5. Cataracts

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Several major projects in recent years provide core material in developing quality indicators for the management of adult-onset senile cataract. The Agency for Health Care Policy and Research (AHCPR) supported a Patient Outcomes Research Team assessment of cataract management, particularly the surgical options, and also supported the development of a practice guideline for the management of adult senile cataract (AHCPR, 1993; Powe et al., 1994; Schein et al., 1994; O’Day et al., 1993). The American Academy of Ophthalmology (1996) has published a guideline on the management of adult cataract, as has a consortium of other ophthalmic organizations (American College of Eye Surgeons, 1993). RAND and the Academic Medical Center Consortium (AMCC) assessed the appropriate indications for cataract surgery using the RAND/UCLA modified Delphi approach (Brook, 1994), and applied these indicators to cataract surgeries performed in the United States (Lee et al., 1993). Individual investigators and research teams have also published extensively on the outcomes and pre-operative predictors of functional improvement after cataract surgery (Mangione et al., 1994, 1995; Tielsch et al., 1995; Schein et al., 1995; Applegate et al., 1987; Bernth-Peterson, 1981). Finally, AHCPR and RAND developed a set of review criteria based on the AHCPR cataract management guideline (Laouri et al., 1995). Taken together, these projects provide a substantial foundation for developing quality indicators for the management of cataract.

A significant issue in understanding the recommended indicators in this chapter is the quality of supporting evidence (AHCPR, 1993; Powe et al., 1994; O’Day et al., 1993). It was not unusual for the sources we reviewed to agree on a given recommendation, with only Level III data (expert opinion) in support of it. At best, only Level II data (observational) have been published to date for these recommendations that have been scientifically assessed. In many cases, Level I (RCT)
trials may be unnecessary or infeasible because the recommendations are so basic (e.g., to perform a complete pre-operative examination of the eye). As in other conditions, we have proposed Level III indicators when consensus exists among all sources.

Another important aspect of the indicators proposed in this chapter is how responsibility for them is separated among different health care providers. For example, while some indicators apply to all providers, eye care specialists alone are held accountable for indicators related to surgery and certain specialized examinations. Such a separation of responsibilities is intentional, as it reflects the current organization of health care services.

Finally, this document reflects the current emphasis in health technology assessment on the impact of a condition on patient functioning and on the prevention of patient morbidity or mortality. As such, and in conformance with current professional guidelines, the management of cataract is centered on ameliorating the effect of cataract on a person’s ability to perform visual tasks and on enhancing health-related quality of life (HRQL). Thus, although a cataract is defined in this document as a lens opacity, management issues do not arise unless the lens opacity is associated with impairment of visual function.

**IMPORTANCE**

The prevalence of lens opacities believed to diminish visual acuity to 20/30 or worse increases with age. In population-based studies, nuclear cataracts, which are the most common form of cataract, rise from 5.7 percent among those aged 55 to 64 years to 30 percent among those aged 75 to 84 years (AHCPR, 1993; Kahn et al., 1977; Spreduto and Hiller, 1984). If the criterion is merely the presence of a lens opacity -- without visual impairment -- then the rate rises from 42 percent among those aged 52 to 64 to virtually 100 percent by the time they reach their 80s (AHCPR, 1993). From the perspective of health care delivery, the surgical removal of cataracts remains the single largest surgical expenditure for Medicare Part B, and cataract is one of the
leading reasons for office visits in the United States, especially among those over age 65.

Given these high utilization rates, it is reassuring that the majority of studies suggest cataract surgeries are only rarely performed for inappropriate reasons (Tobacman et al., 1996). However, recent evidence shows that the utilization of cataract surgery in senior managed care plans, after adjusting for ocular risk factors and co-morbid medical conditions, is half that for comparable patients enrolled in the fee-for-service sector of Medicare (Goldzweig et al., 1997). Thus, concerns about under- as well as over-utilization need to be addressed in any quality indicator system.

