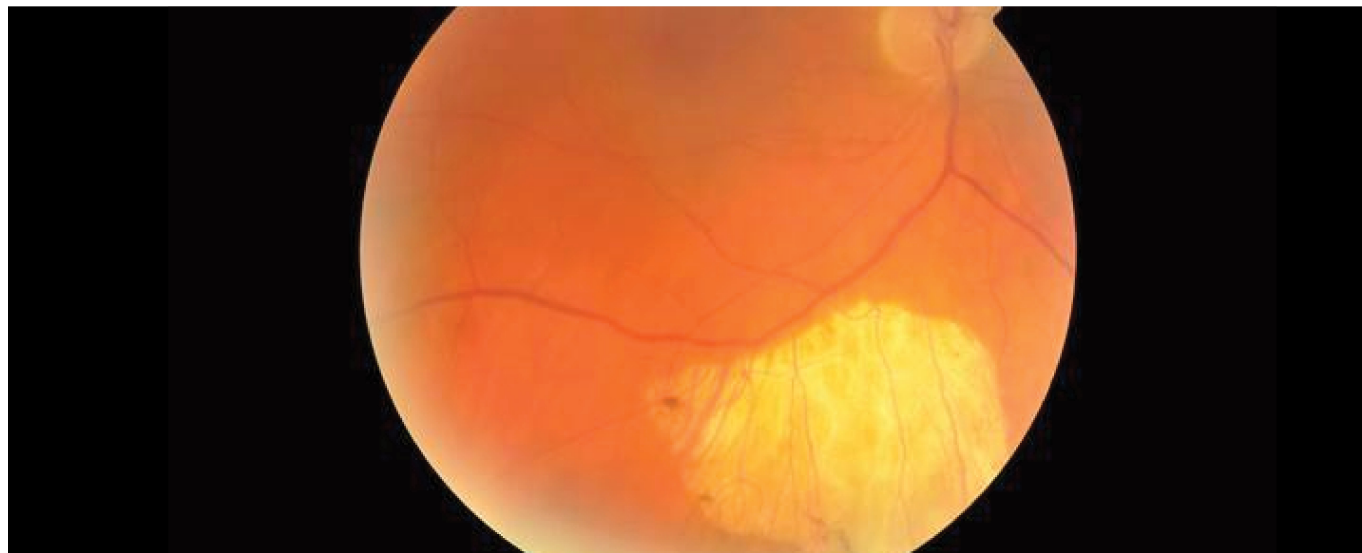


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Case Report

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PEER REVIEWED

Teaching Ocular Imaging, Disease Diagnosis and Management Within a Work-Integrated Setting: a Novel Model Within an Optometric Education Program

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Abstract

Optometric educators are currently challenged to teach increasingly complex material (particularly relating to imaging technologies) within the constraints of pre-existing education programs. Innovation in work-based placements may be a solution. Here, we describe a novel clinical placement where students are intensively integrated into a referral-only, advanced ocular diagnostic and imaging clinic. Student involvement promoted practical and non-cognitive skill development among students and improved efficiency of service delivery in the clinic. These outcomes suggest full integration of students into the workplace operation may be an efficient alternative to observation-based or technician-based models.

Key Words: work-integrated learning, undergraduate, optometry

Introduction

Technological advancements in ocular imaging are rapidly redefining the way eye diseases such as glaucoma and macular degeneration are diagnosed and managed in optometric practice.

In Australia, the scope of practice of optometrists has expanded with the increasing accessibility of advanced imaging technologies as well as therapeutic endorsement of more than 50% of the profession to prescribe scheduled medicines for the treatment of ocular conditions.¹ There are underlying similarities with the scope of practice in other countries. For example, optometrists in the United States are able to perform enhanced primary care procedures such as the use of lasers in certain states.² With the expanding scope of practice of optometrists and ocular imaging technology becoming increasingly ubiquitous in optometric practice,³ optometric educators currently face the challenge of teaching progressively complex material within the time and resource constraints of pre-existing education programs. These constraints are augmented in new or accelerated optometry programs that aim to maximize teaching and learning in a shortened time frame or within a competitive educational environment.⁴⁻⁸ Consequently, the development of novel teaching models and curricular innovation, both for educating optometry students and upskilling optometrists in clinical practice, have been required to keep pace with these changes.

Specific challenges for optometric educators, community optometrists and optometry students include

staying abreast of the plethora of new literature relating to the diagnosis and management of ocular diseases; understanding the application, limitations and interpretation of new imaging technologies such as optical coherence tomography angiography (OCTA); and gaining sufficient hands-on experience using these instruments. Typically, this education for students has taken the form of preclinical and theory-based training followed by clinical examination of patients within college- or university-operated clinics or community-based primary care optometry clinics, or observation-based placements within ophthalmology practices where advanced imaging is conducted by ophthalmic technicians. The length of this practical training varies across optometry programs internationally (average two years in the Australian education system vs. average three years in Doctor of Optometry programs in the United States⁹), but the fundamental goals are the same: to hone students' technical skills and, more importantly, ensure development of the analytical skills necessary to interpret results and render appropriate treatment plans. This is especially critical for current optometric practice where technical elements are increasingly being delegated to technicians.

However, evidence of poor performance in these skill areas by optometrists suggests these placements are not effectively transferring the students' complex theoretical knowledge into clinical skills. For example, Bakkum and Trachimowicz¹⁰ found optometrists in private practice were significantly less likely to correctly identify any of the 10 anatomical layers of the retina compared with optometry students despite this skill being essential for the correct interpretation of OCT images. Similarly, the emergence of "red disease"¹¹ and "green disease,"¹² pertaining to the misclassification of the presence or absence of pathology by the instrument, indicates the consequences of poor understanding relating to the limitations of each instrument and its normative database in clinical decision-making. Thus, implementing new education approaches to address these challenges is essential. Without sufficient training, an optometrist risks misinterpreting results and mismanaging patients.

The aim of this article is to present a novel, practical model for teaching advanced ocular imaging, disease diagnosis and management within a work-integrated setting. This model is implemented as a six-week placement at the Centre for Eye Health (CFEH) for final-year optometry students of the University of New South Wales (UNSW) Sydney, Australia. Students are fully integrated into the clinical pathway for the delivery of intermediate-tier imaging and visual system diagnostic services to patients with, or at risk of, eye disease. Background information about the model and curriculum structure as well as student outcomes and feedback are provided and discussed.

Teaching Model

Setting: Centre for Eye Health

CFEH is a unique optometry-led collaborative initiative of Guide Dogs NSW/ACT and UNSW Sydney, which has been described previously.^{13,14} Briefly, CFEH was established in November 2009 with a mission to reduce preventable blindness by providing diagnostic eye assessments, using state-of-the-art technology, at no cost to patients. CFEH is a referral-only clinic for non-urgent cases and has been validated to reduce unnecessary referrals to ophthalmologists for patients suspected of glaucoma¹³ or macular pathology.¹⁴

Patients presenting to CFEH are a unique cohort who have been identified by their referring optometrist or ophthalmologist as having an ocular abnormality or disease, or being at risk of disease development, but not requiring urgent ophthalmological treatment. Referring practitioners can opt to refer an individual for a comprehensive diagnostic test suite or for imaging tests in isolation. A subset of patients is referred directly to the collaborative care glaucoma clinic, under the oversight of a glaucoma specialist ophthalmologist, for treatment of previously diagnosed glaucoma. Since 2012, CFEH optometrists have examined more than 32,000 demographically diverse patients with the most commonly seen conditions being glaucoma suspect or glaucoma, macular degeneration, other macular pathology, diabetic

retinopathy, peripheral retinal degenerations, pigmented lesions or suspected corneal ectasia.

