Corneal Topography / Computer-Assisted Corneal Topography/Photokeratoscopy

Policy Number: 9.03.05  Last Review: 10/2017
Origination: 10/2000  Next Review: 10/2018

Policy
Blue Cross and Blue Shield of Kansas City (Blue KC) will not provide coverage for corneal topography.

When Policy Topic is covered
Not Applicable.

When Policy Topic is not covered
Computer-assisted corneal topography is considered not medically necessary to detect or monitor diseases of the cornea.

Considerations
Non-computer assisted corneal topography is considered part of the evaluation/and management services of general ophthalmological services (CPT codes 92002–92014), and therefore this service should not be billed separately. There is no separate CPT code for this type of corneal topography.

Description of Procedure or Service

<table>
<thead>
<tr>
<th>Populations</th>
<th>Interventions</th>
<th>Comparators</th>
<th>Outcomes</th>
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| Individuals:  
- With disorders of corneal topography | Interventions of interest are:  
- Computer-assisted corneal topography/photokeratoscopy | Comparators of interest are:  
- Manual corneal topography measurements | Relevant outcomes include:  
- Test accuracy  
- Other test performance measures  
- Functional outcomes |

Computer-assisted topography/photokeratoscopy provides a quantitative measure of corneal curvature. Measurement of corneal topography is being evaluated for the diagnosis and follow-up of corneal disorders such as keratoconus, difficult contact lens fits, and pre- and postoperative assessment of the cornea, most commonly after refractive surgery.
For individuals who have disorders of corneal topography who receive computer-assisted corneal topography/photokeratoscopy, the evidence includes only a few studies. Relevant outcomes are test accuracy, other test performance measures, and functional outcomes. With the exception of refractive surgery, a service not discussed herein, no studies have shown clinical benefit (eg, a change in treatment decisions) based on a quantitative evaluation of corneal topography. In addition, a large prospective series found no advantage with use of different computer-assisted corneal topography methods over manual corneal keratometry. Computer-assisted corneal topography lacks evidence from appropriately constructed clinical trials that could confirm whether it improves outcomes. The evidence is insufficient to determine the effects of the technology on health outcomes.

**Background**

**Detection and Monitoring Diseases of the Cornea**

Corneal topography describes measurements of the curvature of the cornea. An evaluation of corneal topography is necessary for the accurate diagnosis and follow-up of certain corneal disorders, such as keratoconus, difficult contact lens fits, and pre- and postoperative assessment of the cornea, most commonly after refractive surgery.

Assessing corneal topography is a part of the standard ophthalmologic examination of some patients. Corneal topography can be evaluated and determined in multiple ways. Computer-assisted corneal topography has been used for early identification and quantitative documentation of the progression of keratoconic corneas, and evidence is sufficient to indicate that computer-assisted topographic mapping can detect and monitor disease.

Various techniques and instruments are available to measure corneal topography: keratometer, keratoscope, and computer-assisted photokeratoscopy.

The keratometer (also referred to as an ophthalmometer), the most commonly used instrument, projects an illuminated image onto a central area in the cornea. By measuring the distance between a pair of reflected points in both of the cornea’s 2 principal meridians, the keratometer can estimate the radius of curvature of 2 meridians. Limitations of this technique include the fact that the keratometer can only estimate the corneal curvature over a small percentage of its surface and that estimates are based on the frequently incorrect assumption that the cornea is spherical.

The keratoscope reflects a series of concentric circular rings off the anterior corneal surface. Visual inspection of the shape and spacing of the concentric rings provides a qualitative assessment of topography.

A photokeratoscope is a keratoscope equipped with a camera that can provide a permanent record of the corneal topography. Computer-assisted photokeratoscopy is an alternative to keratometry or keratoscopy for measuring corneal curvature. This technique uses sophisticated image analysis programs to provide quantitative
corneal topographic data. Early computer-based programs were combined with keratoscopy to create graphic displays and high-resolution, color-coded maps of the corneal surface. Newer technologies measure both curvature and shape, enabling quantitative assessment of corneal depth, elevation, and power.

**Regulatory Status**
A number of devices have been cleared for marketing by the U.S. Food and Drug Administration (FDA) through the 510(k) process. In 1999, the Orbscan® (manufactured by Orbtek, distributed by Bausch and Lomb) was cleared by FDA. The second-generation Orbscan II is a hybrid system that uses both projective (slit scanning) and reflective (Placido) methods. The Pentacam® (Oculus) is one of a number of rotating Scheimpflug imaging systems produced in Germany.

**Rationale**
This evidence review was originally created in November 1997 and has been updated regularly with searches of the MEDLINE database. The most recent literature update was performed through January 25, 2017.

We evaluated the literature with a focus on the question most pertinent to this evidence review: Does quantitative measurement result in a management change that improves health outcomes?

