- These infections can be caused by:
  1. monomicrobial pathogens including:
     (i) streptococci especially Streptococcus pyogenes (approximately 10% are caused by group A streptococcus alone)
     (ii) Clostridium perfringens (gas gangrene) and other clostridial species,
     (iii) Staphylococcus aureus,
     (iv) Vibrio vulnificus and other Vibrio species,
     (v) Aeromonas hydrophila
  2. polymicrobial synergistic gangrene involves:
     (i) mixed aerobe-anaerobe bacterial flora (eg Escherichia coli, Bacteroides fragilis, streptococci and staphylococci).

- Underlying comorbidities that may predispose to necrotizing fasciitis include diabetes mellitus, alcohol abuse, peripheral vascular disease, renal failure, odontogenic infection, and malignancy; it may complicate chicken pox.
- Group A streptococcal necrotizing fasciitis, however, often occurs in young, previously healthy patients. This is postulated to be due to the absence of previous exposure to more virulent strains of bacteria, as an absence of protective antibody appears to predispose persons to infection.
- Penetrating and crush injuries are particularly likely to cause these infections (chicken pox) in children and adults.

- Necrotizing fasciitis often begins with pain deceptively out of proportion to any skin findings.
- The clinical presentation changes to an exquisitely tender, swollen area of extensive soft tissue erythema.
- The disease progresses at an alarming rate, with skin changing from a shiny red-purple to a pathognomonic gray-blue with ill-defined patches often within 36 hours after onset.
- Necrosis of the superficial fascia and fat produces a thin, watery, malodorous fluid. The area may later become anesthetic as cutaneous nerves are destroyed. A hard, wooden feel of the subcutaneous tissues may be present.
- Crepitation has been noted in approximately 30% and is associated with polymicrobial infections, including Enterobacteriaceae and Clostridium.

- Patients can become extremely toxic, with high fever, anxiety, altered mental status, leukocytosis, shock, and tachycardia.
- The most common primary site is an extremity, although necrotizing fasciitis can affect any body part.
- When present in the perineum and genitalia, it is known as Fournier's gangrene, which is due to infection with group A streptococci or mixed with Clostridial. For Fournier's gangrene of the genitalia, usually following spread from a perianal, retroperitoneal or urinary tract infection, or following genital trauma (eg postpartum).
- For synergistic gangrene and for polymicrobial necrotising fasciitis, in addition to surgical debridement, use: meropenem 1 g (child: 25 mg/kg up to 1 g) IV, 8-hourly.
- For patients hypersensitive to penicillin (excluding immediate hypersensitivity), substitute for benzylpenicillin:
  - cephalothin 2 g (child: 50 mg/kg up to 2 g) IV, 6-hourly.
- For patients with immediate penicillin hypersensitivity, use:
  - metronidazole 500 mg (child: 12.5 mg/kg up to 500 mg) IV, 8-hourly.

- Antimicrobial therapy is directed toward the results of the initial Gram's staining and culturing of aspirate. Initial broad-spectrum therapy with a β-lactam/β-lactamase inhibitor and clindamycin.
- There is evidence to suggest that clindamycin, a protein synthesis inhibitor, suppresses toxin production by streptococci, making it a necessary component of initial antibiotic therapy, until cultures and sensitivities are available.
- In nosocomial infections where MRSA is prevalent or in cases with serious penicillin allergy, empiric therapy with vancomycin and clindamycin would be considered.
- Hyperbaric oxygen therapy remains controversial; however, if available, it may be a beneficial adjunct for a subset of patients with anaerobic gram-negative necrotizing fasciitis.
- Invasive group A streptococcus are associated with higher mortality rates.

- Patients with immediate penicillin hypersensitivity, use:
  - benzylpenicillin 1.8 g (child: 45 mg/kg up to 1.8 g) IV, 4-hourly.
- For patients hypersensitive to penicillin (excluding immediate hypersensitivity), substitute for benzylpenicillin:
  - cephazolin 2 g (child: 50 mg/kg up to 2 g) IV, 8-hourly.
- For patients with immediate penicillin hypersensitivity, use:
  - metronidazole 500 mg (child: 12.5 mg/kg up to 500 mg) IV, 8-hourly.

Pathology:
- The histological hallmark is extensive inflammation and necrosis of the subcutaneous fat, fascia, and muscle.