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Autonomous AI Improves Rates of Annual Eye Exams for Diabetes (EED) and Reduces Time-to-Follow-Up in a Complex Population

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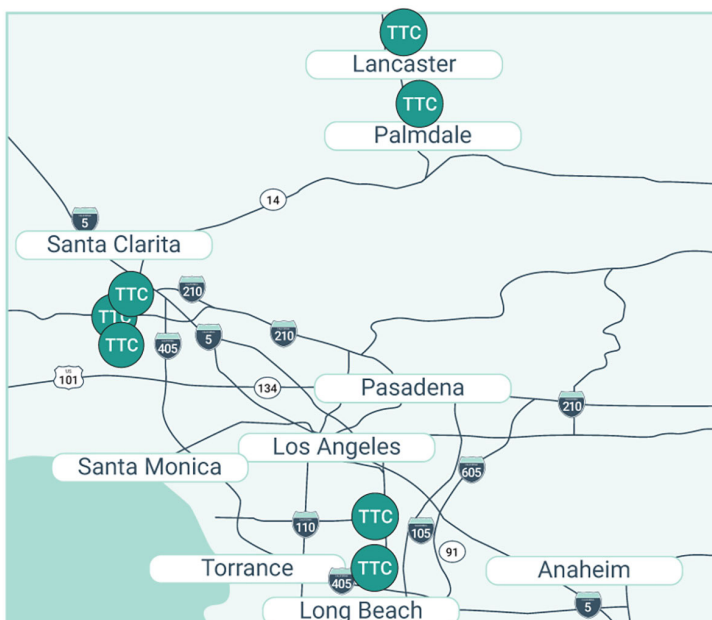
The Medical Care Facility

About Tarzana Treatment Centers, Inc. (TTC): Providing behavioral and medical care to diverse patient population with complex medical needs in Los Angeles County

Tarzana Treatment Centers, Inc. (TTC) provides community-based treatment and services to over 33,000 patients with complex medical needs throughout Los Angeles County (see Figure 1). Of the total patient population, 51% access primary care services, 36% are in substance use disorder programs, 11% receive services in mental health programs, and 2% are in HIV/AIDS programs.

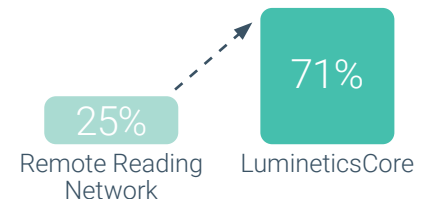
Most patients seen at TTC are Hispanic or Latino (70%). More than half of patients report household incomes less than \$24,999 (at or below the Federal Poverty Level, FPL). Food insecurity, affordable and stable housing, and lack of transportation are persistent challenges.¹

Figure 1. TTC Locations in the Greater Los Angeles Area

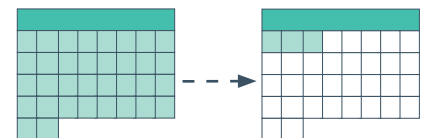


Impact Summary

Rates for eye exams for diabetes (EED) improved at one clinic from 25% with a remote reading network to 71% with autonomous AI in 9 months.



Time-to-follow-up with an eyecare specialist reduced from 1 to 2 months with a remote reading network to 3 to 5 days with autonomous AI.



Case report reduction in HbA1c from 11.8% to 8.9%.

1 in 4

Referable diabetic retinopathy identified with autonomous AI in 1 out of every 4 patients

Annual Eye Exams for Diabetes (EED) Present an Access to Care Problem

TTC's six primary care clinics serve more than 1,200 patients diagnosed with diabetes living in the greater Los Angeles area. These patients face a myriad of socioeconomic challenges that foster poor health outcomes, including lack of access to an annual eye exam for diabetes (EED). Diabetic retinopathy is a complication of diabetes and the leading cause of blindness in working age adults.² Vision loss related to diabetes is preventable with early detection, timely treatment, and appropriate follow-up care.³ The American Diabetes Association (ADA) and the American Academy of Ophthalmology (AAO) recommend that people with a diagnosis of diabetes receive an EED annually.^{2,3} Completing the annual EED often requires an additional visit to an eyecare specialist leading to more time off work, and further transportation and other logistical considerations. The additional visit to an

eyecare specialist represents an access to care problem for an already complex and vulnerable population.



For patients to take any time off work for an additional visit to eyecare could be very detrimental financially for their household.

