

Use of diagnostic drugs by optometrists: a UK perspective

“The use of ophthalmic drugs is an essential part of modern ophthalmic [optometric] practice” (Dunn, 1971).

Dr Simon Barnard

BSc PhD FCOptom FAAO DipCL DipClinOptom

Director of Ocular Medicine, Institute of Optometry, London & Visiting Associate
Professor, Department of Optometry, Hadassah College, Jerusalem, Israel

Stockholm 27th January 2008

Introduction

Optometry has developed, and continues to develop differently and at different rates throughout the world. However, in these developments there are some basic principles that can be recognised and are shared by the optometry profession in most countries. What is usually occurs, but not necessarily in this order, is:

- a recognition (usually by the profession's leaders) of the need to advance and expand the **education** of the profession;
- implementation of that education by the training institutions and/or professional body
- a change in state **legislation**
- **implementation and integration** of these developments in to optometric practice.

In some cases a change in law and even state wide education has not, or indeed may not be necessary. If the law does not specifically forbid a technique or a use of a drug and optometrists have been carrying out certain procedures for a while, then, in some countries **precedent** creates a '*fait accompli*' that may be difficult for legislators to reverse.

An additional, but often forgotten, final principal will have a strong affect on advancement. Whilst the motto: *Educate, legislate, implement* certainly holds true, the last stage, that is the *implementation*, will not be strongly effective unless there is **remuneration**.

Is there anything to learn from history?

The British experience

In the past there were two optometric organisations in the UK; The British Optical Association (BOA) and The Worshipful Company of Spectacle Makers (SMC). The Worshipful Company of Spectacle Makers was given its Charter by King Charles in 1629. The BOA was formed much later and was more "avante garde". In the 1980's the BOA and SMC amalgamated to form the present College of Optometrists.

In the early 1900's some optometrists (then called *ophthalmic opticians*) in the United Kingdom had a desire for professional advancement. However, the council of the SMC restricted its Fellows from using drugs because it was afraid of upsetting ophthalmic surgeons.

Lionel Laurence (1926) describes use of cycloplegics in the 3rd Edition of *Visual Optics and Sight Testing* published by the School of Optics, London.

In the Preface to the First Edition he writes ... "*I have endeavoured to cover here... all that is essential for the sight-testing optician*". The subject is covered in just two pages and he discusses atropine, homatropine and cocaine.

The British Optical Association disagreed with the SMC and wanted the restriction abolished. Discussions within the profession increased during 1936.

In 1938 a Liveryman of the SMC (Claude Lyons?) was summoned before the Court of the SMC and charged with an offence of "using drugs". He argued the case very strongly "*that it was absurd and inequitable that opticians daily concerned with the examination and refraction of the eye should be denied use of drugs*".

The Court of the SMC relented and in February 1938 the SMC inserted in their agreement with their Diploma holders "*the holder [of the diploma] will not in his practice use any drug for the purpose of testing the sight, not test the sight whilst under the influence of drugs, unless he shall have obtained the Company's certificate that he has proved his qualification to use such drugs by passing the Company's examination in that subject*".

Examinations

The first examination in drugs for Fellows of the SMC was held at Liverpool in March 1938.

In 1946 D.W.A. Mitchell, of the London Refraction Hospital, published a textbook on the use of drugs by opticians and courses were arranged at training institutions. In 1948, an examination in Ophthalmic Drugs was instituted by the BOA and was open to all opticians. There were four examination sections: General & ocular anatomy; Drugs used in refractive ophthalmic practice; Clinical use in refraction; and Contraindications. The first BOA examination was held in July 1949.

When the length of Fellowship training for all new ophthalmic opticians increased to three years all ophthalmic opticians (*optometrists*) were examined automatically as part of their training.

Legal aspects of optometric use of diagnostic drugs in the UK

The use of drugs by optometrists (and all health care professionals) in the UK is governed by the Medicines Act 1968. A provision in this act allows optometrists to use and supply drugs during the course of their professional practice.

The General Optical Council (GOC), the government institution that governs optometry, is able to make Rules relating to drugs.

However, the GOC has not found it necessary to do so and the use of diagnostics has not been restricted. This is because there is no evidence that the use of diagnostic drugs is an issue. This is reflected by the fact that no legal cases have ever been brought before either the Investigation Committee or Fitness to Practise disciplinary Committee (Coe, 2007)

Further developments and recent parallels in the UK

The UK was decades ahead of USA optometry for diagnostic drug use. Once USA optometrists obtained diagnostic rights they very quickly fought for and gained therapeutic rights.

