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Establishment and review of educational programs to train optometrists in laser procedures and injections

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ABSTRACT

Current scope of practice for optometrists in many countries include topical and oral medication with injectable and lasers being added more recently to scope in the United States (US), Canada, the United Kingdom (UK) and New Zealand (NZ). This expanded scope of optometric practice improves access to eyecare and is critical since an ageing population with a higher prevalence of vision disorders and higher healthcare costs looms. Expanded scope has been shown alongside strong safety records. This review paper aims to investigate the expansion of optometric scope of practice regarding lasers and injectables in the US, UK, Canada, Australia and NZ. The design and delivery of post-graduation educational programs, curriculum frameworks for advanced skills and the metrics of laser procedures performed by optometrists will be discussed. The State of Oklahoma in the US was first to authorise optometrists to use lasers and injectables in 1988. As of 2024, qualified optometrists in the UK, in twelve states in the US, and specialist optometrists in NZ perform laser procedures. However, lasers and injectables are not within the current scope of optometric practice in Australia and Canada. Training courses such as Northeastern State University Oklahoma College of Optometry Advanced Procedures Course and Laser Procedures Course have been successfully designed and implemented in the US to train graduate optometrists. The outcomes of over 146,403 laser procedures performed by optometrists across the US have shown only two negative outcomes, equating to 0.001%. These metrics outline the effectiveness of these procedures performed by optometrists and show strong support for future optometric scope expansion. Eye health professionals, relevant educational institutions, advocacy groups, and policymakers are called upon to work collaboratively to expand the optometric scope of practice globally.

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Introduction

The optometric profession has evolved substantially over the years. From being a profession primarily involved in refraction and eyeglasses, the scope of practice has expanded from topical therapeutics to oral medications, to injectables, and now to minor surgical and laser procedures. Access to eye care is not consistent between urban and rural communities.[1] It is suggested that the reasons behind the lack of access to ophthalmology services in remote areas include lower numbers of ophthalmologists per capita, cost of services, and longer waiting periods in many countries.[1–3]

It can be assumed that these factors will increase the global economic burden associated with preventable and manageable vision disorders. Optometrists as primary eye care practitioners could play a pivotal role in reducing this economic burden. According to the World Council of Optometry, optometry is 'a healthcare profession that is autonomous, educated, and regulated (licensed/registered), and optometrists are the primary healthcare practitioners of the eye and visual system 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'.[4]

The economic burden of visual impairment and blindness has increased significantly, and a major factor is the lack of access to timely eye care services. It was estimated that in 2020, 596 million people had distance vision impairment worldwide, of whom 43 million were blind.[5] It is projected that by 2050, this number will increase to 895 million including 61 million people with blindness.[5] According to the World Health Organisation, the global financial burden of vision impairment was estimated to be 411 billion USD per year in 2022.[6] The ever-increasing and ageing population exacerbates the prevalence of vision impairment[7] and associated costs.[8]

An observational cohort study published in 2023 compiled data to analyse the workforce supply and demand projections for ophthalmologists in the United States from 2020 to 2035.[9] The total ophthalmology supply is projected to decrease by 12%, yet the demand is projected to increase by 24%. By 2035, ophthalmology is anticipated to have the second worst rate of workforce adequacy compared to 38 medical specialities studied, with greater insufficiencies by location; workforce adequacy of 77% in metropolitan areas versus 29% in nonmetropolitan areas.

This supply and demand mismatch of 30% over the next 15 years outlines why optometry performed laser and minor surgical procedures are crucial to help supply this increased demand for eye care services. In 2020, there was a workforce adequacy of 82% for optometrists, which is anticipated to persist, although growth of 89% is expected in the optometry

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workforce by the year 2035.[9] Filling this gap for eye care services is where optometry could step in, if granted the right to perform advanced procedures.

