

Research article

A vision for strengthening partnerships between optometry and ergonomics

Jennifer Long^{1,2}, Magne Helland³ and Jeffrey Anshel⁴

¹ Jennifer Long Visual Ergonomics, Katoomba, New South Wales, Australia

² School of Optometry and Vision Science, University of New South Wales, Australia

³ Buskerud University College, Department of Optometry and Visual Science, Kongsberg, Norway

⁴ Corporate Vision Consulting, California, United States

Abstract

Background: Ergonomists frequently encounter vision related issues in workplaces. Optometrists play a key role in managing visual concerns. How can ergonomists and optometrists work more closely together to ensure that appropriate interventions are recommended and the comfort and productivity of workers is maintained? **Aim:** To identify occupational optometry education opportunities available to optometrists in three countries: Australia, Norway and the United States of America (USA), and discuss possible strategies for strengthening partnerships between the optometry and ergonomics professions. **Methods:** University optometry courses and entry-level competency standards for optometry practice were accessed in Australia, Norway and the USA. Occupational optometry content of major optometry publications and conferences in these countries were reviewed for the period 2009-2010. **Results:** Optometrists receive occupational optometry education in their basic degree, although the quantity varies between teaching institutions. Postgraduate research degrees on occupational optometry topics are offered in Australia, Norway and USA. The occupational optometry content in optometry conferences and journals is typically less than 10%. Search engine facilities on optometry websites exist to assist identification of optometrists with an interest in occupational optometry. **Conclusions:** Optometrists receive training in occupational prescribing. However, prescribing an appropriate optical or ergonomic prescription is dependent on optometrists receiving adequate information about workplace requirements and policies. Partnerships between optometry and ergonomics can be strengthened at a local level by shared-care arrangements and at an international level by increasing the profile of occupational optometry in research, publications and conference presentations. Further investigation is required to understand the barriers to collaboration between the two professions.

©Long et al: Licensee HFESA Inc.

Background

Vision-related issues may be encountered by ergonomists in workplaces, e.g. in the design of equipment and workstations or while working with individuals who have vision difficulties. Since the role of an ergonomist is to “analyse the human-system interaction and the design of the system...to optimize human well-being and overall system performance” (1), it is important that they understand aspects of visual function in order to provide appropriate advice to their clients.

Optometrists are primary healthcare practitioners who provide comprehensive eye and vision care “which includes refraction and dispensing, detection/diagnosis and management of disease in the eye, and the rehabilitation of conditions of the visual system” (2). Although the scope of practice (e.g. whether permitted to prescribe therapeutic drugs) may vary between countries, the majority of clinical optometrists conduct eye examinations in a consultation room. They may provide occupational vision advice based on their patient’s description of work demands, but it is unusual for an optometrist to visit their patient’s workplaces to see first-hand the working conditions or workstation arrangements or equipment.

With an ageing population, there are an increasing number of workers over the age of 45 who require a vision correction for presbyopia (e.g. reading spectacles) or who have age-related ocular conditions (e.g. glaucoma). As these workers are under the care of eye care practitioners who offer their own advice and recommendations for optical corrections, vision therapy and visual hygiene (e.g. rest breaks), there is the potential for individuals to receive what appears to be conflicting advice from different sources.

It would therefore be sensible that if ergonomists and optometrists have mutual clients then there would be open communication channels between the two professionals (3). This is not a new issue related to modern workplaces and computer use, but has been discussed in the context of eye protection for more than 60 years (4-7). The purpose of this paper is to (i) describe optometrist’s knowledge and exposure to occupational optometry in three countries: Australia, Norway and the United States of America (USA). These countries were selected for analysis as they are the resident countries of the three authors, all of whom work in the field of occupational optometry; and (ii) discuss possible strategies for strengthening partnerships between the optometry and

ergonomics profession at a local and international level to facilitate improved client/patient outcomes.

