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Letter to the editor

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ABSTRACT:

I read with considerable interest the article by Gan and Wang, "Applications and future of artificial intelligence in traumatology." Volume 28, Issue 5, September 2025, Pages 382-384. Their work provides a timely and comprehensive overview of how artificial intelligence (AI) may enhance diagnostic speed, surgical precision, and preventive strategies within trauma care. The authors articulate a clear developmental pathway—encompassing infrastructure, technical innovation, verification, and large-scale implementation—offering a coherent framework for guiding future integration of AI across trauma systems.

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To the Editor,

I read with considerable interest the article by **Gan and Wang**, *"Applications and future of artificial intelligence in traumatology."* Volume 28, Issue 5, September 2025, Pages 382-384. Their work provides a timely and comprehensive overview of how artificial intelligence (AI) may enhance diagnostic speed, surgical precision, and preventive strategies within trauma care. The authors articulate a clear developmental pathway—encompassing infrastructure, technical innovation, verification, and large-scale implementation—offering a coherent framework for guiding future integration of AI across trauma systems.

The paper emphasises how crucial multimodal data is to trauma care. The ability of AI to synthesise imaging, clinical, and spatial data in real time is a major advancement since severe injury continues to impose a considerable global health cost, especially among younger populations. Similarly, the conversation about intelligent robotic systems reveals significant chances to enhance operative precision, lower intraoperative variability, and possibly enhance patient outcomes. The significance of AI in patient communication, rehabilitation guidance, and risk-prediction modeling—areas that are still in their infancy but have a lot of potential—is also noted by the authors. Their acknowledgement of ethical, legal, and governance issues is also admirable. The appropriate use of AI in traumatology requires the protection of privacy, reduction of algorithmic bias, and creation of open regulatory frameworks.(1)

While the article is well-constructed and forward-looking, several refinements could strengthen its contribution and enhance its translational relevance.

1. **Greater emphasis on external and prospective validation.**

AI systems in trauma care frequently suffer from inadequate validation. A recent review of 217 orthopaedic trauma AI studies demonstrated that only a minority underwent external validation, and even fewer were evaluated prospectively. This gap is critical, as models developed in single-centre datasets often show diminished performance when deployed in diverse clinical settings. Reinforcing the need for multicentre and multiregional validation would therefore strengthen the authors' proposed "verification" and "scale application" steps. (2)

2. **Integration of interpretability and transparency.**

Although model development is addressed, it may be beneficial for the manuscript to discuss explainability more explicitly. As highlighted in recent scholarship, even highly accurate models can fail to align with clinical reasoning if their decision-making process is opaque. Providing interpretable outputs—such as saliency maps, confidence estimates, or natural-language reasoning summaries—could advance clinician trust and reduce automation bias, especially in high-acuity trauma scenarios.(2)

3. **Consideration of evolving epidemiological patterns.**

Contemporary trauma literature demonstrates notable shifts in injury demographics, including increased patient age, higher prevalence of comorbidities, and improved short-term mortality. AI-driven risk stratification and deterioration prediction could further support trauma units in adapting to these changing demands. Explicitly linking AI applications to system-level trends could improve the article's relevance for trauma service planning. (3)

4. **Workforce development and clinical readiness.**

As AI becomes embedded in trauma workflows, structured training will be necessary for clinicians, nurses, and allied health professionals. Current literature shows that AI-enabled tools can support education and competency assessment, but also highlights the risks of overreliance. Including a brief reflection on workforce preparedness would strengthen the proposed framework for large-scale application. (4)

5. **Privacy-preserving data governance.**

While the authors identify major privacy risks, referencing emerging technical safeguards—such as federated learning, differential privacy, and encrypted computation—would provide a more complete picture of feasible solutions for cross-institutional data collaboration. (5)

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6. Mitigation of demographic and socioeconomic bias.

AI systems trained on imbalanced datasets may inadvertently reproduce disparities. Encouraging developers to evaluate performance across age, sex, and socioeconomic subgroups would support equitable implementation and align with the authors' broader regulatory recommendations. (6)

Overall, Gan and Wang have produced an insightful, well-structured, and forward-looking analysis of AI in traumatology. The suggestions above aim to complement their work by incorporating additional perspectives from orthopaedic trauma, AI ethics, and trauma epidemiology. Their article will undoubtedly stimulate valuable discussion and contribute to the development of more intelligent, ethical, and responsive trauma systems.

Conflicts of interest : None Declared

Sincerely,
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