Griffin XL, Parsons N, Costa ML, Metcalfe D. Ultrasound and shockwave therapy for acute fractures in adults. *Cochrane Database of Systematic Reviews* 2014; Issue 6.

Reviewer: Linda Metzger 1-30-15

Design: Cochrane Systematic Review and Meta-Analyses

Objective: To assess the effects of low-intensity ultrasound (LIPUS), high-intensity focused ultrasound (HIFUS) and extracorporeal shockwave therapies (ECSW) as part of the treatment of acute fractures in adults.

Summary of Results:

- Includes 12 small sized trials with a total of 622 patients with 648 fractures.
- Eight studies were randomized placebo-controlled trials. Eleven trials tested LIPUS and one trial tested ECSW.
- Functional outcomes from one study of complete fractures found little evidence of a difference between the two groups in the time to return to work (mean difference (MD) 1.95 days favoring control, 95% CI -2.18 to 6.08; 101 participants). Pooled data from two studies found LIPUS did not significantly affect the time to return to training or duty in soldiers or midshipmen with stress fractures (MD -8.55 days, 95% CI -22.71 to 5.61; 93 participants).
- After pooling results from 8 studies (446 fractures), the data showed no statistically significant reduction in time to union of complete fractures treated with LIPUS (SMD = -0.47, 95% CI -1.14 to 0.20). This result could include a clinically important benefit or harm, and should be seen in the context of the highly significant statistical heterogeneity (I^2 = 90%).
- Pooled results from 5 of the 8 trials (333 fractures) reporting proportion of delayed union or non-union showed no significant difference between LIPUS and control (10/168 vs 13/165; RR 0.75; 95% CI 0.24 to 2.28).

Reasons not to Cite as Evidence:

- Sample sizes of the included trials were small. Eight studies had less than 59 participants and the remaining 4 studies ranged from 67 to 120 total subjects.
- Risk of bias' assessment of the included studies was hampered by the poor reporting of methods, frequently resulting in the risk of bias of individual domains being judged as 'unclear'.
- For selective outcome reporting, the overall quality of the reporting of the included studies was poor. The reporting of the methods and results was frequently mixed so that determining the risk of bias from selective reporting of outcomes was very difficult and all 12 trials were assessed as 'unclear' for selective reporting.
- Eleven of the 12 studies were at high risk of selection bias due to an imbalance in baseline characteristics. There was often insufficient data, in particular relating to smoking status, to judge whether there were major imbalances between the treatment and control groups in baseline characteristics.
- Seven studies were at 'unclear' risk of selection bias due to insufficient allocation concealment.

- The results of many trials were probably biased because of missing data from several trial participants.
- Highly significant statistical heterogeneity (I^2 = 90%) was present in the pooled analyses. The trials were very different from each other; for example, they varied in the bone that was broken and whether or not the fractures were also treated surgically. The trials should probably not have been pooled, since pooled data with high heterogeneity may not have a clinically useful interpretation. This variation may be due to differences in characteristics of the intervention, differences in patient characteristics, or bias.
- The results from only one low quality trial (with 59 fractures) testing shockwave therapy were inconclusive.
- While a potential benefit of ultrasound for the treatment of acute fractures in adults cannot be ruled out, the currently available evidence from 12 clinically heterogeneous trials is insufficient to support the routine use of this intervention in clinical practice.

Assessment:

Inadequate for evidence of the effect of low-intensity ultrasound (LIPUS), high-intensity focused ultrasound (HIFUS) and extracorporeal shockwave therapies (ECSW) as part of the treatment for acute fractures in adults.