From the patient’s perspective, amelioration of the visual difficulties posed by cataract offers tremendous benefit not only in functioning and HRQL as measured by both general (SF-36) and vision-specific instruments, but also in terms of satisfaction (Tielsch et al., 1995; Schein et al., 1995; Steinberg et al., 1994). Several studies have shown that decrements in visual performance, including contrast sensitivity, are associated with significantly increased rates of falls and hip fractures (Felson et al., 1989; Tobis et al., 1985). At the same time, some patients with cataracts do not improve with either non-surgical or surgical treatment.

**Definition of Cataract**

For the purposes of this document, a cataract is defined as an acquired opacification of the lens. The mere presence of a lens opacity does not necessarily result in a functional impairment of vision (Mangione et al., 1995). Whether vision is defined by a test performed on an outpatient basis, such as Snellen visual acuity or contrast sensitivity, or by the ability to perform daily visual tasks, such as reading or watching TV, no study has found a consistent and clear relationship between the density of the opacity and the level of vision impairment. Thus, the inquiry into possible visual impairment is separate from the initial inquiry into whether a lens opacity exists.
SCREENING AND PREVENTION

Although screening to detect a lens opacity could be performed with either a trained examiner or photographic assessment, the yield of patients who have lens opacities with related visual impairment is so low that it raises concerns about relative costs and benefits. The Framingham study is particularly instructive in this regard, as only 12 percent of its subjects with lens opacities had visual acuity diminished to 20/30 or worse (AHCPR, 1993). Moreover, visual acuity itself is only modestly related to vision-related functioning (Mangione et al., 1995). Thus, we recommend a quality indicator requiring only that patients be asked by both primary care physicians and eye care providers whether they have functional decrements related to their vision, and make no recommendations for screening of asymptomatic patients for the presence of a lens opacity (Indicator 1).

New data exist on the potential role of several factors in the development of cataract, including ultraviolet radiation (B), diabetes mellitus, certain drugs, cigarette smoking, alcohol consumption, and low antioxidant status (AHCPR, 1993). However, no studies have yet documented that risk factor reduction prevents cataract development.

DIAGNOSIS

The diagnosis of cataracts requires the performance of a magnified eye examination, either by a trained examiner or through the use of a standardized photographic assessment. Once a lenticular opacity is detected, additional assessment is needed to determine if visual impairment exists. Traditionally, visual impairment has been defined by decreased Snellen visual acuity. Under current approaches, however, impairment is increasingly defined by degradation of visual performance on vision-related tasks or through effects on HRQL (Mangione et al., 1995). Establishing the existence of visual impairment is separate from diagnosing the presence of a lens opacity. Like all patients who present with visual complaints, suspected cataract patients should receive an assessment of their vision and visual task performance. We recommend a quality indicator specifying that the eye care provider should conduct a complete eye examination, including a dilated exam of
the fundus (macula, optic nerve, vessels, and periphery) to determine if other concurrent ocular conditions might be related to the impaired visual functioning (Indicator 2).

Regardless of the endpoint of visual impairment used, all studies indicate that the success rates of cataract surgery can be significantly reduced by the presence of other ocular diseases, particularly diabetic retinopathy, glaucoma, and macular degeneration. This is due, in large part, to the potential for a separate, independent effect on visual functioning that cannot be improved by removal of the cataract (Lee et al., 1993; Mangione et al., 1995; Schein et al., 1995). The presence of ocular diseases such as high myopia or pseudoexfoliation syndrome is associated with higher immediate complication rates. This understanding is reflected in every current guideline for the care of patients with cataracts, either in limiting the guideline only to eyes without such conditions (AHCPR, 1993; American Academy of Ophthalmology, 1996; American College of Eye Surgeons, 1993) or in explicitly using more restrictive indications for cataract removal (Lee et al., 1993). Thus, the decision to proceed with surgery should be made with full knowledge of the patient’s ocular status, including a dilated fundus exam, and, if necessary, an ultrasound exam.