The scope of practice, roles and responsibilities of optometrists are different across the world. Optometric scope may include some or all of the following services depending on the regions; 'visual functions assessment services', 'ophthalmic diagnostics services', 'therapeutics management services', and 'dispensing services'. The need for expansion of the optometric scope of practice has been repeatedly highlighted by various organisations across the world.[10–16] Recent studies have shown that optometrists in countries such as the US, UK, Canada, Australia and NZ have been safely and competently prescribing topical ophthalmic and/or oral medications and performing procedures such as lasers and/or injections.[17–19]

Optometric scope of practice has evolved over the past few decades which has resulted in improved access to eye care services and reduction of burden on ophthalmology service providers.[20,21] In the US, optometry was recognised as a regulated profession for the first time in 1901. By 1998, the optometric scope of practice expanded, and optometrists were allowed the use of diagnostic and therapeutic pharmaceutical agents in all states. In that same year, Oklahoma became the first state to specifically authorise the use of lasers, although the previous statute allowed laser utilisation for patient care since 1988.

By 2024, Oklahoma, Kentucky, Louisiana, Alaska, Indiana, Arkansas, Mississippi, Wyoming, Virginia, Wisconsin, Colorado, and South Dakota have also expanded their scope of practice incorporating the use of laser procedures. All 23 optometry schools across the United States have incorporated educational modules focused on ophthalmic medicine, lasers, injections, and minor surgical procedures.

In Canada, the first Canadian provincial optometry acts were passed in Ontario and Manitoba, and by the middle of the 1920s, every province WAS granted the optometric legislation.[22] In the last decade, optometrists have been permitted to administer oral and/or topical therapeutic pharmaceutical agents in many provinces; however, laser and injection procedures are not currently permitted.

In the UK since 1968, all registered optometrists have been able to prescribe a limited range of medications for eye disorders without restriction. However, optometrists who undertook further post-graduate university training can prescribe any medication for ocular disorders. Qualified optometrists can also administer injectables for limited purposes.[23]

In Australia, optometrists were included in the national health scheme of Medicare in 1975.[24] Victorian Parliament was the first to pass legislation permitting suitably qualified optometrists registered to prescribe medications for the treatment of ocular disease. Since the early 2000s, therapeutically qualified optometrists across the country have been prescribing topical medications to treat ocular diseases[24]; however, as of April 2024, optometric scope of practice in Australia does not include oral medications or lasers and injectables.

In New Zealand, optometry program was firstly introduced at The University of Auckland. From 2004, qualified optometrists prescribe medications for the treatment of eye diseases and conditions. The scope of practice has recently incorporated oral medicines, laser procedures such as laser capsulotomy and laser peripheral iridotomy, and injections.[25]

There are differences in the healthcare systems of the US, Canada, UK, Australia, and New Zealand which may play an important role in the varying scope of practice. Moreover, the number of optometrists and ophthalmologists with respect to the population is an important factor. Table 1 shows the number of ophthalmologists and optometrists per 100,000 population in the US, Canada, UK, Australia, and NZ.

As the table above illustrates, there is an opportunity for the optometry profession to use their relatively higher workforce to better respond to the healthcare demands. The US at a ratio of almost 3:1 optometrists to ophthalmologists has started the trend of expanding scope of practice to lasers and injectables. Other countries with even greater disparity between ophthalmologists and optometrists could utilise the higher numbers of optometric workforce to meet the growing public healthcare demands.

Table 2 summarises the expansion of optometric scope of practice in the US, UK, Canada, Australia and NZ. Slight variations exist as to when US Optometry schools embedded advanced procedures into their university curriculum, with some as early as the 1990s, however as of 2024 all US-based Optometry school incorporate lasers and injectables into their curriculum.

This article comprehensively and systematically assesses the optometric scope of practice expansion regarding lasers and injectables in the US, UK, Canada, Australia, and NZ. This article investigates how optometric scope of practice has evolved to include lasers and injectables in the US and recently in the UK and to inspire movement in Australia, Canada and other countries. This article also presents the design and delivery of post-graduate educational programs, curriculum frameworks of advanced skills, and the statistics of laser treatments performed by optometrists to emphasise clinician competency and public safety.

Training and education within optometric school curricula

With advances in healthcare, technology, and research, optometric education has significantly evolved over the years. Academic curricula for optometrists in various jurisdictions around the world have expanded to include oral medications, laser procedures, and injections for ocular disease treatment and management. These allow optometry graduates to have the competencies required to deliver high quality and progressive care, in response to global challenges of access to eye care.[4]

Beyond the optometry degree curriculum, post-graduate training courses and professional development modules have been developed to provide continuing education and

Table 1. Number of optometrists and ophthalmologists per 100,000 population in the US, Canada, UK, Australia, and NZ.