The CFEH clinical team (15 optometrists and a clinical scientist) is responsible for the development, refinement and implementation of CFEH's novel protocols for examining patients, recalling patients to ensure that none is lost to follow-up, and communicating results to co-managing clinicians. Staff optometrists work closely with consultant ophthalmologists from the local public hospital ophthalmology service who provide indirect patient consultations by reviewing images and clinical data collated into a report by the examining optometrists and students. The clinical team is also intrinsically involved in optometric education, providing teaching within the optometry program of UNSW Sydney as well as postgraduate and continuing education for optometrists in clinical practice. Overall, the clinical team has a range of 3-15 years of experience in teaching optometric students.

Curriculum structure

Optometry schools in Australia have adopted various curriculum structures and course lengths ranging from a 3.5-year undergraduate degree, a combined five-year double degree and, most recently, more in line with the United States, a four-year postgraduate OD program. While variation exists among Australian optometric programs, they all essentially consist of at least one year of preclinical training and are followed by at least one year of practical clinical training.



Table 1. [Click to enlarge](#)

With regard to this model, students are enrolled in the combined Bachelor of Optometry/Bachelor of Science undergraduate course at UNSW Sydney, where they undertake a placement at CFEH as a mandatory requirement of the Clinical Ocular Therapy subject during Stage 5 (final year) of the program. **Table 1** gives an overview of the curriculum structure for this placement.

Overall aims of the placement are to improve the students' technical facility relating to advanced imaging modalities and to help them develop appropriate integrative and application skills in using these technologies. Students entering Stage 5 have already completed four years of optometry-specific undergraduate training and are equipped with a sound theoretical knowledge of the anatomy and physiology of the eye, ocular diseases and ocular therapeutics. Students have completed a year of practical hands-on training in the general optometry clinic at UNSW, gaining proficiency in clinical skills such as tonometry, pachymetry, gonioscopy, indirect ophthalmoscopy, funduscopy, and have had some exposure to specialized clinics in areas including contact lens, red eye and color vision.

Prior to beginning their placement, students are required to view 10 one-hour video lectures primarily focused on the differential diagnosis of ocular disease using advanced imaging modalities. They also familiarize themselves with clinically relevant literature related to image interpretation, disease diagnosis and management, and key grading scales such as the AREDS AMD severity scale.¹⁵ Students are scheduled to attend CFEH from 8:30 a.m. to 5 p.m., five days per week, for a total of six weeks. They attend in groups of 8-10 depending upon the total number of students enrolled in that year.

During the first three days, the details of the placement including expectations of professionalism and excellence in patient care delivery and the novel CFEH patient care pathway^{13,14} are outlined to the students. Referral forms and clinical protocols are discussed, and navigation of the customized electronic medical record system (VIP.net, Houston Medical) is demonstrated. The technical aspects of the imaging technologies are demonstrated using an apprenticeship approach. Students familiarize themselves with instrument operation and testing protocols through observing and interacting with supervising optometrists. The range of instruments includes Cirrus OCT (Zeiss), Spectralis OCT (Heidelberg), HRT3 (Heidelberg), Pentacam HR (Oculus), WX 3D non-mydratic stereo photography

(Kowa), Optomap 200TX widefield imaging (Optos), E300 corneal topography (Medmont), IRX3 wavefront aberrometry (Imagine Eyes), Retinomax autorefraction, automated blood pressure measurement, and Humphrey visual field analysis. Instruction is provided on downloading images and reports from the instruments and importing them into the corresponding medical record, with the specific combination of images and/or reports tailored to the referral type and the number of previous visits. Orientation is concluded with a hurdle practical assessment to confirm student competency in providing clear and empathetic patient instructions, operating the instruments, troubleshooting image artifacts and technological issues, and obtaining high-quality images.



Table 2. [Click to enlarge](#)

For the remainder of their placement, students perform advanced imaging and a range of functional testing on patients under the direct supervision of a staff optometrist. In a manner typical of fieldwork placements in other health professions,¹⁶ staff optometrists play an educative, supportive and administrative role in supervising students throughout the placement. Contact procedures (gonioscopy, ultrasonic pachymetry and applanation tonometry), funduscopy and ophthalmoscopy are performed by the staff optometrists. Students are offered the opportunity to examine patients with these techniques where it is deemed likely to further their understanding of the ocular pathology.

Following each patient assessment, students import relevant images and reports into the patient's medical record. Using custom report templates (**Appendix A**) students analyze the results of the patient consultation, list differential diagnoses, propose a diagnosis, discuss a suitable management plan, and reflect on the lessons garnered from the case. Student reports must be submitted within two days to the supervising optometrist (to simulate a true work environment) and individualized written feedback is provided. Final patient reports are written by supervising optometrists and co-signed by a second optometrist or a consultant ophthalmologist, as an additional means of quality control. Students are encouraged to review final reports to complete their learning experience. By the end of the placement, students have been exposed to a wide range of teaching strategies. (**Table 2**)

Student Outcomes

Student outcomes from the model were assessed from its implementation in 2014 to the end of 2016. Quantitative data included analysis of students' patient exposure and student feedback via a paper-based survey. Qualitative data were collected informally through discussion with supervisors and an open-ended comments section in the student survey. Note that there was a change in the curriculum described in Table 1 between 2016 and the previous years where weeks five and six were not performed because students were available only for a four-week period.

Number of patients seen

Individual students, on average, examined 88 patients during a six-week placement at CFEH. As CFEH is a referral-based centre, most patients had signs of ocular disease or were 'non-textbook' cases of diseases. Examinations lasted 30 minutes to two hours per patient and included the opportunity to conduct multiple tests, e.g., students conducting a glaucoma assessment performed visual acuity measurement, autorefraction, blood pressure measurement and Humphrey 24-2 perimetry, obtained retinal photographs, OCT and HRT3 images and assisted with patient history, tonometry, gonioscopy, pachymetry, funduscopy and slit lamp examination. The application of multiple teaching strategies (**Table 2**) meant students were also potentially exposed to a further 550 cases through peer discussions, tutorials, interactive case studies, digital video lectures, problem-based learning cases, grand rounds lectures presented by staff, and review of patient records.

Views from student supervisors

Informal discussions with supervising optometrists were used to determine impressions of student performance within the work-integrated student teaching model. Supervising clinicians commonly noted that student skills relating to the technical aspects of using advanced imaging devices improved over the course of placement. Examples of this improvement included fewer instances of images needing to be retaken by the supervisor or student due to poor quality and an overall reduction in the time taken to acquire images at later stages of the placement. Clinical skills relating to image interpretation and differential diagnosis were also reported to be improved. Specifically, supervising optometrists observed that students developed a greater understanding of how to recognize image artifacts, interpret results from patients who have anatomical or demographic features that fall outside the instrument-based normative database, and provide a cohesive diagnosis and management plan based on their patient reports.

Student survey results

Formal student feedback was collected through a 15-question survey at the end of each placement. Students were asked to rate the level of agreement that most accurately reflected their opinion on a 5-point Likert scale ranging from strongly agree (5) to strongly disagree (1). A summary of the results is provided in **Table 3**. An optional written comments section was also provided. Examples of student quotations are shown in **Table 4**.



Table 3. [Click to enlarge](#)

A total of 183 students across the three years (2014-2016) participated in the survey, which had a 100% response rate. Overall, an average of 4.6 out of 5 (strongly agree) was achieved for all aspects of the students' rotation at CFEH with a notable improvement in the survey scores across all aspects in each successive year. Students showed strong motivation to learn and rated the clinical rotation highly in assisting improvements in clinical confidence and understanding testing protocols (average score of 4.7 out of 5). Cultivation of non-cognitive factors such as self-learning, motivation and embracing challenges was also commonly noted by students in written comments (11 out of 53 comments).