**TREATMENT**

A cataract does not require treatment unless the cataract itself is causing rare, secondary diseases such as phacomorphic glaucoma or lens-related uveitis, or if it sufficiently compromises the ability to monitor or treat other ocular diseases such as diabetic retinopathy or glaucoma (AHCPR, 1993; American Academy of Ophthalmology, 1996; Lee et al., 1993) (Indicator 4). Otherwise, treatment is indicated when the cataract is associated with some degree of visual impairment. In the past, the traditional reliance on Snellen visual acuity to measure visual impairment prompted the treatment of cataracts basically to improve Snellen visual acuity. Thus, for example, indications for cataract surgery were based on the Snellen visual acuity level that a patient could see (e.g., 20/60 or 20/80). Currently, however, the emphasis on functioning and well-being is shifting the basis for
intervention to the patient’s ability to perform visual tasks and activities of daily living related to vision, such as reading, driving safely, and work (AHCPR, 1993; American Academy of Ophthalmology, 1996; American College of Eye Surgeons, 1993; Lee et al., 1993).

Because cataracts can cause a change in the refractive status of the eye, all current guidelines for the management of cataracts recommend that an up-to-date refraction be performed in all eyes with significant functional impairment thought to be due to the cataract. Although no study has documented the effectiveness of this medical intervention, there is universal support for an in-office assessment of refractive status to determine if non-surgical treatment can decrease the visual impairment to a degree significant for the patient (AHCPR, 1993; American Academy of Ophthalmology, 1996; American College of Eye Surgeons, 1993). Thus, we propose a quality indicator that stating that all patients undergoing cataract surgery should have had a refraction in the operative eye within four months before surgery (Indicator 3).

If the medical intervention results in insufficient improvement for the patient then surgical treatment may be warranted. Numerous case series and case-control studies have been performed using visual acuity as the indicator of improvement in visual functioning or impairment after surgical removal of the cataract (AHCPR, 1993; Powe et al., 1994; Schein et al., 1994; O’Day et al., 1993; Lee et al., 1993). A far smaller number of studies have used patient-reported vision-related task performance or visual functioning and HRQL as the indicator of visual impairment. However, these recent studies on vision-related functioning have not only confirmed these findings using vision-related task endpoints, but have also clearly identified that pre-operative visual acuity is not predictive of the surgical outcomes related to functioning and health-related quality of life (Mangione et al., 1995; Schein et al., 1995). Rather, factors such as the presence of other ocular diseases, the patient’s age, and the degree of pre-operative functional impairment are the most important predictors of post-operative functional improvement. These studies clearly indicate that visual functioning can be improved by cataract surgery and that such initial impairment or subsequent improvement is only poorly related to Snellen
acuity. Thus, the decision to proceed with surgery must be made on the basis of functional impairment and not Snellen acuity; there is no role for a Snellen acuity cutoff (Indicator 5).

Due to current cataract extraction techniques, the posterior lens capsule may opacify after surgery. YAG (yttrium-argon-garnet laser) capsulotomy can be used to treat this problem. However, because the use of this technique is associated with an increased risk of complications such as retinal detachment (AHCPR, 1993), it should not be performed in every case of opacification of the posterior lens capsule. Rather, the indications for a YAG capsulotomy are similar to that of the initial cataract surgery: impaired visual functioning thought to be due to a media opacification (in this case, posterior lens capsule) or for specific medical reasons, such as monitoring or treatment of glaucoma or diabetes (AHCPR, 1993; American Academy of Ophthalmology, 1996; American College of Eye Surgeons, 1993) (Indicator 6).

**FOLLOW-UP**

No study has been conducted regarding the ideal follow-up intervals of patients with cataract. Guidelines suggest follow-up intervals ranging from every few months to one year (American Academy of Ophthalmology, 1996), both for continuing preventive care as well as for monitoring the cataract.