**Contact Lens Fitting**
In 2016, Weber et al reported on a prospective, observational study of the association between computer-assisted corneal topography measurements (Pentacam) and scleral contact lens fit. The study included 47 patients (63 eyes) with a variety of indications for scleral contact lenses, most commonly (n=24 eyes) keratoconus. Pentacam measurements correlated with a subset of the scleral contact lens parameters (corneal astigmatism, anterior chamber depth, and corneal height; p<0.001, not adjusted for multiple comparisons) for the group as a whole.

A 2010 study on computer-assisted corneal topography assessed the design of gas-permeable contact lens in 30 patients with keratoconus who were recruited for the study in 2005 and 2006. The report indicated that the subjects were consecutive, although patients whose topographic plots could not be used were excluded (number not described). The fit of the new lens was compared with the fit of the patient’s habitual lens (randomized order on the same day). Clinical evaluation showed a good fit (no or minor modification needed) for more than 90% of the computer-designed lens. However, progression of keratoconus causes a bias favoring the most recently fitted lens, confounding comparison between the new computer-designed lens and the patient’s habitual lens. Trial design and reporting gaps limit conclusions that can be drawn from this study.
Corneal Astigmatism Measurements for Toric Intraocular Lens Implantation
In 2012, Lee et al reported on a prospective comparative study of 6 methods of measuring corneal astigmatism for the purpose of toric intraocular lens implantation. Astigmatism was evaluated in 257 eyes (141 patients) using manual keratometry, autokeratometry, partial coherence interferometry (IOLMaster), ray-tracing aberrometry (iTrace), scanning-slit topography (Orbscan), and Scheimpflug imaging (Pentacam). Each instrument's measurements were masked to the results for the other instruments. The study found no significant difference between the different instruments, indicating no advantage to computerized corneal topography compared with manual keratometry.

Summary of Evidence
For individuals who have disorders of corneal topography who receive computer-assisted corneal topography/photokeratoscopy, the evidence includes only a few studies. Relevant outcomes are test accuracy, other test performance measures, and functional outcomes. With the exception of refractive surgery, a service not discussed herein, no studies have shown clinical benefit (eg, a change in treatment decisions) based on a quantitative evaluation of corneal topography. In addition, a large prospective series found no advantage with use of different computer-assisted corneal topography methods over manual corneal keratometry. Computer-assisted corneal topography lacks evidence from appropriately constructed clinical trials that could confirm whether it improves outcomes. The evidence is insufficient to determine the effects of the technology on health outcomes.

Supplemental Information

Practice Guidelines and Position Statements
A 1999 American Academy of Ophthalmology (AAO) assessment indicated that computer-assisted corneal topography evolved from the need to measure corneal curvature and topography more comprehensively and accurately than keratometry and that corneal topography is used primarily for refractive surgery. AAO indicated several other potential uses: (1) to evaluate and manage patients following penetrating keratoplasty, (2) to plan astigmatic surgery, (3) to evaluate patients with unexplained visual loss and document visual complications, and (4) to fit contact lenses. However, the AAO assessment noted the lack of data supporting the use of objective measurements (as opposed to subjective determinants, like subjective refraction) of astigmatism.

U.S. Preventive Services Task Force Recommendations
Not applicable.

Medicare National Coverage
There is no national coverage determination (NCD). In the absence of an NCD, coverage decisions are left to the discretion of local Medicare carriers.
Ongoing and Unpublished Clinical Trials
A search of ClinicalTrials.gov in February 2017 did not identify any ongoing or unpublished trials that would likely influence this review.

References

Billing Coding/Physician Documentation Information
92025 Computerized corneal topography, unilateral or bilateral, with interpretation and report

ICD-10 Codes
H16.001- Keratitis code range
H16.9
H17.00- Corneal scars and opacities code range
H17.9
H18.001- Other disorders of cornea code range
H18.9

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Additional Policy Key Words
N/A

Policy Implementation/Update Information
10/1/00 New policy added to the Medical section. Considered inclusive to the E/M service.
10/1/01 No policy statement changes.
10/1/02 No policy statement changes.
10/1/03 No policy statement changes.
10/1/04 No policy statement changes. Added S-code.
10/1/05 No policy statement changes.
10/1/06  No policy statement changes.
10/1/07  Policy statement revision made and implemented on the date noted below.
5/1/08  Policy statement revised to include computerized corneal topography which is considered investigational. Non-computerized corneal topography remains a component of the evaluation/and management services of general ophthalmologic services.
10/1/08  No policy statement changes.
10/1/09  No policy statement changes.
11/1/09  Policy statement changed from investigational to not medically necessary. This change is effective 12/1/2009.
10/1/10  No policy statement changes.
10/1/11  No policy statement changes.
10/1/12  No policy statement changes.
10/1/13  No policy statement changes.
10/1/14  No policy statement changes.
10/1/15  No policy statement changes.
10/1/16  No policy statement changes. Added Corneal Topography/ to title.
10/1/17  No policy statement changes.

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