Management of Wounds and Wound Infections

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Disclosure

- I have no actual or potential conflict of interest in relation to this program/presentation.
OBJECTIVES

- Identify types of pharmaceutical products that are available for wound healing
- Identify types of wound cultures and interpretation and identification of topical and systemic antibiotics for treatment of common wound infections
- Osteomyelitis identification and gold standard surgical and pharmaceutical treatment

Wound Scene Investigation

- DIABETIC FOOT ULCERS (WAGNER GRADE)
- VENOUS ULCERATIONS
- ARTERIAL ULCERATIONS
- POST SURGICAL NONHEALING WOUNDS
- PRESSURE ULCERS
- RHINOCEREBRAL MUCORMYCOSIS, FOURNIERS GANGRENE, PYODERMA GANGRENSUM, LEISHMIANSOSIS
- MIXED DISEASE

Clinical Pearl: A thorough History of Present Illness is critical to determining etiology. Your Physical Examination will confirm etiology along with imaging/lab.

2.2 MALIGNANCIES PER 100 LOWER EXTREMITY ULCERATIONS (Armstrong et al, 2017)
DIABETIC FOOT ULCER MANAGEMENT

- KEY FACTORS: TIGHT GLYCEMIC CONTROL, PRESSURE REDUCTION, COMPLIANCE, SMOKING CESSATION, INFECTION PREVENTION, VASCULAR INTERVENTION IF INDICATED
- ASSESS FOR SENSATION (Semmes-Weinstein), CONSIDER FOREIGN BODY (IMAGING IF INDICATED), VASCULAR STATUS, BONE PROBE TEST (BPT), CALLOUS MANAGEMENT, S/SX OF INFECTION, FOOTWEAR
- REMEMBER: TREAT THE WHOLE PATIENT NOT JUST THE HOLE IN THE PATIENT

Radiography of new DFU to look for bony abnormalities, soft tissue gas and foreign body
Sharp debridement best option for removal of debris, eschar and peri-wound callosity

Average 20 weeks to achieve healing

Amputations

- 5 year mortality rate following first time ulceration is 40%
- 52-80% mortality rate after Major Amputation
- 50% more likely to have contralateral limb amputation within next 5 yrs.
- 1/3 will not ambulate again following major amputation
- PAD present in 20-30% of Diabetics
- PAD present in 40% of DFU
- ABI- simple, noninvasive bedside Procedure for screening of PAD

(Thorud et al., 2018)
OFFLOADING ESSENTIAL

- DARCO W/ PEG ASSIST
- DARCO FOREFOOT OFFLOADING
- DARCO HEEL OFFLOADING
- KNEE WHEELER
- TOTAL CONTACT CAST
- AIR CAST

**Clinical Pearl:** Individualize your care to your patient’s needs. Assess gait and risk of falls. DME script required.

VENOUS ULCERATIONS

- GOLD STANDARD COMPRESSION THERAPY- R/O MIXED DISEASE- OBTAIN ABI
- IF CHF IS PRESENT REVIEW RECENT ECHO PRIOR TO DETERMINING COMPRESSION STRENGTH
- If Co-existing untreated DVT present Compression contraindicated.
- COMPLIANCE IS AN ISSUE W/ COMPRESSION- SPEAK WITH PATIENT ABOUT BARRIERS TO COMPRESSION THERAPY TO DETERMINE APPROPRIATE METHOD FOR INDIVIDUAL NEEDS
- CONSIDER VASCULAR CONSULTATION FOR ABLATION IF INDICATED
- Educate on Elevation and Calf pump exercises
Compression Therapy Donning Devices
Arterial Ulcerations

Ischemic wound lateral leg

This picture depicts an ischemic wound on the lateral aspect of the leg near the lateral malleolus. Note that the wound extends through the entire dermis, with a mixture of fibrotic tissue and eschar at its base.