Definitions

“Environmental Optometry” is used to describe optometry as it relates to individuals and their “home, school, work, recreation, transport, underwater and outer space environments” (7). Occupational optometry is a sub-branch of this, specific to “work and vision, visual performance, eye safety and health” (7). In this paper, occupational optometry is defined as visual function and ocular health as it relates to occupational and recreational activities. It includes ergonomics, safety, eye protection and sunglasses, standards, lighting, task-related vision and vision corrections (e.g. computers), occupations (e.g. aviation), devices (e.g. lasers) and sports.

Methods

A comparison was made of the healthcare systems in Australia, Norway and the USA to establish the context of occupational optometry in each country and determine the funding arrangements for occupational eye examinations and optical aids. Optometrist’s knowledge and exposure to occupational optometry was estimated in two ways: (1) undergraduate and postgraduate education opportunities in Australia, Norway and the USA; and (2) availability of continuing professional development and publications for 2009-2010.

The entry-level competency standards for optometry practice in Australia(8), Norway (9) and the USA (10) were accessed and the sections relating to occupational optometry were identified. Postgraduate coursework opportunities were ascertained by visiting the website of the Schools of Optometry in each country. The conference programs for major optometry conferences in Australia, Norway and the USA were obtained. The percentage of occupational optometry content was calculated by dividing the number of occupational optometry oral presentations by the total number of oral presentations.

Similarly, the percentage of occupational optometry content was calculated for the following optometry publications:

- Peer-reviewed impact factor journals: *Clinical and Experimental Optometry* (Australia), *Optometry and Vision Science* (USA), *Ophthalmic and Physiological Optics* (United Kingdom; UK)
- Peer-reviewed non-impact factor journals: *Optometry* (USA) and the *Scandinavian Journal of Optometry and Visual Science*.
- Non-peer reviewed publications: *myvision* (Australia), *Optikeren* (Norway) and *Optometric Management* (USA).

Although non-peer reviewed publications are secondary information sources (e.g. they often present summaries of research papers and clinical pearls for practitioners), their easy to read style and practical content attracts a broad readership. For this reason, they were included in the analysis.

A database search was conducted to identify articles published in 2009-2010 on occupational optometry topics in

journals other than those listed above. Databases used were Medline, Pubmed, Ergonomics Abstracts online and Google Scholar (first 100 articles). Keywords used were optometry, ergonomics, occupation, safety, work, workplace, computer, visual display unit and lighting. Abstracts, editorials, book reviews, news reports (e.g. one paragraph news snippets) and self-published articles on the Internet were not included in the above analysis.

Results

Occupational Optometry within the healthcare system

Eye examinations conducted specifically for occupations (e.g. assessment of suitability for work) or recreations (e.g. to obtain a sport-related licence or qualification) are generally not government funded in Australia, Norway or the USA. Employers may accept liability for the cost of an occupational-related eye examination in Australia and Norway. In the USA, reimbursement for both occupational-related eye examinations and optical appliances is through private health insurance. Norway complies with the European Union directive that task-specific computer spectacles should be provided by the employer (11), whereas in Australia this is at the discretion of the employer (Table 1).

Table 1. Funding for occupational optometry services

	Eye examinations	Optical appliances (e.g. spectacles, contact lenses)
Australia	Routine eye examinations are covered by the Australian Government (12). Medicare does not cover the cost of optometric services associated with tests for fitness to undertake sporting, leisure or vocational activities, commercial licenses, vision screening or when the employer arranges, requests or requires an employee to have an eye examination (section O.5) (12)	Optical appliances are covered by “extras cover” in private health insurance. Some employers partially reimburse spectacle costs (e.g. for computer users or prescription safety eyewear)
Norway	Routine eye examinations by optometrists are paid by the patient. Employers have a duty to ensure that computer users have an optimum visual correction while at work and therefore pay for the eye examination	Employer covers the cost of task-specific spectacles for computer use (general purpose optical corrections are not covered) and prescription eye protection.
USA	Routine eye examination when a disease is present is paid by Medicare for those over 65 years or those with certain disabilities. For others, private medical insurance may cover the cost of a routine eye examination, but only when medically necessary. Occupational eye examinations may also be covered by private medical insurance or a Preferred Provider Organisation (PPO) plan.	Optical appliances are covered by private health insurance. Employers may provide prescription eye protection.

