Vertebroplasty for osteoporotic fracture. *J Fam Pract*. 2009;58:654-656.

Potential PURL Review Form: Randomized controlled trials

SECTION 1: IDENTIFYING INFORMATION

1. Citation	Kallmes DF, Comstock BA, Heagerty PJ, et al. A randomized trial of vertebroplasty for osteoporotic spinal fractures. *N Engl J Med*. 2009;361:569-579.
2. Hypertext link to PDF of full article	http://www.ncbi.nlm.nih.gov/entrez/utils/fref.fcgi?PrId=3051&itool=AbstractPlus-def&uid=19657122&db=pubmed&url=http://content.nejm.org/cgi/pmidlookup?view=short&pmid=19657122&promo=ONFLNS19
3. First date published study available to readers	August 6, 2009
4. PubMed ID	19657122
5. Nominated By	Umang Sharma
6. Institutional Affiliation of Nominator	University of Chicago
7. Date Nominated	August 6, 2009
8. Identified Through	N Engl J Med
9. PURLS Editor Reviewing Nominated Potential PURL	Bernard Ewigman
10. Nomination Decision Date	August 11, 2009
11. Potential PURL Review Form (PPRF) Type	Randomized controlled trial
12. Other comments, materials or discussion	
13. Assigned Potential PURL Reviewer	Umang Sharma
14. Reviewer Affiliation	University of Chicago
15. Date Review Due	
16. Abstract	August 27, 2009
17. Pending PURL Review Date	**BACKGROUND:** Vertebroplasty is commonly used to treat painful, osteoporotic vertebral compression fractures. **METHODS:** In this multicenter trial, we randomly assigned 131 patients who had one to three painful osteoporotic vertebral compression fractures to undergo either vertebroplasty or a simulated procedure without cement (control group). The primary outcomes were scores on the modified Roland-Morris Disability Questionnaire (RDQ) (on a scale of 0 to 23, with higher scores indicating greater disability) and patients' ratings of average pain intensity during the preceding 24 hours at 1 month (on a scale of 0 to 10, with higher scores indicating more severe pain). Patients were allowed to cross over to the other study group after 1 month. **RESULTS:** All patients underwent the assigned intervention (68 vertebroplasties and 63 simulated procedures). The baseline characteristics were similar in the two groups. At 1 month, there was no significant difference between the vertebroplasty group and the control group in either the RDQ score (difference, 0.7; 95% confidence interval [CI], -1.3 to 2.8; *P*=0.49) or the pain rating (difference, 0.7; 95% CI, -0.3 to 1.7; *P*=0.19). Both groups had immediate improvement in disability and pain scores after the intervention.

Although the two groups did not differ significantly on any secondary outcome measure at 1 month, there was a trend toward a higher rate of clinically meaningful improvement in pain (a 30% decrease from baseline) in the vertebroplasty group (64% vs. 48%, *P*=0.06). At 3 months, there was a higher crossover rate in the control group than in the vertebroplasty group (43% vs. 12%, *P*<0.001). There was one serious adverse event in each group. **CONCLUSIONS:** Improvements in pain and pain-related disability associated with osteoporotic compression fractures in patients treated with vertebroplasty were similar to the improvements in a control group. (ClinicalTrials.gov number, NCT00068822.) 2009 Massachusetts Medical Society

