I. ACTION

- New Policy
- Revising Policy Number CMS02.16
- Superseding Policy Number
- Archiving Policy Number
- Retiring Policy Number

II. POLICY DISCLAIMER

Johns Hopkins HealthCare LLC (JHHC) provides a full spectrum of health care products and services for Employer Health Programs, Priority Partners, Advantage MD and US Family Health Plan. Each line of business possesses its own unique contract and guidelines which, for benefit and payment purposes, should be consulted to know what benefits are available for reimbursement.

Specific contract benefits, guidelines or policies supersede the information outlined in this policy.

III. POLICY

For Advantage MD, see Medicare Coverage Database:

- Local Coverage Determination (LCD) for L35091, Cataract Extraction (Including Complex Cataract Surgery)
- National Coverage Determination (NCD) for Intraocular Lenses (IOLs) (80.12)
- National Coverage Determination (NCD) for Refractive Keratoplasty (80.7)

Keywords: Keratoprosthesis (Artificial Cornea), Collagen Cross-Linking for Keratoconus, Cornea, Endothelial Keratoplasty, Phototherapeutic Keratectomy, Refractive Surgery
This policy will focus on the following corneal procedures:

Post-Cataract Post-Transplant Corneal Surgery

Phototherapeutic Keratectomy

Refractive Surgery

Keratoprosthesis (Artificial Cornea)

Endothelial Keratoplasty

Collagen Cross-Linking for Keratoconus

**IV. POLICY CRITERIA**

**A. Post-Cataract Post-Transplant Corneal Surgery**

1. When benefits are provided under the member’s contract, JHHC considers post-cataract post-transplant corneal surgery such as corneal relaxing incision (including limbal relaxing incisions) or corneal wedge resection medically necessary when ALL of the following criteria are met:
   a. Member had previous corneal transplant OR cataract surgery within the past 36 months, AND;
   b. The degree of astigmatism is 3.00 diopters or greater, AND;
   c. The member is intolerant of glasses or contact lenses or has significant insinotrophia.

2. Unless specific benefits are provided under the member’s contract, JHHC considers post-cataract post-transplant corneal surgery not medically necessary for all other indications.

**B. Phototherapeutic Keratectomy**

1. When benefits are provided under the member’s contract, JHHC considers phototherapeutic keratectomy (PTK) medically necessary for ANY of the following conditions:
   a. Corneal scars and opacities (including post-traumatic, post-infectious, postsurgical, and secondary to pathology), OR;
   b. Epithelial membrane dystrophy, OR;
   c. Irregular corneal surfaces due to Salzmann's nodular degeneration or keratoconus nodules, OR;
   d. Recurrent corneal erosions when more conservative measures (e.g., lubricants, hypertonic saline, patching, bandage contact lenses, gentle debridement of severely aberrant epithelium) have failed to halt the erosions, OR;
   e. Superficial corneal dystrophy (including granular, lattice, and Reis-Bückler's dystrophy).

2. Unless specific benefits are provided under the member’s contract, JHHC considers PTK experimental and investigational for all other indications as it does not meet Technology Evaluation Criteria (TEC).

*Note* – Photorefractive keratectomy (PRK) to correct refractive errors such as myopia, hyperopia, astigmatism, and presbyopia in persons with otherwise non-diseased corneas is not the same as PTK and, unless specific benefits are provided under the member’s contract, is considered not a covered benefit.

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C. Refractive Surgery

1. When benefits are provided under the member’s contract, JHHC considers the following refractive surgeries medically necessary:

   a. Astigmatic keratotomy (AK) (arcuate incision, corneal wedge resection) when performed for the correction of surgically induced astigmatism following medically indicated cataract removal or corneal transplant surgery.

   b. Epikeratoplasty (or epikeratophakia) for ANY of the following indications:
      i. For the treatment of scarred corneas and corneas affected with endothelial dystrophy, OR;
      ii. For the treatment of adult aphakia in circumstances where secondary implantation of an intra-ocular lens is not feasible because reentering the eye could affect outcome such as vitreous in the anterior chamber, OR;
      iii. History of uveitis, OR;
      iv. Disorganized anterior chamber that cannot support an intraocular lens, OR;
      v. Significant corneal endothelial disease, OR;
      vi. Gross corneal irregularity after trauma.

