

RISK FACTORS CORRELATED TO INCREASED FRACTURE RISK IN PATIENTS WITH BONY METASTASES

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OBJECTIVES

- Recognize common symptoms of bony metastases
- Identify factors linked to an increased fracture risk in patients with bony metastases
- Identify red flags that could indicate a patient has a fracture
- Recognize patients that specifically require an order from the physicians before mobilizing
- Determine if physical therapy is safe for these patients who are at an increased risk of fracture and any extra recommended precautions

PREVALENCE OF BONY METASTASES

(HERNANDEZ, 2016 & 2018)

Tumor type and stage at diagnosis	Incidence of bone metastases (%)		
	1-year (95% CI)	5-year (95% CI)	10-year (95% CI)
Breast (N=137,720)	3.3 (3.2–3.4)	5.8 (5.7–6.0)	7.9 (7.7–8.1)
Stage IV (N = 5,985)	35.7 (34.5 – 36.9)	49.9 (48.6 – 51.3)	60.8 (58.9 – 62.6)
Prostate (N=22,801)	17.5 (17.0–18.0)	24.0 (23.4–24.6)	28.3 (27.5–29.2)
Stage IV (N = 3,908)	44.5 (43.0 – 46.1)	60.4 (58.7 – 62.1)	71.1 (68.2 – 73.9)
Lung (N=59,344)	10.0 (9.8–10.3)	12.0 (11.7–12.3)	12.7 (12.3–13.2)
Stage IV (N = 13,487)	22.1 (21.4 – 22.8)	25.0 (24.3 – 25.8)	N/A
Other Tumors (N=162,868)	1.9 (1.9–2.0)	3.1 (3.1–3.2)	3.8 (3.6–3.9)
Stage IV (N = 22,147)	5.1 (4.8 – 5.4)	7.8 (7.4 – 8.2)	N/A



COMMON SYMPTOMS OF BONY METASTASES (COLEMAN; 2001)

- Worsening bone pain
- Night pain
- Fracture
- Spinal Cord Compression/ Nerve Root Compression → neurological symptoms (bowel/bladder incontinence, muscular weakness or numbness)
- Hypercalcemia (serum calcium >3.0 mmol/l) → loss of appetite, nausea, thirst, constipation, tiredness, or confusion
- Spinal instability- any movement produces extreme pain



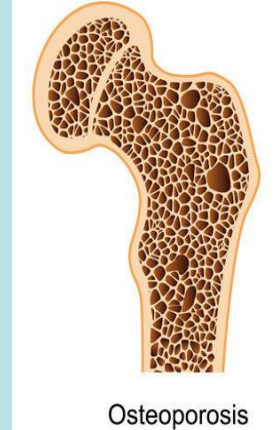
RISK FACTORS FOR FRACTURE



RISK FACTORS FOR FRACTURE



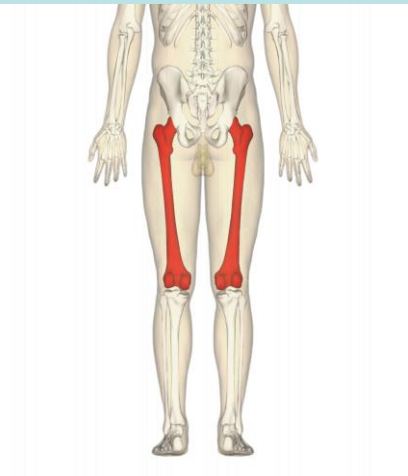
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PAIN AND INCREASED FRACTURE RISK

