JOURNAL OF OPTOMETRIC EDUCATION

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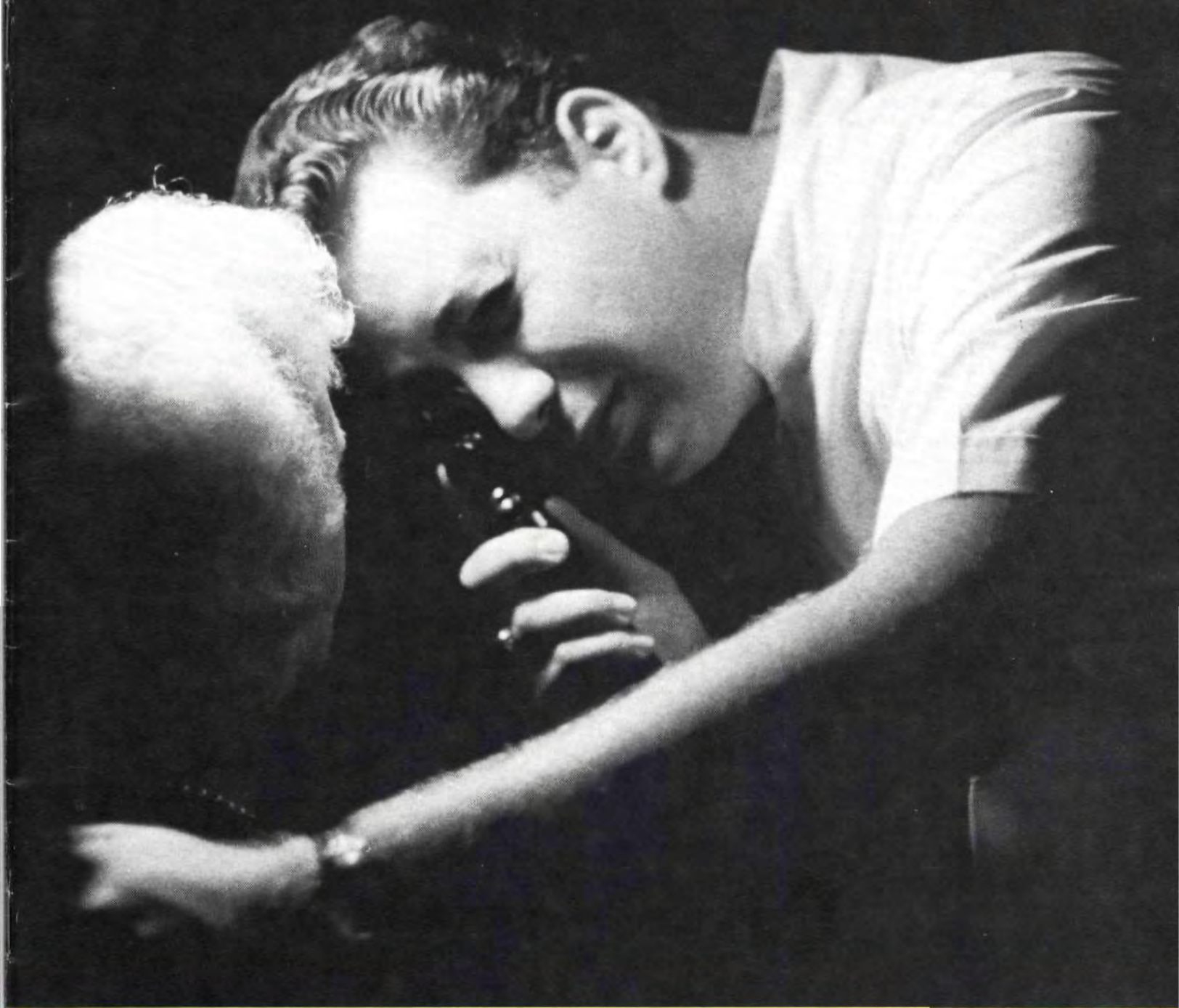

OPTOMETRIC SERVICES FOR THE NON-AMBULATORY

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JOURNAL OF OPTOMETRIC EDUCATION

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DEPARTMENTS

The **JOURNAL OF OPTOMETRIC EDUCATION** is published by the Association of Schools and Colleges of Optometry (ASCO). **Managing Editor:** Harriet L. Long. **Art Director:** Dan Hildt, Graphics in General. Business and editorial offices are located at 600 Maryland Ave., S.W., Suite 410, Washington, D.C. 20024. **Subscriptions: JOE** is published quarterly and distributed at no charge to dues-paying members of ASCO. Individual subscriptions are available at $10.00 per year, $15.00 per year to foreign subscribers. Postage paid for a non-profit, tax-exempt organization at Washington, D.C. Advertising rates are available upon request.

ANNOUNCEMENTS

NERF's Winter Research Symposium, Call for Papers

The National Eye Research Foundation (NERF) invites you to submit a paper to the NERF's Winter Research Symposium in Acapulco, Mexico, at the Pierre Marques Hotel & Club de Golf, March 13 to March 18, 1984.

General Symposium Topic: CONTACT LENS "DRY EYE": PROBLEMS AND SOLUTIONS (AND OTHER TOPICS)

Papers related to the general symposium topic or related subjects are now being accepted. Papers in foreign languages need to be submitted to the NERF offices one month prior to the symposium so that they may be appropriately translated. Titles and abstracts are now being accepted by:

THE NATIONAL EYE RESEARCH FOUNDATION
Dr. Sami G. El Hage, Chairman,
Papers for Mexico
18 South Michigan Avenue,
Suite 902
Chicago, Illinois 60603

For further information, write or call 312/726-7866.

Symposium Format:

1. Most papers are 15-minute presentations. Major papers will be 30 minutes; luncheon speakers will be 45-minute presentations.

2. Intensive morning sessions are planned comprised of presented papers, panel discussions and questions and answers from the delegation.

3. Most afternoons are free for both scientific and vacation exploration.

The proceedings of the NERF's Winter Research Symposium will be published in CONTACTO or as *THE CONTACT LENS "DRY EYE" MANUAL* available Summer 1984.

International Contact Lens Congress

The 5th International Contact Lens Congress, under the sponsorship of the Australian and New Zealand Contact Lens Societies, will be in Surfers Paradise, Queensland, Australia, August 19-24, 1984. Among the speakers will be Dr. Antonio Henriquez, Chief of Ophthalmology of the Arruea Clinic, Barcelona, Spain; Prof. Richard Hill, School of Optometry, Ohio State University; Prof. Brien Holden, Director of Cornea and Contact Lens Research, University of New South Wales; Prof. Kenneth Polse, School of Optometry, University of California; and Prof. Montague Ruben, Director of Contact Lens Research, University of Houston.

In addition to the invited speakers, there will be clinical lectures and several panel-type clinical discussion sessions. The exhibitions will include displays by the world's leading manufacturers of contact lenses and related equipment.

An American-Canadian group, authorized by the Congress Committee, will attend the Congress plus visit Tahiti, Bora Bora, Sidney and the Great Barrier Reef. American and Canadian optometrists interested in joining the North American group should contact Dr. Darrell Carter, School of Optometry, University of California, Berkeley, California 94720.

New Student, Recent Graduate Research Grants

OEP Foundation is offering ten new research grants of $500 each, five to fourth-year optometry students and five for recent graduates in residency programs.

The new grants will be awarded on the basis of submitted research proposals approved by a committee. Two awards have been granted, one to Sam H. Horner III, and one to Debby Feinberg, O.D., Pontiac, Mich., who have already begun their research.

Applicants should consider the following OEP criteria for grants: Proposals should address unanswered behavioral optometry questions, relate to the behavioral approach, and be applicable to the mission statement and long-range goals of the OEP Foundation.

For further information, write to: Senior Student and Recent Graduate Research Grants, OEP Foundation, 2912 S. Daimler, Santa Ana, Calif. 92705 or call (800) 423-4111, (714) 641-3883 in California.

Research: A Crucial Need

Research has always had an accepted important role in the profession and teaching of optometry. The events that have transpired in recent years make research even more crucial to the future of this profession. The educational institutions that foster this profession must use their limited resources for research ever more wisely and effectively.

When considering the development of research, it is useful to make a distinction between the role that research can play and the role that it currently does play. It is clear that optometrically oriented research at this time has very little focus, and that some institutions have rather limited research programs. However, we should first discuss the forces that have suddenly propelled us into our current need to carefully and promptly reassess the situation.

We are moving into a crisis in medicare and medicaid funding, a necessary restructuring of current health delivery programs, the development of new and different forms of preferred providers, etc. As a result we can anticipate that within the next decade, the entire structure of health care provision in the U.S. will be revised. Optometry must define its role within that scheme and maintain its usefulness in the service of the visual needs of this country and of the public.

Various societal changes cannot escape our attention. They affect us all. The average age of the population is increasing. Automation of all manner of tasks is an everyday event; new visual display terminals provide many innovative services whether it be in the workplace or in the home; voice synthesis devices are becoming more commonly used. From a slightly different point of view, one need only to attend one of the major ophthalmic meetings to see the increasing number of roles that are currently performed by the optometrist being replicated mechanically.

One could make a lengthy list of these ongoing changes. Within these changes where do we and will we fit? These are the fundamental questions. Those techniques and schemes that have served us so well for decades may be replaced in the coming years. Are we meeting the challenge of the times? How are we organized to meet those challenges? What may we do to strengthen our position in order to develop the resources and techniques for the future?

The National Eye Institute budget has grown enormously in recent years. For example, their 1984 fiscal year budget will exceed $150 million. Optometry has received only a small portion of that amount over the years—roughly 2 percent of the whole. The total dollar sum bespeaks the concern of the population for eye and vision care; the small amount that we have received bespeaks our inadequate programs and resources. It is worthwhile to question our long-term prospects unless we take the time now to develop strong research entities and resources for the coming years.

It is crucial for us to mobilize our limited resources in the most effective manner in order to provide for professional continuity. This is not a task for the few, but for all of the schools and colleges. ASCO must be among the leaders in developing a broad research program in the optometric profession. We must stimulate the development of research resources. We have to make known the availability of training opportunities for potential optometric researchers in the schools. We need to be represented in critical decision making positions at every level in a variety of institutional units.

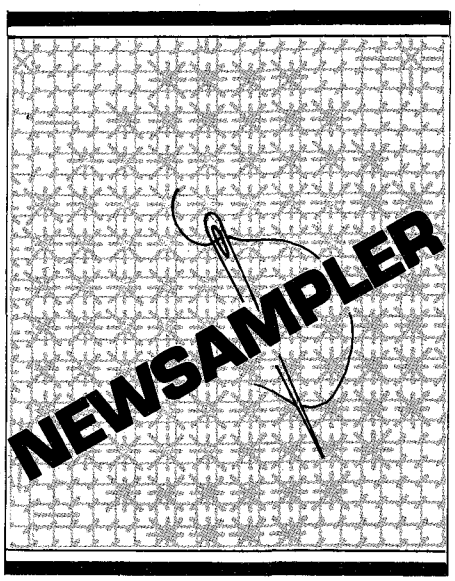
In order to be effective we have to periodically review the current status of research in optometric institutions, and to share our limited resources when indicated and possible. We must recognize the importance of major new activities in this area and try to inculcate our students and our colleagues with the need and the magnitude of this problem.

The principal role of professional optometry is to improve the visual quality of life of the citizens of this nation. As such, we address the entire visual environment and the entire visual task. We are concerned with detection of disease entities in order to provide protection for our patients. Toward this end, we need the cooperation of those concerned with advanced therapeutic regimens. Our working together is the only way in which the patient will receive complete attention and care.

We need to improve the quality of life of a child who is born with a visual disorder; we want to make the life of the elderly person less restrictive. We need to have compassion for and make major progress in behalf of everyone who is afflicted with visual impairments. We must identify ourselves as members of a profession that seeks to serve the needs of our society. Our research, in turn, must lead in the development of new applications of science for the profession. Herein lies the beginnings of the focus to our collective efforts.

No single educational institution can be exempt from these issues. Clearly, teaching and research are interdependent. We must encourage broad participation in our search for new knowledge. ASCO, as well as associated organizations—the American Academy of Optometry and the American Optometric Association—must encourage research. This implies inter-school collaboration in the training of the researcher. Above all, we must recognize that we cannot be complacent in the face of societal and professional changes of unprecedented dimensions occurring at this time in our lives. This is a time for thought, for planning, and for action. If we do not act now, then we will be hopelessly left behind in the competitive environment of today's world. We must organize and direct our resources toward the legitimate goals of the profession.

Jay M. Enoch, O.D., Ph.D., Dean
University of California, Berkeley
School of Optometry



SCCO Holds "Senior Optometrist Program"

Realizing the need for a program dealing exclusively with the concerns of retiring optometrists, the Southern California College of Optometry (SCCO), Fullerton, sponsored a day-long "Senior Optometrist Program" November 5. Selling a practice and taking in a younger partner or associate were the main topics of discussion during the program. Limited to 50 SCCO O.D.'s who had been in practice a minimum of 30 years, the program was the first ever of its kind sponsored by SCCO.

"The college believes that the profession and the practitioner needs assistance in this area of practice management which faces all optometrists," stated SCCO Director of Alumni Relations Harold A. Snider, O.D. "It's projected that the number of optometrists retiring within the next several years will steadily increase. Based on this fact, program topics were selected which discussed a senior optometrist's options for the addition of a younger doctor into his practice, and the necessary steps to consider when selling a practice."

Speakers and topics included: Assistant Professor, The University of Alabama in Birmingham, School of Optometry/The Medical Center John Classe, O.D., J.D., who spoke on "Selling Your Practice: Financial and Legal Considerations," "Different Ways to Take a Younger Doctor into Your Practice," Contractual Arrangements when Selling Your Practice or Taking in Another Optometrist," and "Tax Considerations when Selling Your Practice," was discussed by James C. Sullos, Jr., CPA and John CiCarlo, CPA.

SUNY Establishes Vision Research Institute

Despite the New York Marathon and inclement weather, the State College of Optometry, State University of New York (SUNY), dedicated its new Institute for Vision Research at the college on October 23, 1983.

New York City Mayor Ed Koch, in extending greeteings from the City, acknowledged the contribution of the new Institute to the health and welfare of the city residents. The dedication capped a week-long free vision screening co-sponsored by WABC-TV where more than 4,000 area residents were seen by members of the clinical faculty and third and fourth-year students.

As the research arm of the SUNY College of Optometry, the Institute will be initially composed of 20 vision scientists who will engage in theoretical and applied research into the visual mechanism. Projects such as studying the loss of focusing ability as people grow older; the determination of how a person with amblyopia or "lazy eye" can be assisted with vision training techniques, nutrition and vision, the assessment of visual dysfunction on learning ability are indicative of the types of scientific investigations conducted by the Institute's faculty.

Doctoral candidates, optometric students and scientists-in-residence also will benefit from the Institute's clinical research capabilities as the site of the world's largest and most diverse outpatient clinic of its kind, the University Optometric Center, housed in the same facility.

ICO Alumni Funds Support Student Activities

As part of an ongoing commitment to improving student life and supporting student activities, the Illinois College of Optometry Alumni Association, through its executive council, distributed $8,500 to various recognized, on-campus student organizations.

The Alumni Association granted $1,000 to the ICO yearbook, "Insights," and $1,000 to *Focus,* the student newspaper, for printing and production costs. The class of 1984 received $2,000 for its graduation banquet and Intramural Activities was granted $500 to replace equipment.

The Council awarded $2,500 to Student Volunteer Optometric Services to Humanity for 14 trips involving 26 students this year. Student Activities received $1,500 to use to increase student participation and representation at national and regional conventions, including the American Optometric Student Association and the National Optometric Student Association meetings.

OSU Renames Optometry Building

The optometry building at Ohio State University has been renamed Glenn Ansel Fry Hall in honor of the former director of the optometry school.

The renaming was approved recently by the university's Board of Trustees.

Dr. Fry retired from the university in 1979 as professor emeritus after 44 years on the faculty. During his tenure he was instrumental in establishing the graduate program in physiological optics and developed standards for spectacle lenses and eyeware that are used throughout the world.