Table 4. [Click to enlarge](#)

In terms of teaching methodologies, the tutorials were most highly rated, followed by the course materials and quality of the teaching staff. **(Table 3)** Summary reports and feedback were also helpful, achieving a score of 4.4 out of 5 each. Written comments regarding teaching methodologies also indicated that students valued face-to-face interaction with their supervisors such as in tutorials, discussions of problem-based learning cases, individual feedback and weekly grand round lectures and clinical update meetings presented by staff. **(Table 4)** The appropriateness of the volume of work was rated the lowest (3.9 out of 5) with a number of written comments about the work load being too high (8 out of 53 comments). Forty percent of these comments, however, clarified that high work load was due to other assignments being due during the placement. Overall, survey scores and comments indicated students' perception of the placement was useful, helpful and enjoyable with students gaining confidence in ocular imaging and being motivated to learn.

Clinical efficiency outcomes

Figure 1. Number of patients seen per equivalent full-time (EFT) staff optometrist at the Centre for Eye Health prior to and following implementation of the teaching model.
[Click to enlarge](#)

Figure 1 depicts the number of patients examined per equivalent full-time (EFT) staff optometrist at CFEH before and following student model implementation. Prior to student integration, the two-year average was 673 patients/EFT optometrist. This was improved to 901 (134% increase) and 980 (146% increase) with the introduction of the four- and six-week placements respectively. This increase in efficiency was achieved in combination with scheduling changes that were allowed by the availability of students to participate in patient management. As students became more efficient in their technical skills, an initial one-on-one supervision was replaced by two-on-one supervision of a staff optometrist, which optimized staff and time resources within the clinic.

Discussion

The rapidly changing scope of optometric practice due to advances in ocular imaging technology means increasingly complex competencies are now required from optometrists.¹⁷ Australian optometric education is constantly evolving in response to the expanding scope of practice, in particular the incorporation of advanced technology and prescribing of therapeutic agents,^{1,17} as well as a changing educational landscape from the traditional mode of classroom teaching and learning to more flexible, self-directed, blended teaching and learning modalities. The challenge for optometric educators is to efficiently and effectively develop and deliver this material and provide students an environment where they can apply and translate their textbook knowledge to practical skills and learn to troubleshoot when challenges arise. At the same time, efficient use of clinic time and resources is required due to central fiscal demand. Here, we have described a successful, work-integrated teaching model enhanced by a range of teaching methodologies, where final-year students are intensively integrated into the clinical pathway within a unique workplace setting for six weeks. A discussion of the advantages and disadvantages of the model follow.

The model appears highly effective for teaching complex materials such as advanced ocular imaging and diagnosis

The advantages of work-integrated learning are well-established and include promotion of knowledge development, professional attitudes and communication.¹⁸ For example, community-based optometric placements have been successful in providing students with a broad range of experiences,¹⁹ promoting cultural competency²⁰ and community outreach.²¹ These placements also address entry-level competency standards for the profession of optometry in Australia,¹⁷ and similarly the New Professional Optometric Degree Standards as outlined by the Accreditation Council on Optometric Education (ACOE)²² by providing a platform for students to consolidate, integrate and apply their theoretical knowledge, hence ensuring essential clinical experience and competency to “independently practice contemporary optometry.” The resource-intense nature of placements, however, is often cited as a limitation to implementing and extending these activities in curricula.^{20,23} Consequently, many placements utilize an observation-based approach, which limits the quantity, quality and variety of student interaction and practical skill development.

In this model, although a resource-intense training period of three days was required at the beginning of the placement, the use of a range of teaching methodologies, direct involvement of students in patient care, and examination of a high volume of patients all seemed to be useful in promoting self-directed learning among students and reducing the teaching and resource load during the remainder of the placement. This may be of particular use to new or accelerated optometric programs that are faced with the additional challenges of developing sustainable clinical placement programs within a competitive educational space and shortened time frame. Examples of such programs offered in optometry schools

include the 3.5-year undergraduate degree at Deakin University in Victoria, Australia, and the 36-month Accelerated Scholar's Program at Pennsylvania College of Optometry at Salus University in the United States, which emphasize early clinical exposure and extended clinical placements to allow students to continuously build on their clinical skills. However, specific challenges associated with an accelerated model in Australia include recruiting practices that are adequately equipped to accommodate students and overcoming clinic inefficiencies of students slowing down appointments.⁴ In particular among Australian optometrists, there is moderate support for extended clinical placement programs. The burden on time and decrease in number of patients examined are the top perceived disadvantages.²⁴ The CFEH model design led to outcomes that were beneficial for both the student and workplace, overcoming most of the challenges and perceived disadvantages of clinical placements.^{4,24} Student feedback indicated development of practical capabilities for using, interpreting and applying results from diagnostic imaging technologies within the six-week time frame. Concurrently, student integration allowed for greater service delivery by the clinic. Considering that the ability to interpret and apply results from diagnostic imaging technologies is now considered an entry-level competency by the main professional body for optometrists in Australia,¹⁷ this model demonstrates usefulness towards efficiency in learning these technologies.

The model promoted skills associated with lifelong learning, essential in the optometric profession

Optometry students are required, at a minimum, to attain a competent level of professionalism before they can enter the workforce, whereby they are able to consciously interpret available data and adjust management plans for specific patients or clinical situations. Optometry Australia, the leading professional body, has published detailed entry-level competency standards.¹⁷ Among a range of professional responsibilities, the ability to "continue to expand and update skills and knowledge for safe and evidence-based practice through adoption of a lifelong approach to learning" is deemed essential. The importance of embracing research and evidence-based practice and prioritizing these elements in curricular planning within schools and colleges of optometry has also been highlighted.²⁵ Student survey results indicated this teaching model promoted non-cognitive skills associated with critical reflection, self-learning and motivation, factors known to be essential to students' success beyond university as they embark on their careers^{25,26} and in alignment with Faucher's²⁷ description of professional expertise development.

Raising the standards of new graduates may have a beneficial flow-on effect of contributing to the prevention and reduction of eye diseases within the community. Furthermore, the uniqueness of this optometry-led clinic, its patient cohort and highly skilled optometric staff with a dedicated interest in diagnosis and management of ocular diseases also provides an adaptive learning environment. This environment and the ability to diagnose and manage eye disease more confidently, particularly in light of the increasing scope of optometric practice, could translate to improved career satisfaction when combined with effective programs to upskill the profession and train new graduates.

Student outcomes from this model were used to guide, refine and implement improvements and changes to the teaching methodologies and content

Student surveys and feedback were an important element in guiding and refining the teaching methodologies and materials with enhancements made to the instructional delivery and content. Such changes have resulted in improvements to the student survey scores across all aspects in each successive year. **(Table 3)** As students indicated that they valued face-to-face interactions, teaching methodologies were refined to place an emphasis on delivering these learning opportunities such as the implementation of weekly grand round lectures, tutorials and discussions of problem-based learning cases. Clinical update meetings and grand rounds-style lectures were also modified from a lecture mode presented by staff to "rapid-fire" question and answer sessions, resulting in greater student participation and interaction with their supervisors, as well as cultivating higher-order thinking. Tutorials were also

updated to concentrate on areas where students showed the weakest knowledge based on student-supervisor discussions, performances on their hurdle test of 30 multiple-choice questions (MCQs), and other clinical performances such as communication, report writing and analyzing results, addressing both technical and, more importantly, analytical skills with an emphasis on management and diagnosis. Another aspect measured was volume of work, which garnered the lowest survey scores, although this was possibly confounded by other assignments that were due at the same time. Based on such feedback, report templates were streamlined to adjust the volume of work. This resulted in an improvement of survey scores from 3.2 to 4.4 out of 5, with summary report templates implemented at the final two weeks of the program. These summary report templates encouraged students to integrate relevant results in constructing a concise report and allowed clinical supervisors to prioritize students who needed more guidance in analyzing and integrating results. As evaluating teaching and learning methods are an important responsibility among education providers to ensure delivery of quality teaching and optimize student learning,²⁸⁻³² this model has measured outcomes using strategies such as student surveys and feedback as well as supervisor impressions. These methods have shown to be useful in refining teaching methodologies and content, as demonstrated by an increase in student satisfaction scores, and can be implemented in a variety of clinical settings to evaluate the effectiveness of teaching strategies and materials and to guide refinements.

