

Study finds AI-driven eye exams increase screening rates for youth with diabetes

January 11 2024



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A Johns Hopkins Children's Center study of children and youth with diabetes concludes that so-called autonomous artificial intelligence (AI) diabetic eye exams significantly increase completion rates of screenings

designed to prevent potentially blinding diabetes eye diseases (DED). During the exam, pictures are taken of the backs of the eyes without dilating them, and AI is used to provide an immediate result.

The study noted that the AI-driven technology used in the exams might close "care gaps" among racial and ethnic minority youth with diabetes, populations with historically higher rates of DED, and less access to or adherence to regular screening for eye damage.

In a report on the study published in [*Nature Communications*](#), investigators examined diabetic eye exam completion rates in people under age 21 with type 1 and type 2 diabetes and found that 100% of patients who underwent AI exams completed the eye assessment.

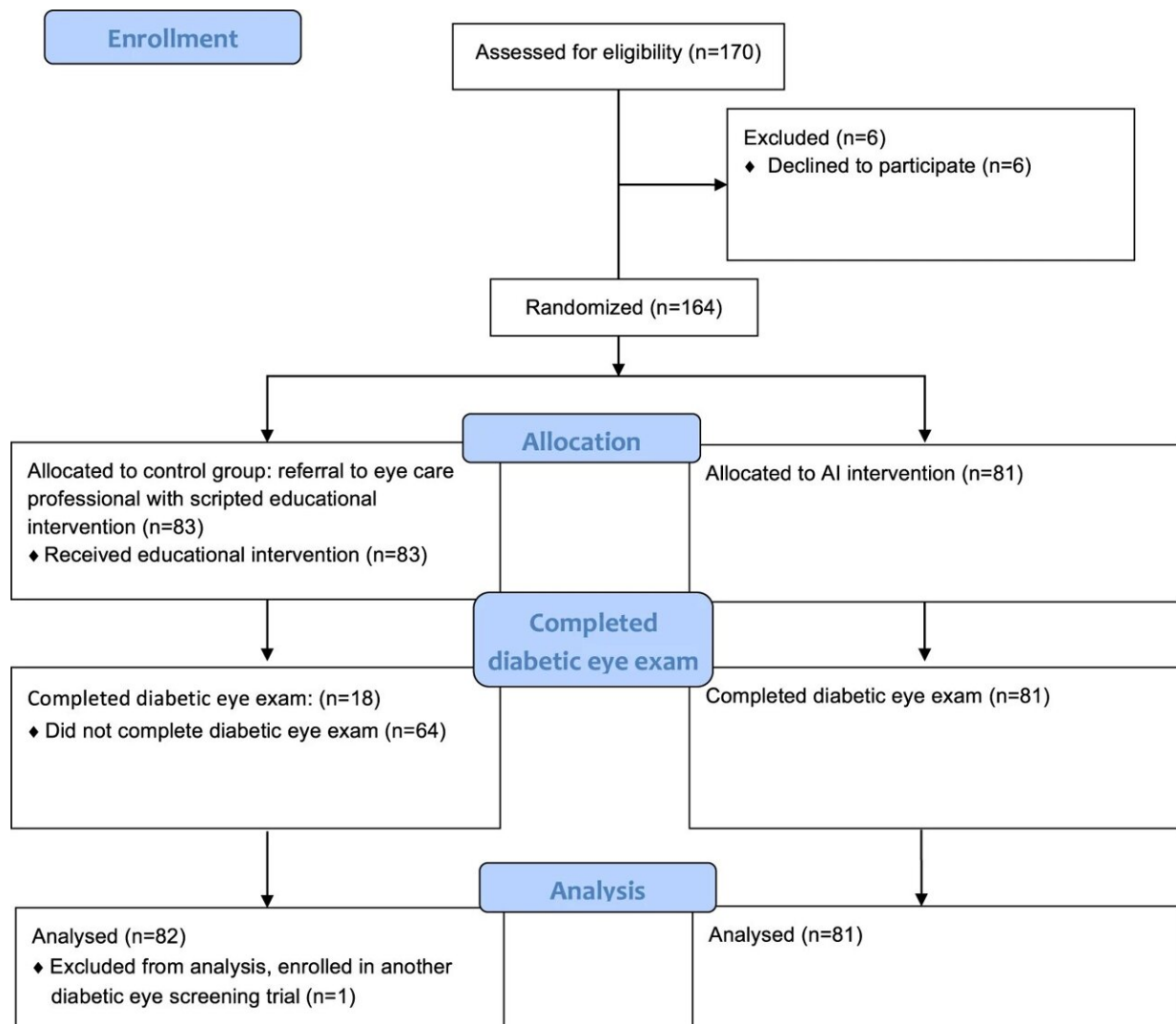
DED primarily refers to diabetic retinopathy, a potentially blinding complication of diabetes that occurs when poorly controlled sugar levels cause the overgrowth of, or damage to, blood vessels and nerve tissues in the light-sensitive retina at the back of the eye.