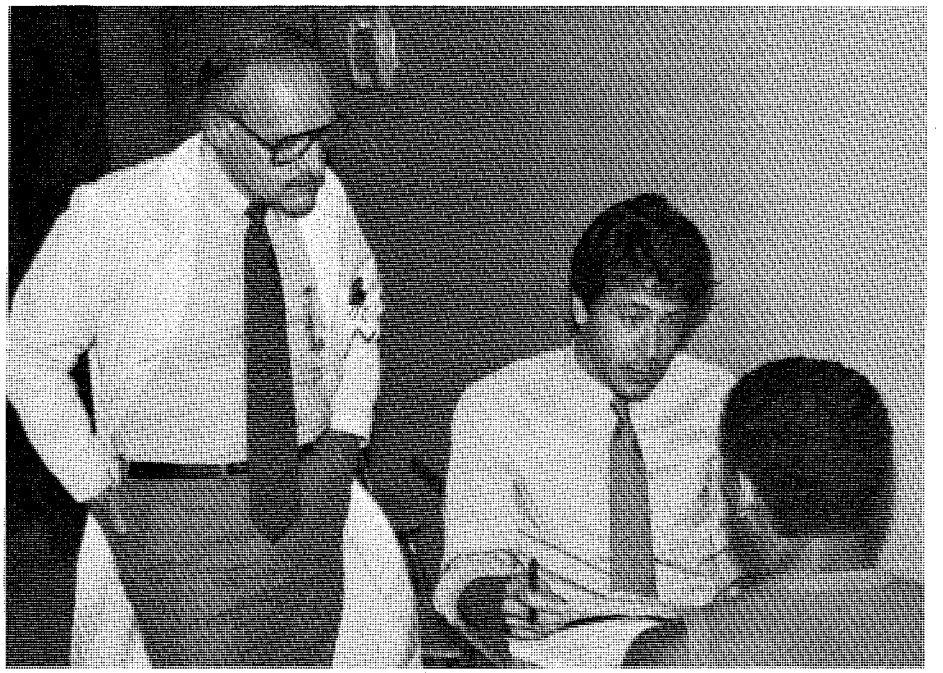
Dr. Fry also helped the optometry program attain status as a school in 1937, and served as its director until 1966 when he was named Regents Professor. (The School of Optometry became a college in 1968.)

The renaming marks the second time this year that Dr. Fry has been recognized by the institution he served. In May, the Trustees established the Glenn A. Fry Professorship Endowment Fund to receive contributions from a campaign to raise $250,000 in his honor. Once $250,00 is raised, a professorship in physiological optics will be established bearing Dr. Fry's name.

SUNY Screens Senior Citizens

Nearly 800 senior citizens in East Harlem, Lenox Hill, Yorkville and South Bronx communities of New York have received comprehensive vision screenings and follow-up care by faculty and staff from the State College of Optometry, State University of New York (SUNY), during the last several months as the result of contributions from the Optometric Center of New York, New York Community Trust, The Florence V. Burden Foundation, and the Helena Rubinstein Foundation.

According to Janice Krantz, social service director at the college's University Optometric Center and a supervisor of the program, nearly 457 senior citizens or 58% have "failed" the screening



Storm Field, health and science reporter for WABC-TV and an optometrist, consults with one of more than 4,000 New York City residents who participated in the WABC/State College of Optometry's week-long free vision screening in October. This third annual community service project was coordinated by Dr. Leonard Werner (left), chairman of the Manhattan-based college's Department of Clinical Services.

and were referred for optometric or ophthalmological care in their communities. The screenings have been held in senior citizen centers, churches and at a local health clinic.

Members of the college's professional staff, including social workers as well as fourth-year students, join faculty members in this community program which assists visually-impaired and blind citizens over 60 years of age. The staff also visits those older citizens who are home-bound.

Speakers Set for National Conference on Women in Optometry

Several of the featured speakers for the first-ever "National Conference on Women in Optometry—Not for Women Only" have been confirmed by conference host, the Southern California College of Optometry (SCCO). The conference, to be held May 3-5, 1984, at the Westin South Coast Plaza Hotel in Costa Mesa, CA, is a premier effort to bring optometrists together to discuss the special attributes and qualities women bring to the profession of optometry.

Speakers who have accepted invitations to address the three-day conference include: Marilyn Ruman, Ph.D.; Treasure A. Wheeler, O.D., V.C.O.V.D.; Richard L. Hopping, O.D., D.O.S.; Carroll M. Lawson; and Sylvia Negard, CPA.

Dr. Ruman, a clinical psychologist, will discuss "Personal Enhancement and Development" during her half-day seminar. Dr. Ruman is Founder and Director of Clinical and Consulting Associates, a family of therapists providing a vast range of psychological services. She also is author of "Superwoman—The Myth and the Reality" and co-author of "Beyond Society and Survival—A Personal Guide to Stress Management."

Treasure A. Wheeler, O.D., F.C.O.V.D., will discuss "Women in Optometry" through a historical perspective and a look at the current status of women in the profession. Dr. Wheeler is a past-president of the Oregon Optometric Association and as such became the first woman to preside over a Western states optometric association.

Richard L. Hopping, O.D., D.O.S., president of the Southern California College of Optometry, will address "Women and the Future of Optometry." Dr. Hopping is a past-president of the American Optometric Association and is actively involved in optometric issues concerning education and the future of the profession on local, state and national levels.

Carroll M. Lawson, an attorney at law practicing in Redlands, CA, will discuss "Legal Aspects of Optometric Practice." A partner in the law firm of Lawson and Hartnell, he is also a professor of law at Loma Linda University and the Loma Linda College of Law. Lawson specializes in corporate practice and estate planning.

"Record Keeping in the Optometric Office," will be discussed by Sylvia Negard, CPA. In addition to maintaining her own accounting practice, she currently serves as director of the Avora Corporation. She is a past-president of Reddy Foods, Inc., and has also been active in the American Society of Women Accountants.

Researcher Uses Eye Pigment "Fingerprint" to Understand Color Vision

Just like a detective using a fingerprint to crack a tough case, a researcher at the University of Houston-University Park College of Optometry hopes a chemical fingerprint of a pigment in the human eye will reveal how a structure in the eye affects color vision.

Called the macula lutea, or yellow spot, the structure is an area of decreased light sensitivity to certain colors located on the back of the eye, or macula.

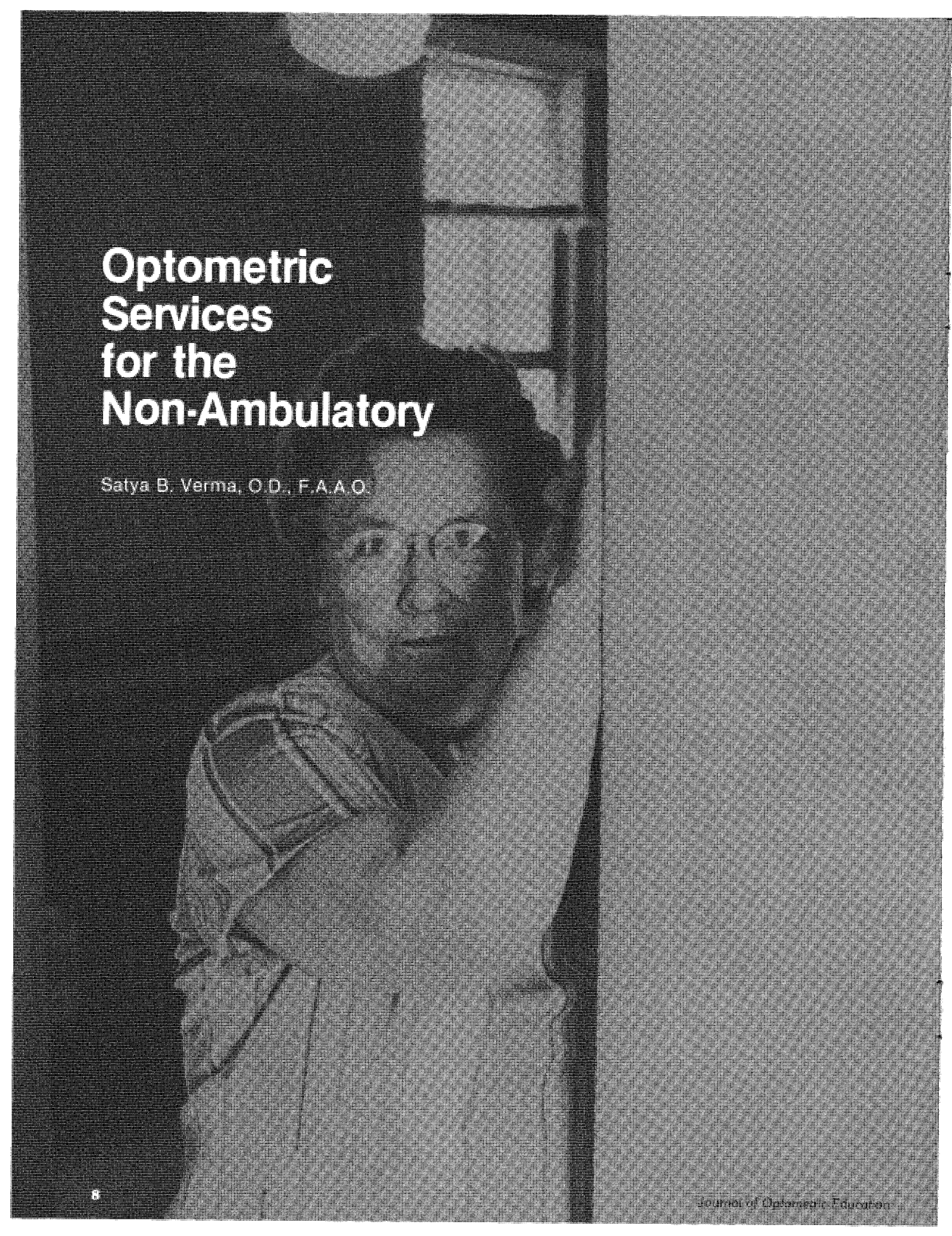
The optical community has long considered the pigment in the yellow spot to be xanthophyll (pronounced zan-thophil), based on research completed in the 1940s. However, Dr. Paul Pease, associate professor of physiologic optics, and a handful of vision specialists now believe that the pigment may be biochemically similar, but not identical, to xanthophyll.

Every chemical absorbs light in a singular way, called the light absorption spectrum. So each chemical's spectrum can be considered the chemical's "fingerprint," Pease explains. "The light absorption spectrum of the yellow spot pigment does not precisely match xanthophill's light absorption spectrum."

"In order to understand the mechanism of color vision, we must know exactly how the macular pigment absorbs light of different wavelengths," Pease says.

Color vision relies on the color light receptors of the eye, the cone cells, which are located in the retina. To-

(continued on page 30)



Optometric Services for the Non-Ambulatory

Satya B. Verma, O.D., F.A.A.O.

There is a need to provide optometric services to those who are ambulatory, home bound or institutionalized. The results of a study previously reported in this journal clearly indicate that a great majority of people who are non-ambulatory are those who are elderly, and unfortunately, these are the ones who cannot go to see an eye care practitioner (Table 1). In 1979, approximately 25 million Americans or 11 percent of the population was 65 years old or older and by the year 2020, their numbers may reach 50 million or more.[1] According to the 1980 census, only 5.3 percent of those 65 and over lived in nursing homes or other institutions.[4] The National Health Survey of the National Center for Health Statistics study in 1973 reported that 37.9 percent of 65 and over had limitations in major activities as opposed to 9.6 percent for all ages.[5]

These home-bound individuals are routinely deprived by their afflictions of the many pleasures and intellectual stimulants from the outside world which promote mental alertness and emotional stability, particularly in the aged. They are imprisoned in the four walls of their homes or rooms for the rest of their lives. These individuals tend to become more dependent upon reading, television, radio, etc., to supplant these natural stimulants. Approximately 50 percent of this population also has hearing problems;[2] this means that they have to depend solely upon good vision. The problem then is, how can they maintain good and healthy eyes and vision if they have not been able to visit their eye doctor? Those of us who are in practice or provide direct patient care are fully aware that about 48 percent of a practice survives on patients who are presbyopes or absolute presbyopes; i.e., these people have to rely on reading glasses in the so-called "Bifocal Age."[8] However, these are the ones who could visit a practitioner and receive care. The non-ambulatory individuals, on the other hand, who are so dependent on their visual system, often find that eye examinations in their homes or institutions are difficult to obtain, and if obtainable, are often prohibitively expensive.

Satya B. Verma, O.D., F.A.A.O., is an assistant professor and coordinator of External Patient Care at the Pennsylvania College of Optometry, Philadelphia.

Available Resources

Although there is overwhelming need to provide these services, very few exist in the real sense. First of all, providing comprehensive eye care away from an office or clinic can be very time consuming and expensive. Secondly, it is very difficult to carry all diagnostic equipment from patient to patient. Thirdly, the majority of patients in this category are at a relatively low income level[6] and the third party coverages do not cover a wide variety of optometric services.

These factors contribute a great deal in discouraging practitioners from getting involved. Organizations like the American Optometric Association and the Association of Schools and Colleges of Optometry need to encourage their membership to provide such services.

This paper describes the services provided to the non-ambulatory patient population of the greater Philadelphia area.

At the Pennsylvania College of Optometry in Philadelphia, a comprehensive program of home eye care exists which is run through the Office of External Educational Programs. The program is based on two main objectives:

1. To sensitize students to the visual needs and care of the elderly with multiple problems.
2. To provide the care to those who need it, but are unable to get it.

These two objectives are closely related, so the net result is a sound educational program with a built-in community service component.

The services of this program are not intended to compete with or replace any existing optometric or ophthalmologic services or programs. The program supplements existing eye care services or provides eye care where none currently exists. To our knowledge, no other institution in Philadelphia provides such a service. Also, any practitioner who provides such services is not widely known.

Educational Benefits

The home eye examination and other off-campus eye examination programs provide students with an opportunity to examine patients outside of the static examination room environment. These experiences test the student's ability to utilize their education and experience to provide a quality examination under a variety of situations.

The staff optometrist supervising each pair of students allows the students to utilize their knowledge and ingenuity to perform an eye examination for each patient under each different situation. The staff member participates as a leader of a guided discovery by asking questions or making suggestions only when the student is on the wrong track and becomes frustrated. At the end of the examination, the staff members check the final findings to verify the examination results. These examinations are conducted by third-year professional students.

Protocol

The office is contacted by any one of the following:

1. The patient
2. Any relative, friend or neighbor
3. Attending social worker/case worker
4. Area agency on aging, blindness, etc.
5. Visiting nurse/homemaker
6. Nursing home staff
7. Area practitioner

When the secretary receives a call she collects all the necessary information called for on the form and informs the caller that she will call back for an appointment. At this time she also informs the caller as to fees, etc. and tells them

TABLE 1
Distribution by Age

	Male	Female	Totals
Up to Age 30	2	2	4
40 to 59 Years of Age	14	13	27
60 to 69 Years of Age	22	57	69
70 to 79 Years of Age	42	115	157
80 Years and above	33	168	201
TOTAL	113	355	468

that on the day of the appointment one staff member will visit the patient with two students.

Patients' Schedules

On an average two to four patients are scheduled on a given day for each staff member. This will depend upon the geographical location of the patients. The patient is called a day before the appointment to either make an appointment or to confirm the appointment, if one was scheduled earlier.

Student Staff Schedule

Two students are assigned to each staff member and they meet in the office in the morning. There they collect all the necessary information on patients for that day. The team leaves for that day's activities. The team travels in the car or a special mobile van equipped with portable equipment. The travel time provides a great opportunity for interaction between the staff and students and is utilized for case discussions, tips on unconventional test procedures, etc. and at times, discussion involves practice management. Thus, the bumpy car ride functions as an informal seminar room. Most of the discussion is usually based on an individual's experiences and can hardly be found in any textbook.

Examination Procedures

Usually the examination is conducted using portable equipment, including a luminous Snellen's acuity chart, trial frame and lens set and a Schiotz tonometer. The setting of the examination room could be anything from a bed in a nursing home to the living room or bedroom of the patient's home. It should not be surprising to find the V.A. chart on the top of the sink or stove if the patient happens to be living in an efficiency apartment or smaller quarters. The most important factor to bear in mind is that *the patient is being tested in his/her normal and routing living environment,* and not in an artificially created office or clinical environment.