This model may be enhanced by the integration of technological solutions to optimize clinical efficiency and extend the student learning experience

We acknowledge that areas within the current model may be improved by implementing technological solutions to transform current manual procedures and optimize the use of resources, in turn enhancing the student learning experience and creating a sustainable learning environment. Specifically, the use of tracking software such as Meditrek (Morrisville, Pa.) to capture the clinical supervisors' impressions of the progress of students will allow for more quantitative analysis of such information. Other enhancements that can be implemented include an electronic portfolio with the potential to allow students and supervisors to track their learning and competencies, expand feedback and interaction modalities, and build learning communities by enabling questions and case discussion with peers and supervisors via a digital platform. As teaching procedural and operational skills related to a vast range of ocular imaging equipment can place considerable burden on time and staff resources, digitizing certain aspects of instructional delivery may be beneficial. For example, instrument demonstration videos disseminated to and completed by students prior to their placement may be useful in allowing flexible, self-directed learning and optimizing use of face-to-face time with supervisors over the orientation period to refine techniques, discuss difficulties and learn to troubleshoot when problems arise. Such enhancements may be implemented in a variety of clinical placements requiring tracking of student-supervisor interaction, competency-based teaching and flexibility of the learning environment.

This model may be limited by the specific scope of the workplace environment

A potential limitation of this teaching model is the workplace setting: CFEH is an optometry-led, referral-only clinic for patients who have or are suspected of having ocular disease. The clinic is also based at a teaching and research institution and therefore staff knowledge is highly specialized and current with specific continuing education practices embedded within the workplace. We acknowledge that most optometry-driven clinics may not operate under such specific clinical protocols. However, most optometry education programs throughout the world are likely to include placements at clinics that utilize advanced ocular imaging technologies and have unique clinical pathways. For example, in most U.S. colleges, students undergo externships at various ocular disease specialty clinics during the final year of the program⁹ such as those offered by Nova Southeastern University.³³ In the United Kingdom, observation-based clinical placements at the Moorfields Eye Hospital are offered by the City University of London.³⁴ In this case, strategies used within the model, specifically the full integration of students into the workplace to perform service delivery and patient management with advanced imaging and the use

of a variety of teaching methodologies should be applicable to a wide range of other clinical settings and contribute to positive outcomes such as those seen in this placement.

Conclusion

This article highlights the potential benefits of intensively integrating optometry students into a unique workplace environment dedicated to advanced ocular imaging and disease management. Survey results collated over three years show increasingly positive feedback from students in regard to various aspects of the model and cultivation of higher-order thinking and non-cognitive factors. The model also shows benefit to the workplace through improved efficiency in service delivery. Considering the increasing level of theoretical knowledge that needs to be taught to optometry students and the consequent pressure this places on finding opportunities to translate the knowledge into practical skills, models such as this may represent efficient methods of addressing these challenges.

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PEER REVIEWED

Faculty Perceptions of the Impact of Electronic Medical and Health Records in Optometric Education in the United States and Puerto Rico

Aurora Denial OD, FAAO, Daniel Bastian OD, FAAO, Gary Chu, OD, MPH, FAAO, and Amy Moy OD, FAAO | *Optometric Education: Volume 43 Number 3 (Summer 2018)*

Abstract

Digital records, i.e., electronic health records (EHRs) and electronic medical Records (EMRs) are the current standard for documenting healthcare information. The purposes of this exploratory study were to gather information about the use of digital records in academic optometric settings in the United States and Puerto Rico and to assess faculty perceptions of the potential impact and implications of digital records in the teaching and learning process. The results indicated that most students have authority to enter data into the majority of the digital record. Potential influences of digital records in teaching and learning were identified in the areas of time for documentation, development of clinical reasoning, and student behaviors.

Key Words: *electronic medical records, electronic health records, digital records, optometric education*

Introduction

In 2001, the Institute of Medicine, which was established by the National Academy of Sciences as an independent advisory organization, advocated for the extensive use of information technology that would “lead to the elimination of most handwritten clinical data by the end of the decade.”¹ This information technology (digital records) became known as electronic health records (EHRs) and electronic medical Records (EMRs). EMRs are digital medical records that contain the standard medical and clinical data collected in one provider’s office.² EMRs were designed to reduce medical errors and improve quality of care.¹ Although the content can vary, most EMRs include clinical documentation (notes), patient data (demographics, lab results, problem/diagnosis list, medication list, psychosocial history, other test results), computerized order entry for medications and tests, clinical messaging, and decision support systems (alerts, warnings, reminders).³ EHRs are a digital collection of individual office visits (EMRs) and other health information. EHRs go beyond the information collected by one office or provider.² EHRs can be shared and provide information about an individual or populations.² As such they have the potential to enhance clinical care and impact research, public health policies and education.⁴

Digital records are a tool for documenting healthcare information and data used in caring for a patient. An important question to ask is whether this tool goes beyond documentation and has an impact on other areas such as student learning. Clinical reasoning, the cognitive process that clinicians use to care for patients, is based on data, information and evidence.⁵ Clinical reasoning can be defined as “thinking through the various aspects of patient care to arrive at a reasonable decision regarding the prevention, diagnosis or treatment of a clinical problem in a specific patient.”⁵ The digital record is a new method of documenting the data and information that can be used to drive the clinical reasoning process of clinicians.

Statistical data have shown a widespread increase in the use of digital records among healthcare

providers and hospitals over the past few years.^{6,7} The Office of the National Coordinator for Health Information Technology reported in 2015 that 3 out of 4 (76%) non-federal acute care hospitals had adopted at least a basic digital record, and more than 8 out of 10 (83%) physicians had adopted a digital records system.^{6,7}

Digital records are also becoming commonplace in academic healthcare settings.⁸⁻¹⁰ In recent years, all optometric education institutions in the United States have implemented a digital record system in at least their main academic clinics.¹¹ In medical education, several advantages and disadvantages of increased digital records use have been identified. Advantages include ease of reviewing notes, availability of information, medical support tools, ease of organizing notes, and potential use of patient registries.⁸ Disadvantages include increased time spent charting, impact on clinical reasoning, impact on the development of student/patient rapport, and information overload.⁸

There is a paucity of information available about the use of digital records in optometric education. A search of PubMed, Medline, and VisionCite using the MeSH terms “electronic medical record” or “electronic health record” and “optometry teaching environments” or “optometric health care education” yielded no relevant articles. The purposes of this exploratory study were to gather information about the use of digital records in academic optometric settings in the United States and Puerto Rico and to assess faculty perceptions of the potential impact and implications of digital records in the teaching and learning process.

Methods

All faculty members who were listed in the Association of Schools and Colleges of Optometry database as having clinical responsibilities were eligible for inclusion in the study. In May 2016, a link to a survey was e-mailed to 790 optometric faculty members who met the inclusion criteria. The survey consisted of 35 questions and sought information about the demographics of faculty users of digital records, and about the implementation, use and impact of digital records in clinical education. Seven of the questions were multiple-choice, four of the questions required a yes/no response, and 21 of the questions required a response along a four-point Likert-type scale (1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree). A comment section was included.