Algorithm for vascular testing in symptomatic PAD

1. Symptoms
   - Critical limb ischemia:
     - Rest pain
     - Tissue loss
     - Non-healing ulceration
     - Gangrene
   - Diagnostic for PAD
     - Referral to vascular specialist

2. Atypical leg symptoms:
   - Claudication
   - Measure ankle-brachial index (ABI)
     - ABI ≤0.90 or >1.3
     - Conclude consultation with vascular specialist
     - Further testing indicated by magnitude of symptoms
       - Duplex imaging
       - CTA
       - MRA
       - Angiography
     - Exercise testing
       - Abnormal: post-exercise ABI decreased by ≥20 percent*
       - Normal: post-exercise ABI unchanged or increased

Patients with diabetes or end-stage renal disease may have falsely elevated ABIs as a result of arterial calcification. The toe-brachial index may be more accurate.

ABI: ankle brachial index; PAD: peripheral artery disease; MRA: magnetic resonance angiography; CTA: computed tomographic angiography.
* Diagnostic for PAD.
MEDICAL MANAGEMENT

- CV RISK FACTOR REDUCTION
- EXERCISE/Weight Loss
- SMOKING CESSION
- ANTIPLATELET THERAPY
- LIPID LOWERING THERAPY
- Glycemic Control
- HYPERTENSION MANAGEMENT
- Vascular Surgery Consult if indicated

(WOCN, 2014)

ANTITHROMBOTIC THERAPY

- SYMPTOMATIC LOWER EXTREMITY PAD- ASA OR CLOPIDOGREL
- ASYMPTOMATIC PAD- ASA IS REASONABLE
- CAPRIE TRIAL CLOPIDOGREL 75MG/DAY ADVANTAGE OVER ASA 325MG/DAY [RRR OF 23.8%]
- PEGASUS- TIMI TRIAL- PAD PATIENTS W/ PRIOR MI TICAGRELOR REDUCED ABSOLUTE RATE OF MAJOR ADVERSE CV EVENT BY 4.1% AND REDUCED RISK FOR PERIPHERAL REVASCULARIZATION (HR 0.63) HOWEVER; 0.12% ABSOLUTE EXCESS OF MAJOR BLEEDING
- EUCLID TRIAL- TICAGRELOR VS CLOPIDOGREL- NO SIGNIFICANT DIFFERENCE IN NEED FOR REVASCULARIZATION.

(Berger et al., 2018)
Post Surgical Wounds

- NPWT- Requires Prescription, studies have shown wound healing est. 3 weeks faster than other therapies.
- Options for disposable, Hospital and home use.
- Allows for continuous irrigation if needed.
- High Risk surgical patients-preventative NPWT disposable device applied to decrease risk of infection and disruption of primary closure.

Pressure Ulcers

- Cost 9.1 to 11.6 billion annually
- Pressure reduction is IMPERATIVE
- Consider comorbidities- DM type II, Chronic Lung conditions, malnutrition, paraplegia, etc.
- Consider dietician consultation if indicated.
- Consider pressure reduction devices- i.e. ROHO CUSHION, LOW AIR LOSS MATTRESS ETC
- Various topical options depending on wound presentation.

(Bryant, 2016)
Topical Wound RX Treatment

- ALWAYS treat underlying cause
- Cleanse Wound (PSI 4-15) force to removed debris w/o harming tissue (Bryant, 2016)
- Debridement if indicated
- Maintain appropriate level of Moisture
- Eliminate Dead Space
- Control odor
- Minimize pain
- Protect wound and peri-wound

Cadexomer Iodine

- Topical Antiseptic- Contains iodine in hydrophilic beads of cadexomer which allows a slow release of iodine in the wound and allows for absorption (Smith & Nephew, 2018)
- Short Term Use for infected wounds
- Gel will turn from brown to yellow/gray- dressing change indicated
- Apply 3 times per week or daily
- Prescribe 150g/wk.
- Apply 1/8 to ¼ thickness to wound base.
- **Metabolism:** Degraded by amylases normally present in Wound Fluid
- **Excretion:** Urine >90%
- **Adverse Reactions:** localized erythema, Eczema, Increased TSH Level, hypersensitivity reaction
- **Contraindications:** Allergy to IODINE, Hashimotos, nontoxic nodular goiter, pregnancy and breastfeeding.
- **Caution:** Renal impairment

(Smith & Nephew, 2018)

