

OPTOMETRIC CLINICAL PRACTICE GUIDELINE

Comprehensive Adult Eye and Vision Examination



OPTOMETRY: THE PRIMARY EYE CARE PROFESSION

Doctors of optometry are independent primary health care providers who examine, diagnose, treat, and manage diseases and disorders of the visual system, the eye, and associated structures as well as diagnose related systemic conditions.

Optometrists provide more than two-thirds of the primary eye care services in the United States. They are more widely distributed geographically than other eye care providers and are readily accessible for the delivery of eye and vision care services. There are approximately 32,000 full-time equivalent doctors of optometry currently in practice in the United States. Optometrists practice in more than 7,000 communities across the United States, serving as the sole primary eye care provider in more than 4,300 communities.

The mission of the profession of optometry is to fulfill the vision and eye care needs of the public through clinical care, research, and education, all of which enhance the quality of life.



**OPTOMETRIC CLINICAL PRACTICE GUIDELINE
COMPREHENSIVE ADULT EYE AND VISION EXAMINATION**

**Reference Guide for Clinicians
Second Edition 2005**

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Approved by the AOA Board of Trustees May 1, 1994 (1st Edition),
Revised 1997, 2002, and April 28, 2005 (2nd Edition)

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243 N. Lindbergh Blvd., St. Louis, MO 63141-7881

Printed in U.S.A.

NOTE: Clinicians should not rely on the Clinical
Guideline alone for patient care and management.
Refer to the listed references and other sources
for a more detailed analysis and discussion of
research and patient care information. The
information in the Guideline is current as of the
date of publication. It will be reviewed periodically
and revised as needed.

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INTRODUCTION

Doctors of optometry, through their clinical education, training, experience, and broad geographic distribution, have the knowledge, skills, and accessibility to provide effective primary eye and vision care services to adult patients in the United States. Primary care has been defined as “coordinated, comprehensive, and personal care, available on both a first-contact and a continuous basis.”¹ Primary care is comprised of several essential components, including diagnosis and treatment; assessment and management; personal support; and, patient counseling and education about disease conditions, disease prevention, and health maintenance.^{1,2} Eye and vision care serves as an important point of entry into the health care system because:³

- Virtually all people need eye and vision care services at some time in their lives.
- By its very nature, eye and vision care provides for the evaluation, assessment, management, and coordination of a broad spectrum of health care needs.
- Eye and vision care is a non-threatening form of health care, particularly to patients who are reluctant to seek general or preventive medical care.

This Optometric Clinical Practice Guideline for the Comprehensive Adult Eye and Vision Examination describes appropriate examination procedures for evaluation of the eye health and vision status of adult patients to reduce the risk of vision loss and provide clear, comfortable vision. It contains recommendations for timely diagnosis, intervention, and, when necessary, referral for consultation with or treatment by another health care provider. This Guideline will assist doctors of optometry in achieving the following goals:

- Develop an appropriate timetable for eye and vision examinations for adult patients
- Select appropriate examination procedures for adult patients
- Effectively examine the eye health and vision status of adult patients

- Minimize or avoid the adverse effects of eye and vision problems in adult patients through early identification, education, and prevention
- Inform and educate patients and other health care practitioners about the need for and frequency of comprehensive adult eye and vision examinations.

I. STATEMENT OF THE PROBLEM

Of all the sensory information relayed to the brain, four-fifths is visual in origin.⁴ Eye and vision disorders have broad implications in health care because of their potential for causing disability, suffering, and loss of productivity. Early detection and treatment of eye and vision disorders are essential to maintain full functional ability. Appropriate diagnosis and management of eye and vision disorders minimize the damage and consequent disabilities that may result from their neglect.⁵

Eye and vision disorders have an impact on the quality of life, particularly as a person ages, and the need for eye and vision care services becomes greater.^{6,7,8,9} The stages of adulthood span a wide range of activities in which good visual function and eye health are of great value and importance¹⁰ in education and career preparation, the establishment of home and family, productive employment, volunteer activities, a wide range of recreational interests, and retirement. Normal age-related changes in visual function and ocular tissues, and increases in the prevalence and incidence of ocular and systemic disease with age, combine to make comprehensive eye and vision care services particularly important for the older adult.^{11,12}

