

Get Ready For
**Online Refraction:
The Fourth O**

By Barry Santini

As recently as a decade ago, the idea of dispensing prescription eyeglasses online seemed far-fetched to most people. Yet today, millions of consumers seeking value and convenience are doing just that. Even progressive lens wearers are buying their glasses from Internet vendors, using online tools to take their own PD measurements.

Will refraction be the next step in the online delivery of optical goods and services? When I discuss the question with other eyecare professionals, their first response is often, “How could it be?” Immediately, more questions follow: “Would it be accurate? If done online, would eye disease go undetected? Would eye doctors become obsolete?” To tease out the answers, ECPs will have to immerse themselves in the point and counterpoint that colors the online refractive debate today.

In the past 100 years, refraction has enjoyed a prominent position within the complete eye exam. As we enter the 21st century however, refraction has been demoted—its importance reduced by the collision of conflicting goals: encouraging the public to seek frequent eye checkups versus putting a cap on escalating health-care costs. Today, refraction finds itself sandwiched between being called “a routine and nonmedical procedure” and being rendered obsolete by advancements in both the auto refractor technology and mobile vision testing applications.

The central question facing the eyecare industry may now be: Is refraction morphing from a skilled, medically-based discipline to a procedure so easy, a caveman could do it? To understand how it may migrate online, we’ll start by looking at refraction’s current

place within a traditional eye exam, the confusing messages our profession sends out that undermine the emphasis we try to communicate on eye health and vision, and how that unstoppable engine of change—the Internet—will dictate what we can essentially afford to spend on certain aspects of vision care.

REFRACTION AND THE COMPLETE EYE EXAM

A refraction is defined as “the process of determining the refractive error of the eye.” According to the American Optometric Association, a complete, comprehensive eye exam should include this diagnostic, as well as the following:

1. A complete medical and visual history.
2. Assessment of present visual acuity.

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3. Preliminary tests, including eye movement, peripheral vision, depth perception, color perception and pupillary response to light.
4. Determination of corneal curvature and examination of the pre-corneal tear film.
5. Eye teaming, binocularity, accommodation/focus lag and stereopsis.
6. Examination of the eyelid and surrounding tissues.
7. Examination of the interior eye, where certification allows.
8. Evaluate intraocular pressure.

Despite the comprehensiveness of these tests and evaluations, many eyeglass wearers are confused about the difference between a refraction and a complete eye exam. One reason is rooted in the tendency for most of us to take our vision for granted. Even eyecare professionals often only seek the council of a fellow eye doctor when they notice the appearance of visual symptoms, such as blurry or double vision or headaches. And the majority of time, the remedy prescribed is glasses. Seen from the public's vantage point, visual symptoms = refraction = glasses. It's no wonder that John Q. thinks refraction, for all intents and purposes, is the eye exam.

MIXED MESSAGES ABOUT VISION AND EYE HEALTH

Every eyecare professional I know realizes the value of a complete eye exam in preserving our most precious sense. And every one of them makes it a point to communicate the same to every one of their patients. Yet ECPs continue to send out a bag of mixed messages that undermine the importance of obtaining the best vision. For example, while we stress the importance of regular eye checkups for all, and take pride in delivering accurately fabricated eyewear, we also advise people with small vision errors—those in and around 0.00D—that they don't really need glasses. Let's take a look how:

1. When a refraction finds a correction whose power or spherical equivalent

lies between -0.50D and +0.50D, the patient is often advised to get glasses "if you feel you really need them."

Often a prescription may not be written, especially if the patient expresses displeasure at the prospect of wearing glasses, or the uncorrected acuity lies above driving standards.

2. When refraction reveals a small change in correction, the advice often heard is that "it doesn't pay to get new glasses."
3. When refraction indicates mild to moderate presbyopia, patients are often told to "just pick up a pair of over-the-counter readers."

Regarding the importance of eye health, do we deliver a consistent message to everyone who walks in our doors? Perhaps not. When people come in to shop for glasses, we've trained our personnel to first ask if they have a written prescription, or to ask the date of their last eye exam. Depending on their answer, we'll often recommend an eye exam before ordering glasses. This is done overtly to ensure eye health, but it is also done to reduce the likelihood of visual dissatisfaction and perhaps the expense of a lens remake.