- **Calcium Alginate**
  - Highly absorptive- polysaccharide derived from seaweed
  - Hemostatic properties (ion exchange facilitates coagulation)
  - Autolytic debridement
  - Frequency of dressing change varies depending on individual needs
  - Available w/ silver (antimicrobial)
  - Not indicated in 3rd degree burns or dry wounds.
  - Used as a filler

(Bryant, 2016)
Collagenase

- **Mechanism of Action**: Enzyme that breaks down collagen in tissues that are damaged.
- Applied to slough covered wounds and/or burns to remove devitalized tissue. If Eschar present crosshatch to allow for adequate penetration.
- Does not damage healthy granular tissue.
- The enzymes in Santyl may increase risk of bacterial infection in bloodstream.
- Apply nickel thick to wound bed daily. Do **NOT** apply with SILVER products.
- **Side effects**: Irritation at site, anaphylaxis
- Costly, Prescription Required.

(Smith & Nephew, 2018)

- 90 day supply may be more cost effective
- 30gm tube Estimated 250-400.00
- Script Example: Collagenase topical Apply nickel thick to the right anterior lower leg ulceration daily. Dispense: 90gm. Refills: 0.
Contact Layer

- Conforming & Porous
- Indications: partial or full thickness wounds, donor sites, split thickness skin grafts
- Changed weekly or as indicated.
- Works well under compression therapy- may apply topical agent over the contact layer or apply secondary dressing for absorption.

(Bryant, 2016)

Hydrocolloid

- Gel forming agents (gelatin, pectin, carboxymethylcellulose
- Impermeable to contaminants
- Promotes autolysis, reduces pain, Promotes moist wound bed
- Adhesive, molds to contours
- 1-2 inch wound edge overlap, apply light pressure for body heat to promote adhesion, change every 3-5 days.
- Indications for use: Partial thickness wounds w/o depth, light exudative wound, Contraindicated in third degree burns, avoid dry eschar, avoid infected wound

(Bryant, 2016)
Medical Grade Honey

- Manuka Honey
- Osmotic action- promotes autolysis.
- Honey produces hydrogen peroxide- may provide broad spectrum antibacterial effect.
- Reduction of odor
- Contraindicated in sensitivity to bee venom, stings or honey
- NOT to be applied to large wounds of diabetics as may increase blood glucose levels
- Dressing changes from daily to three times per wk depending on individual needs

(Bryant, 2016)

Silver Gel

- Antimicrobial- Release silver up to 3 days.
- Amorphous hydrogel base
- Dressing changes daily to three times per wk
- Indications: 1st and 2nd degree burns, partial thickness wounds
- Avoid if allergy to Silver or Silver products

(Bryant, 2016)
Calciphylaxis

- Rare, skin ischemia and necrosis/ calcification of arterioles in the dermis and subcutaneous adipose tissue
- 50% mortality rate within one yr.
- Most common in ESRD/dialysis/ hyperparathyroidism/administration of Vitamin D
- Reduced arteriolar blood flow caused by calcification, fibrosis and thrombus formation
- EVOLVE TRIAL
- Warfarin- Important Risk Factor?
- Extremely painful ischemic ulcers of the thighs, abdomen and buttocks
- Biopsy findings- dermal and pannicular arteriolar calcification, subintimal fibrosis, thrombotic occlusion (punch 4-5mm deep)

(Nigwekar, 2018)

Treatment

- Optimal treatment unknown
- Multi-interventional associated with more effective results
- Optimal /control of Calcium and Phosphate levels
- Treatment of Hyperparathyroidism
- Dialysis
- HBOT
- Wound Care and Pain Control Essential components
- Retrospect analysis- 62% survival rate after undergoing debridement at one yr. compared with 27.4% survival without debridement- SURGICAL NOT BEDSIDE

(Nigwekar, 2018)
Wound Care

- Consideration for Painless dressing changes
- Decrease risk of infection
- Achieve Wound Healing
- NPWT is helpful post debridement/ noncontact layer may be placed underneath foam to decrease pain with dressing changes.
- Topical tetracaine can be injected to wound base prior to dressing changes as well.
- HBOT- 2nd line tx. 2.5 atm 90 min daily. Limited Studies available on effect of outcomes (Nigwekar, 2018)

Pyoderma Gangrenosum (PG)