In the late 1980's and early 1990's UK optometrists were discussing the need to obtain wider therapeutic rights.

The Opticians Act (1958) allowed for optometrist to treat eye disease *in an emergency*. The Opticians Act 1989 was subtly different and stated that referral of disease was not always necessary (*“no justification for referral”*). UK optometrists also had limited therapeutic medicines in their formulary e.g., chloramphenicol. However, their role in therapeutics was not “formalised” or “formally recognised”.

Therapy interest was growing to such an extent that in 1996 optometrists Lyndon Jones and Nick Rumney organised a lecture tour of the UK by Dr Lou Catania, an educationalist and therapeutic optometrist from the USA.

In the same month in 1996, four UK optometrists including Andrew Field, Nigel Burnett-Hodd and Simon Barnard, attended the Pennsylvania College of Optometry (PCO) Ocular Therapeutics course in Philadelphia, USA. Two of them became the first UK practising optometrists to be qualified with the *Certificate of Therapeutics* from PCO.

The ulterior motive for attending the PCO was to bring back to the UK knowledge of therapeutics and introduce this to the undergraduate and Master's degree in Clinical Optometry at City University, London. The City University Masters degree modules were initially oversubscribed and UMIST soon followed with MSC modules in ocular therapeutics.

The College of Optometrists, encouraged by demand from Members & Fellows, added a formal Diploma in Therapeutics to its higher qualifications. The College of Optometrists was then instrumental in negotiating for a change in “law”.

In June 2005 the Government changed the “law” advancing optometry’s therapeutic role. Post graduate therapeutic diplomas leading to government (GOC) registration as therapeutic optometrists is now offered by the Institute of Optometry, City University and Glasgow Caledonian University.

In the summer of 2007 UK optometry gained the rights for Independent Prescribing. The legislation will allow optometrists to prescribe any licensed medicine for ocular conditions affecting the eye and the tissues surrounding the eye.

What can the optometry in other States learn?

- Members of the profession and educators can lead the desire for professional advancement.
- The political, diplomatic and negotiating skills of the executive committees of national professional bodies (e.g., College of Optometrists & Association of Optometrists) are critical for successful implementation
- There will be opposition from some of our friends e.g., ophthalmology, (although the opposition is often from organisations rather than individual ophthalmologists).

Precedent

The law does not always cover everything. In the early 1990's David Austen was taught, at an American Academy of Optometry meeting, the technique of inserting punctum plugs. Within a year the technique we were teaching it at City University to both undergraduates and postgraduates - there was nothing in legislation relating to plugs.

Around 1996 an ophthalmologist complained to the Royal College of Ophthalmologists (RCO) that an optometrist in south England was fitting punctum plugs. The RCO telephoned the College of Optometrists and spoke to the Professional Advisor who answered "*of course optometrists fit punctum plugs*". The College of Optometrists immediately convened a committee to write Guidelines for fitting punctum plugs by optometrists

The lesson here is that precedent can be important where no law is present to stop the use of drugs or techniques. If possible, use these loopholes supported by **EDUCATION.**

Which classes of drugs?

- Cycloplegics
- Mydriatics
- Anaesthetics

Why use diagnostics?

- Ocular media and fundus examination
- Enhancing retinal photography; optical coherence tomography
- Refraction through cataracts when pupils are small
- Cycloplegic refraction
- Techniques where anaesthesia is required

Who objects to diagnostics for optometrists and why?

National ophthalmology organisations often argue against changes in law to allow optometrists to use drugs. The Norwegians and Dutch optometry professions have fought and won this battle. Whilst the ophthalmology organisations arguably have an altruistic motive, namely protection of the public, these motives are often seen by governments as protectionism aimed at defending a monopoly,

Ophthalmology organisations have been known to use arguments such as:

- 1) these are "dangerous medicines" and when used by optometrists the public is in danger and
- 2) the "risk of acute glaucoma"

Responses to this argument

The argument that diagnostic ophthalmic drugs are dangerous in optometrists' hands

This ceases to be an argument so long as there is organised

- **education, training & formal examinations** all of which include an understanding of the use; precautions; dangers; and possible adverse side effects of the drugs
- **Disciplinary governance of the profession**

The “danger” is actually massively exaggerated. Mydriatic induced glaucoma is rare. If it happens, it would most likely have happened anyway at some time in the future (e.g., in the cinema on vacation and midnight on a Sunday). If it happens, you are doing the patient a favour.

