Evidence Table
Skeletal Metastasis
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Clinical Question: In patients over the age of 18 with active or recent cancer, is the risk of fracture with metastasis greater than the effects of bedrest on function and quality of life?

Key Words: Cancer, skeletal or bone, metastasis

Databases Searched: APTA's Hooked on Evidence, Pubmed, Cinahl
These two databases were searched in the following sequences:
Hooked on Evidence: **metastasis** – no articles found
Pubmed: **skeletal AND metastasis AND physiotherapy**- 1; **skeletal AND metastasis AND physical therapy**– 0; **bone AND metastasis AND physiotherapy**– 6; **bone AND metastasis AND physical therapy**– 8; **osseous AND metastasis AND physical therapy**– 0; **osseous AND metastasis AND physiotherapy**– 2; Limits of English, adults.
Cinahl: **fracture AND cancer** – 4 articles, none applicable; **fracture AND** metastasis – 2 articles, none applicable. **Skeletal AND** metastasis – 28 articles primarily on prognosis and medications, none applicable; **osseous AND** metastasis – 10 articles primarily on prognosis and surgical options, none applicable; Limits of English, adults

Introduction:

Bone metastasis is a possible complication of advanced stages of cancer. The debilitating pain and pathological fractures have a profound affect on a person's quality of life and functional mobility. The most common cancers to metastasize to bone are breast, prostate, lung, kidney and thyroid[1]. Bone metastases can cause significant pain, pathological fractures, spinal cord compression, and hypercalcemia. Skeletal metastasis can cause either an osteolytic or an osteoblastic reaction in the bone. An osteolytic reaction stimulates bone tissue to be reabsorbed. An osteoblastic reaction stimulates bone growth, although not likely of good quality[2]. The lysis of bone tissue causes an increase in calcium (hypercalcemia) in the blood[3]. There is not a consensus among healthcare professionals regarding the risk of pathological fracture during weight bearing activities by a patient with bone metastases. Currently there is not a well-researched method to predict which patients will experience a pathological fracture, and the alternative option of bedrest has its own problems, with known side effects of progressive weakness, muscle atrophy, osteoporosis[3], muscle contracture, pressure sores, pneumonia, and increased risk of thromboembolic disease[2]. The benefits of mobilization include prevention/reduction of the prior symptoms and risks, as well as improved quality of life.

Citation, Design	Purpose of Document	Participants	Cancer Types Addressed	Intervention	Outcome Measures	Main Results	Conclusions
Bunting & Shea *Cancer* 2001. Review	A review and statistical analysis of methods for predicting	N/A	Not specified	Prediction of risk of fracture by use of: - Bone scan - Diameter of	The authors addressed the percentage of patients with bone	Any method of predicting risk addresses the problem at that	Risk of fracture and risk of side effects of bedrest are not easily separated. The author suggests

	pathological fracture and the risk for rehabilitating these patients.			lesion - Percentage of the cortex affected by lesion - Score of variables (size of lesion, location, pain, type)	mets that resulted in fracture and statistical significance of results.	instant, while tumors change rapidly. Also, all studies addressed mets in long bones and did not differentiate between the amount of weight on the bone in question, and new treatments may affect the way mets react	general guidelines: - AROM only of limb with mets - Patients informed of risks/benefits of both - When severe pain or hypercalcemia is noted in pts, hospice should be considered
Bunting RW *Clinical Orthopaedics and Related Research*. 1995. Review	A review of rehabilitation limitations with patients with bony metastases and pathological fractures.	N/A	Not specified	Complications of bone mets include: - Spinal cord compression - Pain - Pathological fracture	Risk factors for a poor outcome include: history or development of hypercalcemia, requiring parenteral narcotics to control pain	N/A	The author concluded that the patients with skeletal metastases are appropriate rehab candidates to improve quality of remaining life.
Bunting, et al. *Clinical Orthopaedics and Related Research.* 1985 Cohort	Is there an increased risk of fracture during rehabilitation of patients with skeletal metastases?	54 patients with metastatic bone disease.	Not specified	Observation of patients admitted for physical therapy in a rehabilitation unit.	Measurements were positive or negative for fracture, with documentation of age, sex, site of primary cancer, previous treatment for primary cancer, pathologic fx and treatment type, type of lesion, activity during fracture.	16 fractures were recorded in 12 patients, with only 1 fracture occurring during physical therapy. Fractures in order of frequency include: new or further vertebral body compression, humerus, rib, femur, and knee. Fractures occurred fall out of bed, rolling in bed, sit-stand transfer, lying in bed, sliding board transfer, and unknown.	Patients with increased likelihood of fracture in this study were younger, female, in a more advanced stage of disease, and a prior pathological fracture. However, the risk of fracture related to rehabilitation is low, and fractures are possible even when in bedrest.
Mirels H *Clinical Orthopedics and Related Research* 1985 Retrospective Study	Are there specific diagnostic features of metastatic bony tumors that are predictive of fracture?	38 patients with 78 metastatic lesions of long bones	Primarily breast, but also myeloma, prostate, lung, cervix, and occult.	Review of x-rays and files on patients with known mets from 1981 to 1985 at one facility.	Location, pain level, lesion type, and size of lesion all contributed to a point system from 1 – 12.	Chance of fracture for a score of 7 was 4%, 8 was 15%, 9 was 33%, and as the score increased beyond 7, the risk of fracture increased.	The author concluded that the weighted scoring system was more accurate than a single risk factor in predicting risk of impending fracture, and thus

							determining which patients needed prophylactic fixation.

Conclusion:

The risk of pathological fracture in patients with bony metastases is difficult to accurately predict, and the side effects of prolonged bedrest are well known. The study by Bunting, et al. demonstrated a low risk of pathological fracture in patients undergoing physical therapy, however the research has not been replicated that this writer is aware of. The conclusion that can be reached is that mobilization of patients with bone metastases should be undertaken with great caution, with full patient/caregiver understanding of the risks and benefits of both mobilization and prolonged bedrest. The activity should be pain-limited in the patient's active range of motion. Manual muscle testing and resistance exercises are not appropriate on the involved extremity. Further research is necessary to reach any solid conclusions regarding patient safety in this area.

Works Cited:

1. Bone metastasis detailed guide. *American Cancer Society* [online]. Available at http://documents.cancer.org/6119.00/6119.00.pdf. Accessed October 3, 2006.
2. Bunting RW and Shea B. Bone metastasis and rehabilitation. *Cancer*. 2001; 92 [supplement]; 1020 – 8.
3. Bunting RW. Rehabilitation of cancer patients with skeletal metastasis. *Clinical Orthopaedics and Related Research.* 1995; 312: 197 – 200.
4. Bunting RW, Lamont-Havers W, Schweon D, Kliman A. Pathologic fracture risk in rehabilitation of patients with bony metastases. *Clinical Orthopaedics and Related Research.* 1985; 192: 222 – 227.
5. Mirels H. *Clinical Orthopaedics and Related Research.* 1985; 249: 256 – 264.