendations of other groups and institutions.

Rating of Outcomes

The CP rated outcomes on a nine-point scale per question where outcomes rated 1–3 were of limited importance, 4–6 were important, and 7–9 were critical. Ratings were submitted prior to the first online *en banc* meeting.

Study Quality Assessment and Certainty of Evidence

Each reviewer critically appraised the included evidence for directness, methodological validity, magnitude and precision of the results, and applicability. The certainty of the evidence for each outcome and the overall certainty of evidence for each question were assessed using the GRADE approach through the GradePRO software (Table 3.2.1) [3]. Draft recommendations were written based on the evidence of net benefit of screening on identified specific outcomes and the overall certainty of that evidence.

Table 3.2.1. Basis for assessing the quality of the evidence using the GRADE approach

Certainty of Evidence	Interpretation
High	We are very confident that the true effect lies close to that of the estimate of the effect
Moderate	We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different
Low	Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect
Very Low	We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect

Factors that lower quality of the evidence are:

- Risk of bias
- Important inconsistency of results
- Some uncertainty about directness
- High probability of reporting bias
- Sparse data/Imprecision
- Publication bias

Additional factors that may increase quality are:

- All plausible residual confounding, if present, would reduce the observed effect
- Evidence of a dose-response gradient
- Large effect

Data Synthesis

RevMan and STATA were used for the quantitative synthesis of effect estimates for critical and important clinical outcomes. Data were summarized narratively when quantitative synthesis was not possible. The synthesized data were compiled in evidence summaries that were submitted to the CP before the online *en banc* meetings.

3.3 Formulation of the Recommendations

Evidence to Decision Framework

The CP evaluated the evidence summaries and draft recommendations prior to and during the online *en banc* meetings. Final recommendations were generated as guided by the Evidence-to-Decision (EtD) framework (Table 3.3.1). Panelists were sent an online EtD form prior to the *en banc* meetings, and the summary of their responses were presented after their corresponding evidence summary during the meeting.

Table 3.3.1. Detailed considerations based on the Evidence-to-Decision framework [4]

1. Is the problem a priority?
2. How accurate is the test?
3. How substantial are the desirable anticipated effects?
4. How substantial are the undesirable anticipated effects?
5. What is the certainty of the evidence of test accuracy?
6. Is there important uncertainty about or variability in how much people value the main outcomes, including adverse effects and burden of the test and downstream outcomes of clinical management guided by the test results?
7. Does the balance between desirable and undesirable effects favor the test or the comparison?
8. How large are the resource requirements (costs)?
9. What is the certainty of the evidence of resource requirements (costs)?
10. Does the cost-effectiveness of the test favor the test or the comparison?
11. What would be the impact on health equity?
12. Is the test acceptable to key stakeholders?
13. Is the test feasible to implement?

Consensus Process

After the presentation of an evidence summary, the CP discussed the evidence and their responses to the EtD survey. These discussions provided basis for the panelists' decisions on the wording (whether for or against screening) and the strength of each recommendation (whether strong or weak). A consensus decision was reached if 75% of all CP members agreed [3]. If consensus was not reached, questions and discussions were encouraged, and another round of voting was conducted.

The CP determined the strength of each recommendation based on the certainty of the evidence and the considerations outlined in Table 3.3.1. A strong recommendation indicates that the CP is "confident that the desirable effects of adherence to a recommendation outweigh the undesirable effects." On the other hand, a weak recommendation is given when the trade-offs between benefit, harm and costs are uncertain—either because of the quality of the evidence or because evidence shows that the desirable and undesirable effects are closely balanced.

Patients' Views and Preferences

This guideline guaranteed that patients' views and preferences were considered in all the recommendations. The technical facilitator actively encouraged the patient advocates among the Consensus Panel to contribute their opinions on each question. When available, relevant studies on patient views, values, and preferences on the topic were also presented during the *en banc* meetings.

3.4 Planning for Dissemination and Implementation

The CPG recommendations will be incorporated in a web-based and mobile application that is user-friendly and accessible to the public through https://phex.ph. Copies of the evidence summaries and the full CPG manuscript will also be posted online on the DOH website and on the official websites of participating organizations. An abridged version of the final CPG manuscript will be published in the Acta Medica Philippina. The CPG will undergo quality screening by the DOH Evidence Generation and Management Division for recognition and implementation as a National Practice Guideline by DOH and the Philippine Health Insurance Corporation (PhilHealth).

3.5 External Review

The CPG manuscript was externally reviewed by three specialists in ophthalmology with experience in implementing public health policies to gather feedback on the content and quality of the CPG. The external reviewers were provided a copy of the draft manuscript and a link to an online questionnaire used to collect their insights on the CPG. The questionnaire contained three questions and the reviewers were asked to rate each question on a 5-point scale to indicate their opinion on the relevant item. The questionnaire also included a free-form text space for comments and suggestions.

The reviewers unanimously rated the proposed guidelines to be clear and practical. There were mixed opinions regarding the anticipated training requirements that implementing the CPG recommendations will entail, but two out of the three reviewers belived that the guidelines were simple enough and easy to implement with minimal training. No significant revisions to the CPG and its contents were suggested, although one reviewer suggested the possible use of photo-screeners.*

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* Photo screeners are instruments that capture an image of a patient's eyes, usually used in pre-school children to detect abnormalities in eye alignment, in pupillary reflexes, and the red-orange reflex. Its use at the primary care level was not discussed since there were no studies that met the inclusion criteria of the evidence reviewers that evaluated the instrument.

4. Recommendation and Evidence Summaries

4.1 Screening for amblyopia

RECOMMENDATIONS

1. **Among asymptomatic, apparently healthy children, we <u>recommend screening</u> for amblyopia.**
   (strong recommendation, low certainty of evidence)

Justification and Considerations
Because of the profound effects on a child's visual development and eventual visual disability in adulthood, it was judged to be important that risk factors and signs of amblyopia be detected early despite the low quality of the evidence supporting screening for amblyopia.

4.1.1 Key Findings

Seven studies [three quasi-randomized controlled trials (quasi-RCTs), four cohort studies] investigated the effectiveness and potential harm of screening compared to no or reduced frequency of screening for the risk of amblyopia among healthy children. Results showed that the effects of screening tended towards benefit on the risk of amblyopia, particularly among cohort studies and when screening was conducted during school-aged years (i.e., 7.5–18 years). Visual acuity of the amblyopic eye was also significantly better in the screening group compared to the control group. Screening afforded no significant benefit on the risk of severe amblyopia and time to amblyopia diagnosis. There were no significant differences in the odds of experiencing bullying between those who underwent screening compared or no screening, but among children treated for amblyopia, children who were screened had lower odds of experiencing bullying. The overall certainty of evidence was rated very low due to serious risk of bias, inconsistency, and imprecision in some critical outcomes.

4.1.2 Burden of Disease

Amblyopia, also called "lazy eye", is the most common threat to the vision of children [1]. It is characterized by a Snellen visual acuity difference of ≥2 lines between both eyes, occurring when there is a deficient stimulus to the eye in the first decade of life. It develops in children up to 8 years old [2] with an estimated prevalence of 1–5% among different countries. The main causes of amblyopia include URE, strabismus, cataract, and ptosis.

Amblyopia can affect children's learning, daily activities, and psychological state. Timely treatment is important to prevent severe consequences of amblyopia, which include conventional patching, refractive correction, atropine, optical penalization, and binocular therapy [1]. Amblyopia has been shown to be more responsive to treatment among children <7 years old [3].

4.1.3 Benefits and Harms of Screening

Direct evidence on screening for amblyopia versus no or reduced screening was found (Table 4.1.1). These studies were conducted among healthy children (n=26,098) in Israel, Sweden, Netherlands, and the United Kingdom. Pooled analysis showed that the effects of vision screening compared to no or reduced screening demonstrated a trend towards benefit on the risk of amblyopia [RR 0.72 (95% CI 0.49, 1.05)] [4–8]. Significant heterogeneity between studies (I^2=65%) was also observed, which may be due to variations in the timing and the type of vision screening tests administered, as well as the length of follow-up.

Among quasi-RCTs, vision screening had an inconclusive effect on the risk of amblyopia when compared to reduced frequency of screening [RR 0.82 (95% CI 0.44, 1.54)] [4,5], while the effects of vision screening compared to no screening on the risk of amblyopia leaned towards beneficial among cohort studies [RR 0.63 (95% CI 0.38, 1.04)] [6–8]. Subgroup analysis according to the time period of outcome measurement showed an inconclusive effect of vision screening on the risk of amblyopia when conducted during preschool years (i.e., aged 3–5 years) [RR 1.30 (95% CI 0.73, 2.30)] [4,9], but significant benefit when screening was conducted during school-aged years (i.e., aged 7.5–18 years) [RR 0.62 (95% CI 0.43, 0.90)] [5–8].

Two studies reported on the risk of severe amblyopia, which was defined in one study as visual acuity <0.25 (20/80) [4] and in the other study as visual acuity ≤20/60 [6]. Pooled results showed that the effect of screening on the risk of severe amblyopia was inconclusive [RR 0.34 (95% CI 0.02, 5.23)]. No significant differences in time to amblyopia diagnosis were also found between the intervention and the control groups [adjusted HR 0.97 (95% CI 0.78, 1.20)] [4]. Most amblyopia diagnoses were made at 36 and 45 months.

Visual acuity in the amblyopic eye after patching treatment was reported in three studies [5,7,8], but only data from two studies could be pooled due to the adequacy of the data provided. In these studies, the visual acuity of the amblyopic eye was significantly higher in the intervention group compared to the control group [pooled MD -0.08 logMAR (95% CI -0.14, -0.01); around up to 4 letters gained] [5,7]. The third study also reported a significantly better median visual acuity of the amblyopic eye in the intervention group compared to the control group [0.5 (20/40) vs. 0.2 (20/100), p<0.001] [8].

One cohort study described the impact of vision screening for amblyopia on bullying at age 8 years [10]. This study reported that the odds of experiencing bullying were not significantly different between children who underwent preschool screening (aged 3 years and 1 month) and those who did not experience preschool screening [adjusted OR 0.92 (95% CI 0.80, 1.06)] (Table 4.1.1). However, among children who were patched as treatment for amblyopia, those who underwent preschool screening had significantly lower odds of experiencing bullying compared to those who did not undergo preschool screening [adjusted OR 0.39 (95% CI 0.16, 0.92)]. The lower odds of experiencing bullying were likely because patching treatment ended before the start of school among those who were screened.

Screening may also lead to unnecessary referrals due to false positive screening results. The false positive rate in detecting amblyopia or its risk factors (strabismus, astigmatism, hyperopia, myopia, anisometropia) ranged from 4–56% for visual acuity tests (LEA symbols or HOTV visual acuity test) and from <1–14% for combined clinical examination screening tests (visual acuity tests, stereoacuity tests, ocular alignment tests) [11].

Table 4.1.1. Summary of findings on the benefits and harms of vision screening for amblyopia

Outcomes	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation	Certainty of Evidence
Amblyopia	5 studies (n=24,552)	RR 0.72 [0.49, 1.05]	Inconclusive	Very low
Severe amblyopia	2 studies (n=12,401)	RR 0.34 [0.02, 5.23]	Inconclusive	Very Low
Time to amblyopia diagnosis	1 study (n=10,811)	HR 0.97 [0.78, 1.20]	Inconclusive	Very Low
Mean VA, amblyopic eye[a]	2 studies (n=271)	MD -0.08 [-0.12, -0.05]	Benefit	Low
Bullying	1 study (n=4,463)	Adjusted OR 0.92 [0.80, 1.06]	No difference	Very Low

CI *Confidence Interval*; HR *Hazard Ratio*; MD *Mean Difference*; OR *Odds Ratio*; RR *Risk Ratio*; VA *Visual Acuity*
[a] in logMAR units

The overall certainty of evidence for the included studies was very low due to risk of bias, imprecision, and inconsistency in some critical outcomes.

4.1.4 Diagnostic Performance of Screening Tests

Due to the direct evidence collected on the prespecified outcomes, data on diagnostic accuracy of vision screening was not included in this evidence summary.

4.1.5 Cost Implication

A systematic review of economic evaluations on vision screening programs from five countries was published in 2022. From a societal and third-party payer perspective, vision screening to detect amblyopia and refractive errors in children was found to be cost-effective compared to no screening [12]. However, there was a wide range of incremental cost-effectiveness ratios (ICERs) due to the variety in the organization of vision screening services, in prevalence of amblyopia and refractive errors, in health care system delivery, and in the utility estimates used by different studies due to lack of evidence on impact of amblyopia on quality of life.

In a 2021 cost-effectiveness study in the United Kingdom, an orthoptist-delivered single visual acuity screen to detect reduced visual acuity and amblyopia at age 4–5 years was highly cost effective with good outcomes [13]. The main contributing factors to success appeared to be training and experience in accurate visual acuity testing, the opportunity to rescreen equivocal results, and monitoring, audit, and feedback of outcomes. Similar findings were observed in a 2022 cost-effectiveness study among the Netherlands, England and Wales, and Romania where visual acuity measurement to detect amblyopia was found to be cost-effective in all three countries [14]. The cost-effectiveness per quality-adjusted life year (QALY) gained was EUR 24,159.00 for the Netherlands, EUR 19,981.00 for England and Wales, and EUR 23,589.00 for Romania.

4.1.6 Equity, Acceptability, and Feasibility

The National Vision Screening Act, also known as RA 11358, was signed into law in 2019. This Act led to the establishment of the National Vision Screening program under the Department of Education, which aims to conduct vision screening tests on kindergarten students to identify early childhood vision problems and provide immediate attention through referral to eye care practitioners. PHP 10 million was appropriated for the implementation of this program [15].

4.1.7 Recommendations from Other Groups

Most guidelines recommend screening for visual disorders (including amblyopia) at least once before the age of 5 years [11,16–18]. The Canadian Association of Optometrists and the Canadian Ophthalmological Society specify that aside from routine screening by a primary care practitioner, a comprehensive eye examination must be given during early childhood by an ophthalmologist or optometrist to detect risk factors for amblyopia [16]. While the USPSTF expressed that there was insufficient evidence to determine the effectiveness of vision screening in children aged <3 years [11], various American medical societies recommend that children between the ages of 6 months and 3 years should undergo vision assessment via a physical examination [e.g. external inspection, the fixation and follow test, the RRT, and pupil examination] while instrument-based screening could be conducted beginning 1 year of age [18].

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4.2 Screening for ocular pathology

RECOMMENDATIONS

2. **Among asymptomatic, apparently healthy infants, we recommend the use of red reflex testing using a funduscope or an Arclight to detect ocular abnormalities (i.e., cataract, retinoblastoma, refractive error).**
   (strong recommendation, low certainty of evidence)

Justification and Considerations
The ease by which a red reflex can be elicited by simple instruments that can be used by health professionals with minimal training without producing significant harm to the patients caused the consensus panel to strongly recommend the performance of the test despite the low quality of the evidence.

4.2.1 Key Findings

Screening using the RRT among infants with congenital cataract aged 1 year and aged 6 weeks showed an increased risk of referral for intervention when compared with infants who were not screened [RR 9.83 (95% CI 1.36, 71.20) and RR 4.61 (95% CI 1.12, 19.01)]. The benefits of cataract surgery by age 5 years are seen among children who received an intervention before 5.6 weeks of age for unilateral cataracts and before 10 weeks of age for bilateral cataracts.

For any ocular pathology, using the RRT without dilation in infants <1 year old had a pooled sensitivity of 7.5% (95% CI 7.4, 7.5) and pooled specificity of 97.5% (95% CI 97.5, 97.5). The low sensitivity was attributed to high false negatives for posterior segment abnormalities. One study found detecting anisometropia at ≥0.125 D using the RRT yielded a sensitivity of 54%, a specificity of 92%, and an AUC 0.74 (95% CI 0.64, 0.84).

In detecting cataract or retinoblastoma, the Arclight has a sensitivity of 92.7% (95% CI 80.1, 98.5) and a specificity of 96.7% (95% CI 88.5, 99.6), while a penlight has a sensitivity of 7.3% (95% CI 1.5, 19.9) and specificity of 95% (95% CI 86.1, 99.0). For retinoblastoma, smaller lesions with less tumor seeding [i.e., International Classification of Retinoblastoma (ICRB) Group A–C] have at least a 90% success rate from needing to be enucleated or being exposed to radiotherapy compared to a 47% success rate in cases with more diffuse seeding (ICRB Group D).

4.2.2 Burden of Disease

Two of the most common ocular diseases in children are congenital cataracts and retinoblastoma. Both can present as leukocoria, which is a white reflection seen from the pupil when illuminated instead of the normal red-orange reflex.

Childhood cataracts have an overall prevalence ranging 0.32–22.9 cases per 10,000 (median 1.03 cases per 10,000). The condition may be congenital or acquired, with congenital cataracts having a prevalence ranging 0.63–9.74 cases per 10,000 (median 1.71 cases per 10,000). Middle-income economies have a relatively lower prevalence of childhood cataracts

compared to high-income economies, ranging from 0.32–8.49 cases per 10,000 and 0.74–22.7 cases per 10,000, respectively [1]. However, among developing countries, congenital cataracts have a prevalence of 1–3 cases per 10,000 births. The primary identified cause of childhood cataract cases was rubella (20.5%) followed by suspected rubella infection (8.2%) based on a local study from a tertiary hospital from 2000–2003. However, most causes of childhood cataracts were idiopathic in nature (61%) [2]. Globally, childhood cataracts account for 5–20% of pediatric blindness, and delayed management can cause deprivation amblyopia aside from untreated visual impairment.

Although considered rare, retinoblastoma is the most common cause of intraocular malignancy with a prevalence of 1 case per 15,000 to 1 case per 20,000 births, commonly occurring during the first 3 years of life [3,4]. In a tertiary Philippine hospital, retinoblastoma was reported to have increased from 40 cases per 100,000 in 1967–1977 to 237 cases per 100,000 in 1997–2001. Leukocoria was found to be the most common presentation (67–77%) followed by strabismus (6–11%). Thirty percent were found to be bilateral.

4.2.3 Benefits and Harms of Screening

Studies have shown that testing with the RRT could lead to the diagnosis of ocular pathologies and increased referral for treatment. Among children presenting with an abnormal red reflex, a study found that the most common causes for this condition were refractive errors (20.4%) and congenital cataracts (7.9%) [5]. Another study compared the risk of referral for a surgical intervention after an RRT at a health facility (maternity ward, well baby clinic, referral from pediatrician, etc.) among infants with congenital cataract who were screened and those who were not screened. The study found that infants aged 1 year with congenital cataracts had a higher risk for referral for a surgical intervention among those screening with the RRT compared to those who were not screened [RR 9.83 (95% CI 1.36, 71.20)] (Table 4.2.1) [6]. The risk for referral among 6-week-old infants was also higher among infants who were screened compared to those who were not screened [RR 4.61 (95% CI 1.12, 19.01)] (Table 4.2.1). This translates to up to an additional 1 per 1,000 neonates detected for referral for congenital cataract intervention.