A. Epidemiology of Eye and Vision Disorders in Adults

The prevalence of common eye and vision conditions underscores the importance of regular eye and vision care. Conservative estimates suggest that 55 percent of the U.S. population wears corrective lenses; of these approximately 10 percent wear contact lenses.¹³ Estimated prevalence rates for two common refractive errors are 25 percent for myopia and 53-63 percent for astigmatism.^{14,15} Presbyopia, the natural age-related loss of eye focusing ability, usually begins between ages 38 and 45 and the prevalence is virtually 100 percent by ages 50-52 years.¹⁶ Age-related changes in the prevalence of refractive errors have been documented, including an increase in hyperopia and a decrease in myopia. The Blue Mountains Eye Study noted that the prevalence of hyperopia increased from 36 percent in persons <60 years of age to 71 percent of persons 80 years of age, and the prevalence of myopia decreased from 21 percent in persons <60 years of age to 10 percent of

persons ≥ 80 years of age.¹⁷ As adults age, visual change due to refractive error is one of the most frequent reasons for consultation with an eye care practitioner and uncorrected refractive error is the most common cause of reduced vision.^{17,18}

Cataract development is a normal consequence of aging and a significant cause of vision loss in the United States. Approximately one in every six people in the United States age 40 and older have developed cataracts, nearly 20.5 million individuals; by age 80, more than half are affected.¹⁹ As a result of the aging of the U.S. population, the total number of adults with cataract is expected to increase to 30.1 million by the year 2020.²⁰

More than 2.2 million, or 1.9 percent of Americans age 40 and over have glaucoma, an estimated 1.9 percent of this patient population group.²¹ The risk of developing glaucoma increases significantly with age. As a result of the rapidly aging population in the U.S., the number of individuals with open-angle glaucoma is predicted to increase by 50 percent to 3.36 million people by the year 2020.²² Unfortunately, approximately half of all patients with glaucoma do not know they have it and will likely suffer unnecessary vision loss.^{23,24} Since glaucoma in its most common form seldom causes symptoms until the disease has progressed substantially, patients are generally unaware that they have glaucoma until it is diagnosed in the course of a comprehensive eye and vision examination.

Over 5.3 million Americans age 18 and older have diabetic retinopathy, an estimated 2.5 percent of this population group.²⁶ Over the age of 40, approximately 4.1 million U.S. adults (3.4 percent) have diabetic retinopathy.²⁵ However, about half of adults whose diabetes puts them at risk are not receiving timely and recommended eye care to detect, diagnose, and treat diabetic retinopathy.²⁷ Early diagnosis of diabetic retinopathy coupled with annual dilated eye examinations will identify patients at high risk and who will benefit most from intensified therapy, both ocular and systemic.²⁸

Age-related macular degeneration (AMD) is a leading cause of severe vision loss in older adults. Among the U.S. population age 40 years and older, 1.75 million individuals (1.47 percent) are estimated to have

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AMD.²⁹ This number is expected to nearly double to almost 3 million individuals by the year 2020.²⁹

The aging of the U.S. population is such that by the year 2020 one in four Americans will be at least 65 years of age.³⁰ The visual function, eye health, and systemic health care needs of this older adult population, including the increased prevalence of visual impairment with increasing age, further emphasize the importance of comprehensive adult eye and vision care services.³¹

The visual demands of the workplace also contribute to the need for regular eye care. The most frequent health complaints among workers who use computers are vision related. Studies indicate that visual symptoms occur in 50-90 percent of computer users.^{32,33,34,35} A survey of optometrists³⁶ estimated that approximately 10 million primary eye care examinations are provided annually, primarily because of vision problems experienced by individuals who use computers. Other workers whose jobs involve extensive near viewing tasks also experience similar problems.