Instrumentation

The survey was initially developed from a review of the literature and the investigators' clinical experience. A draft of the survey was fine-tuned by a focus group consisting of five clinical educators from the New England College of Optometry. The focus group refined questions and provided feedback on the readability and soundness of each question. To aid in simplicity, the terms EMR and EHR were used interchangeably in the survey. The intention was for faculty to reflect on the digital records used in their clinical setting. The survey was administered via the web-based system SurveyMonkey®. The survey was re-sent to all potential participants two weeks after the initial deployment. The formatting of the survey by SurveyMonkey® ensured that each participant could only respond once. Information obtained by the survey was confidential and anonymous. The survey is shown in **Appendix A**.

Data analysis

All data analysis was conducted using IBM SPSS version 25 (Chicago, IL) with alpha set at $p < 0.05$. Measures of central tendency were conducted for all continuous variables, and percent and proportions were calculated for all categorical variables. Within-subjects analysis of variance with the Bonferroni technique to control for inflated Type I error was employed to determine differences among survey items. A series of Spearman's rho correlations was conducted to determine the relationships between items from the survey and the following demographic variables: (a) age, (b) years practicing optometry, (c)

years using EMRs, (d) number of clinical students, and (e) months using the current EMR system. Results of the a priori power analysis using G*Power (V3.1) software indicated a sample of $N = 67$ to achieve a moderate effect size of 0.30 with a 0.80 power and alpha set at $p < 0.05$ (two-tailed). The comments were analyzed using a grounded theory approach. The authors identified relevant comments with emerging themes and reached a consensus on the themes.

The study was reviewed by the Institutional Review Board at the New England College of Optometry and given an exempt status.

Results

The final overall response rate for the survey was 34% (265) of the clinical faculty members from optometry schools in the United States and Puerto Rico. The assumptions for linearity and normality were met for all variables.

TABLE 1
Student Use of Digital Records

Where(s) of the EHR does the student have the authority to edit?	% Responses
None	85
EO	34
EO	12
edit medications	96
	28
	3
additional testing	48
for notes	36
own medications	41
	93
rotation	88
	4

Table 1.

[Click to enlarge](#)

TABLE 2

Using Digital Records in a Teaching

	% Responses	Standard Deviation
	80	0.40
	62	0.49
	52	0.50
	46	0.40
	16	0.37
	31	0.46

Table 2.

[Click to enlarge](#)

TABLE 3

Using Digital Records in a Teaching

	% Responses	Standard Deviation
	74	0.43
	60	0.49
	82	0.38
	22	0.42

Table 3.

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The median age of the respondents was between 36-45 years (mean 44 years). Respondents had 4-7 years of digital record experience. Thirty-two percent of the respondents had been practicing for more than 25 years. Eighty-seven percent of the respondents practiced in an optometric institution's eye clinic, 11% in a community health center, and 2% in a private practice setting. The Compulink system was the most used overall (48%). Eighty-six percent of the respondents reported using digital records specifically designed for eye care, and 96% reported using paper charts in the past. The majority of participants

(66%) indicated that they felt students were well-trained in the use of digital records before arriving in clinic, and 84% indicated that students were exposed to using a digital record system in the preclinical environment. Most faculty (78%) reported being comfortable using their current digital record, and 69% reported not receiving formal training in the use of digital records as a teaching tool. The majority of respondents (85%) reported that students had authority to enter data into the EMR; 91% reported students could enter medication updates; 93% reported students could enter allergies; and 89% reported students could enter tests and interpretations. This data is shown in **Table 1**.

Statistically significant differences were found among the *challenges in using digital records in a teaching environment* $F(5, 259) = 79.52, p < 0.001, \eta^2 = 0.62$. Pairwise comparisons using the Bonferroni technique to control for inflated Type I error indicated that *time for documentation* is the greatest challenge, while *too much data* is the least challenging. Descriptive statistics related to challenges in using digital records are presented in **Table 2**. Statistically significant differences were also found among the *advantages in using digital records in a teaching environment* $F(3, 262) = 128.96, p < 0.001, \eta^2 = 0.60$. Pairwise comparisons using the Bonferroni technique indicated that *legibility of records* and *ability to access past records easily* are the greatest advantages, while *use of templates* is the least advantageous. Descriptive statistics related to advantages in using digital records are presented in **Table 3**.

The majority of faculty (74%) reported that time spent by students and faculty for documentation in the digital record takes away from time spent teaching. Respondents were split 50/50 on the perception of a digital record as a useful learning tool. The majority (78%) did not agree with the statement “The EHR has positively impacted my enthusiasm for teaching.”

Fifty-eight percent of the respondents perceived that the inherent prompts (i.e., templates) and layout of a digital record system hinder students' development of clinical reasoning. Fifty-two percent of the respondents reported that they give students their undivided attention including direct eye contact during case presentation. Fifty-nine percent of the respondents did not agree with the statement "As a clinical instructor, I tend to rely more on information from the EHR than a student's oral case presentation."

Student behaviors as reported by faculty are impacted by digital records in *frequency of copying and pasting data* (67%)

[illegible]

Table 4.

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[illegible]

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There were statistically significant correlations between faculty age and their (a) experience using a digital record system, and (b) the number of students they supervise in the clinic at a given time. The relationships between the demographic variables with the items from the survey are shown in **Table 6**. According to the data, older respondents and those practicing longer are statistically more likely to agree with items Q15 (*time spent by faculty for documentation within the EMR system takes away from teaching*), Q19 (*during case presentation, my student has my undivided attention including direct eye contact*), Q26 (*the use of EMRs has specifically impacted the students' ability to maintain eye contact with patients during the case history*), and Q29 (*I received formal faculty development training in the use of EMRs as a teaching tool*).

Finally, instructors with more clinical students are statistically more likely to agree with items Q21 (*students frequently copy and paste information from a previous record into the current EMR*) and Q32 (*EMRs propagate erroneous information*). In contrast, instructors who were supervising fewer clinical students are statistically more likely to agree with items Q18 (*as a clinical instructor, I tend to rely more of information from the EMR than a student's oral case presentation*) and Q22 (*to aid in efficiency, I frequently use information from EMRs to monitor students' activity in the exam room prior to speaking with students*).

Table 7.

Table 8.

[Click to enlarge](#)

Discussion

Student usage of the individual components of digital records

- 2.9.1 The graduate must be able to identify, record and analyze pertinent history and problems presented by the patient.
- 2.9.8 The graduate must be able to effectively communicate orally and in writing with other professionals and patients.
- 8.2.4 The patient record must allow for efficient review of the patient's condition and any pertinent previous care provided at the program's clinical facility.¹³

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patients.”¹⁵ The survey revealed that in most sections of the digital record students have the authority to enter data. The majority (85%) of optometric sites and instructors give students the authority to document in the EMR. This gives the students the opportunity to learn and practice documentation skills. In contrast, Wittels et al. found that only 63% of emergency medicine clerkships allowed medical students to document a patient encounter.¹⁶ These differences may reflect differences in billing policies, patient safety issues or environments (inpatient hospital care vs. outpatient care). According to the survey, optometry students participate less in some sections, such as data for billing, demographics, generating referrals, ordering additional tests, and ordering additional medications, than in other sections. Student documentation in all sections should be encouraged to provide a comprehensive educational experience.