Eye care profession	US	Canada	UK	Australia	New Zealand
Full time equivalent ophthalmologists, per 100, 000 population	5.7[26]	3.5[27]	2[28]	4[29]	3.4[30]
Full time equivalent optometrists per 100, 000 population	16.2[26]	17[31]	12.5[32]	19[29]	17.7[33]
Optometrist/ophthalmologist Ratio	2.84	4.85	6.25	4.75	5.20

Table 2. Optometric scope of practice expansion in the US, Canada, the UK and Australia.

Country/state (where applicable)	Year	Type of training during scope expansion	Changes in the scope of optometric practice
US/all states	Prior to 1988	Post-graduate and university curriculum	Diagnostic and therapeutic pharmaceutical agents incorporated into scope of practice
US/Oklahoma	1988	Post-graduate	Lasers and injectables incorporated into scope of practice
US/Kentucky	2011	Post-graduate	Lasers and injectables incorporated into scope of practice
US/Louisiana	2014	Post-graduate	Lasers and injectables incorporated into scope of practice
US/Alaska	2017	Post-graduate	Lasers and injectables incorporated into scope of practice
US/Indiana	2018	Post-graduate	Lasers and injectables incorporated into scope of practice
US/Arkansas	2019	Post-graduate	Lasers and injectables incorporated into scope of practice
US/Mississippi	2021	Post-graduate	Lasers and injectables incorporated into scope of practice
US/Wyoming	2021	Post-graduate	Lasers and injectables incorporated into scope of practice
US/Wisconsin	2021	Post-graduate	Lasers and injectables incorporated into scope of practice
US/Virginia	2022	Post-graduate	Lasers and injectables incorporated into scope of practice
US/Colorado	2022	Post-graduate	Lasers and injectables incorporated into scope of practice
US/South Dakota	2024	Post-graduate	Lasers and injectables incorporated into scope of practice
Canada	~2010	Post-graduate	Topical and oral medications incorporated into scope of practice
UK	1968	Post-graduate	A limited range of medications incorporated into scope of practice
UK	2023	Post-graduate	Injections incorporated into scope of practice
New Zealand	2022	Post-graduate and university curriculum	Lasers and injectables incorporated into scope of practice
New Zealand	2014	Post-graduate and university curriculum	Topical and oral medications incorporated into scope of practice
Australia	2000	Post-graduate and university curriculum	Topical medications incorporated into scope of practice

advanced training to optometrists across the world. For overseas-trained optometrists, many countries require bridging programs or competency exams to ensure quality and safety before registration.[34,35] Academic accreditation bodies oversee academic institutions to ensure high quality and rigorous standards.[36,37]

United States and Canada

In the United States and Canada, academic institutions are accredited by the Accreditation Council on Optometric Education which develops the framework in keeping with the highest global standard for professional education.[36,38] A series of national licencing exams and jurisprudence exams are required to grant an optometrist practice licence.[39] Within each jurisdiction, state boards of optometry (in the US) and provincial regulatory colleges (in Canada) are authorised by the government for self-regulation, effective oversight, and application of licensure regulations.

In the US, application of lasers and injections have been utilised by optometrists for decades. Laser procedures such as YAG laser capsulotomy, selective laser trabeculoplasty, and laser peripheral iridotomy have been performed safely by certified optometrists in Oklahoma since 1988. Similarly, injections such as local anaesthesia, intradermal and subconjunctival steroid injections, and other injections for ocular disease management have been within the scope of optometric practice as well. This robust track record has led to more states with expanded scope of practice authorising procedures such as lasers and injections.

As of 2024, 12 states have laser privileges for optometrists and 18 states have injectables authority for optometrists.[40–51] In 2024, all US-based optometry schools had to submit a written attestation to suggest that they incorporate lasers and injectables into their curriculum. Therefore, graduates from all universities are competent to perform these procedures. However, slight variations exist among states in regard to board exams and licencing of practitioners. Some states still require post-graduate training if the optometrists choose to practice in a state different to the one where they completed their optometry course.