- NEUTROPHILIC DERMATOSIS- RARE 3-10 CASES PER MILLION PPL P/YR
- WOMEN MORE THAN MEN/ AVE AGE 40-60
- INFLAMMATORY AND ULCERATIVE DISORDER OF THE SKIN
- INFLAMMATORY PAPULE OR PUSTULE THAT PROGRESSES TO PAINFUL ULCERATIONS W/ BLUSH UNDERMINED BORDER AND PURULENT BASE
- > ½ DEVELOP IN ASSOCIATION W/ UNDERLYING SYSTEMIC DISEASE (INFLAMMATORY BOWEL DISEASE, HEMATOLOGIC DISORDERS, ARTHRITIS)
- FAMILIAL CASES HAVE BEEN REPORTED

(Schadt, C. et al., 2018)
### DIAGNOSIS

**DELPHI CONSENSUS OF INTERNATIONAL EXPERTS**

<table>
<thead>
<tr>
<th>Major Criterion</th>
<th>Minor Criteria</th>
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<tbody>
<tr>
<td>Biopsy- positive for neutrophilic infiltrate</td>
<td>exclusion of infection</td>
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<tr>
<td></td>
<td>pathergy</td>
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<tr>
<td></td>
<td>personal hx of inflammatory bowel disease or arthritis</td>
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<td></td>
<td>hx of rapidly ulcerated papule or pustule</td>
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<tr>
<td></td>
<td>ttp/bluish undermining border</td>
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<td></td>
<td>anterior lower leg (multiple)</td>
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<td>wrinkled paper scar at healed ulcer sites</td>
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<td>decrease in size within one month of initiating immunosuppressive</td>
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(Schadt, C. et al., 2018)

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### Treatment

- Immunosuppressive Therapy
- Do NOT debride these ulcerations
- Topical treatment aimed at maintaining a moist wound healing environment with aim at pain control and decreasing bacterial load.

(Schadt, C. et al., 2018)
Rhinocerebral Mucormycosis

MUCORMYCOSIS (ZYGOMYCOSIS)

- HIGH RISK PTS- IMMUNOCOMPROMISED & DIABETICS (70% OF CASES)
- FUNGI FOUND IN DECAYING VEGETATION AND IN THE SOIL
- GROWS RAPIDLY, RELEASES LARGE NUMBERS OF SPORES CAN BECOME AIRBORNE
- OCCURS FROM INHALATION OF SPORES
- ANGIOINVASIVE- INFARCTION OF INFECTED TISSUES
- CASES HAVE OCCURRED AFTER TORNADO, TSUNAMI AND VOLCANIC ERUPTION
- REPORTED IN US MILITARY PERSONNEL WHO SUSTAINED BLAST INJURIES DURING COMBAT IN AFGHANISTAN

(Cox, 2017)
MORTALITY RATE- 25-62%

- Signs of Orbital Involvement- Periorbital Edema, Proptosis, Blindness
- Facial Numbness results from infarction of Fifth Cranial Nerve
- Spread from the Ethmoid Sinus to the Frontal Lobe results in obtundation
- Imaging- Endoscopic Evaluation of Sinuses/ CT of Head or MRI
- Treatment- Consult ENT/Surgery for Immediate Surgical Intervention, Amphotericin B, Broad Spectrum Azoles
- Months of treatment often required with reconstructive surgery D/T severe disfigurement for those who survive

(Cox, 2017)

Cutaneous Leishmaniasis (Papillomyoma)

- Vector borne disease- sand fly. Sand fly injects up to 1k parasites in one bite
- Incubation period from weeks to months
- Diffuse cutaneous, local cutaneous, mucosal, systemic
- Pink colored papule- enlarges- develops into nodule or plaque like lesion leading to a painless ulceration with an indurated border
- Old world CL and New World CL
- Cases in Oklahoma and Texas have been noted
- Definitive diagnosis by histology, culture & molecular analysis w/ PCR

(Aronson et al., 2018)
Fournier's Gangrene

- Necrotizing Soft Tissue Infection involving the Scrotum, Penis or Vulva.
- Average Age 50-60
- 80% underlying co-comorbidities- DM. 22-40% mortality rate.
- Perianal or Retroperitoneal Infection spreads along fascial planes to the genitalia
- Fever, Pain, Erythema, Swelling in the genitalia
- Progression with necrosis, crepitus- gas on imaging
- Infection can spread to the perineum and abdominal wall
- Prompt Surgical intervention is imperative- antibiotic therapy without surgical debridement is associated with close to a 100% mortality rate.

