BIG DATA, BIG POSSIBILITIES

A look at how the Cole Eye Institute uses EHR systems to its advantage.

BY SRUTHI AREPALLI, MD; ALEKSANDRA RACHITSKAYA, MD; AND RISHI SINGH, MD



The integration of electronic health record (EHR) systems into clinical ophthalmology practice has become widespread. With an emphasis on efficient, concise documentation, EHR systems provide a compact, storable, and portable access point for patient records and clinician review, allowing transparent care and open communication between subspecialties and within departments. Moreover, it provides a unique tool to retrieve data for clinical projects and research—be it an ongoing trial, a retrospective review, a clinical project, or a quality improvement study. EHR systems are immediately accessible and allow health care professionals to harvest multiple data points simultaneously, which dramatically reduces the time required for manual chart review.

At the Cole Eye Institute, an EHR system was first implemented in 2012, with multiple, ongoing revisions undertaken since then to ease workflow, amplify clinician productivity, and increase accurate documentation.[1,2] Certain incorporated parameters increase not only the utility of the system, but also its use for research purposes. EHRs can be used both for retrospective case series and for identifying patients who might be candidates for ongoing clinical studies.

For example, a current medication review checkpoint requires verification at each office visit. This becomes important when analyzing records for medication-related ocular events or responses to treatment, as the clinician can verify a medication that was in use at a particular point in time. Moreover, a straightforward query through the EHR system yields a list of patients taking the medication in question.

Recently, we conducted a study looking at the ocular hemorrhagic events in patients on newer anticoagulation and antiplatelet therapies. A database-wide search revealed patients currently using certain anticoagulation drugs by searching their medication lists. These charts were then cross-referenced by looking for keywords such as "hemorrhage," "bleeding," and "heme" to narrow down the charts for possible instances of ocular hemorrhage on these medications. Without such EHR search functions, collecting the data would be an arduous and time-consuming task.

Queries can be performed based on both diagnosis via ICD codes and procedures/surgeries via CPT codes. For example, a query can identify patients who received an intravitreal anti-infective injection in 2016 at a single location (Figure 1). In the query, the tabs across the top of the figure organize the patient information by medical record number, site of care, provider name, and encounter date. These metrics can be imported into Excel and filtered based on the data available.

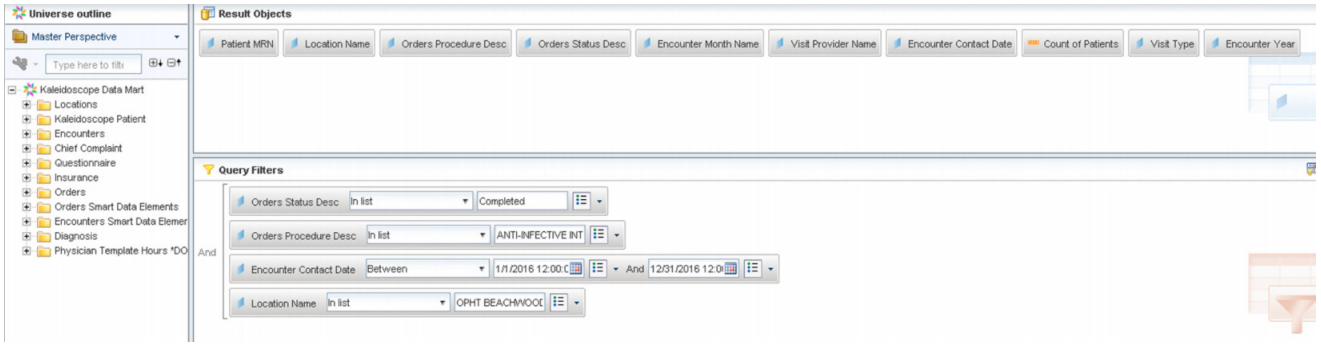

Figure 1. An example of a query for intravitreal anti-infective injections given at a single Cleveland Clinic Cole Eye Center location through the year 2016. These results can be imported into an Excel file and further arranged based on various parameters.

A simple query of diagnostic, surgical, or procedural codes can yield a significant number of qualified patients for possible inclusion in a clinical trial that is recruiting patients. This has the added benefit of providing study participation opportunities to patients who might not be seen frequently in clinic, such as those with non-exudative AMD. While review of the chart in its entirety is required to verify that a patient qualifies for the study, the EHR system provides a valuable starting point.