SECTION 2: CRITICAL APPRAISAL OF VALIDITY

1. Number of patients starting each arm of the study?	131 patients total: 68 vertebroplasties, 63 simulated procedures
2. Main characteristics of study patients (inclusions, exclusions, demographics, settings, etc.)?	5 centers in U.S., 5 in U.K., 1 in Australia Inclusion critera: age 50+, diagnosis of 1-3 painful osteoporotic vertebral fxs btw T4-L5, inadequate pain relief with standard medical therapy, and current pain rating of 3+ on 0-10 scale. Fxs also had to be less than 1 year old Exclusion criteria: suspicion of neoplastic, retropulsion of bony fragments, concomitant hip fx, active infection, bleeding diasthesis, recent surgery, lack of telephone access, inability to communicate in English, dementia
3. Intervention(s) being investigated?	Injection of PMMA (medical cement) into fractured vertebral body
4. Comparison treatment(s), placebo, or nothing?	Simulated procedure (conscious sedation, local anesthetic)
5. Length of follow-up? Note specified end points, eg, death, cure, etc.	Primary outcome 1 month, also reported at 3, 14, 90 days
6. What outcome measures are used? List all that assess effectiveness.	Primary outcome: modified Roland-Morris Disability Questionnaire (RDQ) and patients' ratings on back-pain scale 0-10. RDQ=valid, reliable scoring of physical disability associated with back pain, scored 0-23, with higher score indicative of greater disability. Outcome was % of patients who had 30% decrease in RDQ and pain score (threshold considered clinical significant). Secondary outcomes: scores on Pain Frequency Index, Pain Bothersome Index, study of osteoporotic fractures-ADL scale, European Quality of Life (QOL) scale, use of opioid meds, scores on physical component scale, mental component summary.
7. What is the effect of the intervention(s)? Include absolute risk, relative risk, NNT, CI, *P* values, etc.	Primary outcomes at 1 month 1. Mean RDQ score: adjusted tx effect 0.7, 95% CI -1.3 to 2.8, *P*=.49 vert group 12.0±6.3 control 13.0±6.4 2. Mean pain-intensity rating: adjusted tx effect 0.7, 95% CI -0.3 to 1.7, *P*=.19 vert group: 3.9±2.9 control 4.6±3.0 Both groups had substantial improvement in back-related disability/pain at 3 days. Secondary outcomes: no significant difference in any measure, including pain/QOL at 1 mo Crossover at 3 mos: 8 pts in vertebroplasty group (12%) 27 pts in control group (43%), *P*<.001 Pts who crossed over (from either group) did not have same level of improvement at 3 months as pts who didn't cross over.

8. Study addresses an appropriate and clearly focused question - ***select one***	Well covered
9. Random allocation to comparison groups	Well covered
10. Concealed allocation to comparison groups	Adequately addressed
11. Subjects and investigators kept “blind” to comparison group allocation	Well covered
12. Comparison groups are similar at the start of the trial	Well covered
13. Were there any differences between the groups/arms of the study other than the intervention under investigation? If yes, please indicate whether the differences are a potential source of bias.	Well covered
14. Were all relevant outcomes measured in a standardized, valid, and reliable way?	Well covered
15. Are patient-oriented outcomes included? If yes, what are they?	Yes: back-related disability and pain.
16. What percent dropped out, and were lost to follow-up? Could this bias the results? How?	1 in tx group, 2 in placebo group.
17. Was there an intention-to-treat analysis? If not, could this bias the results? How?	Yes
18. If a multi-site study, are results comparable for all sites?	Yes
19. Is the funding for the trial a potential source of bias? If yes, what measures were taken to insure scientific integrity?	No. Funded by a grant from National Institute of Arthritis and Musculoskeletal and Skin Diseases. Authors state: No commercial entity paid for any materials used in the study. Research funds paid for all costs related to the control interventions. Costs of the vertebroplasty procedure were billed to insurance

20. To which patients might the findings apply? Include patients in the study and other patients to whom the findings may be generalized.	Inpatients and outpatients with uncontrolled back pain due to vertebral fractures.
21. In what care settings might the findings apply, or not apply?	Same
22. To which clinicians or policy makers might the findings be relevant?	Anesthesiologists, pain specialists, neurosurgeons, primary care providers, hospitalists, ER providers.

SECTION 3: REVIEW OF SECONDARY LITERATURE

1. DynaMed excerpts

2. DynaMed citation/access date	Vertebral Fractures. In: DynaMed [database online]. Available at: www.DynamicMedical.com Last updated: August 20, 2009. Accessed August 23, 2009.
3. Bottom line recommendation or summary of evidence from DynaMed (1-2 sentences)	Vertebroplasty may not be effective.
4. UpToDate excerpts	
5. UpToDate citation/access date	Sheon et al. Clinical manifestations and treatment of osteoporotic thoracolumbar vertebral compression fractures. In: Basow DS, ed. UpToDate [database online]. Waltham, Mass: UpToDate; 2009. Available at: http://www.uptodate.com. Last updated: June 1, 2009. Accessed August 23, 2009.
6. Bottom line recommendation or summary of evidence from UpToDate (1-2 sentences)	May help with short-term pain, not effective for long term pain, though long term benefits do include prevention of recurrent pain, less height loss, and improved functionality.
7. PEPID PCP excerpts	Treatment • Ortho/trauma consult • Nonoperative treatment Most Fxs with <40% loss of vertebral height
8. PEPID citation/access data	Vertebral body fractures. Available at: http://www.pepidonline.com. Accessed August 23, 2009.
9. PEPID content updating	1. Do you recommend that PEPID get updated on this topic? Yes, there is important evidence or recommendations that are missing 2. Is there an EBM Inquiry (HelpDesk Answers and Clinical Inquiries) as indicated by the EB icon (EB) that should be updated on the basis of the review? No, this topic is current, accurate and up to date.
10. Other excerpts (USPSTF; other guidelines; etc.)	None
11. Citations for other excerpts	n/a
12. Bottom line recommendation or summary of evidence from Other Sources (1-2 sentences)	n/a