Table 4.2.1. Summary of findings on the effectiveness of the red reflex test in the detection of congenital cataract for referral for surgery

Outcomes	No. of Studies (No. of Participants)	RR [95% CI]	Interpretation	Certainty of Evidence
Referral for surgery ≤1 year of age	1 OS (n=394,438)	9.83 [1.36, 71.29]	Benefit	Low
Referral for surgery ≤6 weeks of age	1 OS (n=394,438)	4.61 [1.12, 19.01]	Benefit	Low

CI *Confidence Interval*; OS *Observational Study*; RR *Risk Ratio*

Despite its benefits, screening with the RRT may present with some harm. A study reported an increased likelihood of having clinical conjunctivitis among children tested with RRT in the nursery [OR 1.22 (95% CI 1.01, 1.47)] [7]. Although there was no increase in bacterial conjunctivitis rate between the two groups compared, other associated factors such as vaginal delivery, males born by Caesarean section and length of stay may be responsible. Meticulous hand washing and hygiene, as well as a hands-off approach to examination, were recommended to mitigate the risk for conjunctivitis. Aside from a risk for certain infections, childhood vision screening may potentially lead to unnecessary referrals due to false positive findings particularly for vision abnormalities with low prevalence (<10%) [8]. In turn, this could lead to increased anxiety and costs.

Congenital cataracts can be treated to prevent the occurrence of blindness when the cataracts are detected early. Better visual acuity outcomes are achieved when the congenital cataract is removed before 6 weeks of age in unilateral cases and before 8 weeks of age in bilateral cases [9]. By 5 years of age, visual outcomes from surgery of a dense unilateral cataract followed a bilinear model [10]. If surgery is performed before 5.6 weeks, the average visual acuity is 20/45; after this critical age, there is a steep decline in achieved vision. As the age doubles beyond the critical age, there is a doubling of the Snellen denominator. For bilateral dense cataracts, at 5 years of age, there is a trend towards worse vision (r=0.23, p=0.07) as age at the time of surgery increased [11]. It was also observed that vision of 20/100 or worse occurred in patients operated on at >10 weeks of age.

Treatment for retinoblastoma aims to prevent the occurrence of blindness and death as untreated retinoblastoma could lead to mortality within 1–2 years. Detection of smaller lesions and early treatment can have a survival rate as good as 95%. In a systematic review on survival rates from 2010–2020 according to economic standing, low-to-middle income countries (LMICs) had a survival rate of 83% (95% CI 70, 93), whereas a high-income country had a survival rate of 98% (95% CI 95, 100) [12]. Survival rates can be as low as 20% due to late diagnosis and treatment [13].

Globe preservation and vision optimization may be done if the disease is localized intraocularly using newer treatment modalities such as intraarterial, intravenous, or intraocular chemotherapy. In high-income countries, retinoblastoma is considered a curable cancer using these treatment options [14]. In developing countries where such advanced options are largely unavailable, enucleation remains as the primary treatment option to address retinoblastoma. The socioeconomic difference is highlighted by the global salvage rate in LMICs as being 34% (21–49%) compared to 70% (60–80%) in high-income countries. Smaller lesions with less tumor seeding (ICRB Group A–C) have at least a 90% success rate from needing to be enucleated or being exposed to radiotherapy compared to a 47% success rate in cases with more diffuse seeding (ICRB Group D) [15]. Histopathologic features from enucleated eyes from a tertiary Philippine hospital showed that those with high-risk features tended to develop orbital recurrence or distant metastasis, despite adjuvant chemotherapy. Such features included a positive optic nerve margin with any ocular tissue or extrascleral involvement [16].

The certainty of evidence was downgraded to low due to serious risk of bias due to confounding since the population was gathered from a cataract register and imprecision from wide confidence intervals.

4.2.4 Diagnostic Performance of Screening Tests

A diagnostic accuracy study on the detection of cataracts or retinoblastoma in children [mean age 33.6 months (SD 2–60 months)] compared the performance of different tools for RRT (including a penlight and the Arclight, which is similar to a direct ophthalmoscope) as used by trained ophthalmic nurses with indirect ophthalmoscopy by a pediatric ophthalmologist [17]. The Arclight had a sensitivity of 92.7% (95% CI 80.1, 98.5) and a specificity of 96.7% (95% CI 88.5, 99.6) (Table 4.2.2). On the other hand, the penlight had a sensitivity of 7.3% (95% CI 1.5, 19.9) and a specificity of 95% (95% CI 86.1, 99.0).

In another study on the detection of any ocular pathology among infants <1 year of age, the pooled accuracy measures of RRT without dilation had a sensitivity of 7.5% (95% CI 7.4, 7.5), a specificity of 97.5% (95% CI 97.5, 97.5), a positive predictive value of 53%, and a negative predictive value of 74% (Table 4.2.2) [18]. The low sensitivity was attributed to high false negatives for posterior segment abnormalities. The RRT has the limitation of identifying

changes that occur within the passage of light such that retinal changes found in the periphery will not be detected by the test. If anterior segment ocular conditions are only considered, the sensitivity of the test goes up to 99.6% [19].

Lastly, a study attempted to determine the diagnostic accuracy of RRT in detecting anisometropia. The sensitivity and specificity were 54% and 92%, respectively, to detect anisometropia ≥0.125 D, with an area under the curve estimate equal to 0.74 (95% CI 0.64, 0.84) (Table 4.2.2). Considerations, however, included that the test was performed by a trained ophthalmic fellow [20].

Table 4.2.2. Summary of findings on the diagnostic accuracy of screening in the detection of ocular disease

Instrument/Test	No. of Studies (No. of Participants)	Sn [95% CI]	Sp [95% CI]	Certainty of Evidence
Detecting cataract or retinoblastoma in children ≤5 years old (vs. indirect ophthalmoscopy)				
Penlight	1 DAS (n=101)	7% [1, 20]	95% [86, 99]	High
Arclight	1 DAS (n=101)	93% [80, 98]	97% [89, 100]	High
Detecting ocular disease in infants (vs. comprehensive eye exam with dilation)				
Funduscope	5 CS (n=7,641)	7.5% [7.4, 7.5]	97.5% [97.5, 97.5]	Moderate
Detecting anisometropia of ≥0.125D (vs. cycloplegic refraction)				
Direct ophthalmoscope	1 DCS (n=92)	53.7% [39.6, 67.4]	92.1% [78.6, 98.3]	High

CI *Confidence Interval*; CS *Prospective Cohort Study*; DAS *Diagnostic Accuracy Study*; DCS *Diagnostic Cohort Study*; Sn *Sensitivity*; Sp *Specificity*

The certainty of evidence for the diagnostic accuracy studies on detecting ocular disease in general was downgraded to moderate due to serious risk of bias in recruiting the patients since the population was gathered from those where informed consent was given which may have affected the sample population. The remaining studies, however, were deemed to have high certainty of evidence.

4.2.5 Cost Implication

A 2001 cost-effective analysis in Sweden reported an ICER of SEK 234,000.00 (PHP 1.2 million) per QALY if three more children per year were detected by mandatory maternity ward and well-baby clinic screening compared to well-baby clinic screening alone [21].

No local cost-effectiveness study was found on the screening and linked management of ocular diseases in children. Table 4.2.3 lists items that may be involved in the screening and early detection of ocular disease along with their respective costs [22].

Table 4.2.3. Costs associated with screening and early detection of ocular disease

Item	Specifics	Cost
Screening instrument	Direct ophthalmoscope	PHP 10,000.00
	Arclight ophthalmoscope	PHP 4,000.00
Confirmatory test	Ophthalmologist consult	PHP 700.00–1,500.00
	Fundus photography (per eye)	PHP 900.00–1,300.00
	Ocular ultrasound (per eye)	PHP 3,000.00–4,600.00
Genetic testing for retinoblastoma	Blood test for genetic markers	PHP 20,000.00
Examination under anesthesia	Anesthesia rate	PHP 40,000.00

PHP *Philippine Peso*

The cost of screening for retinoblastoma or congenital cataract is dependent on the risk category of the patient, which would then dictate the ideal frequency of tests. For patients with familial history of retinoblastoma, screening can be performed until the age of 4 years [22]. For patients with suspected retinoblastoma, genetic testing is ideal to classify the patient as low-, intermediate-, high-risk, or no risk. Patients with a high risk may need to undergo monthly screening followed by return visits of longer interval should there be no significant findings. Examinations may be done in the clinic or under anesthesia to allow a more sufficient examination of the retina.

4.2.6 Equity, Acceptability, and Feasibility

Retinoblastoma is considered a treatable malignancy in more developed countries where various eye-sparing treatments are available, such as chemotherapy, radiation, cryotherapy, and laser surgery. However, enucleation is still performed in most cases in the Philippines due to the advanced stage of the disease at presentation [23]. If both eyes were affected, enucleation was recommended for the worse eye and conservative options are employed for the better eye. A local study among parents of patients with retinoblastoma found that acceptance or refusal of enucleation may depend on psychosocial factors surrounding the treatment: the notion that cancer is a fatal illness, unacceptable aesthetic outcome of the surgery, and cost of treatment [23]. Other considerations for treatment depended on their views on the value of life, regard for the opinion of medical practitioners, and appreciation of the efficacy of treatment.

4.2.7 Recommendations from Other Groups

Various guidelines recommend an ocular inspection and an RRT during the newborn examination to detect ocular abnormalities and conditions (e.g., congenital cataract) [24–27], although the timing of this exam varied from within the first 48–72 hours of birth to within the first week of birth [25–27]. Some guidelines recommend at least one follow-up examination at 6–8 weeks after birth [24,25,27] or within the first 6 months of life [24,28], while a group of American ophthalmological societies recommend screening even beyond 6 years of age [24]. In addition, the WHO recommends that newborn screening services “should be accompanied by diagnostic and management services for children identified with an abnormality” [29].

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4.3 Screening for strabismus

RECOMMENDATIONS

3. **Among asymptomatic, apparently healthy children, we recommend screening for strabismus using the Hirschberg test.**
   (strong recommendation, low certainty of evidence)

Justification and Considerations
The following discussions were made during the CP meeting:

- Although the evidence points to instrument-based screening, the Hirschberg test could readily be performed using a penlight, which is a significantly cheaper alternative.
- The Hirschberg test and its applications (such as through a photoscreener) could be performed or operated by non-ophthalmologists.

4.3.1 Key Findings

No direct evidence was found on the effectiveness of screening for strabismus. The following review discusses the effects of linked management and the diagnostic accuracy of screening tools for strabismus.

Several surgical and non-surgical treatment options are available for strabismus. Among those covered in this review, patching and occlusion showed significant improvement for motor alignment and visual acuity at the end of treatment, respectively. Bilateral lateral rectus recession, adjustable sutures, and interventions with botulinum toxin did not show significant differences in outcomes against their respective comparators.

The Hirschberg test, specifically the photography Hirschberg application, showed a high sensitivity and low specificity result in detecting strabismus. The semi-automated tool shows potential in detecting strabismus, especially horizontal strabismus. Another study on a Hirschberg photo screener yielded opposite results of high specificity and low sensitivity which was later confirmed by the gold standard test. With the lack of number of participants and studies it is unclear whether the Hirschberg test is reliable as a screening tool for strabismus.

4.3.2 Burden of Disease

Strabismus or “crossed eyes” refers to the misalignment of one or both eyes (intermittently or constantly) [1]. It is defined by the deviation of the primary lines of sight by ≥1 prism diopter and is estimated to occur among 2–5% of the global population. Normally, the eyes can focus on the same image, which the brain processes into a three-dimensional image and results in the ability to sense depth. A misalignment of the eye creates discrepancy in the visual stimuli processed by the brain, which would then only process information from the eye that has a straight focus, resulting in loss of depth perception [2].

Strabismus is primarily categorized into four subtypes based on the direction of the turned or misaligned eye: esotropia (convergent or inward turning), exotropia (divergent or outward turning), hypertropia (upward turning) and hypotropia (downward turning) [1,3]. In studies of

clinical populations, esotropia is 3–5 times more common in children in comparison to exotropia [1,3,4]. The different subtypes of strabismus also have different occurrence rates according to race or ethnicity. The prevalence of strabismus, particularly for the esotropia subtype, is reportedly higher in western countries (especially for white people and Caucasians) compared with exotropia which is seen more in Black people and Asians [3,4]. Strabismus could be primary in origin, or accompanied by abnormal motility of the eyes, double vision, and/or decreased vision [1]. This condition occurs more commonly in children and usually appears by 3 years old. However, this could also occur to older children and adults. People with this visual condition are at risk for developing amblyopia (lazy eye) and impaired stereopsis (binocular depth perception), which could further lead to permanent loss of vison if early detection and treatment is not done [1,3].

Screening for visual disorders should ideally be conducted before 2–3 years of age, which is the peak age for the onset [1]. One of the screening tools used to test for strabismus is the Hirschberg reflex test (or corneal reflex test). Hirschberg testing estimates the size of the strabismus by determining how far the deviated light reflex is off-center [5]. This test is administered by directing the light to the patient's eye while being instructed to look directly at the light to assess the location of light reflex of the eye [2].

4.3.3 Benefits and Harms of Screening

No direct evidence was found on the effectiveness of screening for strabismus on the outcomes of interest. The following studies present evidence on the effectiveness of various linked management strategies for strabismus (Table 4.3.1).

A review on surgical and non-surgical management for patients with intermittent exotropia reported that the effects of bilateral rectus recession on motor alignment (both near and distant) [MD 1.00 (95% CI -2.69, 4.69) and MD 2.00 (95% CI -1.22, 5.22), respectively] and stereoacuity at near fixation [RR 0.77 (95% CI 0.35, 1.71)] were not significantly different from those of unilateral lateral rectus recession with medial rectus resection [6,7]. The minor adverse events recorded were also not significantly different between the two groups [RR 7.36 (95% CI 0.339, 140.65)], but the estimate implies a greater risk for harm among recipients of unilateral lateral rectus recession with medial rectus resection. Similarly, an RCT comparing adjustable sutures and nonadjustable sutures found that although there was an increased chance of ocular alignment with nonadjustable sutures, the difference was not statistically significant [RR 1.18 (95% CI 0.36, 1.82)] [8,9].

Among patients with intermittent exotropia, patching was found to have greater benefit for motor alignment at near and at distant fixation [MD -2.23 (95% CI -4.02, -0.44) and MD -2.00 (95% CI -3.40, -0.61), respectively] when compared with active observation [6,10,11]. Benefits were also observed with occlusion; a review that covered occlusion therapy reported that supplementary occlusion with near activities showed better visual acuity than occlusion with non-near activities [MD -0.03 (95% CI -0.11, 0.05)] [12–14]. The review also reported the results of an RCT that compared part-time occlusion with observation wherein occlusion had shown better visual acuity for strabismic amblyopia [MD -0.18 (95% CI -0.32, 0.40)] [12,15].

Another review covered the use of botulinum toxin therapy for strabismus. The findings of this review indicate that botulinum toxin therapy had a similar effectiveness on ocular alignment [RR 0.91 (95% CI 0.71, 1.16)], binocular single vision [RR 0.88 (95% CI 0.63, 1.23)], sensory fusion [RR 0.88 (95% CI 0.63, 1.23)] and stereopsis [RR 0.86 (95% CI 0.59, 1.25)] when compared with surgery [16–18]. Botulinum toxin therapy with sodium hyaluronate also did not

yield significantly different effects on ocular alignment when compared with botulinum toxin alone [RR 0.81 (95% CI 0.36, 1.82)] [16,19].

The overall certainty of evidence was downgraded due to risk of bias and imprecision due to problems with randomization, unclear reporting of results, absence of masking, and unclear sequence generation and randomization. The included studies were also downgraded due to the indirectness of the study to the research question.

Table 4.3.1. Summary of findings on the effectiveness of linked management for strabismus

Outcomes (Duration of Follow-Up)	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation	Certainty of Evidence
Bilateral LR recession (vs. unilateral LR recession with MR resection)				
Motor alignment (near, PD) (6 months)	1 RCT (n=163)	MD 1.00 [-2.69, 4.69]	Inconclusive	Low
Stereoacuity (near)	1 RCT (n=163)	RR 0.77 [0.36, 1.71]	Less risk with unilateral LR recession with MR resection	Very low
Motor alignment (distant, PD) (6 months)	1 RCT (n=163)	MD 2.00 [-1.22, 5.22]	Inconclusive	Low
Minor AEs	1 RCT (n=197)	RR 7.36 [0.36, 140.65]	Harm in the unilateral LR recession with MR resection	Very low
Adjustable sutures (vs. nonadjustable sutures)				
Improved ocular alignment (<8 PD) (6 months)	1 RCT (n=60)	RR 1.18 [0.91, 1.53]	Equivalent	Very low
Patching (vs. active observation)				
Motor alignment (near, PD) (6 months)	2 RCT (n=511)	MD -2.23 [-4.02, -0.44]	Favors patching	Moderate
Stereoacuity (near)	1 RCT (n=324)	MD 0 [-0.07, 0.07]	Equivalent	Very low
Motor alignment (distant, PD) (6 months)	2 RCT (n=511)	MD -2.00 [-3.40, -0.61]	Favors patching	Moderate
Occlusion with near activities (vs. occlusion with non-near activities)				
Mean VA at cessation of treatment (logMAR units)	2 RCT (n=150)	MD -0.03 [-0.11, 0.05]	Benefit	Very low
Part time occlusion (vs. observation)				
Mean VA at cessation of treatment (logMAR units)	1 RCT (n=39)	MD -0.18 [-0.32, -0.04]	Favors occlusion	Very low
Botulinum toxin (vs. surgery)				
Improved ocular alignment (≤10 PD) (median 6 months)	2 RCT (n=102)	RR 0.91 [0.71, 1.16]	Equivalent	Low
Binocular single vision	2 RCT (n=102)	RR 0.88 [0.63, 1.23]	Equivalent	Low
Sensory fusion	2 RCT (n=102)	RR 0.88 [0.63, 1.23]	Equivalent	Low
Stereopsis	2 RCT (n=102)	RR 0.86 [0.50, 1.25]	Equivalent	Low
AEs with botulinum toxin (median 6 months)	2 RCT (n=102)	Induced ptosis: 20.8 to 4.66 Induced vertical deviation: 2.2 to 8.3		Low
Botulinum toxin with sodium hyaluronate (vs. botulinum toxin without sodium hyaluronate)				
Improved ocular alignment (≤10 PD) (median 6 months)	1 RCT (n=47)	RR 0.81 [0.36, 1.82]	Equivalent	Low
AEs with botulinum toxin (median 6 months)	1 RCT (n=47)	Induced ptosis: 23% [2.2, 20] AEs recovered within next follow up		Low

AE *Adverse Event*; CI *Confidence Interval*; LR *Lateral Rectus*; MD *Mean Difference*; MR *Medial Rectus*; PD *Pupillary Distance*; RCT *Randomized Controlled Trial*; RR *Risk Ratio*

4.3.4 Diagnostic Performance of Screening Tests

A local cross-sectional study compared the performance of a photographic Hirschberg test application with the alternate prism cover test [20]. The application was able to match the face and eyes of the participants with a success rate of 95.14%. It was also highly sensitive at detecting horizontal strabismus at both distance and near fixation [92.86% (95% CI 55.13, 99.82) for both], but had poor specificity for horizontal strabismus [distance fixation: 7.69% (95% CI 0.19, 36.03); near fixation: 0 (95% CI 0, 28.49)] and for vertical strabismus [distance fixation: 14.81% (95% CI 4.19, 33.73)]; near fixation: 8% (95% CI 0.98, 26.03)] (Table 4.3.2). In another study that tested the diagnostic accuracy of a digital photoscreener for a school screening program, the test yielded a sensitivity of 46% (95% CI 19, 75) and specificity of 97% (95% CI 94, 99) (Table 4.3.2) [21,22].

