

Online Surgical Outcome Database to Improve Resident Cataract Surgery Performance

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Setting and Problem

Mastery of cataract extraction and intraocular lens placement (CE/IOL) is an important requirement of ophthalmology residency. Residents must learn microsurgical technique, clinical optics, and management of complications to give patients the best refractive outcome and, ultimately, the best postoperative vision. We sought to improve patient outcomes from resident CE/IOL cases by creating an online database tool to track several clinical parameters and provide residents with feedback on their surgical results.

Intervention

We developed a cataract outcome database software called Insight, using the Ruby on Rails web application language, MySQL database engine, and Linux application servers. This web-based application (FIGURE) allows residents to enter several preoperative variables: medical record number, date of surgery, supervising attending, preoperative visual acuity, and planned refractive outcome. At the 1-month postoperative visit, residents can enter the following information: (1) best corrected visual acuity, (2) postoperative refraction, and (3) presence of any complications (ie, posterior capsule rupture and endophthalmitis). With these data, Insight provides residents with individualized reports of his or her outcomes, including information such as the mean difference between planned and actual refraction and the endophthalmitis rate. It also provides institution-wide statistics, including total endophthalmitis rate and total capsule rupture rate.

Outcomes to Date

For an initial pilot, we provided each of the 21 ophthalmology residents at the Kresge Eye Institute (Detroit, Michigan) access to Insight. Residents were instructed to log every CE/IOL they performed as primary surgeon for the first 6 months of the 2013–2014 academic year. A total of 226 cataract surgeries were recorded during the pilot.

The capsule rupture rate for this time period was 3.53% (8 cases) and there were no cases of endophthalmitis. The average preoperative vision was 20/263, and the average postoperative vision was 20/23. Mean

target refraction was -0.32 spherical diopters. Residents averaged a $+0.11$ diopter shift from their target refraction and had a mean astigmatism of $+0.44$ diopters.

Use of the Insight software allowed us to gain valuable information about resident surgical performance. The rates of posterior capsule rupture in our sample were lower than national average of 4.5%–6.7%. To the authors' knowledge, no study to date has reported the refractive outcomes of resident cataract surgeries, presumably due to the difficulty of acquiring and analyzing the data. Our outcome database application makes such analysis easy. We also found that residents reported a negligible hyperopic shift. However, reported postoperative astigmatism are approaching visual significance, suggesting residents may benefit from additional instruction on astigmatism reduction techniques such as premium toric intraocular lenses and limbal relaxing incisions.

Our initial pilot has several limitations. Insight relies on resident self-report, and there may be reporting bias. We also met resistance from some residents who, when polled, cited time required to look up postoperative outcome data and the burden of “double logging” the surgical cases in Insight and the Accreditation Council for Graduate Medical Education case log as barriers to data entry. Review of access logs indicated residents were consistently able to enter a case in less than 30 seconds. This does not include time to locate the required information in the electronic health record (EHR).

To address data entry compliance, we encourage residents to enter data into Insight immediately after seeing a patient for their 1-month postoperative visit. Also, by creating direct links to Insight on all clinic computers, we hope to encourage use of Insight in real-time. Our ultimate goal is to work with medical informatics and have outcome variables automatically populated into Insight directly from the EHR.

We believe online tracking of outcomes is applicable to fields beyond ophthalmology. Any procedure with measurable results or specific complications may benefit from a similar application. Residents would then receive reports on their personal performance, and those with lower performance could be guided in improving their technique.

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Surgical Outcomes - Cataract Surgery

Please fill out this form for each CE/IOL pt at their 1 month follow up

* Required

Pre-Operative Information

Patient ID Number *

Date of Surgery *

Assisted By / Attending

Pre-Op Visual Acuity

Planned Refractive Outcome

Notes

Private Notes (only you can see these notes)

Add Case

Cancel

Post-Operative Information

Best Corrected Visual Acuity

Post-op Refraction

Capsule Broken?

☐ Yes

☐ No

Endophthalmitis?

☐ Yes

☐ No

FIGURE

SCREENSHOT FROM INSIGHT DEMONSTRATING THE MAIN FORM USED BY RESIDENTS TO ENTER CATARACT OUTCOME DATA

We plan to further incorporate Insight into our surgical curriculum. Residents will complete periodic self-evaluations, in which they review their outcome data, compare their performance to others, and identify areas for improvement. Faculty also will receive reports on complication rates and outcomes for resident cases they supervise, and will use this information to refine surgical teaching. We have made Insight freely available for anyone to use at <http://www.insight.so>. If used by other ophthalmology programs, Insight could become a powerful tool to improve education and patient outcomes.

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