Impact on teaching

Based on the survey responses, time spent on documentation by both students and faculty reduces the amount of time available for clinical teaching. The majority of comments related to teaching loudly echoed a concern for lost teaching time. Older respondents and those practicing longer were more likely to agree that faculty documentation within the digital record takes away from teaching. This may reflect differences in comfort levels related to technology and learning. Most clinical faculty are responsible for providing a high level of patient care, maintaining clinical productivity and educating students. In any given clinical session, there is a limited amount of time. In most clinical environments, a constant high level of patient care while maintaining productivity is necessary to ensure financial stability. Therefore, clinical teaching becomes vulnerable to any reduction in time. An important question to ask is why documentation in digital records is so slow. Slowness in documentation could be attributed to the inherent design of digital records, changes in student behaviors, or inadequate/ineffective training. The survey revealed that most faculty members feel that students are exposed to digital records in the preclinical environment and are well-trained before arriving in clinic. However, the study did not determine the students' level of skill after training, type of training or the specific amount of time dedicated to training, which may influence the speed of documentation. Student behaviors such as writing findings on paper before entering data into the computer could contribute to a slower and less efficient student. The reasons some students write before entering data was not explored in the study. Theoretically, students may write before entering data because they are not confident in their findings or efficient in the use of the computer or data entry. Seventeen percent of the respondents perceived that student documentation allows more time to teach. This group tended to be younger with less years in practice.

Faculty members were split on the potential use of digital records as a tool for assisting teaching and learning. Younger respondents with fewer years in practice were more likely to agree that digital records are a useful tool to assist in teaching and promote learning. The most significant advantages of digital records identified were *ability to access past records*, *ability to access patient information*, and *legibility of records*. In a national study by Hammoud, these same advantages were identified in medical education.⁸ Theoretically, these characteristics have the potential to aid in teaching and learning. However, the advantages afforded by digital records may be offset by the perceived loss of teaching time.

Student behaviors

Identifying changes in student behaviors related to digital records as perceived by faculty can be helpful in guiding teaching strategies. The *ability to maintain eye contact with a patient during case history* and the *use of the copy and paste features* were perceived changes in student behavior related to the use of digital records. Faculty who were older, practiced longer and had been using digital records longer were more likely to agree with the students' loss of eye contact. Most faculty agreed that the design of the exam room had not been adjusted to maximize communication while using a digital record. Faculty who

felt that the layout of the exam room had been modified tended to be younger with fewer years in practice. The ability to communicate and develop a relationship with the patient is an essential tool in rendering a high level of patient care.¹⁷ Poor eye contact while using digital records reflects poor communication skills and may impact the development of rapport with the patient.¹⁸ Students in the preclinical environment need to develop and practice communication skills that allow for the gathering of appropriate data while fully maintaining eye contact and efficiently entering data into the digital record. Suggestions for improving eye contact may include altering exam room layout to maximize communication, instructing the student to look at the patient and move away from the keyboard during the case history, and using defined breaks from conversations with patients to enter data.

The tendency for students to copy and paste information was perceived by a majority of survey respondents. This has serious consequences related to ethics, medical errors and propagation of incorrect information. In 2001, a study within the Veterans Administration System revealed that "20% of notes showed evidence of copying with an average of 1.01 errors per copied note."¹⁹ In a 2009 physician survey, 90% of the physicians who wrote notes used the copy and paste function.²⁰ In optometric education, anecdotal information indicates that many students copy and paste information as a means of decreasing documentation time. In clinic, students are learning and it is the clinical instructor's job to instruct them on the potential negative consequences related to copying and pasting information. All institutions and clinical environments should have a clear policy on copying and pasting during documentation. Unethical practices, poor patient care and increased liability should not be a mere click away.

Clinical reasoning

One of the goals of clinical teaching is the development of clinical reasoning. Faculty perceived digital records to impact the development of clinical reasoning in three areas: student reliance on templates, use of copy and paste features, and the presentation of clinical data/thought process. Most digital records contain multiple templates as well as the capability of adding free text. The majority of faculty in this study (58%) perceived digital records to hinder the development of clinical reasoning. This perception was also reiterated in the faculty comments on clinical reasoning. In medical education, a major challenge of digital records was the potential barrier to the development of clinical reasoning skills.⁸

Clinical reasoning involves gathering, synthesizing, analyzing and critically reviewing information/data. Historically, questioning during the case history allows the clinician to gather information, generate an initial hypothesis and refine the hypothesis based on a patient's response. The use of templates can impact reasoning because questions are asked as dictated by the template and not by the student's thought process. Therefore, and in order to ensure that a student is applying clinical reasoning, faculty should challenge the student's thought process to demonstrate that adequate skill, advancement and progression are achieved.

Another potential barrier to the development of clinical reasoning skills is the copying and pasting of information, specifically the assessment/diagnosis and management. The majority of faculty agreed in the survey that students utilize this feature. Respondents with more students to supervise were more likely to agree that students too frequently copied and pasted information from a previous record into the current digital record. Perhaps faculty with more supervisees are more exposed to repetitious notes and thus are more able to detect frequent copying and pasting. The final assessment/diagnosis and management lists represent coming to a conclusion by gathering, analyzing and evaluating appropriate information, examining assumptions and identifying any biases. If students are allowed to copy and paste this part of the note, it may negatively influence the development of clinical reasoning skills.

Student case presentation represents the oral presentation of data and a student's clinical reasoning.²¹ A

majority of faculty (64%), especially those who were younger with fewer years in practice, indicated using digital records to get information to monitor a student's activity, and (66%) indicated using digital records to aid in instructor decision-making before student case presentation. Additionally, 59% of the respondents reported relying on information from the student's oral case presentation rather than the digital record, and 52% indicated that students have the clinical faculty member's undivided attention during case presentation. As an educational tool, case presentation allows the clinical instructor the opportunity to gain insight into a student's reasoning while allowing the student the opportunity to perfect the skill. In medicine, case presentation can take 2-7 minutes.²¹ Clinical faculty often balance the more efficient acquisition of information from a digital record with the educational experience of case presentation. Student need, productivity requirements and patient care may dictate during any given patient encounter where and how information is acquired. In the survey, age, years in practice and years using digital records were associated with providing undivided attention to students, which suggests that experienced clinicians might more easily recognize the value and educational benefit of case presentation.

Interestingly, respondents with fewer students were more likely to rely on information from the digital record than on the student's oral case presentation. One possible explanation is that faculty with fewer students may have a better understanding of their students' abilities and can with greater confidence simply rely on the digital record rather than investing in the time of an oral case presentation. This explanation is partially supported by the fact that respondents with fewer students are also more likely to use information from the digital record to monitor students' activity in the exam room prior to speaking with students.

The goals of clinical faculty are to educate and take care of patients. The value of case presentation must be recognized and balanced with the efficient acquisition of information.

Limitations of the study

The study was limited by the sample size, lack of data related to respondents' specific institution, blurring of the terms EMR and EHR in the survey, and lack of specificity in some of the questions. The overall response rate to the survey was 34%, representing 265 respondents. The individual response rate for each question varied between 265-252 respondents because a response to each question was not mandatory to complete the survey. There is no agreement in the literature on acceptable response rates.²² However, response bias or non-response error is always more of a risk with a lower response rate.²² Data were not collected related to the name of each respondent's institution. This may have introduced a bias if, for example, a large number of faculty from one institution responded. In the survey, the participants were instructed to use the terms EHR and EMR interchangeably. Although the digital record that most faculty are completing after each encounter is an EMR, the interchangeable use of the terms may have blurred the specific components of the digital record that were impacted. In hindsight, more specificity in some of the questions such as the length and type of training received by students and faculty, level of expertise in using digital records, type of data or text that students copy and paste, and the specific level of impact on enthusiasm for teaching would have been helpful.