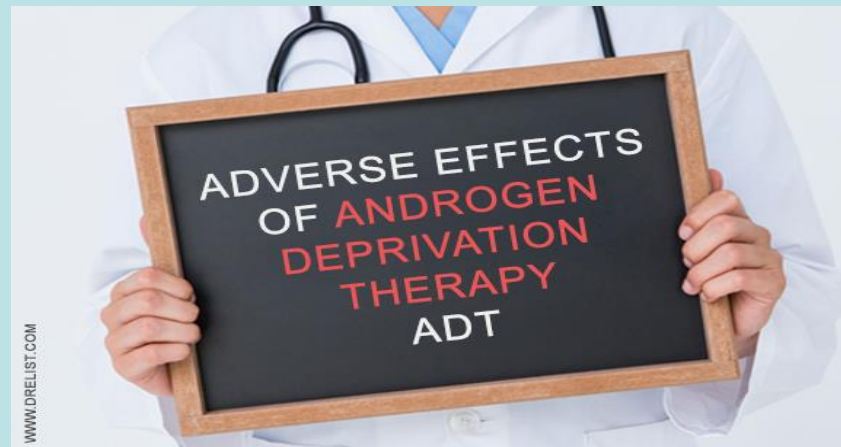
- Pain with weight bearing and functional activity***
 - **Functional pain: single best predictor of pathological fracture** (Maltser; 2017)
(Sheill; 2018, Mirels; 2003)
- Increasing local pain
(Klaassen; 2017, Benca; 2016)
- Pain at fracture site before injury
 - **78-84% of patients had fractures**
(Yong-Cheng; 2012, Dijkstra; 1997)



ADT AND FRACTURE RISK

(SHEILL; 2018, WANG; 2015, ALIBHAI; 2009, SHAHINIAN; 2005)

- 4 studies (3 cohort studies and 1 narrative review):
 - ADT use increased fracture risk by 20-45%
- Statistically significant increase in fracture risk by 2.83x



MIREL'S CLASSIFICATION SYSTEM OF 1989

(BENCA; 2016, MIRELS; 2003, DAMRON; 2003)

- Golden standard used
- Harder for PTs to use
- Retrospective analysis studied classification system:
 - Fracture scores ranged between 7-12
 - Score of 9 or higher- most accurate for diagnosing impending fracture (0% false positive)
- Reproducible and valid
- Sensitivity: 91%, Specificity: 35%



MIREL'S CLASSIFICATION SYSTEM OF 1989

(MIRELS; 2003)

Variable	1	2	3
Site	Upper Extremity	Lower Extremity	Peritrochanteric
Pain	Mild	Moderate	Severe
Lesion	Blastic	Mixed	Lytic
Size	<1/3 rd diameter	1/3 rd -2/3 rd	>2/3 rd

RED FLAGS INDICATING FRACTURE

(DOWNIE; 2013)

- Local pain at specific site in bone, especially with weight bearing and palpation
- Inability to bear weight
- Lump
- Swelling
- Bruising



- Limited joint ROM
- Neurological changes (muscle weakness, numbness/tingling, changes in bowel/bladder) → spinal cord compression
- Night pain
- Gait abnormality

WHAT PATIENTS REQUIRE DOCTORS' ORDERS FOR SAFE MOBILIZATION?