B. The Comprehensive Adult Eye and Vision Examination

The comprehensive adult eye and vision examination provides the means to evaluate the function and health of the eyes and visual system and to obtain information to diagnose the cause of signs noted by the examiner or symptoms reported by the patient. It also provides the means to identify the presence of other ocular or systemic conditions that may exist without symptoms. The examination is a dynamic and interactive process. It involves collecting subjective data directly from the patient and obtaining objective data by observation, examination, and testing³⁷ (See Appendix Figure 1).

The nature of the eye and vision system is such that many conditions can produce the same or similar symptoms. For example, blurred vision can result from many causes, including uncorrected refractive errors, systemic conditions such as diabetes mellitus or hypertension, and sight- or life-threatening conditions such as eye or brain tumors.

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In addition, potentially blinding conditions such as glaucoma or diabetic retinopathy may cause no symptoms until they are far advanced and the ocular damage is irreparable.

The goals of the comprehensive adult eye and vision examination are to:

- Evaluate the functional status of the eyes and visual system, taking into account special vision demands and needs
- Assess ocular health and related systemic health conditions
- Establish a diagnosis (or diagnoses)
- Formulate a treatment and management plan
- Counsel and educate the patient regarding his or her visual, ocular, and related systemic health care status, including recommendations for treatment, management, and future care.

II. CARE PROCESS

A. Examination of Adult Patients

1. General Considerations

This Guideline describes the optometric examination for patients 18 years of age or older. The individual components are described in general terms because the order and methods of testing vary from practitioner to practitioner and change as new technology is developed and is made available in the clinical setting.

The examination components described are not intended to be all-inclusive. Professional judgment and individual patient symptoms and findings may significantly influence the nature and course of the examination.³⁸ The examination process may also vary from that delineated in this Guideline according to patient cooperation and comprehension and the examination setting. For example, professional judgment may dictate modification of the examination for the developmentally delayed or infirm adult or for the adult in an institutional setting such as an extended care facility.^{39,40,41,42} Some components of the examination may be delegated.

2. Early Detection and Prevention

Periodic comprehensive examinations by doctors of optometry are an important part of preventive health care, providing early detection of eye health and visual performance problems, as well as prevention of visual loss in certain eye conditions. Many eye and vision disorders create no obvious symptoms; therefore, individuals are often unaware that problems exist. Early detection, diagnosis, and treatment are important for maintaining clear, comfortable vision and good ocular health and, when possible, preventing permanent vision loss. One study estimated that approximately 92,700 new cases of blindness each year would have been curable or preventable through timely detection and treatment.⁴³

3. Examination Sequence

The comprehensive adult eye and vision examination may include, but is not limited to, the following procedures (See Appendix Figure 2).

a. Patient History

The patient history is the initial component of the examination. The objective is to obtain specific information about the patient's perception of his/her eye and vision status and important background information on related medical issues. It helps to identify and assess problem areas, and it provides the doctor of optometry an opportunity to become acquainted with the patient, establishing a relationship of confidence and trust.^{44,45} The collection of demographic data generally precedes the taking of the patient history. Major components of the patient history include:^{46,47}

- Nature of the presenting problem, including chief complaint
- Visual and ocular history
- General health history, which may include a social history and review of systems
- Medication usage, including prescription and nonprescription drugs; use of mineral, herbal, and vitamin supplements; documentation of medication allergies; and utilization of other complementary and alternative medicines
- Family eye and medical histories
- Vocational and avocational vision requirements
- Identity of patient's other health care providers.

b. Visual Acuity

Visual acuity, measured with and without the patient's most recent spectacle or contact lens correction, includes:

- Distance visual acuity (DVA)
- Near visual acuity (NVA)
- Acuity at identified vocational or avocational working distances.

c. Preliminary Testing

The preliminary testing component of the examination includes tests to initially define the patient's visual function, ocular health, and related systemic health status.^{48,49,50} The testing procedures, instrumentation utilized, and order of test performance vary; however, the following areas may be assessed when appropriate:

- General observation of the patient (e.g., overall patient appearance, mobility, demeanor)
- Observation of external ocular and facial areas
- Pupil size and pupillary responses
- Versions and ductions
- Near point of convergence (NPC)
- Cover test
- Stereopsis
- Color vision.