Formal education

There are four schools of optometry and vision science in Australia, one in Norway and 20 in the USA. An understanding of occupational optometry is a core competency in Australia, Norway and the USA although the scope varies between countries (Table 2). All courses leading to an optometry qualification (and hence, registration) therefore address this competency, but the number of tuition hours and variety of topics vary between institutions.

A postgraduate Occupational Optometry course is currently under revision in Norway and is due to be offered again in 2012. After passing a four hour exam, the successful student receives a certificate of completion, which can be partially credited to a Master of Visual Science. There are no postgraduate occupational optometry coursework opportunities or residency programs in Australia or in the USA. Postgraduate research degrees on occupational optometry topics are offered at some schools of optometry in each country, but the topics are dependent on the expertise of specific staff members.

Optometrists with a special interest in occupational optometry can be located by searching computer databases. Unlike

Norway, where inclusion on the database is dependent on demonstrating expertise, in Australia and the USA there may be varying levels of competence within the listed members, since inclusion is not audited.

Continuing professional development and publications

Occupational optometry content was included in conferences and publications during 2009-2010, but the total was relatively small (n=85) (Table 3). The high percentage content in the *Scandinavian Journal of Optometry and Visual Science* (20%) is because this is a young journal with only four editions since 2008 and one out of the five peer-reviewed articles was on an occupational optometry topic. Almost half of the occupational optometry articles published in peer-reviewed, impact factor journals related to colour vision including one whole edition of *Ophthalmic and Physiological Optics* devoted to this topic. The database search revealed a further 24 articles published on occupational optometry topics during the period 2009-2010, including publications in *Ergonomics*, *Applied Ergonomics*, *Investigative Ophthalmology and Visual Science*, *the Lancet*, *Risk Analysis and Accident Analysis and Prevention*.

Table 2. Occupational optometry - formal educational opportunities and qualifications

	Entry level competency for the practice of optometry	Postgraduate coursework	Postgraduate Research	How can an optometrist with occupational optometry expertise be identified?
Australia	<p>Section 1.10.2 Advice is provided on eye protection for occupational and home-based activities and for recreational pursuits</p> <p>Section 5.11 Advice is provided on vision, eye health and safety in the workplace and recreational settings, including lighting and ergonomic design (5.11.2). Needs to understand industry and other occupational requirements (5.11.3) and be able to communicate with employee and employer organisations (5.11.3) (8)</p>	No	Yes	Optometrists Association of Australia (OAA) hosts a search facility for "Eye Safety Campaign". Optometrists interested in participating in the campaign apply for inclusion on the list and are provided with an "Occupational Optometry Guide" (13) prepared by the OAA in conjunction with industry experts.
Norway	<p>Section 5. Eye examinations for patients who work with computers, including history taking relevant for the work situation (5.1), lighting and general ergonomics (5.2) and instruction on appropriate workstation arrangement (5.3). Specifically, the competency standard states that the dimensions of the workplace should be measured before eyeglasses are prescribed, preferably by the optometrist visiting the workplace. The patient, occupational therapists or occupational medical doctors can also measure the workstation dimensions, preferably in collaboration with the optometrist.</p> <p>Section 6. Examination of patients for a driving license to ensure compliance with the national driving license regulations (6.1). (9)</p>	Proposed for 2012	Yes	Norwegian Association of Optometry hosts a search facility for "Occupational Optometry". Inclusion is granted after applicants submit documentation on courses, relevant background or experience in occupational optometry.
USA	Applied Science module in National Board Examination which leads to registration as an optometrist includes required knowledge of spectacle lens prescriptions, eye protection, colour vision and vocational counselling (10).	No	Yes	A list of optometrists interested in computer vision is privately maintained. Inclusion is dependent on optometrists having attended a one-day computer vision syndrome seminar (this is offered by private arrangement).