As of 2024, all US-based optometry schools teach lasers and injectables as part of their curriculum.[51–65] The necessary training and competencies are taught throughout the entire optometry academic curricula with stringent standards established by independent academic regulatory bodies, similar to medicine, dentistry, and other regulated healthcare professionals. The authors urge all optometry schools in Canada, Australia, and New Zealand to incorporate advanced procedure training in their university curriculum.

Recently, the School of Optometry and Vision Science at the University of Waterloo, Canada, added injections and lasers to their curriculum.[66,67] Laser theory, surgical co-management, intravenous and intramuscular injections training have been part of the curriculum since the late 1990s and 2011, respectively.[67]

The United Kingdom

In the UK, the General Optical Council establishes the standard for optometry schools and program performance and is regulated by the Professional Standards Authority for Health and Social Care.[68] Cardiff University has provided theoretical and practical simulation training course for eye healthcare professionals in therapeutic laser procedures including YAG laser capsulotomy, selective laser trabeculoplasty and laser peripheral iridotomy.[69] Moorfields Eye Hospital also provides training courses covering YAG capsulotomy, selective laser trabeculoplasty, and laser peripheral iridotomy for optometrists and other eye healthcare professionals.[70]

Australia and New Zealand

In Australia and NZ, the Optometry Council of Australia and New Zealand oversees the educational and examination standards for universities across Australia and NZ.[37] Optometry graduates are licenced upon passing final examinations through their academic program; there is no national licencing exam. Optometrists in New Zealand have been safely and effectively prescribing oral medications for primary and secondary ocular diseases since 2014. Since July 2022, specialist optometrists in New Zealand are authorised to perform YAG capsulotomy and laser peripheral iridotomy.[71] However,

optometrists in Australia have not incorporated oral medications or lasers and injectables in their scope of practice as of 2024.

Training and education post-graduation

Education does not cease on graduation day. As health care professionals, optometrists are lifelong learners that are required to obtain continuing medical education to maintain the optometry licence. New procedures, updated technology, and changes in techniques and management occur continually. An ophthalmologist who finished their formal training in 1990 is not prohibited from performing Laser-Assisted In Situ Keratomileusis or Anti – vascular endothelial growth factor injections even though their formal training concluded years prior to the advent of these procedures.

Medical professionals, whether surgeons, dentists, nurses, optometrists, podiatrists, primary care physicians, along with all others, are required to stay up to date on the latest in technology and training. This includes adding new procedures to their armamentarium post-graduation. Optometry has successfully accomplished this with expanded scope in laser procedures and surgical procedures through the Advanced Procedures Course.

United States and Canada – the advanced procedures course

In the US, post-graduate training and education commenced in the late 1980s with the first state permitting optometrists to perform laser procedures being Oklahoma. Laser and surgical training have been occurring since then and has occurred via the 32-hour 'Northeastern State University Oklahoma College of Optometry Advanced Procedures Course' also known as the 'Ophthalmic Procedures Course'. This course has evolved considerably over the years, and for the past 15–20 years has consisted of the 16-hour Surgical Procedures Course and the 16-hour Laser Procedures Course which comprise the entire 32-hour Advanced Procedures Course. This course has been delivered in 34 states across the US, 3 Canadian Provinces and the UK to educate optometrists in lasers and injectables.

The Surgical Procedures Course consists of didactic training along with hands-on laboratory training. Topics covered include surgical anatomy of the eyelids, instrument selection, the consent form process, proper aseptic techniques, eyelid lesion review, local anaesthesia, radiofrequency and lesion removal techniques, surgical pathology and biopsy, intense pulsed light therapy, chalazion management, botox applications, and suturing techniques and training. Thorough coverage of ophthalmic office-procedures is covered through multiple hours of video grand rounds.

