

Optometry Australia

Position Statement on Artificial Intelligence in Optometry

May 2024



Purpose and Scope

This position statement was developed by Optometry Australia (OA). The purpose of this position statement is to outline a series of recommendations to guide the sustainable development, regulation, and adoption of Artificial Intelligence (AI) in optometry and eye care in Australia. It should not be used for information on how and where to apply AI in eye care.

OA is dedicated to the continuous evolution of the profession of optometry, improved community eyecare, and a sustainable healthcare system. All is transforming the way optometrists deliver eye care now and in the future.

Therefore, OA:

- Welcomes Al-related technological innovation on the basis that it provides opportunities to improve patient care, benefits the wider community, and enhances optometric practice.
- Recognises the potential risks that exist with improper use of AI and emphasises the critical importance of safe and effective implementation of these technologies in eye care.
- Acknowledges existing frameworks for the ethical use of AI in healthcare and supports the development of an ethical framework for use of AI in eye care.
- Recognises our responsibility to stay abreast of technological advancements in eyecare, including AI, and to help establish guidance around appropriate use.

Definitions

Term	Definition
Artificial Intelligence (AI)	<i>Artificial Intelligence (AI)</i> is defined by the International Organization for Standardization (ISO) as an engineered system that generates predictive outputs such as content, forecasts, recommendations, or decisions for a given set of human-defined objectives or parameters without explicit programming ¹ .
Machine Learning (ML)	<i>Machine Learning (ML)</i> is that part of AI which studies how computers can improve their perception, knowledge, thinking, or actions based on experience or data. The patterns derived from training data using ML algorithms can be applied to new data for prediction or decision-making purposes.
Deep Learning (DL)	Deep Learning (DL) is the use of large multi-layer (artificial) neural networks that compute with continuous (real number) representations, similar in concept to hierarchically organised neurons in human brains.

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Term	Definition
Generative AI	<i>Generative AI</i> describes various AI systems trained on a vast quantity of data (e.g., text) to recognise patterns so that they can produce appropriate responses to user prompts or requests. It can produce a variety of novel content, such as images, video, music, speech, text, software code, and product designs.
Large Language Model (LLM)	<i>Large Language Models (LLM)</i> are a form of generative AI that specialise in the generation of human-like text. A Multimodal Foundation Model is a type of generative AI that can process and output multiple data types (e.g., text, images, audio).
Black Box Al systems	<i>Black Box AI systems</i> are AI programs that use a large clinical data set and complex data features to arrive at a diagnosis, without providing insight into the underlying processes or reasoning behind those outputs. These results have more susceptibility to bias and should be interpreted with appropriate clinical judgment.
White Box AI systems	White Box AI systems are programs that arrive at results through more transparent and understandable processes than those derived by Black Box AI. White Box AI systems produce more linear and reliable data but are comparatively less innovative.
Biomarker AI systems	<i>Biomarker AI systems</i> focus on identifying specific biomarkers or biological indicators associated with certain eye conditions or diseases. Examples of biomarkers within optometry include specific vascular, cellular, or retinal layers characteristics or measurements. Outcomes can be more transparently linked to underlying processes and therefore can provide greater insight into individualized diagnoses.

While OA recognises the transformative potential of AI in eye care, and optometry, and the associated patient benefits that could ensue; we believe it is essential to approach integration of AI and clinical practice with caution - prioritising patient safety, ethical practice, and ongoing professional development.

Optometry Australia believes that:

- Clinical decisions in eyecare must continue to be made by, and remain the responsibility of, health professionals who
 have the appropriate expertise, qualifications, and professional accountability. Al applications that have "black box"
 outputs, demonstrated biased outcomes, and are unable to be understood by eyecare practitioners and patients
 may present risks to patient safety. Furthermore, Al applications that undervalue the knowledge base, communication
 skills, and the clinical judgement and expertise of optometrists and other trained eye health professionals should
 be discouraged.
- It is important that optometrists understand how to responsibly use AI in ways that enhance professional practice and do not put patient safety at risk. Therefore, OA supports the recommendations within the Australian Alliance for AI in Healthcare (AAAiH)'s National Policy Roadmap for AI in Healthcare for Australia, which calls for clear guidelines and legislation concerning the responsible use of AI in healthcare².
- OA support, and should be consulted in, the development of legislated AI Principles and an ethical framework for the use of AI in health care and eye care.
- Al applications created for use within the optometry profession must comply with TGA regulation, including section 41BD of the Therapeutic Good Act 1989. They should have well-defined use cases, be able to be well understood and effectively assessed by regulators and the users of the technology, and should satisfy regulatory requirements for safety, accuracy, and efficacy.
- Al applications that play any role in widening the access gap for disadvantaged communities, either through reinforcement of existing societal and population data biases, or through negative impact(s) on access to best practice care, must be avoided and discouraged.
- Practitioners have a responsibility to stay abreast of the latest developments in AI as they relate to their own practice and best patient care. OA will undertake an important role in working with experts, regulators, developers, and other key stakeholders to provide continuing professional development (CPD) to registered optometrists about relevant aspects of AI in health and eye care.