Table 3. Occupational optometry content in conference and publications 2009-2010

		Number of Occupational Optometry presentations / articles	Occupational optometry content as a % of total content
Conferences	Australia	9	3.5%
	Norway	0	0%
	USA	13	3.8%
Peer reviewed impact factor journals	Clinical and Experimental Optometry	7	5.4%
	Ophthalmic and Physiological Optics	13	7.4%
	Optometry and Vision Science	9	3.3%
Peer reviewed non-impact factor journals	Optometry	0	0%
	Scandinavian Journal of Optometry and Visual Science	1	20.0%
Non-peer reviewed publications	ivision	9	4.9%
	Optikeren	20	13.2%
	Optometric Management	4	2.2%

Discussion

Optometrists receive education about occupational optometry in their basic degree and this is a requirement for optometrist's registration. Therefore, if a patient presents for an eye examination and requires occupational optometry advice, the optometrist should be able to provide this or be able to access resources to assist them formulate their advice.

Formal postgraduate opportunities in occupational optometry are limited, so optometrists interested in furthering their knowledge need to actively seek information via attendance at conferences or reading optometry publications. This should not preclude optometrists from developing expertise as professional expertise is obtained by factors such as curiosity and a desire to solve a new problem or challenge (14), but may require them to independently source publications or further education outside of optometry.

This presents an opportunity for ergonomics to forge greater links with optometry by inviting optometrists to ergonomics professional development events which include occupational optometry content, for example, invite optometrists to the Nordic Ergonomics Society annual conference which includes a Visual Ergonomics stream in the conference program. In Australia (15) and the USA (16) there is a legislative requirement for optometrists to accrue a minimum number of continuing education points per year to maintain their professional registration, including a minimum number of points from medical therapeutic topics in some jurisdictions. In Norway, continuing education is voluntary but may become compulsory in the near future. Marketing such events with the promise of approved continuing education points might be an incentive for attracting attendance by optometrists who are interested in these topics.

Possible barriers to attracting optometrists to ergonomics events is a perception that ergonomics is "common sense" (17) and therefore not worthy of further education or that occupational problems and their prevention are not very prevalent (7) and therefore not relevant to their clinical needs (18-20). One way to increase the credibility of ergonomics in the optometry community is to increase the number of occupational optometry case studies and research reports in ophthalmic publications and conferences. These would provide examples of optometrists and ergonomists successfully working together and illustrate how optometrists might expand their scope of practice. Since evidence-based practice is strong in optometry (21), it would be important to frame any publications in these terms. The current low numbers of occupational optometry topics presented within optometry means that occupational issues are often grouped with "public health" topics – this may be a disincentive for potential authors and presenters to submit their work. On the other hand, including occupational optometry topics within general (rather than topic-specific) optometry conferences and publications would increase occupational optometry's exposure and may encourage others to also present their work.

There is informal communication between optometry and ergonomics. For example, in Australia and Norway there are optometry internet forums where optometrists can pose occupational optometry questions which are then answered by other forum members knowledgeable on those topics. Similarly, ergonomics forums such as aus-ergo (Australia) and Ergoweb (USA) allow ergonomists the opportunity to ask vision-related questions which may be answered by optometrists. These forums illustrate deficiencies in knowledge in both professions which could be addressed by greater collaboration.

Partnerships between optometry and ergonomics can be strengthened at a local level by increased communication between individual ergonomists and optometrists when they have a mutual client, for example, by providing information about workstation design or working distances to the optometrist so that task-suitable spectacles are prescribed (4, 22) or informing the optometrist of workplace policies for particular lens designs prior to the eye examination. This is consistent with the explicit recommendations in the Norwegian competency standard (9), the implicit recommendations to communicate with employee organisations in the Australian competency standard (8) and with the core competencies defined by the International Ergonomics Association (i.e. "Communicates effectively with the client, any stakeholders, the public and professional colleagues" (23)). Increasing optometrists and ergonomists awareness of these standards could reduce the risk of optometrists prescribing "wrong lenses" or giving "wrong advice" and could heighten optometrist's awareness of the complexity of workplace-related issues, provide them with a clinical challenge and thus increase their interest in occupational optometry (14).