SECTION 4: CONCLUSIONS

1. Validity: How well does the study minimize sources of internal bias and maximize internal validity? Give one number on a scale of 1 to 7 (1=extremely well; 4=neutral; 7=extremely poorly)	4
2. If 4.1 was coded as 4, 5, 6, or 7, please describe the potential bias and how it could affect the study results. Specifically, what is the likely direction in which potential sources of internal bias might affect the results?	Underpowered
3. Relevance: Are the results of this study generalizable to and relevant to the health care needs of patients cared for by "full scope" family physicians? Give one number on a scale of 1 to 7 (1=extremely well; 4=neutral; 7=extremely poorly)	1
4. If 4.3 was coded as 4, 5, 6, or 7, please provide an explanation.	
5. Practice-changing potential: If the findings of the study are both valid and relevant, does the practice that would be based on these findings represent a change from current practice? Give one number on a scale of 1 to 7 (1=definitely a change from current practice; 4=uncertain; 7=definitely not a change from current practice)	2
6. If 4.5 was coded as 1, 2, 3, or 4, please describe the potential new practice recommendation. Please be specific about what should be done, the target patient population and the expected benefit.	New practice recommendation: Do not recommend vertebroplasty for painful spinal fractures.
7. Applicability to a Family Medical Care Setting: Is the change in practice recommendation something that could be done in a medical care setting by a family physician (office, hospital, nursing home, etc), such as a prescribing a medication, vitamin or herbal remedy; performing or ordering a diagnostic test;	2

performing or referring for a procedure; advising, educating or counseling a patient; or creating a system for implementing an intervention? Give one number on a scale of 1 to 7 (1=definitely could be done in a medical care setting; 4=uncertain; 7=definitely could not be done in a medical care setting)
8. If you coded 4.7 as a 4, 5, 6 or 7, please explain.

9. Immediacy of Implementation: Are there major barriers to immediate implementation? Would the cost or the potential for reimbursement prohibit implementation in most family medicine practices? Are there regulatory issues that prohibit implementation? Is the service, device, drug or other essentials available on the market? Give one number on a scale of 1 to 7 (1=definitely could be immediately applied; 4=uncertain; 7=definitely could not be immediately applied) 1
10. If you coded 4.9 as 4, 5, 6, or 7, please explain why.

11. Clinical meaningful outcomes or patient oriented outcomes: Are the outcomes measured in the study clinically meaningful or patient oriented? Give one number on a scale of 1 to 7 (1=definitely clinically meaningful or patient oriented; 4=uncertain; 7=definitely not clinically meaningful or patient oriented) 1
12. If you coded 4.11 as a 4, 5, 6, or 7 please explain why.

13. In your opinion, is this a Pending PURL? Give one number on a scale of 1 to 7 (1=definitely a Pending PURL; 4=uncertain; 7=definitely not a Pending PURL) 2

Criteria for a Pending PURL:

- Valid: Strong internal scientific validity; the

findings appears to be true.
- Relevant: Relevant to the practice of family medicine
- Practice changing: There is a specific identifiable new practice recommendation that is applicable to what family physicians do in medical care settings and seems different than current practice.
- Applicability in medical setting:
- Immediacy of implementation

14. Comments on your response in 4.13.	The study is small and may be underpowered to detect a difference in outcome, but perhaps in combination with the other study on this topic this week, it could be a PURL.

SECTION 5: EDITORIAL DECISIONS

1. FPIN PURLs editorial decision (select one)	Pending PURL—Forward to JFP Editor
2. Follow up issues for Pending PURL Reviewer	
3. FPIN PURLS Editor making decision	Sarah-Anne Schumann
4. Date of decision	August 27, 2009
5. Brief summary of decision	The quality of previous studies informing current practice has been fairly low (eg, observational studies). Each of these studies may have been underpowered to detect a true difference and may not be too convincing individually. But cumulatively, they do suggest that vertebroplasty is not an effective intervention.