Procedures discussed include benign eyelid lesion removal, cyst drainage and excision, eyelid biopsy, radiofrequency ablation of trichiasis, radiofrequency surgical closure of puncta, chalazion intralesional steroid injection, chalazion incision and curettage, conjunctivochalasis plication, xanthelasma removal, and corneal crosslinking, among others. Hands-on laboratory training covers much of these topics with special emphasis on suturing techniques, radiofrequency, lesion removals, injections, intense pulsed light therapy, and corneal debridement for corneal crosslinking. Doctors finishing the 16-hour Surgical Procedures Course leave comfortable and competent in all aspects of these procedures.

The Laser Procedures Course also consists of didactic training along with hands-on laboratory training. Topics covered include laser physics, laser tissue interactions, gonioscopy, laser therapy for the open angles glaucomas (laser trabeculoplasty), laser therapy in narrow angles (iridotomy and iridoplasty), laser capsulotomy, and managing potential laser complications. Multiple intensive and rigorous hands-on laboratories are conducted which train participants on YAG lasers, green lasers, selective laser trabeculoplasty, as well as the individual procedures of YAG laser capsulotomy, laser peripheral iridotomy, laser trabeculoplasty, gonioscopy, among others.

For all procedures included in the entire 32-hour course, indications, contraindications, risks and complications, preoperative measurements, post-operative management, procedural techniques, and coding and billing are extensively discussed. The course concludes with an intensive written examination where passage is required to obtain certification for Surgical Procedures and Laser Procedures.

The University of Waterloo School of Optometry and Vision Science has developed an Advanced Procedures Certification course that has been administered for several years in Ontario, Canada. Similar to the Northeastern State University Oklahoma College of Optometry Advanced Procedures Course, and taught by certified instructors that have taken the course, have performed procedures, and licenced to perform them in jurisdictions where these procedures are authorised. The content includes topics and procedures very similar to the Northeastern State University Oklahoma College of Optometry Advanced Procedures Course as described above.

UK and injectables

The education and training requirements of optometrists in the UK are currently transitioning following a General Optical Council education strategic review,[68] which updated the knowledge, skills and behaviours expected by optometrists in the UK. Updated curricula have been approved by the General Optical Council and, from September 2023, are being delivered by several UK universities to a masters in optometry level. Once registered, all optometrists have access to a limited number of diagnostic drugs and can sell and supply a general sales list, pharmacy medications to their patients, and a limited number of prescription-only medications in an emergency.[72,73]

The College of Optometrists Higher Qualifications[74] and the Advanced Practice Framework[75] define and underpin the education required to extend the scope of practice post-registration, including specialities such as glaucoma, medical retina, cataract and ocular emergencies, which practitioners are increasingly undertaking.

UK optometrists undertaking post-graduate university training[76,77] may register as independent prescribing speciality optometrists and can prescribe any medication for the eye and ocular adnexa. Some UK universities interweave independent prescribing training into their new master in optometry programs.[78] Patients obtain their prescription-only medications from pharmacists under a prescription given by an 'appropriate practitioner'.

An optometrist-independent prescriber is an appropriate practitioner concerning any prescription-only medicine other than— (a) a medicinal product that is a controlled drug or (b) a medicinal product that is for parenteral administration.[79] Since the dictionary definition of parenteral is 'outside the gastrointestinal tract', these legal regulations are erroneous as they exclude optometrists from prescribing even topical ocular medications.[79] As such, parenteral in this context is generally interpreted in the UK as excluding the supply of injectable medications prescribed by an optometrist.

Optometrists may, however, administer injectables. For example, the College of Optometrists guidance on chalazion removal states that[80]; ' ... *therapies, such as incision and curettage or steroid injections could be undertaken by appropriately trained optometrists for persistent chalazia ... and mechanisms need be in place to access the required parenteral medicines*'. These mechanisms remain undefined and unimplemented, which add further to the barriers in the facilitation of optometrists prescribing medications which already exist.[81]

UK and ophthalmic laser treatments

UK healthcare is dominated by the National Health Service. Most UK optometrists work in National Health Service primary eye care services with different contractual arrangements in each of the four UK nations. A small number of optometrists work in secondary care hospital eye services. In that setting, optometrists have been performing ophthalmic laser treatments for many years as part of hospital-based ophthalmology teams. The training of optometrists within the hospital eye service to perform laser treatments remains local and ad hoc, with the potential for inconsistencies in training. The UK alliance[82] have published policies and procedures that hospitals training optometrists may adopt, but there is no obligation.