Conclusion

Digital records constitute the present and future landscape of health care and have become a vital component of clinical care. The results of this study indicate that students have authority to use several parts of the digital record. Further, the results indicate that time related to documentation within digital records impacts the educational process. Additionally, the study indicates that faculty perceive digital records as having an impact on student behaviors and the development of clinical reasoning skills. Age, years in practice and years using digital records are indicators for the perception of faculty documentation affecting teaching time, providing undivided attention to students during case

presentation, and the perception of an impact in student eye contact with patients. To maximize use of digital records in patient care and clinical education, tools such as educational guidelines and template assistance need to be developed to guide faculty and students during the teaching and learning process. The study raises several issues for future investigation, including what specifically about digital records takes more time, whether the training and skill level of students impact the time for documentation, whether digital records impact enthusiasm for clinical optometric teaching, what specific type of training is received by faculty, what is the impact of the training, how template design impacts the development of clinical reasoning skills. In an effort to develop educational strategies, future areas of research may include students' perception of digital records, Medicare compliance, ethics and medical errors, implementation strategies and lessons learned from past experiences.

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Appendix A

1. The student has been identified as a medical student by the ACOE system and is not a resident or fellow.	2. The student has been identified as a medical student by the ACOE system and is not a resident or fellow.
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Appendix A.

[Click to enlarge](#)

Dr. Denial [deniala@neco.edu], Editor of Optometric Education, is a Professor of Optometry at the New England College of Optometry. She developed, administers and teaches in the Clinical Reasoning Course Sequence. She is also a clinical instructor.

Dr. Bastian is an Assistant Professor at the New England College of Optometry. He is an Instructor of Record for the first-year Principles and Practices of Optometry II and III courses. Dr. Bastian is an Attending Optometrist at the Lynn Community Health Center in Lynn, Mass.

Dr. Chu is the Senior Director of Public Health and Community Collaborations at the New England College of Optometry. He is responsible for the design, development, review and management of the college's community health center and outreach programs.

Dr. Moy is an Associate Professor of Clinical Optometry and Chief Clinical Officer of the Clinical Network at the New England College of Optometry. She is also the Director of Optometry at the Boston Children's Hospital, Martha Eliot Health Center.

Features

Editorial

@ Our Wit's End with Unprofessional Student E-mails

Aurora Denial, OD, FAAO | *Optometric Education: Volume 43 Number 3 (Summer 2018)*



Aurora Denial, OD, FAAO

Traditionally, out-of-class communication between students and faculty involved meetings during office hours or informal meetings. These meetings have been shown to contribute to a positive student outcome.¹⁻³ Today, e-mail communication between students and faculty is common at all levels of education. It provides students with a convenient and efficient method of interacting with faculty outside of class and can be a means of discussing information they may not feel comfortable discussing face-to-face. However, e-mail communication differs from face-to-face communication because it does not allow the participants to clarify information on-the-spot or to interpret nonverbal cues and feedback. Stephens et al. identified that overly casual e-mails from students to instructors created a less than positive attitude toward the message and significantly impacted student credibility and an instructor's willingness to comply with a simple request for a face-to-face meeting.⁴

Faculty are Inundated

According to the New York Times, student e-mails that are unprofessional with regard to etiquette, grammar and content are overwhelming faculty.⁵ Attributes of unprofessional e-mails include an inappropriate salutation such as "hey," use of first names, or use of Mr./Miss./Ms. Other contributors to unprofessional e-mails are poor grammar, lack of capitalization, inappropriate abbreviations, lack of subject line information, no signature, grade-begging, negotiating work assignments, or an unprofessional tone. Studies have indicated that grade-begging — asking for a higher grade without a legitimate reason — occurs more frequently in e-mails than in face-to-face meetings.^{6,7}



Table 1. [Click to enlarge](#)

Anecdotal reports from faculty in optometric education confirm they are receiving a large amount of unprofessional e-mails. Recently, I received an e-mail from a student that referred to me as "Mrs. Denial" and included "Im having trouble with a topic u covered in class. Can u meet at 11 tomorrow." I've had students use idk (I don't know) in an e-mail to me as well. In another example, a student contacted me with a legitimate concern about a quiz taken with the college's learning management system. I was sympathetic to the concern until I read the last sentence of the e-mail: "if this issue is not resolved I will have to take it to a higher power." I'm not sure if the student would have used the same phrase in a face-to-face meeting, but my level of sympathy towards the student changed immediately.

Generational or Not, Inappropriate E-mail is Unacceptable

Can generational differences account for the unprofessional nature of students' e-mails? Perhaps the issues are related to the types of expectations held by Millennial students, which include a quick response, the right to have a voice, informality, negotiation, and the use of titles as inauthentic.⁸ It's worth

asking, too, whether students ever formally learn how to compose an e-mail. One might assume that most students learn informally and from e-mailing peers. Aguilar-Roca et al. studied whether a two-minute training class significantly increased the use of professional e-mails in student-to-faculty correspondence.⁷ The study demonstrated “a significant increase in overall professional quality of student e-mails in the trained class due to more frequent use of proper salutations, appropriate capitalization and a class-specific subject line.”⁷ However, no difference was detected in professional content or grade-begging between the trained and untrained group.⁷

Unprofessional e-mails should not be tolerated by faculty. Discussing unprofessional e-mails with students can help to alter the behavior. A plethora of websites offer tips for composing professional e-mails. **(Table 1)** Faculty often include these guidelines in course syllabi. Providing students with some common-sense tips may help to guide them toward more professional e-mailing and maintaining a positive relationship with faculty.

I welcome optometric faculty and administrators to share their experiences and ideas on this important topic.

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Industry News

Industry News

Industry News

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Industry News

DTC Campaign Features Multifocal Contact Lenses



Alcon has launched a new direct-to-consumer campaign to increase consumer awareness of multifocal contact lens options and encourage them to visit an eyecare professional. The “See Near and Far” campaign includes a television spot running throughout 2018 on ABC, NBC, CBS, ESPN and other networks along with national print and digital media.

“See Near and Far” aims to reach presbyopes who may already be wearing reading glasses or who are just starting to experience difficulties with near vision. It conveys the benefits patients can expect to experience with DAILIES TOTAL1 Multifocal contact lenses. [Click here for more information](#) about Alcon’s direct-to-consumer efforts to educate patients.

New Device Stimulates Natural Tear Production



The TrueTear handheld neurostimulation device from Allergan is the first and only FDA-cleared device designed to temporarily increase tear production with neurostimulation in adult patients, offering a novel and innovative way to address inadequate tear production. Using disposable tips, patients insert the device into the nasal cavity to induce the production of natural tears. In two clinical trials, TrueTear was shown to be safe and effective for temporarily increasing tear production in adult patients. Visit www.truetear.com for more information.

Photochromic Lens Options Expand



Sensity Dark and Sensity Shine, the newly launched photochromic lenses from Hoya Vision Care, include all of the features of original Sensity lenses with added processing and performance.

Sensity Dark, priced the same as original Sensity, activates behind the windshield of a car and fades back to full clarity. Sensity Shine also activates behind the windshield of a car and offers wearers a fashion-forward look with mirror coating. Color options for Sensity Dark and Sensity Shine — a neutral grey tone, a more flamboyant brown and a lively and slightly intense green — were chosen to provide ideal contrast and glare reduction without sacrificing precise vision. Visit <https://www.hoya.com>.

Project Foresight Winners



Walmart and Sam's Club Health & Wellness presented awards to the winners of its annual optometry student scholarship competition, Project Foresight. Project Foresight, open to students at all ASCO member schools, is a national competition that highlights the Walmart and Sam's Club Health and Wellness vision of providing quality, affordable, accessible healthcare for all. Two-person student teams were asked to research and present on how Walmart partners with optometrists and how they envision that partnership moving forward.

Janelle Sventek and Verle Judd (University of the Incarnate Word Rosenberg School of Optometry) earned first place and received a \$15,000 team scholarship and traveling trophy. Carrie DeWolfe and Katie Cargill (Michigan College of Optometry at Ferris State University) were the runners-up and received a \$5,000 team scholarship. Stay tuned for the 2018-2019 Project Foresight competition.

