



An official website of the United States government

[Here's how you know](#)

FULL TEXT LINKS

**Sage Journals**

[Telemed J E Health](#). 2026 May 22:15305627261454208. doi: 10.1177/15305627261454208.  
Online ahead of print.

# Diagnostic Performance of an Artificial Intelligence Model for Retinal Abnormalities in Primary Health Care: A Real-World Teleophthalmology Study

[Alan Cristian Marinho Ferreira](#)<sup>1</sup>, [Mariana Abreu Caporali de Freitas](#)<sup>1</sup>, [Rosangela Durso Perillo](#)<sup>2</sup>,  
[Carlos Eduardo Menezes Amaral](#)<sup>3</sup>, [Alaneir de Fátima Santos](#)<sup>3</sup>

Affiliations

PMID: 42170796 DOI: [10.1177/15305627261454208](#)

## Abstract

**Introduction:** Timely access to ophthalmological care is a challenge in primary health care (PHC). Teleophthalmology and artificial intelligence (AI) are tools to expand access, but real-world evidence remains limited. This study evaluates the diagnostic performance of an AI model for detecting retinal abnormalities in PHC, analyzing variability across clinical and demographic subgroups.

**Methods:** This cross-sectional study analyzed 2,158 initial retinal exams, resulting in a final paired sample of 824 retinographies for accuracy analysis. The exams were conducted within a teleophthalmology workflow in the PHC of six municipalities in Minas Gerais, Brazil. A commercial AI model based on a convolutional neural network (Eyer Maps®) evaluated the images and was compared with classifications performed by an ophthalmologist, considered the reference standard. Cluster analysis was performed, and sensitivity, specificity, positive and negative predictive values, Cohen's Kappa coefficient, and area under the receiver operating characteristic curve (AUC) were calculated.

**Results:** The AI model demonstrated almost perfect agreement with the human specialist (Kappa: 0.819;  $p < 0.001$ ). In the global sample, sensitivity was 83.0%, specificity was 98.0%, positive predictive value was 98.0%, negative predictive value was 86.0%, and AUC was 0.91. Eight distinct clusters were identified, in which the model maintained high specificity (96.0-100.0%), with sensitivity varying only in one specific subgroup.

**Conclusions:** In a real-world teleophthalmology context within PHC, AI showed robust diagnostic performance and a high capacity for confirming retinal abnormalities, minimizing unnecessary referrals. The findings reinforce its potential as a supportive tool for organizing ophthalmological care and optimizing assistance workflows in PHC.

**Keywords:** artificial intelligence; diagnostic accuracy; primary health care; retinal imaging; telehealth; teleophthalmology.

[PubMed Disclaimer](#)

## Related information

[GEO Profiles](#)

[MedGen](#)

## LinkOut – more resources

**Full Text Sources**

[Atypon](#)