Table 4.3.2. Summary of findings on the diagnostic accuracy of screening test for strabismus

Screening test		No. of Studies (No. of Participants)	Sn [95% CI]	Sp [95% CI]	Certainty of Evidence
Photographic Hirschberg test application	*Horizontal strabismus (distance fixation)*	1 XS (n=27)	92.86% [66.13, 99.82]	7.69% [0.19, 36.03]	Low
	Vertical strabismus (distance fixation)	1 XS (n=27)	-	14.81% [4.19, 33.73]	Low
	Horizontal strabismus (near fixation)	1 XS (n=25)	92.86% [66.13, 99.82]	0 [0, 28.49]	Low
	Vertical strabismus (near fixation)	1 XS (n=25)	-	8 [0.98, 26.03]	Low
Hirschberg digital photoscreener		1 XS (n=271)	46% [19, 75]	97% [94, 99]	Low

CI *Confidence Interval*; Sn *Sensitivity*; Sp *Specificity*; XS *Cross-Sectional Study*

4.3.5 Cost Implication

No local or international cost-effectiveness study was found on the screening and linked management of strabismus. The cost of a photoscreening application was estimated at EUR 6.61 (PHP 460.07), EUR 7.52 (PHP 523.41), and EUR 9.40 (PHP 654.26) for ages 3 years, 3 years and 9 months, and 5–6 years, respectively.

4.3.6 Equity, Acceptability, and Feasibility

No literature was found on the perceptions of persons screened using the Hirschberg test or any other method of strabismus screening, or on the considerations involved in screening for strabismus. However, previous research studies have noted negative perceptions on strabismus. A study among children aged 3–7 years old reported that starting age 6 years, children exhibited negative attitudes and behaviors (including throwing, striking, and verbal disparagement) towards dolls that displayed strabismus [23]. Another study among elementary school teachers noted that teachers held negative social bias against children with strabismus, and that children with esotropic strabismus had more difficulty in learning compared to children with exotropia [24]. Lastly, a study among adults and children observed that a squinting right eye was more negatively perceived than a squinting left eye ($p<0.001$), and that children had a more negative perception of esotropia than exotropia ($p<0.001$) [25]. The study also reported that adults felt squinting children faced problems such as being mocked by their peers, poor eyesight, judgment from other adults, less acceptance from other children and less self-confidence, and the view that they are less intelligent than others.

4.3.7 Recommendations from Other Groups

The USPSTF recommends screening once among at-risk children aged 3–5 years for vision abnormalities (including strabismus) and for their associated risk factors (including family history in a first-degree relative, prematurity, low birth weight, maternal substance abuse, maternal smoking during pregnancy, and low levels of parental education) for a moderate net benefit based on moderate-certainty evidence [26]. It was uncertain if vision screening would benefit children <3 years old.

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4.4 Screening for refractive errors

RECOMMENDATIONS

4. **a. Among asymptomatic, apparently healthy children, we recommend screening for refractive errors using age-appropriate visual acuity charts:**
   (a) annually for children aged 3–8 years and
   (b) every 2 years for children aged 9–18 years.
   (strong recommendation, low certainty of evidence)

4. **b. Among asymptomatic, apparently healthy adults, we recommend screening for refractive errors using visual acuity determination followed by the pinhole test:**
   a. **every 5–10 years for adults aged 18–40 years,**
   b. **every 2–4 years for adults aged 40–54 years,**
   c. **every 1–3 years for adults aged 55–64 years, and**
   d. **every 1–2 years for adults aged ≥65 years.**
   (strong recommendation, moderate certainty of evidence)

CHILDREN

Justification and Considerations

Despite the low certainty of evidence, the CP voted for a strong recommendation due to the following:

- Refractive error is a risk factor for the development of amblyopia.
- Refractive error may not immediately manifest in a child and may develop over time.
- Unilateral refractive error may be difficult to detect without screening due to compensation from the better eye.
- Children may not readily complain of blurred vision, which may contribute to delays in detecting refractive error. However, the panel noted that children aged 9–18 years may be more vocal than younger children regarding issues with their vision, forming the basis for less frequent screening (i.e., every 2 years) among this age group.
- Visual acuity testing may also lead to the detection of other vision conditions aside from refractive error.

4.4.1 Key Findings

Indirect evidence on the effectiveness of screening was included in this review. Linked management using prescription lenses was associated with benefit favoring spectacle use, but this result was not statistically significant. Pharmaceutical agents such as pirenzepine and atropine led to statistically significant reduction in myopia progression and in axial elongation. Cross-sectional studies on the accuracy of visual acuity charts for detecting refractive errors showed that the LEA chart, HOTV chart, and the E chart had a higher pooled sensitivity, but that the logMAR chart had a higher pooled specificity. The overall certainty of evidence for the studies included in this review is low.

4.4.2 Burden of Disease

Disease Frequency

Refractive error is a vison problem caused by abnormalities in the shape of the eye, leading to blurred vision [1]. In children, it can manifest as myopia (near-sightedness), hyperopia (far-sightedness), or astigmatism (blurriness and distortion of images due to abnormal shape of the cornea) [2]. UREs are one of the leading causes of moderate to severe visual impairment and blindness worldwide [3]. Among children in the Western Pacific Region, the estimated pooled prevalence of astigmatism, hyperopia, and myopia is 12.1%, 3.1%, and 18.2%, respectively [4].

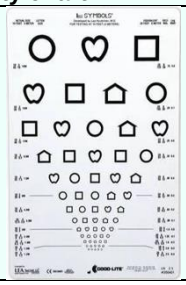
While there are no nationwide data on refractive errors among children, the Philippine National Blindness Survey and Eye Disease Study found that approximately 400,000 Filipinos had URE in 2018 [5]. According to the DOH, 25% of 332,150 bilaterally blind Filipinos are due to refractive errors [6]. Local school-based research studies have also been conducted to investigate the prevalence of refractive errors among students. A study among public schools in Cebu found that approximately 24.5% of elementary students had refractive errors (22.6% with astigmatism, 3.8% with myopia, and 2.8% with hyperopia) [7]. The prevalence in another study among public school children was reported to be 69% [8]. The most common refractive error detected was hyperopic astigmatism (34.9%) followed by hyperopia (14.7%), astigmatism (11.4%), myopia (4.6%), myopic astigmatism (2.0%), and anisometropia (vision in one eye worse than the other) (0.9%) [8]. Among Filipino children from a private school, the most prevalent refractive error was astigmatism (19.4%), followed by myopia (14.8%), and hyperopia (3.2%) [9].

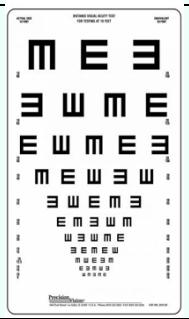
Between 1990 and 2019, disability-adjusted life-years (DALYs) due to URE rose by 8% among adolescents globally [10]. After adjusting for population size, these rates decreased moderately by 4.8%. DALY was higher among adolescent females. A drastic increase in DALY was observed between ages 5–9 years, gradually rising and plateauing before age 20 years.

Management of the Condition

Visual acuity tests, which are charts with letters or symbols, are used to assess vision impairments such as refractive errors. Examples of these charts are summarized in Table 4.4.1. Current management for refractive errors in children includes spectacles, contact lenses, eye drops, and surgery.

Table 4.4.1. Visual acuity charts and their corresponding applicable age groups

Visual acuity chart		Age range	Description
LEA		Children 36 months and above; older children and adults who are illiterate	The test is conducted by familiarizing the test subject with the symbols on the LEA chart. They can be asked to identify them verbally or point to the corresponding symbol on pointer cards with the 5 symbols that appear in the chart. The distance between the test subject and the chart should be 3 meters and the rating is equal to the Snellen Chart notation. Vision is tested with one eye occluded and the subjects are expected to read until the 6/6 line. At least 4 or 5 symbols must be correctly identified per line.

Visual acuity chart		Age range	Description
HOTV		Children 36 months or older as long as they can read the letters	The test is an alternative to the LEA Chart but uses western letters as Optotypes. The testing procedure is the same.
Snellen		Children and adults who can read	The most commonly used visual acuity with a series of lines with letters diminishing in size from the top to the bottom. It is the forerunner of most of the charts used today and its optotypes or letters are based on a 5x5 square where the thickness of the lines of the letters and the gaps in between are equal to 1/5 of their size. The simplest charts are printed on boarded paper and placed 6 meters from the test subject. Digital charts are now available where the size of the optotypes can be calibrated based on the testing distance to approximate the size of the optotypes if viewed at 6 meters.
E		Cooperative children and illiterate adults	The Tumbling E chart is similar to the Snellen Chart but does not use different letters. The sole optotype is an E that is displayed facing different directions. The test subject is expected to identify the direction that the legs of the E is pointing to. The optotype sizes and the diminishing size of the E in the different lines of the chart correspond to the Snellen chart. The test procedure is the same but subjects may be given an E card to hold to indicate the appearance of the E in the chart if they are nonverbal.
LogMAR		Cooperative children and adults	LogMAR charts are similar to the Snellen Chart with letters of the same size along each line and diminishing in size from the top line to the bottom. The difference between the two charts is the rate of diminution or the relative sizes of the optotypes between lines. They have been found to be more sensitive to slight changes and to be more accurate than other charts. Because its notations are mathematically easier to analyze, the LogMAR chart has become the gold standard for testing visual acuity in research. It is also known as the ETDRS Chart for the Early Treatment Diabetic Retinopathy Study, the multicenter trial popularized its use.

4.4.3 Benefits and Harms of Screening

The review utilized indirect evidence from systematic reviews and meta-analyses of RCTs on treatment for refractive errors in children (Table 4.4.2). These studies have a risk of bias ranging from very high to low due allocation concealment, masking, and attrition bias.

Refractive errors are often treated with prescription spectacles. A review investigating the use of spectacles compared to no spectacles showed that spectacle correction was associated with a lower risk for developing strabismus [RR 0.65 (95% CI 0.41, 1.02)] and with worsening visual acuity [RR 0.87 (95% CI 0.64, 1.18)] by age 3–4 years among hyperopic children [11]. However, these pooled estimates were not statistically significant. Another review found that under-correcting myopia (i.e., spectacles blurred by +0.50 D) increased myopia progression

[MD -0.15 D (95% CI -0.29, 0)] and increased axial elongation [MD 0.05 mm (95% CI -0.01, 0.11)] after 1 year compared to children in the fully corrected group [12].

Refractive errors are also treated with pharmaceutical agents like pirenzepine and atropine. Findings of a meta-analysis show that pirenzepine gel and atropine eye drops significantly decreased myopia progression after 1 year [MD 0.31 D (95% CI 0.17, 0.44) and MD 1.00 D (95% CI 0.93, 1.07), respectively] when compared with a placebo [12]. Both antimuscarinic drugs led to less axial elongation with respect to those who received a placebo [MD -0.13 mm (95% CI -0.14, -0.12) and MD -0.35 mm (95% CI -0.38, -0.31)]. Another meta-analysis also cited a statistically significant difference in myopia progression [MD 0.20 D (95% CI 0.13, 0.27) and a highly significant change in axial elongation [MD -0.08 mm (95% CI -0.11, -0.04 mm)] between atropine and placebo groups [13]. Similar findings were observed in a review investigating the effects of differing concentrations of atropine on myopia progression and axial elongation [14].

Table 4.4.2. Summary of findings on the effectiveness of screening and of treatment for refraction errors among children

Outcome (Duration of follow-up)	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation	Certainty of Evidence
Spectacle use (vs. no spectacles)				
Incidence of strabismus up to 3–4 years of age	4 RCTs (n=804)	RR 0.65 [0.41, 1.02]	Trend towards benefit from intervention	Very low
Visual acuity worse than 20/30 3–4 years of age	4 RCTs (n=770)	RR 0.87 [0.64, 1.18]	Trend towards benefit from intervention	Very low
Full correction (vs. undercorrection)				
Change in refractive error (1 year)[a]	2 RCTs (n=142)	MD -0.15 [-0.29, 0]	Favors full correction	Low
Pirenzepine (vs. no treatment)				
Change in refractive error (1 year)	2 RCTs (n=326)	MD 0.31 [0.17, 0.44]	Favors pirenzipine	Moderate
Change in axial length (1 year)	2 RCTs (n=326)	MD -0.13 [-0.14, -0.12]	Favors pirenzipine	Low
Atropine (vs. no treatment)				
Change in refractive error (1 year)	3 RCTs (n=629)	MD 1 [0.93, 1.07]	Favors atropine	Moderate
Change in axial length (1 year)	2 RCTs (n=502)	MD -0.35 [-0.38, -0.31]	Favors atropine	High
0.01% atropine (vs. no treatment)				
Change in spherical equivalent refraction	4 RCTs (n=769)	MD 0.2 [0.13, 0.27]	Favors atropine	Moderate
Axial length elongation	4 RCTs (n=769)	MD -0.08 [-0.11, 0.04]	Favors atropine	Moderate
0.5% atropine (vs. no treatment)				
Refraction	5 RCTs (n=547)	MD -0.89 [-1.04, -0.75]	Favors atropine	Very low
Axial length	3 RCTs (n=330)	MD -0.2 [-0.48, 0.08]	Favors atropine	Very low
1.0% atropine (vs. no treatment)				
Refraction	4 RCTs (n=855)	MD -0.75 [-1.2, -0.3]	Favors atropine	Very low
Axial length	3 RCTs (n=791)	MD -0.34 [-0.4, -0.28]	Favors atropine	Moderate

CI *Confidence Interval*; MD *Mean Difference*; RCT *Randomized Controlled Trial*; RR *Risk Ratio*
[a] in diopters

Harms associated with treatment for refractive errors were also noted. A meta-analysis found that atropine eye drops were associated with an increased likelihood for blurred near vision [OR 9.47 (95% CI 1.17, 76.78)] and hypersensitivity reactions [OR 8.91 (95% CI 1.04, 76.03)] [15]. Another meta-analysis on contact lens wear reported no serious ocular adverse events, with non-serious ocular adverse events occurring at a crude rate of 10.6 per 100 patient-years and an estimated pooled incidence of 8.9 per 100 patient-years (95% CI 4.5, 17.4) [16]. Among the 86 non-serious adverse events that occurred, the most common ones (n) were slitlamp findings of Grade 2 or less requiring treatment (26), unspecified conjunctivitis (14), and allergic conjunctivitis (13). Thirty-seven of the 86 adverse events were considered possibly lens-related, giving a crude incidence of 4.5 per 100 patient years for contact lens-related events. The crude incidence of ocular adverse events among spectacle wearers was 1.8 per 100 patient-years.

4.4.4 Diagnostic Performance of Screening Tests

Evidence from six cross-sectional studies with low risk of bias were considered to determine the diagnostic accuracy of screening for refractive errors among children (Table 4.4.3). The screening tools included in this assessment were the LEA chart, the HOTV chart, the E chart, and the logMAR chart.

A pooled analysis of studies utilizing the LEA chart, the HOTV chart, or the E chart found that these screening tools were highly sensitive [Sn 90% (95% CI 86.3)] but moderately specific [Sp 67% (95% CI 53.7, 78.5)] [17–19]. A study among Native American children aged 3–7 years using the ETDRS-style Lea symbols logMAR chart reported a similar level of sensitivity (Sn 90%) but a much lower specificity (44%) for detecting astigmatism [18]. However, when comparing the performance of these charts with each other, it was found that the HOTV chart (Sn 90.2%) and the E chart (Sn 90.2%) were more sensitive that the LEA chart (Sn 87.8%), and that the HOTV chart (77.3%) and the LEA chart (75%) were more specific than the E chart (Sp 69.8%) [17]. Comparing the diagnostic accuracy of a Distance Visual Acuity E chart with a Near Visual Acuity E chart among primary schoolchildren in China (aged 6–12 years) also showed that the Near Visual Acuity E chart was less sensitive than the Distance Visual Acuity E chart (Sn 85.2% vs. Sb 91.2%) but was more specific (Sp 86.2% vs. Sp 76.8%) in detecting SRE (cutoff: ≤20/40) [19].

Upon pooling the results of diagnostic accuracy studies on the logMAR chart, it was found that this tool had moderate sensitivity [Sn 68.9% (95% CI 54.8, 80.1)] but high specificity [Sp 94.3 (95% CI 88.7, 97.2)] [20–22]. These studies were conducted among different age groups (range 6–14 years) utilizing different cutoff scores. A Singaporean study among children aged 7–9 years used a cutoff score of ≤0.28 logMAR units to detect refractive errors [20], while an Irish study used a cutoff of <0.20 logMAR units [21]. The Irish study also compared the diagnostic performance of the logMAR chart between two age groups (6–7 years vs. 12–13 years) and between myopic and hyperopic children aged 12–13 years. It was observed that both the sensitivity and specificity were higher when the test was conducted among children 12–13 years old (Sn 73% vs. Sn 50%, Sp 93% vs. Sp 92%), and that the chart was better able to detect myopia (Sn 92%, Sp 91%) than hyperopia (Sn 41%, Sp 84%) [21]. Lastly, an Australian study among adolescents (aged 11–14 years) aimed to assess the diagnostic performance of the logMAR chart for detecting myopia, hyperopia and astigmatism. Overall, the sensitivity was 72.2% and the specificity was 93.3% (cutoff: 53 letters, 6/6–2) [22]. Visual acuity performed best in detecting myopia (cutoff: 45 letters, 6/9.5; Sn 97.8%, Sp 97.1%). The best cutoff for hyperopia was 57 letters 6/62 (Sn 69.2%, Sp 58.1%) and 55 letters 6/6 for astigmatism (Sn 77.4%, Sp 75.4%).

Table 4.4.3. Summary of findings on the diagnostic performance of screening for refraction errors among children

Instrument/Test	No. of Studies (No. of Participants)	Sn [95% CI]	Sp [95% CI]	Certainty of Evidence
ETDRS-style LEA chart, LEA chart, HOTV, E chart	2 XS (n=1,013)	90 [86.3, 92.8]	67 [53.7, 78.5]	High
LogMAR	3 XS (n=6,553)	68.9 [54.8, 80.1]	94.3 [88.7, 97.2]	High

CI *Confidence Interval*; ETDRS *Early Treatment of Diabetic Retinopathy Study*; Sn *Sensitivity*; Sp *Specificity*; XS *Cross-Sectional Study*

4.4.5 Cost Implication

No local cost-effectiveness studies on the screening and linked management for refractive errors among children were found. PhilHealth offers Z Benefits for children with disabilities (aged 0–17 years and 364 days) who fit any of the following criteria: (a) having undergone a visual disabilities assessment from an ophthalmologist who categorized their visual disability (Table 4.4.4), determined the need for assistive devices, and developed an appropriate rehabilitation plan; (b) having an enucleated eye or other clinical indications determined by ophthalmologists for children needing ocular prosthesis; and (c) must be eligible at the time of pre-authorization [23].

Table 4.4.4. Philippine Health Insurance Corporation definitions for visual impairment

Category of visual disabilities	Best-corrected VA[a]		Equivalent – for non-verbal
	Worse than	Equal to or better than	
			A normal child can center,[b] steady[c] and maintain[d]
Category 1 (Moderate)	20/70	20/200	Can center and steady Does not maintain
Category 2 (Severe)	20/200	20/400	Can only center Does not maintain, not steady
Category 3 (Profound vision loss)	Counting fingers at 3 meters or 20/400	Counting fingers at 1 meter or 20/1200	Cannot center, maintain not steady
	Or visual field of 10 degrees or less		
Category 4 (Near total vision loss)	Counting fingers at 1 meter of 20/1200	Light perception	Cannot center, Maintain, not steady
Category 5 (Total vision loss)	No light perception		Total blindness

[a] Best-corrected Visual Acuity is taken in the better eye and defined as visual acuity taken
[b] Center – eye captures the stimuli
[c] Steady – eye focuses to the target
[d] Maintain – eye can track the target (the eye can do the following when it is presented with a stimuli)

The services covered under the Z Benefits for children with visual disabilities include (a) low vision assessment with treatment plan, (b) assistive health technology device (optical and electronic devices), (c) assistive device prescription, (d) training on activities of daily living as part of rehabilitation, (e) visual skill straining, (f) environmental adaptation as part of rehabilitation, and (g) follow-up consultation (Table 4.4.5) [24].

