

Position Statement
on
Augmented Intelligence (Aul)
(Approved by the Board of Directors: May 18, 2019)

Augmented intelligence (Aul) is a concept that focuses on artificial intelligence's (AI) assistive role, emphasizing that Aul is designed to enhance human intelligence and the physician/patient relationship rather than replace it. The choice of the word "augmented", which means "to improve," reinforces the foundational role human intelligence plays when machine learning and algorithms are used to discover clinical relationships and solve problems.

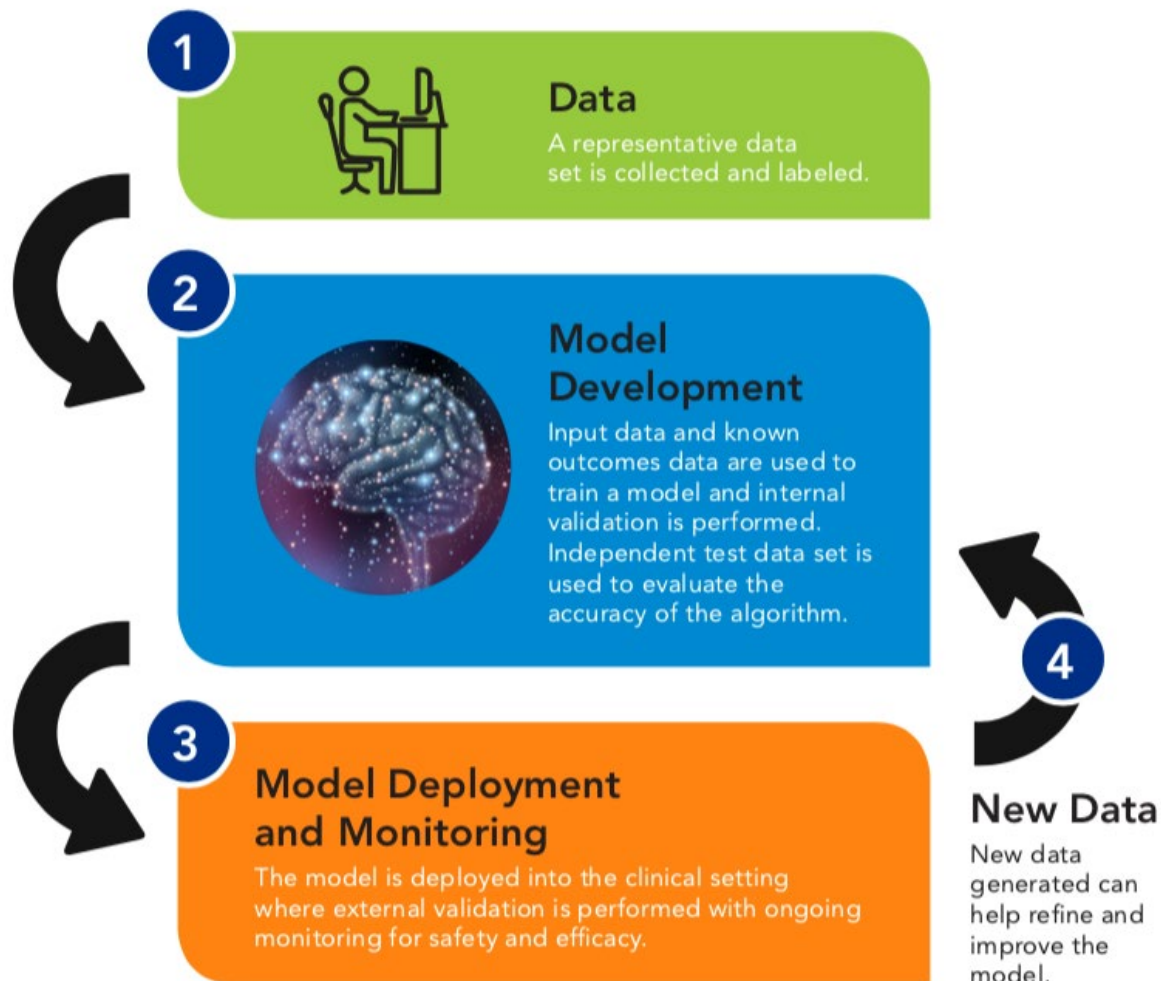
As the profession of dermatology integrates Aul into clinical practice, clinicians must adhere to general principles of human-centered design. Patients should feel well-cared for even when interacting with software. Clinicians should spend time conducting work appropriate for their skills and training, while being able to delegate algorithmic tasks to machines, with the goal of enhancing patient care. Both health care recipients and providers should collaboratively engage in the development of Aul applications. Our patients should always have the choice to access a provider if they desire such access.