The basic examination consists of ocular and general health history, visual acuities with habitual correction, examination of the external and internal eye health, retinoscopy, and subjective tests using trial frame and trial lenses. Tonometry is performed using a Schiotz tonometer and other tests when indicated. Once the final prescription has been determined and with the concurrence of the faculty member, the patient is advised of the prescription and has the option to get glasses through the program or just settle for the prescription. Before the team leaves, the faculty member gives a self-addressed, stamped postcard to the patient. The patient is asked to fill it out after the team has left and have it mailed. The postcard has some questions on the quality of the services and the provider's attitude toward the patient. If the patient desires to receive the glasses through the program, the team then proceeds further with frame selections and measurements. The faculty member later orders the necessary glasses for the patient.

Dispensing and Follow-Up Procedures

When the glasses are received from the lab they are sent for verification. The verified glasses are then given to a student who makes arrangements to dispense them to the patient.

The protocol calls for the secretary to contact the patient a few weeks after the dispensing to see if they are satisfied with the service. (However, due to lack of staff, this does not always get accomplished.)

If the patient needs follow-up care, the arrangements for the same are made at a later date. If the team determines the need for referral of the patient to other health care providers, the faculty member takes care of the same.

The data collected on 468 patients seen either at home or in a nursing home in the greater Philadelphia area[3] revealed the age distribution shown in Table 1. It also was found that contrary to general belief approximately 75 percent of this population had good functional corrected vision.[3]

It is very difficult to obtain a good history on these patients and prioritize their problems. However, it was found that:

1. Twenty-five (25) patients had no problem seeing or functioning with the present Rx, but there were some problems with their glasses.

2. One hundred and ten (110) patients had specific problems with reading.

3. Thirty-five (35) patients had specific problems seeing far away, such as watching TV, etc.

4. The remaining 180 patients had vision problems in general, far and near. This group could not pinpoint the exact nature of visual difficulty.

Other visually related complaints included itching, tearing, burning, pain around eyes, diplopia, tired eyes, headache, and so on. The majority of the time, however, the reason was always difficulty in being able to function.

There were approximately 30 aphakic patients and another 15 had some type of cataract interfering with their vision. Other conditions noted included hypertensive retinopathy/arteriosclerotic changes, diabetic retinopathy, Arcus senilis, Senile Macular degeneration and a host of others.

Cataract seemed to be the single most prevalent cause of reduced vision in this group. The number of people who could not be helped was very small. One thing which was initially noted on each visit, whether at home or in an institution, was the poor lighting arrangements for reading or close work.

Weaknesses and Problems

No program, no matter how perfect and invaluable, does have some inherited problems and this one is no exception. Some of the drawbacks have already been discussed. These can be summarized as follows:

1. *Very time consuming:* It will take relatively lesser time to examine a patient in an office as opposed to a home. The practitioner is not familiar with the area of examination. There is a great deal of professional time lost in travel from one patient to the other.

2. *Less financial reward, hence less attractive:* All the professional time cannot be fully reimbursed. Medicare currently does not cover optometric services unless provided to those who have had cataract surgery.

3. *Difficult to move all diagnostic equipment from patient to patient.*

4. *Lack of student motivation:* The students are being exposed to a non-traditional approach; nursing homes and patient homes do not provide for a conducive working environment. Above all, limited tests that can be performed discourage the students to volunteer for these services.

5. *Lack of awareness of the program in the community:* There is no network that disseminates information to all these people that such services exist. Traditionally people feel that doctors do not make house calls as they used to in

earlier days, although the trends are changing. A great deal of effort is needed to make these services known, so that the non-ambulatory patients can avail themselves of these services.

6. *Lack of understanding of the complexity of the patient:* Not all older patients are of the same makeup and needful of the same care.

7. *Patient satisfaction may be harder to achieve:* It is very difficult to carry a large variety of frames and samples to allow the patient a large selection. This can be somewhat frustrating and unsatisfactory to some patients.

8. *Lack of ophthalmological support to make home visits when indicated.*

9. *Most important, a great number of patients cannot afford even the low cost examination and glasses.* Most of them are either on Medicaid or Medicare or both.

Conclusion

No doubt there are numerous problems and limitations in providing these services. These patients may not express any excitement over optometrists' contributions in their life style, but there is always a certain degree of gratitude and appreciation that someone cares for them and came to see them.

Our experience has clearly indicated that all non-ambulatory patients are neither senile (as the myth is), nor do they always have complex visual problems. The small sample of the study presented clearly reflects that more than 50 percent of the patients have normal or near-normal correctible vision.

However, it must be emphasized that most of the non-ambulatory patients are living in very much under-illuminated environments. It is often forgotten by the practitioner and believed by the patients that all age groups need the same amount of light to function. This myth needs to be corrected and underscored[7] Even if the vision cannot be improved further with the best correction, introduction of a simple stronger light bulb not only improves acuity but also visual efficiency. It makes reading of the material a lot easier. Every elderly patient needs to be prescribed good illumination for reading.

Thus, it is clear that we can contribute a great deal in their lives by improving their seeing conditions and opening up a whole new world.

In conclusion, let me emphasize that we owe it to our education and professions, to our community and society, and to those less fortunate people who cannot visit an office to provide eye care. The practitioners have to sacrifice some of their time to care for these people. And it is a challenge to us all, who are advocates of public health, to carry the message and arouse awareness at all levels of local, state and federal government the immense needs of these people. Unless the bureaucratic red tapes are cut to cover vision care services and means are provided to serve these underserved people, their future looks bleak.

It is hoped this paper succeeds in creating some interest about these people. Those who are in education can set examples for future practitioners by involving students in such programs through the curricula in schools. □

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REVIEW CLINIC

A Measure of Quality

Samuel D. Hanlon, B.S., O.D., and Nina Jue, B.S., O.D.

The Southern California College of Optometry utilizes a "review clinic" for patients whose problems are not satisfactorily resolved as a result of the initial examination and treatment plan. This establishes a convenient vehicle for assessing the quality of care provided.

Introduction

The responsibilities of a teaching clinic for any of the health professions have a dual emphasis. Of prime importance naturally must be the level of care provided to the patient population served but of equal importance is the level of competence attained by the student doctors in the facility. A considerable amount of time and effort is spent assessing the cognitive knowledge and technical skills of the students. These two areas are prerequisite to clinical competence; however, quality care by the student doctors is not necessarily assured by their level of knowledge or technical ability. Therefore, additional measures must be utilized to evaluate the level of patient care provided. Donabedian[1] devised an evaluation system of health care divided into three components: structure, process and outcome.

Structure is the relatively stable characteristics of the providers of care, of the tools and resources they have at their disposal, and of the physical and organizational settings in which they work. It includes the facilities and equipment and how they conform to standards, descriptions of staffing patterns, qualification and experience of personnel,[1] and descriptions of organizational arrangement and financing patterns.[2] Quality assessment by structure is the easiest and least expensive method and is therefore a commonly used indicator of quality. The assumption made here is that good structure will lead to good process and therefore good outcome. This is not always true; structure is rele-

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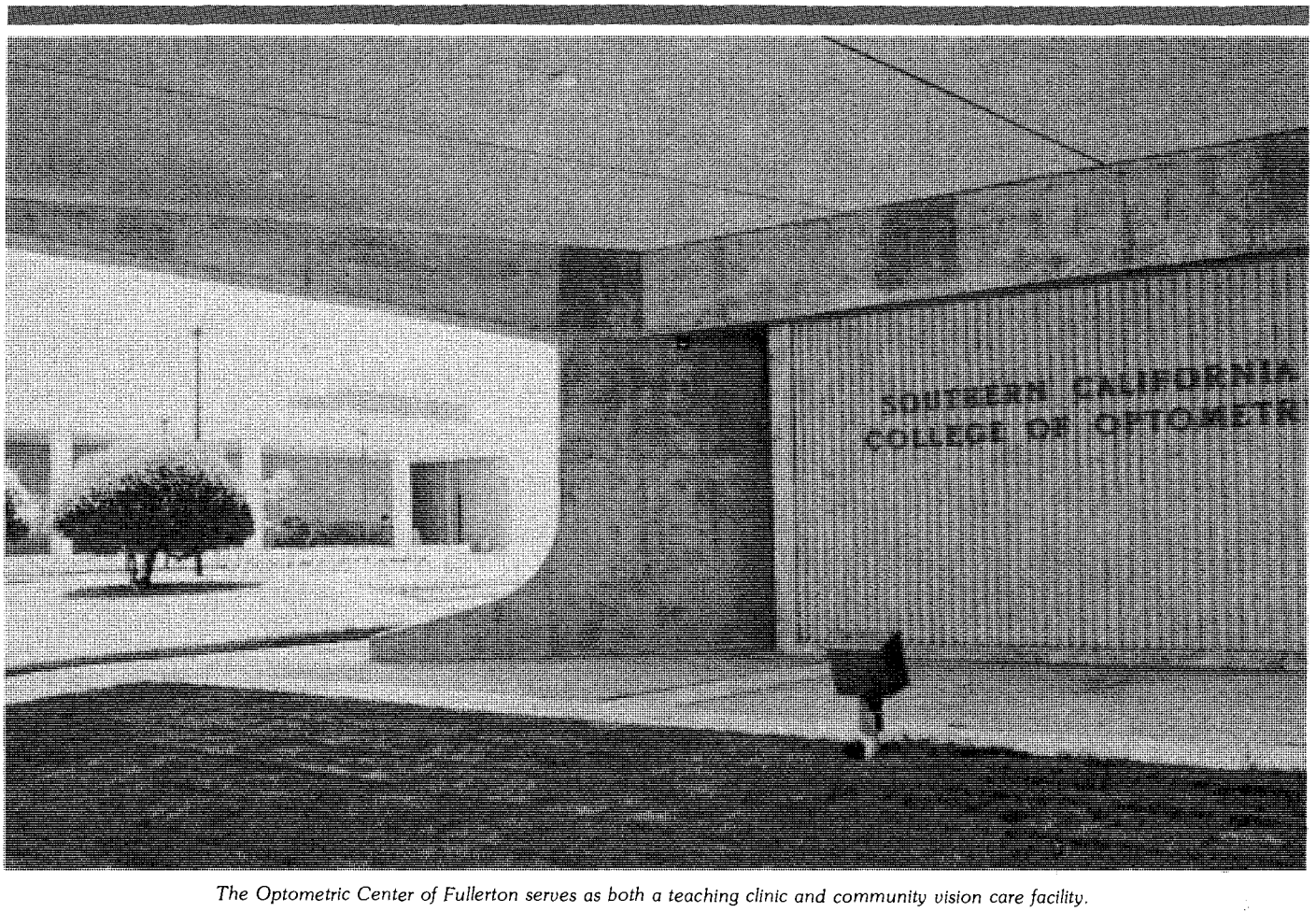


The Optometric Center of Fullerton serves as both a teaching clinic and community vision care facility.

vant to quality in that it increases or decreases the probability of good performance but it does not guarantee quality.

Process involves what is done to or for the patient, including how the care provider uses resources and knowledge for patient care. Process review is generally thought to be easier and cheaper to carry out in comparison to outcome review.[2] Explicit criteria are required to serve as the standard. The quality of the process of care is defined as normative behavior derived either from the science of medicine or from the ethics and values of society. The problem of establishing criteria is compounded by varying peer judgments, varying philosophies of care, and the lack of relevant scientific data.

Outcome is defined as a change in a patient's current and future health status that can be attributed to antecedent health care. In other words, outcome is determined by whether or not the patient's problem was reduced or eliminated and is therefore the ultimate indicator of quality because its focus is on the end result of care.[3]

Outcome may be assessed by many methods including patient interviews, patient questionnaires, and re-examinations. Patients seen at the OCF whose presenting complaints are not resolved satisfactorily are scheduled for re-examination in Review Clinic Service. The Review Clinic attempts to obtain a satisfactory case disposition. In this investigation, the Review Clinic was used as a method of assessing the outcome of visual examinations and treatment at the Fullerton clinic. Identification of common errors causing patient return points out areas that need improvement leading to fewer Review Clinic patients and a better learning experience. After all, assessing alone is of little value to quality assurance unless it leads to changes that improve patient care.

A health care provider facility must assess the care provided by each of the three assessment strategies. Review Clinic provides a means of outcome assessment which can be used to determine the efficacy of treatment at the Optometry Clinic in Fullerton and provide a statistical breakdown of causes for patient return.

Such an evaluation is important in order to maintain high standards of patient care but is also very informative for student clinicians. By working with patients who return to Review Clinic, clinicians must utilize problem-specific tests and procedures to determine the problem and then devise an appropriate solution. In this way it reinforces the problem-oriented method of patient care and gets away from the structured routine. Additionally, students learn what errors are commonly made by clinicians and methods of avoiding those errors.

Data

Review Clinic patients seen from June, 1981, through May, 1982, at the Optometry Clinic in Fullerton were categorized by stroke count according to age and the diagnosis of the returning complaint. Categories were separated into four basic areas, each of which was divided into its component categories as follows: (1) Dispensing Errors (improper multifocal segment height, poor frame adjustment, poor frame selection, poor multifocal segment selection, lab error, prescription ordered incorrectly); (2) Treatment Errors (referral required, prism needed/not needed, change in astigmatic axis, change in astigmatic power, over/under power in reading addition); (3) Data Errors (over plus distance Rx, over minus distance Rx, astigmatic axis, astigmatic power); and (4) Patient/Clincian Communication (use of multifocals and multifocal options, use of spectacles at distance or near, patient compliance to treatment, adaptation to the prescription, pathology changes, and changes due to contact lens wear.

While all three assessment strategies are related, the exact relationship is not clear. Brook's[4] study which compared methods of quality review showed that the results of quality assessment are dependent on which method of review is used. An advantage of outcome review is that it circumvents the unknown relationship between structure, process and outcome and places emphasis on the end results.[3]

This study utilizes a method of outcome review to assess the quality of care being provided and to implicate areas of needed improvement. The information gained can be utilized to improve patient care and to enhance the educational experience of the student clinician.

Method

Setting

One of the clinics operated by Southern California College of Optometry, the Optometric Center of Fullerton, serves as both a teaching clinic and community vision care facility which serves a two-million population within a twenty-five mile radius. Services provided by the Center include primary care vision examinations, contact lenses, orthoptics, vision therapy, ocular disease detection, special testing, and low vision. Student clinicians assigned to this clinic are either in their third or fourth year of professional studies.

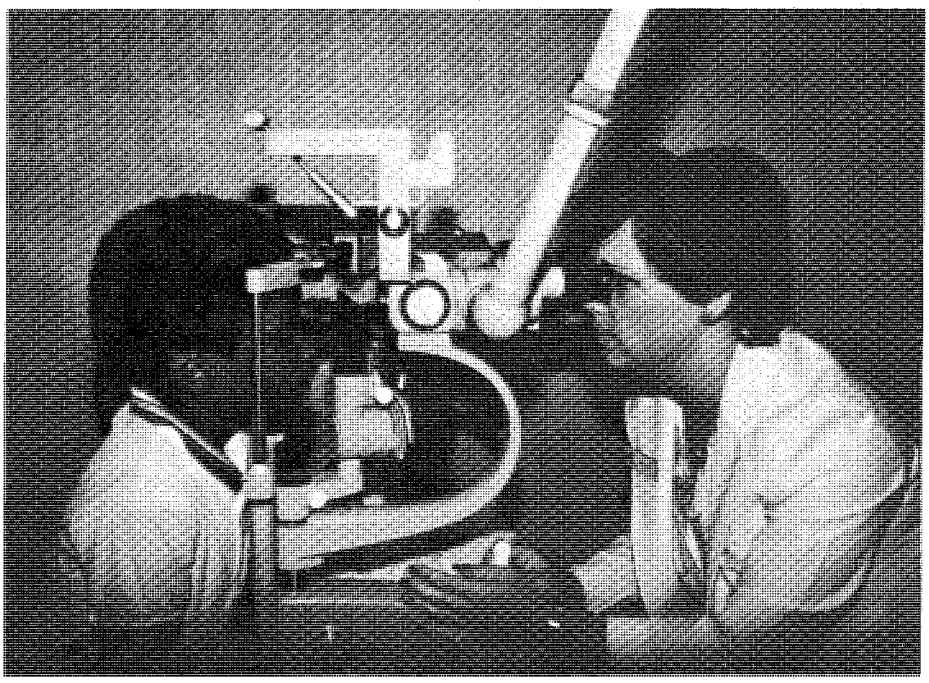
Quality Assessment

Structural assessment of the clinic indicates an environment which provides quality health care. The facility is fully equipped for routine vision examinations and in addition, many instruments for specialized procedures such as electrodiagnosis, photography, and binocular vision evaluation. Student proficiency is assured by rigorous clinical examinations which must be successfully completed in order to qualify for clinical assignments.