(Stevens et al., 2018)
Treatment

- Prompt surgical intervention
- Empiric antibiotic regimens: carbapenem or beta lactam inhibitor PLUS Vancomycin or Daptomycin (MRSA coverage) PLUS Clindamycin- anti toxin effects
- HD support
- IV immune globulin- streptococcal – 2018 metaanalysis (four nonrandomized and one randomized)- treatment w/ clindamycin w/ IVIG decreased 30 day mortality rate in half.
- HBOT- increases the efficacy of certain IV antibiotics and slows progression of Necrotizing infections

(Stevens et al., 2018)
HBOT

- Requires Prescription for Treatment.
- Mainly performed on outpatient basis.
- CMS has specific criteria for approved conditions
- Patient breathes 100% oxygen while inside a treatment chamber at a pressure higher than seal level pressure. Typical pressure is 2 to 2.5 ATA for 90 minutes depending on indication treated.
- Monoplace or Multiplace Chambers
- UNDERSEA AND HYPERBARIC MEDICAL SOCIETY website: www.uhms.org
- Center for Medicare Services website: www.cms.gov

CMS HBOT Indications

- Gas Gangrene
- Acute traumatic peripheral ischemia
- Crush Injuries
- Progressive Necrotizing Infections (Necrotizing Fasciitis)
- Acute Peripheral Arterial Insufficiency
- Preparation and preservation of compromised skin grafts
- Chronic refractory osteomyelitis
- Osteoradionecrosis
- Soft tissue radionecrosis
- Diabetic foot ulcerations Wagner grade III or higher
Wound & Skin Infections

- Types of cultures
- Skin & Soft Tissue Infections
- Osteomyelitis

Presence of Infection

- > 2 Classic Findings of Inflammation: Redness (Erythema or Rubor)  Warmth (calor) Edema, Induration, Tenderness and pain (dolor).
- Secondary Signs: nonpurulent secretions, friable or discolored granulation tissue, undermining of wound edges, foul odor.

- DFI – Determine Severity  Mild, (PEDIS Grade 2)  Moderate (PEDIS Grade 3)  Severe (PEDIS Grade 4) - Inpatient scale- predicts 6 month risk of amputation and mortality in DFU.
- "Sausage toe" (swollen, erythematous, no contours suggestive of Osteo.

(Bryant, 2016)
**Bacterial Burden**

- **Contamination:** Presence of nonreplicating microorganisms
- Local and systemic antibiotics are NOT utilized for contaminated wounds
- **Colonization:** microorganisms adhere to the surface of the wound and replicated. Does not impair wound healing. No symptoms.
- Inappropriate use of antibiotics during this phase has contributed to resistance.
- **Critical Colonization:** delayed wound healing responds to topical antimicrobial tx. No systemic response of infection. **NERDS N:** nonhealing **E:** increased exudate **R:** red and bleeding wound **D:** Debris **S:** smell (3 or more diagnostic)
- Treatment of Critical Colonization- Topical antimicrobials

(Bryant, 2016)

**Biofilm**

- Microorganisms in ECM adherent to the wound undergo phenotypical changes with attachment and develop biofilm- if not disrupted within 24 hours becomes more permanently attached.
- Longer duration= more resistant to removal and greater infection risk
- 60% of chronic wounds have biofilm/6% of acute wounds
- Serial surgical debridement essential (Ultrasound adjunct)
- Biofilm most susceptible to antimicrobial tx 1st 24 hrs. after debridement

