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Editorial

Assessing Quality Metrics in Ophthalmic Surgery: A Standardized Approach

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Quality improvement is a continuous process that involves identifying processes or outcomes that are not optimal and implementing changes to make health care effective, safe, and patient-centered. The Plan-Do-Study-Act cycle is one of several quality improvement tools to support and improve the activities of quality management and improvement. It involves identification of a problem, collection of data to establish baseline occurrence, and development and implementation of a plan to address the problem followed by remeasurement of the frequency to gauge impact. The result of an intervention is used to modify or continue the initial plan and the cycle starts again. The step of identifying a problem can be made easier when standardized metrics are in place for health care processes and outcomes. Moreover, metrics enable benchmarking, i.e., comparison of results to institutional or national standards. Currently, in the field of ophthalmology, agreed-upon metrics and benchmarks are lacking in both standardized metrics for subspecialties as well as patient-reported outcomes. A standardized approach to establishing agreed-upon metrics and reporting of these would enable quality improvement efforts and allow both clinicians and patients to better understand their care.

The Accreditation Council for Graduate Medical Education requires that a graduate medical education program prepare residents and fellows in the domains of quality improvement and patient safety, with an emphasis on providing trainees with data on quality metrics and benchmarks related to their patients.[1] An emphasis on quality and safety in ophthalmology is also reflected in the American Board of Ophthalmology's decision to require a separate patient safety activity for the maintenance of certification.[2]

There are examples of physician- and patient-reported quality metrics to monitor the success of ophthalmic procedures. The Merit-based Incentive Payment System (MIPS) is a program administered by the Centers for Medicare and Medicaid Services to incentivize quality.[3] The MIPS has 4 requirements, i.e., quality, promoting interoperability, improvement activities, and cost. The MIPS includes 20 physician-reported measures for ophthalmic surgeries, such as complication rates after cataract surgery and rates of graft dislocation requiring surgical intervention following endothelial keratoplasty.[4] The MIPS has a well-defined process of developing quality measures that involves evaluating the performance gap, assessing feasibility of potential measures, gauging their reliability and validity, and comparing them to related and competing measures.[5] Reporting these has historically required individualized approaches to data collection, though the American Academy of Ophthalmology (Academy) IRIS® Registry (Intelligent Research in Sight) has more recently aided with MIPS compliance.[6]

The International Consortium for Health Outcomes Measurement has developed physician- and patient-reported measures for various ophthalmic surgeries using surveys and the modified Delphi technique among their working group members. These have not been employed broadly and a study found significant variation in the type and reporting timeline of postoperative outcome measures for cataract, cornea, glaucoma, strabismus, and oculoplastic procedures among 8 hospitals that used these metrics.[7] Patient-reported outcome measures recommended by the International Consortium for Health Outcomes Measurement for ophthalmology include the Catquest-9SF survey for cataract and the Impact of Vision Impairment survey for age-related macular degeneration.

There is a paucity of literature on standardized metrics by which we can measure the success of subspecialized ophthalmic surgeries at physician, institutional, and national levels. Metrics should consist of outcome and process metrics that are standardized across a variety of health care settings, including hospital-based outpatient department and ambulatory surgical centers.[8] Outcome metrics, such as improvement in visual acuity or development of a complication, are predefined end points that reflect the impact of the health care intervention on the health status of patients. Process metrics, such as conducting a surgical time-out prior to surgery, constitute actions performed by a physician to ensure quality and safety while treating a patient's condition. Unplanned return to the operating room has been used as a quality metric across various surgical specialties. In ophthalmic surgeries, this metric has been used to describe the success of cataract, vitreoretinal, and glaucoma surgeries.[9–11] Likewise, similar to postsurgical infection rates in other surgical subspecialties, endophthalmitis rates have been reported after various intraocular surgeries and procedures in ophthalmology.[12] A study by Zafar et al assessed both patient and physician level endophthalmitis rates following cataract surgery.[13,14] They report a national benchmark for postcataract surgery endophthalmitis rate that physicians and institutions can use to compare their own endophthalmitis rates and assess quality. Given the rarity of certain complications at the physician level, e.g., postoperative endophthalmitis, composite complication rates (multiple infrequent complications combined into a single metric) may serve as a valuable quality metric for the purposes of benchmarking.