d. Refraction

The analysis of refractive error incorporates objective and subjective assessment of the patient's refractive correction needs. The goal is to determine the lens correction needed to provide optimal visual acuity for all viewing distances.^{51,52} During this component of the examination, the refractive error is determined and the patient's need for a specific reading or other nearpoint prescription is assessed, particularly if the patient is presbyopic.⁵³ The refractive analysis may include:^{54,55,56,57,58,59,60}

- Measurement of the patient's most recent optical correction
- Measurement of the anterior corneal curvature (e.g., keratometry, corneal topography)
- Objective measurement of refractive status
- Subjective measurement of monocular and binocular refractive status at distance and near or at other specific working distances.

e. Ocular Motility, Binocular Vision, and Accommodation

Depending on the patient's age, visual signs and symptoms, and preliminary test results, appropriate tests of ocular motility, binocular visual function at distance and near, and accommodation are incorporated into the examination.^{61,62} The interrelationship of these functional aspects of vision is especially critical for clear, comfortable vision for reading and other close work. Procedures may be used to assess:

- Ocular motility
- Vergence amplitude and facility
- Suppression
- Ocular alignment, including fixation disparity and associated phoria
- Accommodative amplitude, response, and facility
- Negative relative accommodation (NRA) and positive relative accommodation (PRA).

f. Ocular Health Assessment and Systemic Health Screening

Thorough assessment of the health of the eyes and associated structures is an important and integral component of the comprehensive adult eye and vision examination. The eyes and associated structures are not only sites for primary ocular diseases, but they are also subject to systemic disease processes that affect the body as a whole (secondary ocular diseases, e.g., disorders of neurologic, vascular, endocrine, immune, or neoplastic origin).⁶³ This portion of the examination contributes to the diagnosis of diseases and disorders that have ocular manifestations and helps determine the impact of any systemic diseases on the eye and associated structures. It also includes assessment of the potential for ocular complications of medications used by the patient.

Pharmacologic dilation of the pupil is generally required for thorough stereoscopic evaluation of the ocular media; posterior segment, including the macula and optic nerve; and the peripheral retina.^{64,65,66} The results of the initial dilated ocular fundus examination (DFE) may indicate the appropriate timing for subsequent pupillary dilation.^{67,68,69,70} The health

of the anterior structures of the eye and the intraocular pressure level are typically assessed prior to pupillary dilation. However, dilation may facilitate examination of anterior segment structures when certain conditions are present or suspected. Other procedures and technologies that do not require dilation may be used to supplement the findings of a DFE.

The components of ocular health assessment and systemic health screening may include:^{71,72,73}

- Evaluation of the ocular anterior segment and adnexa
- Measurement of the intraocular pressure (IOP)
- Evaluation of the ocular media
- Evaluation of the ocular posterior segment
- Visual field screening (confrontation, or other method, as appropriate)
- Systemic health screening tests (e.g., blood pressure measurement, carotid artery assessment, blood glucose level screening, cranial nerve assessment).

g. Supplemental Testing

During the eye and vision examination, the doctor of optometry continually assesses information obtained from the patient along with the clinical examination findings gathered. The interpretation of subjective and objective data may indicate the need for additional testing, either performed or ordered by the optometrist. Supplemental procedures may be performed immediately or during subsequent examinations (e.g., pachymetry, threshold visual field testing). There are several reasons for performing additional procedures. Supplement or clarify existing data when indicated to:

- Confirm or rule out differential diagnoses
- Enable more in-depth assessment
- Provide alternative means of evaluating patients who may not be fully cooperative or who may not comprehend testing procedures.

h. Assessment and Diagnosis

At the completion of the examination, the doctor of optometry assesses and evaluates the data to establish a diagnosis (or diagnoses) and formulate a treatment and management plan. In some cases, referral for consultation with or treatment by another doctor of optometry, the patient's primary care physician, or another health care provider may be indicated.