Quality assurance procedures directed toward the process are stressed at the clinic. A clinic protocol is strictly adhered to in order to assure consistency in care and to maximize quality. Each student doctor/patient contact is directly supervised by licensed clinical faculty. The student and faculty review the patient record for accuracy and completeness and discuss the treatment plan.

It would appear that the Optometric Center of Fullerton does provide quality vision care as indicated by the physical facility and the procedures utilized for patient care. However, the third

"Process involves what is done to or for the patient, including how the care provider uses resources and knowledge for patient care."



The facility is fully equipped with sophisticated and technically advanced equipment.

method of assessment, outcome of care provided, needs to be addressed.

Results

The total number of basic visual examinations (BVE) performed from June, 1981, through May, 1982, was 10,212. During this same time period, 298 patients were seen in Review Clinic; this indicates a return rate of 2.9%. A sample month showed that 49% of BVE patients were under age 40, 39% were age 40 to 65, and 12% were over age 65. By using these percentages, the number of BVE patients seen during this time period can be estimated as 5,004 under age 40, 3,983 age 40 to 65, and 1,225 over age 65.

The age distribution of Review clinic patients was 59 patients (17.8%) under age 40, 158 (52.3%) age 40 to 65, and 84 (28.2%) over age 65. Table 1 shows the percentage of patients who returned to Review Clinic according to age; 1% of BVE patients under page 40 were later seen in Review Clinic, 4.0% age 40 to 65 returned, and 6.9% over age 65 returned.

Each of these major divisions was subdivided into their component categories as shown in Table 2. The most common errors were: Under dispensing errors, improper multifocal segment height (4.7% of the total errors); under treatment errors, over plussed reading add (13.1%), and change in cylinder power (5.0%); under Data Collection errors, over plussed (9.4%) and over minused (6.0%) refractions; under Patient/Clinician Communication errors, explanation of adaptation (9.4%) and

TABLE 1

Number of Basic Visual Examination (BVE) Patients Seen from June, 1981, through May, 1982, According to Age Compared to the Number of Review Clinic (RC) Patients

Age	#BVE Patients	# RC Patients	% Return
Under 40	5004	52	1.0
40-65	3983	158	4.0
Over 65	1225	84	6.9

TABLE 2.

Categorization by Subdivisions of the Reason for Return to Review Clinic According to Age Group (ht. = height, sel. = selection)

	Dispense						Treatment							Data				Communication						Oth	Tot	%
Age	Seg. ht.	Frame adj.	Frame sel.	Seg. sel.	Lab error	Incorrectly ordered	Referral needed	Prism needed	Prism not needed	Cyl axis	Cyl power	Over + add	Over - add	Over +	Over -	Cyl axis	Cyl power	Multifocals	Far/near use	Pt. compliance	Adaptation	Path	CL			
40	0	1	0	1	3	2	6	0	0	1	5	2	0	6	5	2	3	0	1	3	5	0	4	2	52	17.5
40-65	8	3	3	2	3	3	2	1	2	0	5	28	10	13	7	2	5	24	4	1	17	2	0	12	158	53
65	5	5	0	0	4	1	0	3	0	0	5	7	3	9	6	3	3	3	1	0	6	7	0	13	84	28.2
Unknown	1											2								1					4	1.3
TOTAL	14	9	3	3	10	6	8	4	2	1	15	39	13	28	18	8	11	27	5	5	28	9	4	27	298	
%	4.7	3.0	1.0	1.0	2.3	2.0	2.7	1.3	.7	.3	5.0	13.1	14.4	9.4	6.0	2.7	3.4	9.1	2.0	1.7	9.4	3.0	1.3	9.1		

explanation of multifocal use and options (9.1%). The "other category included systemic problems, medication effects, and errors made by outside labs; this accounted for 9.4% of Review Clinic patients. The categories are ranked by percent in Table 3.

Discussion

Comparison of the return rate to Review Clinic between this analysis and a previous study by Davis and Rose[5] in 1979 shows a small decrease, from 3.2% to 2.9%. Assuming a total of 10,000 BVE patients per year, this amounts to 30 less patients seen in Review Clinic. The percentage of cases requiring modification of the spectacles at the Clinic's expense increased from 55% to 59.6%, an approximate difference of 13 reorders. These changes are not sizeable and quality of care based on outcome assessment by Review Clinic appears to have remained relatively stable over the past four years.

The work of Davis and Rose indicated that the "misinformed patient" was by far the most common reason for patient return. This study showed that Patient/Clinician Communication errors were common, but errors in treatment and data collection also comprised a high percentage of errors. A direct comparison between the two studies is not possible since different categories were utilized.

Although the majority of BVE patients were under age 40, there are relatively few Review Clinic patients under age 40. The BVE patient most likely to return to Review Clinic is the patient over age 65. Since a large percentage of errors were multifocal related, it was not surprising that over 80% of Review Clinic patients were over age 40.

The major errors encountered were, in decreasing order: (1) over plussed reading power of multifocals; (2) over plussed refraction and explanation of adaptation; (3) explanation of multifocal use and their options; (4) over minused refraction; (5) a change in astigmatic power; and, (6) improper multifocal segment height.

The frequency of errors in the above areas indicate where patient care can be improved, thus leading to a derease in patient return. The high percentage of errors in over plussing the reading add power, as well as over plussing the distance refraction and change in astigmatic power, emphasizes the importance of demonstrating near and distance proposed prescriptions. Demonstration of ranges of clear vision through the reading lens is of particular importance. Communication with the presbyope regarding the use of multifocals and the advantages and disadvantages of the available options (more than one pair of glasses, bifocals, trifocals) cannot be overstressed. The clinicians must use his/her own judgment in determining the patient's level of understanding. Demonstration of the options with trial lenses may be necessary in many cases. Taking a few extra minutes reassuring and explaining the necessary adaptation to a new prescription would decrease the return rate to Review Clinic by about 10%, a few minutes well spent. The multifocal wearer should be forewarned of magnification and prismatic effects of the prescription. It is important to teach the first-time bifocal wearer how to correctly use the spectacles. The proper multifocal segment height is critical for the multifocal wearer and care should be taken to take into consideration the patient's habitual segment height, occupation, posture and habits.

This investigator suspects that the percentage of errors attributed to Data Collection is artificially high due to the minimal changes in refraction often found. Many of these small modifications resulted in a reorder of spectacles. An analysis of the percentage of reorders according to the specific amount of changes would have been of interest

TABLE 3

Ranking of the Subcategories of Reason for Return to Review Clinic

Diagnosis of Return	Percent
Over + add	13.1
Over + distance	9.4
Adaptation explanation	9.4
Other	9.1
Multifocal use explanation	9.1
Over - distance	6.0
Change in cylinder power	5.0
Segment height	4.7
Over - add	4.4
Lab error	3.4
Cylinder power	3.4
Frame adjustment	3.0
Path change explanation	3.0
VT/Path referral needed	2.7
Cylinder axis	2.7
Prescription incorrectly ordered	2.0
Use of spectacles (far/near)	2.0
Patient compliance	1.7
Prism needed	1.3
Contact lens wear changes	1.3
Frame selection	1.0
Segment selection	1.0
Prism not needed	0.7
Change in cylinder axis	0.3

and should be included in a subsequent Review Clinic analysis.

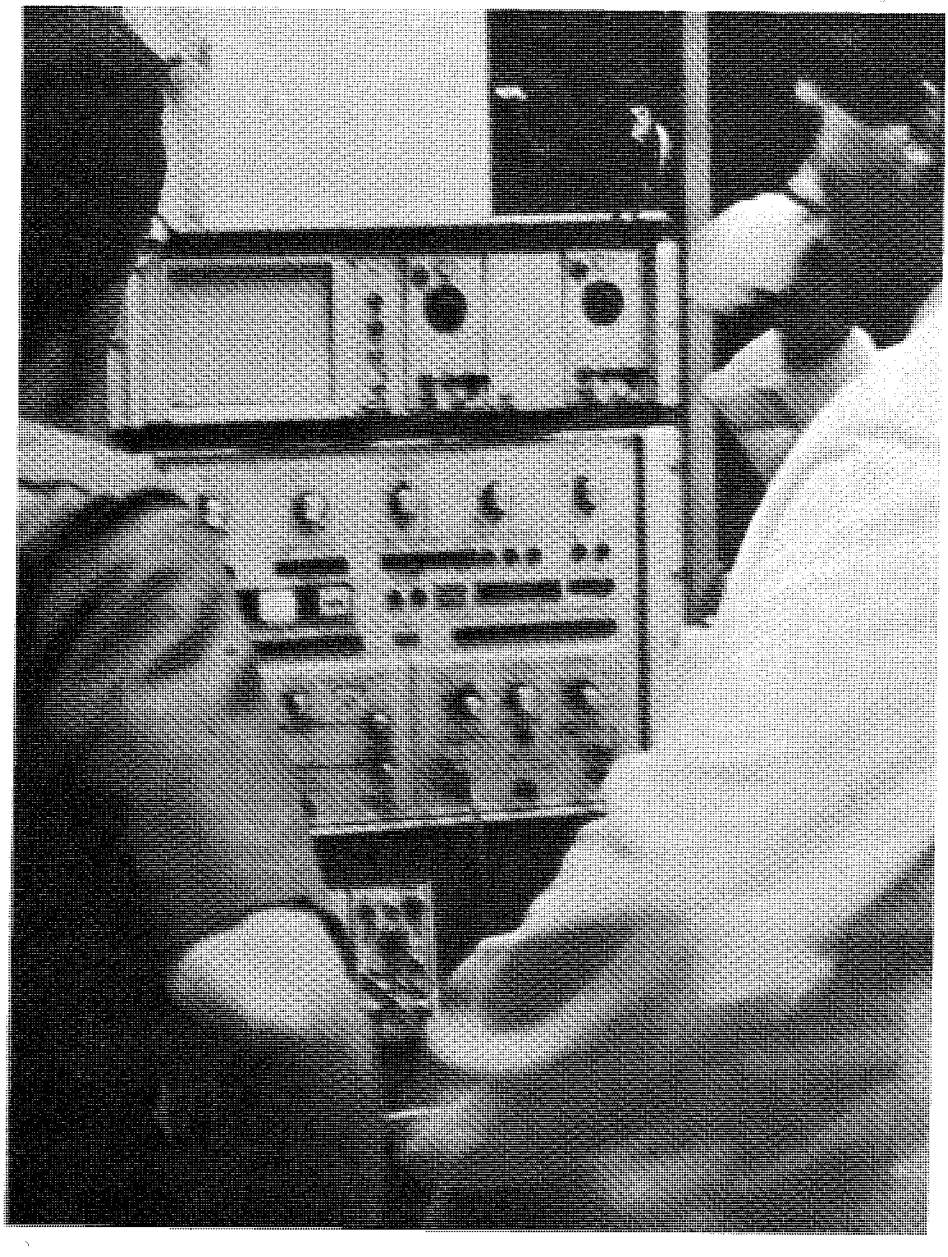
Assessment of outcome by this analysis of Review Clinic indicates that quality vision care is being provided at the Optometry Clinic in Fullerton with only a 2.9% return rate. In comparison to the Davis and Rose study, quality of care based on outcome assessment has remained relatively constant. The findings of this analysis have indicated the most common errors and have introduced means of decreasing patient return by improving patient care.

Summary

The quality of care provided at the Southern California College of Optometry Clinic in Fullerton based on the outcome of care was investigated by analysis of Review Clinic. The questions investigated were: (1) "Has treatment based on outcome assessment improved over the past four years?"; and (2) "In order to improve care provided, what are the most common errors at the present?"

Results of the study were as follows: (1) the return rate of BVE patients to Review Clinic was only 2.9%; (2) over 80% of Review Clinic patients were over age 40; and (3) the most common errors were over plussed reading adds and distance refractions, and explanation of adaptation and multifocal use.

From these findings, it can be concluded that quality of care based on outcome has maintained a high level over the past four years. Optometric care may be improved by (1) demonstrating distance and near prescriptions, (2) explaining and demonstrating the use of multifocals and the possible options, and (3) explaining adaptation. The presbyope has special needs and requires special attention. Implementing these conclusions will not only benefit the quality of patient care but will also increase cost efficiency of care by decreasing the costs of Review Clinic operation and enhance the learning experience of the student clinician. □



Many instruments for specialized testing procedures are included in the facility.

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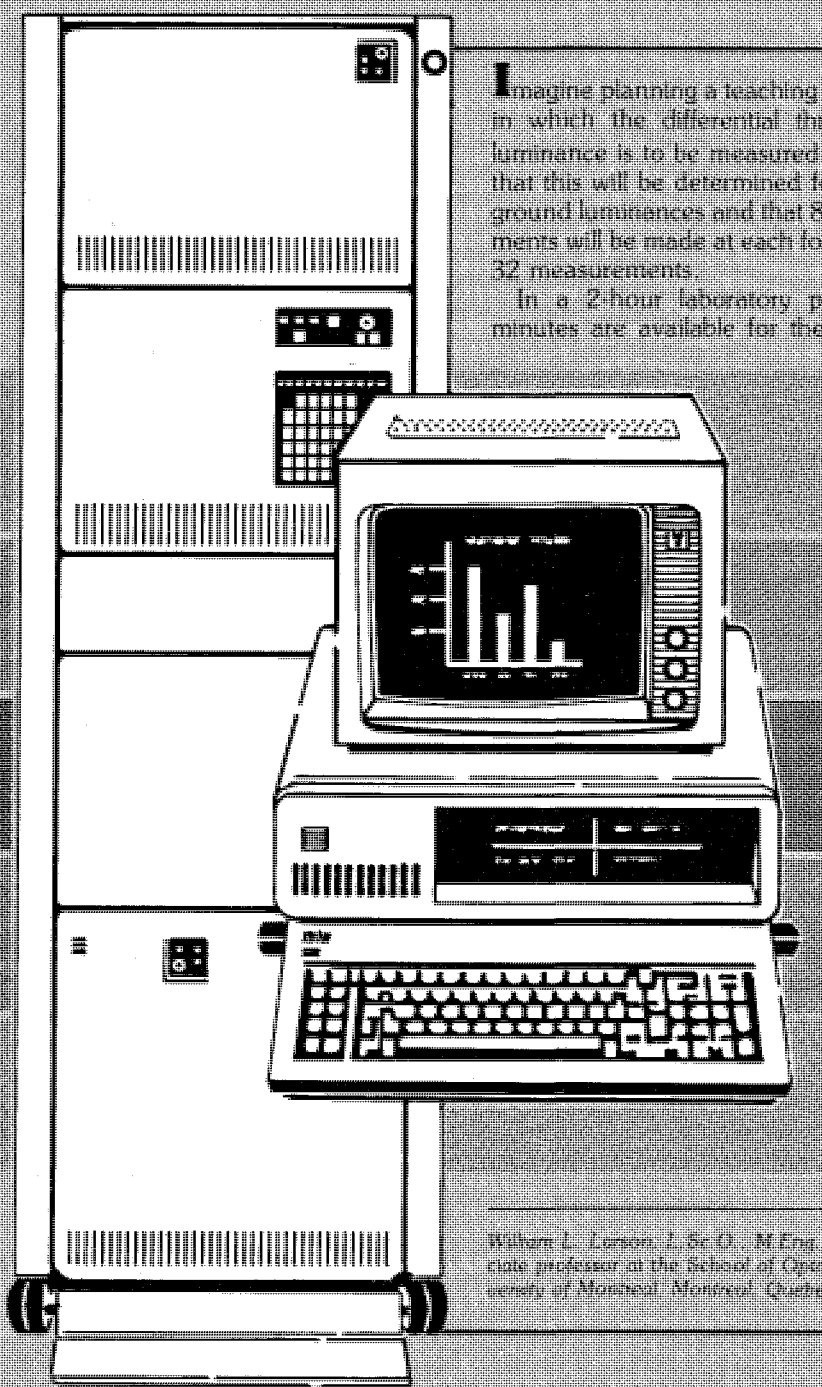
Applying High Technology in Teaching Laboratories

William L. Larson, L.Sc.O., M.Eng.