Shared-care of patients with other healthcare practitioners is becoming more widespread within optometry (8, 24-26). For example, in the management of patients with diabetes (27), glaucoma (28) or when referring patients with ocular health or surgical needs to an ophthalmologist (26, 29). Unlike these

medical examples, which attract a Medicare rebate in Australia and the USA, shared-care with ergonomists would be classified as “occupational” and therefore require private funding. This may discourage employers from providing information to optometrists as doing so would make them liable for the costs associated with the service. For example, some workplaces in Australia and the USA provide prescription safety spectacles for their employees but only based on an existing non-task-specific spectacle prescription. Norway has circumvented this to a certain extent by legislating that employers must pay for eye examinations and task-specific spectacles for computer users, but there is evidence that this may require more promotion within workplaces to be truly effective (30). There is also the difficulty of defining what is “work” (and hence, what is compensable) when the use of the internet, mobile phones and other communication devices have blurred the boundaries between work and home. Further investigation is required to determine how best to overcome these barriers.

Conclusions

At a local level, partnerships can be strengthened between optometry and ergonomics by:

- Ergonomists inviting optometrists to actively participate in problem solving by providing them with information to assist their prescribing decisions;
- Giving feedback to optometrists to reassure them of the value of their involvement; and
- Emphasising the need for optometrists to provide evidence-based recommendations.

At an international level, partnerships can be strengthened by:

- Inviting optometrists to ergonomics events that include occupational optometry content. Include continuing education points as an incentive for attendance;
- Assisting optometrists to write case studies illustrating successful occupational optometry interventions and publishing these in ophthalmic publications. This will increase awareness of occupational optometry as a valid sub-speciality and provide role models for optometrists seeking to expand their scope of practice; and
- Greater participation by optometrists in ergonomics related research.

Outcome measures to gauge the success of these partnerships include number of publications and conference presentations on occupational optometry topics, attendance by optometrists at ergonomics events and demand for occupational optometry postgraduate opportunities.

There are many common areas between optometry and ergonomics that have not been fully developed. We hope this review will stimulate dialogue between the two professions. Ultimately this will benefit the employee/patient and may improve productivity in the workplace.

References

1. *What is ergonomics?* International Ergonomics Association (IEA) http://www.iea.cc/01_what/What%20is%20Ergonomics.html. Accessed 12th May 2011
2. *About us.* World Council of Optometry. <http://www.worldoptometry.org/en/about-wco/index.cfm>. Accessed 12th May 2011
3. Horgen G, Aaras A, Fagerthun H, Larsen S. Is there a reduction in postural load when wearing progressive lenses during VDT work over a three-month period. *Applied Ergonomics*. 1995;26(3):165-71.
4. Lathey M. The introduction of an eye protection program. *The Australian Journal of Optometry*. 1973;56:321-6.
5. Report of the committee on industrial vision. *The Australasian Journal of Optometry*. 1946;29(4):156-70,81.
6. Harvey L. Industrial Optometry. *The Australasian Journal of Optometry*. 1952;35(10):445-51,74.
7. Kleinstein R. Occupational Optometry and Primary Care. In: Pitts D, Kleinstein R, editors. *Environmental Vision: Interactions of the eye, vision and the environment*. Boston: Butterworth-Heinemann; 1993. p. 3-50.
8. Kiely P. Optometrists Association Australia Universal (entry-level) and Therapeutic Competency Standards for Optometry 2008. *Clinical and Experimental Optometry*. 2009;92(4):362-286.
9. Retningslinjer I Klinisk Optometri. Oslo: Norges Optikerforbund; 2010. <http://www.optikerne.no/pop.cfm?FuseAction=Doc&pAction=View&pDocumentId=24517>. Accessed 31st March 2011.
10. National Board of Examiners in Optometry <http://www.optometry.org/index.cfm> Accessed 3rd May 2011
11. Council Directive on the minimum safety and health requirements for work with display screen equipment (fifth individual Directive within the meaning of Article 16 (1) of Directive 87/391/EEC); Directive 90/270/EEC - display screen equipment; 1990. <http://osha.europa.eu/en/legislation/directives/provisions-on-workload-ergonomical-and-psychosocial-risks/osh-directives/5>. Accessed 2nd June 2011
12. *Australian Government Department of Health and Ageing - Medicare Benefits Schedule Book*. Commonwealth of Australia; 2010.
13. OAA. *Occupational Optometry Guide*. Carlton, VIC, Australia: Optometrists Association Australia; 2010.
14. Faucher C. Development of professional expertise in optometry. *Optometry*. 2011;82:218-23.
15. *Continuing professional development registration standard*. Optometry Board of Australia. 2010 <http://www.optometryboard.gov.au/Registration-Standards.aspx> Accessed 3rd June 2011

