### Diagnosis and Treatment of Neoplastic Vertebral Fractures in Adults

#### Clinical Question List

**Definition:**
Fracture of the vertebral body due to loss or destruction of cortical or trabecular bone structural integrity from a primary or metastatic neoplastic process. Fractures may or may not be symptomatic and may or may not result in clinically significant deformity and/or neurologic deficit.

**Inclusion Criteria:**
- Age ≥ 18 years
- Spine or sacral fractures
- Single or multiple level fractures
- Simple or complex fractures
- With or without pain. Pain may be axial, radicular, generalized or combination.

**Exclusion Criteria:**
- Acute or chronic spine infection including epidural abscess, discitis, and/or osteomyelitis
- Major trauma
- Prior surgery at the affected level
- Isolated intradural tumor

**Natural History**
- Does underlying histology affect the natural history of metastatic neoplastic vertebral fractures?
- Aside from the effects of underlying histology, what are the expected outcomes of neoplastic vertebral fractures in the absence of treatment directed at the fracture or underlying disease?

**Cost Effectiveness**
- In the treatment of neoplastic vertebral fractures, what is the comparative cost-effectiveness of
  1. Medical and/or radiation therapy alone vs.
  2. Vertebral augmentation (with or without radiation therapy) vs.
  3. Thermal ablation, radiofrequency ablation or cryoablation with or without augmentation vs.
  4. Operative fusion/fixedation

**Clinical Diagnosis**
- Which elements (individual or in combination) of a history, symptoms, and/or physical examination are most sensitive and specific for identifying a patient with neoplastic vertebral fracture?

**Medical Treatment**
- How do non-pharmacologic treatments (e.g., bracing, physical therapy, acupuncture, massage, cannabis, exercise, etc.) compare in terms of reducing severity and duration of pain and disability in neoplastic vertebral fractures?
How do pharmacologic treatments (non-chemotherapeutic) and non-pharmacologic treatments compare with interventional treatments in terms of reducing severity and duration of pain and disability in neoplastic vertebral fractures?

Does timing or sequencing of interventions (e.g., analgesics, bisphosphonates, chemotherapy, XRT, stereotactic XRT, bracing, surgery or vertebral augmentation) improve patient outcomes?

Do restrictions on patient activity alter outcomes in patients with neoplastic vertebral fractures?

Do general and individualized physical therapy programs differ in pain and functional outcomes for patients with neoplastic vertebral fractures?

**Imaging Diagnosis**

Which imaging modalities and findings are most sensitive and specific for the accurate diagnosis of and treatment planning for neoplastic vertebral fractures?

**Interventional Treatment**

What are the criteria/indications/contraindications for vertebral augmentation in patients with neoplastic vertebral fractures?

How do interventional treatments (augmentation, thermal ablation, radiofrequency ablation and cryoablation) compare to medical treatments in reducing severity and duration of pain and disability in patients with neoplastic vertebral fractures?

Are there specific characteristics of the fracture or the patient that influence outcomes in patients with neoplastic vertebral fractures undergoing vertebral augmentation?

What is the risk of treating multiple vertebral levels at one time, for patients with multi-level neoplastic vertebral fractures?

What is the incidence and risk factors for adjacent vertebral body fractures after vertebral augmentation for neoplastic vertebral fractures?

Does the addition of vertebral augmentation to radiation therapy improve outcomes in patients with neoplastic vertebral fractures?

Does the prophylactic use of vertebral augmentation reduce the risk of vertebral fracture after stereotactic radiotherapy for vertebral metastasis?

Does physical therapy after augmentation affect patient outcomes, including pain and function?

**Surgical Treatment**

Does surgical fixation with or without fusion improve outcomes in patients with neoplastic vertebral fractures compared to nonoperative care or interventional procedures?

Does the use of minimally invasive surgical approaches (e.g., percutaneous pedicle screws, muscle-sparing decompression/arhthodesis techniques) improve outcomes compared to open surgical approaches in patients undergoing surgery for neoplastic vertebral fracture?

In patients undergoing surgery for neoplastic vertebral fractures, are clinical and radiological outcomes affected by the types of implants used?

In patients undergoing surgery for neoplastic vertebral fractures, are clinical and radiological outcomes affected by the use of vertebral augmentation of the implants, of the fractured vertebral body, or of adjacent levels?