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Table 1. Examples of Quality Metrics for Ophthalmic Surgeries

Procedure	Metric Type	Metric: What is Measured?
All procedures	Outcome	Unplanned return to operating room within 90 days[15]
	Outcome	Endophthalmitis within 6 wks[15]
	Process	Preoperative patient verification[16]
	Process	Preoperative surgery site marked[16]
Phacoemulsification	Outcome	Posterior capsular rupture and/or vitreous loss during surgery[15,17–19]
	Outcome	Descemet's detachment during surgery[18]
	Outcome	Dropped nucleus during surgery[15]
	Outcome	Unexpected zonular dialysis during surgery[15,17–19]
	Outcome	Iris damage during surgery[15,19]
	Outcome	Wrong intraocular lens implantation during surgery[15]
	Process	Confirmation of correct intraocular lens for the correct patient from the surgeon as part of surgical timeout and before opening the intraocular lens[16]
Penetrating keratoplasty	Outcome	Suprachoroidal hemorrhage during surgery[19]
	Outcome	Primary graft failure (failure of graft to clear within 8 wks after surgery)[19]
Endothelial keratoplasty	Outcome	Acute pupillary block on postoperative day 1[15]
	Outcome	Graft detachment requiring rebubble within 2 wks[15,19]
	Outcome	Primary graft failure within 8 wks[19]
Trabeculectomy or tube shunt	Outcome	Suprachoroidal hemorrhage within 90 days[15,18,19]
	Outcome	Blebitis within 90 days[15,19]
	Outcome	Hypotony with maculopathy or choroidal detachment within 90 days[15,19]
Adult primary rhegmatogenous retinal detachment and macular hole surgery	Outcome	Final retinal reattachment rate at 3 to 6 mos for primary rhegmatogenous retinal detachment surgery[7,18,19]
	Outcome	Single surgery retinal reattachment rate at 3 to 6 mos for macular hole surgery[18,19]
Strabismus surgery	Outcome	Globe penetration during surgery[15,18]
	Outcome	Diplopia in primary position at 6 mos[7,18,19]
Ptosis surgery	Outcome	Orbital hemorrhage with vision loss within 1 day of surgery[20]
	Outcome	Overcorrection of ptosis at 4 wks[21]

Many ophthalmology departments have Quality and Safety oversight committees within their larger quality programs. Examples of ophthalmology departments that publicly report quality metrics include Massachusetts Eye and Ear, Cole Eye Institute at Cleveland Clinic, John A. Moran Eye Center at the University of Utah, and Kellogg Eye Center at the University of Michigan. They measure a range of outcomes that are different from each other in most cases. Common metrics include rates of zonular dialysis and endophthalmitis after cataract surgery, and wound leak, suprachoroidal hemorrhage, and infection rates after glaucoma surgery. Table 1 outlines examples of quality metrics for commonly performed ophthalmic surgeries.[3,7,15–21] Analysis of these metrics, and comparison to internal and external benchmarks, has informed quality improvement projects in these institutions.[16] At the Kellogg Eye Center, monitoring complications resulted in the formulation of guidelines for alerting attending physicians of abnormalities on pupillary examination before dilation by a technician.[15] In addition, monitoring cases of wrong intraocular lens insertion led to the development of a safety protocol including an intraocular lens-specific "timeout" at 4 institutions across the United States.[22]

