



Addressing Health Equity With a High-Risk Underserved Patient Population Using Autonomous AI

Diagnosing Diabetic Retinopathy in Primary Care During the COVID Pandemic

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The Medical Care Facility

Cahaba Medical Care is a Federally Qualified Health Center (FQHC) that sees a high-risk patient population.

Cahaba Medical Care is a Federally Qualified Health Center (FQHC) and a Patient-Centered Medical Home (PCMH) that delivers care to some of the most underserved areas of central Alabama including Bibb, Perry, Chilton, and Jefferson Counties.

With patients in both rural and urban settings, 95.5% of patients who reported their income are at or below 200% of the federal poverty guideline (see figure 1). Additionally 54% of the patient population is classified as a racial and/or ethnic minority.

Understanding the population they serve, Cahaba has made it their mission to provide high quality and compassionate primary and preventative healthcare for all ages and conditions regardless of ability to pay or insurance status.

At Cahaba 15.9% (2,724) of patients had a diagnosis of diabetes, compared with 14.6% in the state of Alabama and 13.0% nationally. Many of the patients served by Cahaba have multiple chronic conditions, which means that chronic condition management is even more complex.

Figure 1. Federal Poverty Level (FPL) and Cahaba Patient Population: 95% of patients at Cahaba are at or below 200% FPL

Low income line	95% of patients at or below 200% of Federal Poverty Guideline	Federal Poverty Guidelines:
		Family 2 \$17,420
Poverty line	30% of patients between poverty line and low income line	Family 3 \$21,960
	17% of patients below poverty line	Family 4 \$26,500

Impact Summary

In an already at-risk population:

 1 in 4

1 in 4 are susceptible to going blind unnecessarily due to diabetes

- Prevalence of diabetes exceeds both national and Alabama averages
- Adherence to annual eye exams for diabetes is low

After just 90 days of LumineticsCore addition:

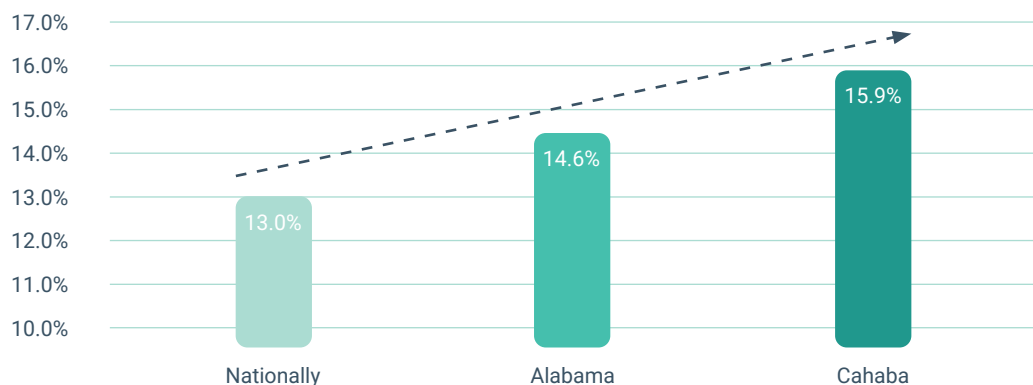
 1 in 3

1 in 3 patients with diabetes had referable levels of diabetic retinopathy

- Improved patient access occurred

Since the onset of COVID-19, Cahaba opened Respiratory Virus Evaluation Clinics, provided onsite and curbside testing and vaccinations, telehealth and home healthcare visits. They became a major distribution site for COVID-19 testing and vaccinations, providing 51,608 COVID-19 tests as of October 2021.

Figure 2. Percentage of adults with diabetes



The Problem

Preventing diabetic retinopathy is a major access to care problem in this underserved population.

Diabetic retinopathy (DR) and diabetic macular edema (DME) are complications of diabetes. Across the nation, about one in three people with diabetes has DR. DR is the leading cause of blindness in the United States and early detection can prevent disease progression.

Annual eye exams are recommended for people with diabetes, which typically means another medical visit. Access to an eye exam requires scheduling with a specialist, transportation, potential need for childcare, time away from work and other logistics. In a population who is already underserved and not accessing care, an additional visit to a specialist is nearly impossible. Only complicated by the fact that many Alabama communities are isolated from eye care services.

Access to care and issues around health equity have been further exacerbated by COVID. It is difficult enough to get patients into primary care for COVID testing and vaccines, an additional visit to a specialist has become near impossible.



We see patients not completing their annual diabetic eye exams due to overall understanding of importance, busyness of life, transportation issues, lack of insurance or just general non-participation in all forms of outside testing.

John B. Waits, MD, FAAFP
Cahaba Medical Care
Chief Executive Officer

Earlier attempts to bring DR diagnoses into the care setting using remote reading networks did not meaningfully move the needle.

In 2019 Cahaba made its first foray into bringing the diagnosis of DR into the primary care setting. Fundus imaging cameras were purchased for the Cahaba primary care offices and introduced into the clinic workflow with a remote reading network. The idea was the patient would receive the exam in the primary care setting, go home and receive a result and follow-up call when available.