However, what happens when that same shopper is looking for plano sunglasses? Do we routinely ask if they previously had or need a prescription, the date of their last exam, or that they should consider an eye health checkup before buying sunglasses? Our messages about the importance of eye health are mixed, but should be the same to all people, regardless of refractive error. But they're not. Our gatekeeping here seems to be centered strictly on whether a person has an appreciable refractive error.

Here's the logic we're sending out: The prescription is derived from the refraction, and the refraction is what we have led the public to believe is the eye exam. In the age of the power of the Internet, this could very well backfire on us.

We also send out an inconsistent message about the importance of a change in prescription. We tell most wearers that a

0.50D change in Rx is to be considered significant. Yet at the same time, we often treat the Rx range of half-diopter on either side of plano as not worthy of correcting by saying, "Fill it only if you feel you need it."

CALCULATING HARM AND RISK

Excellence in eyecare and eyewear does not come cheaply. But recommendations such as "Check Yearly, See Clearly" can only apply upward pressure on healthcare costs. How can we continue to recommend seeing the eye doctor frequently without adding to the ever growing burden of healthcare costs? I'm not sure we can, certainly not without shifting some of these increased costs to the public's pocket. Perhaps we should look to solve this dilemma using a different approach, one where the risk of undiagnosed eye disease is correlated against the absence of visual symptoms. This is precisely what our neighbors to the north have done.

Canada's national healthcare system attempts to cover each citizen's healthcare needs. But in order to contain costs, compromises are made. In the arena of vision care, the Canadian Ophthalmological Society has used its own evidenced-based risk assessment in creating their current public advisory for eye exam frequency. Briefed, the formula in regard to specific ages is very clear cut:

Healthy adults who do not notice anything wrong with their eyes should see an eye doctor according to this schedule:

- Age 19 to 40: Once every 10 years
- Age 41 to 55: Once every five years
- Age 56 to 65: Once every three years
- Over age 65: At least every two years

Ten years between eye exams? To our American sensibilities, this appears incredible. But it's hard to argue that broadening the public's access to or frequency of eye exams, under our current fee structure, would not result in escalating costs. At a minimum, some cost shifting to patients will be inevitable. This is exactly the devel-

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opment we have witnessed in the guise of increased or separate co-pays for refraction. By moving refraction to “a la carte” status, we’re making its cost a clear target. We’re priming the public’s desire to seek a way to reduce their out-of-pocket costs. And online could very well be the siren that changes everything we know about refraction.

THE DMV WILL PAVE THE WAY

In September 2011, the New York State Commissioner of Motor Vehicles announced effective immediately and consistent with the department’s mandate to streamline

and make more user-friendly the driver licensure and registration processes, regular acuity screenings by eyecare professionals would no longer be required. Instead, drivers would be required to have their visual acuity tested only once at initial licensure and be self-certified at renewals thereafter. Unfortunately for the commissioner, the outcry and pushback from the state’s eyecare professionals, driving organizations and citizens was loud and clear. No one wanted senior citizens driving without first being tested to a minimum vision standard. The commissioner tabled this new vision testing requirement. He took this action, despite his department’s research that

other states such as Pennsylvania have employed the same one-time screening methodology for years without seeing a statistically significant increase in accidents, injuries or fatalities.

Now the stage is set: If a trustworthy and efficacious self-administered test of visual acuity became available—one done in the privacy of your own home and perhaps through a personal computer or iPad—a test meeting these requirements would probably enjoy rapid adoption through our country’s DMVs. And if acuity testing migrates online, how long will it be before refraction inevitably follows? (See sidebar on Dyops.)

Dyops: A New Dynamic Optotype

In 2008, recruiter Allan Hytowitz was frustrated. Sitting in front of his computer for over eight hours a day playing matchmaker and trying to improve the lives of hopeful job candidates, and helping companies succeed by hiring that skilled talent, his vision was riddled daily with blur and headaches and a frequent inability to comprehend what he was seeing. At times he wondered if he should, or could, continue in his chosen and previously very successful career. As he desperately tried to find the cause of his visual difficulties, all of the medical practitioners he consulted assured him there was nothing medically or physically wrong with him or his eyes. Yet he couldn’t work and had trouble seeing.