Accurate reporting and benchmarking require transparency around undesired outcomes; it is therefore important to protect ophthalmologists reporting these metrics. Efforts should be made to improve systems instead of penalizing individuals to encourage reporting without fear of professional or personal repercussion. Moreover, patient risk factors and complexity of a surgeon's practice must be considered while benchmarking. International classification of diseases codes can be used to identify the indication for surgery as well as systemic and ophthalmic comorbidities. Composite indices such as the Charlson Comorbidity Index, which is a commonly used indicator of mortality risk and disease burden, can be used for systemic diseases.[23] Accounting for social determinants of health is important for delivering equitable care and for understanding factors that can influence patient outcomes. Electronic health records (EHRs) can be used to adjust for some, although not all, of this.[24]

Electronic health records may also facilitate the collection of patient-reported outcome measures using automated patient questionnaires at appropriate intervals after different ophthalmic procedures. The workflow would need to take into consideration the procedure, patient's preferred contact information, choice of questionnaire, time intervals for sending the questionnaire to patients and follow-up, receipt of questionnaires, and scoring of responses. Patient-reported outcome measures data can be used at the individual level to provide feedback to the surgeon, but also, in aggregate, to establish benchmarks around expected patient improvement.[25]

Although intrainstitutional benchmarking may be valuable, with the expansion of clinical registries and increasing use of big data in ophthalmology, national standards to compare quality across physicians and institutions are

increasingly possible. Registries can be used to create benchmarks for all ophthalmic surgeries. The Academy IRIS Registry is the largest clinical data repository for Ophthalmology.[26] The IRIS Registry serves as the reporting tool for MIPS, and practices have the option to link their EHR directly, which makes reporting more efficient. The Academy developed an IRIS Registry dashboard for physicians based on Centers for Medicare and Medicaid Services-approved quality measures for ophthalmology in 2014. The IRIS Registry dashboard allows interinstitutional comparison and creation of personalized performance reports for surgeons to help guide their future practice. Furthermore, data from the IRIS Registry can be used to design interventions and monitor subsequent outcomes. For example, a recent study using the IRIS Registry found that patients undergoing immediate sequential bilateral cataract surgery do not have an increased risk of endophthalmitis.[27] Another example of a clinical registry in ophthalmology that can be used to monitor quality outcomes is the Sight Outcomes Research Collaborative (SOURCE™).[28] SOURCE™, established by the University of Michigan, is a consortium of academic ophthalmology departments sharing deidentified EHR and ocular imaging data with researchers at participating sites. The IRIS Registry houses a large amount of data with > 13 000 clinicians registered to contribute data electronically. The IRIS Registry is also working on integrating imaging and free text data into its database. The SOURCE™ repository comprises 14 academic institutions that use EPIC EHR, and the data includes imaging metadata and measurements as well as examination elements from medical reports.

Using tools such as the Delphi technique, which is a structured method of consensus-building among experts, subspecialty societies may leverage their position as a collective body of national experts to develop consensus and identify important processes and outcome metrics for commonly performed procedures. Members of subspecialty societies may write to the society leadership to form a task force comprising quality improvement leaders from their field to address this important issue. In these processes, societies should take into consideration the ease of extracting data for varying metrics; metrics that can be examined through automated extraction from the EHR are more likely to be adopted.

Creating standardized metrics for subspecialized surgeries are a means to an end. Ko et al suggest that data may not be the most prominent component of improvement activity, and that resources, skills, and expertise for improvement need to be supported, and tools are needed for small-scale surgical improvement.[29] They also propose a framework for quality improvement activities, which includes problem detailing, goal specification, strategic planning, evaluation, knowledge acquisition, end of project decision-making, data factors, stakeholder involvement, improvement team factors, and contextual factors.[30]

A standardized set of global as well as subspecialty-specific metrics for ophthalmology, including physician- and patient- reported metrics, would allow for richer quality improvement programs and a better understanding of the gaps in the care we provide. Developing consensus on standardized quality metrics is an important milestone needed to advance quality improvement in our field.

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Abbreviations and Acronyms:

EHR = electronic health recordIRIS Registry = Intelligent Research in SightMIPS = Merit-based Incentive Payment SystemSOURCE™ = Sight Outcomes Research Collaborative

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