Table 4.4.5. Summary of package codes and rates of services and interventions for visual impairment

Z Code	Description of services	Cost
Package code and rates for initial assessment and intervention for the Z benefits for children with visual impairment		
Z019.1	Initial assessment and intervention (i.e., rehabilitation and training) for Category 1 Visual impairment	PHP 25,920.00

Z Code	Description of services	Cost
Z019.2	Initial assessment and intervention (i.e., electronic assistive device, rehabilitation, and training) for Categories 2, 3, and 4 Visual impairment	PHP 31,920.00
Z019.3	Initial assessment and intervention (i.e., electronic assistive device, rehabilitation, and training) for Category 5 Visual impairment	PHP 9,070.00
Add-on[a] devices for children with visual disabilities		
Z019.41 or Z019.42 with/out Z019.43	Optical Aid 1: Low Power Distance, Categories 1, 2, 3 and 4 visual impairment eyeglasses + low power optical device	PHP 7,350.00
	Optical Aid 2: High power Distance, Categories 1, 2, 3 and 4 visual impairment progressive eyeglasses + high optical device	PHP 13,820.00
	Optical Aid 3: Colored Filter, Categories 1, 2, 3 and 4 visual impairment	PHP 2,940.00
Z019.44	White cane, Category 5 visual impairment	PHP 1,000.00
Yearly diagnostics, after the first year of enrolment of children with visual disabilities		
Z019.5	Yearly Diagnostics for Categories 1, 2, 3 and 4	PHP 3,220.00
Z019.6	Yearly follow up consultation for Category 5	PHP 780.00
Other benefits for children with visual disabilities (i.e. electronic assistive device replacement and ocular prosthesis)		
Z019.7	Electronic Aid Replacement done every 5 years	PHP 6,000.00
Z019.8	Ocular Prosthesis, per eye[b]	PHP 20,250.00

PHP *Philippine Peso*

[a] These add-on assistive devices are availed of on top of the benefits for initial assessment and intervention for the Z Benefits for visual disabilities.

[b] Ocular prosthesis maybe availed of exclusively or with any of the benefits for visual disabilities if the child fulfills the inclusion criteria.

4.4.6 Equity, Acceptability, and Feasibility

One study investigated the equity of access to eye care in childhood. They reported that eye conditions were more prevalent among children of a lower social class compared to children of higher social class [OR 1.69 (95% CI 1.15, 2.46)] [25]. Despite these rates, it was observed that children belonging to a lower socio-economic class were less likely to utilize screening services [OR 0.65 (95% CI 0.43, 0.98)] or to consult an eye-care specialist [OR 0.83 (95% CI 0.70, 1.00)].

According to a qualitative study in the United States, barriers to seeking follow-up care after screening include the high cost of corrective lenses, limited availability of convenient eye care appointments, a parental perception of inadequate communication between schools and the parents and community, lack of community awareness about the frequency and potential effect of refractive errors in children, and adolescents' reluctance to wear glasses [26]. Other factors affecting noncompliance were also noted in a meta-analysis on treatment compliance for refractive errors, reporting that 40.14% (95% CI 32.78, 47.50) complied with spectacle use [27]. Broken/lost spectacles, forgetfulness, and parental disapproval were the reasons for non-compliance. In Tanzania, focus group discussions on the barriers to spectacle use among secondary school students included peer pressure and parental concerns about the safety of spectacle use, the cost of purchasing spectacles, and difficulties in accessing good local optical services [28]. However, the authors observed that students were generally pleased with the appearance of spectacles and the benefit of spectacles on their vision.

4.4.7 Recommendations from Other Groups

The USPSTF released a statement recommending vision screening at least once in all children aged 3–5 years to detect amblyopia or its risk factors using RRT, the cover uncover test, the corneal light reflex test and visual acuity tests (Snellen, LEA symbols and HOTV charts), autorefractors, photoscreeners, and steoroacuity tests [29]. There is currently insufficient evidence to assess the balance of benefits and harms of vision screening in children aged <3 years The USPSTF also notes that there is not enough evidence to determine the optimal screening interval in children aged 3–5 years.

ADULTS

Justification and Considerations

The following discussions were made during the CP meeting:

- Visual acuity determination and the pinhole test are both simple to perform and do not require many resources to implement. Non-ophthalmologists and non-optometrists may also be trained to perform the tests.
- Treatment for refractive error is effective and can greatly improve quality of life.

4.4.8 Key Findings

Both direct (one cluster RCT) and indirect evidence (four cross-sectional diagnostic studies, one therapeutic RCT) on the effectiveness of screening were included in this review. Screening for conditions causing vison problems did not significantly impact visual function or visual acuity, although improvement in visual function was observed with the use of prescription lenses [MD 7.3 (95% CI 3.5, 11.1), p<0.01]. Visual acuity tests were found to have moderate accuracy in determining the presence of conditions causing visual problems, while the pinhole test was both sensitive and specific in the detection of UREs. The overall certainty of evidence was moderate because of risk of bias due to unclear blinding of outcome assessors, attrition, and incomplete outcome assessment at follow-up.

4.4.9 Burden of Disease

Globally, UREs are considered the leading cause of moderate to severe visual impairment [30]. According to the 2018 Philippine National Blindness Survey and Eye Disease Study, 0.38% of the Philippine population suffers from visual impairment due to refractive errors, and it is estimated that 3.26% suffer from UREs [31]. Patients with refractive errors left untreated suffer from decreased function and quality of life, regardless of age, sex, or race [32].

Refractive errors can occur at any age across the lifespan, with varying distribution of each type per age bracket. In worldwide estimates, astigmatism is the most common type of error among adults (40.4%), followed by hyperopia (30.9%), and myopia (26.5%) [33]. Older adults may also have comorbid presbyopia, with an estimated worldwide prevalence of 25%, occurring predominantly in those aged ≥40 years [34]. Locally, there are no population-based studies on the distribution of refractive errors. One single center survey of patients seeking ophthalmologic care showed a prevalence of 59% for myopia, 47.88% for astigmatism, 30% for hyperopia [35].

Refractive errors may regress, stabilize, or progress in severity. As much as 32% of those with childhood myopia progress to high myopia in adulthood [36]. Myopia progression is particularly associated with other potential sight threatening complications, such as choroidal thinning, peripheral retinal degeneration, retinal detachment, cataract, glaucoma, and myopic choroidal neovascularization [37,38]. Hyperopia may resolve spontaneously with age among those diagnosed in childhood in up to 46% of cases [39]. Existing hyperopia has been implicated as a risk factor for the development of primary angle-closure glaucoma (PACG) [37].

Persons with the disease are initially evaluated by visual acuity determination. This may be followed by a pinhole test, which makes the use of an occluder to determine if an individual's reduced vision could be due to refractive error [40]. Once decreased acuity is determined, an ophthalmologic examination is performed, which would include a refraction of the affected eyes [38]. Cycloplegic agents may be used to eliminate the confounding effect of accommodation in determining refractive error, but the use of these agents has been associated with adverse effects.

Different treatments may be utilized depending on the severity of the refractive error, the patient's visual needs, occupational or recreational considerations, and individual preferences. Interventions include the use of corrective lenses or contact lenses and keratorefractive surgery [38].

4.4.10 Benefits and Harms of Screening

Direct evidence on the effectiveness of screening for refractive errors among adults was taken from a cluster RCT that compared universal eye screening with targeted screening. The trial found that, among community-dwelling older adults aged ≥75 years, visual acuity [RR 1.07 (95% CI 0.84, 1.38)] and visual function [MD 0.4 (95% CI -1.7, 2.5)] did not significantly improve at follow up (Table 4.4.6) [41]. In a separate study on the effectiveness of prescription lenses, use of prescription lenses led to improved visual function compared to those who did not receive their lenses [MD 7.3 (95% CI 3.5, 11.1), p<0.01] [42]. However, no significant differences in overall mobility [MD 0.47 (95% CI 0.08, 1.0), p<0.01], distance visual acuity [MD 1.6 (95% CI -2.2, 5.4), p=0.41], and near visual acuity [MD 3.9 (95% CI -0.7, 8.5), p=0.10] were found between treated and untreated individuals.

Table 4.4.6. Summary of findings on the effectiveness of screening and of treatment for refraction errors among adults

Outcome (Duration of Follow-Up)	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation	Certainty of Evidence
Screening for vision problems				
VA[a] (3–5 years)	1 RCT (n=3,249)	RR 1.07 [0.84, 1.38]	Equivalent	Moderate
Visual function[b] (3–5 years)	1 RCT (n=3,249)	MD 0.4 [-1.7, 2.5]	Equivalent	Moderate
Prescription lenses for refraction error				
Visual function[b] (3 months)	1 RCT (n=111)	MD 7.3 [3.5, 11.1], p<0.01	Benefit	Moderate
Disability/mobility[c] (3 months)	1 RCT (n=95)	MD 0.47 [0.08, 1.0], p<0.01	Inconclusive	Moderate
Distance vision[d] (3 months)	1 RCT (n=111)	MD 1.6 [-2.2, 5.4], p=0.41	Inconclusive	Moderate
Near vision[e] (3 months)	1 RCT (n=111)	MD 3.9 [-0.7, 8.5], p=0.10	Inconclusive	Moderate

[a] <20/60, assessed with Snellen chart
[b] NEI-VFQ (0-100, higher score=better function)
[c] Rosow-Breslau Scale (0-1, higher score=better)
[d] logMAR (0-70 letters)
[e] Modified ETDRS (0-75 letters)

There was no reported harm in conducting visual acuity testing or the pinhole test to screen for conditions causing visual impairment. However, evidence was found on the complications of undergoing cycloplegic refraction. In a cohort of participants who underwent cycloplegic refraction, 8.8% experienced side effects, especially with increasing concentration of agent used [43]. Atropine was associated with transient fever, flushing, or a combination of both. Cyclopentolate was associated with drowsiness, red eye, flushing, with some cases of hyperactivity, bad mood, skin sores, and conjunctivitis.

Regarding treatment of refractive errors, prescription lenses are considered the safest and with the least complications. New wearers may feel discomfort, especially if there is improper correction of error [44]. Contact lens users may experience dry eyes, blepharitis, or keratitis [45]. If not used in compliance to hygienic and length of wear recommendations, it may be associated with increased risk of microbial keratitis, which is a potentially sight-threatening complication if not properly treated. Microbial keratitis may occur in 4–10 persons per 10,000 users [46]. Corneal refractive surgeries carry the greatest risk of complications; although improvement in visual acuity may be achieved, the procedure has some risk of infection, may affect near vision in older adults, and preclude proper intraocular pressure (IOP) determination for subsequent ophthalmic evaluation or treatment [37]. In a single-center study with a 5-year follow-up, there was a 16.3% complication rate for all surgeries [47]. Majority (73%) was dry eye, followed next by regression, and some cases of increased IOP.

The certainty of evidence for these studies was moderate due to risk of bias from lack of blinding of outcome assessors [41,42] and lack of intention to treat analysis [41] for those unable to complete outcome assessments.

4.4.11 Diagnostic Performance of Screening Tests

Visual acuity testing (cut-off: 20/30) had a pooled sensitivity of 66% (95% CI 51, 79; I^2=96%) and a pooled specificity of 73% (95% CI 54, 87; I^2=79%) as a screening test for conditions causing visual impairment, excluding refractive errors (Table 4.4.7) [48–50]. One study on screening for conditions causing visual impairment (including refractive errors; cutoff: 20/30) reported a higher sensitivity and a similar estimate of specificity [Sn 74% (95% CI 68, 79), Sp 73% (95% CI 60, 84)] [50]. In comparison, a cross-sectional study on screening using the pinhole test reported a sensitivity of 90% (95% CI 81, 95) and a specificity of 88% (95% CI 4, 91) for detecting refractive errors when the maneuver improves visual acuity by 2 logMAR lines [51].

These studies had a risk of bias from lack of predetermined threshold for index test [48,50], and unclear blinding of outcome assessors to results of index and reference test [48–51]. One study was imprecise in the estimate of specificity of pinhole test [51].

Table 4.4.7. Summary of findings on the diagnostic performance of screening for refraction errors among adults

Instrument/Test	No. of Studies (No. of Participants)	Sn [95% CI]	Sp [95% CI]	Certainty of Evidence
VA determination (inc. refractive errors)[a]	1 XS (n=317)	74% [68, 79]	73% [60, 84]	Moderate
VA determination (exc. refractive errors)[a]	3 XS (n=8,698)	66% [51, 79]	73% [54, 87]	Low
Pinhole test	1 XS (n=488)	90% [81, 95]	88% [4, 91]	Moderate

CI *Confidence Interval*; Sn *Sensitivity*; Sp *Specificity*; VA *Visual Acuity*; XS *Cross-Sectional Study*
[a] reference standard: ophthalmologist evaluation

4.4.12 Cost Implication

No local cost-effectiveness studies on the screening and linked management for refractive errors were found. The following items may be involved during screening and treatment for refractive error, and their respective estimated costs are noted in Table 4.4.8.

Table 4.4.8. Costs associated with refractive error screening and linked management among adults

Item	Cost
Ophthalmologist consult	PHP 500.00–1,500.00
Refraction procedure (automated/subjective, standalone)[a]	PHP 500.00 (standalone)
Prescription lenses (per pair)	PHP 500.00–2,000.00
Contact lenses (per month)	PHP 1,000.00–2,000.00
Refractive eye surgery	PHP 50,000.00–100,000.00

PHP *Philippine Peso*

[a] may be included in ophthalmologist consult or free when buying prescription lenses

The cost of eye care provider consultation may vary among facilities offering evaluation. Currently, there is no regulation that prescribes the cost of prescription lenses, contact lenses, or refractive eye surgery, and national health insurance does not cover any form of treatment for refractive errors or for keratorefractive surgery [52].

4.4.13 Equity, Acceptability, and Feasibility

There are a few studies that evaluated patient values and acceptability of vision screening. Medical screening among older drivers was generally acceptable and preferred, with 94% of those surveyed having a positive attitude toward vision screening specifically [53]. Most preferred to include tests for visual acuity, contrast vision, and visual field, with assessments done at an interval of 2–3 years among those ≥70 years.

Although no articles were found on the attitudes of patients toward refractive error determination procedures, the reviewers suggest that the acceptability of treatments for refractive error are affected by costs, cosmetic concerns, and safety. In a school-based study of spectacle compliance among adolescents in China, the following factors were associated with better compliance to prescription lenses: female, low socioeconomic status, vision worse than 20/20, and having less issues with appearance [54]. A survey of university students in Africa showed that although 54.6% had been advised by an eye care professional to wear prescription lenses, only 46.0% of those advised wore corrective lenses [55]. The most common perceived barriers to use were appearance, fear of embarrassment or teasing, and the cost of lenses [55]. In a population-based survey among Saudi Arabians, the primary reason for use of contact lenses was cosmetic concerns of vision correction [56]. Another study found that refractive eye surgery was considered an acceptable form of correction among medical students [57]. While majority (73%) would be willing to undergo the procedure to address refractive error, 14.1% of students were hesitant to undergo the procedure due to fear of complications [57].

4.4.14 Recommendations from Other Groups

Guidelines by the American Optometric Association [58] and the American Academy of Ophthalmology (AAO) [59] both recommend comprehensive eye examinations among

asymptomatic adults. However, the frequency of screening varied between the guidelines (Table 4.4.9).

Table 4.4.9. Frequency of screening as recommended by the American Optometric Association and the American Academy of Ophthalmology

American Optometric Association [58]	**American Academy of Ophthalmology** [59]
Aged 18–39 years: every 2 years	Aged <40 years: every 5–10 years
Aged 40–64 years: every 2 years	Aged 40 – 54 years: every 2–4 years
	Aged 55–64 years: every 1–3 years
Aged ≥65 years: annual	Aged ≥65 years: every 1–2 years

On the other hand, the USPSTF [60], the American Academy of Family Physicians [61], and the CTFPHC [62] make no recommendations for screening. The 2018 guideline released by the CTFPHC recommended against screening among adults aged ≥65 years due to the lack of significant benefit with screening [62]. In contrast, the 2022 guideline by the USPSTF found that there was insufficient evidence to assess the benefits and harms of screening among asymptomatic adults aged ≥65 years [60].

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4.5 Screening for cataract

RECOMMENDATIONS

5. **Among asymptomatic, apparently healthy adults, we <u>suggest against</u> screening for cataracts.**
   (weak recommendation, low certainty of evidence)

Justification and Considerations
The following discussions were made during the CP meeting:

- Cataract may also be detected during screening for other vision disorders.
- Asymptomatic individuals may have the ability to sense if there are problems in their visual acuity and have an active role in clinical decision-making.

4.5.1 Key Findings

No direct evidence was found on the effectiveness of screening for cataracts. The evidence included in this review included studies of vision screening programs (including ocular conditions aside from cataract), trials comparing expedited and delayed treatment for cataract, and diagnostic accuracy studies on cataract screening tests.

Vision screening at the primary care setting was found to be equivalent to no screening, delayed screening, or usual care in terms of visual acuity, likelihood of vision disorders, or vision-related functional impairment based on data from four RCTs. Because cataract treatment has already been proven to be safe and effective, no studies were found that had a placebo group due to it being considered unethical. However, immediate treatment as compared to delayed surgery showed improvement in visual acuity but no significant difference for quality of life. Six studies were found that included tests for screening such as visual acuity charts, the pinhole test, a computer vision screener (CVS), and the Amsler grid. Of these tests, the assessment of near visual acuity yielded the highest sensitivity, followed by the CVS. The pinhole test and the Amsler grid were the most specific of the included tests.

4.5.2 Burden of Disease

Cataract is the leading cause of blindness worldwide [1]. It occurs as the opacification of the lens, which can lead to loss of useful vision [2]. Approximately 35 million people worldwide are visually impaired due to cataract, while over 10 million are blind because of it. The prevalence the condition varies by region and by age group, where most cases were in found in the age group of ≥60 years. There are multiple risk factors with cataract such as age, sex, race, and myopia being non-modifiable risk factors while smoking, socioeconomic status, and alcohol are among some of the modifiable risk factors [3]. Even though multiple suggested risk factors are known, there is no identified method for preventing cataract formation [4].

Diagnosis is usually done with a combination of a visual acuity test and an eye examination to detect any opacity of the crystalline lens [5]. These tests may include visual acuity charts, the pinhole test, a CVS, and the Amsler grid. No pharmacologic treatment is currently available for cataracts, although non-surgical options such as changing glasses and contact lenses can help those with cataracts in the early stage. Worldwide, the most widely used surgery for

cataract is sutureless, small-incision phacoemulsification with foldable intraocular lens implantation done in an outpatient setting [6].

4.5.3 Benefits and Harms of Screening

No studies were found regarding the benefits and harms of screening for cataract directly. The following RCTs describe vision screening programs where cataract is assessed as part of a multiorgan health screen for older adults. The trials compared universal with targeted vision screening [7], immediate with delayed vision screening [8], vision screening with usual care [9], and vision screening with no screening [10]. Screening was done using visual acuity tests, either via Glasgow visual acuity chart, ETDRS visual acuity chart, or Snellen visual acuity chart. Other trials also included the use of pinhole testing for persons with visual acuity worse than 6/18 (20/60), recognizing a face and/or reading normal letters in a newspaper. These tests were done by general practitioners, office staff, or trained nurses in a primary care setting. These studies found that there was no difference between screening in a primary-care setting versus no vision screening, delayed screening, or usual care in terms of visual acuity, likelihood of vision disorders, or vision-related functional impairment (Table 4.5.1). The studies included prior did not report harms.