Wearing the progressive glasses his eye doctors had repeatedly recommended and prescribed, he assumed those lenses were “the best thing since sliced bread,” something his trusted doctors had assured him. However, he found in over 15 years of wearing progressive glasses, that he was constantly seeking an optometrist or optician who could make progressives that would let him see clearly and reduce his headaches. Sparked by his frustration with areas of reduced intermediate utility—a limitation dictated by the adjacent peripheral blur areas—he began to question his doctor’s recommendations of progressive lenses. Allan came to realize that none of those eyecare professionals could effectively quantify the actual intermediate area of visual utility to his satisfaction. So began his quest to discover why conventional eye testing, aka refraction, was so poor at revealing the limitations of those lenses.

By literally pulling himself up by his boot straps, over the next few years, Allan self-taught himself the basics of refraction and acuity testing. What he uncovered was that vision testing was still mired to using a chart of graded-sized letters, and that eyecare professionals were reluctant to engage in a dialogue about its

deficiencies. By challenging some of the assumptions made by Dr. Snellen over 150 years ago—assumptions made when the telegraph was the world’s most efficient means of communication—he was able to create an entirely new way of testing visual acuity, one based upon the idea of using a moving, rather than static optotype. He calls his creation a “dynamic optotype,” or “Dyop” for short.

The idea is breathtakingly simple: By using rotating rings with alternating black and white segments on a neutral background, a Dyop harnesses the motion-processing sensitivity of the human eye, and results in a visual acuity test that is exquisite in its subjective sensitivity. Unlike the other optotypes, there is no gray area of indecision about whether one can see or recognize a letter—you either detect the rotational motion of the Dyop or you don’t. That precise detection ability confidently indicates your acuity and the endpoint of your refraction. Dyops are not only more precise than Landolt rings, they are more culturally neutral since Landolt rings are still influenced by character recognition. With the employment of color, Dyops have been determined to be a useful diagnostic tool for the evaluation of color vision deficiencies and various forms of dyslexia.

As a computer-based vision screening tool, Dyops allows a person to quickly self-diagnose the following: acuity, peripheral vision, color vision and motion sensitivity. Dyops even screens for 20/20 acuity in infants as young as 5 months old. It may just become the type of convenient, self-administered vision screening test that DMVs are looking for.

The unique qualities of Dyops have been recognized by being granted full patent protection in the United States as well as the rest of the world. For more information, see www.dyops.org.

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**WHICH MATTERS MOST:
ACCURACY OR TRUST?**

Remember our first question above, the one asking whether online refraction could be considered accurate? Given the various factors that can affect the formula in a given prescription, including differences in exam technique, test time of day, patient fatigue, length of exam and doctor discretion, how can we assume that any individual refractive finding could be certified as “accurate”? Just allowing for the prescription variations we currently see between different doctors examining the same individual diminishes the argument that a single set of refractive values could be described as right, correct or conclusive.

With a gray area established around refraction, the debate now becomes one about the logic of continuing to argue that refraction done online would yield

results any less accurate or useful than the same done in person. The question of accuracy is not the central argument against refraction entering the online arena. Rather, an equally important question is one focused on confidence: Can we put our trust in a refraction done online? In the near future, it is possible that refractive technology, with its increasingly sophisticated algorithms, will sufficiently progress to leave us with essentially no other choice.

**WILL EYE DOCTORS
BECOME OBSOLETE?**

Of course not. But refraction as we know it is rapidly being redefined for the 21st century. Sure, conventionally done refraction will still exist, but probably only in the emerging category of concierge medicine. In the future, refraction will be benchmarked to the only standard that all

the parties’ involved—healthcare professionals, politicians, insurers and citizens—will agree upon is the one we can afford. Online refraction will be treated as sufficiently adequate and its values will be considered no less accurate than the values we accept now.

Today, eye exam frequency is dictated in large part by insurance coverage. As human vision always remains fluid, people will begin to seek out refraction when and where they want it, and at a cost they find acceptable. With new online testing modalities promising to improve subjective precision, increased patient confidence and trust is sure to follow. As far as online refraction goes, the question is not whether it would or could happen. It is when. **LT**

Barry Santini is a New York State licensed optician based in Seaford, N.Y.