Aul holds transformative potential in the care of skin with impact on each of the Quadruple Aims (enhancing patient experience, improving population health, reducing costs, and improving the professional fulfillment of care teams). Early AI efforts across medicine have shown promise and impact in expanding access to high-quality care. These include enabling novel insights into health and disease including in risk assessment and triage, diagnosis, treatment and monitoring, supporting patient engagement, and improving care team efficiency. Each application of Aul in the care of skin conditions must be subject to the highest validation and quality standards prior to widespread use in healthcare delivery.

Defining High-Quality Aul

The Academy supports the development of augmented intelligence (Aul) technology provided that it is designed and evaluated in a manner that enables the delivery of high-quality care to patients.

Developing Augmented Intelligence Models in Dermatology



*This infographic depicts supervised machine learning, the predominant technique currently used to develop AI tools in medicine.

Model Development

- Data used to generate Aul algorithms must be handled in accordance with patient privacy laws.
- Aul algorithms must be developed using high-quality data that is representative of the population on which it will be used.
- Aul algorithms used for the delivery of patient care must be subject to rigorous validation and clinical evaluation prior to deployment.

The development of Aul technology relies on the collection and storage of large quantities of data. Good-faith effort should be made to comply with the Health Insurance Portability and Accountability Act (HIPAA) as applicable. Data should be handled securely. Proper consent must be obtained when appropriate. All data handling

including acquisition, transfer, and storage must be in accordance with patient privacy laws.

The validity and generalizability of Aul technology is dependent upon the quality and source of the data that is used to develop the Aul model. The characteristics of these data sets influence the nature of the algorithms generated and carry the potential to extend bias to delivery of clinical care if the data sets are not representative of the population in which AI algorithms will be used. Therefore, data used to train Aul models must be of high quality and their source identifiable. Where possible, data labeling methods and characteristics of the training data set must be made transparent. All efforts should be made to ensure the data is free of as much bias as possible.

Aul algorithms must be internally validated and evaluated, and the methodology and results made transparent. Aul outputs should be reproducible across various clinical platforms. Appropriate labeling for intended use of the algorithm should be stated, including any use case restrictions. Although it is difficult to fully determine the inner workings of Aul algorithms, we support efforts to gain transparency into the process of how Aul algorithms reach their conclusions. We acknowledge that this is an active field of research and will develop with time.

Clinical Deployment

- After an AI algorithm has been evaluated on an independent test set, external validation and monitoring must be performed in a clinical setting.

Aul must integrate into physician and provider workflows. Key stakeholders must be present in the design of how these tools integrate into practice. Prospective clinical trials with relevant clinical end points based on intended use should be performed in order to validate Aul technology for patient care. Both clinical effectiveness and patient safety should be demonstrated before using this technology for clinical decision making. Care must be made in identifying potential bias which could arise in the design or deployment that could potentially exacerbate health care disparities, particularly among vulnerable populations. Data collected during model deployment can be used for model retraining and refinement.

Post-marketing surveillance

- Appropriate post-marketing surveillance must be performed to ensure safety.

Aul tools will be subject to appropriate regulation, and post-marketing surveillance must also be performed to ensure safety through routine evaluation after deployment. The technology should improve outcomes important to patients, clinicians, and other health system stakeholders, and efforts should be made to measure these outcomes. Outcomes may include quality, cost, and/or efficiency of care delivery. Aul tools should be safeguarded from cyber threats that could harm the integrity of the products.

Future Directions

Effective and ethical development and implementation of augmented intelligence (Aul) will require continuous engagement, education, exploration of privacy and medical-legal issues, and advocacy.

Engagement

- Assess knowledge, expectations, biases, and fears of stakeholders pertaining to Aul.
- Conduct needs assessments/studies to direct Aul development and integration.
- Gather robust evidence in order to guide best practices and appropriate use.

Engagement of and collaboration with stakeholders is essential. Assessing and understanding knowledge, expectations, biases, and fears allow for more efficient development and more effective deployment of Aul technologies in healthcare. For patients and providers, studies on acceptability, feasibility, predictive accuracy, and clinical outcomes may identify areas of greatest need, adoption barriers, and adaptability of these tools to different clinical settings. These studies will guide prioritization of Aul development and more seamless integration into clinical practice and the lives of patients and providers. Recognizing the most relevant research gaps to fill will guide development of best practices, appropriate use criteria, and a robust evidence base. With this information and experience, the Academy aims to collaborate with our public policy partners to promote high-quality, responsible applications of Aul and proactively create a framework to assess and improve these technologies.