In 2021, Northeastern State University Oklahoma College of Optometry Advanced Procedures Course provided ophthalmic laser and surgical training to UK optometrists. Subsequently, postgraduate university training in ophthalmic lasers for optometrists at Moorfields Optometry Education in conjunction with University College London, Institute of Ophthalmology was launched,[70] and this year, Cardiff University, Wales will follow suit.[69] Both these universities take a similar approach to training optometrists to perform ophthalmic laser treatments, with blended learning lectures and tutorials, followed by practical face-to-face training using model eyes on three laser techniques: YAG capsulotomies, selective laser trabeculoplasty, and laser peripheral iridotomy.

Learning objectives include gaining advanced knowledge of ophthalmic conditions that may require therapeutic laser treatments, understanding the indications and contraindications of laser treatments, communicating risks and benefits to patients, principles of consent and managing the complications, which are examined to university standards by written examination and practical assessment. Both universities state that after training, there is an expectation of further in-vivo training to gain further competence.

The Moorfields Optometry Education course defines further stages: structured in-vivo training with competency signoffs, building up a portfolio with formative assessments and case-based discussions, defined self-audit, and reflective statements.[83] Learners typically take 3 months to complete the course. This course, underpinned by medical education theory and principles, was designed to address the need for structured, quality-assured laser training.[83]

Australia and New Zealand

In NZ, specialist optometrists are authorised to perform ophthalmic surgeries such as YAG laser capsulotomy and laser peripheral iridotomy.[84] Prior to performing the procedure in vivo, optometrists must first demonstrate competence in the theoretical and procedural aspects of performing YAG laser capsulotomies and laser peripheral iridotomy. During the training, a minimum of 20 capsulotomy and 20 laser peripheral iridotomy procedures performed directly under the supervision of an ophthalmologist is required to be eligible for attaining the designation of a specialist optometrist.[84] Specialist optometrists in NZ must undertake these procedures in collaboration with a registered ophthalmologist. Although Australia is a broad country with excess demand of eye care services in remote areas,[85,86] optometrists in Australia are not eligible to perform lasers or injections.

Laser and injections, training and education requirements, tracking data, and contributions to the field

There are twelve states in the US where optometrists are permitted to perform laser procedures, including YAG laser capsulotomy, laser peripheral iridotomy, laser trabeculoplasty, and others. The first state was Oklahoma over 35 years ago. The optometric law in the state of Oklahoma did not exclude laser procedures from the scope of practice of an optometrist, thus optometry has been performing laser procedures in Oklahoma since the late 1980s.

When the optometry law was challenged in 1997 by political ophthalmology and medicine, the law changed to specifically grant optometrists the right to perform these procedures was passed in Oklahoma in 1998. This scope expansion has continued through 2024, with South Dakota being the twelfth state to pass laser scope. In order, the states where laser procedures are permitted are Oklahoma (1988), Kentucky (2011), Louisiana (2014), Alaska (2017), Indiana (2018), Arkansas (2019), Mississippi (2021), Wyoming (2021), Wisconsin (2021), Virginia (2022), Colorado (2022), and South Dakota (2024).

There are also 18 states where optometrists are permitted to perform injections of the eye and ocular adnexa including, but not limited to, local anaesthetic injections and intralesional steroid injections. These states include Oklahoma, Kentucky, Louisiana, Alaska, Arkansas, New Mexico, Oregon, Tennessee, Virginia (intralesional steroid only), North Carolina (intralesional steroid only), Utah, Mississippi, Wyoming, Wisconsin, Iowa, Colorado, Washington, and South Dakota.

Almost all states that permit advanced procedures require that optometrists provide completion of a course that includes both didactic and clinical or laboratory experience and is provided by an accredited optometry or medical school and approved by the State Board. The course that has primarily been used for each state is the Northeastern State University Oklahoma College of Optometry Advanced Procedures Course as described above.

Some states with expanded scope do not require additional requirements for optometrists who have recently (within the past 5 years approximately) graduated from a school or college of optometry. This emphasises that laser and surgical procedures are readily being taught in course curriculums, which can then translate to clinical practice.