   c. Lamellar keratoplasty (non-penetrating keratoplasty) for the treatment of corneal diseases, including scarring, edema, thinning, distortion, dystrophies, degenerations, and keratoconus.

   d. Penetrating keratoplasty (PK) (corneal transplantation, perforating keratoplasty) for treatment of corneal diseases, including ANY of the following:
      i. To improve poor visual acuity caused by an opaque cornea, OR;
      ii. To remove active corneal disease, such as persistent severe bacterial, fungal, or amebic inflammation of the cornea (keratitis) after appropriate antibiotic therapy, OR;
      iii. To restore altered corneal structure or to prevent loss of the globe that has been punctured, OR;
      iv. To treat corneal diseases, including bullous keratopathy, keratoconus, corneal scar with opacity, keratitis, corneal transplant rejection, Fuch’s dystrophy, corneal degeneration, other corneal dystrophies, corneal edema, and herpes simplex keratitis.

   e. Intralase-Enabled Keratoplasty (IEK) is an accepted method of penetrating keratoplasty.

   f. The insertion of Intrastromal corneal ring segments (i.e. INTACS® prescription inserts (Addition Technology, Sunnyvale,CA)) when provided in accordance with the Humanitarian Device Exemption (HDE) specifications of the U.S. Food and Drug Administration (FDA) for the treatment of myopia and astigmatism in patients with keratoconus who meet ALL of the following criteria:
      i. Age 21 years of age or older, AND;
      ii. Progressive deterioration in vision, such that adequate functional vision on a daily basis with contact lenses or eyeglasses can no longer be achieved, AND;
      iii. Clear central corneas, AND;
      iv. Corneal thickness of 450 microns or greater at the proposed incision site, AND;
      v. Corneal transplantation is the only other remaining option for improving functional vision.

2. Unless specific benefits are provided under the member's contract, JHHC considers Intrastromal corneal ring segments experimental and investigational for all other indications, as it does not meet Technology Evaluation Criteria (TEC).

3. Unless specific benefits are provided under the member’s contract, JHHC considers the following refractive surgery techniques to be NOT be medically necessary because eyeglasses or contact lenses have been shown to provide more accurate corrections of refractive errors than refractive surgery, (not an all-inclusive list):

   a. Eye surgery mainly to correct refractive errors such as:
Subject: Treatment of the Cornea

i. Radial Keratotomy (RK)
ii. Anistigmatic Keratotomy (AK)
iii. Photoastigmatic Keratectomy (PARK)
iv. Laser-in-situ Keratomileusis (LASIK)
v. Keratomileusis
vi. Epikeratophakia
vii. Photorefractive Keratectomy (PRK)
viii. Intraocular Lens Implants (clear lens extraction)
ix. Implantable contact lenses (without lens extraction)
x. Any other refractive surgical procedures, (Tecnis Symfony® Intraocular Lenses)

4. Unless specific benefits are provided under the member's contract, presbyopic intraocular lenses Crystalens™, ACySof ReSTOR™, ReZoom™, Array® Model SA40, Tecnia ZM900, to correct presbyopia is considered a convenience item and therefore not a covered benefit.

5. Unless specific benefits are provided under the member’s contract, JHHC considers the following refractive surgery techniques to be experimental and investigational, as they do not meet Technology Evaluation Criteria (TEC), (not an all-inclusive list):
   a. Minimally invasive Radial Keratotomy (Mini-RK)
   b. Hexagonal Keratotomy (HK)
   c. Standard Keratomileusis (ALK)
   d. Keratophakia
   e. Conductive Keratoplasty
   f. Thermokeratoplasty
   g. Orthokeratology
   h. Scleral expansion surgery

D. Keratoprosthesis (Artificial Cornea)

1. When benefits are provided under the member’s contract, JHHC considers the Boston Keratoprosthesis (Boston KPro) medically necessary for corneal blindness when ALL of the following criteria are met:
   a. The cornea is opaque and vascularized, AND;
      i. Vision less than 20/400 in the affected eye, AND;
      ii. Lower than optimal vision in the opposite eye, AND;
   b. The member has had 1 or more prior failed penetrating keratoplasties (corneal transplants), with poor prognosis for further grafting, (except in infants who do not require previous attempts), AND;
   c. Member does not have ocular comorbidity which would preclude functional benefit from keratoprosthesis.

