

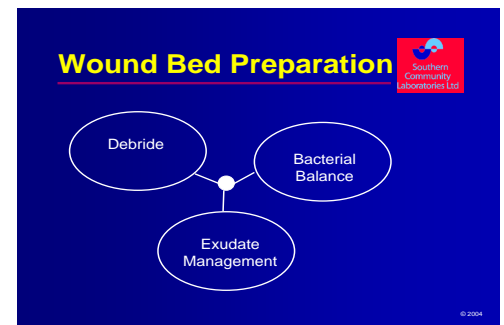
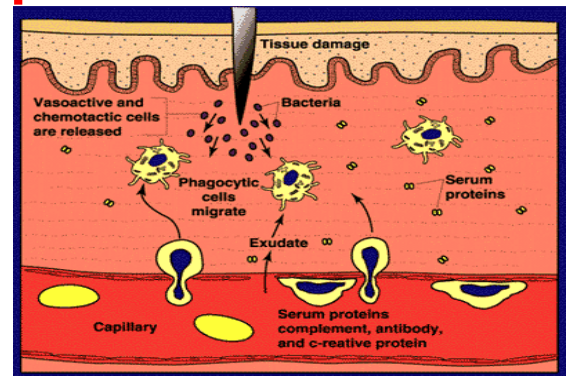
# Wounds – Microbiology Perspectives

## Wound Types

- Surgery
- Acute soft tissue
- Bite
- Diabetic ulcer (5x infection rate)
- Decubitus (pressure) ulcer (underlying issues)
- Burns

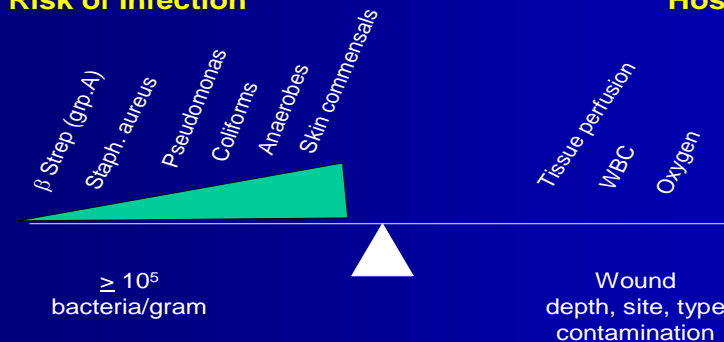
## Wounds can be either:

- **Acute** external damage e.g. surgery, cuts, bites, crush, gun or
- **Chronic**, endogenous damage e.g. ulcers, pressure sores commonly with decreased blood and/or metabolic disorders
- Both acute and chronic wounds are susceptible to contamination with exogenous / endogenous flora ± O<sub>2</sub>
- Increased blood leads to increased tissue perfusion with antibodies and O<sub>2</sub>, this leads to increased healing
- White blood cell activity absent/ reduced with decreased O<sub>2</sub>



## Wound Factors

### Risk of Infection



## Heavy Colonisation

- Delayed healing
- Change in colour of the wound bed
- Friable, absent or abnormal granulation tissue
- Abnormal odour
- Increased serous exudate
- Increased pain at the wound site

## Infection

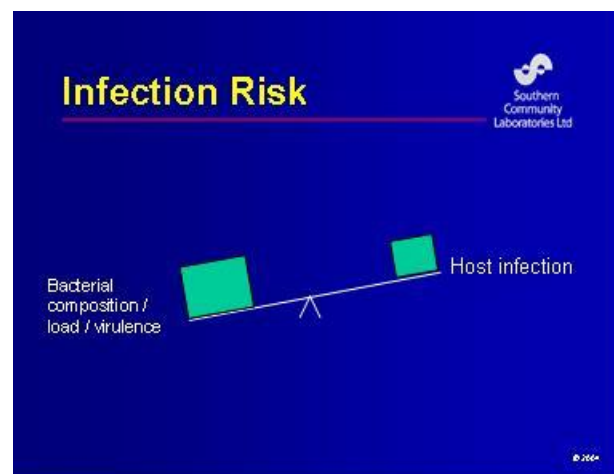
- Advancing redness (erythema), cellulitis
- Fever
- Warmth
- Oedema
- Pain, foul odour
- Pus