There were no RCTs or systematic reviews found that compared treatment versus no treatment of cataract. This was supported by a systematic review that stated that a consensus has been made that the clinical and quality of life benefits of modern cataract removal are such that an RCT including non-intervention would be unethical [11]. Instead, three RCTs that compared the visual acuity of patients who had expedited surgery versus delayed cataract surgery were included in this review [12–15]. The results showed that expedited treatment may be more effective than having it delayed [OR 7.22 (95% CI 3.15, 16.55)] (Table 4.5.1). In another study, the quality of life (in terms of incidence of falls), results were not significant [OR 0.81 (5% CI 0.55, 1.17)] (Table 4.5.1). The quality of this study is low due to it having only women >70 years as the participants.

Table 4.5.1. Summary of findings on the effectiveness of vision screening and of linked management for cataract

Outcome (Duration of follow-up)	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation	Certainty of Evidence
Vision screening (vs. no visual testing, delayed visual testing, usual care)				
Falls	2 RCTs (n=535)	OR 0.81 [0.56, 1.17]	Equivalent	Low
Mean VA (1 year)	1 cluster RCT (n=188)	39 letters vs. 35 letters	Equivalent	Low
Vision-related QOL[a]	1 cluster RCT (n=3,249)	MD 0.4 [-1.7, 2.5]	Equivalent	Moderate
Improvement of visual function (6 months)	1 cluster RCT (n=261)	RR 0.85 [0.52, 1.40]	Equivalent	Low
Likelihood of VA worse than 6/18 (3–5 years)	1 cluster RCT (n=3,249)	RR 1.07 [0.84, 1.34]	Equivalent	Low
Prevalence of visual disorders	1 cluster RCT (n=1,121)	MD -4.00 [-4.48, -3.52]	Equivalent; trend towards screening	Low
Difficulty in daily activities	0	-	Inconclusive	-
Expedited cataract surgery (vs. delayed cataract surgery)				
VA	3 RCTs (n=737)	OR 7.22 [3.16, 16.55]	Benefit	Low
Falls	2 RCTs (n=535)	OR 0.81 [0.56, 1.17]	Equivalent	Low

CI *Confidence Interval*; MD *Mean Difference*; OR *Odds Ratio*; QOL *Quality Of Life*; RCT *Randomized Controlled Trial*; RR *Risk Ratio*; VA *Visual Acuity*

[a] scale 0–100

4.5.4 Diagnostic Performance of Screening Tests

One of the included studies assessed visual acuity testing (i.e., pinhole test or logMAR chart) against a reference standard (i.e., complete examination by an ophthalmologist) [16]. Near visual acuity (cut-off: ≤20/30) was the most sensitive [Sn 97% (95% CI 96, 98)] but also least specific test [Sp 3% (95% CI 2, 4)] (Table 4.5.2). Distance visual acuity and the pinhole test were both less sensitive than near visual acuity testing [Sn 44% (95% CI 41, 47) and Sn 31% (95% CI 28, 34), respectively], but these tests were also more specific [Sp 77% (95% CI 75, 79) and Sp 89% (95% CI 87, 91), respectively]. Higher cut-offs (i.e., ≤20/40 to ≤20/60) were associated with lower sensitivity and higher specificity.

Two studies investigated the performance of a CVS against detailed history and symptoms, slit lamp and dilated funduscopic examination, tests of visual acuity, visual field, and orthoptic tests. The tool includes six tests of vision function (near visual acuity, visual field, fixation disparity, stereoacuity, high contrast distance visual acuity, and low contrast distance visual acuity) along with the participant's history and symptoms. High- and low-contrast distance visual acuity were used for the diagnosis of cataracts, and the tests yielded similar levels of sensitivity and specificity (Table 4.5.2) [17].

A study used the Amsler grid as part of a complete ophthalmic examination for screening of ocular diseases except for refractive error. The study found that the tool had a low sensitivity [Sn 20% (95% CI 14, 27)] and a relatively high specificity [Sp 88% (95% CI 80, 94)] (Table 4.5.2) [18].

Table 4.5.2. Summary of findings on the diagnostic performance of tools for detecting cataract

Instrument / Test	No. of Studies (No. of Participants)	Sn [95% CI]	Sp [95% CI]	Certainty of Evidence
VA test: presenting distance ≤20/30	1 XS (n=2,290)	44% [41, 47]	77% [75, 79]	Moderate
VA test: pinhole distance acuity ≤20/30	1 XS (n=2,290)	31% [28, 34]	89% [87, 91]	Moderate
VA test: reading acuity ≤20/30	1 XS (n=2,290)	97% [96,98]	3% [2, 4]	Moderate
Computerized visual function test: high-contrast, VA >0.19 logMAR	2 XS (n=380)	75% [66, 82]	56% [49, 62]	Moderate
Computerized visual function test: low-contrast, VA >0.39 logMAR	2 XS (n=380)	71% [62, 79]	60% [54, 66]	Moderate
Amsler grid	1 XS (n=317)	20% [14, 27]	88% [80, 94]	Low

CI *Confidence Interval*; Sn *Sensitivity*; Sp *Specificity*; VA *Visual Acuity*; XS *Cross-Sectional Study*

Despite the Snellen or ETDRS chart being a common tool used in the primary care setting, there are no clinically relevant reference standard exists to determine their diagnostic accuracy for diagnosing cataract. There is lack of evidence in determining the accuracy of pinhole testing, the Amsler grid, visual acuity tests other than the Snellen or ETDRS, physical examination, or funduscopic examination as a singular test for diagnosing cataracts in primary care.

4.5.5 Cost Implication

The cost per QALY gained for cataract surgery ranges from USD 9.00–1,600.00/QALY in developing countries up to USD 245.00–22,000.00/QALY in western countries [19]. In a study done in Indonesia, the ICER of performing phacoemulsification was better as compared to

small incision cataract surgery (SICS) despite having greater direct costs [20]. This is primarily attributed to phacoemulsification having faster recovery times (approximately 7 days) as compared to SICS (approximately 21 days), which ended up having greater costs overall.

According to the PhilHealth, a member of PhilHealth who undergoes cataract surgery can claim up to PHP 16,000.00 per eye [21]. No data regarding the cataract surgery costs in public and private hospitals, as well as private clinics are publicly available.

4.5.6 Equity, Acceptability, and Feasibility

Vision plays a key role in the ability to do activities relating to mobility and well-being [22–24]. Loss of vision, particularly in the elderly, led to lower physical and mental function and loss of independence to do activities of daily living [25]. Several studies have found as association between improved visual function and health-related quality of life with cataracts treatment [26–30]. Up to 90% of patients who underwent cataract surgery noted improvements in functional status and satisfaction with vision [31–34].

A 2014 longitudinal study was conducted in the Philippines and in Bangladesh where people with cataracts that were about to receive cataract surgery were interviewed about vision-specific and generic health-related quality of life, daily activities, and economic indicators [35]. The results showed that at baseline, the participants had had poorer health and vision-related quality of life, were less likely to do productive activities, and were more likely to receive assistance with certain activities. During the 1-year follow-up post-surgery, there was a noteworthy improvement in their quality of life and an increase in time spent in productive activities.

4.5.7 Recommendations from Other Groups

The USPSTF recommends screening for impaired visual acuity in older adults, which includes conditions such as cataract, due to the available evidence on the benefits and harms of screening among this population group [36]. The AAO also recommends a comprehensive eye examination every 1–2 years for adults aged ≥65 years [37].

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4.6 Screening for glaucoma

RECOMMENDATIONS

6. **Among asymptomatic, apparently healthy adults, we recommend screening to check for risk factors for glaucoma annually; those with risk factors will be referred to higher level of care every year.**
   (strong recommendation, low certainty of evidence)

Justification and Considerations
The Panel voted for a strong recommendation despite the low certainty of evidence due to the benefits of early detection and treatment of glaucoma on health outcomes. As a silent disease, many patients may remain asymptomatic and may only become aware of having glaucoma by the advanced stages of the condition.

The following considerations were also noted:

- The evidence reviewed for this question primarily covers open-angle glaucoma. However, there are more patients with closed-angle glaucoma in the Philippines.
- Screening for glaucoma among asymptomatic individuals may be difficult. Training is required to ensure accuracy during glaucoma determination.
- A greater level of risk (i.e., presence of more risk factors or more comorbidities) may necessitate more frequent assessment (i.e., twice a year).

4.6.1 Key Findings

No direct evidence was found on the effectiveness of screening for glaucoma compared to no screening. The following review comprises evidence from 38 studies, i.e., cross-sectional diagnostic studies and RCTs of the treatment of glaucoma compared to control/placebo.

Treatment for glaucoma was associated with a lower mean IOP as well as with decreased risk of glaucoma progression. The following screening tools for glaucoma were included in this review: ophthalmoscopy, optic disc photography, tonometry, and pachymetry. The sensitivities and specificities of these tools spanned a wide range, with the Humphrey Field Analyzer (HFA) having the highest sensitivity and tonometry having the highest specificity. The overall certainty of the included evidence is low.

4.6.2 Burden of Disease

Glaucoma is a mixed group of optic neuropathies that can lead to irreversible visual field loss and blindness if left untreated. It is the second leading cause of blindness worldwide wherein approximately 3.5% of the global population suffer from either open-angle or angle-closure glaucoma [1,2]. The prevalence of PACG and primary open-angle glaucoma (POAG) are 2.2% and 4.0%, respectively [2]. A 2021 systematic review noted that Asians had the highest amount of undetected manifest glaucoma [OR 2.62 (95% CI 1.26, 5.48)] and POAG cases [OR 2.67 (95% CI 1.09, 6.57)] [3]. There are several risk factors associated with glaucoma including age, corneal thickness, vertical cup-to-disc ratio (CDR), myopia, and race [4–11].

Glaucoma assessment may be facilitated with the following tools. Optic disc photography is the assessment of the CDR using indirect ophthalmoscopy as well disc photographs to evaluate the optic disc. Tonometry, on the other hand, is a measurement for IOP. Visual fields can be assessed by an HFA, which is commonly used as part of the reference standard in diagnosing glaucoma. Pachymetry is the measurement of corneal thickness.

Elevated IOP is commonly associated as a risk factor for glaucoma, but it is now not considered a reliable measure since many persons were found to have glaucoma while having normal IOP and vice versa. Measurement of IOP or fundus examination alone may not be enough to diagnose the disease. A comprehensive examination done by an ophthalmologist would be the optimal way of diagnosing the disease. Treatment aims to lower the IOP of the eye to prevent progression of the disease that can lead to vision loss. These includes pharmacologic therapy, laser therapy, and even surgery [12]. This evidence summary mainly focuses on POAG.

4.6.3 Benefits and Harms of Screening

No studies were found that directly assessed the benefits and harms of screening for glaucoma. This is supported by a review done by Ervin et al. who were not able to find any review or study that "provided evidence for direct or indirect links between glaucoma screening with visual field loss, visual impairment, optic nerve damage, IOP or patient-reported outcomes" [13]. The USPSTF POAG screening guidelines used a study to assess the benefits and harms of screening, but this was not included in the summary since the study only included the components relevant in the diagnosis of glaucoma. Hence, indirect evidence based on linked management for glaucoma was included in this review (Table 4.6.1).

Glaucoma treatment focuses on decreasing the IOP of the eye. Sixteen trials showed that there was a decrease in IOP with medication as compared to the placebo [MD -3.14 mmHg (95% CI -4.19, -2.08), I^2=95%] [5,14–28]. Despite the high level of heterogeneity, the direction of effects across the studies were consistent. Progression of glaucoma was based on the detection of any defect in the visual field, optic discs, or ocular hypertension. In terms of progression, treatment with topical therapy was found to be favorable compared with a placebo or not having treatment [RR 0.68 (95% CI 0.49, 0.96); RD -4.8% (95% CI -8.5, -1.0)] [5,17–30]. In trials assessing harms related to glaucoma treatment, no significant differences were found in terms of serious adverse events [RR 1.14 (95% CI 0.60, 1.99)] [5,14,20,30]. While withdrawal due to adverse events was higher in the control group, the difference was not statistically significant [RR 2.40 (95% CI 0.71, 19.32), I^2=0] [18,20,23,31,32].

Table 4.6.1. Summary of findings on the effectiveness of linked management for glaucoma

Outcome	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation	Certainty of Evidence
Mean IOP (in mmHg)	16 RCTs (n=3,706)	MD -3.14 [-4.19, -2.08]	Benefit	Moderate
Progression to glaucoma	7 RCTs (n=3,771)	RR 0.68 [0.49, 0.96]	Benefit	High
SAEs	3 RCTs (n=3,140)	RR 1.14 [0.60, 1.99]	Equivalent	Moderate
Withdrawal due to AEs	5 RCTs (n=648)	RR 2.40 [0.71, 19.32]	Harm	Moderate

AE *Adverse Event*; CI *Confidence Interval*; IOP *Intraocular Pressure*; MD *Mean Difference*; RCT *Randomized Controlled Trial*; RR *Risk Ratio*; SAE *Serious Adverse Event*

4.6.4 Diagnostic Performance of Screening Tests

Two studies assessed the diagnostic performance of optic disc photography in distinguishing between glaucoma and non-glaucoma but had used different cut-off values in their assessments. One study utilized a CDR cut-off of 0.65 for large discs and 0.5 for small discs and found that optic disc photography had a sensitivity of 71% (95% CI 54, 85) and a specificity of 49% (95% CI 44, 55) (Table 4.6.2) [33]. The other study had a CDR cut-off of 0.4 and reported a sensitivity of 18% (95% CI 9, 31) and a specificity of 67% (95% CI 62, 71) [34]. Two other studies reported similar discriminations of CDR [AUROC 0.85 (95% CI 0.74, 0.96) and AUROC 0.81 (95% CI 0.74, 0.92)] [35,36].

Data pooled from 13 studies showed that different tonometry measurements (Goldmann tonometry, rebound tonometry, Schiotz tonometer, AT555, and Ocular response analyzer) had a combined sensitivity of 48% (95% CI 31, 66) and combined specificity of 94% (95% CI 90, 96) (Table 4.6.2) [12,31–34,37–44]. The cutoff used for the majority of studies was 21–22 mmHg except for two studies where the cutoffs were 22.6 mmHg and 25 mmHg, respectively. Among the different tests for IOP, Goldmann tonometry had a higher sensitivity [Sn 66% (95% CI 36, 87)] but was also highly imprecise [12,39,40,42]. All types of tonometry were found to be highly specific.

Pooled estimates from six studies showed that the HFA was a highly sensitive [Sn 87% (95% CI 69, 95)] and specific [Sp 82% (95% CI 66, 92)] tool (Table 4.6.2) [15,32,41,43–45]. All methods of using the HFA also had similarly high AUROC scores.

A population-based study on glaucoma screening among the Latino population included an assessment of the diagnostic accuracy of a pachymeter (cut-off: ≤504 µm) in distinguishing between glaucomatous and non-glaucomatous eyes. The study reported that the sensitivity and specificity for a pachymeter was 16% (95% CI 11, 21) and 91% (95% CI 90, 92), respectively (Table 4.6.2) [40].

Table 4.6.2. Summary of findings on the diagnostic performance of tools for detecting glaucoma

Instrument / Test	No. of Studies (No. of Participants)	Sn [95% CI]	Sp [95% CI]	Certainty of Evidence
Optic disc photography[a]	1 XS (n=902)	71% [54, 85]	49% [44, 55]	Low
Optic disc photography[b]	1 XS (n=2,631)	18% [9, 31]	67% [62, 71]	Low
Tonometry	13 XS (n=32,892)	48% [31, 66]	94% [90, 96]	Low
HFA	6 XS (n=11,244)	87% [69, 95]	82% [66, 92]	Low
Pachymetry	1 XS (n=6,082)	16% [11, 21]	91% [90, 92]	Moderate

CI *Confidence Interval*; HFA *Humphrey Field Analyzer*; Sn *Sensitivity*; Sp *Specificity*; XS *Cross-Sectional Study*
[a] CDR cut-off: 0.65 for large discs, 0.5 for small discs
[b] CDR cut-off: 0.4

4.7.5 Cost Implication

In studies done in the United Kingdom [46,47] and in Finland [48], population-based glaucoma screening programs were not deemed to be cost-effective, especially in high-income countries. However, a Chinese study done in 2019 supported the implementation of glaucoma screening. Compared with no screening, combined screening of POAG and PACG in rural China was predicted to result in an incremental cost-utility ratio of USD 569.00 (95% CI 17.00, 4,180.00) and an ICER of USD 1,280.00 (95% CI -58.00, 7,940.00), both of which are below the WHO cost-effectiveness threshold of 1–3 times rural gross domestic product [49]. For the

urban China setting, combined screening is predicted to result in fewer net costs and greater gain in health benefits than no screening. Findings were robust in all sensitivity analyses.

A review of 16 studies reporting the costs for glaucoma found that annual treatment costs varied between USD 878.00 purchasing power parity (PPP) in Nigeria for surgical treatment and USD 5,272.00 PPP reported for four European countries for a much wider number of cost items such as rehabilitation care and home care costs [50]. Another study in the United States reported average 5-year costs for three glaucoma treatment strategies: medical treatment, trabeculectomy and tube insertion. Costs ranged from USD 6,707.00 for medical treatment to USD 10,949.00 for tube insertion.

4.6.6 Equity, Acceptability, and Feasibility

Glaucoma, due to its impact in one's vision, can greatly affect quality of life, such as difficulties in doing activities such as walking, driving, and reading [51] and an increased risk for accidents [52]. However, no direct studies were found showing patient values and perceptions on glaucoma screening.

In terms of management, a 2017 study in Singapore done in 2017 showed that the management done by the primary care had little difference compared to the specialty care group [53]. Patient satisfaction between the two groups was also comparable with each other [GOR 1.43 (CI 0.50, 2.00)]. However, the medical officers who were in primary care were given specialty training costing approximately SGD 48,000. Most hospitals in the Philippines have an eye center to diagnose and manage ophthalmologic conditions such as glaucoma. However, these specialized areas are the only places where the specific equipment and materials needed to do certain procedures are available. Diagnosis of glaucoma in a private hospital is approximately PHP 1,000.00.

4.6.7 Recommendations from Other Groups

The recommendations on glaucoma screening from two guidelines presented conflicting recommendations. The AAO recommends a baseline comprehensive eye evaluation at age 40 years among persons without risk factors. The examination must be composed of visual acuity measurement, pupil examination, anterior segment examination, IOP measurement, gonioscopy, optic nerve head and retinal nerve fiber layer examination, and fundus examination [54]. The recommended frequency for screening was every 2–4 years for persons aged 40–54 years, every 1–3 years for persons aged 55–64 years, and every 1–2 years for persons aged ≥65 years. However, increased frequency of screening was recommended among those with risk factors for glaucoma. On the other hand, the USPSTF makes no recommendation to screen due to limited evidence on the advantages of screening [55]. The guideline specified that optical coherence tomography and HFA could be used to screen for glaucoma. Treatment may lead to lower mean IOP and decreased progression of glaucoma, but there was no evidence that it improved quality life and visual outcomes.

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4.7 Screening for age-related macular degeneration

RECOMMENDATIONS

7. **Among asymptomatic, apparently healthy adults aged >60 years with risk factors for age-related macular degeneration, we recommend screening using dilated fundoscopy or color fundus photography, or a referral to higher level of care every 1–3 years.**
   (strong recommendation, low certainty of evidence)

Justification and Considerations
Despite the low certainty evidence, the CP voted for a strong recommendation due to the benefits of early diagnosis and treatment of AMD on health outcomes. However, the Panel noted that there is a lack of trained specialists and of ophthalmoscopes in rural health centers. In such cases, referral to a provincial hospital with skilled personnel and specialists may be more feasible.

