ID PERSPECTIVES ON SOFT TISSUE INFECTIONS

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OVERVIEW

General principles of Infectious Diseases

Antibiotic allergies

Purulent vs nonpurulent infections

Antibiotic choices

Specific sites of concern

- Decubitus ulcers
- Diabetic foot wounds

Recurrent infections

ID PRINCIPLES

Culture before starting antibiotics

If someone is not acutely ill, can withhold antibiotics while awaiting cultures

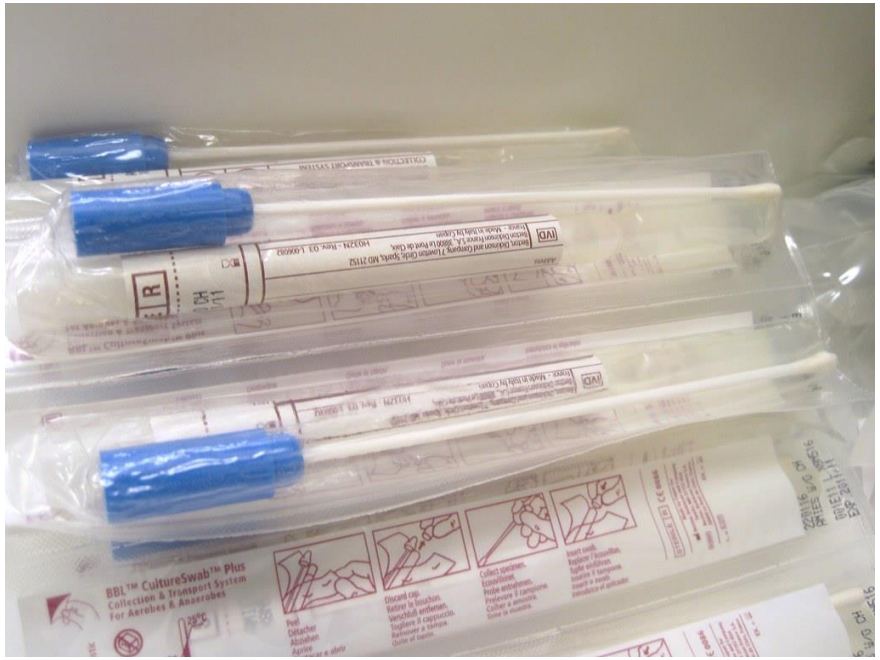
Determine if a culture represents infection vs. colonization

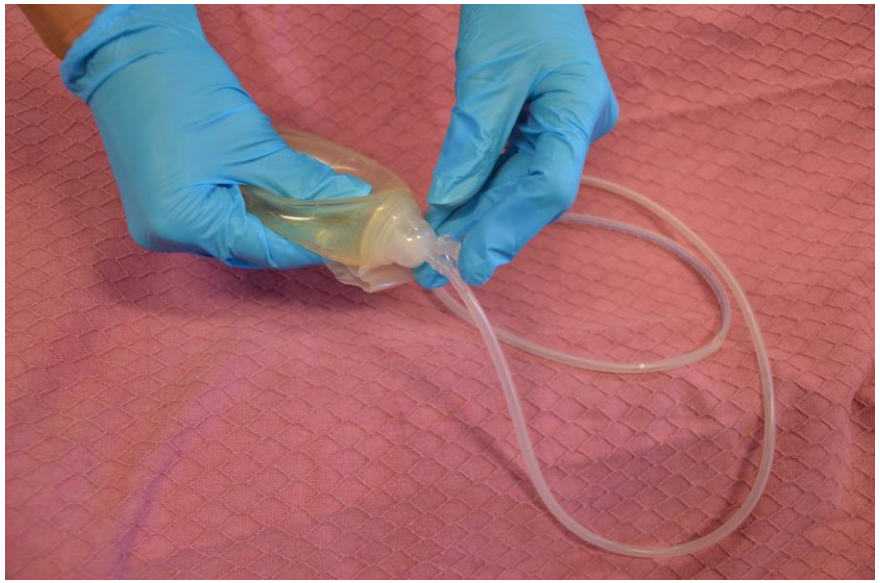
Treat with the narrowest spectrum antibiotic possible for the shortest duration that is appropriate

CULTURES

What to culture
- OR cultures
- Deep wounds

What not to culture
- Drainage devices
- Superficial wounds





ANTIBIOTIC ALLERGIES

LESS EFFECTIVE
ANTIBIOTIC OPTIONS

EXCESSIVELY BROAD
ANTIBIOTIC CHOICES

ALLERGY DOCUMENTATION

Penicillin allergy - nausea

Penicillin allergy - tolerated amoxicillin

Penicillin allergy – anaphylaxis, tolerated cefuroxime

PENICILLIN ALLERGIES

Reported in ~10% of the US population

Most are able to tolerate penicillin

Beta-lactams (penicillins and related antibiotics) are the backbone of most antibiotic regimens

~80% of patients with a true IgE- mediated allergic reaction to penicillin lose the sensitivity after 10 years.