Context: Artificial Intelligence in Optometry

Al is able to handle large volumes of clinical data with less susceptibility to inter-observer variation. By automating repetitive tasks such as data entry, image analysis, and patient record management, Al could allow optometrists to focus on interpreting results, providing personalised care, and developing innovative treatment plans for their patients.

Al is already being implemented in a variety of ways in optometry and eye care, including through the following modalities, which are only a representation of the broad array of applications:

- Al algorithms recognise and interpret patterns in retinal imaging results via deep learning techniques in order to screen for and provide a provisional diagnosis for a variety of retinal conditions and systemic associations^{3,4}. They also analyse patient data to predict disease progression, prognosis, or treatment outcomes.
- Al driven Large Language Models (LLMs) have demonstrated proficiency in symptom analysis, generation of clinical reports and referrals, and correct diagnosis of a range common eye conditions^{5,6,7}. However, significant limitations exist in the accuracy and implementation of such technologies in providing nuanced clinical care.
- Al can assist in automating and refining the process of determining refractive errors and prescribing corrective lenses. This includes analysing visual acuity measurements, patient responses, and individualised characteristics to optimise the accuracy of prescriptions and lens selections^{8,9}. Al-powered devices and software can enhance visual aids for individuals with low vision¹⁰.
- Al facilitates the analysis of large datasets from clinical trials, electronic health records, and imaging studies to identify trends, patterns, and potential risk factors for various eye diseases. This has the potential to accelerate eye health research and data analysis. Nevertheless, researchers and clinicians must be aware of the risk of inherent underrepresentation of some populations in ophthalmic datasets being amplified by Al algorithms^{11,12}.
- Al has been found to streamline referral into and triage within ophthalmology emergency departments. Given the expansion of the optometry workforce within hospital settings, this will have implications for the oversight and assessment of patients in need of critical ocular care^{13,14}.
- Al assists in synthesising clinical documentation, including consultation notes, reports and referrals, by extracting relevant information from patient encounters.
- Al-powered practice management systems can automate administrative tasks, optimise resource allocation, and employ predictive analytics to forecast future performance.

With the aforementioned benefits of AI technologies in mind and acknowledging that the uses cases for AI in optometry and in eye care more broadly will continue to increase as various AI-enabled applications are developed and brought to market, OA believes there is an urgent need to ensure that the opportunities to enhance patient care are balanced carefully against the associated risks and responsibilities.

OA recognise the imperative to ensure optometrists have clarity about how to responsibly use AI in ways that enhance professional practice and do not place patient safety at risk.

Artificial Intelligence in Healthcare and Clinical Decision Making

Increasingly, AI will play an important role within optometry, providing complementary and additional information for optometrists, including as a second opinion or a means to confirm professionally made clinical decisions.

OA supports the position taken by the AMA in its August 2023 Position Statement on AI in Healthcare, which notes that "*Healthcare organisations must never establish protocols where the clinical independence of the practitioner is undermined by AI, or the final decision is made by a person in a non-clinical role with the aid of AI*"¹⁵. The RACGP (Royal Australian College of General Practitioners) Position Statement expands on this sentiment by asserting that "*AI cannot replicate the value judgements [of a clinician]*"¹⁶.

Optometrists must ensure that they possess the appropriate knowledge and judgement to discern the validity of AI- generated diagnostic data. In order to do so, an understanding of how data is utilised and interpreted by different types of AI technology, including for example in the implementation of both black and white box AI, is crucial. To minimize the risk of disadvantaging certain patient populations, strategies for ensuring data inclusivity in AI should occur at both development and utilization stages¹⁷. Research has indicated that the input of health professionals early in the development of clinical AI tools ensures greater validation of, and trust in, the generated data¹⁸. OA and optometrists should therefore be consulted in the development of AI eye care tools.