Imagine planning a teaching laboratory in which the differential threshold of luminance is to be measured. Suppose that this will be determined for 4 background luminances and that 8 measurements will be made at each for a total of 32 measurements.

In a 2-hour laboratory period, 95 minutes are available for the performance of the experiment. Therefore, the average time for each measurement cannot exceed 3 minutes. This seems to be adequate with the appartus at hand.

Now imagine that there is only one apparatus and that as many as 12 students will attend each laboratory. The time now available for each measurement will be 15 seconds. Does this seem like an impossibility? Not if the experiment were automated as it has been for the physiological optics course [OPP 2012] at the School of Optometry, University of Montreal. This example demonstrates that an apparently impossible requirement can be met by the application of high technology to the teaching laboratory.

Automation can be defined as the use of machines to do work that would otherwise require human labor. An objection to automation in teaching laboratories is that students should not have their work done for them by machines. On the other hand, automation makes easy things which otherwise would be difficult. In addition, when properly used, it enables students to grasp the principles of the experiment with a minimum of confusion and error. More data can be gathered in the time available so that results are complete and amenable to statistical analysis. Automated experiments should not relieve students of necessary work nor should they conceal the details of data analysis. In short, automation can be used to make learning as efficient as possible.

The differential threshold of luminance experiment, outlined above, is one of many that have been auto-

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FIGURE 1

An experiment to measure relative spectral efficiency. Changes in luminance are provided for as in the differential threshold experiment described in the text.

mated for physiological optics laboratory courses at the School of Optometry, University of Montreal. Two others are illustrated in Figures 1 and 2. This work has been performed over the last decade. The purpose of this article is to pass on some principles of automation. These will be illustrated by means of the differential threshold experiment.

Automate to Solve a Problem

There are many problems which can be solved by automation, but there are also some that can be created by it. It is prudent to automate only when this is the best way to solve a particular problem. Following is a list of problems common to teaching laboratories.

1. Equipment cannot be duplicated because of expense
2. Laboratory space is insufficient for the duplication of experiments
3. Students cannot master the performance of an experiment in the time available
4. Data is of poor quality
5. A reasonable quantity of data cannot be gathered in the time available
6. Laboratory conditions make it difficult to record data
7. Apparatus is unreliable

In the differential threshold experiment before automation, there were four problems to be solved; see above items 2, 5, 6 and 7. Of these, item 7 was the most significant because luminance (v L) was altered by changing neutral density filters contained in the slide tray of a Kodak Carousel projector. Changes were made by two switches on the projector's remote control. A characteristic of this projector is that sometimes the change occurs in a direction opposite to that requested. While of no great inconvenience when showing slides, this causes confusion during an experiment. When the mechanical switches were replaced with electronic ones and these were controlled by a computer, operation was error free.

Automate to Simplify a Procedure

Experiments sometimes require skills that a student has not acquired. If a student's attention is diverted from experimental observations to the manipulation of the equipment, some of the experiment's educational content will be lost. When all unnecessary steps have been removed from an experimental procedure, and those remaining have been simplified, a student can concentrate on the principles to be demonstrated by the experiment.

The condition tested for can be identified by means of a push-button switch. In the differential threshold experiment, the student pressed a hand-held switch each time the threshold was reached. All changes were made by a programmed computer. In this way, the student's attention was concentrated on the detection of the threshold.

Automate to Improve Data Quality

Data gathered manually may include recording errors. Scales are sometimes misread and numbers may be imperfectly remembered or recorded. Students' data often includes this kind of error but this can be avoided when information is gathered by a programmed computer. Students using good data can direct their attention to the interpretation of anomalous results without attributing these to recording errors.

Automate to Improve Data Quantity

Manual acquisition of data is time consuming and it is unrealistic to expect students to amass significant amounts of data in one laboratory period. When an experiment is automated, its speed of execution is set by a computer program and is therefore invariable. Good programming can optimize the acquisition of data so that an experiment's duration is no longer related to a student's ability.

In the automated version of the differential threshold experiment, 6 switches were provided so that as many as six students could perform the experiment at the same time. The carousel's position was automatically changed at 2 sec intervals, and each switch was monitored to detect its actuation. As each student responded, the current slide tray position was recorded against the switch number. Only unactuated switches were monitored. When all had been actuated, the tray was advanced by four positions (to make sure that the threshold had been passed for all), a bell was rung (to indicate that the direction was changed) and filter changes were again made at 2 sec intervals. In this way, the threshold of first visibility was found followed by that of first invisibility, etc., until four of each had been recorded. Switch actuations which occurred within one reaction time after a change were attributed to the previous tray position. Such attention to detail is desirable when an experiment is programmed.

Automate to Record Data

The room was in darkness during the differential threshold experiment. Results were stored by the computer and were typed out by a high-speed printer with one copy for each student and one for the professor. When all trials were completed, students were given their data. A column of numbers

showed the position of the slide tray at each switch actuation. In this way, no analysis was done for the student. A list showing the filter at each tray position was posted on the laboratory wall. The work of analysis was performed during the next laboratory period.

An additional laboratory period for data analysis is helpful if students are unfamiliar with the required procedures. Once a correct analysis has been shown, there should be no need to repeat the process for similar experiments.

Automate to Reduce Drudgery

In some experiments, the analysis of results involves lengthy calculations. When the same calculation is performed with different values, there is little to be gained by repetition once the student has mastered the procedure. Further repetitions are not only boring but a waste of time, especially when there are errors in arithmetic.

A few calculations should be required of the student with the balance being performed by the computer controlling the experiment. Correct answers to the required calculations should be given to the instructor by the computer so that students' errors can be identified easily.

Differential threshold data were not treated in this way because calculations were simple. In the nonius horopter experiment, 64 equations had to be solved. In this case, only the first two were solved by the student.

How to Automate Experiments

The essential element for any automation project is a digital computer. Microcomputers are now inexpensive enough for price to be a secondary consideration. What is important is the facility with which "hardware" modifications can be made as well as the ease with which "machine language" programs can be written, tested and revised. The term "hardware" refers to the physical elements which make up "the computer" as a unit.

Aside from obvious elements such as memory and the central processor, there should be an analog to digital converter (a/d) for changing voltages into numbers, digital to analog converters (d/a) for changing numbers into voltages and parallel input/output elements (i/o) to get the status of switches and to generate two voltage levels for external use (nominally 0 and 5 V). Such elements are provided on one or more plug-in circuit boards which are connected to the computer by inserting them into slots in the computer's frame. External connections to boards are simplified when "flat cable" connectors are used. Wiring and connections to external apparatus are the user's responsibility.

A "development system" should be considered when buying the computer. This is an ensemble of programming aids for producing original programs. Development systems usually include the computer and everything necessary for laboratory automation with the exception of a/d, d/a and extra i/o boards. Development systems are intended for manufacturers and other commercial users. They are designed to reduce the time required to market a product incorporating a particular computer. Programming for a laboratory project is similar to developing a product for sale in that a deadline must be met if the work is to be of any use. It often happens that an unrecognized defect is concealed in a program. If this shows up during a laboratory session it can usually be located and temporarily corrected with the help of a "monitor" which is an adjunct to the development system.

In this author's experience, programming is a skill which can only be acquired through practice. Books are available which describe the programming rules for a given central processor (i.e., computer). These are sometimes provided with the computer when it is purchased. It is helpful to have a high level language program such as BASIC for general use. This may come as part of the computer's operating system but if not it should be available. Programming in BASIC is much easier than in "machine language" (i.e., the numerical instruction code) because most of the work has already been done. The difficulty with programs such as BASIC is that they are too slow to handle many real time tasks. One should always consider using BASIC unless it has been shown to be too slow. Machine language (also called assembly language) programming cannot be avoided with certain real time experiments such as those in which eye movements are recorded.

Most users will need guidance when connecting their computer to external devices. *How to Build and Use Electronic Devices Without Frustration, Panic, Mountains of Money, or an Engineering Degree*[1] is extremely helpful. A microprocessor systems handbook[2] published by Analog Devices explains the interfacing of microprocessors with a/d and d/a converters. Another[3] covers the interfacing of transducers for the measurement of temperature, flow, force, pressure and level.

FIGURE 2

An experiment in which fixation disparity is studied with the help of an electronic phase difference haploscope. The same apparatus is used for experiments on the nonius horopter and Panum's fusional area. The student makes adjustments by means of a potentiometer. A satisfactory adjustment is indicated to the computer, which is located in an adjacent room, by means of a handheld switch.

This author has been automating laboratory courses for the last ten years and for nine of them worked without a development system. The original computer became obsolete and has been replaced with an RCA CMOS Microboard system. This has the advantage of noiseless operation because it needs no fans to dissipate heat. It is lightweight and occupies little space. It is an 8 bit system which makes it somewhat harder to program than the original 16 bit system. It uses two Sony microdisk (3½") drives for storage of programs and data. A line printer or terminal capable of printing at least 120 characters/sec is required for programming and data output for student use. □

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A Contact Lens Record Review System for Quality Assurance

Thomas G. Quinn, Jr., O.D., M.S.

A daily record review system was implemented for a ten-week period in an optometric teaching clinic limited to contact lens care. Clinicians participated in the process on a rotational basis, reviewing patient records kept by their peers. Specific areas to be investigated were outlined and findings recorded on a Contact Lens Record Review form.

Statistical analysis of the summary data indicates a significant improvement in the quality of patient records occurred throughout the review period. Implementation of such a program educates students in methods of quality assessment and provides a forum for discussion of case management techniques.

Proper record keeping is often a struggle to maintain, particularly in an educational setting where these and other skills are being developed. However, it is in just such a multi-examiner environment that clear and complete records are an absolute necessity. Proper and efficient follow-up care is in large part dependent upon the quality and completeness of past records.[1] This is particularly true in cases involving patients wearing contact lenses. The potential for change in the patient's refractive and physiological state is greater than in the average spectacle wearer.[2] Many contact lens induced changes can only be discovered if previous data have been properly recorded and are available for comparison at the time of follow-up examination.

For a ten-week period, patient records were reviewed daily by optometry students participating in a contact lens clinical rotation to assess completeness and evaluate whether or not ap-

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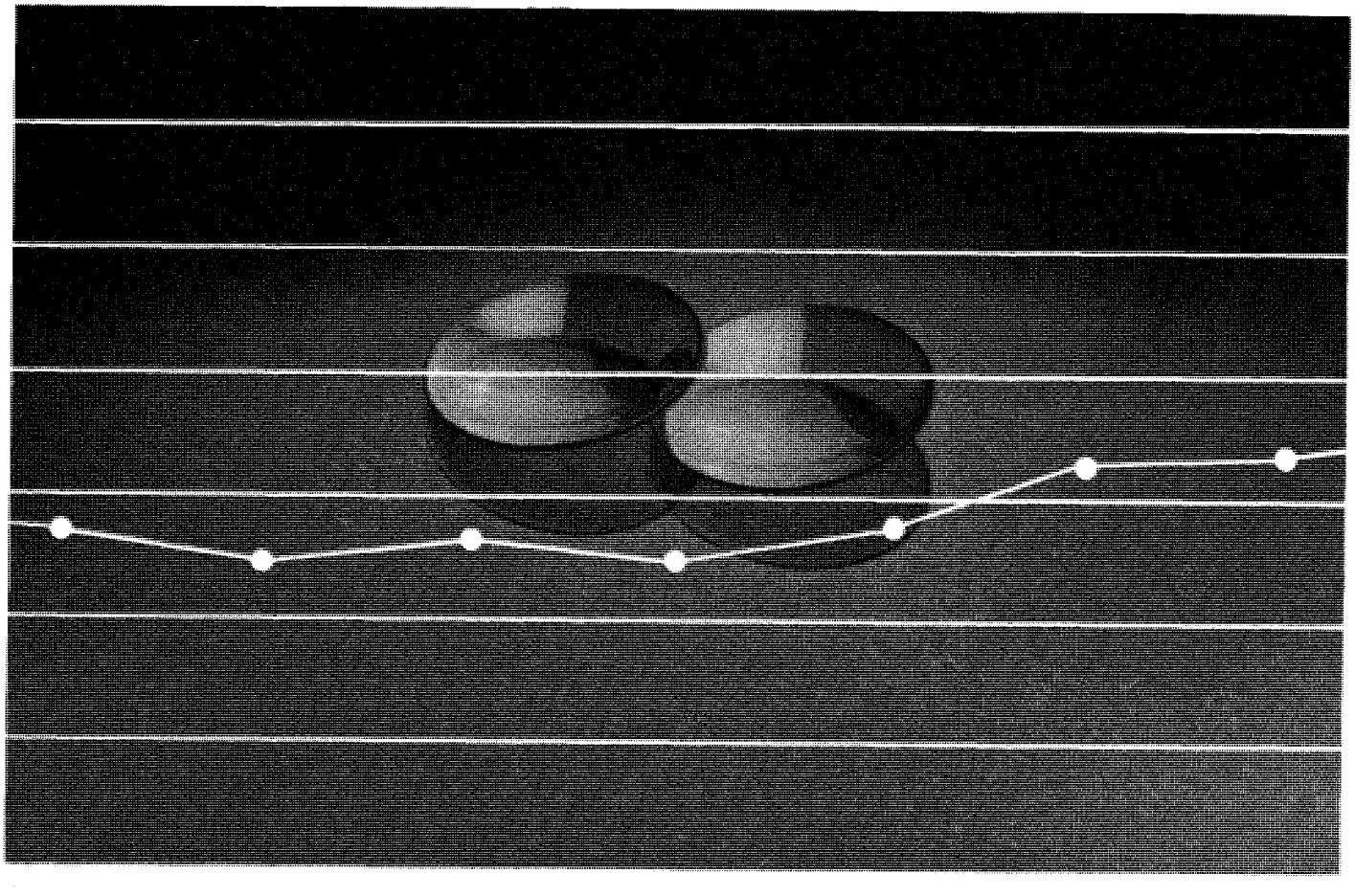


propriate care was rendered by their peers. Summary data from the review were then analyzed to assess what effect, if any, the review had on the quality of subsequent records reviewed.

Methods

Students assigned under a common faculty member for contact lens clinical instruction on a given afternoon participated in the record review on a rotational basis (example: instructor X's students participated the first week, instructor Y's the second, instructor Z's the third; repeat). Each student, therefore, took part in the review process two or three times during the ten-week period.

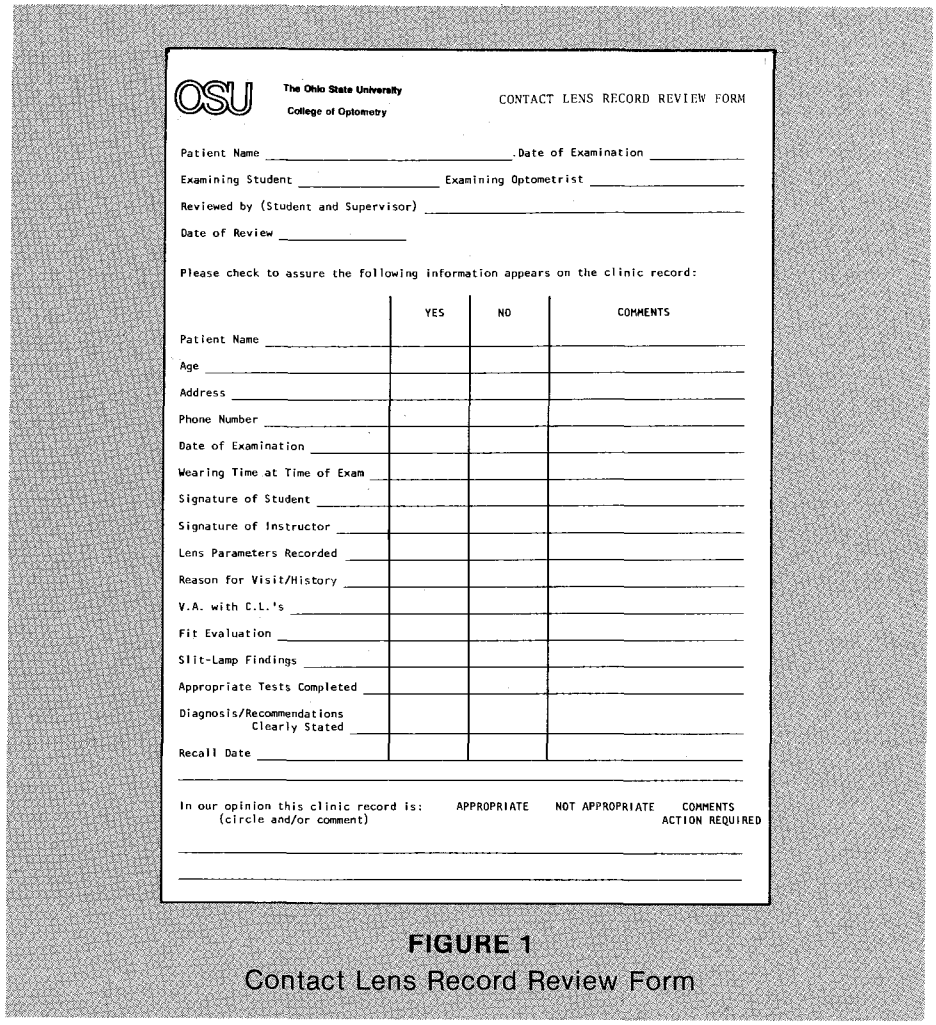
An assigned faculty member supervised the review on a given afternoon for the ten-week term, the individual faculty member being different each day of the week (example: instructor A supervised every Monday of the quarter, instructor B every Tuesday, etc.). The supervisor acted as a consultant and discussion leader for the group.

