Geographical Nationwide Mapping of Diabetic Retinopathy Using Teleretinal Screening

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Background
- The prevalence of diabetes is expected to increase from 27.8 million in 2007 to 60.7 million in 2030.1
- Diabetic retinopathy is the leading cause of blindness in younger cases in the United States.2
- AAO guidelines stipulate that individuals with Type 1 diabetes should receive annual screenings within 5 years of onset and those with Type 2 diabetes should receive annual screenings immediately following diagnosis.3
- Teleretinal screening is a well-established method to effectively screen patients with diabetic retinopathy1 and begins at the point of care from a primary physician’s office, where the image is uploaded to a cloud-based platform and evaluated by an eye-care specialist for pathology.

Methods
- Retrospective review of retinal images taken in primary care physician offices and uploaded to the cloud-based Intelligent Retinal Imaging System at 286 locations over 30 states.
- Deidentified patient data was accessed from IRS from June 2013 to November 2017.
- Total number of patients screened, prevalence of any diabetic retinopathy (DR) and diabetic macular edema (DME) at each camera location, and within each state was calculated.
- By using the zip codes of the camera location, rates of DR were mapped within each state and nationally.

Figure 2: Prevalence of Diabetic Retinopathy Aggregated from Teleretinal Screening Cameras from 2013-2017

Results
- A total 330,012 patients were screened for DR.
- National prevalence of DR was 26.3% (61,960/330,012).
- Of those, 224,842 patients were screened for DME as well.
- National prevalence of DME was 5.7% (12,862/224,842).
- Number of exams performed and prevalence rates of DR and DME for each state are shown in Figure 1.

A nationwide map showing rates of DR are shown in Figure 2. States with the highest prevalence of DR are ND, RI, TN, SC, and TX.

Conclusions
- By aggregating data from teleretinal cameras across multiple geographical locations, there is the potential to compare differing rates of diabetic retinopathy across different parts of the country.
- Currently, wide variability exists in the number of images taken within each state and is likely related to the number and amount of time cameras have been in use. It is possible that a wider network of cameras across differing populations may result in more accurate assessment of DR and DME prevalence at the county, state, and national level.
- Strategic placement of cameras may help identify where diabetic disease is more prevalent. This information may be useful to physicians, epidemiologists, policy makers or other stakeholders who determine how and where resources get allocated.
- By combining this data with other demographic and socioeconomic information, we could potentially identify areas in need of care in the form of health care infrastructure, transportation services, etc.
- Integrating data from this clinic with others who utilize teleretinal screening can help in identifying geographic markers that could be linked to diabetic retinopathy.
- Limitations of this study include lack of widespread implementation of teleretinal screening, the possibility of the same patient being screened multiple times, patient movement across populations, and having multiple graders across cameras.

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Literature cited