What's that smell? Necrotizing Soft Tissue Infections (NSTI) and their management

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What is it?

- NSTI is a severe and aggressive bacterial skin and soft tissue infection that causes rapidly progressive and extensive soft tissue destruction with associated systemic toxicity, multi-organ failure and death.
- It is characterized by necrosis of the skin, subcutaneous tissues and the fascia[1] and can occur on any part of the body and frequently cannot be distinguished from simple cellulitis upon initial presentation.[2]
- 4 types of infections:
  - Type I (polymicrobial) (most common)
  - Type II (monomicrobial)
  - Type III (marine organisms such as *Vibrio vulnificus*)
  - Type IV (fungal such as mucormycosis).[2,3,4,7]
- The most common bacterial organisms are group A streptococcus (GAS or *Streptococcus pyogenes*), clostridia species, MRSA, MSSA and Gram negative bacteria.[1,4,6]

Evaluation

- NSTI can occur spontaneously with no clear portal of entry **OR** it can be associated with trauma or surgery
- Perform a thorough history and physical exam
  - The most common findings in order of frequency are:
    - Edema that extends beyond visible erythema (75%)
    - Severe pain out of proportion to physical exam (72%)
    - Erythema without sharp margins (72%)
    - Fever (60%)
    - Crepitus (50%)
    - Skin changes including bullae, necrosis, or ecchymosis (38%). [9]
- The infection can spread as quickly as 2.5cm per hour with or without obvious skin changes.[6,10]

Laboratory work & imaging

- Lab studies only support the diagnosis
- Imaging is not routinely needed, but should imaging be necessary, a computerized tomography (CT) scan with intravenous (IV) contrast is the study of choice as an MRI would cause a delay to the OR.[7]
- The Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score can be used to help determine the risk of NSTI
  - It is comprised of six components: CRP, WBC, hemoglobin, sodium, glucose and creatinine
  - Score $\geq$ 6 indicates intermediate probability (50–75%) for NSTI and thus merits careful evaluation
  - Score $\geq$ 8 suggests a high probability (>75%) of a NSTI[1,7,9,11]

Treatment

- The cornerstone of NSTI treatment is early diagnosis, prompt administration of empiric broad-spectrum antibiotics and **emergent surgical exploration** with aggressive debridement of necrotic and infected tissue.[4]
- Three antibiotics are administered in the following order (per UMC protocol)
  - Clindamycin
  - Piperacillin/Tazobactam or a Carbapenem
  - Vancomycin
- **Emergent and adequate surgical debridement is the most important intervention**
- Mortality rates have ranged **from 23% to 76%** with recent studies demonstrating mortality rates around 25% with standard management.[1,2,3,4]

UMC Protocol

- Any concern for NSTI requires an emergent page to the general surgery team for evaluation
- These patients are treated with the same acuity as a level 1 trauma
- A PowerPlan within Cerner's EMR to be activated for antibiotics and labs
- Antibiotics administered in the following order:
  - Clindamycin
  - Piperacillin/Tazobactam (or other Carbapenem)
  - Vancomycin

UMC PROTOCOL

- Emergent and aggressive surgical debridement
- All patients are managed by the surgical ICU team post operatively
- Repeat operation to be done within the following 24 hours from initial surgery
- De-escalate antibiotics based on intra-operative cultures and tissue samples

But Why?

- The mortality of NSTI has historically been extremely high, but has decreased in recent years due to prompt recognition and aggressive treatment by a multidisciplinary team throughout a patient's hospital course.[4]
- Our intent is to reduce morbidity and mortality for NSTI patients in the El Paso region by prompt and aggressive treatment
- We hope to ascertain commonalities amongst our patient population to help identify patients at an increased risk for development of NSTIs as well as more tailored therapy based on the most commonly encountered infections at UMC

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Questions?