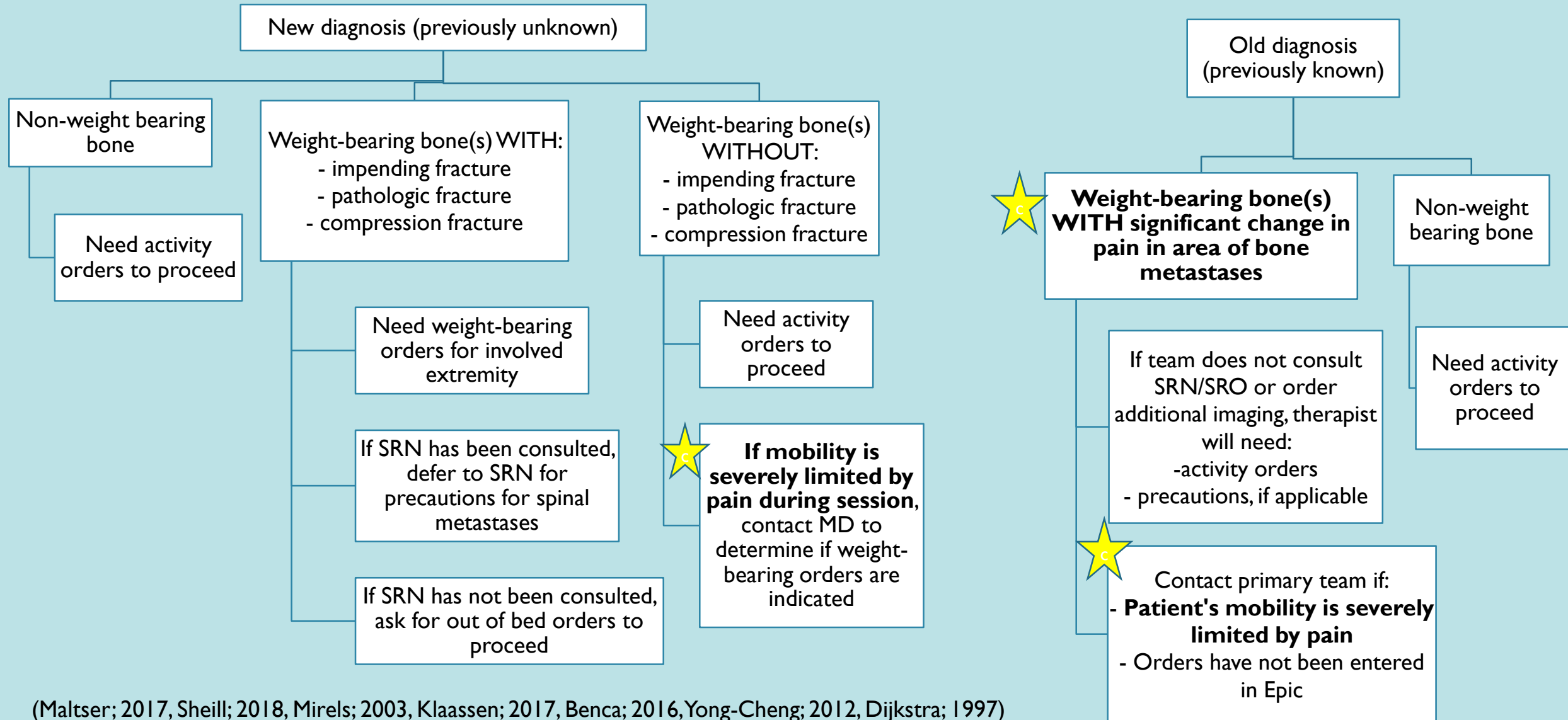
- Imaging shows a new/changed fracture, especially in weight bearing bones
- ****Pain limiting functional mobility**** (Maltser; 2017)
- Increasing local pain in area of bony metastases (Maltser; 2017)
- Patient on ADT with bone pain (Wang; 2015)



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BONE METASTASES DECISION FLOWSHEET



THERAPY RECOMMENDATIONS

(MALTSER; 2017)

IS THERAPY RECOMMENDED?

- Safe, effective, no increased fracture risk



STRATEGIES TO INCLUDE

- Maintain function, promote safety, and fracture prevention with ADLs
- Fall prevention strategies
- Education for safe lifting and carrying heavy objects
- Need comprehensive mobility assessment
- Assess neuro signs and symptoms
- Caregiver education for safety and function in home

GENERAL SAFETY MEASURES WITH BONE METASTASES

(MALTSER; 2017)

- Avoid excessive resistive, compressive, or rotational torque-like forces on involved limb
- Avoid excessive spinal flexion, extension, and rotation
- More severe fracture risk:
 - Offload affected limb
 - Use AD or orthoses to safely enhance function and mobility
- No MMT in affected limb
- Monitor throughout session for increasing functional pain



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CONCLUSION

- Currently lack adequate clinical methods for fracture risk prediction in patients with metastases
- Symptoms of bony metastases: night pain, fracture, worsening pain, neurological symptoms
- Pain with functional activity single best predictor of increased fracture risk
- Therapists need to assess red flags that could indicate patient has a fracture
- Certain patients will require physician orders before mobilizing
 - Especially those with pain limiting functional mobility
- Therapy is recommended for these patients to maintain function, promote safety, and prevent fractures with ADLs

ANY QUESTIONS??



Thank you!!!

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