(Bryant 2016)
### Topical Antimicrobials

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<tr>
<th>Antimicrobial</th>
<th>Description</th>
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| Acetic Acid 0.25% | - P. aeruginosa, gm + and gm - organisms  
- Protect Periwound, changes PH, used as irrigant or soak |
| Chlorhexidine 0.02% | - S. aureus and E.coli  
- Irrigant |
| HydraFera Blue | - MRSA, S. epidermis, VRE, S. aureus, S. epidermidis, serratia and E.coli |
| Honey | - Broad antibacterial, fungi, protozoa and viruses  
- Anti-inflammatory |
| PHMB | - Broad spectrum gm +/gm - |
| Silver | - Broad spectrum, VRE, MRSA  
- Dependent on rate of release of ionic silver |
| Sodium hypochlorite | - 0.025% exerts antimicrobial effects w/o cytotoxicity to fibroblasts |

*(Armstrong, 2017)*

### Signs/SX of Systemic Infection

- Fever, Chills, Delirium, diaphoresis, anorexia, tachycardia, hypotension, dysglycemia, electrolyte imbalance, acidosis, azotemia
- Leukocytosis
- Left shift Leukocyte Diff
- Elevated ESR and CRP (ESR > 70 increased probability of osteomyelitis)
- Large prospective observational study noted elevation of CRP a week after DFI finished treatment was only independent factor that predicted the need for Lower Extremity Amputation. (IDSA, 2012)
Types of Cultures

- Swab (Aerobic and Anaerobic)- Levine Technique, Avoid antiseptics prior to culture, <50% concordance w/ bone cultures
- Tissue Culture- More Accurate than Swab Cultures, Dermal curette or scalpel.
- Tissue Biopsy- Punch Biopsy, Consider local anesthetic (lidocaine or lidocaine w/ epi) prior to procedure. Obtain consent. Sutures and CCGT should be readily available.
- Bone Culture- Definitive Diagnosis for Osteomyelitis/2-3 specimens, 1 for cx/1 for histology

Clinical Pearl: Collect after wound has been cleansed and debrided and prior to initiating antibiotic therapy.  
(Bryant, 2016)

Skin & Soft Tissue Infections

<table>
<thead>
<tr>
<th>Nonpurulent (Cellulitis, Necrotizing Infections)</th>
<th>Purulent (Abscess, Furuncle, Carbuncle)</th>
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<tbody>
<tr>
<td><strong>Mild</strong>- Oral Antibiotic- PCN, Cephalosporin, Dicloxacillin or Clindamycin</td>
<td><strong>Mild</strong>- I&amp;D</td>
</tr>
<tr>
<td><strong>Moderate</strong>- IV Antibiotics- PCN, Ceftriazone, Cefazolin or Clindamycin</td>
<td><strong>Moderate</strong>- I&amp;D, C&amp;S Empiric Antibiotics- Bactrim DS or Doxycycline</td>
</tr>
<tr>
<td><strong>Severe</strong>- Consider Necrotizing- urgent Surgical consult/Empiric Antibiotics- Vancomycin PLUS Zosyn</td>
<td><strong>Severe</strong>- I&amp;D, C&amp;S, Empiric Antibiotic- Vancomycin, Daptomycin, Linezolid or Ceftaroline</td>
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Mild Infections- 1-2 weeks duration of therapy  
Moderate- Severe- 2-3 weeks duration  
(Stevens et al, 2014)
MSSA SOFT TISSUE INFECTIONS

- NAFICILLIN 1-2 g Q4 hours IV - Parental drug of choice
- Cefazolin 1g Q8 hours IV - For PCN allergic patients except w/ immediate hypersensitivity reaction/ less bone marrow suppression
- Clindamycin 600mg Q8 hours IV OR 300-450mg PO QID - bacteriostatic
- Dicloxacillin 500mg PO QID - Oral agent of choice for MSSA
- Cephalexin 500mg PO QID - For PCN allergic patients- Except w/ Immediate hypersensitivity reaction
- Doxycycline 100mg PO BID
- Bactrim 1-2 DS PO BID - efficacy poorly documented

- Recommended duration of treatment is 5 days but may be extended if indicated.

