

## Pressure Ulcers

### KEY MESSAGES

1. Avoid unnecessary imaging in pressure ulcers. Do imaging if worried about an underlying abscess, not to look for osteomyelitis.
2. Avoid unnecessarily prolonged antibiotics in infected pressure ulcers, 5-14 days is sufficient for most.
3. Exposed bone and bony changes on imaging are expected in pressure ulcers. Cure requires surgery where appropriate.

### DIAGNOSIS

- Staging of pressure ulcers:
  - Stage 1 – Intact skin with non-blanchable erythema
  - Stage 2 – Partial loss of dermis with shallow open ulcer
  - Stage 3 – Full thickness skin loss with exposed subcutaneous fat
  - Stage 4 – Full thickness skin loss with exposed bone, muscle, or tendon
  - Stage X – Unstageable due to overlying slough or eschar
- Exposed bone (or positive probe to bone) does not correlate with osteomyelitis in sacral pressure ulcers. Histologic studies have shown most patients with exposed bone do not have osteomyelitis.
- Pressure ulcers often cause non-infectious, inflammatory changes in bone including reactive bony changes and fibrosis.
- Bone biopsy with histopathological evaluation is the gold standard for diagnosis of pressure ulcer associated osteomyelitis.
- Imaging studies (including CT, MRI, and nuclear medicine) are unable to differentiate non-infectious inflammatory bone changes from osteomyelitis. Only bone biopsy can confirm the presence of osteomyelitis.
- Wound swabs from unbridged sacral ulcers are likely to grow a wide range of cutaneous and enteric colonizing flora. These correlate poorly with the true invasive tissue/bone pathogen(s). If done, presence or absence of MRSA is most therapeutically significant.

### MICROBIOLOGY

- Soft tissue and bone infections are often polymicrobial
- Commonly cultured organisms include *Staphylococcus* (including methicillin-resistant), *Streptococcus*, *Enterococcus*, Enterobacterales, *Pseudomonas aeruginosa*, and *Bacteroides*.
- Polymicrobial or anaerobic bacteremia may be a manifestation of an infected pressure ulcer.

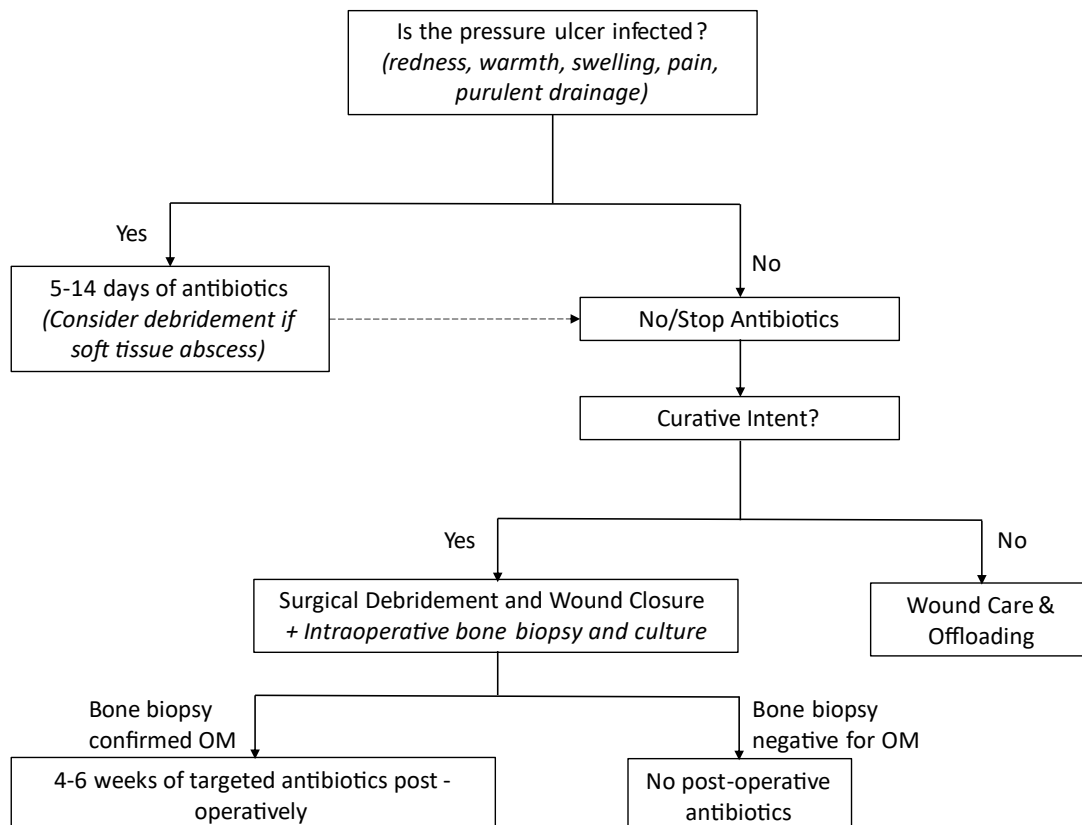
### MANAGEMENT

#### General Principles

- Antibiotics are only needed acutely if soft tissue infection or bacteremia
- Cure of stage 4 pressure ulcers requires adequate nutrition, pressure offloading, surgical debridement of infected and devitalized tissue with tissue coverage, and ongoing wound care. If chronic osteomyelitis is confirmed, 4-6 weeks of post-operative antibiotics may prevent failure of surgical wound closure.
- Candidates for definitive surgical closure must be highly motivated to adhere to pressure offloading over the long-term. Definitive surgical closure is not an option in those whose underlying cause of pressure ulcer has not been mitigated due to high recurrence rates.
- Treatment of osteomyelitis associated with a stage 4 pressure ulcer without surgical wound closure is illogical as exposed bone remains open to further contamination.

## Management Approach

Aspect of Care	Management Approach	
	Definitive Surgical Closure	NO Definitive Surgical Closure
Imaging Studies	NO – only if needed for surgical planning	NO – unless concern for deep tissue abscess as source of sepsis
Wound swabs	NO	NO
Surgical Timing	Immediate debridement. Surgical wound closure when tissue healthy and viable.  Multistage procedures or prolonged initial antibiotics are not shown to reduce post-operative complications.	Bedside or surgical debridement by any surgical specialty familiar with anatomic region as needed to control infection.
Bone biopsy	YES – send for histopathology to confirm osteomyelitis and bone culture to direct therapy. Can be done at the time of definitive surgical closure or preoperatively.	NO
Antibiotics	Only if acute soft tissue infection present.  If OM confirmed, 4-6 weeks of culture-directed therapy following definitive surgical closure to reduce failure of wound closure.	NO  If acute soft tissue infection present, brief course of treatment can be given (5-14 days)
Nutritional Optimization	Optimize to support wound healing	Optimize to support wound healing
Wound Management	Surgical debridement and definitive surgical wound closure	Routine wound care +/- periodic debridement of necrotic/non-viable tissues.
Pressure Off-loading	Yes, to prevent failure of surgical wound closure	Yes, to prevent deterioration and allow potential healing





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