2. Unless specific benefits are provided under the member’s contract, JHHC considers the Boston Keratoprosthesis (Boston KPro) for all other indications to be experimental and investigational, as it does not meet Technology Evaluation Criteria (TEC).

3. Unless specific benefits are provided under the member’s contract, JHHC considers the AlphaCor keratoprosthesis to be experimental and investigational, as it does not meet Technology Evaluation Criteria (TEC).

E. Endothelial Keratoplasty

1. When benefits are provided under the member’s contract, JHHC considers endothelial keratoplasty, Descemet's stripping endothelial keratoplasty (DSEK), Descemet's stripping automated endothelial keratoplasty (DSAEK), and Descemet's membrane endothelial keratoplasty (DEK) medically necessary for ANY of the following indications in persons with endothelial failure AND with expectation of visual improvement after surgery.

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a. Bullous keratopathy, OR;
b. Corneal edema, OR;
c. Endothelial corneal dystrophy and other posterior corneal dystrophies, OR;
d. Mechanical complications due to corneal graft or ocular lens prostheses, OR;
e. Rupture of Descemet’s membrane and iatrojectic injury to Descement’s membrane.

2. Unless specific benefits are provided under the member’s contract, JHHC considers endothelial keratoplasty, Descemet's stripping endothelial keratoplasty (DMEK), Descemet's stripping automated endothelial keratoplasty (DSAEK), and Descemet's membrane endothelial keratoplasty (DMEK) experimental and investigational for all other indications, as they do not meet Technology Evaluation Criteria (TEC).

F. Collagen Cross-Linking for Keratoconus

1. When benefits are provided under the member’s contract, JHHC considers epithelium-off photochemical collagen cross-linkage using riboflavin and ultraviolet A medically necessary for progressive keratoconus and keratectasia.

2. Unless specific benefits are provided under the member’s contract, JHHC considers photochemical collagen cross-linkage experimental and investigational for the treatment of infectious keratitis as it does not meet Technology Evaluation Criteria (TEC).

3. Unless specific benefits are provided under the member's contract, JHHC considers epithelium-on (transepithelial) collagen cross-linkage experimental and investigational for keratoconus, keratectasia and all other indications, as they do not meet Technology Evaluation Criteria (TEC).

V. DEFINITIONS

Astigmatic Keratotomy (AK) - incisional surgical procedure used to correct corneal astigmatism. Arcuate incisions are placed in the corneal mid-peripheral zone of the steep meridian at approximately 90% depth (Laurenzi, 2019).

Corneal Wedge Excision - is an effective treatment for high astigmatism after penetrating keratoplasty. The length of the incision centered at the axis of the flatter meridian of the cornea and was extended over a range of 60-90 degrees (Ezra, 2007).

Endothelial Keratoplasty (EK) - also referred to as posterior lamellar keratoplasty, is a form of corneal transplantation in which the diseased inner layer of the cornea, the endothelium, is replaced with healthy donor tissue (Cornea, 2017).

Epikeratoplasty - a type of refractive procedure is one in which the corneal epithelium is removed and a lathed donor lenticule is placed onto the recipient cornea and secured with sutures until it heals in place. It has been referred to as "a living contact lens." It is no longer routinely performed given the advantages of modern laser refractive procedures (Vislisel, 2016).

Intrastromal Corneal Ring Segments (ICRSs) - are made of PMMA (polymethylmethacrylate)- They are implanted in the deep corneal stroma to modify the corneal curvature. This procedure does not involve corneal tissue nor does it invade the central optic zone. One type of the ICRS is the INTACS (Addition Technology INC., Sunnyvale, CA) (Karacal, 2018).

Keratoprosthesis (Artificial Cornea) - is a surgical procedure where a diseased cornea is replaced with an artificial cornea. It is usually recommended after a person has had a failure of one or more donor corneal transplants (Keratoprosthesis, 2016).