Nicholas Hermann, PA-C
Medical Champion
Tarzana Treatment Centers

Bringing the Eye Exam for Diabetes (EED) into the Primary Care Clinics

Remote Reading Network & Imaging at Point-of-Care

In 2013, TTC added a remote reading network solution to complete annual EED at the primary care clinics. The patient presented for a routine appointment and retinal photos were captured by a medical assistant. The medical assistant uploaded the images to be read remotely by an eyecare specialist and results were returned to a secure portal in three to five business days. The medical assistant would then access the

secure portal, manually upload the results to the electronic health record, and contact the patients with the results. The entire process, including time-to-follow-up with an eyecare specialist when indicated, took one to two months. Time-to-follow-up in this case means time to schedule an appointment for referable diabetic retinopathy.

The Solution

Autonomous AI Imaging, Analytics, & Report at Point-of-Care

In September 2022, all six TTC primary care clinics moved from remote reading networks to autonomous AI with LumineticsCore®. LumineticsCore is the first FDA cleared fully autonomous AI system for the diagnosis of diabetic retinopathy at the point-of-care.⁴ The patient presents for a routine appointment and retinal photos are captured by a medical assistant. The system conducts quality control analysis to ensure effective bilateral and image quality. The autonomous AI provides review and interpretation and generates an individual patient report. The diagnostic results are provided during the patient visit and fully integrated with electronic health records. The autonomous AI system creators assume liability arising from system failure or misdiagnosis. If indicated, the patient is provided a referral to an eyecare specialist at the point-of-care.



Aggregate Performance Across all Six TTC Primary Care Clinics

There are more than 1,850 patients diagnosed with diabetes across all six TTC primary care clinics. In 2022, TTC set a goal of 50% completion rate for annual EED . Overall rates for EED across the six primary care clinics improved from 37% (511 out of 1,398 patients) in Q2 2022 with remote reading networks to 47% (875 out of 1,875 patients) in Q4 2022 with autonomous AI. As of time of writing, all clinics were on track to exceed the goal of 50% in 2023 (see Figure 2) .

One out of every four patients completing an annual EED with autonomous AI was found to have referable diabetic retinopathy that may have otherwise gone missed. Time-to-follow-up for scheduling with an eyecare specialist for potentially vision-saving treatment was reduced from one to two months with a remote reading network to three to five days with autonomous AI, (see Figure 3).

Figure 2. Performance Across all Six TTC Clinics with Point-of-Care EED Solutions

Across all Six TTC clinics	Remote Reading Network (Q2 2022)	Autonomous AI (Q4 2022)
Rates for EED	37%	47%
Time-to-follow-up with an eyecare specialist*	1 - 2 months	3 - 5 days

*Time-to-follow-up describes time to schedule an appointment for referable diabetic retinopathy with an eyecare specialist when indicated.

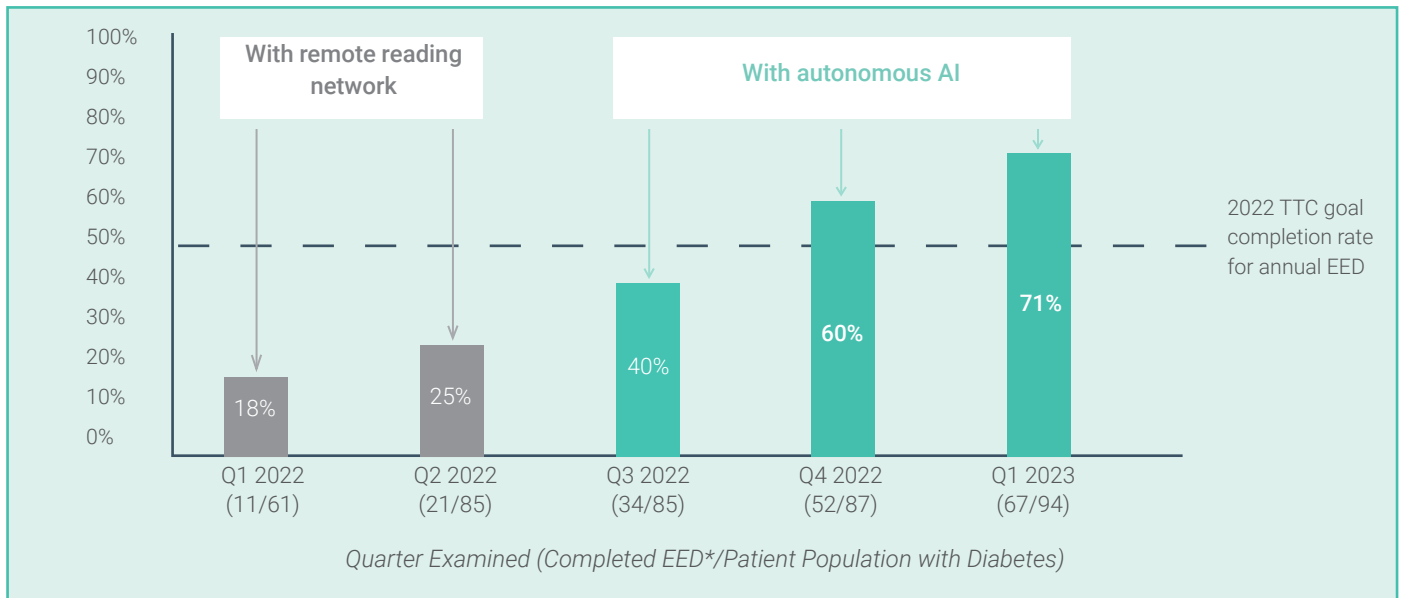
Figure 3. Comparison of Referral Pathways Representing Time-to-Follow-Up