Data suggest that the rate of cataract progression is slow (AHCPR, 1993). One small study determined that the rate of vision loss over an average of almost three years was 1.5 lines of Snellen acuity per year, with a loss of nearly two lines per year among those who had any degree of loss (Gloor and Farrell, 1989). Unfortunately, no data exist on the natural history of vision-related functioning due to untreated cataract. Thus, we make no recommendations on the frequency of follow-up exams among those with cataracts who do not undergo cataract surgery. However, as noted in the screening section, all guidelines agree that patients should be asked about their degree of visual functioning, with specific attention given to whether impairment of visual tasks or vision-related functioning exists (AHCPR, 1993; American Academy of
If patients are to undergo surgery, the available guidelines agree to a large degree on which pre-operative tests should be performed, what operative issues should be considered, and what post-operative management should be arranged. However, no data have been published linking the performance of any specific pre-operative test -- other than vision-related functioning assessment -- with post-operative outcomes. Further, the small amount of existing data reveals a wide variation between optometrists, ophthalmologists, and internists in the use of preoperative tests (Bass et al., 1995, 1996; Steinberg et al., 1994).

Recent studies have shown that complication rates and outcomes after four months are comparable with either a traditional extracapsular technique or a phacoemulsification technique for cataract removal (although the intracapsular technique is associated with higher immediate complication rates) (Schein et al., 1994; Steinberg et al., 1994). No other aspect of intra-operative management has been studied in a similarly detailed fashion, other than the comparability of routes of anesthesia during surgery or specific surgical maneuvers for creating incisions or removing the lens. Thus, we make no recommendation regarding the intra-operative considerations of cataract surgery.

No study has documented the ideal intervals for follow-up after surgery, or what steps should be performed during the post-operative assessment. The only published study on post-operative care patterns demonstrates variations between different provider types, but does not examine the outcomes of care by different care patterns (Bass et al., 1996). All current guidelines agree that the operating surgeon has the responsibility for managing the post-operative care of the patient (Indicator 7). Patients should be seen within 24 to 48 hours of surgery, and have a complete anterior segment examination performed to detect any complications at that time (AHCPR, 1993; American Academy of Ophthalmology, 1996; American College of Eye Surgeons, 1993) (Indicator 8). Similarly, regular follow-up exams are recommended, as is a dilated fundus examination within 90 post-operative days. However, recent data from a RAND/AHCPR-sponsored project indicates that this last
recommendation is rarely carried out in the community setting unless a patient complains of symptoms (Laouri et al., 1995). Thus, we make no recommendation regarding the advisability of a dilated fundus exam within the 90 day postoperative period. Finally, patients should be asked if the functional difficulty that spurred surgery improved within 90 days (Indicator 9).
REFERENCES