Al should never replace the invaluable, clinical decision-making role of trained optometrists who have ethical and professional responsibility to act in the best interests of their patients.

Legislation and Ethics

OA, together with other peak bodies, supports the development of legislated AI Principles in Health Care which would apply across the health system¹⁹. As the peak professional body for optometrists in Australia, OA should be consulted in the development and implementation of these legislated AI Principles.

Legislated AI Principles ideally would:

- Confirm the pre-eminent clinical decision-making role of health professionals through open communication with their patients and within their designated scope, with AI used as an input at the discretion of the clinical decision-maker.
- Enunciate appropriate requirements to ensure that patients provide informed consent for the use of AI in their health care, including the need to guarantee the privacy and security of any personal health information generated using AI.
- Ensure appropriate regulation of AI platforms and applications as software-based medical devices overseen by the Therapeutic Goods Administration (TGA), including registration on the Australian Register of Therapeutic Goods (ARTG) before they can be used in Australia.
- Require AI platforms and applications to provide sufficiently detailed information regarding the evidentiary basis for their solutions, clear guidance regarding their responsible real-world uses and the risk involved, and the ability for health professionals to interact with and assess them.

- Require AI platforms to provide guidance about ongoing monitoring, audit, and migration of systems to new populations, (for example, risks related to performance deterioration if the system is applied in a new, target population that deviates significantly from the population used in training) to ensure patient safety.
- Ensure safeguards, including appropriate documentation by health professionals, on real-world clinical decisions that involve using AI to ensure it continues to benefit, and not harm, patients, health professionals and the wider community.
- Cover the oversight of AI applications that are accessed without the oversight of health professionals, including wearable devices, online and mobile health applications, and AI enabled screening facilities in public locations.

OA also supports the development of an Ethical Framework for the use of AI in eye care. In complement to the desired legislated principles above, the Ethical Framework would:

- Confirm that optometrists must use AI in a safe, competent, ethical, and contemporary manner that meets the standards set by the Optometry Board of Australia and is in the best interests of patients.
- Guide the formulation of updated practice guidance for optometrists that encompass the use of AI.
- Make clear that AI should only be used in accordance with the professional practice of optometry and not to make clinical decisions outside the professional scope of optometrists.
- Emphasise the importance of using AI to improve access and equity in the provision of optometry services.

The Ethical Framework for the use of Al in optometry would be developed by OA after consultation with optometrists and key stakeholders, with consideration of similar ethical frameworks for Al in other areas of the health system^{20,21,22}. It would be endorsed by the Optometry Board of Australia (OBA).

Risks and Liabilities

OA acknowledges there is likely to be a swathe of AI applications in eye health and healthcare more broadly. This brings potentially significant risks health professionals, including optometrists, and their patients unless there are agreed standards and recognised systems for quality assurance of AI platforms and applications.

Within optometry, some risks associated with the use of Al include:

- Implementation of technologies beyond their capabilities, without appropriate clinical reasoning, or beyond their demonstrated limitations, such as in the implementation of LLM for complex cases^{4,5,6,23}.
- Deskilling of the profession if AI systems are relied upon for decision-making and diagnosis, potentially reducing the need for traditional diagnostic skills and expertise.
- Uncertainties around legal responsibility and liability where AI employed in clinical decision-making results in incorrect diagnoses or recommendations.
- Improper patient management as a result of inadequate referral pathways generated by AI systems, which could lead to suboptimal patient care and increased healthcare costs.
- Challenges to the sustainability of optometry practices if they fail to effectively integrate AI technologies into their operations or lose competitive advantage to AI- enabled competitors.
- Intrinsic shortfalls in design and utilisation. Al- generated data can have perpetuated errors. Al models can be employed without knowledge or consent, and the clinician's ability to oversee and control the quality and relevance of inputs is limited.

Addressing these risks requires a comprehensive approach that encompasses legal and ethical considerations, robust cybersecurity measures, clear communication with patients and stakeholders, and strategic planning for the integration of Al into optometry practices.

An AI regulatory environment that focusses on quality standards, in addition to responsible and ethical use, will provide optometrists with the confidence to invest in and use AI applications that aim to enhance patient outcomes and enable innovation. Such measures should result in a reduced level of financial risk and professional liability from using AI in optometry practice, which in turn should be reflected in insurance premium costs.