Groups met on a daily basis for one hour to review the previous day's records. Approximately twenty percent of the previous day's records were selected at random by the file clerk for review. Records involving care rendered by any student member of the group were disqualified.

Findings were recorded on a Contact Lens Record Review Form (Figure 1). The areas listed on this form investigate two major areas. The five initial checklist items are necessary for proper patient identification. The remaining areas consist of professional information felt to be necessary in *all cases* to provide adequate care at each visit.

If any of the items listed on the review form were found to be incomplete or not properly carried out (e.g., recommendations), the record was labeled "not appropriate." Judgments were made based on the standards of each review committee. In order to promote consistency in evaluation standards among the groups, all supervisors met prior to implementation of this study to arrive at a common approach to contact lens patient management. These judgments basically followed common philosophies of contact lens patient care.[2] Records were labeled "appropriate" only if *all* of the items on the review form were found to be satisfactorily completed.

In this clinic, a parameter sheet for recording patient lens specifications is a standard part of every clinical record.



OSU The Ohio State University College of Optometry

CONTACT LENS RECORD REVIEW FORM

Patient Name _____ Date of Examination _____

Examining Student _____ Examining Optometrist _____

Reviewed by (Student and Supervisor) _____

Date of Review _____

Please check to assure the following information appears on the clinic record:

	YES	NO	COMMENTS
Patient Name			
Age			
Address			
Phone Number			
Date of Examination			
Wearing Time at Time of Exam			
Signature of Student			
Signature of Instructor			
Lens Parameters Recorded			
Reason for Visit/History			
V.A. with C.L.'s			
Fit Evaluation			
Slit-Lamp Findings			
Appropriate Tests Completed			
Diagnosis/Recommendations Clearly Stated			
Recall Date			

In our opinion this clinic record is: (circle and/or comment) APPROPRIATE NOT APPROPRIATE COMMENTS ACTION REQUIRED

FIGURE 1
Contact Lens Record Review Form

Verified parameters of newly dispensed lenses, parameters of lenses previously worn by patients, and all lens modifications are recorded on this sheet. This provides the examiner with easy access to a comprehensive lens history for each patient. This is of great practical importance in terms of (1) convenience in replacing lost or damaged lenses, (2) deciding on a lens design during refitting procedures and (3) assessing whether or not parameter changes have taken place (i.e., flattening or warpage of base curve, lens modifications made elsewhere, etc.). During the study, the area "Lens Parameters Recorded" was deemed to be appropriately completed only if lens parameters were properly recorded on this sheet.

The category of "Fit Evaluation" is considered complete with a rigid lens wearing patient if lens centration, lens movement, cornea-to-base curve and cornea-to-peripheral curve relationships are described. For satisfactory documentation of a soft lens fit, lens centration and movement must be noted.

Requirements for recording "Slit-Lamp Findings" vary depending upon the type of lens worn. Notations on the presence or absence of corneal edema and staining are required in *all* cases. If present, the degree of involvement must be noted.

The general category of "Appropriate Tests Completed" was created to reflect the degree of completion of procedures whose necessity varies depending upon the specific visit, patient and lens type. For example, a spectacle refraction would be indicated at a visit in which a new patient is being evaluated for contact lenses. Such a procedure is not necessarily indicated at a lens dispensing visit.

Each day, a summary form outlining the committee's findings was completed and turned in to the coordinator in charge. Results were tabulated on a weekly basis to minimize effects of possible variations in individual supervisor acceptance standards.

If the review committee deemed a record to be inadequate a specific course of remedial action was recommended to the student and instructor involved in the case. A report of the action taken was then filed with the coordinator. It was the responsibility of the coordinator to see that all recommendations made by the review committee were properly carried out.

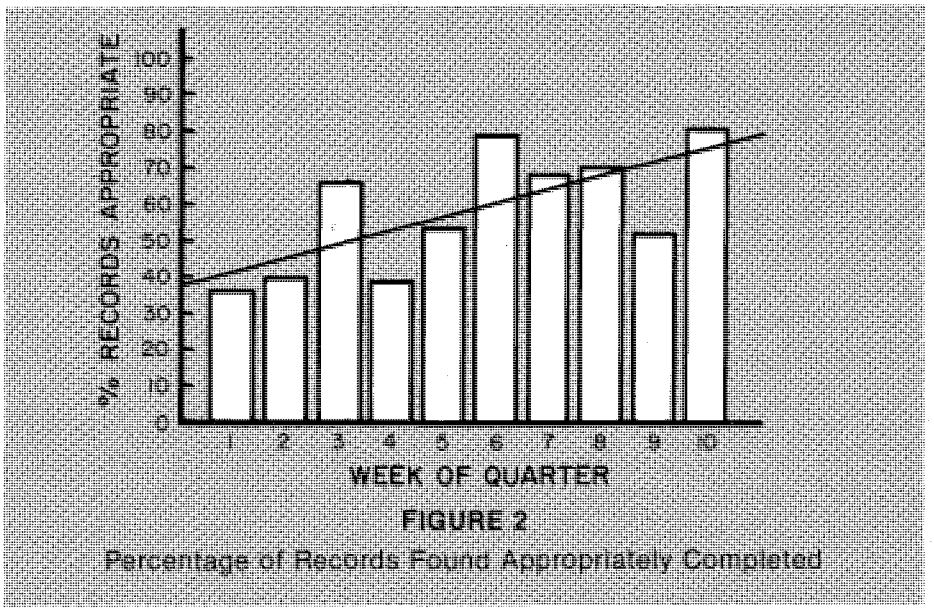


FIGURE 2
Percentage of Records Found Appropriately Completed

Results

At least 97% of all records were found to be appropriately completed in areas relating to information for patient identification (items 1-5). No significant (a = .025) increase or decrease was found to occur in these areas throughout the ten-week study period.

During the first week of the review process, 95% of those records reviewed had satisfactorily recorded the reason the patient was seen in the clinic. This improved throughout the quarter (a = .025) to the point where 100% of the records were consistently found to be adequately completed in this area.

A significant improvement (a = .05) was observed to occur during the review period in the area of proper recording of lens parameters. An improvement (a = .025) was also noted in the recording of lens fitting characteristics.

Keeping clear and complete records of arrived at diagnoses and recommendations has been reported in previous studies to be an area of difficulty.[3] In this study, 86% of the records were found to be appropriate in this area during the first week of the study. However, a consistent improvement (a = .005) was found to occur throughout the ten-week review period. One hundred percent of the records reviewed during the final week of the review period were found to be satisfactorily completed in the area of diagnosis/recommendations.

All other areas were found not to change significantly (a = .05) throughout the ten week period.

A total of 460 patient records were reviewed during the ten weeks of the study. As can be seen in Figure 2, the review committees found an overall increase in the total quality of patient records kept during that period (a = .025).

Discussion

The goal of all health care professionals should be to provide the highest quality of care to their patients. How does one know whether or not this goal is in fact being attained?

Record audits have been shown to be effective as a means of indirectly assessing the quality of care rendered to patients.[3,4,5,6,7] Areas reviewed in such a program should include those most important to assuring that patients receive a reasonable level of care. If shortcomings are found, a mode by which corrective action is a vital part of this procedure.[5]

Levenson[4] points out that with such systems "difficulties arise when records have not been properly kept. Some technically proficient practitioners keep poor records."

It is true that immediate care rendered by such individuals may be proper. However, as discussed earlier in this paper, competent follow-up care is made difficult without accurate and complete past records. This is especially true in a clinic setting such as a school or college of optometry, where the patient may well be seen in the future by a different examiner.

This record review program gave students an opportunity to take part in a review process and to observe firsthand its subsequent effect on the quality of records reviewed. It was hoped this experience would increase student awareness of the role clinical record keeping plays in providing patients with quality optometric care. This experience also served the important function of educating students in a method of carrying out a record review program.[5]

Direct participation in the program also gave students the opportunity to review cases and informally discuss their management with a supervised group of peers. This provided students with an excellent opportunity to gain exposure to a variety of interesting cases and their management. It was felt this type of exposure served to strengthen students' diagnostic and patient management skills.

The results of this study show a definite improvement in the quality of clinical record keeping during the implementation of a patient record review program. It is unlikely this improvement is due merely to a natural improvement in the record keeping skills of the students, as the review program was carried out during the student's final quarter of contact lens clinic. Students had previously had two to three quarters of contact lens clinic experience, as well as extensive experience in other clinics, in which to establish record keeping habits. It, therefore, appears that the institution of a record review system can result in an actual improvement in the quality of patient records. Since quality of patient care is in large part dependent upon the accuracy and completeness of patient records, a record review system appears to be a means of assuring and improving immediate care rendered to patients and of guaranteeing a greater potential for quality care in the future.

Acknowledgement

The author wishes to acknowledge the encouragement and assistance of Dr. Arol Augsburger, Clinical Associate Professor of Optometry, the Ohio State University College of Optometry, in the development of this report. □

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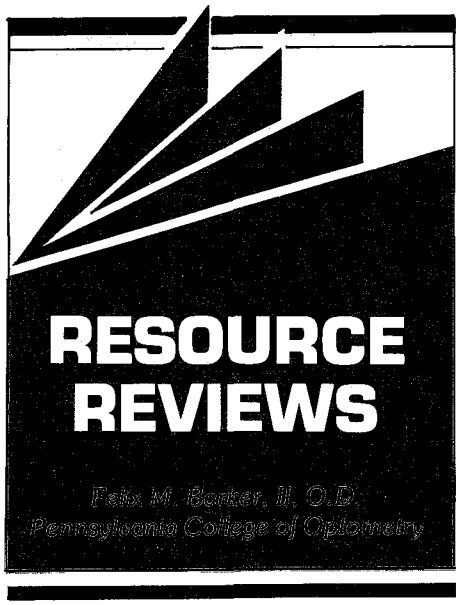


Atlas of the Peripheral Retina by Frank C. Bell, M.D., and William J. Stenstrom, M.Ed., W.B. Saunders Company, Philadelphia, PA, 1983, 232 pp., illus., hard-bound $75.00.

The *Atlas of the Peripheral Retina* is a well-illustrated reference text which will aid the practitioner and educator alike. The atlas is organized into major sections covering anatomy, peripheral degenerations, retinal detachments and tumors, as well as infectious, inflammatory, vascular and medical problems affecting the peripheral retina.

Over 100 clinical entities are presented by the authors in a two-page standardized reference format. Each condition is identified and explained on the left hand page in a few paragraphs with references. On the facing page is a beautifully drawn, full retinal diameter, fundus drawing of the findings under discussion.

These full page composite drawings are done by William Stenstrom, the well-known ophthalmic illustrator. The "ora to ora" format is a useful one because in contrast to photography it allows the artist to represent the total appearance of the fundus at a single glance.

The *Atlas of the Peripheral Retina* is an up-to-date and convenient source of clinically useful information about retinal disease. It is a highly recommended addition to the optometrist's library.

Practical Hints Series, Volume I —Common External Eye Problems by Louis J. Catania, O.D. Primary Eye Care Educational Services, Dresher, PA, 1982, 80 slides, 4 cassette tapes, three-ring bound, $151.00.

Cornea, Cornea, Cornea, Volume II—Keratitis and Corneal Injury by Louis J. Catania, O.D. Primary Eye Care Educational Services, Dresher, PA, 1983, 40 slides,* 2 cassette* tapes, three-ring bound, $151.00.

These interesting loose-leaf volumes cover the practical management of external eye problems and corneal disease for the optometrist in a well organized slide-tape format. Each subject heading is presented on a sixty minute audio tape which is synchronized with twenty full color 35mm slides. The material on the tape is also printed in a clearly understandable outline with pre-test, post-test, descriptions of the slides.

Practical Hints Volume I is in four sections dealing with the management of common lid and conjunctival problems. *Cornea Volume II* presents two sections on corneal infection and injury.* Both volumes are thorough and full of helpful hints from a very practical problem-solving point of view. Clinicians will enjoy the subject material because it describes the most common yet annoying clinical entities seen in practice.

Because of their topical relevance, practical approach, and organized format, these slide tape series are an important educational tool for student and practitioner alike. They are highly recommended.

*An additional 40 slides and 3 cassettes will be available in spring, 1984. Persons purchasing the series will receive the two sections now available in the binder. The remaining sections on viral corneal infection and corneal dystrophy will be delivered in installments this spring.

Presurgical Evaluation of Eyes with Opaque Media by Dwain Gordon Fuller, M.D., and William L. Hutton, M.D. Grune & Stratton, Inc., New York, 1982, 228 pp., illus., hard-bound, $39.50.

Persurgical Evaluation of Eyes with Opaque Media is a useful text which describes certain specialized clinical procedures used in the evaluation of eyes with opaque media.

In this well-illustrated text, the authors quickly cover routine clinical testing and the more sophisticated subjective retinal function tests such as laser interferometry and blue field entoptoscope testing. Next they consider the role of bright flash electroretinography and evoked potentials. The remaining bulk of the text is devoted to B-scan ocular ultrasonography. Ultrasound techniques are described and then the role of ultrasound in diagnosing ocular disease and injury is discussed. There are representative ultrasonographs of most types of posterior polar conditions.

In assessing the overall value of this text it seems that more in-depth treatments of specialized subjective tests, ocular electrophysiology and ultrasound may be available from other sources. There is also a clear cut emphasis by the authors toward ultrasound as a tool. However, the strength of the book is its concise and practical demonstration of an extensive range of ultrasonographic clinical presentations. This makes it useful clinically as an atlas to aid in diagnosis. Educationally it demonstrates well the range of ocular problems where ultrasound and special tests play a role in diagnosis.

The Lacrimal System edited by Benjamin Milder, M.D., and Bernardo A. Weil, M.D., with eight contributors. Appleton-Century-Crofts, East Norwalk, Connecticut, 1983, 240 pp., illus., hard-bound, $50.00.

The field of Dacryology is the study of the lacrimal system and its abnormalities. This area is of significant clinical interest to the primary care practitioner because of the countless hours per week (s)he will often spend solving such patient problems. In view of the very few such sources which have been published to date, this interesting text represents an important contribution to the primary care literature.