**RECOMMENDED QUALITY INDICATORS FOR CATARACTS**

The following indicators apply to men and women age 18 and older (except where otherwise specified).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Quality of Evidence</th>
<th>Literature</th>
<th>Benefits</th>
<th>Comments</th>
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<tr>
<td><strong>Screening</strong></td>
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<tr>
<td>1. Patients aged 55 and older presenting for non-urgent care should be asked annually if they are having difficulty with visual function.¹</td>
<td>III</td>
<td>Cataract Management Guideline Panel 1993; AAO, 1996; SGO, 1992; Laouri, et al., 1995</td>
<td>Improve visual functioning.</td>
<td>Determines those who might benefit from an eye evaluation and possible cataract management.</td>
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<td><strong>Diagnosis</strong></td>
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<td>2. Patients who report difficulty with visual function¹ should be offered a complete eye exam by an optometrist or ophthalmologist. This examination should be performed at least annually and should include all of the following: • visual acuity measurement • intraocular pressure measurement; • pupil exam; • motility exam; • slit lamp exam; • dilated fundus exam.²</td>
<td>II</td>
<td>Cataract Management Guideline Panel 1993; AAO, 1996; SGO, 1992; Lee, 1993; Laouri, et al., 1995</td>
<td>Improves visual functioning.</td>
<td>Determines if the visual difficulty is related to the cataract. Detects the presence of other diseases that may be treated to reduce the risk of blindness (e.g., diabetes).</td>
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<tr>
<td>3. Patients should be offered refraction in the operative eye within 4 months before surgery unless a prior refraction made no improvement in otherwise stable vision in the past two years.</td>
<td>III</td>
<td>Cataract Management Guideline Panel 1993; AAO, 1996; SGO, 1992; Lee, 1993; Laouri, et al., 1995</td>
<td>Improves visual functioning.</td>
<td>Determines if a non-surgical intervention may be successful in delaying the need for surgery.</td>
</tr>
<tr>
<td>Treatment</td>
<td>Indicator</td>
<td>Quality of Evidence</td>
<td>Literature</td>
<td>Benefits</td>
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<td>4. Patients with cataracts should be offered surgery if any of the following situations are present:</td>
<td>a. phacomorphic glaucoma; b. phacolytic glaucoma; c. lens-related uveitis; d. disrupted anterior lens capsule in otherwise phakic eye; e. cataract prevents adequate monitoring or treatment of glaucoma or diabetes.</td>
<td>III</td>
<td>Cataract Management Guideline Panel 1993; AAO, 1996; SGO, 1992; Lee, 1993</td>
<td>Prevent progression of disease.</td>
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<td>5. In the absence of a medical indication for cataract surgery, the ophthalmologist should offer cataract surgery only when both of the following conditions are met:</td>
<td>• the patient’s visual functioning is impaired; • there is either a normal fundus exam or a statement that the surgeon believes the patient’s visual function would improve after the surgery.</td>
<td>II</td>
<td>Cataract Management Guideline Panel 1993; AAO, 1996; SGO, 1992; Lee, 1993; Mangione, 1995; Mangione, 1994; Tielsch, 1995; Schein, 1995; Bernth-Petersen, 1981; Laouri, et al., 1995</td>
<td>Improve visual function.</td>
</tr>
<tr>
<td>6. YAG capsulotomy should not be offered unless one condition from each of the following categories is met:</td>
<td>• presence of opacity or impairment of the patient’s visual function; • there is either a normal fundus exam or a statement that the surgeon believes the patient’s visual function would improve after the surgery.</td>
<td>III</td>
<td>Cataract Management Guideline Panel 1993; AAO, 1996; SGO, 1992</td>
<td>Avoid surgical complications.</td>
</tr>
<tr>
<td>Follow-up</td>
<td>Indicator</td>
<td>Quality of Evidence</td>
<td>Literature</td>
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| 7.        | Within 90 days of surgery, the surgeon should do at least one of the following:  
|           | • examine the patient;  
|           | • refer the patient for further care;  
| 8.        | Within 48 hours of surgery, an optometrist or ophthalmologist should offer patients who have undergone cataract extraction a complete anterior segment eye examination, including all of the following:  
|           | • visual acuity measurement;  
|           | • intraocular pressure measurement;  
| 9.        | Patients who have undergone cataract extraction should have their visual functioning assessed within 90 days of surgery. | II | Cataract Management Guideline Panel 1993; AAO, 1996; SGO, 1992; Laouri, 1995 | Improve visual functioning. | Evaluates improvement after surgery. |
Definitions and Examples

1 Difficulties with or impairment of visual function include problems with glare, recreational activities, reading, driving, employment, IADLSs, ADLs, mobility.
2 Dilated fundus exam must include documentation of the: optic nerve, macula, vasculature, and retinal periphery.
3 Medical indications for cataract surgery:
   a. phacomorphic glaucoma;
   b. phacolytic glaucoma;
   c. lens-related uveitis;
   d. disrupted anterior lens capsule in otherwise phakic eye;
   e. cataract prevents adequate monitoring or treatment of glaucoma or diabetes.

Quality of Evidence Codes

I    RCT
II-1 Nonrandomized controlled trials
II-2 Cohort or case analysis
II-3 Multiple time series