Nevertheless, it is imperative to educate optometrists how to screen for many of the “at risk” patients e.g., van Herrick slit lamp technique. Optometrists in the UK are increasingly also learning gonioscopy.

Fundoscopy: To dilate or not dilate?

The evidence supporting the relative “safety” of dilation is overwhelming.

The myth of acute glaucoma

Liew G, et al (2006) argue the case that mydriasis is safe in the Editorial of the British Medical Journal.

In the Rotterdam study of 6760 people routine use of mydriatic eye drops in all participants aged 55 and over precipitated acute angle closure glaucoma in only two individuals, a prevalence of just 0.03% (Wolfs RC, et al 1997).

The Baltimore Eye Survey of 4870 people showed no cases of acute glaucoma precipitated by mydriasis (Patel et al, 1995).

A systematic review by Pandit & Taylor (2000) reported that out of an estimated 600 000 individuals who received mydriatic eye drops, 33 (0.006%) developed acute angle closure glaucoma, giving an estimated risk of one in 20 000.

In a study of 1232 Chinese Singaporeans, Foster et al (2000) reported no cases of acute glaucoma after mydriasis

Pandit & Taylor (2000) state that pupil dilation is important for thorough fundoscopy and the risk of precipitating acute angle closure glaucoma with routine use of mydriatics is close to zero. They conclude that Tropicamide 0.5% is a safe agent for use in primary care.

Precautions

Although the risk of inducing an attack of acute glaucoma is evidently low, optometrists should nevertheless take precautions to further enhance the care they give to their patients.

- 1) Check anterior chamber angles before dilating. If obviously almost closed then reconsider dilating
- 2) Check intraocular pressure (IOP) before dilating
- 3) If angles narrow, then check IOPs again
- 4) If angles narrow, warn patients of symptoms of attack (pain, hazy vision, nausea)

Cycloplegics

Cycloplegics work by binding to effector sites in the ciliary muscle thereby blocking action of acetylcholine. Pupillary dilation is an (unwanted) side effect and its onset precedes cycloplegia.

The optometrist should ensure there are no angle anomalies before instillation of cycloplegic drop.

Cycloplegics are most often used in children in the presence of esotropia or esophoria or when latent hypermetropia is suspected. Another use is to impose *penalisation* of a dominant eye in amblyopia. Cycloplegics used topically in the eye are safe, in the correct dosage in infants and children of all ages. Occasionally cycloplegics are useful in "young adults."

Cycloplegic drugs

Atropine sulphate is now only available to *Additional Supply* optometrists (those with the higher therapeutic qualification)

Homatropine hydrobromide is now only available to *Additional Supply* optometrists (as above)

Cyclopentolate hydrochloride is available to all optometrists

Tropicamide has a relatively poor cycloplegic action

Atropine

This is the most toxic drug optometrists have access to. Recovery from a single drop of 1% atropine takes 3-7 days for cycloplegia and up to 14 days for mydriasis.

There are numerous potential severe side effects if absorbed into the systemic circulation. The signs of atropine poisoning are remembered by the phrase:

- Blind as a bat (eyes)
- Dry as a bone (glands)
- Red as a beetroot (BVs and temp.)

- Mad as a hatter

Atropine poisoning is thankfully rare, but can lead to death. If atropine poisoning is suspected vomiting should be induced.

Cyclopentolate

This is the most commonly used cycloplegic drug, by optometrists in the UK. Cyclopentolate has a good safety profile and minimal side effects (both local and systemic) if used in correct dosage.

Cycloplegia is usually obtained within 30 minutes with maximal cycloplegia after 1 hour. Recovery is usually within 12-16 hours but occasionally takes longer. Always reassure parents that the vision and pupil **always** go back to normal.

Local side effects of cyclopentolate include:

- Dilated pupil – flare, glare, photophobia
- Reduced amplitude of accommodation – NV difficult
- Marginally dry eye

However, remember that if the patient is a hypermetrope then

- Distance vision will also be blurred.

Other adverse reactions include:

- Allergic dermatitis
- (rarely) transient psychotic symptoms

Cycloplegic drug of choice.