Each state has various requirements to complete prior to performing laser and surgical procedures in their state. That process is determined by the legislative process and requirements put forth by the Optometry Board in each respective state. In most of the states, successful completion and passage of the Northeastern State University Oklahoma College of Optometry Advanced Procedures Course is required. The course includes both didactic and clinical or laboratory experience, that is a minimum of 32 hours in length. Further details about each state are provided in Supplementary 1.

The evidence supports that optometry is capable of effectively and safely performing advanced procedures. A 2023 study from Optometry and Vision Science assessed the efficacy and safety of Nd:YAG laser capsulotomy procedures performed by optometrists over six sites across Oklahoma and Louisiana, US.[17] Participants had an Nd:YAG laser capsulotomy performed if they were diagnosed with posterior capsular opacification with a visual acuity worse than 6/12. Snellen visual acuity improved from an average of 6/12 to 6/6^{-} with no postoperative complications such as increased intraocular pressure, inflammation, visually significant intraocular lens pitting, macular oedema, or retinal detachment.

A post-procedure survey showed that 99% of participants reported subjective improvement in their vision after the capsulotomy.[17] Furthermore, the study results were compared across the literature with 19 of the most recent ophthalmology YAG capsulotomy studies. The comparison showed equivalent results in terms of starting visual acuity, ending visual acuity, rates of complications, and amount of energy used during the procedure. Of note, this optometry study had the fifth highest number of subjects out of the 20 studies compared. This study helped conclude that YAG laser capsulotomies can be effectively and safely performed by optometrists, yielding excellent patient outcomes and satisfaction.

Chadwick et al. compared the safety and efficacy of selective laser trabeculoplasty between Allied Health Professions (including 2 optometrists and 1 orthoptist) and ophthalmologists benchmark on 325 eyes from 208 patients in the UK. Results of their study found a comparable complication rate between Allied Health Professions and ophthalmologists benchmark (3.9% compared to a 3.8%, respectively).[87]

Konstantakopoulou et al. interviewed eyecare professions to assess the acceptability and training requirements of optometrist-delivered selective laser trabeculoplasty. The interviewees included specialist consultant ophthalmologists, clinical glaucoma fellows, optometrists, ophthalmic nurses and patients. They found optometrist-delivered selective laser trabeculoplasty service was considered to be beneficial to the National Health Service in the UK.[88] This is in agreement with Gunn et al., that confirmed a notable support for developing glaucoma services delivered by optometrists in primary and secondary care, after considering sufficient training, appropriate case selection and clinical responsibility.[89]

Studies confirm the implementation of selective laser trabeculoplasty clinics led by optometrists help strengthen the overall glaucoma care service by increasing the opportunity to promptly treat people with glaucoma.[90] Table 3 summarises current published literature regarding the safety and efficacy of lasers and injections performed by optometrists in different countries.

The Ophthalmic Office Procedures Handbook, published in February 2024, reviews procedural and surgical techniques routinely performed in an office or minor-surgery suite.[92] Many of the chapters were authored by optometrists who are readily performing these procedures and have the expertise to educate other eye care providers in the technique, preoperative, and postoperative care. This textbook is an excellent supplement to the Ophthalmic Laser Handbook,[93] published in early 2022, both of which were written by optometric physicians and ophthalmologists from across the United States and Canada.

Outcomes and metrics are important for scope expansion in any field of healthcare, to demonstrate successful training, education, and proper implementation into patient care. Metrics for advanced procedures performed by optometrists in various states that have already passed scope expansion have been included in Table 4. These metrics outline the effectiveness of laser surgeries performed by optometrists and show strong support for future optometric scope expansion. Further details about each state are provided in Supplementary 2.

Barriers and enablers

Legislation and regulatory policies are the 'foundation of authority relevant to the scope of practice'.[94] The process of introducing new regulations can be time-consuming and adversarial. Where there may be scope of practice overlap, 'medical muckraking' can occur which can often make clinical issues a political debate.[94–96] However, this is not to discourage stakeholder engagement. A well-functioning healthcare system requires collaboration to 'deliver quality services to all people when and where they need them'.[94]

Evidence shows that jurisdictions where optometry scope of practice includes lasers and injections have helped address the disparity between growing patient needs and lack of medical physicians. In the US, projections of savings were calculated of up to $4.6 billion annually. Patients overwhelmingly support optometrists providing the full range of care

Table 3. Evidence of safety and efficacy of lasers and injectable performed by optometrists in different countries.