B. Management of Adults

1. Patient Education

Communication with the patient at the conclusion of the comprehensive adult eye and vision examination should include review and discussion of examination findings and anticipated outcomes based upon the recommended courses of action.^{74,75} Patient counseling and education may include:

- Review of the patient's visual and ocular health status in relation to his/her visual symptoms and complaints
- Discussion of refractive correction that provides improved visual efficiency and appropriate eye protection
- Explanation of available treatment options, including risks, benefits, and expected outcomes
- Recommendation of a course of treatment with the reasons for its selection and the prognosis
- Discussion of the importance of patient compliance with the treatment prescribed
- Recommendation for follow-up care and re-examination.

Patients who have undergone surgical or laser procedures for error reduction need to be counseled regarding their ongoing need for periodic comprehensive eye and vision examinations. Procedures to correct refractive error do not reduce the risk of the development of refractive error related complications (e.g., retinal detachment, glaucoma) or other eye problems.

2. Coordination, Frequency, and Extent of Care

The diagnosis of a wide array of eye and vision anomalies, diseases, disorders, and related systemic conditions may result from a comprehensive adult eye and vision examination. As a primary care provider, the doctor of optometry can treat or manage most of these eye and vision problems. Additionally, they may coordinate care of the patient with other health care providers for certain ocular and nonocular problems detected and diagnosed during the examination.

The nature and severity of the problem(s) diagnosed determine the need for optical correction (e.g., spectacles or contact lenses); other treatment (e.g., low vision rehabilitation or vision therapy services); referral for consultation with or treatment by another doctor of optometry, the patient's primary care physician, or other health care provider; and follow-up evaluations. Data interpretation and the professional judgment of the optometrist contribute to decisions regarding appropriate treatment and management, including recommended follow-up examination intervals.

On the basis of the examination, the doctor of optometry may determine that the patient needs additional services. Intraprofessional consultation may be needed for optometric services such as treatment and management of ocular disease, low vision rehabilitation, vision therapy, and specialty contact lenses. Interprofessional consultation with an ophthalmologist may be needed for ophthalmic surgery or other aspects of secondary or tertiary eye care.

The comprehensive adult eye and vision examination may reveal nonophthalmic conditions for which the doctor of optometry may coordinate needed care.^{76,77,78,79,80} The patient may be referred to his or her primary care physician or another health care provider for further evaluation and treatment of systemic conditions or related health problems. Information shared with other health care providers offers a unique and important perspective resulting in improved interdisciplinary care of the patient.

Since the prevalence of ocular diseases and vision disorders tends to increase with patient age, the recommendations for patient re-examination are partially age dependent (Table 1). The increased and unique visual demands of a technological society bring about the need for regular optometric care during the adult years. Although the prevalence of ocular disease is relatively low for young adults, vocational and avocational visual demands are significant. Thus, for young adults to maintain visual efficiency and productivity, periodic examinations are recommended. For older adults in whom the prevalence of ocular disease is greater, the recommendation is for annual examinations.

Patients should be advised to seek eye and vision care more frequently than the recommended re-examination interval if new ocular, visual, or systemic health problems develop. In addition, the doctor of optometry may recommend more frequent re-examinations of certain patients at risk. Such patients include: those with diabetes, hypertension, a family history of ocular disease, or whose clinical findings increase their potential risk; those working in occupations that are highly demanding visually or are eye hazardous; those taking prescription or nonprescription drugs with ocular side effects; those wearing contact lenses; and those with other health concerns or conditions.

Table 1
Recommended Eye Examination Frequency for Adult Patients

Patient Age (Years)	Examination Interval	
	<u>Asymptomatic/ Risk Free</u>	<u>At Risk</u>
18 to 40	Every two years	Every one to two years or as recommended
41 to 60	Every two years	Every one to two years or as recommended
61 and older	Annually	Annually or as recommended

Patients at risk include those with diabetes, hypertension, a family history of ocular disease, or whose clinical findings increase their potential risk; those working in occupations that are highly demanding visually or are eye hazardous; those taking prescription or nonprescription drugs with ocular side effects; those wearing contact lenses; those who have had eye surgery; and those with other health concerns or conditions.

The American Optometric Association Optometric Clinical Practice Guideline, “Care of the Contact Lens Patient” describes appropriate timelines for contact lens Progress Evaluations.