4.7.1 Key Findings

No direct evidence was found on the effectiveness of screening for AMD. Hence, evidence on the effectiveness of linked management for AMD (1 network meta-analysis of 92 RCTs) and on the diagnostic accuracy of screening tests (15 diagnostic accuracy studies) were sought.

Factors that increase the risk for progression of an eye to late AMD include increased age, smoking, family history of AMD, and the presence of characteristic macular lesions. Prediction models with these risk factors have found that a greater AUC was achieved in models that included characteristic macular lesions. However, indirect ophthalmoscopy or color fundus photography is needed to detect these macular lesions. The Amsler grid and the preferential hyperacuity perimeter were explored as alternatives, and both tools have shown high diagnostic accuracy in the detection of late AMD. Treatment such as antioxidants or intravitreal injections of anti-VEGF can be initiated to reduce progression to AMD and the likelihood of having poor visual outcomes. Earlier detection of late AMD was found to lead to better visual acuity outcomes.

4.7.2 Burden of Disease

AMD is a leading cause of severe, irreversible vision impairment in developed countries. Although an estimated 80% of AMD patients have atrophic AMD, the neovascular form with its natural history is responsible for nearly 90% of the severe visual acuity loss (20/200 or worse) from AMD. Pooled prevalence in Asian adults aged 45–85 years was 6.81% (95% CI 3.14, 13.94) for early AMD, 0.37% (95% CI 0.17, 0.85) for late AMD, and 7.38% (95% CI 3.40, 14.46) for any form of AMD [1]. The estimated 15-year incidence for early AMD is 22.7% and for advanced AMD is 6.8% among adults >49 years of age.

Early AMD typically presents without symptoms (Table 4.7.1). When visual changes occur, AMD may have progressed to the intermediate or late stage. Screening may be accomplished through an assessment of risk factors, but fundoscopy or color fundus photography are required to confirm a diagnosis. Other screening tools that may be used to assess for AMD

include the Amsler grid and the preferential hyperacuity perimeter. The Amsler grid is a simple tool to evaluate metamorphopsia. The preferential hyperacuity perimeter, on the other hand, is an instrument used in some programs for home monitoring of AMD.

Table 4.7.1. Clinical classification of age-related macular degeneration based on phenotypic characteristics

	Bird et al. 1995	**Wisconsin grading**	**AREDS**	**NICE 2018**
No abnormal findings	No aging changes • Absence of drusen • No pigmentary abnormalities Normal aging changes • Small drusen ≤63um • No pigmentary abnormalities	-	Grade 1 • No drusen or non-extensive small drusen	• No signs of AMD • Small drusen <63um only
Early AMD	• Medium sized drusen >63um and ≤125um • No pigmentary abnormalities	• Large (≥125 um) drusen • Retinal pseudodrusen • Pigmentary abnormalities	Grade 2 • Extensive small drusen • Non-extensive intermediate drusen • Pigment abnormalities in at least one eye	Low risk of progression • Medium drusen ≥63um or <125um • Pigmentary abnormalities Medium risk of progression • Large drusen ≥125um • Reticular drusen • Medium drusen with pigmentary abnormalities
Intermediate AMD	• Large drusen >125um • Pigmentary abnormalities	-	Grade 3 • Extensive intermediate drusen • Large drusen • Non-central geographic atrophy in at least one eye	High risk of progression • Large drusen ≥125um with pigmentary abnormalities • Reticular drusen with pigmentary abnormalities • Vitelliform lesion without significant visual loss (best corrected acuity better than 6/18) • Atrophy <175um and not involving the fovea
Late AMD	• Neovascular AMD • Any geographic atrophy	• Neovascular AMD • Geographic atrophy	Grade 4 • Geographic atrophy • Retinal PED • CNV in at least one eye	Indeterminate • RPE degeneration and dysfunction (presence of degenerative AMD changes with subretinal or intraretinal fluid in the absence of neovascularization) • Serous PED without neovascularization Wet active • Classic CNV • Occult CNV • Mixed CNV • Retinal angiomatous proliferation • Polypoidal choroidal vasculopathy Dry • Geographic atrophy in the absence of neovascular AMD • Significant visual loss (6/18 or worse) associated with dense confluent drusen, or advanced pigmentary changes and /or atrophy, or vitelliform lesion Wet inactive • Fibrous scar • Subfoveal atrophy or fibrosis secondary to an RPE tear • RPE atrophy • Cystic degeneration (persistent intraretinal fluid or tubulations unresponsive to treatment)

AMD *Age-Related Macular Degeneration*; AREDS *Age-Related Eye Disease Study*; CNV *Choroidal Neovascularization*; NICE *National Institute for Health and Care Excellence*; PED *Pigment Epithelial Detachment*; RPE *Retinal Pigment Epithelium*

Patients with early AMD are recommended to have a balanced and healthy diet and to discontinue smoking [2]. According to a CPG on AMD, there are evidence from prospective RCTs on the benefits of the following treatments for neovascular AMD: antioxidant vitamins and minerals (to slow down progression of AMD), intravitreal injection of anti-VEGF agents, photodynamic therapy, and laser photocoagulation [3].

4.7.3 Benefits and Harms of Screening

No direct evidence was found on the effects of screening or early detection for AMD. The evidence reviewed focused on risk factors associated with AMD, as well as the benefits and harms of linked management for AMD (i.e., antioxidant and mineral therapy, intravitreal anti-VEGF therapy).

The diagnosis of AMD is done clinically based on patient history and symptoms. There is strong evidence for risk factors for advanced AMD, such as increasing age (>60 years), family history of AMD or genetics, and smoking (Table 4.7.2) [4]. There is a higher likelihood for the progression to late AMD with increasing baseline age and with smoking [5]. The likelihood of having late AMD increases when there is a family history of the condition and with smoking [6]. There is also an increasing likelihood of having AMD depending on the presence of macular lesions, with more severe lesions having a greater likelihood [7]. However, it must be noted that diagnosing the type of AMD would not be made based on risk factors alone [8], and that dilated fundus examination could be used to confirm a diagnosis of AMD.

Table 4.7.2. Summary of risk factors for age-related macular degeneration

Risk Factor	Effect Estimate [95% CI]
Increasing baseline age	HR 1.09 [1.07, 1.10]
Smoking Former smoker Current smoker	 HR 1.32 [1.14, 1.54] HR 2.20 [1.65, 2.92] OR 3.58 [1.52, 2.09]
Family history of AMD	OR 6.18 [1.94, 6.61]
Macular lesions	HR 4.76 [2.48, 9.34] (SSS grade 1) HR 35.89 [19.75, 65.21] (SSS grade 4)

AMD *Age-Related Macular Degeneration*; CI *Confidence Interval*; HR *Hazard Ratio*; OR *Odds Ratio*; SSS *Single Severity Scale*

Earlier detection and earlier treatment of AMD has the benefit of better outcomes. In a study on treatment delays for AMD, patients with delayed treatment for neovascular AMD by ≥21 weeks had an increased likelihood of worsening vision even with intravitreal anti-VEGF treatment compared to a delay of ≤7 weeks [OR 2.62 (95% CI 1.20, 5.68)] [9].

Treatments using vitamin therapies can mitigate the projected increase in prevalence of AMD [10]. The intake of antioxidants with zinc reduced the likelihood of developing advanced AMD by 28% [OR 0.72 (95% CI 0.52, 0.98)] and of vision loss by ≥3 lines by 23% [OR 0.77 (95% CI 0.62, 0.96)] (Table 4.7.3) [11–13]. Beta-carotene potentially has increased risk of lung cancer in smokers and should be replaced by lutein and zeaxanthin [14].

A systematic review of practice guidelines for AMD strongly recommended intravitreal injection of anti-VEGF for the management of active neovascular AMD for patients with a visual acuity of 6/12 to 6/96 [15]. Anti-VEGF therapy was considered associated with improved vision-related quality of life compared to no treatment [16]. The use of bevacizumab was seen to have similar visual acuity outcomes compared to ranibizumab [17]. A separate meta-analysis showed small differences between anti-VEGF agents (conbercept, brolucizumab,

ranibizumab, aflibercept, and bevacizumab) in terms of vision gain of ≥15 ETDRS letters and vision loss of ≥15 ETDRS letters (Table 4.7.4) [18]. The anti-VEGF treatments all had significant odds of improving vision by ≥15 letters compared to placebo. For vision-related quality of life [measured by the National Eye Institute Visual Function Questionnaire (NEI-VFQ)], a review compared aflibercept and ranibizumab and showed equivalent outcomes [MD -0.39 (95% CI -1.71, 0.93)], averaging an increase in score by five points [19]. The recommended dosing regimen is to use the treat and extend method. A 2014 systematic review and meta-analysis of randomized trials found no relationship with mortality, but a possible relationship between more intensive treatment with ranibizumab and risk of systemic vascular events [20].

Table 4.7.3. Summary of findings on treatment for late age-related macular degeneration with antioxidant multivitamins and mineral supplements (vs. placebo or no treatment)

Outcome (Duration of follow-up)	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation	Certainty of Evidence
Progression to late AMD[a] (avg. 6 years)	3 RCTs (n=2,445)	OR 0.72 [0.58, 0.90]	Benefit	Moderate
Progression to neovascular AMD (avg. 6 years)	1 RCT (n=1,206)	OR 0.62 [0.47, 0.82]	Benefit	Moderate
Progression to geographic atrophy (avg. 6 years)	1 RCT (n=1,206)	OR 0.75 [0.51, 1.10]	Inconclusive	Moderate
Progression to vision loss[b] (avg. 6 years)	1 RCT (n=1,791)	OR 0.77 [0.62, 0.96]	Benefit	Moderate
Quality of life[c] (2 years)	1 RCT (n=110)	Control group: MD -8.7 Intervention group: MD 12.3 [4.24, 20.36]	Benefit	Low
Adverse events	-	Antioxidant arms reported yellow skin (8.3% vs. 6.0%, p=0.008) HR (mortality) 0.87 [0.60, 1.25]	No SAEs associated with multivitamin use	Very low

AMD *Age-Related Macular Degeneration*; CI *Confidence Interval*; HR *Hazard Ratio*; MD *Mean Difference*; OR *Odds Ratio*; RCT *Randomized Controlled Trial*; SAE *Serious Adverse Event*
[a] includes neovascular AMD, geographic atrophy or both
[b] loss of ≥3 lines on logMAR chart
[c] change in NEI-VFQ score (higher score=better function)

Table 4.7.4. Summary of findings on treatment for late age-related macular degeneration with anti-VEGF

Drug	No. of Studies (No. of Participants)	OR [95% CI]	Interpretation	Certainty of Evidence
Gain ≥15 ETDRS letters (vs. placebo)				
Aflibercept	34 RCTs (n=8,809)	8.47 [4.72, 15.77]	Benefit	Moderate
Ranibizumab	34 RCTs (n=8,809)	9.18 [5.22, 16.71]	Benefit	Moderate
Bevacizumab	34 RCTs (n=8,809)	8.08 [4.35, 15.25]	Benefit	Moderate
Adverse events (vs. placebo)				
Aflibercept	15 RCTs (n=5,785)	1.32 [0.78, 2.33]	Similar to placebo, trend towards harm	Moderate
Ranibizumab	15 RCTs (n=5,785)	1.61 [0.92, 2.88]	Similar to placebo, trend towards harm	Moderate
Bevacizumab	15 RCTs (n=5,785)	1.45 [0.66, 3.05]	Similar to placebo, trend towards harm	Moderate

CI *Confidence Interval*; OR *Odds Ratio*; RCT *Randomized Controlled Trial*

The overall certainty of evidence on treatment effects was downgraded to moderate due to

risk of bias concerns as to randomization and concealment methods.

4.7.4 Diagnostic Performance of Screening Tests

Prediction models have been developed based on known risk factors for AMD. Models for late AMD that use demographic (age and gender) and environmental (smoking, BMI, level of education) data as predictors have a diagnostic accuracy ranging AUC 0.62–0.67 [21]. When phenotypic or fundus lesions were included, the diagnostic accuracy of the model increased to AUC 0.89–0.90, highlighting the importance of the dilated fundus examination.

Diagnostic accuracy studies found that the Amsler grid has a pooled sensitivity of 78% (95% CI 64, 87) and a pooled specificity of 97% (95% CI 91, 99) in detecting AMD (Table 4.7.5) [22]. The preferential hyperacuity perimeter has a similarly high diagnostic accuracy with a pooled sensitivity of 85% (95% CI 80, 89) and a pooled specificity of 87% (95% CI 82, 91). However, the authors encourage caution in the interpretation of these estimates given the case-control nature of the study design. The cases included were patients with neovascular AMD and excluded earlier stages of AMD.

Table 4.7.5. Summary of findings on the diagnostic performance of tools for detecting neovascular age-related macular degeneration

Instrument/Test	No. of Studies (No. of Participants)	Sn [95% CI]	Sp [95% CI]	Certainty of Evidence
Amsler grid	7 CC (n=891)	78% [64, 87]	97% [91, 99]	Low
Preferential hyperacuity perimeter	7 CC (n=836)	85% [80, 89]	87% [82, 91]	Low

CC *Case-Control Study*; CI *Confidence Interval*; Sn *Sensitivity*; Sp *Specificity*

Fundoscopy or color fundus photography are used in the diagnosis of the type of AMD [8]. There is potential in the use of artificial intelligence algorithms in screening programs using digital fundus images given its high diagnostic accuracy in detecting intermediate or late AMD, otherwise referred to as referable AMD [Sn 88.0% (95% CI 88, 88); Sp 90.0% (95% CI 90, 91); AUC 0.983 (95% CI 0.979, 0.987); DOR 275.27 (95% CI 158.43, 478.27)] [23].

Certainty of evidence for diagnostic tools for detecting neovascular AMD was downgraded to low due to heterogeneity of included studies and indirectness to the target population.

4.7.5 Cost Implication

No local and international cost-effectiveness studies were found on screening and linked management for AMD. The following items may be involved in the processes of screening and of treatment for AMD and their respective estimated costs are noted in Table 4.7.6.

Table 4.7.6. Costs associated with age-related macular degeneration screening and linked management

Item	Cost
Ophthalmologist consult	PHP 500.00–1,500.00
Amsler grid (production / printing cost)	Minimal
Preferential hyperacuity perimetry	PHP 1.1 million (USD 19,800.00)
Color fundus photograph	PHP 900.00–1,300.00
AREDS multivitamins (per month)	PHP 1,800.00
Anti-VEGF injection (per month)	PHP 5,000.00 + PHP 35,000.00–45,000.00 (medicines)

AREDS *Age-Related Eye Disease Study*; PHP *Philippine Peso*; USD *United States Dollar*; VEGF *Vascular Endothelial Growth Factor*

4.7.6 Equity, Acceptability, and Feasibility

In a cohort of individuals >40 years of age with normal vision at baseline and underwent eye screening after 5 years, 2.39% were identified to have developed vision loss of <6/12. The main causes were from cataract, and none were identified due to AMD though some individuals reported family history of AMD [24].

AMD has been found to negatively impact quality of life and visual disability based on a systematic review of patient-reported and performance-based outcome measures impacted by AMD [25]. The condition affects activities of daily living including mobility, driving, face recognition, scene perception and computer use. Vision-specific quality of life, as measured using the NEI-VFQ, showed that there was significant decrease in visual function over a 5-year period in patients initially with early AMD that progressed to late AMD [MD -13.3 (95% CI -15.8, -10.9), p<0.001], as well as those with late AMD that further progressed [MD -16.2 (95% CI -18.6, -13.9), p<0.001] [26]. A review of qualitative studies on macular degeneration also noted the emotional impact of the disease with associated risk for depression [27]. Though with the introduction of anti-VEGF therapies, the impact of AMD may be less severe.

4.7.7 Recommendations from Other Groups

The WHO [28] and the CTFPHC [29] recommend screening for visual impairment or other vision disorders among apparently healthy individuals aged ≥60 years and aged ≥19 years, respectively. According to the 2017 guideline by the WHO, the Snellen chart may be used to detect visual impairment; other tools for screening, aside from visual acuity testing and torchlight external examination, include direct ophthalmoscopy and fundus photography if available. However, the CTFPHC does not recommend vision screening among adults aged ≥65 years due to low-quality evidence on improvement of vision and quality of life.

The AAO [3], the Philippine Academy of Ophthalmology [30], Optometry Australia [31] and the NICE [8] recommend conducting a comprehensive eye examination among individuals with signs and symptoms of AMD. NICE specified the use of the slit lamp biomicroscopic fundus examination for confirming the diagnosis of early AMD.

Optometry Australia [31] and the CTFPHC [29] recommend a risk-based approach to determine the need and the frequency of assessment for AMD, respectively. Optometry Australia specified considering the following risk factors when determining the need for assessment: aged >60 years, family history of AMD, smoking, hypertension, and cardiovascular disease. According to the CTFPHC, a comprehensive eye examination between 1–3 years beginning 40 years of age should be conducted for high-risk patients for visual impairment.

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30. VitreoRetina Society of the Philippines. AGE RELATED MACULAR DEGENERATION (AMD) PREFERRED PRACTICE PATTERNS (PPP) Philippines: 2016. 2016.
31. Hart K, Ayton L, Abbott C, Kalff S, Lek JJ, Ly A, et al. Clinical Practice Guide for the diagnosis, treatment and management of Age-Related Macular Degeneration. 2019.

5. Research Implications/Gaps

There was limited evidence on the benefits and harms of screening compared to no screening for the vision-related disorders included in this guideline. A common limitation of the included evidence was indirectness. For some questions, although evidence on screening was included, the screening strategy was non-specific to the vision-related disorder of concern. Most of the included studies were also conducted among non-Filipino populations who may have a different level of risk for vision-related disorders.

More studies could also investigate the resources required and cost-effectiveness of a screening or early detection program, patient values and preferences, and the acceptability, feasibility, and equity of screening and early detection among the selected vision disorders. Most of the included studies were conducted among European or American countries, whose situations may vastly differ from the local context.

6. Dissemination and Implementation

6.1 Dissemination

A full copy of this CPG will be sent to DOH for transmittal and publication. The Disease Prevention and Control Bureau will transmit copies to PhilHealth, health maintenance organizations and non-government organizations involved in a periodic health examination.

The CPG recommendations will be incorporated in a web-based and mobile application that is accessible to the public through https://phex.ph. DOH plans to develop a simplified version of this CPG and to make it available in a format that will be ready for reproduction and dissemination to doctors, other healthcare workers, and patients in different healthcare settings. It will also be available electronically for interested parties who might visit the DOH website. Different medical societies and other stakeholders may also include the guidelines in their own websites and discuss the recommendations during medical conventions and other educational activities.

6.2 Implementation and Monitoring

The Task Force Steering Committee will develop a program of monitoring to determine the best practices of relevant stakeholders in terms of screening for vision disorders and impairments. Monitoring the use of this CPG on at least an annual basis may also be a subject of research by interested parties.

These recommendations will be incorporated into an online application that can be accessed by primary care providers and patients along with other PHEX guidelines. For any individual person, after provision of basic demographic data, the application will enumerate the screening tests that should be done. The use of the app can also serve as documentation of the uptake of the CPG. Other data that could be used to assess usage of the guideline include monitoring of reimbursements for screening once these have been included in PhilHealth packages.