Lamellar Keratoplasty (non-penetrating keratoplasty) - involves selective removal and replacement of diseased corneal layers (Espander, 2013).

Limbal Relaxing Incisions (LRI) - (a subset of astigmatic keratotomy) are partial thickness incisions made at the corneal periphery for the treatment of corneal astigmatism. These incisions make the misshapen cornea more spherical, which improves visual clarity (Kozak, 2018).
Penetrating Keratoplasty (PK) - is a full-thickness transplant procedure, in which a trepnie of an appropriate diameter is used to make a full-thickness resection of the patient's cornea, followed by placement of a full-thickness donor corneal graft (Vislisel, 2016).

Phototherapeutic Keratectomy (PTK) - has been found to be an effective treatment for a variety of superficial corneal disorders. Corneal surface irregularity, epithelial instability, and superficial opacity may benefit from the procedure. It is considered a bridge between medical and surgical management of different corneal diseases. PTK can be used for therapeutic and/or refractive indications (Gonzalez, 2018).

Refractive Surgery - a surgical method of vision correction by changing the refractive properties of the eye (Laurenzi, 2019).

VI. BACKGROUND

The cornea is the eye’s outermost layer. It is the clear, domeshaped surface that covers the front of the eye. It plays an important role in focusing your vision. Although the cornea may look clear and seem to lack substance, it is a highly organized tissue. Unlike most tissues in the body, the cornea contains no blood vessels to nourish or protect it against infection. Instead, the cornea receives its nourishment from tears and the aqueous humor (a fluid in the front part of the eye that lies behind the cornea). The tissues of the cornea are arranged in three basic layers, with two thinner layers, or membranes, between them. Each of these five layers has an important function.(National, 2016). These layers are the following:

Epithelium

The epithelium is the cornea’s outermost layer. Its primary functions are to block the passage into the eye of foreign material, such as dust, water, and bacteria; and provide a smooth surface to absorb oxygen and nutrients from tears, which are then distributed to the other layers of the cornea. The epithelium is filled with thousands of tiny nerve endings, which is why your eye may hurt when it is rubbed or scratched. The part of the epithelium that epithelial cells anchor and organize themselves to is called the basement membrane (National, 2016).

Bowman’s membrane

The next layer behind the basement membrane of the epithelium is a transparent film of tissue called Bowman’s layer, composed of protein fibers called collagen. If injured, Bowman’s layer can form a scar as it heals. If these scars are large and centrally located, they may cause vision loss (National, 2016).

Stroma

The stroma is behind Bowman’s layer, which is the thickest layer of the cornea. It is composed primarily of water and collagen. Collagen gives the cornea its strength, elasticity, and form. The unique shape, arrangement, and spacing of collagen proteins are essential in producing the cornea’s light--conducting transparency (National, 2016).

Descemet’s Membrane

Descemet’s membrane is behind the stroma, a thin but strong film of tissue that serves as a protective barrier against infection and injuries. Descemet’s membrane is composed of collagen fibers that are different from those of the stroma, and are made by cells in the endothelial layer of the cornea (see above). Descemet’s membrane repairs itself easily after injury (National, 2016).
Endothelium

The endothelium is the thin, innermost layer of the cornea. Endothelial cells are important in keeping the cornea clear. Normally, fluid leaks slowly from inside the eye into the stroma. The endothelium’s primary task is to pump this excess fluid out of the stroma. Without this pumping action, the stroma would swell with water and become thick and opaque.

In a healthy eye, a perfect balance is maintained between the fluid moving into the cornea and the fluid pumping out of the cornea. Unlike the cells in Descemet’s membrane, endothelial cells that have been destroyed by disease or trauma are not repaired or replaced by the body.

Each time we blink, tears are distributed across the cornea to keep the eye moist, help wounds heal, and protect against infection. Tears form in three layers: An outer, oily (lipid) layer that keeps tears from evaporating too quickly and helps tears remain on the eye. A middle (aqueous) layer that nourishes the cornea and the conjunctiva- the mucous membrane that covers the front of the eye and the inside of the eyelids. A bottom (mucin) layer that helps spread the aqueous layer across the eye to ensure the eye remains wet.