CONCLUSION

The comprehensive adult eye and vision examination is an important component in the evaluation of a patient's overall health status. Its comprehensive nature enables assessment of the patient's eye, vision, and related health care needs. Given the prevalence of eye health and vision problems in adults, the importance of services provided during the comprehensive adult eye and vision examination should not be underestimated.

A primary expectation of patients presenting for an examination by an optometrist is to maintain or restore clear, comfortable vision and to maintain good eye health. However, important disease prevention and health promotion aspects are also provided to patients through regular comprehensive eye and vision examinations that relate not only to eye and vision care but to health care in general.^{81,82,83} As primary eye care providers, doctors of optometry have the expertise to examine, diagnose, treat, and manage a wide variety of eye and vision problems. For many patients requiring systemic or other related health care services, optometrists also serve as an important point of entry into the health care system.

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IV. APPENDIX

Figure 1
Comprehensive Adult Eye and Vision Examination:
A Brief Flowchart

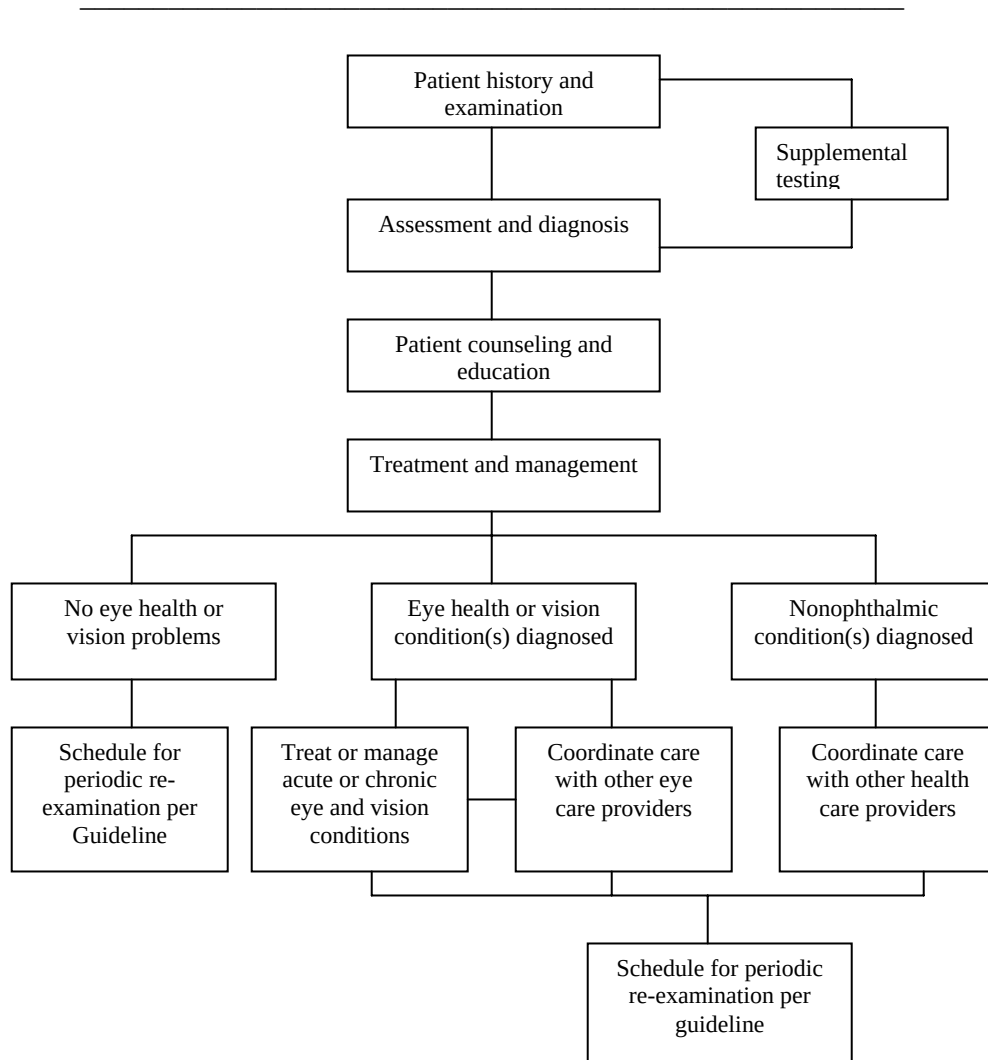


Figure 2
Potential Components of the Comprehensive Adult
Eye and Vision Examination