7. Applicability Issues

7.1 Organizational Considerations to Implementation

Comprehensive history taking, physical examination, and monitoring are essential parts of evaluating risk factors and the probability of developing diseases. This CPG does not necessarily supersede the consumers' (i.e., health professionals, hospital administrators, employers, payors, patients) values, settings, and circumstances. Although this CPG intends to influence the direction of health policies for the general population, it should not be the sole basis for recreating or abolishing practices that aim to improve the health conditions of many Filipinos, particularly those who are part of the workforce.

7.2 Resource Implications

Some of the screening/early detection tests specified in this guideline could be performed by primary care practitioners using readily available or reproducible resources, but training is needed to ensure that these tools will be correctly used to yield accurate and precise results. Other tests will require the expertise of a specialist at a higher level of care and the use of equipment that may not be available at the health center.

8. Updating of the Guidelines

The recommendations of this CPG shall hold until such time that new evidence on screening strategies or diagnostic tests for vision disorders compel the updating of this CPG. The Vision Disorders Task Force intends to review this CPG no later than 2026.

9. Appendices

Appendix 9.1: PERIODIC HEALTH EXAMINATION TASK FORCE ON VISION DISORDERS 2022-2023

Steering Committee:	Carlos Garcia Naval, MD (chair) Shelley Ann M. Mangahas, MD (co-chair) Alex Bienvenido J. Alip, Jr., MD Ma. Olive P. Lazo, MD Chandru P. Pessumal, O.D.
Consensus Panel:	Beltran Alexis Aclan, MD, MHCM Christine Anne Corazon Arreola-Lamorena, MD Catherine Guzman-Asio, MD Rommel Hernandez, MD, CFP, MHA Nancy Ilagan Regino Mallari, RN, LPT Marvin Masalunga, MD, MPM Andrea Kristina Pajarillo, MD Anna Maria Roqueza Winona Sevilla-Pasimio, PhD Neal Vicente Torres, MD
Evidence Review Experts:	James Paul Gomez, MD Kenneth Brian Lim, MD Kristine Marie Lim, RN Josemaria Lopez, MD Ma. Rosario Jacinta Lopez Carol Tan-Lim, MD
Technical Coordinator:	Aldous De Leon, MD
Technical Facilitator:	Sandra Torres, MD
Technical Writer:	Joy Gillera Isabel Teresa Salido
Administrative Officers:	Noleen Marie Fabian

Appendix 9.2: PERIODIC HEALTH EXAMINATION PHASE 3 CENTRAL COMMITTEE

Program Leader:	Ian Theodore Cabaluna, MD, GDip, MSc (cand.)
Co-Program Leaders:	Leonila Dans, MD, MSc Marissa Alejandria, MD, MSc
Steering Committee Members:	Dr. Antonio Dans, MD, MSc Dr. Dante Morales, MD Dr. Diana Lachica, MD Dr. Aileen Espina, MD Maria Vanessa Sulit, RN, MSc
COI Committee Members:	Dante Morales, MD Antonio Dans, MD, MSc Maria Vanessa Sulit, RN, MSc Angela Du, MD Camilo Te, MD Miriam Timonera, MD
Program Managers:	Josephine Sanchez, RN
Assistant Program Manager:	Lea Galia, MD
Administrative Staff:	Pamela Tagle Lailanie Tejuco Michelle Recana
COI Administrative Officer:	Ivy Cruz

Appendix 9.3: SUMMARY OF COI DECLARATIONS

Name	Affiliation	Summary of Declared COIs	Management
Steering Committee			
Carlos Garcia Naval, MD	Philippine Society for Cataract and Refractive Surgery	Financial COI	The COIC recommended that a co-chair be appointed to co-manage the group
Shelley Ann M. Mangahas, MD	Tarlac Provincial Hospital	Non-financial COI	To declare: consultant in Fred Hollow Foundation (an NGO)
Alex J. Bienvenido Alip, Jr., MD	Centro Escolar University	None	-
Ma. Olive P. Lazo, MD	Ateneo School of Medicine and Public Health	None	-
Chandru P. Pessumal, O.D.	De Ocampo Memorial College	Financial COI	The COIC recommended the following to have Dr. Pessumal continue to be part of the SC: • Make sure that the majority of SC members are unconflicted vs. the conflicted in the SC • Ask the SC member to recuse himself during decisions involving the identified potential COI
Name	**Expertise**	**Summary of Declared COIs**	**Management**
Consensus Panel			
Beltran Alexis Aclan, MD, MHCM	• Pediatric ophthalmology • Healthcare management	Financial COI	Cannot vote on questions pertaining to uveitis and glaucoma; may share opinion with the group
Christine Anne Corazon Arreola-Lamorena, MD	• Family medicine • Health services administration	Financial COI	Cannot vote on all questions; may share opinion with the group
Catherine Guzman-Asio, MD	Ophthalmology	Financial COI	Cannot vote on all questions; may share opinion with the group
Rommel Hernandez, MD, CFP, MHA	• Family medicine • Hospital administration • Occupational medicine	None	-
Nancy Ilagan	Social welfare	Non-financial COI	To declare: • Social welfare officer • Community eye health officer • Provincial eye health officer

Regino Mallari, RN, LPT	• Public health • Nursing	Non-financial COI	To declare: • Public health nurse Tarlac city health office • Community eye health officer • Provincial eye health officer • Involved in provincial eye health program (glaucoma, diabetic retinopathy)
Marvin Masalunga, MD, MPM	• Pathology • Public management in health systems and development	None	-
Andrea Kristina Pajarillo, MD	• Pediatric ophthalmology • Health policy	Financial COI	Cannot vote on all questions; may share opinion with the group
Anna Maria Roqueza	• Management • Patient advocate	None	-
Winona Sevilla-Pasimio, PhD	• Economics • Patient advocate	None	-
Neal Vicente Torres, MD	Ophthalmology	None	-
Name	Affiliation	Summary of Declared COIs	Management
Evidence Review Experts			
James Paul Gomez, MD	Asian Eye Institute	None	-
Kenneth Brian Lim, MD	Philippine Medical Association	None	-
Kristine Marie Lim, RN	-	None	-
Josemaria Lopez, MD	-	None	-
Ma. Rosario Jacinta Lopez	National Institutes of Health, Institute on Aging	None	-
Carol Tan-Lim, MD	University of the Philippines Department of Clinical Epidemiology	None	-
Technical Coordinator			
Aldous De Leon	Philippine General Hospital	Non-financial COI	To declare: regular guesting at radio programs; gives advise to diabetics to go for diabetic retinopathy screening
Technical Facilitator			
Sandra Torres	Cardinal Santos Medical Center	None	-
Technical Writer			
Joy Gillera	-	None	-
Isabel Teresa Salido	University of the Philippines Manila	None	-
Administrative Officer			
Noleen Marie Fabian	University of the Philippines Diliman	None	-

Appendix 9.4: SEARCH STRATEGY

Screening for amblyopia

DATABASE	SEARCH STRATEGY / SEARCH TERMS	DATE AND TIME OF SEARCH	RESULTS	
			Yield	Eligible
Medline	{"Amblyopia"[Mesh] OR amblyopia OR “lazy eye”} AND (screen*{Title/abstract}) Filters: June 7, 2017 to March 17, 2023	Mar 17, 2023 10:00PM	283	3
CENTRAL	{MeSH descriptor: [Amblyopia] explode all trees OR amblyopia} AND screening Filters: June 7, 2017 to March 17, 2023	Mar 17, 2023 10:00PM	20	0
Clinical Trials.gov	Amblyopia and screen Filters:children	Mar 17, 2023 10:00PM	10	1

Screening for ocular pathology

DATABASE	SEARCH STRATEGY / SEARCH TERMS	RESULTS	
		Yield	Eligible
PubMed	Search Terms: “Red Reflex Test”, “Bruckner”, “screening” Limits: reviews, systematic reviews, meta-analysis, English	20	10
Cochrane Library	Search Terms: “Red Reflex Test”, “Bruckner”	131	1

Screening for strabismus

DATABASE	SEARCH STRATEGY / SEARCH TERMS	DATE OF SEARCH	RESULTS	
			Yield	Eligible
Pubmed	Hirschberg reflex test	Nov 22, 2022	0	0
	Hirschberg test		1	0
	Corneal reflex test		24	1
	"Strabismus"[Mesh] AND "Exotropia"[Mesh] AND “Esotropia"[Mesh] Filter Systematic review		3	2
	Strabismus		52	2
	Strabismus screening	Nov 24, 2022	97	9
	Strabismus treatment	Nov 25, 2022	138	5
	exotropia	Dec 5, 2022	25	1
	esotropia		19	0
Cochrane	Hirschberg reflex	Nov 23, 2022	3	0
	Hirschberg Test		6	1
	Strabismus test		5	1
	Strabismus		15	4
	Cornea reflex test		53	0
HERDIN	Strabismus, Exotropia and Esotropia Filter 2015-2022	Dec 5, 2022	0	0
USPSTF	Published recommendation	Dec 2, 2022	104	
NICE	Strabismus and eye	Dec 2, 2022	3 292	0 1
CTFPHC	guidelines	Dec 2, 2022	-	0
AOA	Clinical practice guideline strabismus	Nov 29, 2022	-	1*

DATABASE	SEARCH STRATEGY / SEARCH TERMS	DATE OF SEARCH	RESULTS	
			Yield	Eligible
AAO	Clinical practice guideline strabismus	Nov 29, 2022	-	1*

Screening for refractive errors among children

DATABASE	SEARCH STRATEGY / SEARCH TERMS	DATE AND TIME OF SEARCH	RESULTS	
			Yield	Eligible
USPSTF	vision disorder AND screening AND children Category: Vision and Hearing Disorders Age Group: Pediatric	Oct 25, 2022 8:00PM	3	0
NICE	vision disorders AND screening AND children Filter: Guidance	Oct 25, 2022 8:05PM	12	0
CTFPHC	vision disorder AND children	Oct 25, 2022 8:10PM	3	0
AAO	guidelines Filter guideline	Oct 25, 2022 8:15PM	24	0
COS	clincial practice guideline	Oct 25, 2022 8:30PM	1	0
Pubmed	((("Mass Screening"[Mesh]) AND (("Child"[Mesh] OR "Child, Preschool"[Mesh] OR "Infant"[Mesh] OR "Infant, Newborn"[Mesh])) AND ((("Eye Diseases"[Mesh]) OR ("Eye"[Mesh])) OR ("Vision Disorders"[Mesh]))) AND ("Practice Guidelines as Topic"[Mesh]) Filter: from 2012 to 2022	Oct 25, 2022 8:40PM	62	
	(("Child"[Mesh] OR "Child, Preschool"[Mesh] OR "Infant"[Mesh] OR "Infant, Newborn"[Mesh] OR "Adolescent"[Mesh])) AND ((((("Refractive Errors"[Mesh]) OR ("Astigmatism"[Mesh])) OR ("Hyperopia"[Mesh])) OR ("Myopia"[Mesh]))) AND ("Mass Screening"[Mesh]) Filter: in the last 5 years	Nov 24, 2022 9:30PM	126	
	(("Child"[MeSH Terms] OR "child, preschool"[MeSH Terms] OR "Infant"[MeSH Terms] OR "infant, newborn"[MeSH Terms] OR "Adolescent"[MeSH Terms]) AND ("Refractive Errors"[MeSH Terms] OR "Astigmatism"[MeSH Terms] OR "Hyperopia"[MeSH Terms] OR "Myopia"[MeSH Terms])) AND (meta-analysis[Filter])	Nov 24, 2022 9:33PM	74	
	"Refractive Errors"[Mesh] Filter Meta-Analysis, Systematic Review, Humans, English, Child: birth-18 years, from 2015 - 2022	Nov 27, 2022 8:30PM	71	
Cochrane	(MeSH [Infant] OR MeSH [Child, Preschool] OR MeSH [Child] OR MeSH [Adolescent]) AND (MeSH [Mass Screening]) AND (MeSH [Refractive Errors]))	Oct 25, 2022 8:50PM	31	

Screening for refractive errors among adults

DATABASE	SEARCH STRATEGY / SEARCH TERMS	DATE OF SEARCH	RESULTS	
			Yield	Eligible
USPSTF	error of refraction	Nov 20, 2022	8	1
NICE	error of refraction	Nov 20, 2022	6	0
CTFPHC	vision	Nov 20, 2022	1	1

DATABASE	SEARCH STRATEGY / SEARCH TERMS	DATE OF SEARCH	RESULTS	
			Yield	Eligible
	all published and archived guidelines	Nov 20, 2022	23	0
PubMed	(PUBMED: Search using (guideline [Publication Type] OR practice guideline [Publication Type] or recommendation*[Title] OR standard* [Title] OR standard* [Title] OR guideline* [Title])) AND "Refractive Errors"[Mesh]	Nov 20, 2022	1	0
	"Refractive Errors"[Mesh] Date of Publications: January 1, 2015 onward	Nov 21, 2022	9,661	search narrowed (see below)
	"Refractive Errors"[Mesh] Date of Publications: January 1, 2015 onward Language: English		9,122	search narrowed (see below)
	"Refractive Errors"[Mesh] Date of Publications: January 1, 2015 onward Language: English Article Type: Meta-Analysis		175	2
	"Refractive Errors"[Mesh] Filters applied: Systematic Review, English, Adult: 19+ years, from 2015/1/1 - 2022/11/21		21	0
	"Refractive Errors"[Mesh] Filters applied: Meta-Analysis, English, Adult: 19+ years, from 2015/1/1 - 2022/11/21		30	0
	"Refractive Errors" [Mesh] 2015-2022 Article Type: Randomized Control Trials Language: English Age: Adult 19+ years	Nov 28, 2022	249	0
	("Refractive Errors"[Mesh]) AND (Diagnosis/Broad[filter])	Dec 12, 2022	10377	search narrowed
	("Refractive Errors"[Mesh]) AND (Diagnosis/Narrow[filter])		330	search narrowed
	("Refractive Errors"[Mesh]) AND (Diagnosis/Narrow[filter]) Filters applied: English, Adult: 19+ years.		61	6
	Pinhole test Language: English Age: Adult +19	Jan 6, 2022	54	1
	effectiveness of prescription lenses for error of refraction Filters applied: English, Adult: 19+ years	Jan 9, 2023	29	1
	((((("Refractive Errors"[Mesh]) AND ("Mass Screening"[Mesh]) OR "Vision Screening"[Mesh]) OR "Multiphasic Screening"[Mesh]) OR "Diagnostic Screening Programs"[Mesh])		3,798	
	((((("Refractive Errors"[Mesh]) AND ("Mass Screening"[Mesh]) OR "Vision Screening"[Mesh]) OR "Multiphasic Screening"[Mesh]) OR "Diagnostic Screening Programs"[Mesh]) FIlter: 2015 onward		805	

DATABASE	SEARCH STRATEGY / SEARCH TERMS	DATE OF SEARCH	RESULTS	
			Yield	Eligible
	""((((""Refractive Errors""[Mesh]) AND (""Mass Screening""[Mesh]) OR ""Vision Screening""[Mesh]) OR ""Multiphasic Screening""[Mesh]) OR ""Diagnostic Screening Programs""[Mesh]) FIlter: 2015 onward" English, Adult: 19+ years		258	27
AAO	All publications under category "Preferred Practice Patterns (Guidelines, Summary Benchmarks)	Nov 20, 2022	32	3
AAOpt	No Relevant Publications (Only lectures and presentations)	Nov 20, 2022		
AOA	No publications	Nov 20, 2022		
Guidelines International Network	All guidelines in the English language, published in 2015 or later, related to any of the following categories: (1) Diagnosis, Treatment (2) Diagnosis, Treatment and Prevention (3) Diagnostics (4) Diagnosis (5) Screening (6) Screening Diagnosis	Nov 20, 2022	17	0
Cochrane	All systematic reviews published 2015 onward, under the category of "Diagnosis"	Nov 20, 2022	176	0 relevant hits (4 articles on ophthalmologic conditions, none on errors of refraction)
	All systematic reviews published 2015 onward Review Type: "Intervention"		4317	search narrowed, see next
	All systematic reviews published 2015 onward Review Type: "Intervention" Topics: "Eyes & vision"		181	1
	All systematic reviews published 2015 onward Topics: "Eyes & vision"		184	1

Screening for cataract

DATABASE	SEARCH STRATEGY / SEARCH TERMS	DATE AND TIME OF SEARCH	RESULTS	
			Yield	Eligible
Medline	(("cataract"[MeSH Terms] OR "cataract"[All Fields] OR "cataracts"[All Fields] OR "cataractic"[All Fields] OR "cataractous"[All Fields]) AND ("diagnosis"[MeSH Subheading] OR "diagnosis"[All Fields] OR "screening"[All Fields] OR "mass screening"[MeSH Terms] OR ("mass"[All Fields] AND "screening"[All Fields]) OR "mass screening"[All Fields] OR "early detection of cancer"[MeSH Terms] OR ("early"[All Fields] AND "detection"[All Fields] AND "cancer"[All Fields]) OR "early detection of cancer"[All Fields] OR "screen"[All Fields] OR	Feb 1, 2023 17:30H	637	3

DATABASE	SEARCH STRATEGY / SEARCH TERMS	DATE AND TIME OF SEARCH	RESULTS	
			Yield	Eligible
	"screenings"[All Fields] OR "screened"[All Fields] OR "screens"[All Fields])) AND (meta-analysis[Filter] OR randomizedcontrolledtrial[Filter] OR systematicreview[Filter])			
	("cataract"[MeSH Terms] OR "cataract"[All Fields] OR "cataracts"[All Fields] OR "cataractic"[All Fields] OR "cataractous"[All Fields]) AND "specificity"[Title/Abstract]	Feb 01, 2023 18:00H	386	3
	(("adult"[MeSH Terms] OR "adult"[All Fields] OR "adults"[All Fields] OR "adult s"[All Fields]) AND ("cataract"[MeSH Terms] OR "cataract"[All Fields] OR "cataracts"[All Fields] OR "cataractic"[All Fields] OR "cataractous"[All Fields]) AND ("randomized controlled trial"[Publication Type] OR ("randomized"[Title/Abstract] AND "controlled"[Title/Abstract] AND "trial"[Title/Abstract]))) AND (meta-analysis[Filter] OR systematicreview[Filter])	Feb 01, 2023 21:00H	351	0
	(("cataract"[MeSH Terms] OR "cataract"[All Fields] OR "cataracts"[All Fields] OR "cataractic"[All Fields] OR "cataractous"[All Fields]) AND ("accidental falls"[MeSH Terms] OR ("accidental"[All Fields] AND "falls"[All Fields]) OR "accidental falls"[All Fields] OR "falling"[All Fields] OR "falls"[All Fields] OR "fallings"[All Fields])) AND (meta-analysis[Filter] OR systematicreview[Filter])	Feb 02, 2023 13:30H	17	4
	(("cataract"[MeSH Terms] OR "cataract"[All Fields] OR "cataracts"[All Fields] OR "cataractic"[All Fields] OR "cataractous"[All Fields]) AND ("economics"[MeSH Subheading] OR "economics"[All Fields] OR "cost"[All Fields] OR "costs and cost analysis"[MeSH Terms] OR ("costs"[All Fields] AND "cost"[All Fields] AND "analysis"[All Fields]) OR "costs and cost analysis"[All Fields])) AND (meta-analysis[Filter] OR systematicreview[Filter])	Feb 02, 2023 13:30H	78	5
	(("cataract"[MeSH Terms] OR "cataract"[All Fields] OR "cataracts"[All Fields] OR "cataractic"[All Fields] OR "cataractous"[All Fields]) AND ("quality of life"[MeSH Terms] OR ("quality"[All Fields] AND "life"[All Fields]) OR "quality of life"[All Fields])) AND (meta-analysis[Filter] OR systematicreview[Filter])	Feb 02, 2023 13:30H	102	4
	("cataract"[MeSH Terms] OR "cataract"[All Fields] OR "cataracts"[All Fields] OR "cataractic"[All Fields] OR "cataractous"[All Fields]) AND ("activities of daily living"[MeSH Terms] OR ("activities"[All Fields] AND "daily"[All Fields] AND "living"[All Fields]) OR "activities of daily living"[All Fields] OR ("activity"[All Fields] AND "daily"[All Fields] AND "living"[All Fields]) OR "activity of daily living"[All Fields])	Feb 02, 2023 13:30H	300	5
Cochrane	Cataract screening in Title Abstract Keyword		24	0
AAO	Cataract/Anterior Segment in Preferred Practice Guidelines (PPP) subcategory		12	1
NICE	Cataract in Guidance		49	0
USPSTF	Cataract		133	1
CTFPHC	Cataract		0	0