Higher Cylinder Power Debuts



The -2.75D cylinder power is now available for the entire portfolio of Bausch + Lomb ULTRA for Astigmatism contact lenses, from +6.00D to -9.00D. According to the company, the addition makes Bausch + Lomb ULTRA for Astigmatism contact lens the only monthly planned replacement lens with this cylinder power available in the fit set.

Bausch + Lomb ULTRA for Astigmatism lenses combine MoistureSeal technology for comfort and OpticAlign design for stability. For more information on these and other contact lenses, [visit the B+L website](#).

New White Paper on Ultra-widefield Imaging



Dr. Daniel Epshtein, OD, has added a new white paper to the New Grad Optometry website. [A Complete Guide to the Clarus 500 Ultra-widefield Retinal Camera](#) provides insights into the ever-changing eyecare landscape and why more eyecare professionals are implementing ultra-widefield technology into their patient care protocols.

Dr. Epshtein has a hospital-based practice where he combines his research experience with the latest clinical strategies to detect sight-threatening disorders early and to provide the best possible treatments. He considers the CLARUS 500, a high-definition ultra-widefield fundus imaging system from Zeiss, to be a crucial component of an integrated approach to the diagnosis and management of ocular pathology.

Get Up to Date on the Value of VEP and ERG



Diopsys, developer of the Diopsys NOVA and other visual electrophysiology technologies, offers a variety of [resources for eyecare professionals](#) at its website, including educational videos and case studies. Recent blog posts at the site include "How Patients Benefit from ERG Vision Testing" and "What do I see on this VEP?"

Leading eyecare centers across the country utilize Diopsys devices, which are backed by more than 15 years of published studies. Visitors to the site can conveniently narrow their search for information based on disease state, product and/or resource type.

FDA Clears Multi-modal Imaging Device with Swept Source OCT



Topcon Medical Systems announced that its DRI OCT Triton Series has received 510(k) clearance from the FDA. The DRI OCT Triton features easy image capture and a 1-micron, 1050-nm light source with a scanning speed of 100,000 A-scans/second. The multi-modal instrument incorporates a built-in retinal

camera, eye tracking during capture of selected scans, and combines the company's years of expertise in OCT imaging, color, red-free, fluorescein angiography and fundus autofluorescence imaging with the diagnostic power of swept source OCT.

For more information, visit www.topconmedical.com.

Schools Can Take Advantage of Digital Indirect



Keeler Americas now offers its Keeler Modified Digital Indirect ophthalmoscope to schools and colleges of optometry. The Modified Digital Indirect is the same unit used by the National Board of Examiners in Optometry for all students taking Part III of the board exam. The unit is designed to combine ease of use with a great view to allow swift examination by students and concise evaluation by professors.

For User Support and information about all of Keeler's products, visit <https://support.keeler-global.com/index.html>.

New Line of Slit Lamps Introduced



Marco has introduced a new line of slit lamps, the Ultra M Series, which it says features elegant and intelligent design, progressive engineering and functional flexibility. Attributes of the Ultra M Series include multiple color and blue-correction filters, patented integrated background illuminator, extended slit aperture and wider field of view, and intelligent operator and patient interfaces.

For more information on Ultra M Series design enhancements, visit www.MARCO.com.

Student Grant Program Completes Its Third Year



The 2018 winners of the National Vision/National Optometric Student Association (NOSA) grants are Jaelyn DeBerry, Southern College of Optometry class of 2019 (\$4,000); Priscilla Chang, Illinois College of Optometry class of 2019 (\$2,000); and Sterlin Blakley, University of Alabama at Birmingham School of Optometry class of 2019 (\$1,000).

Each year, the grant program recognizes three students who are NOSA members. For this year's grant program, which was inspired by Simon Sinek, consultant and author of *What is Your Why?*, students were asked to submit an essay or video revealing their "why," and explaining their personal mission as a future Doctor of Optometry. National Vision hopes the grants encourage students to continue their work in primary care and to recognize its importance in communities nationwide.

Visit <https://www.nationalvision.com/> to learn more about National Vision.

Capture More Data for Scleral Lens Fitting



With the new Cornea Scleral Profile (CSP) Report, the Oculus Pentacam now measures sagittal height, a key parameter for scleral lens fitting. More than 200 Scheimpflug images covering a diameter of up to 18 mm are taken in the measuring process. All images for a Cornea Scleral Profile scan are taken from the same visual axis without the need for eye movement.

The usual Pentacam data are also recorded and populated into the displays already familiar to Pentacam users. The CSP scan is a tear-film independent measurement with automatic release. This ensures the values from the CSP Report are as reproducible as all other measured data. A link to external fitting software for scleral lenses is available.

Find complete [information about Pentacam online](#).

Take the Wider View with New OCT Combination Instrument



Optos launched Monaco, its new compact desk-top ultra-widefield retinal imaging device. Monaco provides greater imaging functionality and is the company's first imaging device to combine optical coherence tomography with ultra-widefield color imaging, 3-in-1 color depth imaging and autofluorescence.

[Click here](#) to learn more about Monaco.

OD Leadership Team Announced



Rev360, the eye care software and business solutions company that serves practices using RevolutionEHR, announced a growing leadership team of seven optometrists:

- Scott Jens, OD, CEO
- Mike Rothschild, OD, Director of Practice Management Initiatives
- Brett Paepke, OD, Director of ECP Services
- Kelly Kerkisick, OD, Director of Professional Relations
- Ann Hoscheit, OD, Director of ECP Strategy
- Todd Zarwell, OD, Director of Practice-Facing Technologies
- Ali Khoshnevis, OD, Manager of Consumer-Facing Technologies

Members of the OD leadership team possess deep and unique optometric expertise coupled with years of practice management experience operating their own businesses, all on the RevolutionEHR software platform. They spearhead Rev360's innovation efforts, work to advance the RevolutionEHR software, and deliver business solutions to customers. [Learn more about the team.](#)

Applications Now Being Accepted for Student Mission Trip



The application process is now open for the 2019 Student OneSight clinic to a yet-to-be-determined global location next May. The OneSight organization is focused on bringing both sustainable and urgent

vision care solutions to communities around the world. On the OneSight trip, optometry students work under the supervision of Luxottica Retail-affiliated doctors performing comprehensive eye exams. They help support a core team of Luxottica volunteers in the frame fitting, manufacturing and dispensing of new eyewear. For the selected students, Luxottica Retail covers the expenses associated with the clinic, including air fare, accommodations and meals.

Optometry students interested in participating in a 2019 OneSight vision clinic can [apply online](#). Applications will be accepted through Dec. 10, 2018.

Special Announcement

Thank You!

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ASCO extends its sincere thanks to the following sponsors of the Ophthalmic Optics Educators Special Interest Group and the Low Vision Educators Special Interest Group!

OPHTHALMIC OPTICS EDUCATORS SIG



Michelle J. Hoff, OD, ABOAC, FNAO, Associate Clinical Professor at the University of California – Berkeley School of Optometry, is an individual contributor to the SIG.

LOW VISION EDUCATORS SIG

Visionaries' Circle (\$5,000 and above)



Bioptic Club (\$2,000 – \$4,999)



Magnifier Club (\$1,000 – \$1,999)



ASCO's SIGs are the vehicles for faculty interchange and the sharing of ideas, resources and experiences. The groups provide forums for professional staff, administrators and faculty with common responsibilities to communicate directly with each other about issues related to common areas of interest and expertise. SIGs encourage interaction, cooperation and the sharing of best practices. They also develop guidance in areas of focus and expertise. These collaborative efforts dramatically advance optometric education.

Industry News