- A. Patient History
 1. Nature of presenting problem, including chief complaint
 2. Visual and ocular history
 3. General health history, which may include social history and review of systems
 4. Medication usage (including prescription and nonprescription drugs); mineral, herbal, and vitamin supplement usage; and, medication allergies
 5. Family eye and medical histories
 6. Vocational and avocational vision requirements
 7. Identity of patient's other health care providers
- B. Visual Acuity (VA)
 1. Distance visual acuity testing
 2. Near visual acuity testing
 3. Testing of acuity at identified vocational or avocational working distances
- C. Preliminary Testing
 1. General observation of patient
 2. Observation of external ocular and facial areas
 3. Pupil size and pupillary responses
 4. Versions and ductions
 5. Near point of convergence
 6. Cover test
 7. Stereopsis
 8. Color vision

D. Refraction

1. Measurement of patient's most recent optical correction
2. Measurement of anterior corneal curvature
3. Objective measurement of refractive status
4. Subjective measurement of monocular and binocular refractive status at distance and near or at other specific working distances

E. Ocular Motility, Binocular Vision, and Accommodation

1. Evaluation of ocular motility
2. Evaluation of vergence amplitude and facility
3. Assessment of suppression
4. Evaluation of ocular alignment, including fixation disparity and associated phoria
5. Assessment of accommodative amplitude, response, and facility
6. Assessment of relative accommodation

F. Ocular Health Assessment and Systemic Health Screening

1. Evaluation of the ocular anterior segment and adnexa
2. Measurement of intraocular pressure
3. Evaluation of the ocular media
4. Evaluation of the ocular posterior segment
5. Visual field screening
6. Systemic health screening tests

Figure 3
CPT-4 Coding of the Optometric Comprehensive Adult Eye and Vision Examination: Potential Coding Options

New Patient

(Combine Office Visit Code with Refraction Code):	Code
Comprehensive (full) Office Visit	92004
Refraction	92015

New Patient

(Combine Evaluation and Management Code with Refraction Code):	Code
Level 4	99204
Level 5	99205
Refraction	92015

Established Patient

(Combine Office Visit Code with Refraction Code):	Code
Comprehensive (full) Office Visit	92014
Refraction	92015

Established Patient

(Combine Evaluation and Management Code with Refraction Code):	Code
Level 4	99214
Level 5	99215
Refraction	92015

The appropriate ICD-9-CM (International Classification of Diseases, 9th rev. Clinical Modification) codes should be designated for each of the Office Visit elements.

Source: Clinical Procedural Terminology, 4th rev.

Abbreviations of Commonly Used Terms

AMD –	Age-related macular degeneration
DFE –	Dilated ocular fundus examination
DVA –	Distance visual acuity
IOP –	Intraocular pressure
NPC –	Near point of convergence
NRA –	Negative relative accommodation
NVA –	Near visual acuity
PRA –	Positive relative accommodation
VA –	Visual acuity

Glossary

Accommodation The ability of an eye to focus clearly on objects at various distances, or through various lens powers, resulting from changes in the shape of the crystalline lens.

Adnexa The accessory structures of the eye, including the eyelids, lacrimal apparatus, and the extraocular muscles.

Age-related macular degeneration (AMD) An acquired retinal disorder characterized by pigmentary atrophy and degeneration, drusen and lipofuscin deposits, and exudative elevation of the outer retinal complex in the macular area.

Anterior ocular segment The part of the eye including and anterior to the crystalline lens (i.e., cornea, anterior chamber, iris, ciliary body).