Infants < 1 yr-old

Cyclopentolate 1% for strabismics and high +ve

Older children

1% or 0.5% cyclopentolate

Drops or spray

Closed or open eye

Mydriatics

Uses

- Mydriatics are used to examine properly the ocular media and ocular fundi e.g., **always** dilate a patient complaining of flashes and/or floaters
- Retinoscopy through small pupil and cataract

Why dilate?

Indirect ophthalmoscopy is best carried out through a dilated pupil. Indirect ophthalmoscopy has some major advantages over direct ophthalmoscopy.

- The field of view of a direct ophthalmoscope is approximately 10° (two disc diameters) with direct ophthalmoscopy (emmetrope) compared to 40° with head set indirect and 120° with Volk 90D Superfield.
- Illumination is much brighter with indirect enabling the optometrist to better see through poor media (e.g., cataract).

Mode of action

Pupil dilation can be achieved by blocking the action of the iris sphincter muscle (antimuscarinics); or by stimulating the iris dilator muscle (sympathomimetic). These two drug groups are often used synergistically to obtain the optimum dilation.

Antimuscarinics

Many options are available but tropicamide is the most commonly used by optometrists in the UK. The drug binds to effector sites on the iris sphincter muscle preventing the action of acetylcholine. This results in pupillary dilation with complete abolition of the light reflex. There is a mild effect on accommodation.

Tropicamide

Available in 0.5% and 1.0% concentrations. The lower concentration may be used effectively for lighter irides.

Remember that induced angle-closure is very rare (<1:100,000) but that it is important to assess the apparent anterior chamber angle (van Herrick) and IOP pre- and, when necessary, post- dilation.

A rise in IOP of >5mmHg may be significant.

Sympathomimetics

In the UK now, the only option available is phenylephrine hydrochloride – an α -agonist. This is available as 2.5% or 10.0% for intraocular work. Lower concentrations can be used as conjunctival vasoconstrictors. The 10% dose is really unnecessary in optometric practice.

The drug stimulates the actions of noradrenaline on the iris dilator muscle.

Topical anaesthetics

These work by blocking the propagation of action potentials along ocular surface neurons. They can be used by optometrists in the UK in their practice but cannot be supplied by the optometrist to the patient, i.e., may be used only in the practice.

There are various drugs available:

Either ester-linked:

- Proxymetacaine
- Oxybuprocaine
- Amethocaine

Amide linked:

- lignocaine

Both categories have an almost instantaneous onset (a few seconds). Esters are effective for 15 minutes and amides have a longer duration (25 minutes). All anaesthetics cause some ocular surface epithelial cell desquamation and the more drug is instilled, the more epithelial cell loss. Therefore avoid high dosages must be avoided. One drop is adequate for optometric procedures. The drug is deactivated by the enzyme acetylcholine esterase.

Uses of anaesthetics

- Goldmann applanation and Pascal DCT tonometry
- Gonioscopy
- Removal of corneal foreign bodies
- Investigation of corneal abrasions
- Contact lens practise (fitting procedures; scleral lenses)
- Dry eye management
 - Punctum plugs
 - Collagen
 - Silicon
 - Thermoplastic

Advantages of diagnostic rights for any national optometric profession

For patients and other health care professionals

Undoubtedly the most important advantage is gained by the public that is for patients because this will give more comprehensive and accessible care in the primary care setting.

Another group that gains by optometrists gaining additional rights such as the use of diagnostic drugs is the medical profession, especially ophthalmology. Because optometry is the ideal *primary care* eye care profession and, by definition, is directly accessible to the public, more patients will be correctly managed. The effect of this is that more patients will be correctly referred for an ophthalmological opinion and a higher proportion of those referrals will require targeted *secondary care*, the domain of ophthalmological expertise.

This may not always be recognised initially by ophthalmology but enables that profession to concentrate not in the more common refractive and binocular vision anomalies but the specialise in the areas which is truly their domain, for example, surgery and the treatment of sight threatening disease. It should be remembered that some fifty percent of the glaucomatous population in the western, developed world remain undiagnosed. Whilst optometry has a responsibility in detecting and referring these patients, ophthalmology has a responsibility to adequately treat and manage these patients. By relinquishing to optometry *primary care* ophthalmology can fulfil its proper specialist roles of providing *secondary* and *tertiary* care. The important proviso is that optometrists are very well educated and trained.