More specifically, when patients presented for routine diabetes related care, medical assistants captured retinal images using the fundus imaging system, uploaded the images via a docking station to be sent to a remote eye care specialist for evaluation. Once results were made available in a secure portal, clinical

staff logged back in, manually pulled the results, updated the patient's chart in the EHR, and phoned the patient with results and next steps if indicated.

The system was difficult to operationalize because it required multiple steps that diverged from standard clinical workflow. Also, reads frequently came back non-satisfactory and staff would not be aware until well after the patient had left, therefore requiring callbacks and rescheduling. Usage of the system quickly diminished.

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At Cahaba, despite innovations in remote reading networks, testing rates remained as low as 17% to 35% at each clinic location. This is compared to the national average of 50%-57% depending on population.

The Solution

Implementation of autonomous AI highlights the potential to improve access for at-risk populations.

Cahaba transitioned from the fundus camera and remote reading center combination to LumineticsCore®, a fully autonomous AI system that is FDA cleared using the De Novo pathway.

LumineticsCore consists of a fundus camera coupled with AI software and provides a diagnostic result at the point-of-care, without the need for a specialist or remote reading network to interpret the image.

The value of point-of-care AI retinal testing

1. The service represented by LumineticsCore is a complete service and includes image acquisition guidance, quality checks as well as individualized per-patient results at the point-of-care
2. Flexible workflows are less onerous on staff as the exam is provided utilizing existing clinic operations
3. Point-of-care diagnostics improve the ability to deliver comprehensive diabetes care management



An immediate point-of-care result is great to close the communication loop with the patient. The more you can get done when the patient is at the visit the better.

John B. Waits, MD, FAAFP | Cahaba Medical Care |
Chief Executive Officer



Outcomes

Within 90 days, LumineticsCore diagnosed one out of every three people tested with DR, which would have otherwise gone undetected.

From April to end of June 2021, LumineticsCore was implemented at the Cahaba locations in Bessemer, Ensley, Fairfield, Maplesville, Marion, and Woodstock, Alabama.

Patients were identified as needing LumineticsCore exams through existing electronic health record flags, monthly quality reports or during provider visits. Exams were scheduled with or near existing office visits.

To ensure complete gap closure, for those needing follow-up with eye care, patients were provided direct referrals including a follow-up coordination to ensure patient follow through with their appointments. Additionally, collaborations with local eye care were established ensuring patients receive vision saving treatment in a timely manner.

Figure 3: 90 day post-implementation testing data

	Cahaba - Bessemer	Cahaba - Ensley	Total across both clinics
Population with diabetes	529	272	801
Total LumineticsCore exams completed in 90 days	73	32	105
Case positivity rate for vision threatening disease identified with LumineticsCore	20 (27.4%)	10 (31.3%)	30 (28.6%)

Impacts

30 people were found to have vision-threatening disease that may have gone undetected without the LumineticsCore point-of-care system.

Across both Bessemer and Ensley, over 800 people live with diabetes. **In an already at-risk population, over 1 in 4 are susceptible to going blind unnecessarily due to diabetic retinopathy.**

Within the first 90 days, over 100 exams were conducted and 28.6% were found to have positive signs of disease.

Working to close a meaningful care gap, such as the eye exam for diabetes measure, can prevent blindness directly impacting a patient's quality of life.

Patients with access issues are most vulnerable and at risk of developing diabetes. That same population has a higher prevalence of severe cases of diabetic retinopathy. Bringing point-of-care retinal testing with immediate results to meet the patient at primary care locations can help address health equity issues and disparities in care by expanding access to those most vulnerable, which is especially important during the global pandemic.

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If the rate of testing continues through the remainder of the year, adherence rates with the annual eye exam would almost double.

Digital Diagnostics' first FDA De Novo cleared product is the AI diagnostic platform, called LumineticsCore. LumineticsCore detects diabetic retinopathy at the point-of-care without physician oversight and is deployed across the globe in healthcare settings. Visit [digitaldiagnostics.com](https://www.digitaldiagnostics.com) to learn more about the Digital Diagnostics platform.

Federally Qualified Health Centers are community-based health care providers that receive funds from the HRSA Health Center Program to provide primary care services in underserved areas. <https://www.hrsa.gov>

Cahaba has received accreditation as a Patient-Centered Medical Home by the National Committee for Quality Assurance (NCQA) and Joint Commission.

American Diabetes Association. (2020, February). The Burden of Diabetes in Alabama.

Centers for Disease Control and Prevention. National Diabetes Statistics Report, 2020. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Dept of Health and Human Services; 2020. <https://www.cdc.gov/visionhealth/>

A survey of Alabama eye care providers in 2010–2011 Paul A MacLennan, Gerald McGwin, Jr, Karen Searcey, Cynthia Owsley BMC Ophthalmol. 2014; 14: 44. Published online 2014 Apr 3. doi: 10.1186/1471-2415-14-44

<https://www.ncqa.org/hedis/measures/comprehensive-diabetes-care/>

Lundeen EA, Wittenborn J, Benoit SR, Saaddine J. Disparities in Receipt of Eye Exams Among Medicare Part B Fee-for-Service Beneficiaries with Diabetes — United States, 2017. MMWR Morb Mortal Wkly Rep 2019;68:1020–1023. doi: <http://dx.doi.org/10.15585/mmwr.mm6845a3>