According to the study researchers, retinopathy affects between 4% and 9% of youth with type 1 diabetes and 4% to 15% of youth with type 2 diabetes. About 238,000 children, adolescents and [young adults](#) under age 20 are estimated to have diagnosed diabetes, according to the American Diabetes Association. Frequent screenings for DED facilitate early detection and treatment and can help prevent the progression of DED.

Generally, diabetes specialists and eye doctors recommend annual screenings, which typically require an additional, separate visit to an eye care provider, such as an optometrist or ophthalmologist, and the use of drops to dilate the pupil so that a clear view of the retina is visible through specialized instruments.

However, studies show only 35% to 72% of youth with diabetes undergo recommended screenings, with even higher care gap rates among minority and poor youth. Previous studies also show that barriers to screenings include confusion about the need for screenings, inconvenience, and lack of time, access to specialists and transportation.

Previous [studies](#) by Risa Wolf, M.D., a pediatric endocrinologist at Johns Hopkins Children's Center, and her team have found autonomous AI screening that uses cameras produce results that enable accurate DED diagnosis.



Flow diagram of patient enrollment and randomization in the ACCESS study (Based on CONSORT guideline 2010 flow diagram). Credit: *Nature Communications* (2024). DOI: 10.1038/s41467-023-44676-z

In the new study, researchers enrolled 164 participants, ranging in age from 8 to 21 years, and all from the Johns Hopkins Pediatric Diabetes Center between Nov. 24, 2021, and June 6, 2022. Some 58% were female, and 41% were from [minority groups](#) (35% Black; 6% Hispanic).

Some 47% of participants had Medicaid insurance. The subjects were randomly assigned to one of two groups. A group of 83 patients received the standard screening instructions and care and were referred to either an optometrist or ophthalmologist for an eye exam.

A second group of 81 patients underwent a five-to-10-minute autonomous AI system diabetic eye exam during a visit to their endocrinologist (the specialists who typically care for people with diabetes) and received their results at the same visit.

The AI system takes four pictures of the eye without dilation and runs the images through an algorithm that determines the presence or absence of [diabetic retinopathy](#), Wolf says. If it is present, a referral is made to an eye doctor for further evaluation. If it is absent, "you're good for the year, and you just saved yourself time," she adds.

Researchers found that 100% of patients in the group offered the autonomous AI screening completed their eye exam that day, while 22% of patients from the second group followed through within six months to complete an eye exam with an optometrist or ophthalmologist. The researchers found no statistical differences based on race, gender or

socioeconomic status for whether participants in the second group scheduled the separate [screening](#) with an eye doctor.

The researchers also found that 25 out of 81 participants, or 31%, in the autonomous AI group had a result indicating that DED was present. Sixteen of those participants, or 64%, followed through in scheduling a secondary appointment with an eye care provider. Further analysis showed those who did not schedule the appointment were more likely to be Black and have Medicaid insurance.

"With AI technology, more people can get screened, which could then help identify more people who need follow-up evaluation," says Wolf. "If we can offer this more conveniently at the point of care with their [diabetes](#) doctor, then we can also potentially improve health equity, and prevent the progression of diabetic eye disease."

The investigators caution that the autonomous AI used in their study is not approved by the U.S. Food and Drug Administration for those under 21 years old. And they say a potential source of bias in the study was that some of the participants were familiar with autonomous AI diabetic eye exams from a prior study, and therefore may have been more willing to participate in the new one.

More information: Risa M. Wolf et al, Autonomous artificial intelligence increases screening and follow-up for diabetic retinopathy in youth: the ACCESS randomized control trial, *Nature Communications* (2024). [DOI: 10.1038/s41467-023-44676-z](https://doi.org/10.1038/s41467-023-44676-z)

Provided by Johns Hopkins University School of Medicine

Citation: Study finds AI-driven eye exams increase screening rates for youth with diabetes (2024,

January 11) retrieved 29 April 2024 from <https://medicalxpress.com/news/2024-01-ai-driven-eye-exams-screening.html>

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