[Stevens et al. 2014]

MRSA SSTI

- Vancomycin 30mg/kg/d in 2 Divided Doses IV – parenteral drug of choice for treatment of MRSA
- Linezolid 600mg Q12 hours IV or 600mg PO BID - Expensive, Bacteriostatic
- Clindamycin 600mg IV q8 hours or 300-450mg PO QID - inducible resistance in MRSA, Bacteriostatic
- Daptomycin 4mg/kg IV q24 hours - possible myopathy, bactericidal
- Ceftaroline 600mg IV BID
- Doxycycline 100mg PO BID
- Bactrim DS 1-2 tablets PO BID

Length of treatment 1-2 wks. [Stevens et al., 2014]
Oritavancin

- Indicated for Adults with ABSSSIs, Gm + including- MSSA, MRSA, Enterococcus Faecalis, S. aginosus, S. intermedius & S. constellatus
- NO Admission required
- One infusion equal to 2 wks. of Vancomycin
- No PICC line required
- Given in the ER/infusion center.
- Lipoglycopeptide with 3 mechanisms of action- disrupts cell membrane integrity, inhibition of transglycosylation & inhibition of transpeptidation
- >99.9% in vitro kill within one hour

(Melinta Pharma, 2018)

Clinical Pearls

- Recurrent skin Abscesses- consider pilonidal cyst, hidradenitis suppurativa or foreign body
- I&D and Culture early in the course of infection
- Recurrent Abscesses- 5-10 day course of antibiotic based on Culture results
- **Staph Aureus**- Consider 5 day decolonization regimen twice daily of intranasal mupirocin, daily chlorhexidine washes and daily decontamination of personal items
- **Recurrent Cellulitis**- Prophylactic antibiotics- Oral PCN or erythromycin BID for 4-52 weeks or IM Benzathin PCN q 2-4 wks.- should be considered in patients who have 3-4 episodes of cellulitis per year
- Annual Recurrence Rates of 8-20% in Lower Extremity Cellulitis

(Stevens et al, 2014)
Adjunctive Therapy

- Prednisone 40mg PO daily for 7 days in nondiabetic adults patients with cellulitis (weak, moderate)
- NSAID – Ibuprofen 400mg PO QID for 5 days
- Randomized, double-blind, placebo-controlled trial- 108 adult nondiabetic patients, demonstrated that an 8 day course of oral corticosteroids in combination with ABX led to significantly more rapid clinical resolution of cellulitis (primarily of the legs) than ABX alone

(Stevens et al., 2014)

Animal/Human Bite Infected Wounds

- Immunocompromised, asplenic, advanced liver disease, edema of affected area, moderate to severe injuries esp. hand and face or penetration of the periosteum or joint capsule- early ABX therapy for 3-5 Days is recommended
- Post Exposure Prophylaxis for Rabies may be indicated
- Augmentin Covers likely Aerobes and Anaerobes found in bite wounds

(Baddour et al., 2018)
Osteomyelitis

- Consider if a deep ulceration, Ulcer >2 CM², non-healing after 6 weeks of wound care and offloading.
- DFI- Ulcer >3mm depth or CRP >3.2mg/dl or ESR >60mm/hour may help differentiate Cellulitis from Osteomyelitis (IDSA, 2012)

Diagnosis

- BPT +
- Radiographs (initial imaging although low sensitivity and specificity) films will show cortical erosion, periosteal reaction, mixed lucency and sclerosis. Serial imaging greater sensitivity and specificity.
- ESR CRP, CBC
- Bone Culture + - definitive diagnosis send for culture and histology
- Diagnostic- MRI is study of choice
- If MRI is contraindicated consider a leukocyte scan w/ bone scan.

(IDSA, 2014)
Treatment

- Medical: IV Antibiotics based on sensitivity for 6-8 weeks. Nonsurgical tx with 3-6 month course of antibiotics reported success rate of 65-80% (IDSA, 2012)
- Surgical removal of infected bone: Changes biomechanics of the area, esp. the foot.
- If GAS is present on imaging, abscess or necrotizing infection: URGENT Surgical Intervention IS indicated
- IF PAD Present: Consult Vascular Surgery

Patient Centered Care

- Consider individualized needs and wishes
- 4 situations in which nonsurgical management may be considered:
  - Unacceptable loss of function
  - Limb Ischemia inoperable but wishes to avoid amputation
  - Confined to forefoot and minimal soft tissue loss
  - Pt and HCP agree surgical intervention too high risk
Questions

References