Further, OA encourages consideration of a National AI Act and the establishment of a whole-of-economy AI Regulator whose responsibilities would include oversight of standards

Broader Implications

The proliferation of AI applications that have entered into the eyecare domain has potential implications for access and equity, collaborative care, professional education, screening of systemic health conditions, and direct-to-consumer services. Whilst not exhaustive, OA's position on these implications is briefly outlined below.

Access and Equity

Al purports to improve the ability to improve access to timely eye care for various disadvantaged groups, including those living in rural and remote locations, First Nations Peoples, older Australians, those living with multiple chronic health conditions, Culturally and Linguistically Diverse (CALD) communities, etc.

However, the beneficial uses of AI – if not made widely (and equitably) available or if inadequately trained and validated – could widen the gap between those Australians who for geographic, economic, and social reasons have access to timely, high-quality eye health services, and those who do not^{24,25}.

It is crucial that opportunities to use AI applications that do improve access and equity are diffused equitably into existing and future models of eye care. However, such applications should not be prioritized in disadvantaged communities over the use of traditional approaches if doing so would compromise the quality of clinical care²⁶.



Optometry Australia is a strong advocate for collaborative eye care and is working to embed, maintain and grow efficient models of collaborative eye care that fully utilise the skillset of Australian optometrists. Advances in digital technologies, including AI, may enhance various elements of collaborative eye care, including the prioritisation of at-risk patients, data sharing, disease progression assessment, remote diagnosis and management, and specialised evaluation^{27,28}.

Al may facilitate efficiencies in collaborative care models and referral pathways, particularly in strengthening the communications between optometry and primary care general practice. The use of Al in collaborative care should conform with relevant regulations, principles and ethical frameworks of the various health professions involved.

Health Conditions

The implementation of AI- driven early systemic disease detection for a range of health conditions (e.g., Alzheimer's disease, heart disease etc) through examination of retinal biomarkers could complement the scope of optometrists^{29,30,31}. However, early diagnosis of systemic conditions bears a range of ethical considerations. Early identification of those at risk of certain pathologies could allow for implementation of disease modifying treatments before progression of a condition to symptomatic stages, and early access to information and services. Identification of large population cohorts for clinical trials could also result from pre- clinical AI detection of pathologies, however important ethical considerations exist with this consideration³².

Al may enable eye care practitioners to provide less invasive clinical testing for early detection of systemic diseases, but onward referral for expert interpretation of data and treatment pathways would be critical³³. The practical and ethical issues associated with Al-driven early disease screening should be considered in developing Al principles and ethical frameworks.

Direct to Consumer Services

Al-enabled retinal screening that occurs outside the health system or without the oversight of an appropriately trained health professional carries additional risks that may outweigh the benefits in the absence of an effective regulatory framework. OA believes it is preferable for Al enabled health screening to occur with oversight and management by the health professionals who are responsible for post screening diagnosis and treatment, which in the case of eye care, is principally optometrists and ophthalmologists.

Education

Evidence- based education, possessing relevant commercial disclosures and which maintains an appropriate level of independence from individual AI providers, will empower optometrists to best employ AI³⁴. Optometrists should have an up-to-date understanding of AI platforms and applications, the skills to use and scrutinize AI responsibly and effectively, and knowledge of the relevant regulatory principles and ethical frameworks.

OA is committed to the delivery of high quality continuing professional development (CPD) about relevant aspects of AI, including data science, bioinformatics, results interpretation, and the ethics of AI. Optometry Schools also have a key role to play in ensuring that the responsible and effective use of AI in optometry practice is included in their curricula.

Conclusion

OA recognises the transformative potential of AI in optometry. We are, however, cognisant of the risks and believe it is critical that the optometry profession embraces and integrates AI technologies in ways that prioritise patient safety, adhere to evidence-based practice principles, and uphold ethical standards.

We support the leading policy experts in this space who have outlined a coordinated approach to the real-world application of AI, in the recently released National Policy Roadmap for AI in Healthcare (AAAiH, 2023)³. There is a need for ongoing education and practical upskilling for optometrists in AI technologies, and for practitioners to ensure that they have adequate knowledge of result interpretation.

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This position statement has been developed with input from leading experts from across the digital health landscape, and optometry profession. We appreciate their guidance and support.

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