

Can AI Detect Bone Fractures More Accurately Than Physicians?

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Abstract

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Artificial intelligence (AI) is rapidly transforming various sectors, and healthcare is no exception. One of the most promising applications of AI in medical imaging is the detection of bone fractures. The question on many health professionals' minds is whether AI can truly surpass the diagnostic accuracy of human physicians. This article delves into the current state of AI in fracture detection, examining its performance against that of radiologists and other clinicians.

The Rise of AI in Radiography

The interpretation of radiographs to identify fractures is a critical task in emergency medicine and orthopedics. However, it is not without its challenges. Missed fractures are a common source of diagnostic error, which can lead to delayed treatment and adverse patient outcomes. Factors such as radiograph quality, the subtlety of the fracture, and the experience level of the interpreting physician can all influence diagnostic accuracy.

In recent years, deep learning, a subset of AI, has shown remarkable potential in analyzing medical images. AI algorithms can be trained on vast datasets of radiographs to recognize patterns associated with fractures. These systems can process images with incredible speed and consistency, offering a potential solution to the challenges of manual interpretation.

AI vs. Human Accuracy: What the Evidence Shows

Several studies have compared the performance of AI algorithms with that of

human clinicians in detecting bone fractures. A 2023 study published in *European Radiology* compared the accuracy of an AI algorithm to that of non-specialized radiologists in detecting wrist fractures [1]. The study found that the AI's sensitivity (83%) was significantly higher than that of the radiologists (76%). However, their specificities were comparable at 96%. Interestingly, the combination of AI and a radiologist's analysis yielded the best performance, with a sensitivity of 88% [1]. This suggests that AI may be most effective when used as a supportive tool to augment, rather than replace, human expertise.

A more recent study from 2025, published in *Emergency Radiology*, evaluated two commercial AI algorithms, BoneView and RBfracture, for detecting musculoskeletal trauma [2]. Both algorithms demonstrated high sensitivity and specificity, with BoneView achieving a sensitivity of 89.3% and a specificity of 88.5%, while RBfracture showed a sensitivity of 87.2% and a specificity of 89.2%. The study concluded that both AI algorithms performed comparably to the reported ranges for human radiologists [2].

These findings are consistent with a broader trend in the literature. While some studies report AI outperforming less experienced clinicians, the general consensus is that AI's performance is on par with that of experienced radiologists. A meta-analysis of several studies found no statistically significant difference in the overall diagnostic performance between AI and clinicians for fracture detection.

The Role of AI in Clinical Practice

Given the evidence, it is clear that AI has a significant role to play in the future of fracture detection. While it may not be a complete replacement for physicians, it can serve as a powerful adjunctive tool. Here are some of the key benefits of integrating AI into clinical workflows:

Improved Accuracy: *As demonstrated by the research, AI can help to improve diagnostic accuracy, particularly when used in conjunction with a clinician's interpretation. It can act as a "second reader," helping to reduce the rate of missed fractures. This is especially valuable in high-volume emergency departments where fatigue and workload can impact performance.*

Increased Efficiency: AI algorithms can analyze radiographs in a fraction of the time it takes a human. This can help to streamline workflows, reduce patient wait times, and allow clinicians to focus on more complex cases.

* **Standardization and Consistency:** AI provides a consistent level of analysis, unaffected by factors such as time of day or workload. This can help to standardize the quality of care and reduce variability in interpretation.

Limitations and Future Directions

Despite its promise, AI is not without its limitations. As noted in the research, AI algorithms can struggle with subtle or complex fractures [2]. They are also susceptible to errors from poor image quality or unusual patient anatomy. Furthermore, the ethical and legal implications of using AI in clinical decision-making are still being debated.

Conclusion

So, can AI detect bone fractures more accurately than physicians? The current evidence suggests that while AI can match and in some cases exceed the performance of non-specialized clinicians, it is not yet a definitive replacement for experienced radiologists. The most accurate and effective approach appears to be a collaborative one, where AI is used to support and enhance the diagnostic capabilities of human experts.

As AI technology continues to mature, it will undoubtedly become an increasingly integral part of radiological practice. For health professionals, the key will be to embrace this technology and learn how to leverage its strengths to provide the best possible care for their patients.

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