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Extended Research Article

Tele-ophthalmology-enabled and artificial intelligence-ready referral pathway for community optometry referrals of retinal disease: HERMES cluster randomised trial with a diagnostic accuracy study

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Plain language summary

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Plain language summary

Community-based optometrists are the main source of referrals to hospital eye services in the United Kingdom. Many referrals are for problems with the retina, which is the layer at the back of the eye which allows us to see. Optical coherence tomography devices detect retinal conditions and are increasingly used by community-based optometrists; however, not all are sufficiently trained to use these machines. This leads to many inappropriate referrals and delayed access to treatment.

The HERMES study assessed the effectiveness of a teleophthalmology referral pathway between community optometrists and hospital eye services. Teleophthalmology is the review of medical information that has been electronically exchanged. Using this technology, referrals with eye scans from community optometrists were remotely reviewed by hospital-based eye specialists.

Two hundred and ninety-four participants were recruited by 26 optometry sites, of whom 158 participants were referred via the teleophthalmology referral platform and 136 participants were referred via the standard referral pathway. The teleophthalmology pathway effectively reduced the proportion of unnecessary urgent referrals by almost 60%, decreased the proportion of incorrect referral urgency by 25% and significantly reduced the proportion of incorrect diagnoses and the time to consultation. If implemented, it is likely to have lower costs and greater effectiveness.

The role of artificial intelligence to improve hospital referrals was also assessed. Artificial intelligence is a computer programme that is trained to do tasks which require human intelligence. We used an artificial intelligence model to look at eye scans and recommend if a hospital referral was required. We found that the model could not support many of the people who visit community optometry practices in England, and it was therefore used only on suitable scans from study participants. The model's referral recommendation was compared to optometrists and hospital experts, where it sometimes made different referral decisions than hospital experts but similar decisions to optometrists.

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