16. *Optometry licensure*. Association of Regulatory Boards of Optometry. <http://www.arbo.org/index.php?action=arbofaqs>. Accessed 3rd June 2011
17. Long J, Burgess-Limerick R, Stapleton F. Toward a more comfortable profession - disseminating ergonomics information to Australian optometrists. In press, *Ergonomics Australia*.
18. Weir K. Thinking outside the (voice) box: a case study of students' perceptions of the relevance of anatomy to speech pathology. *Anatomical Sciences Education*. 2008;1:166-74.
19. Cervero R. A factor analytic study of physicians' reasons for participating in continuing education. *Journal of Medical Education*. 1981;56:29-34.
20. *Continuing professional development policy*. Optometry Board of Australia. <http://www.optometryboard.gov.au/CPD/Key-Documents.aspx>. Accessed 3rd June 2011].
21. Anderton PJ. Implementation of evidence-based practice in optometry. *Clinical and Experimental Optometry*. 2007 July 2007;90(4):238-43.
22. Long J. What every ergonomist needs to know about multiple focus spectacles. *Ergonomics Australia*. 2003 December 2003;17(4):10-3.
23. *International Ergonomics Association Summary of Core Competencies in Ergonomics: Units and Elements of Competency* (2001). International Ergonomics Association; http://www.iea.cc/browse.php?contID=edu_competencies. Accessed 2nd August 2011
24. *A global competency-based model of scope of practice in optometry*. www.hkspo.org.hk/wco_upload/261201285975.pdf. Accessed 2nd June 2011
25. Soroka M, Krumholz D, Bennet A. The practice of optometry: National Board of Examiners in Optometry survey of optometric patients. *Optometry*. 2006;77:427-37.
26. Sundling V, Gulbrandsen P, Bragodottir R, Bakketeig L, Jervell J, Straand J. *Optometric practice in Norway: a cross-sectional nationwide study*. ACTA Ophthalmologica Scandinavica. 2007;85:671-6.
27. Woods CA. Working better with GPs : Lessons to be learned from a study of health care networks in the management of diabetes. *Clinical and Experimental Optometry*. 2006 Jan 2006;89(1):1-2.
28. Lu C, Lu V, Goldberg I, Day R. Towards integrated care: Australia's new model of care for patients with glaucoma. *Medical Journal of Australia*. 2010 16th August 2010;193(4):200-1.
29. Pierscionek T, Moore J, Pierscionek B. Referrals to ophthalmology: optometric and general practice comparison. *Ophthalmic and Physiological Optics*. 2009;29:32-40.
30. Niskanen T, Lehtela J, Ketola R, Nykyri E. Results of Finnish national survey on EU legislation concerning computer work. *Applied Ergonomics*. 2010;41:542-8.