The EHR also incorporates discrete documentation.[1] During a clinical encounter, discrete documentation requires the clinic to select from a predetermined set of choices when interpreting diagnostic imaging. Additionally, the physician must assess if there is worsening, improvement, or stability of the disease process. This not only helps to eliminate inherent reporting bias, but also allows for the analysis of outcomes in broad, predetermined categories. For example, when analyzing optical coherence tomography (OCT) scans for patients with diabetic macular edema, the clinician must select certain choices such as intraretinal fluid, subretinal fluid, or ellipsoid zone loss and document if the pathology is better, stable, or worsened compared with the patient's previous visit (Figure 2). This requirement allows collection of data in an automated approach.

By utilizing EHR systems, data collection and analysis can be conducted on a much larger scale than a single institution or practice. In 2014, the American Academy of Ophthalmology (AAO) created the Intelligent Research in Sight (IRIS) registry. This registry is the first nationwide, comprehensive database available to all ophthalmologists in the AAO. As of January 2016, more than 20 million patients were included, with 70 million office visits recorded and 12,000 physicians participating. Such a large population base allows an impressive retrospective review, much larger than would be possible at a single institution. Examples of this include analysis for surgical complications, such as the frequency of endophthalmitis following cataract surgery.[3] Practice patterns can also be analyzed, revealing the tendency to utilize certain diagnostic procedures or imaging studies in particular diseases.

EHR systems allow identification of potential clinical trial patients and retrospective chart analyses. Although each chart requires clinician review to ensure that the proper inclusion or exclusion criteria are met, EHR systems have eased the burden of time for obtaining and reviewing individual paper charts manually. Utilizing the EHR can not only aid in effective documentation during each clinical visit, but it can also create opportunities for larger future analyses. ■

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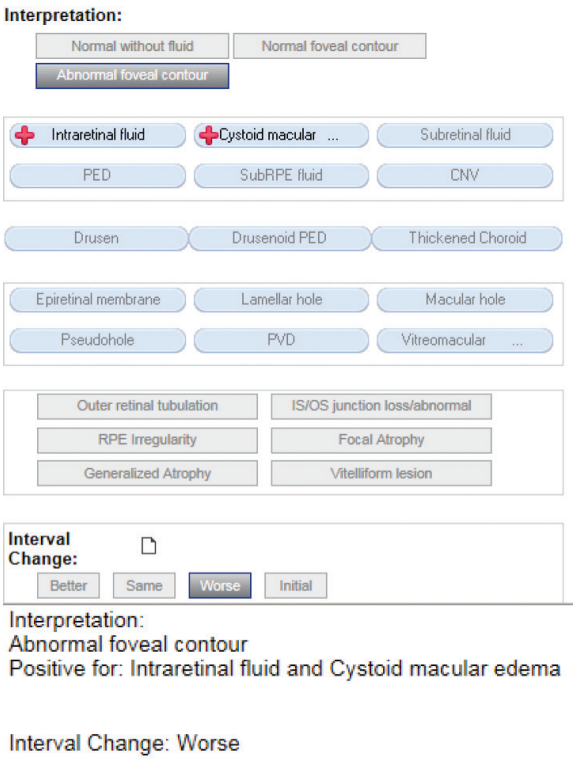

Figure 2. An example of discrete documentation. While interpreting a macular OCT, the clinician is required comment on the foveal contour and various other aspects, such as the presence or absence of intraretinal fluid. The clinician is then required to grade the interim change as better, stable, or worse.

Sruthi Arepalli, MD
- ophthalmology resident, Cole Eye Institute, Cleveland Clinic Foundation, Cleveland
- financial disclosure: none
- sruthiarepalli@gmail.com

Aleksandra Rachitskaya, MD
- vitreoretinal physician, Cole Eye Institute, Cleveland Clinic Foundation; and assistant professor of ophthalmology, Cleveland Clinic Lerner College of Medicine; all in Cleveland
- financial disclosure: consultant, Allergan
- rachita@ccf.org

Rishi Singh, MD
- staff physician and medical director, clinical systems office, Cole Eye Institute, Cleveland Clinic Foundation; associate professor of ophthalmology, Case Western Reserve University; president of the Retina World Congress; all in Cleveland
- financial disclosure: researcher, Alcon, Apellis, Genentech, Regeneron; consultant, Allergan, Genentech, Optos, Regeneron, Shire, Zeiss
- drrishisingh@gmail.com