

# Technology, teaching, and the future of ophthalmology and the ophthalmologist

## A Tecnologia, o ensino e o futuro da oftalmologia e do oftalmologista

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Technological progress in fields such as health care has led to solutions for many problems that were thought in the past to be unsolvable. With progress in artificial intelligence, in the future diagnostic equipment will likely be autonomous and operate with minimal human talent. Thus it seems likely that exams, once performed by doctors, such as refractometry or screening of glaucoma, cataracts, and retinopathies, will be performed by machines operated by technicians. The advantages of technological development in ophthalmology include easier access to ocular checkups, contributing to the universalization of ophthalmologic exams and early detection of eye diseases. This is expected to increase the demand for generalist ophthalmologists who can accurately interpret the clinic significance of exam results as well as the demand for subspecialists who can treat complex cases using specialized techniques<sup>(1)</sup>.

In the past 20 years, the number of medical schools in Brazil has tripled. However, the number of vacancies in residences programs for specialized teaching has not kept up with this increase; the best-structured university services have been reduced and, in some cases, the number of residents has been reduced due to budget constraints. As newly-graduated doctors in Brazil are allowed to work clinically, many young professionals excluded from specialty opportunities in ophthalmology

end up pursuing non-accredited services (not prepared for teaching). Therefore, a significant number of doctors with limited theoretical training enter the ocular health field annually. They generally work out of large urban centers where there is a great volume of appointments or in clinics performing initial exams, and thus refer cases of eye diseases to subspecialists.

Putting the two above-described realities together, we can predict that less technically-prepared professionals will be excluded from the market due to technological advances, resulting in ocular exams with lower costs and better precision. Such doctors could in the future become technicians who operate the diagnostic machines. While the future of ophthalmology has a valorization bias with large medical corporations buying and consolidating clinics, the future of ophthalmologists appears bleak. Doctors will progressively leave positions as autonomous professionals to become employees of large health companies where they do not even know their bosses.

Such technological changes may be inevitable. Nevertheless, strategies can be created to improve teaching in ophthalmology and reduce the lost value of doctors' work. One solution is to increase the number of vacancies in well-structured residence programs without endangering the quality of teaching.

As there is no foresight of better financing for public health, which would favor more clinical and surgical appointments and allow a natural increase in the quantity of residencies available for medical students, a non-conventional approach is needed through thinking out of the box. Thus, we should consider the ideas of professors Rubens Belfort Jr. and Marcos Avila of creating vacancies for clinical ophthalmologists and eliminating the medical residencies in hospital environments, which are important actions to create the "ophthalmologists that Brazil needs."

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Another solution would be to improve teaching efficiency, thus optimizing the available resources to train a greater number of residents. Currently, residents rotate in all specialties, dividing their time equally between clinical and surgical training opportunities. Considering that clinical teaching does not have limitations, i.e., a single case can be discussed with several students, it is mainly surgical training that limits increases in teaching because it requires financing as well as physical and human resources.

My suggestion for improving efficiency in medical residence programs for ophthalmology, given the modern context, is to prioritize clinics teaching all subspecialties and focus on surgical teaching. Thus, not all residents would learn all ocular surgeries (e.g., ocular surface, plastics, lacrimal duct, strabismus, cataract, retina, glaucoma, etc.). Instead, they would choose one technique for specialization. Given the limited resources of the teaching institutions, it could be seen as a waste that training programs include several surgical techniques when medical students will seldom use all the techniques in their professional lives. The time previously used to teach other techniques could now be used to perform more selected surgery and to intensify general clinical training. In addition, the time needed by students

during their medical residency would be optimized. Consequently, it would become possible to offer more specialized vacancies and students would be more prepared as general ophthalmologists with a specific surgical subspecialty. They would also be better trained after the residence program for a specialized fellowship or to start their careers<sup>(2,3)</sup>.

It would be productive if we could offer general surgical training opportunities to all residents in order to help them to choose their areas of interest. However, I believe that there are currently more pressing priorities. In my view, given the above facts, it is more important to increase the number of specialty vacancies in residence programs in institutions structured for teaching, improving the background of young ophthalmologists to create favorable conditions for the inclusion of these doctors into the modern health care market.

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