The Orthopaedic Trauma Association Position Statement on the Use of Artificial Intelligence in the Management of Musculoskeletal Injuries

The field of orthopaedic trauma surgery stands at the threshold of a transformative era, as artificial intelligence (AI) becomes increasingly integrated into patient care, surgical planning, and treatment optimization. Recognizing both the promise and the responsibility that this emerging technology brings, the Orthopaedic Trauma Association (OTA) has developed this position statement to articulate a clear, principled approach to AI implementation. This document outlines the foundations of AI use in musculoskeletal injury management, addresses the challenges of data stewardship and bias mitigation, and ultimately seeks to empower clinicians to harness AI responsibly, transparently, and equitably.

Patient-centered care with adequate human oversight. AI advancement should always ensure a benefit to patients. AI should be a supportive tool in the surgeon-patient relationship rather than a detached decision-making force. Human oversight remains critical to ensure alignment between AI recommendations and patient needs.

Equity, accessibility, and inclusivity. AI technologies should be designed to be inclusive and account for diverse patient populations across different socio-economic, racial, and geographic backgrounds. The tools need to avoid inequitable care through biased algorithms and to be shared with all members of the OTA, ensuring fair access to all who wish to use them.

Transparency, explainability, and informed consent. Patients must be informed on how AI is used in their diagnosis, treatment planning, and surgery. Surgeons need to be able to explain the risks and benefits of AI recommendations in an understandable and transparent manner, allowing a shared decision-making process. Informed consent should ensure patients fully know AI's role in their care.

Quality and Integrity of Data Sources. The quality and integrity of data sources are essential for the ethical and effective use of AI. Key requirements include representative datasets, rigorous validation, standardized performance benchmarks, real-world testing protocols, and continuous monitoring systems to detect and address algorithmic bias. The OTA will promote independent validation through global collaborations using diverse datasets and self-monitoring to detect performance deviations and enable real-time adjustments, particularly in resource-limited settings. Established reference standards will help maintain reliability and trust in AI technology.

Privacy, Confidentiality, and Security of Patient Information. Protecting patient privacy, confidentiality, and security through robust data encryption and secure storage protocols is foundational to building trust in healthcare AI. Regulatory compliance and standardized data exchange protocols are vital for fostering collaboration and innovation.

Building AI Literacy, professional development and collaboration. The OTA aims to position its members to be at the forefront of AI integration in surgical practice, by promoting AI literacy, research support, interdisciplinary collaborations, and accessible learning platforms to ensure surgeons can effectively evaluate and implement AI technologies while maintaining the highest standards of patient care and ethical practice.

Integration of AI into the care of musculoskeletal Injuries. The OTA recognizes the transformative potential of AI in orthopaedic trauma a d would like to see its integration in the following, but not limited to, key areas of interest:

- Imaging Analysis and Diagnosis: AI algorithms for fracture detection, classification, and surgical planning using radiographs, CT, and MRI
- Predictive Modeling: Risk assessment for complications, outcome prediction, and personalized treatment planning based on patient-specific data
- Perioperative Care: AI-driven surgical guidance, robotics, implant selection, and real-time monitoring systems to optimize procedural outcomes
- Rehabilitation Support: Use of wearable devices and biosensors to track progress and provide personalized recovery recommendations.
- Access to Care: NLP-enhanced documentation, automated scheduling, and multilingual support to streamline workflows and improve accessibility for underserved populations.
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Funding and Resources for AI in Orthopaedic Trauma Care. The OTA will advance AI implementation through strategic partnerships with government agencies, industry leaders, and academic institutions. Our approach focuses on developing multi-institutional research networks, establishing public-private partnerships, creating dedicated funding streams, and forming collaborative consortia.

Integrating artificial intelligence into orthopaedic trauma care represents a watershed moment in our field's evolution. Together, we can harness the transformative potential of AI to enhance patient care while maintaining the highest standards of clinical excellence and ethical practice.

The OTA Board of Directors

References:

1. FDA reference
2. NIH reference
3. NSF reference
4. WHO reference
5. AMA reference
6. ACS reference