Education

- Educate stakeholders on advantages and limitations of Aul.
- Promote transparency and choice for patients when Aul is utilized in care.
- Educate providers on best practices and appropriate use for Aul.

Education and awareness of the promise and potential pitfalls of these technologies are needed for effective and ethical integration in the healthcare system. For patients and providers, there should be transparency and choice on how their medical information is gathered, utilized, and stored and when, what, and how Aul technologies are utilized in their care process. There should be clarity in the symbiotic and synergistic roles of Aul and human judgment so that it is clear to the patient and provider when and how this technology is utilized to augment human judgement and interpretation. Ongoing education of providers on evidence-based best practices will promote competency and appropriate utilization of Aul to provide care that is comprehensive and coordinated. The Academy encourages the continuing education on the rights and roles of patients and providers and the ongoing collaboration with public policy.

Privacy, Medical-Legal issues:

- Ensure PHI is protected and consent for any data usage and storage is transparent.
- Advance patients' and providers' understanding of inputs, outcomes, and appropriate use of Aul.

Although the promise of Aul to improve health and wellness holds significant potential, issues related to privacy and medical-legal complications are amplified by technology that requires transmission of data beyond the confines of a providers' institution. Protected Health Information must be managed with effective safeguards to prevent inadvertent exposure. As with in-person medical care, transparency in consent for data usage is required. Allocation of risk among the Aul-manufacturer/designer, provider, and patient should be considered for all stakeholders to more accurately assess and mitigate risk. Aul tools and systems should be explainable in a way that is intuitive and understandable by both providers and patients.

As Aul-powered algorithms increase our ability to accurately prognosticate, the ramifications of dissemination of this information to third parties, such as insurance companies or employers, presents significant risk.

Advocacy

- Collaborate with stakeholders and policymakers to create policies that will promote high-quality, inclusive, equitable, and accessible Aul.

Aul has the potential to transform our collective and personal experience of health, healthcare, and wellness. To achieve this potential, deliberate and diligent efforts must be taken to engage and collaborate with stakeholders and policymakers. The Academy hopes to work with administrative and legislative colleagues to create policies that promote Aul that is high-quality, inclusive, equitable, and accessible. Through collaboration and research, the Academy strives to guide the design, implementation, and regulation of these technologies and augment care for all.

Glossary:

1. **AI (artificial intelligence)** refers to a machine with human capabilities. For example, a machine that has the ability to classify skin lesions at the level of a clinician would be considered to be artificially intelligent.
2. **Aul (augmented intelligence)** is a newer term coined to incorporate the concept of the integration of artificial intelligence tools and systems with clinicians and into the healthcare delivery system to enhance our current capabilities.
3. **Bias** occurs in observational data but takes on heightened importance in that Aul trained on data containing bias will produce tools and systems that amplify and codify those biases. This is exacerbated by the “black box” nature of Aul, which obscures how it arrived at its prediction.
4. **Big data** in the medical context refers to complex datasets often containing structured and unstructured fields as exists in electronic health records.
5. **Computer vision** is a field that crosses disciplines and aims to drive deeper understandings from visual data including images or videos and mimic tasks performed by the human visual system.
6. **Machine learning (ML)** refers to the use of computational and statistical tools, or **algorithms**, for identifying relationships in data and making intelligent predictions. Within the umbrella term of machine learning, **deep neural networks** are a specific type of machine learning that have been applied to image recognition. A wide variety of other models of machine learning exist and are chosen as appropriate for the particular task and characteristics of the data.
7. **Supervised learning** refers to an approach where teaching the model involves using data where each datapoint is labeled with an output. For example, clinically annotated or histologic diagnoses associated with images of skin lesions. **Unsupervised learning** occurs when the model trains on the data itself, without any labeling.
8. The data is split into a **training set**, which is the data from which the model learns. Subsequently, the model is evaluated on a **test set**, which allows an unbiased evaluation of the model. This test set is typically well-curated and importantly, does not overlap with the training set.

This Position Statement is provided for educational and informational purposes only. It is intended to offer physicians guiding principles and policies regarding the practice of dermatology. This Position Statement is not intended to establish a legal or medical standard of care. Physicians should use their personal and professional judgment in interpreting these guidelines and applying them to the particular circumstances of their individual practice arrangements.