Autor/year	Country	Type of procedure	Findings
Chadwick et al.[87]	UK	SLT	Similar complication rate between Allied Health Professions and ophthalmologists benchmark
Konstantakopoulou et al.[88]	UK	SLT	Optometrist-delivered selective laser trabeculoplasty service is beneficial to the National Health Service
Lighthizer et al.[17]	US	YAG laser capsulotomy	YAG laser capsulotomy is effectively and safely performed by optometrists providing excellent patient outcome and satisfaction.
Gunn et al.[89]	UK	Glaucoma services	A notable support for developing glaucoma services delivered by optometrists in primary and secondary care
Hussain et al.[91]	US	Laser trabeculoplasty	A national shift towards greater optometric involvement in traditional ophthalmic procedures

Table 4. Number of laser treatments and the negative outcome of procedures performed by optometrists in the US.

State	Year	Number of laser surgeries	Number of complaint or negative outcomes
Oklahoma	1988–1998	Over 50,000	1
Kentucky	As of January 2024	Over 60,000	0
Louisiana	As of September 2023	25,807	0
Alaska	2020-current	2,000	0
Arkansas	In 2021	1,135	0
Arkansas	In 2022	1,821	0
Mississippi	In 2021	570	1
Mississippi	In 2022	1,904	0
Mississippi	In 2023	2,054	0
Wyoming	In 2023	1,112	0

which includes lasers and injections.[95] A report by the US Department of Health and Human Services to facilitate efficient high-quality care in the healthcare system concluded that, 'states should consider changes to their scope-of-practice statutes to allow all healthcare providers to practice to the top of their license, utilising their full skill set'.[97]

Regulatory bodies and government officials are encouraged to prioritise the growing demands of ageing populations globally, and consider the strong track record of safety and positive healthcare outcomes that optometrists have already shown in other jurisdictions where they perform procedures such as lasers and injections.[96]

Education directly influences the scope of practice across many healthcare professions. Formal education with post graduate continuing professional development education was found to allow a sustainable increased scope of practice.[94] High-quality accredited educational programs are paramount for optometry students and practicing optometrists to gain competency and confidence in procedures such as lasers and injections. Jurisdictions looking to increase the scope of practice can look to areas globally where such programs have already been implemented with excellent outcomes. Optometrists globally are encouraged to continue pursuit of excellence and embrace their role in the healthcare system by staying actively engaged in these continuing educational programs.

The future and where eyecare is going

Optometric education across the US, Canada and the UK have shifted to include injections, lasers, and minor surgical procedures into the course curriculum. With curriculum adjustments to include more of a standardised approach to advanced procedures education, after incorporating the lasers and injectables in the scope of practice, all optometry students will be equipped with the foundational knowledge to perform these procedures upon graduation.

Having a global standardised program, such as the Northeastern State University Oklahoma College of Optometry Advanced Procedures course, taught internationally, will allow all optometrists who are inclined to effectively and safely provide these services to patients. By educating optometrists across the world, with supplementation of optometry school curricula, optometrists will be well equipped with the knowledge and skills necessary to perform advanced procedures in a standardised fashion.

Conclusion

The global shortage in ophthalmology services, the increasing prevalence of ocular conditions with an ageing population, and the increasing need for access to timely eye care services highlight the urgent need for educational programs to expand the optometric scope of practice. This review paper explored the optometry educational programs, both in optometry school curricula as well as post-graduate training and certification courses such as the Northeastern State University Oklahoma College of Optometry Advanced Procedures Course, for speciality skills and extended scope of practice in the US, UK, Canada, Australia, and NZ.

The authors of this paper call upon eye health professionals, relevant educational institutions, advocacy groups, and policymakers to work collaboratively in expanding the optometric scope of practice globally. These changes are essential to improve access to quality eye care services that will result in enhanced visual functions and subsequently improve the quality of life for patients with eye diseases.

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