In the UK ophthalmology generally has a very fine relationship with optometry with ophthalmologists valuing highly the role that of optometry plays. For its part, the optometric profession recognises that part of its role is supportive of ophthalmology and that this is both valuable and valued.

Advantages of diagnostic rights for optometrists and the optometric profession

In general terms, diagnostic rights for optometry are not just advantageous for the public and ophthalmology. Many optometrists aspire to a higher level of knowledge and an altruistic desire to help better their patients. Even if there is initially no fiduciary advantage, simply providing a more comprehensive and enhanced standard of care is gain enough.

Nevertheless, there are more precise and specific reasons why diagnostic rights are important for optometrists. These are:

- an ability to provide more comprehensive refractive diagnoses, advice and management
- a potential to widen the scope of patient care to include
 - (a) Enhanced glaucoma diagnosis
 - (b) Retinal disease diagnosis and co-management
 - (c) Punctum plugs
 - (d) Gonioscopy
 - (e) Others
- Increased government and health care services recognition of the scope of optometry
- Recognition of the enhanced role of optometry by pharmaceutical and equipment manufacturers. For example, paradoxically, Optos plc has a policy of rolling out Optos Panoramic laser scanning cameras in countries where optometrists dilate pupils, that is where it understands that optometrists have diagnostic experience and therefore can use the camera to the optimum effect. In the case of Optos plc, these countries are the USA, the UK, Canada, Hong Kong, and Eire. Optos plc is now exploring the possibility of co-operating with optometry in Norway where diagnostic rights have recently been obtained.

Other considerations

Whilst the theory of the use of diagnostic ophthalmic drugs is paramount, the relationship with the patient must not be forgotten. There are a number of important considerations that should be considered.

- 1) Always ask parent's permission (consent).
- 2) Take time to explain to **the child** what you are going to do
 - "Do you ever have a bath... ?"
 - "Have you ever splashed yourself... ?"
 - "Is this a large or a tiny drop... ?"
 - "Not in your eye but just in the corner... ?"
- 3) Ask permission first of the child, even as young as two years-old.
- 4) Never tell a lie. The drop does sting a little but it is "*like splashing your eye in the bath*"

Conclusions

In those countries where the standard of education and practise of optometry is of a standard that is deemed at least adequate, the public will benefit greatly from the optometric profession in that country being granted diagnostic ophthalmic drug use.

In summing up, we return to the statement of the late Professor Gerald Dunn, late Head of the Department of Optometry & Visual Science, City University London and formerly Secretary and Director of Examinations of the British Optical Association, "***The use of ophthalmic drugs is an essential part of modern ophthalmic [optometric] practice***"

Acknowledgements

The author wishes to thank Alcon Pharmaceuticals UK for sponsoring this lecture in Paris and to Richard Pearson MPhil FCOptom, DipClinOptom, formerly Senior Lecturer at City University, London for his advice and direction to the following publications: *A History of the Worshipful Company of Spectacle Makers* by Frank Law (SMC) & *History of the British Optical Association 1895-1978* by Margaret Mitchell (BOA).

References

- Coe P (2007) Personal communication, Registrar, General Optical Council, London, UK
Foster PJ, Oen FT, Machin D, Ng TP, Devereux JG, Johnson GJ, et al. (2000) The prevalence of glaucoma in Chinese residents of Singapore: a cross-sectional population survey of the Tanjong Pagar district. *Arch Ophthalmol.* 118:1105-1111.
Dunn, G (1971) Forward: *The action and uses of ophthalmic drugs*, O'Connor Davies, PH,

- Barrie & Jenkins, London, 1972
- Liew G, et al (2006), Editorial *British Medical Journal* (2006;332:3)
- Pandit RJ, Taylor R. (2000) Mydriasis and glaucoma: exploding the myth. A systematic review. *Diabetic Med.* 17:693-699
- Patel KH, Javitt JC, Tielsch JM, Street DA, Katz J, Quigley HA, et al (1995) Incidence of acute angle-closure glaucoma after pharmacologic mydriasis. *Am J Ophthalmology* 1995;120:709-717.
- Wolfs RC, Grobbee DE, Hofman A, de Jong PT (1997) Risk of acute angle-closure glaucoma after diagnostic mydriasis in non selected subjects: the Rotterdam Study. *Investigative Ophthalmology Visual Sci.* 38:2683-2687