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## Title Page

**Title:** Distal forearm fractures can be reliably diagnosed using ultrasound

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Distal forearm fractures can be reliably diagnosed using ultrasound

#### STUDY QUESTION

In patients with possible distal forearm fracture, is ultrasound scanning a reliable method of diagnosis when compared to X ray?

#### STUDY DESIGN

Design: Systematic review and meta-analysis  
Data source: Medline, Web of Science, the Cochrane Library  
Study inclusion criteria: Comparison of ultrasound and x-ray in patients with potential distal forearm fractures; written in English, French, German or Spanish language

#### MAIN RESULTS

A total of 16 studies involving 1,204 patients with 641 fractures were included. 12 studies involving 951 patients looked specifically at children. Included studies all used X ray as their "gold standard" for diagnosing fractures and compared ultrasound to this. Most studies were of average to high quality, although almost all had high risk of bias due to their convenience recruitment methods. Meta-analysis found that 4-view ultrasound had a high specificity of 0.90 (0.81-0.95) and high sensitivity of 0.96 (0.86-0.99). 6-view ultrasound had an even higher specificity of 0.98 (0.96-0.99) and sensitivity of 0.98 (0.96-0.99). There was no significant difference when probes of differing frequencies were compared. Operators who had had a short period of instruction got results equally reliable as expert operators.

#### CONCLUSION

Ultrasound is a reliable method of diagnosing distal forearm fractures, with 6-view ultrasound being more reliable than 4-view, although most studies used convenience sampling rather than completely sampling the population presenting with suspected forearm fracture..

#### ABSTRACTED FROM

Douma-den Hamer, D., Blanker, M.H., Edens, M.H., Buijteweg, L.N., Boomsma, M.F., van Helden, S.H. and Mauritz, G-J. (2016) Ultrasound for Distal Forearm Fracture: A Systematic Review and Diagnostic Meta-Analysis PLoS One, 11(5)

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#### COMMENTARY

Forearm fractures are so common that any improvement (however small) in the patient pathway will be likely to tangibly improve outcomes. This was a thorough systematic review of papers going back to the 1940s and including 4 different languages with 2 reviewers (so we can probably forgive them that there was no independent arbitration of areas of disagreement between them). The results should make all Emergency Departments sit up and take note - ultrasound is a reliable tool to diagnose forearm fractures. For ultrasound aficionados it will be pleasing to see this work is supported by some very recent prospective evidence (Rowlands 2016). It is in the area of how, and who, to train where we need more information. Only 2 studies looked at inter-rater reliability (key to ensuring engagement and implementation) and the training interventions differed quite markedly between studies. It is interesting that outcomes appeared not be different between those who received training and those who didn't. While this seems implausible, and probably does need to be the subject of an Educational Randomised Control Trial, the strength of evidence would suggest ultrasound is relatively easy to perform. As you age, bones break in different ways, so caution is needed specifically in the adult group but it is beholden on the paediatric emergency medicine care community to look at their practice and consider evaluating this intervention that is likely to improve the patient experience.

Rowlands R, Rippey J, Tie S and Flynn J. Bedside Ultrasound vs X-ray for the Diagnosis of Forearm Fractures in Children. The Journal of Emergency Medicine 2016 (in press)  
<http://dx.doi.org/10.1016/j.jemermed.2016.10.013>

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