Remote Reading Network 1 - 2 months	7 steps	Autonomous AI 3 - 5 days	4 steps
1. Day of exam: Retinal Images captured		1. Day of exam: Exam completed, diagnostic results provided to patient/provider. Full EHR integration same day at point-of-care	
2. Image sent to tertiary party; report returned in 3-5 business days		2. Referral Coordinator automatically uploads required documents to insurance provider	
3. Manual upload to EHR		3. Insurance provider approves referral 1-2 days later	
4. Follow-up with patient phone call		4. Patient scheduled with eyecare specialist	
5. Referral Coordinator manually uploads required documents and sends to insurance provider			
6. Insurance provider approves referral 2-3 business days later			
7. Patient scheduled with eyecare specialist			

Reseda Primary Care Clinic: An Early Adopter of Autonomous AI within TTC

Reseda is an outpatient primary care clinic in the TTC integrated care system. Four months after implementing autonomous AI (September through December 2022), annual rates of EED improved from 25% using remote readers in Q2 2022 (21 of 85 patients) to 60% using autonomous AI in Q4 2022 (52 of 87 patients). In Q1 2023, Reseda was able to reach 71% completion of the EED (67 out of 94 patients). A Chi-square test was performed to determine whether there was a statistically significant difference between the proportion of patients with diabetes completing their EED with remote reading networks (Q2 2022) and autonomous AI (Q4 2022), $\chi^2_1 = 21.64$. The difference was statistically significant, $p < 0.0001$; and the clinic exceeded their targeted goal (see Figure 4).

Figure 4. EED Completion with Autonomous AI at Reseda Primary Care Clinic



*Represents EED completed by point-of-care solution or traditional referrals to eyecare specialists

Case Report

Patient Experience with Autonomous AI

A 66-year-old Hispanic male presented to the clinic with a history of type 2 diabetes. EED was completed using autonomous AI and flagged for positive signs of diabetic retinopathy. Patient was referred to an eyecare specialist and received a diagnosis of severe proliferative diabetic retinopathy in both eyes. Because the patient was able to see the impact of diabetes complications on the image, he took actions to reduce his HbA1c from 11.8% to 8.9% three months after autonomous AI diagnosis.



Patients are empowered when they see how their retina looks and what a worse outcome prognosis could be. In this case, the patient was so motivated to not lose his sight that he dropped his HbA1c within three months. We are now discussing decreasing daily insulin dosages.

– Provider Overseeing Diabetes Care

Conclusion

TTC provides care to some of the most vulnerable populations in Southern California. Over 1,850 patients live with diabetes, and targeted rates of the evidence based annual EED had not been attained even with remote reading networks. In the first four months after implementation of autonomous AI, the rates of testing increased from 37% with remote reading centers to 47% with autonomous AI, and, as of time of writing, were on track to exceed TTC's goal of 50% completion rates for annual EED in 2023. At one of the TTC clinic sites, Reseda, annual EED rates moved from 25% to 71% nine months after implementation.

Across all sites, time-to-follow-up for scheduling appointments with eyecare specialists was reduced from one to two months down to three to five days. Over one out of every four patients tested with the autonomous AI system were found to have referable diabetic retinopathy that may have otherwise gone missed.



When we have a patient with a positive diagnosis, the clinical team has a feeling of satisfaction. We know we will intervene with a referral to eyecare the same day, potentially saving their vision.

– Nicholas Hermann, PA-C
Medical Champion
Tarzana Treatment Centers

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 to learn more about the Digital Diagnostics platform.

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2. American Diabetes Association Professional Practice Committee. (2022, December 16). 12. *Retinopathy, neuropathy, and foot care: standards of medical care in diabetes-2022*. Diabetes Care. https://diabetesjournals.org/care/article/45/Supplement_1/S185/138917/12-Retinopathy-Neuropathy-and-Foot-Care-Standards
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