The cornea acts as a barrier against dirt, germs, and other particles that can harm the eye. The cornea shares this protective task with the eyelids and eye sockets, tears, and the sclera (white part of the eye). The cornea also plays a key role in vision by helping focus the light that comes into the eye. The cornea is responsible for 65–75 percent of the eye’s total focusing power. The cornea and lens of the eye are built to focus light on the retina, which is the light-sensitive tissue at the back of the eye. When light strikes the cornea, it bends—or refracts—the incoming light onto the lens. The lens refocuses that light onto the retina, which starts the translation of light into vision. The retina converts light into electrical impulses that travel through the optic nerve to the brain, which interprets them as images. The refractive process the eye uses is similar to the way a camera takes a picture. The cornea and lens in the eye act as the camera lens. The retina is like the film (in older cameras), or the image sensor (in digital cameras). If the image is not focused properly, the retina makes a blurry image. The cornea also serves as a filter that screens out damaging ultraviolet (UV) light from the sun. Without this protection, the lens and the retina would be exposed to injury from UV rays. There are some common conditions that affect the cornea as injuries, allergies, keratitis, and dry eye. Other types of conditions which affect vision in different ways are called corneal dystrophies (National, 2016).

Corneal Dystrophy

A corneal dystrophy is a condition in which one or more parts of the cornea lose their normal clarity due to a buildup of material that clouds the cornea. These diseases are usually inherited, affect both eyes, progress gradually, don't affect other parts of the body, are not related to diseases affecting other parts of the eye or body and happen in otherwise healthy people. Some cause severe visual impairment, while a few cause no vision problems and are only discovered during a routine eye exam. Other dystrophies may cause repeated episodes of pain without leading to permanent vision loss. Some of the most common corneal dystrophies include keratoconus, Fuchs' dystrophy, lattice dystrophy, and map-dot-fingerprint dystrophy(also known as epithelial basement membrane dystrophy) (National, 2016).

Keratoconus

Keratoconus is a progressive thinning of the cornea. It is the most common corneal dystrophy in the U.S., affecting one in every 2,000 Americans. It is most prevalent in teenagers and adults in their 20s. Keratoconus causes the middle of the cornea to thin, bulge outward, and form a rounded cone shape. This abnormal curvature of the cornea can cause double or blurred vision, nearsightedness, astigmatism, and increased sensitivity to light. The causes of keratoconus aren’t known, but research indicates it is most likely caused by a combination of genetic susceptibility along with environmental and hormonal influences.
About 7 percent of those with the condition have a history of keratoconus in their family. Keratoconus is diagnosed with a slit-lamp exam. Your eye care professional will also measure the curvature of your cornea. Keratoconus usually affects both eyes. At first, the condition is corrected with glasses or soft contact lenses. As the disease progresses, you may need specially fitted contact lenses to correct the distortion of the cornea and provide better vision. In most cases, the cornea stabilizes after a few years without causing severe vision problems. A small number of people with keratoconus may develop severe corneal scarring or become unable to tolerate a contact lens. For these people, a corneal transplant may become necessary.

**Fuchs' Dystrophy**

Fuchs’ dystrophy is a slowly progressing disease that usually affects both eyes and is slightly more common in women than in men. It can cause your vision to gradually worsen over many years, but most people with Fuchs’ dystrophy won’t notice vision problems until they reach their 50s or 60s. Fuchs’ dystrophy is caused by the gradual deterioration of cells in the corneal endothelium; the causes aren’t well understood. Normally, these endothelial cells maintain a healthy balance of fluids within the cornea. Healthy endothelial cells prevent the cornea from swelling and keep the cornea clear. In Fuchs’ dystrophy, the endothelial cells slowly die off and cause fluid buildup and swelling within the cornea. The cornea thickens and vision becomes blurred.

As the disease progresses, Fuchs' dystrophy symptoms usually affect both eyes and include:

- A cloudy or hazy looking cornea
- Glare, which affects vision in low light
- Painful, tiny blisters on the surface of the cornea
- Distorted vision, sensitivity to light, difficulty seeing at night, and seeing halos around light at night
- Blurred vision that occurs in the morning after waking and gradually improves during the day

The first step in treating Fuchs' dystrophy is to reduce the swelling with drops, ointments, or soft contact lenses. If a patient has a severe disease then the eye care professional may suggest a corneal transplant.