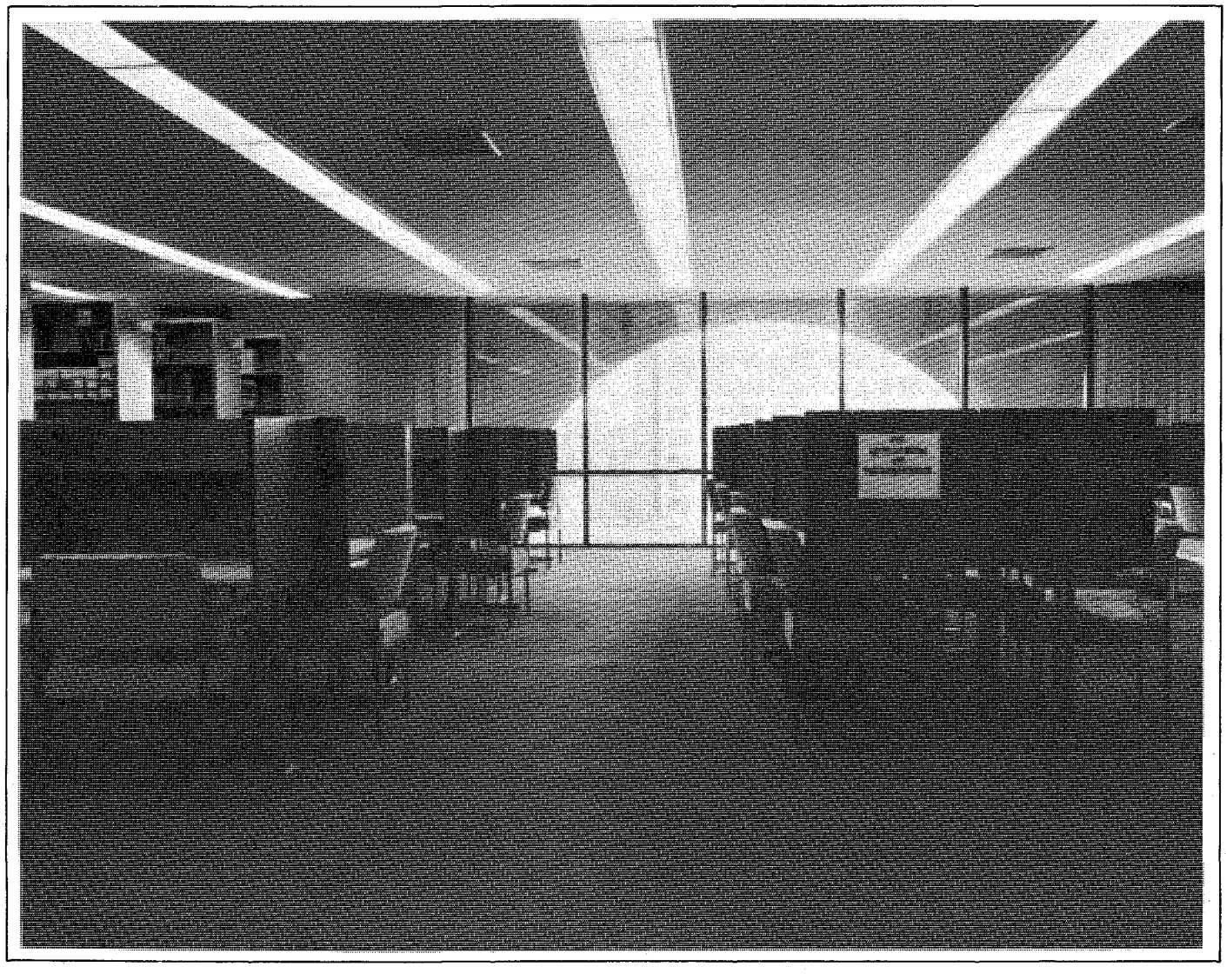
The Lacrimal System is written in a concise fashion with an easily read style. Emphasis is placed upon communication of pertinent facts, figures, and concepts without long-winded discussions. Chapters rarely exceed 15 pages and they are filled with helpful photos, diagrams, tables and the like. Because of its good organization, readers can quickly locate the subject of interest to them.

This book offers chapters on the development, anatomy, and physiology of the normal lacrimal system as well as on the biochemistry and physiology of the tear film. There is excellent coverage of routine and specialized diagnostic testing procedures and up-to-date discussions of treatment modalities available. Chapters are supported by substantial reference material.

The Lacrimal System is a delightful little text which fills an important void for the primary eye care practitioner educator and student. Your attention is invited to this timely and important contribution to the literature.

Annual Survey of Optometric Educational Institutions 1982-83

The following is a summary of portions of the 1982-83 Annual Survey of Optometric Educational Institutions which is conducted by the American Optometric Association, Council on Optometric Education. The accompanying tables highlight information on student enrollment, academic achievement, financial aid and student expenditures for the year 1982-83. This report is published as an annual feature of JOE.



Student Enrollment

Total student enrollment for the academic year 1982-83 was 4,561. This represented an increase of less than 1% (.44%) over the previous year's enrollment of 4,541. First-year students totaled 1,120.* This represented a decline of 3.6% from the previous year's 1,162.

Female enrollment increased by 8.9% to 1,173 students in 1982-83 from 1,077 in 1981-82, and women represented one-fourth (25.7%) of the total enrollment. The number of women in the 1982-83 entering class comprised 29.3% (328 students) compared to 26.7% or 310 students in 1981-82. This represented an increase of 5.8%.

Minority enrollment accounted for 12.17% (555 students) of the student body in 1982-83 compared to 10.66% in 1981-82. This represented an increase of nearly 15% (14.7%) over the previous year and, for the third year in a row, topped the highest previously-recorded percentage of 8.9% (345 students) of the student body in 1975-76. This year's increase in minority enrollment indicated a continuing climb in the percentage of minority enrolled in the schools and colleges over the past five years. Minority enrollment represented 8.07% of the total student body in 1978-79, 8.78% in 1979-80, 9.52% in 1980-81, 10.66% in 1981-82, and 12.17% in 1982-83.

Women accounted for 37.8% (210 students) of minority enrolled in 1982-83, compared to 34.9% in 1981-82. Of minorities enrolled, 53% were Asian American, 19% Spanish surname, 14% Black American, 11% foreign national, and 3% native American Indian.

Academic Achievement

More than two-thirds of the entering class in 1982-83, 67.4% or 743 students, had four or more years of prior college work before entering optometry school. In addition, the majority of this class, 61.8% or 681 students, had a baccalaureate or higher degree, whereas only 5.6% or 62 students were reported as having 4+ years of prior college work. The number of entering students having four or more years of college represented a decline of 7.8% from the 1981-82 total of 806 (69.7% of the entering class); also, the number of students having a baccalaureate or higher degree decreased by 6.1% from 1981-82's total of 725 students (62.7% of the entering class). It should be noted, however, that the total number of students reported in this table also showed a decrease of 4.8%.

Of the remaining first-year students, 9.5% had 2+ years of prior college work, and 23.1% had 3+ years.

The mean grade point average for entering students in 1982-83 was 3.17, declining from 3.19 in 1981-82. Thirteen of the sixteen U.S. optometric educational institutions had mean grade point averages of 3.0 or better, and six of these institutions had mean grade point averages of 3.25 or better. These grade point averages were based on a total of 1,144 entering students reported in *Information for Applicants to Schools and Colleges of Optometry*, Fall, 1984, published by the American Optometric Association in cooperation with the Association of Schools and Colleges of Optometry.

Financial Aid

The amount of aid granted through institutions other than loans** for the academic year 1982-83 is given in percentages for fifteen of the U.S. institutions. Also, the amount of student loans granted through institutions for 1982-83 is given in the same manner. These show the percentage of students receiving aid in each of the four classes, percentage of average aid, and the percentage from federal and state sources. These amounts previously were reported in dollars on past surveys; therefore, it is impossible to make any comparisons between years or to determine any increases or decreases in amounts, types, or sources of aid for the academic year 1982-83.

Student Expenditures

Annual student expenditures for tuition, fees, books, supplies, and other costs excluding living expenses ranged from $1,975 to $11,425 for residents and $4,369 to $13,425 for non-residents in 1982-83. The mean average expenditure for costs other than room and board was $5,280 for residents and $8,446 for non-residents. These represented increases of 30% and 22% over the 1981-83 mean costs of $4,063 and $6,926 for residents and non-residents, respectively.

The average expenditures for room and board in 1982-83 ranged from $2,192 to $5,571. The mean average expenditure was $3,291. This represented an increase of 11.1% over the previous year's $2,963.

Taken altogether, the mean average cost of education for an optometry student in 1982-83 totaled $8,571 for residents and $11,737 for non-residents. These represented increases of 22% and 18.7%, respectively, over the costs of $7,026 and $9,889 in 1981-82. □

Information for Applicants to Schools and Colleges of Optometry, Fall, 1984. St. Louis, Missouri: American Optometric Association. No explanation can be given for the discrepancy in numbers of first-year students reported in this booklet and the COE Annual Survey of Optometric Educational Institutions.

**Includes scholarships, fellowships, grants in aid, etc.

The following abbreviations have been used in the accompanying tables.

Schools

FSC	—	Ferris State College
IAU	—	InterAmerican University of Puerto Rico
ICO	—	Illinois College of Optometry
IU	—	Indiana University
NECO	—	New England College of Optometry
NSU	—	Northeastern State University
PU	—	Pacific University
PCO	—	Pennsylvania College of Optometry
SCCO	—	Southern California College of Optometry
SCO	—	Southern College of Optometry
SUNY	—	State University of New York
TOSU	—	The Ohio State University
UAB	—	University of Alabama in Birmingham
UCB	—	University of California, Berkeley
UH	—	University of Houston
UMSL	—	University of Missouri-St. Louis

(continued)

Profile of 1982 Entering Class

Grade Point Averages (4.0 Scale)

	High	Low	Mean	Number of Students
FSC	4.00	2.59	3.38	32
IAU	3.58	2.36	2.86	32
ICO	N/A	N/A	2.95	118
IU	N/A	N/A	3.38	67
NECO	3.73	2.44	3.20	84
NESU	4.00	2.64	3.23	25
PCO	3.90	2.50	3.08	137
PU	3.95	2.18	3.16	84
SCCO	3.90	2.80	3.27	97
SCO	3.83	2.10	2.87	112
SUNY	4.00	2.52	3.22	64
TOSU	4.00	2.61	3.33	60
UAB	3.87	2.61	3.30	40
UCB	4.00	2.20	3.32	64
UMSL	3.90	2.10	3.00	30
UH	4.00	2.50	3.16	98
Total				

SOURCE: *Information for Applicants to Schools and Colleges of Optometry, Fall, 1984. St. Louis, Mo: American Optometric Association.*

N/A—Not Available

Provinces and Territories

CZ — Canal Zone
PR — Puerto Rico
USP — U.S. Possessions
ALB — Alberta
BC — British Columbia
MAN — Manitoba
NB — New Brunswick
NF — Newfoundland
NS — Nova Scotia
ONT — Ontario
PEI — Prince Edward Island
QUE — Quebec
SAS — Saskatchewan
CAN.TER. — Canadian Territories
O.COUN. — Other Countries

1982-83 Annual Survey of Optometric Educational Institutions

Number of First Year Students Enrolled with:

	2+ Yrs.	3+ Yrs.	4+ Yrs.	B.A., B.S.	M.A., M.S.	Ph.D.	TOTAL
FSC	20	4	3	2			29
ICO	19	25	18	45	1		108
IU	19	14	3	28	3		67
NECO		9		75		4	88
NSU	8	5	3	9			25
PCO		19		110	7	1	137
PU	5	27	11	38	2		83
SCCO	6	25	13	52	1		97
SCO	16	22	2	69	3		112
SUNY		4	1	57	2		64
TOSU	12	25	4	19			60
UAB		9	1	29	1		40
UCB		30		32	2		64
UH		31		61	6		98102
UMSL		5	3	20	1	1	30
U.S. TOTALS	105	254	62	646	29	6	1102

1982-83 Annual Survey of Optometric Educational Institutions

Full-Time Students Enrolled in the Professional Degree Program

	First Year		Second Year		Third Year		Fourth Year		TOTALS		
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Total
FSC	23	6	24	6	26	4	22	8	95	24	119
ICO	82	26	108	25	127	22	122	25	439	98	537
IU	43	25	39	27	45	23	48	19	175	94	269
NECO	67	21	59	32	55	31	61	20	242	104	346
NSU	19	6	21	3	18	4	16	1	74	14	88
PCO	98	48	104	38	107	38	120	26	429	150	579
PU	66	17	71	12	67	17	65	19	269	65	334
SCCO	66	31	64	31	70	25	66	22	266	109	375
SCO	93	22	109	17	124	18	120	22	446	79	525
SUNY	34	30	36	26	36	26	44	20	150	102	252
TOSU	45	18	44	14	46	14	44	13	179	59	238
UAB	28	14	26	14	24	13	28	7	106	48	154
UCB	38	26	43	23	50	26	43	18	174	93	267
UH	68	30	67	31	67	25	75	26	277	112	389
UMSL	22	8	19	9	26	5	n/a	n/a	67	22	89
U.S. TOTALS	792	328	834	308	888	291	874	246	3388	1173	4561

1982-83 Annual Survey of Optometric Educational Institutions

Minority Group Students Enrolled

	Black American		Spanish Surname		Native American Ind.		Asian Amer.		Foreign Nationals		TOTALS			% of Student
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Total	body
FSC	2								1		3		3	2.52
ICO	1	1	6	2			16	9	3	1	26	13	39	7.26
IU	5	6	8	1	1	1			2		16	8	24	8.92
NECO	4	1	2	4			5	4	4	2	15	11	26	7.51
NSU					6	2					6	2	8	9.09
PCO	5	10	5	3			12	8	3	3	25	24	49	8.46
PU			8		1		35	14	8	3	52	17	69	20.66
SCCO	3	3	8	8	1		47	30	3		62	41	103	27.47
SCO	2	5	7	1	1		10	1	4	1	24	8	32	6.10
SUNY	4	3	1	4			6	5	1	1	12	13	25	9.92
TOSU	2										2		2	0.84
UAB	2	2		2				2			2	6	8	5.19
UCB	3	5	15	4	1	1	41	35			60	45	105	39.33
UH	4	1	14	4	2	1	8	7	10	7	38	20	58	14.91
UMSL	1	1				1	1				2	2	4	4.49
U.S. TOTALS	38	38	74	33	13	6	181	115	41	18	345	210	555	12.17

1982-83 Annual Survey of Optometric Educational Institutions

	Financial Aid Granted Through Institutions Excluding Loans							Student Loans Granted through Institutions					
	Percentage of Students Receiving Aid					From	From	Percentage of Students Receiving Loans					
	1st Year	2nd Year	3rd Year	4th Year	Average	Federal	State	1st Year	2nd Year	3rd Year	4th Year	Average	Federal
FSC	36	29	13	27	26	81	19	36	61	52	37	46	97
ICO	13	21	20	28	21	74	17	88	96	89	85	90	98
IU	16	21	15	4	14	0	2	63	65	72	54	64	95
NECO	42	59	30	40	43	55	34	49	42	30	21	36	100
NSU	50	75	29	n/a	54	76	15	69	83	76	n/a	77	21
PCO	10	5	5	5	6	0	40	80	80	80	80	80	100
PU	7	12	12	9	10	6	94	17	19	19	12	17	95
SCCO	19	33	38	56	37	7	93	90	85	83	89	87	28
SCO								3	30	39	32	26	90
SUNY	55	51	58	36	50	34	52	98	98	98	98	98	97
TOSU	40	35	43	41	40	0	0	32	32	31	30	31	90
UAB	3	3	5	3	4	40	0	78	93	78	73	81	100
UCB	5	6	4	6	5	0	45	32	35	40	20	32	89
UH	19	14	18	3	14	60	0	38	23	37	5	26	30
UMSL								13	13			13	92

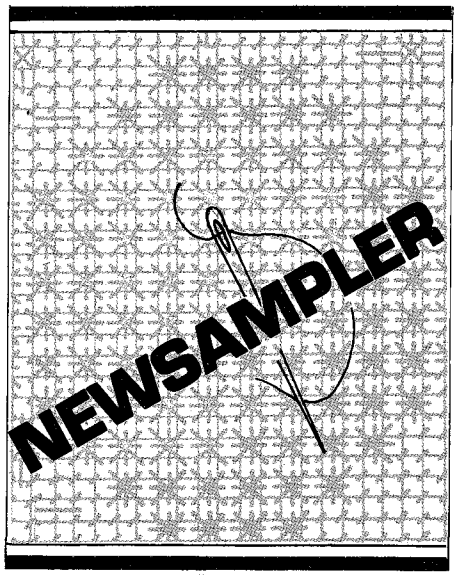
1982-83 Annual Survey of Optometric Educational Institutions