## To grow bacteria requires:

- Moisture
- Time
- Nutrients
- Temperature

## Healing vs. Infection

- Moisture leads to wound healing (occlusive dressings) and fresh epithelialisation
- Moisture leads to bacterial growth
- But moisture essential for cell growth/healing – i.e. a balance
- Non-healing wounds
  - ? density organisms most important or
  - ? type organism(s) most important, or neither
  - Increased number of species ↑ infection risk, increased numbers of any species ↑ infection risk



## First Steps

- Remove devitalised tissue (reduces microbial load & ↓ impermeable biofilm formation)
- Irrigate to decrease load of bacteria
- ? antiseptic required to reduce bacterial load if infection or heavy colonisation has led to non-healing wound
- Manage exudates

## Sample Collection

- Swabs
- To clean or not to clean before swab collection?  
Deeper seated infections will usually have causative species on wound surface as well. If uncleaned prior to sampling, there may be some extra less important species present as well, but result is often similar
- Where to sample from the wound? – advancing edge or wound base usually best, active infection area

## Antiseptics - Localised Infection

- Especially chronic or trauma, which are failing to heal (? polymicrobial infection or heavy colonisation)
- For example, Cadexomer iodine, chlorhexidine, 1% silver sulfadiazine (Acetic Acid 1% for Pseudomonas only)
- Povidone iodine cytotoxic, but ? okay for acute surgical – if good blood supply, rapid healing

## Systemic Antibiotics

- Prophylaxis (surgery) only if good evidence shows sufficient benefits without MDRO risk increase
- Severe, febrile, cellulitis i.e. clinically infected

## Alternatives

- Maggots
- Essential oils (dilute, some cytotoxicity issues)
- Honey (e.g. manuka)
  - Increase osmolarity
  - Increase slow release H<sub>2</sub>O<sub>2</sub> (hydrogen peroxide)
  - Deodoriser because glucose use rather than protein metabolism (smelly)
- Hyperbaric O<sub>2</sub> ? okay, but cost, complications
- Debridement
- Vacuum/pressure reduction
  - healing helped (for example, pressure sores)
  - Increase blood, increase moisture, can decrease 1000 x microbial load in four days



## Other

Need good blood sugar regulation, oxygenation, core body temp regulation & surveillance processes

## Wound Microbiology Summary

### Three types of wounds

1. Clinically infected, not healing (culture required to narrow antibiotic range)
2. Not clinically infected, healing (good, no swab required generally)
3. Not clinically infected, not healing (consider culture, ?? not healing because heavy bacterial load)

### Three types/ranges of flora may be reported

1. Clearly identified, recognised pathogen present, e.g. *Staph.aureus*, *Strep.pyogenes*, *Pseudomonas* – treat with narrow range appropriate antibiotic if clinically infected
2. No growth or small numbers “skin flora”, for example, *Staph.epidermidis*. No likely infection identified
3. Polymicrobial mixture, moderate to heavy “pea soup” - if moderate to heavy and wound is non healing at least consider topical antiseptics for 14 days if irrigation has been ineffective, then evaluate – reduced bacterial load can promote healing (?? 20% cases) if other factors do not outweigh this healing process

### Remember!!

1. **You** evaluate if clinically infected or non healing (the lab report cannot do this!)
2. The laboratory will show the likely pathogen(s) to allow appropriate treatment options if clinically indicated

**Footnotes:** Uncommon but very significant! Chronic infections may sometimes be caused by e.g. virus or atypical Mycobacteria – need to specifically request for these due to cost. If clinical infection but no common or likely pathogens isolated at least consider this option