**Lattice Dystrophy**

Lattice dystrophy gets its name from a characteristic lattice-like pattern of deposits in the stroma layer of the cornea. The deposits are made of amyloid, an abnormal protein fiber. Over time, the deposits increase and the lattice lines grow opaque, take over more of the stroma, and gradually converge to impair vision. Although lattice dystrophy can occur at any time in life, it most commonly begins in childhood between the ages of 2 and 7. In some people, amyloid deposits can accumulate under the epithelium of the cornea. This can erode the epithelium, and cause a condition known as recurrent epithelial erosion. This erosion alters the cornea’s normal curvature and causes temporary vision problems. It can also expose the nerves that line the cornea and cause severe pain. To ease this pain, an eye care professional may prescribe eye drops and ointments to reduce the friction of the eyelid against the cornea. In some cases, an eye patch may be used to immobilize the eyelid. The erosions usually heal within days, although you may have some pain for the next six to eight weeks. By age 40, some people with lattice dystrophy have scarring under the epithelium that can impact vision to such an extent that the most effective treatment will be a corneal transplant. Although the early results of corneal transplantation are typically good, lattice dystrophy may reappear later and require long-term.

**Map-Dot-Fingerprint Dystrophy (Epithelial Basement Membrane)**

Map-Dot-Fingerprint Dystrophy, also known as Epithelial Basement Membrane Dystrophy, occurs when the basement membrane develops abnormally and forms folds in the tissue. The folds create gray shapes that look like continents on a
map. There also may be clusters of opaque dots underneath or close to the maplike patches. Less frequently, the folds form concentric lines in the central cornea that resemble small fingerprints. Symptoms include blurred vision, pain in the morning that lessens during the day, sensitivity to light, excessive tearing, and a feeling that there’s something in the eye. Map-Dot--Fingerprint dystrophy usually occurs in both eyes and affects adults between the ages of 40 and 70, although it can develop earlier in life. Typically, map-dot-fingerprint dystrophy will flare up now and then over the course of several years and then go away, without vision loss. Some people can have map-dot-fingerprint dystrophy but not experience any symptoms. Others with the disease will develop recurring epithelial erosions, in which the epithelium’s outermost layer rises slightly, exposing a small gap between the outermost layer and the rest of the cornea. These erosions alter the cornea’s normal curvature and cause blurred vision. They may also expose the nerve endings that line the tissue, resulting in moderate to severe pain over several days.

The discomfort of epithelial erosions can be managed with topical lubricating eye drops and ointments. If drops or ointments don't relieve the pain and discomfort, there are outpatient surgeries including:

- Corneal scraping to remove eroded areas of the cornea and allow healthy tissue to regrow
- Laser surgery to remove surface irregularities on the cornea
- Anterior corneal puncture, which help the cells adhere better to the tissue

There are other diseases that can affect the cornea are the following: Herpes Zoster (Shingles), Ocular Herpes, Iridocorneal Endothelial Syndrome (ICE), Pyterygium, and Steven-Johnson Syndrome (National, 2016).

There are various treatments for advanced corneal disease which are Laser Surgery, Corneal Transplant Surgery, Anterior Lamellar Keratoplasty, Endothelial Lamellar Keratoplasty and Artifical Cornea (National, 2016).

Laser Surgery

Phototherapeutic keratectomy (PTK) is a surgical technique that uses UV light and laser technology to reshape and restore the cornea. PTK has been used to treat recurrent erosions and corneal dystrophies, such as map-dot-fingerprint dystrophy and basal membrane dystrophy. PTK helps delay or postpone corneal grafting or replacement.

Corneal Transplant Surgery

Corneal transplant surgery removes the damaged portion of the cornea and replaces it with healthy donor tissue. Corneas are the most commonly transplanted tissue worldwide. In the past, the standard approach to corneal transplants was to surgically replace the entire cornea with donor tissue, a technique known as penetrating keratoplasty. This is called a full thickness transplant, and may still be the only option for people with advanced keratoconus and scarring, severe herpetic scarring, or traumatic injury that affects the whole cornea. However, most people who need a cornea transplant undergo a newer procedure called lamellar keratoplasty. This is called a partial thickness transplant. In this procedure, the surgeon selectively removes and replaces the diseased layer(s) of the cornea and leaves the healthy tissue in place. Replacing only diseased layers with a donor graft leaves the cornea more structurally intact and leads to a lower rate of complications and better visual improvement.