Annual Student Expenditures

	Resident Educational Expenditures					Non-Resident Educational Expenditures					Average Room & Board Expenditures
	1st Year	2nd Year	3rd Year	4th Year	Average	1st Year	2nd Year	3rd Year	4th Year	Average	
FSC	$6,666	$6,116	$6,224	$6,822	$6,457						$2,192
ICO						8,335	8,000	7,530	8,195	8,015	3,150
IU	5,807	9,319	7,963	6,205	7,574	10,216	13,028	11,572	9,312	11,032	2,360
NECO						9,882	9,552	9,640	7,262	9,084	5,571
NSU	2,093	2,148	1,608	n/a	2,039						3,500
PCO	6,445	6,302	5,975	6,035	6,189	9,945	9,702	9,375	9,425	9,611	4,155
PU						9,555	8,255	7,955	7,605	8,343	2,295
SCCO						7,597	7,366	6,493	6,031	6,872	3,700
SCO	7,488	7,193	7,004	3,741	6,351	11,688	11,393	11,204	7,941	10,557	3,906
SUNY	11,700	11,200	10,800	12,000	11,425	13,700	13,200	12,800	14,000	13,425	4,100
TOSU	3,350	3,503	3,401	3,227	3,370	6,780	6,933	6,831	6,657	6,800	2,217
UAB	3,114	3,716	3,151	2,455	3,109	4,374	4,976	4,411	3,715	4,368	3,169
UCB	2,672	1,672	1,885	1,672	1,975	5,882	4,822	5,035	4,822	5,140	3,250
UH	5,153	4,194	4,194	7,360	5,250	6,453	5,394	5,394	7,580	6,205	2,640
UMSL	4,554	4,240	4,240	n/a	4,345	10,554	10,240	10,240	n/a	10,344	3,165

1982-83 Annual Survey of Optometric Educational Institutions
Permanent Residence

	FSC	ICO	IU	NECO	NSU	PCO	PU	SCCO	SCO	SUNY	TOSU	UAB	UC	U.S. UH	UMSL	Total
AL			1					1	1			97				100
AK							3						1			4
AZ				2		2	9	13	2						1	29
AR			1					1	27					9	1	39
CA		30	5	12		11	43	183	7	1			240	2	6	540
CO		4				14	15	4					3			40
CT		4		42		5			2					1	1	55
DE						7		1								8
DC																0
FL		13	6	9		2	2	8	61				1	28	2	132
GA			1	1		1			41	1		12				57
HI		4		1		2	26	14	1				1			49
ID		3	1				16	8								30
IL		164	10	2		4	3	3	9				1	7	6	209
IN		9	157						2							168
IA		38	7				6	11	2					1	2	67
KS		2	1	1			3	2	12					33	3	57
KY			3					1	32			8		12		56
LA			1						26			3		28		58
ME				24	4								1			29
MD		9	1	4		40			17			6	2	6		85
MA		2	2	120		10			2				1			137
MI	119	68	6			1		1	6					4	3	208
MN		20	7	2			13	11	1		9			1		66
MS									23			4		7		34
MO		2	5				1	4	4					1	54	71
MT				1			15	8					1			25
NE		1	8					1	7		16			16		49
NV						1	5	13	2							21
NH				10			1									11
NJ		5	2	23		76	1	2	4	1			1	2	1	118
NM							4	4	1				3	9		21
NY		43	7	54		44		1	10	246	2		2	7	1	417
NC						38			51			8		7		104
ND		9	1				14	16	1	1	4					46
OH		8	2			4			7		206					227
OK		1	1	1	88		2	2	4					9		107
OR		1					49	4					3			57
PA		18	2	6		265		1	6		1			2	2	303
RI				12				1	2							15
SC			1	1					24			8				33
SD		4	1				11	7	2					1		26
TN		1	1	1		1	2		73							79
TX		4	1				1		4	1				175		186
UT		3		1			11	18	3				1	1		38
VT			1	2					1							4
VA				1		38		1	9			8			1	58
WA		1		1			53	4	3							62
WV		6		3		12			18	1						39
WI		54	23	1		2	8	8	5				2	1	4	108
WY							7	4					1			12
PR			1	5		3			1				1			11
USP																0
ALB							3							1		4
BC		1					2								1	4
MAN																0
NB																0
NF																0
NS																0
ONT		1		2			1									4
PEI																0
QUE										1				2		3
SAS																0
CAN.TER.																0
O.COUN.		4	2	2		6	6	3	5				1	14		43
TOTAL	119	537	269	346	88	579	334	375	625	252	238	154	267	389	89	4561



(continued from page 7)

gether with the rod cells, they transmit information through the retina, to the optic nerve, and on to the brain. The yellow spot lies in front of the cone cells in the area of highest visual acuity, the fovea.

If the yellow spot is more dense than usual, distinctions between yellow and violet, and blue and green become less apparent. This is similar to the blue-yellow defect which occurs more frequently among older patients, according to Pease.

Whether or not this means that the amount of macular pigment increase in age is unknown, but exact identification of the pigment would shed some light on the consequences of aging on vision, Pease adds.

All doubt about the eye pigment could be solved by a simple extraction and biochemical analysis of the pigment. However, the extraction process may alter the chemical structure of the pigment, Pease says.

He suspects that the evidence about the pigment from the research in the 1940s pertains to an altered form of the macular pigment, accounting for the apparent difference in light absorption spectrum compared to that which Pease has observed.

Philadelphia "Homeless" Receive Free Eye Examinations

Philadelphia's homeless, including "street people" were given free eye examinations, ocular treatments and eyeglasses at the Eye Institute of the Pennsylvania College of Optometry in December. The donated services were coordinated through the Eye Institute and the Philadelphia Committee for the Homeless, a non-profit volunteer organization which works with emergency shelters. The City Department of Public Health will also be sending patients. The eyeglasses will be funded by a grant from the William Penn Foundation.

"We are doing what we can to provide needed health care services to the homeless and other needy people," said Charles Mullen, O.D., executive director of the Eye Institute. "Through eye examinations and other tests, we are able to detect serious systemic diseases, including diabetes, hypertension, and other conditions. We can alert patients and referring agencies to any medical, as well as ocular problems which should be followed up. Where possible, we provide or arrange for follow-up care."

Dr. Mullen said that the Eye Institute staff, along with its residents and interns, was donating its services to promote goodwill during the holidays as well as to heed the city's call to help the homeless.

Keeping Up with People...

John R. Levene, dean of faculty at Southern College of Optometry, died suddenly while visiting in New York City on December 11, 1983. Dr. Levene, a distinguished scholar and lecturer, assumed the dean of faculty position in 1975. He previously had held teaching and administrative positions at Indiana University, University of Houston and City University, London, England.

Students at the State University of New York (SUNY) College of Optometry who will be included in the 1984 edition of *Who's Who Among Students in American Universities and Colleges* are **Laurel A. Feltham, Mindy S. Gelbart, Teresa L. Halliwell, Steven E. Jacobs, Alan H. Jaffee, Richard J. Madonna, Patricia E. Novak, Steven J. Schiff,** and **Mark D. Woodward.** These nine students, all of whom are in the top 10 percent of their respective classes at the State College of Optometry, were selected by the college and the editors of the annual directory for their academic achievement, service to the community, leadership in extracurricular activities and potential for continued success.

Steven E. Jacobs, Brooklyn, N.Y., a second-year student at SUNY College of Optometry has been awarded first prize, a $2000 scholarship, for his winning essay in the 1983 Nikon Scholar Awards Competition. The annual award, sponsored by Nikon Inc., Instrument Division, is open to first-year students from optometry colleges nationwide who are invited to submit an essay on an optometric topic that Nikon selects. As a supplementary award, Jacobs' school, the State College of Optometry, will receive a Nikon CS-2 Slit Lamp Microscope.

The names of twelve students from the Southern California College of Optometry (SCCO), Fullerton, will be included in the 1984 edition of *Who's Who Among Students in American Universities and Colleges.* Fourth-year students named this year from SCCO are: **Bruce C. Brockman; Mark A. DeGeorge; Denise A. DeSylvia; Orlin J. Fick; Allison A. Hendrick; Daniel L. Mason; Robert D. McQuaid; Rex M. Roberson;** and **Karen K. Toki.** Third-year students from SCCO include: **Douglas J. Flor; Timothy A. Giles;** and **Margaret S. Stark.**

Illinois College of Optometry (ICO) faculty elected **Donald Mazzulla, O.D.,** of Westmont, IL, as the faculty representative to the college's Alumni Association executive council, September 11, at the annual faculty retreat held in St. Charles, IL. Dr. Mazzulla replaces **Brian W. Caden, O.D., M.A.,** whose two-year term expired in October.

Howard I. Woolf, O.D., of Baltimore, MD, president of the Illinois College of Optometry Alumni Association for 10 years, turned the gavel over to **James B. Hasler, O.D.,** of Reedsburg, WI, during the annual fall Alumni Council meeting held at ICO.

Illinois College of Optometry announced the addition of **Gary Allan Lesher, Ph.D.,** to the Division of Basic Sciences faculty as an assistant professor in pharmacology and toxicology. Dr. Lesher served as an assistant professor in the Department of Pharmacology and Toxicology at the University of Maryland's School of Pharmacy before joining the faculty at ICO.

Kevin Wah, director of the ICO learning resources center since 1978, was named director of library and in-

structional services. In addition, **Steven Beckerman, O.D., Mark Kosciuszko, O.D.,** and **Donald Mazzulla, O.D., M.S.** were appointed assistant professors in the Division of Patient Care.

James LaMotte, Ph.D., was appointed chairman of the ICO Division of Basic Sciences and **Kenneth Hyde, Ph.D.,** assistant dean for admissions, was appointed acting director of research in the absence of **Yuzo Chino, Ph.D.,** who is on sabbatical in Japan.

Tracy Williams, O.D., and **Michael Blinstrup, O.D.,** recently joined the ICO Division of Optometric Sciences from the Division of Patient Care. Dr. Blinstrup also was appointed assistant professor.

Three adjunct faculty have been added to the ICO staff. **Stuart Paul Richer, O.D., M.Sc.,** will teach interns in ICO's Ocular Disease laboratory and give seminars to residents; he will also participate in the development of an Ocular Health Clinic module and of an Automated Refraction module. **Alan Tomlinson, M.Sc., Ph.D.,** director of clinical and professional services at Wesley-Jessen, will handle special contact lens cases and provide staff supervision for interns in more difficult contact lens cases. **Philip Evans Irion, O.D.,** a sports vision specialist, joins ICO as an adjunct associate professor and will lecture in the Sports vision course and help organize sports vision programs with ICO interns.

Eight Illinois College of Optometry fourth-year students received $1,800 from Beta Sigma Kappa, international optometric fraternity, for four different research projects. **Alan Winkelstein,** of Parsippany, NJ, and **Earle Scharff,** of Fort Worth, TX, received $500 for their study, "The Measurement of Contrast Sensitivity in Ocular Hypertensives Using Different Counterphase Frequencies."

BSK awarded $350 to **Paul Foreman,** of Fort Dodge, IA, and **Richard Trevino,** of Reisterstown, MD, for their research, "MEM Retinoscopy as a Method of Determining the Near Point Prescription for Children with Low Vision."

A project, "Refitting Successful PMMA Wearers with Gas Permeable Lenses: The Pros and Cons," conducted by **Todd Bussian,** of Lena, IL, and **Julie Schornack,** of Chicago, IL, received $450.

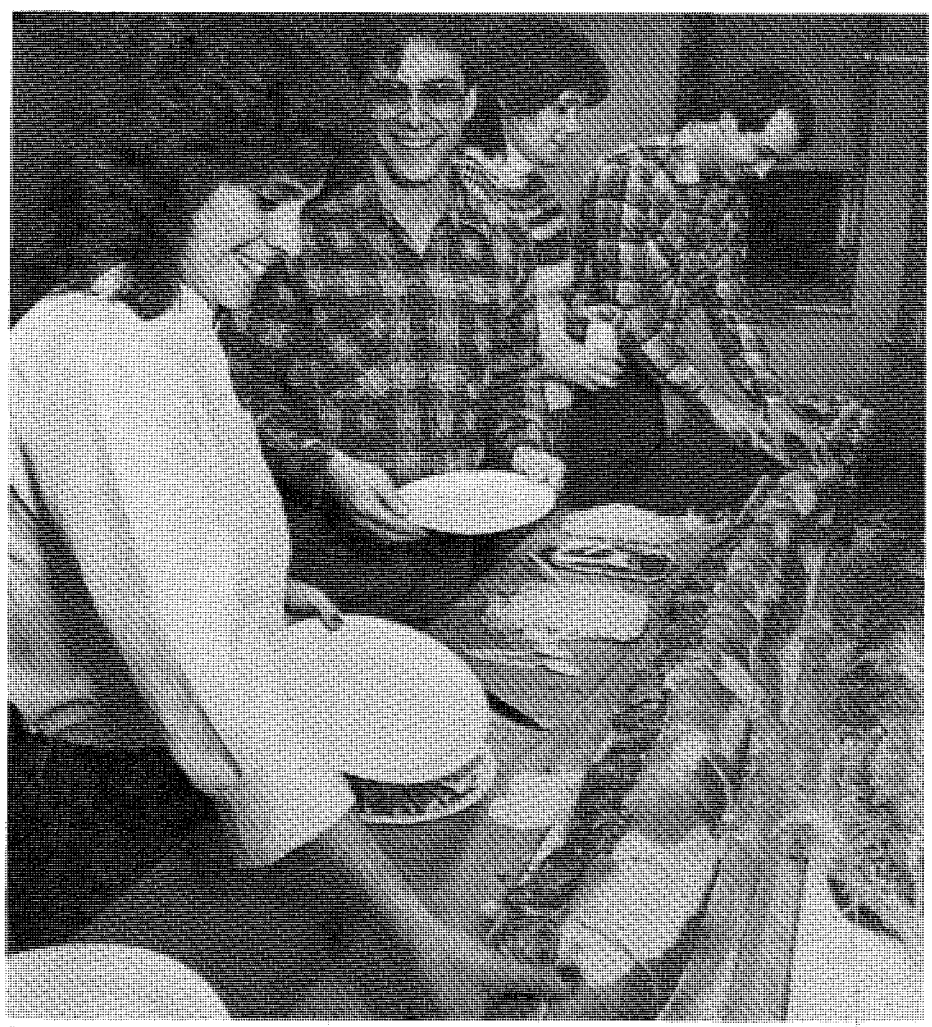
Joyce Schiermeyer, of St. Joseph, MO, and **Janyce Jordahl,** of Neillsville, WI, received $500 for their research project, "Threshold Stereopsis in Infants."

Two of Illinois College of Optometry's pediatric faculty recently completed requirements for advanced degrees in related areas. **Karen Robertson, O.D., M.Ed.,** received a master's of education in special education, emphasizing child development and learning disabilities. **Dominick Maino, O.D., M.Ed.,** completed all requirements for a master's of education, emphasizing the special education areas of mental retardation and early childhood.

Francis Michael Terranova, Jr., O.D., ICO assistant professor, won the Knight-Henry Memorial Award with **Kristi Remick** for a research project, "Preferential Looking: Monocular vs. Binocular Visual Acuities of Infants." The paper appeared in the Optometric Extension Program June 1983 Curriculum II.

Illinois College of Optometry students who have been selected for inclusion in the 1984 edition of *Who's Who Among Students in American Universities and Colleges* include: **Patricia J. Andolina, Thomas A. Banton, David A. Burstein, Todd G. Bussian, Bradley D. Goldberg, Janyce M. Jordahl, Robert S. Juckett, Jeffrey L. Pattain, Michael J. Giese, Jon M. Williamson, Nancy A. Wojcik,** and **Jeffrey R. Pyne.**

Felix A. Koetting, O.D., a past member and chairman of the ICO Board of Trustees, died October 3 at the age of 90.



Pennsylvania College of Optometry students Miriam Lavelle, of Latrobe, PA, Keith Clawson, of Westminster, MD, Lynne Paul, of Jamesville, NY, and Rick Adams, of Gastonia, NC, get ready to dig into a six-foot-long hoagie before starting a fund-raising phonathon for the college. The students are hoping to raise over $30,000 for the college's annual giving program for scholarships, research and patient health care. The students, who are divided into four teams—The Fighting Irises, Crazy Corneas, Laughing Lenses and Peppy Pupils—will be on the phone until February 22.

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