Diagnose Uveitis

By Andrew Reynolds, MD; David Tremblay, MD; and George N. Magrath, MD

The uveitides are a diverse and heterogeneous group of diseases that involve inflammation anywhere along the uveal tract or inflammation of adjacent ocular structures. The diagnosis can be elusive, and the differential often includes infection, systemic inflammatory disease, localized eye inflammatory disease, masquerade syndromes, and idiopathic causes. In fact, 28 major uveitic disease entities were identified by the Standard Uveitis Nomenclature working group. Differentiating among these entities can be laborious and expensive, but the underlying causes have vastly differing morbidity and mortality as well as treatment paradigms.

There are significant public health interests as well: In the United States, it is estimated that there are close to 40 000 new cases of uveitis per year and that 10% to 15% of blindness is due to uveitis. In an era increasingly defined by containing health care costs, the "shotgun" approach is fast becoming obsolete. Ophthalmologists need a focused, targeted approach that balances efficiency and effectiveness. Minimizing workup not only saves health care dollars but also ultimately benefits patients by subjecting them to fewer tests and further unwarranted workups in the face of ambiguous results.

In order to serve this purpose, we created Diagnose Uveitis, a simple and efficient application available on multiple platforms to aid in the diagnosis and laboratory evaluation of patients with uveitis. The app works well as an on-call tool for young residents, where it functions as an excellent teaching resource, but would fit equally well into an experienced ophthalmologist's busy practice, where the efficiency and time-saving features of the app would excel.

DIAGNOSE UVEITIS

The Diagnose Uveitis app was designed, developed, and tested entirely in-house by residents at the Storm Eye Institute under the guidance of the faculty. It is designed to take a few pertinent history and examination findings and deliver a succinct yet inclusive differential diagnosis. Although somewhat dependent on the user's responses, the app generally asks about 4 to 6 questions regarding demographics; prompts a brief review of systems focused on the most common uveitis-associated symptomatology; and the location, duration, and severity of the inflammation. The app then constructs a differential diagnosis of 4 to 10 diseases as well as a list of recommended testing.

We have found that, on average, Diagnose Uveitis takes about 25 seconds to both input data and produce its differential and testing recommendations. This is quick enough to be an effective examination companion and makes the app highly functional even in a busy clinic. The app is generally governed by a few underlying ideals. It focuses on identifying infectious causes of uveitis such as tuberculosis and syphilis, given that these diseases have both markedly different treatment protocols compared with the other inflammatory causes of uveitis and relatively higher likelihood of systemic morbidity and mortality. The app also favors specific labs over the less-specific inflammatory screening labs such as erythrocyte sedimentation rate and

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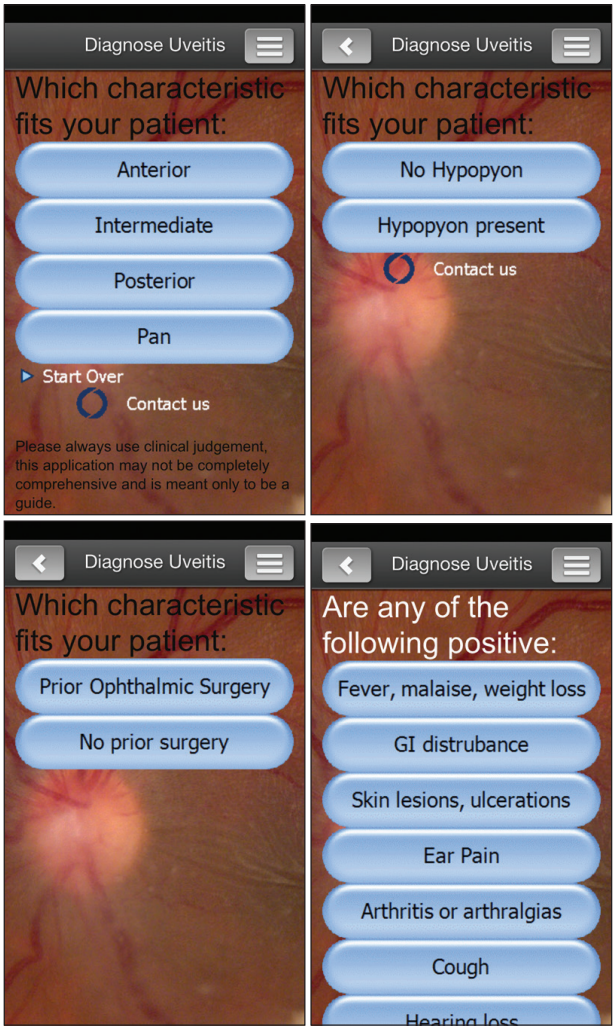

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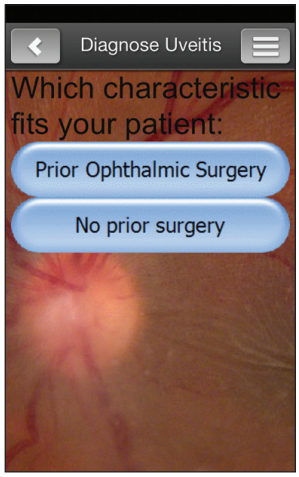
C-reactive protein, which rarely aid in procuring a final diagnosis.



After the user's responses are entered, the app constructs a differential diagnosis of 4 to 10 diseases as well as a list of recommended testing.

CLINICAL PERFORMANCE

In a pilot study conducted at our institution, Diagnose Uveitis performed extremely well on all metrics investigated. First, the app needed to be inclusive. In this regard, the app delivered. When run on uveitis clinic patients in our tertiary care referral center, the app correctly included the ultimate diagnosis in its differential in 96% of cases. After proving its effectiveness, we looked at its cost-saving capabilities. When we compared the app's testing recommendations with physician-ordered labs, we found that laboratory testing decreased by 25% and lab costs by 20%. However, we suspect that cost savings could be even greater if one were to look at impact of disease, as an undiagnosed or incorrectly diagnosed patient will require more clinic visits, testing, and treatment than 1 who is properly identified.

AVAILABILITY AND FUTURE DIRECTION

Two versions of Diagnose Uveitis are currently available: (1) a web-based version accessible on our website, www.diagnoseuveitis.com, with any standard web browser and (2) an iPhone and iPad app available in the iTunes App Store. The iPhone and iPad version was developed in objective-C for iOS and grants users access to the app's functionality without requiring an Internet connection. A version for Android devices is currently in development as well. We plan to incorporate additional modules into the app to aid in the diagnosis of other common ocular diseases. ■

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