Anterior Lamellar Keratoplasty

Anterior Lamellar Keratoplasty removes damaged stromal tissue and replaces it with healthy stroma from a donor. This procedure is used for the following:

- Severe corneal scarring
- Corneal dystrophies that affect the stroma
• Keratoconus

Endothelial Lamellar Keratoplasty

Endothelial Lamellar Keratoplasty removes diseased endothelial tissue and replaces it with healthy endothelium from a donor. This procedure is used for the following:

• Fuchs' dystrophy
• Post-cataract edema
• Corneal failure after surgery for cataract, glaucoma or retinal detachment

Artifical Cornea

A keratoprosthesis (KPro) is an artificial cornea. A KPro may be the only option available for people who have not had success with corneal tissue implants or who have high risk of tissue rejection (such as those with Stevens-Johnson syndrome or severe chemical burns).

The Boston Type-1 KPro is the most used keratoprosthesis. It is made of clear plastic and consists of three parts, with donor cornea tissue clamped between front and back plates. When fully assembled it has the shape of a collar button. The procedure to insert KPro is performed by an ophthalmologist, usually on an outpatient basis.

Corneal transplants are generally done under local anesthetics as an outpatient procedure. With full thickness transplants, the damaged cornea is removed and replaced with a donor cornea. Tiny stitches secure the transplant. Partial thickness transplants use fewer stitches.

Information regarding Refraction and Refractive Errors

Refraction is the bending of light as it passes through one object to another. Vision occurs when light rays are bent (refracted) as they pass through the cornea and the lens. The light is then focused on the retina. The retina converts the light-rays into messages that are sent through the optic nerve to the brain. The brain interprets these messages into the images we see.

Refractive errors occur when the shape of the eye prevents light from focusing directly on the retina. The length of the eyeball (longer or shorter), changes in the shape of the cornea, or aging of the lens can cause refractive errors.

The signs and symptoms of refractive errors are the following: double vision, haziness, glare or halos around bright lights, squinting, headaches, and eye strain. People who are at risk for refractive errors include individuals that have parents with certain refractive errors may be more likely to get one or more refractive errors. Presbyopia affects most adults over the age of 35. Other refractive errors can affect both children and adults.

The most common types of refractive errors are myopia, hyperopia, presbyopia and astigmatism.

Myopia (nearsightedness) is a condition where objects up close appear clearly, while objects far away appear blurry. With myopia, light comes to focus in front of the retina instead of on the retina.

Hyperopia (farsightedness) is a common type of refractive error where distant objects may be seen more clearly than objects that are near. However, people experience hyperopia differently. Some people may not notice any problems with their vision,
especially when they are young. For people with significant hyperopia, vision can be blurry for objects at any distance, near or far.

Astigmatism is a condition in which the eye does not focus light evenly onto the retina, the light-sensitive tissue at the back of the eye. This can cause images to appear blurry and stretched out.

Presbyopia is an age-related condition in which the ability to focus up close becomes more difficult. As the eye ages, the lens can no longer change shape enough to allow the eye to focus close objects clearly.

Refractive errors can be diagnosed by an eye care professional during a comprehensive dilated eye examination. Some people do not realize they are not seeing as clearly and do not have any complaints of visual discomfort or blurred vision until they visit with their eye care professional. Refractive errors can usually be corrected with eyeglasses, contact lenses or surgery (National, 2018).

VII. CODING DISCLAIMER

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Note: The following CPT/HCPCS codes are included below for informational purposes. Inclusion or exclusion of a CPT/HCPCS code(s) below does not signify or imply member coverage or provider reimbursement. The member’s specific benefit plan determines coverage and referral requirements. All inpatient admissions require preauthorization.