Astigmatism Refractive anomaly due to unequal refraction of light in different meridians of the eye, generally caused by a toroidal anterior surface of the cornea.

Cataract An opacity of the crystalline lens or its capsule.

Color vision The ability to perceive differences in color.

Contact lens A small, shell-like, bowl-shaped glass or plastic lens that rests directly on the eye, in contact with the cornea or the sclera or both, serving as a new anterior surface of the eye and/or as a retainer for fluid between the cornea and the contact lens, ordinarily to correct for refractive errors of the eyes.

Corneal curvature The shape of the front surface of the eye (cornea).

Cover test A clinical test to determine the alignment of the eyes, and measure the magnitude of the angle of deviation of the visual axes.

Diabetic retinopathy A disease of the retina associated with diabetes mellitus, characterized by microaneurysms, hemorrhages, exudates, and proliferative retinal changes.

Dilated ocular fundus examination (DFE) Thorough stereoscopic examination of the posterior ocular segment, including the macula and optic nerve, and the peripheral retina that is performed following pharmacologic dilation of the pupil.

Ductions Ability of the eyes to show a full range of motion under monocular (one eye) viewing conditions.

Fixation disparity Overconvergence, underconvergence, or vertical misalignment of the eyes under binocular viewing conditions with the magnitude of the vergence error being small enough to allow for fusion. Clinical measurement of fixation disparity is in minutes of arc.

Glaucoma A group of ocular diseases with various causes that ultimately are associated with a progressive optic neuropathy leading to a loss of visual function. Glaucoma is often associated with abnormally increased intraocular pressure.

Hyperopia (hypermetropia) The refractive condition in which parallel rays of light entering the eye, with accommodation relaxed, focus behind the retina. Hyperopia is the clinically preferred term rather than hypermetropia and also the lay term, farsightedness.

Intraocular pressure (IOP) The pressure within the eye relative to the constant formation and drainage of the aqueous humor.

Myopia Refractive condition in which parallel rays of light entering the nonaccommodated eye are focused in front of the retina; nearsightedness.

Near point (nearpoint) of convergence (NPC) The maximal extent the eyes can be converged, using tonic, accommodative, fusional, and proximal convergence.

Negative relative accommodation (NRA) A measure of the ability to relax accommodation while maintaining binocular vision at a fixed distance, usually 40 cm. Measurement is made with plus-lens additions until the patient reports the first sustained blurring of the target.

Ocular motility Clinically referring to saccadic and pursuit eye movements, including fixation maintenance, but not vergences.

Positive relative accommodation (PRA) A measure of the ability to stimulate accommodation

while maintaining binocular vision at a fixed distance, usually 40 cm. Measurement is made with

minus-lens additions until the patient reports the first sustained blurring of the target.

Posterior ocular segment The part of the eye located posterior to the crystalline lens (i.e., vitreous, choroid, retina, optic nerve).

Presbyopia A reduction in accommodative ability that occurs normally with aging and necessitates a plus-lens addition for satisfactory seeing at near.

Pupillary response The response of the pupils of the eyes to stimulation by light or accommodation.

Refraction Clinically, the determination of the refractive errors of an eye or eyes (e.g., myopia, hyperopia, astigmatism, anisometropia).

Refractive status (refractive error) The degree to which images received by the eyes are not focused on the retina (e.g., myopia, hyperopia, astigmatism).

Retinal detachment Separation of the sensory retina from underlying structures, resulting in potential loss of vision.

Stereopsis Binocular visual perception of three-dimensional space, based on retinal disparity. Clinically referred to as depth perception.

Suppression Under binocular viewing conditions, the inability to perceive all or part of objects in the field of vision of one eye, attributed to cortical inhibition.

Vergence Disjunctive movements of the eyes in which the visual axes move toward each other with convergence or away from each other with divergence.

Version Conjugate movement in which the two eyes move in the same direction.

Visual acuity The clearness of vision that depends upon the sharpness of the retinal image and the integrity of the retina and visual pathway. It is expressed as the angle subtended at the anterior focal point of the eye by the detail of the letter or symbol recognized.

Visual field The area or extent of space visible to an eye in a given position.

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