Screening for glaucoma

DATABASE	SEARCH STRATEGY / SEARCH TERMS	DATE OF SEARCH	RESULTS	
			Yield	Eligible
Medline	(("glaucoma"[MeSH Terms] OR "glaucoma"[All Fields] OR "glaucomas"[All Fields] OR "glaucoma s"[All Fields]) AND ("diagnosis"[MeSH Subheading] OR "diagnosis"[All Fields] OR "screening"[All Fields] OR "mass screening"[MeSH Terms] OR ("mass"[All Fields] AND "screening"[All Fields]) OR "mass screening"[All Fields] OR "early detection of cancer"[MeSH Terms] OR ("early"[All Fields] AND "detection"[All Fields] AND "cancer"[All Fields]) OR "early detection of cancer"[All Fields] OR "screen"[All Fields] OR "screenings"[All Fields] OR "screened"[All Fields] OR "screens"[All Fields])) AND (meta-analysis[Filter] OR systematicreview[Filter])	Jan 5, 2023	229	3
	(("glaucoma"[MeSH Terms] OR "glaucoma"[All Fields] OR "glaucomas"[All Fields] OR "glaucoma s"[All Fields]) AND ("risk factors"[MeSH Terms] OR ("risk"[All Fields] AND "factors"[All Fields]) OR "risk factors"[All Fields])) AND (meta-analysis[Filter] OR systematicreview[Filter])	May 27, 2023	143	5
	(("glaucoma"[MeSH Terms] OR "glaucoma"[All Fields] OR "glaucomas"[All Fields] OR "glaucoma s"[All Fields]) AND ("diagnosable"[All Fields] OR "diagnosi"[All Fields] OR "diagnosis"[MeSH Terms] OR "diagnosis"[All Fields] OR "diagnose"[All Fields] OR "diagnosed"[All Fields] OR "diagnoses"[All Fields] OR "diagnosing"[All Fields] OR "diagnosis"[MeSH Subheading])) AND ((meta-analysis[Filter] OR systematicreview[Filter])	Jan 7, 2023	379	15
	("glaucoma"[MeSH Terms] OR "glaucoma"[All Fields] OR "glaucomas"[All Fields] OR "glaucoma s"[All Fields]) AND ("therapeutics"[MeSH Terms] OR "therapeutics"[All Fields] OR "treatments"[All Fields] OR "therapy"[MeSH Subheading] OR "therapy"[All Fields] OR "treatment"[All Fields] OR "treatment s"[All Fields])) AND (meta-analysis[Filter] OR systematicreview[Filter])	Jan 7, 2023	477	23
	(("glaucoma"[MeSH Terms] OR "glaucoma"[All Fields] OR "glaucomas"[All Fields] OR "glaucoma s"[All Fields]) AND ("economics"[MeSH Subheading] OR "economics"[All Fields] OR "cost"[All Fields] OR "costs and cost analysis"[MeSH Terms] OR ("costs"[All Fields] AND "cost"[All Fields] AND "analysis"[All Fields]) OR "costs and cost analysis"[All Fields])) AND ((meta-analysis[Filter] OR systematicreview[Filter])	Jan 8, 2023	55	1
Cochrane	glaucoma in Title Abstract Keyword	Jan 7, 2023	55	2
CENTRAL	MeSH descriptor: [Coronaviridae Infections] explode all trees OR MeSH descriptor: [Coronavirus] explode all trees OR coronavirus OR novel coronavirus OR NCOV OR covid19 OR covid 19 OR covid-19 OR severe acute respiratory syndrome coronavirus 2 OR SARS2 OR SARS 2 OR SARS COV2 OR SARS COV 2 OR SARS-COV-2} AND (colchicine OR MeSH descriptor: [Colchicine] explode all trees Filters: March 26, 2021 to August 28, 2021	Jan 10, 2023	21	0
AAO	Glaucoma	Jan 7, 2023	185	1
NICE	Glaucoma	Jan 7, 2023	67	0
USPSTF	Glaucoma	Jan 7, 2023	1	1
CTFPHC	Glaucoma	Jan 7, 2023	9	0

Screening for age-related macular degeneration

DATABASE	SEARCH STRATEGY / SEARCH TERMS	RESULTS	
		Yield	Eligible
PubMed	Search Terms: “Macular degeneration”, “screening” Limits: reviews, systematic reviews, meta-analysis, English, 2015 onwards	879	51
Cochrane Library	Search Terms: “Macular degeneration”	29	4

Appendix 9.5: IMPLEMENTATION TOOLS

Red Reflex Test

- Conduct the test in a darkened room. Switch off the lights, draw the curtains or ask the parents and child to accompany you into a room which does not have a window.
- Use a direct ophthalmoscope with the lens power set at ‘0’. Make sure the batteries are charged.
- Sit about half a meter (50 cm) away. Hold the ophthalmoscope close to your eyes.
- Encourage the child to look at the light source and direct the light at the child's eyes individually and together. You should see an equal and bright red reflex from each pupil.
- Pay attention to the color and brightness of the red reflex. It should be identical in both eyes. Any difference between the eyes, an absence of the red reflex or an abnormal color may indicate a serious illness.

Source: How to test for the red reflex in a child. Community Eye Health [Internet]. 2014;27(86):36. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4194850/

Hirschberg Test

- Use a light source, such as a penlight or finhoff transilluminator.
- Instruct the patient to focus their gaze on your light source.
- From a distance of 2 feet, shine your light source equally into the patient’s eyes at midline.
- Observe the reflection of light off the cornea, which should appear as a pin-point white light near the center of the pupil in each eye.

Source: Moran CORE | Alignment Assessment (Hirschberg) [Internet]. Available from: https://morancore.utah.edu/basic-ophthalmology-review/alignment-assessment-hirschberg/

Pinhole Test

- Clean and dry the pinhole occluder.
- Ask the patient to cover one eye with the occluder and position the pinhole so they can see through it.
- Test one eye at a time by following the same procedure used to test visual acuity.

Source: Hennelly ML. How to detect myopia in the eye clinic. Community Eye Health [Internet]. 2019;32(105):15–6. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6688402/

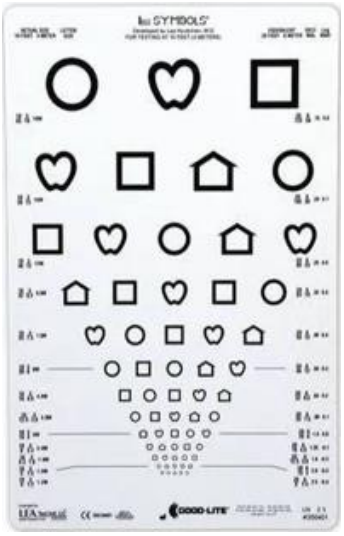
Visual Acuity Testing

- Use a Snellen chart, placed 6 metres (20 feet) away from the person.
- For younger children or those who cannot read, use a tumbling E or a tumbling C chart and ask them to point in the direction of the opening in each letter.
- Ensure there is good natural light or illumination on the chart, as Snellen charts are designed to test central vision at high contrast.1
- Explain the procedure to the person.
- Position the person, sitting or standing, at a distance of 6 metres (20 feet) from the chart.
- Clean and dry the occluder. If no plain occluder is available, use clean card or a tissue. Ask the patient to cover one eye but not to press on it.
- Test one eye at a time. Starting from the top of the chart, ask the person to read the letters (Snellen chart) or point in the direction of the open end of the letter (tumbling E or C chart). Position the chart at 3 metres (10 feet) if the person's vision is less than 6/60 and record as 3 metres instead of 6 (e.g. 3/60).
- Record the visual acuity (written as a fraction next to the smallest line the person can read). For example, if the person cannot read the bottom row (visual acuity of 6/6) but can read the next row of letters (6/9) then their visual acuity is 6/9.
- If the patient cannot see the letters on the 6/6 line, they may have a refractive error, such as myopia.

Source: Hennelly ML. How to detect myopia in the eye clinic. Community Eye Health [Internet]. 2019;32(105):15–6. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6688402/

Visual Acuity Charts

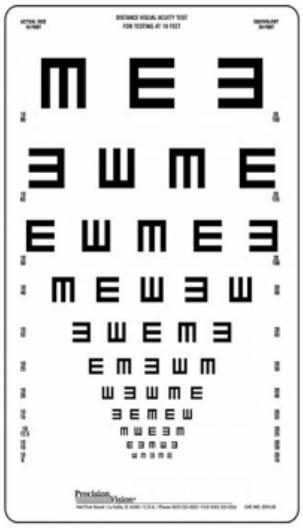
LEA chart



HOTV chart

Snellen chart

E chart



logMAR chart

Appendix 9.6: AGREE REPORTING CHECKLIST (SELF EVALUATION)

CHECKLIST ITEM AND DESCRIPTION	REPORTING CRITERIA	Page #
DOMAIN 1: SCOPE AND PURPOSE		
1. OBJECTIVES *Report the overall objective(s) of the guideline. The expected health benefits from the guideline are to be specific to the clinical problem or health topic.*	☒ Health intent(s) (i.e., prevention, screening, diagnosis, treatment, etc.) ☒ Expected benefit(s) or outcome(s) ☒ Target(s) (e.g., patient population, society)	11
2. QUESTIONS *Report the health question(s) covered by the guideline, particularly for the key recommendations.*	☒ Target population ☒ Intervention(s) or exposure(s) ☐ Comparisons (if appropriate) ☐ Outcome(s) ☐ Health care setting or context	12
3. POPULATION *Describe the population (i.e., patients, public, etc.) to whom the guideline is meant to apply.*	☒ Target population, sex and age ☐ Clinical condition (if relevant) ☒ Severity/stage of disease (if relevant) ☐ Comorbidities (if relevant) ☐ Excluded populations (if relevant)	11
DOMAIN 2: STAKEHOLDER INVOLVEMENT		
4. GROUP MEMBERSHIP *Report all individuals who were involved in the development process. This may include members of the steering group, the research team involved in selecting and reviewing/rating the evidence and individuals involved in formulating the final recommendations.*	☒ Name of participant ☐ Discipline/content expertise (e.g., neurosurgeon, methodologist) ☒ Institution (e.g., St. Peter's hospital) ☐ Geographical location (e.g., Seattle, WA) ☒ A description of the member's role in the guideline development group	78-79
5. TARGET POPULATION PREFERENCES AND VIEWS *Report how the views and preferences of the target population were sought/considered and what the resulting outcomes were.*	☒ Statement of type of strategy used to capture patients'/publics' views and preferences (e.g., participation in the guideline development group, literature review of values and preferences) ☒ Methods by which preferences and views were sought (e.g., evidence from literature, surveys, focus groups) ☐ Outcomes/information gathered on patient/public information ☒ How the information gathered was used to inform the guideline development process and/or formation of the recommendations	16

CHECKLIST ITEM AND DESCRIPTION	REPORTING CRITERIA	Page #
6. TARGET USERS *Report the target (or intended) users of the guideline.*	☒ The intended guideline audience (e.g. specialists, family physicians, patients, clinical or institutional leaders/administrators) ☒ How the guideline may be used by its target audience (e.g., to inform clinical decisions, to inform policy, to inform standards of care)	11
DOMAIN 3: RIGOUR OF DEVELOPMENT		
7. SEARCH METHODS *Report details of the strategy used to search for evidence.*	☒ Named electronic database(s) or evidence source(s) where the search was performed (e.g., MEDLINE, EMBASE, PsychINFO, CINAHL) ☒ Time periods searched (e.g., January 1, 2004 to March 31, 2008) ☒ Search terms used (e.g., text words, indexing terms, subheadings) ☒ Full search strategy included (e.g., possibly located in appendix)	14, 80-86
8. EVIDENCE SELECTION CRITERIA *Report the criteria used to select (i.e., include and exclude) the evidence. Provide rationale, where appropriate.*	☐ Target population (patient, public, etc.) characteristics ☒ Study design ☒ Comparisons (if relevant) ☒ Outcomes ☐ Language (if relevant) ☐ Context (if relevant)	14-15
9. STRENGTHS & LIMITATIONS OF THE EVIDENCE *Describe the strengths and limitations of the evidence. Consider from the perspective of the individual studies and the body of evidence aggregated across all the studies. Tools exist that can facilitate the reporting of this concept.*	☒ Study design(s) included in body of evidence ☒ Study methodology limitations (sampling, blinding, allocation concealment, analytical methods) ☒ Appropriateness/relevance of primary and secondary outcomes considered ☒ Consistency of results across studies ☒ Direction of results across studies ☒ Magnitude of benefit versus magnitude of harm ☒ Applicability to practice context	18-71

CHECKLIST ITEM AND DESCRIPTION	REPORTING CRITERIA	Page #
10. FORMULATION OF RECOMMENDATIONS *Describe the methods used to formulate the recommendations and how final decisions were reached. Specify any areas of disagreement and the methods used to resolve them.*	☒ Recommendation development process (e.g., steps used in modified Delphi technique, voting procedures that were considered) ☒ Outcomes of the recommendation development process (e.g., extent to which consensus was reached using modified Delphi technique, outcome of voting procedures) ☒ How the process influenced the recommendations (e.g., results of Delphi technique influence final recommendation, alignment with recommendations and the final vote)	15-16
11. CONSIDERATION OF BENEFITS AND HARMS *Report the health benefits, side effects, and risks that were considered when formulating the recommendations.*	☒ Supporting data and report of benefits ☒ Supporting data and report of harms/side effects/risks ☒ Reporting of the balance/trade-off between benefits and harms/side effects/risks ☒ Recommendations reflect considerations of both benefits and harms/side effects/risks	18-71
12. LINK BETWEEN RECOMMENDATIONS AND EVIDENCE *Describe the explicit link between the recommendations and the evidence on which they are based.*	☒ How the guideline development group linked and used the evidence to inform recommendations ☒ Link between each recommendation and key evidence (text description and/or reference list) ☒ Link between recommendations and evidence summaries and/or evidence tables in the results section of the guideline	18-71
13. EXTERNAL REVIEW *Report the methodology used to conduct the external review.*	☒ Purpose and intent of the external review (e.g., to improve quality, gather feedback on draft recommendations, assess applicability and feasibility, disseminate evidence) ☒ Methods taken to undertake the external review (e.g., rating scale, open-ended questions) ☒ Description of the external reviewers (e.g., number, type of reviewers, affiliations) ☒ Outcomes/information gathered from the external review (e.g., summary of key findings) ☐ How the information gathered was used to inform the guideline development process and/or formation of the recommendations (e.g., guideline panel considered results of review in forming final recommendations)	17

CHECKLIST ITEM AND DESCRIPTION	REPORTING CRITERIA	Page #
14. UPDATING PROCEDURE *Describe the procedure for updating the guideline.*	☒ A statement that the guideline will be updated ☒ Explicit time interval or explicit criteria to guide decisions about when an update will occur ☐ Methodology for the updating procedure	75
DOMAIN 4: CLARITY OF PRESENTATION		
15. SPECIFIC AND UNAMBIGUOUS RECOMMENDATIONS *Describe which options are appropriate in which situations and in which population groups, as informed by the body of evidence.*	☒ A statement of the recommended action ☒ Intent or purpose of the recommended action (e.g., to improve quality of life, to decrease side effects) ☒ Relevant population (e.g., patients, public) ☒ Caveats or qualifying statements, if relevant (e.g., patients or conditions for whom the recommendations would not apply) ☒ If there is uncertainty about the best care option(s), the uncertainty should be stated in the guideline	18, 23, 30, 36, 51, 57, 64
16. MANAGEMENT OPTIONS *Describe the different options for managing the condition or health issue.*	☒ Description of management options ☐ Population or clinical situation most appropriate to each option	18, 23, 31, 37-38, 44, 51, 58, 64-66
17. IDENTIFIABLE KEY RECOMMENDATIONS *Present the key recommendations so that they are easy to identify.*	☒ Recommendations in a summarized box, typed in bold, underlined, or presented as flow charts or algorithms ☒ Specific recommendations grouped together in one section	8-9, 18, 23, 30, 36, 51, 57, 64
DOMAIN 5: APPLICABILITY		
18. FACILITATORS AND BARRIERS TO APPLICATION *Describe the facilitators and barriers to the guideline's application.*	☒ Types of facilitators and barriers that were considered ☒ Methods by which information regarding the facilitators and barriers to implementing recommendations were sought (e.g., feedback from key stakeholders, pilot testing of guidelines before widespread implementation) ☒ Information/description of the types of facilitators and barriers that emerged from the inquiry (e.g., practitioners have the skills to deliver the recommended care, sufficient equipment is not available to ensure all eligible members of the population receive mammography) ☒ How the information influenced the guideline development process and/or formation of the recommendations	18, 23, 30, 36, 43, 51, 57, 64

CHECKLIST ITEM AND DESCRIPTION	REPORTING CRITERIA	Page #
19. IMPLEMENTATION ADVICE/TOOLS *Provide advice and/or tools on how the recommendations can be applied in practice.*	☒ Additional materials to support the implementation of the guideline in practice. For example: ○ Guideline summary documents ○ Links to check lists, algorithms ○ Links to how-to manuals ○ Solutions linked to barrier analysis (see Item 18) ○ Tools to capitalize on guideline facilitators (see Item 18) ○ Outcome of pilot test and lessons learned	87-89
20. RESOURCE IMPLICATIONS *Describe any potential resource implications of applying the recommendations.*	☒ Types of cost information that were considered (e.g., economic evaluations, drug acquisition costs) ☒ Methods by which the cost information was sought (e.g., a health economist was part of the guideline development panel, use of health technology assessments for specific drugs, etc.) ☒ Information/description of the cost information that emerged from the inquiry (e.g., specific drug acquisition costs per treatment course) ☒ How the information gathered was used to inform the guideline development process and/or formation of the recommendations	20, 26-27, 33, 40-42, 46, 53-54, 59-60, 68, 74
21. MONITORING/ AUDITING CRITERIA *Provide monitoring and/or auditing criteria to measure the application of guideline recommendations.*	☒ Criteria to assess guideline implementation or adherence to recommendations ☒ Criteria for assessing impact of implementing the recommendations ☒ Advice on the frequency and interval of measurement ☐ Operational definitions of how the criteria should be measured	73
DOMAIN 6: EDITORIAL INDEPENDENCE		
22. FUNDING BODY *Report the funding body's influence on the content of the guideline.*	☒ The name of the funding body or source of funding (or explicit statement of no funding) ☒ A statement that the funding body did not influence the content of the guideline	3
23. COMPETING INTERESTS *Provide an explicit statement that all group members have declared whether they have any competing interests.*	☒ Types of competing interests considered ☒ Methods by which potential competing interests were sought ☒ A description of the competing interests ☒ How the competing interests influenced the guideline process and development of recommendations	13-14, 78-79