VIII. CODING INFORMATION

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<td>Q1005</td>
<td>New technology, intraocular lens, category 5 as defined in Federal Register notice</td>
</tr>
<tr>
<td>S0596</td>
<td>Phakic intraocular lens for correction of refractive error</td>
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<tr>
<td>S0800</td>
<td>Laser in situ keratomeileusis (LASIK)</td>
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<tr>
<td>S0810</td>
<td>Photorefractive keratectomy (PRK)</td>
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<tr>
<td>S0812</td>
<td>Phototherapeutic keratectomy (PTK)</td>
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<tr>
<td>V2630</td>
<td>Anterior chamber intraocular lens</td>
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<tr>
<td>V2631</td>
<td>Iris supported intraocular lens</td>
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<tr>
<td>V2632</td>
<td>Posterior Chamber intraocular lens</td>
</tr>
<tr>
<td>V2785</td>
<td>Processing, preserving, and transporting corneal tissue</td>
</tr>
<tr>
<td>V2787</td>
<td>Astigmatism correcting function of intraocular lens</td>
</tr>
<tr>
<td>V2788</td>
<td>Presbyopia correcting function of intraocular lens</td>
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</table>

65757       Backbench preparation of corneal endothelial allograft prior to transplantation
65760       Keratomileusis
65765       Keratophakia
65770       Keratoprosthesis
65771       Radial keratotomy
65772       Corneal relaxing incision for correction of surgically induced astigmatism
65775       Corneal wedge resection for correction of surgically induced astigmatism
65785       Implantation of intrastromal corneal ring segments
66840       Removal of lens material; aspiration technique, 1 or more
66940       Removal of lens material; extracapsular (other than 66840, 66850, 66852)
66985       Insertion of intraocular lens prosthesis (secondary implant), not associated with concurrent cataract removal
<table>
<thead>
<tr>
<th>ICD10 CODES</th>
<th>DESCRIPTION</th>
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<tr>
<td>B00.50</td>
<td>Herpesviral ocular disease, unspecified</td>
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<tr>
<td>B00.52</td>
<td>Herpesviral keratitis</td>
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<tr>
<td>B02.33</td>
<td>Zoster keratitis</td>
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<tr>
<td>B94.0</td>
<td>Sequelae of trachoma</td>
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<tr>
<td>E50.6</td>
<td>Vitamin A deficiency with xerophthalmic scars of cornea</td>
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<tr>
<td>H16.001 - H16.9</td>
<td>Keratitis</td>
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<tr>
<td>H17.00 - H17.9</td>
<td>Corneal scars and opacities</td>
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<tr>
<td>H18.10 - H18.13</td>
<td>Bullous keratopathy</td>
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<tr>
<td>H18.20 - H18.239</td>
<td>Corneal edema</td>
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<tr>
<td>H18.331 - H18.339</td>
<td>Rupture in Descemet’s membrane</td>
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<tr>
<td>H18.40 - H18.49</td>
<td>Corneal degenerations</td>
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<td>H18.50 - H18.59</td>
<td>Hereditary corneal dystrophies</td>
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<td>H18.601 - H18.629</td>
<td>Keratoconus</td>
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<td>H18.70 - H18.799</td>
<td>Other corneal deformities</td>
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<tr>
<td>H18.821 - H18.829</td>
<td>Corneal disorder due to contact lens</td>
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<tr>
<td>H18.831 - H18.839</td>
<td>Recurrent erosion of cornea</td>
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<tr>
<td>H20.811 - H20.819</td>
<td>Fuchs' heterochromic cyclitis</td>
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<td>H27.00 - H27.03</td>
<td>Aphakia</td>
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<td>H52.201 - H52.229</td>
<td>Astigmatism</td>
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<tr>
<td>Q12.0</td>
<td>Congenital cataract</td>
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<tr>
<td>Q12.3</td>
<td>Congenital aphakia</td>
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IX. REFERENCE STATEMENT
Analyses of the scientific and clinical references cited below were conducted and utilized by the Johns Hopkins HealthCare LLC (JHHC) Medical Policy Team during the development and implementation of this medical policy. Per NCQA standards, the Medical Policy Team will continue to monitor and review any newly published clinical evidence and adjust the references below accordingly if deemed necessary.

X. REFERENCES


### XI. APPROVALS

Historic Effective Dates: 03/03/2017; 02/19/2019