AI AND THE MAKING OF AN OPHTHALMOLOGIST

Thoughtful integration of this technology into training programs is required.

BY MEDHA SUNIL, MD

AI is gradually beginning to influence parts of ophthalmic clinical practice. It can be a mechanism for labeling images or highlighting areas of concern or for helping departments handle increasing patient volume. For senior clinicians, AI is another tool to incorporate into practice. For those early in their ophthalmology journeys, the rising prominence of AI raises a different question: What will it mean for how they learn?

CLINICAL GESTALT

Ophthalmology is shaped by subtle visual details—a slight change in color, a shift in contour, a tiny distortion on OCT, or a delicate reflex that suggests abnormality. Much of what experienced clinicians describe as intuition is really clinical gestalt; it is the result of repeatedly reviewing a wide range of normal and abnormal patterns until something clicks and one's judgment becomes instinctive.

AI directly intersects with this stage of learning. Most of the progress in ophthalmic AI has focused on interpreting images, especially retinal photographs and OCT scans. In a number of deployments, the algorithm is the first to review a scan; it sorts and labels a case or draws attention to subtle features. This is valuable for managing workloads, but it also changes the trainee experience. The first interpretation, even when it is wrong, is often the moment when learning happens.

Workflow changes are not new to ophthalmology. In many UK departments, extended-role practitioners such as emergency nurse practitioners, advanced clinical practitioners, and clinical nurse specialists manage significant parts of eye casualty, low-risk clinics, postoperative care, and triage. This shift in care has improved clinical efficiency and patient flow, but it has also changed what early-career doctors outside ophthalmology typically encounter. Many foundation doctors, internal medicine trainees, and junior clinical fellows see fewer routine or straightforward cases than previous generations did.

Although specialty training years 1 and 2 continue to provide young ophthalmologists with structured exposure, the broader point is that clinical workflows evolve, and trainee experience often changes with them. AI may represent another step in that progression. It is not inherently positive or negative, but the technology is influential enough that it requires planning rather than passive adoption.

GROUND TRUTH

AI models are trained by comparing their predictions to a correct label, but in ophthalmology, labels are not always straightforward. For example, even specialist graders may disagree on whether a photograph shows mild or moderate diabetic retinopathy, whether an OCT scan contains early fluid, or whether an optic disc looks glaucomatous. These disagreements are not mistakes; many images lie in a gray zone.

Large AI studies have shown that defining ground truth can be more challenging than developing the model itself. Benchmarking often requires several graders, careful consensus building, and a clear understanding of how to interpret borderline cases. This ambiguity is part of real clinical practice, and it is how clinicians form judgment. If trainees encounter only AI-labeled answers, they lose the opportunity to work through uncertainty and understand why experts sometimes disagree.

Another question relates to how much trainees should rely on AI outputs. When a tool automatically marks an area on a scan, it becomes easy for clinicians to accept that interpretation, especially early in their training, but AI is not flawless. Some models rely on subtle correlations that are difficult for humans to recognize, and others struggle with atypical or borderline cases. Developing confidence in one's own interpretation requires at least some time spent forming an independent view before being exposed to any suggested answers.

THOUGHTFUL IMPLEMENTATION

There are aspects of ophthalmology that AI cannot touch. Vision is central to how people navigate their lives,

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and discussions of sight loss carry a unique emotional weight. Supporting patients through disease progression, managing uncertainty, and communicating clearly about risks and limitations depend on human connection. These skills are developed only through real patient encounters.

If used thoughtfully, AI can strengthen training. The technology can help highlight subtle features that trainees might otherwise overlook. Large, labeled datasets can broaden trainees' exposure, especially for those working in small units. Additionally, AI-based training tools can allow trainees to review multiple variations of the same condition and help them understand how small differences influence clinical interpretation.

These tools extend education rather than replace it. This is why training programs should integrate AI carefully. Trainees should have opportunities to assess images independently before reviewing any AI output. The intention is not to withhold access but to recognize that the order of exposure shapes how clinical reasoning develops. Teaching should include examples of situations where AI performs poorly and explain why. The natural ambiguity of ground truth should be explained rather than hidden. Above all, the communication skills and empathy necessary in ophthalmology must remain central to training because they shape the patient experience more than any algorithm can.

CONCLUSION

AI cannot replace ophthalmologists, but it will influence how the next generation learns, what they see, and how their confidence develops. If the technology is integrated in a way that respects the foundations of training, learners can develop into clinicians who understand new tools, question their limitations, and still rely on their own eyes and judgment. ■

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