When excluding those with high risk penicillin allergy histories, about 99% of the remaining patients can tolerate beta-lactam antibiotics

CDC STI Treatment Guidelines, 2021

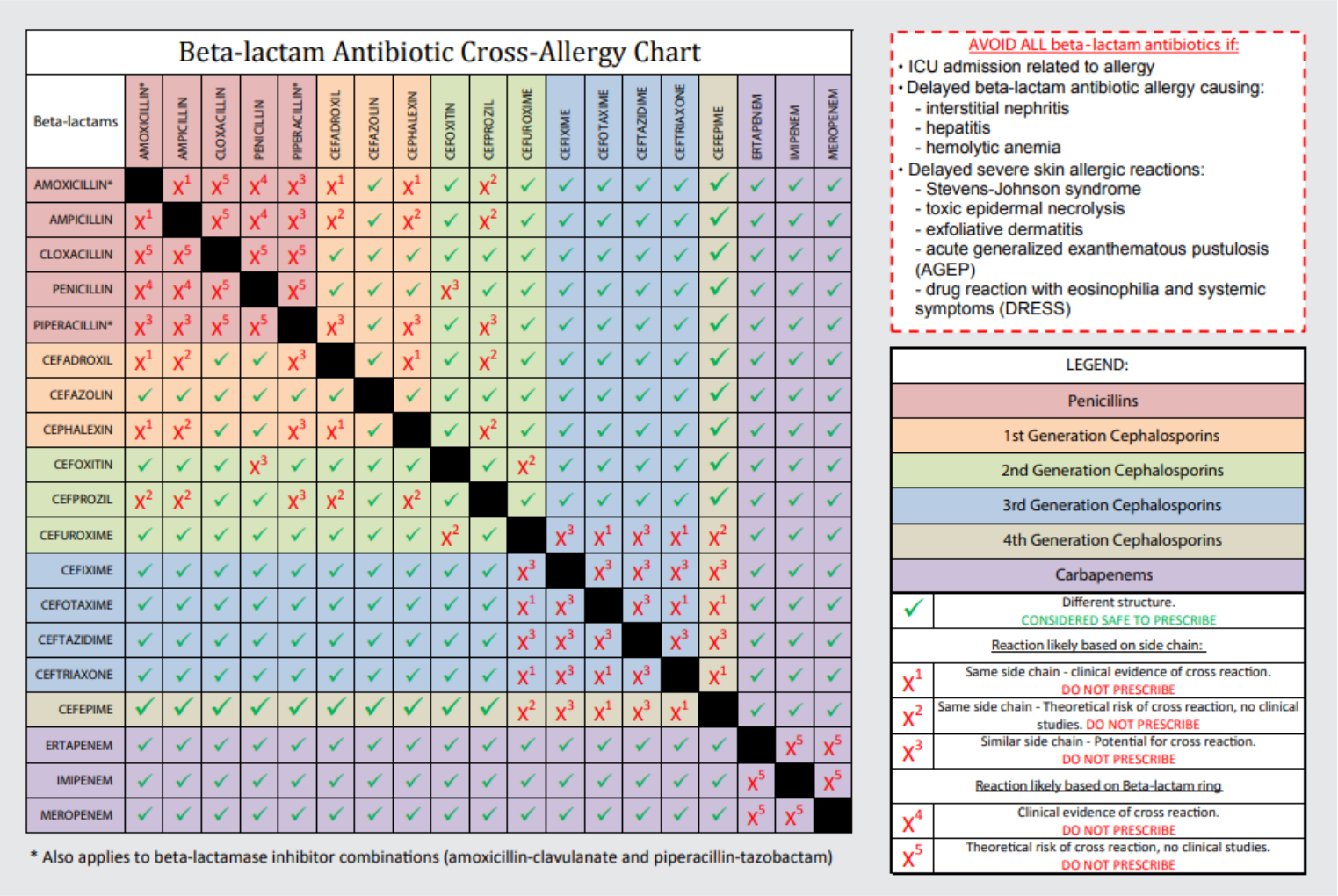


FIGURE 1. Beta-lactam cross-allergy chart.

Source: Interior Health Authority.

OPTIONS

Skin testing

Graded challenge

Desensitization

- ICU
- Progressively larger doses
- Need to take the antibiotic consistently – need to re-desensitize if stopped

SOFT TISSUE INFECTIONS

IDSA GUIDELINES (2014) NONPURULENT INFECTIONS

Mild	Moderate	Severe

• Oral Rx
  • Penicillin VK
  • Cephalexin
  • Cefadroxil
	• IV Rx
	  • Penicillin
	  • Cefazolin
	  • Ceftriaxone
		• Debridement
		  • Piperacillin-tazobactam + vancomycin

Stevens DL et al. Clin Infect Dis 2014;59(2):e10-52

NECROTIZING INFECTIONS

Get cultures

Concern for toxin production

- Clindamycin (900mg IV Q8 hours)
- Linezolid (600mg Q12 hours)

IDSA GUIDELINES (2014) PURULENT INFECTIONS

Mild	Moderate	Severe
• I&D	• I&D • C&S • Empiric TMP-SMX or doxycycline	• I&D • C&S • Empiric vancomycin or daptomycin or linezolid

Stevens DL et al. Clin Infect Dis 2014;59(2):e10-52

IV ANTIBIOTICS *STAPHYLOCOCCUS AUREUS*

Methicillin susceptible *Staphylococcus aureus* (MSSA)

Methicillin resistant *Staphylococcus aureus* (MRSA)

MSSA

Drugs of choice

- Oxacillin/nafcillin
  - Can be irritating to peripheral veins
  - Optimal dosing is continuous infusion
  - Monitor electrolytes and liver function tests
- Cefazolin

Alternatives

- Same as MRSA coverage
  - Vancomycin
  - Daptomycin
  - Linezolid/tedizolid

VANCOMYCIN

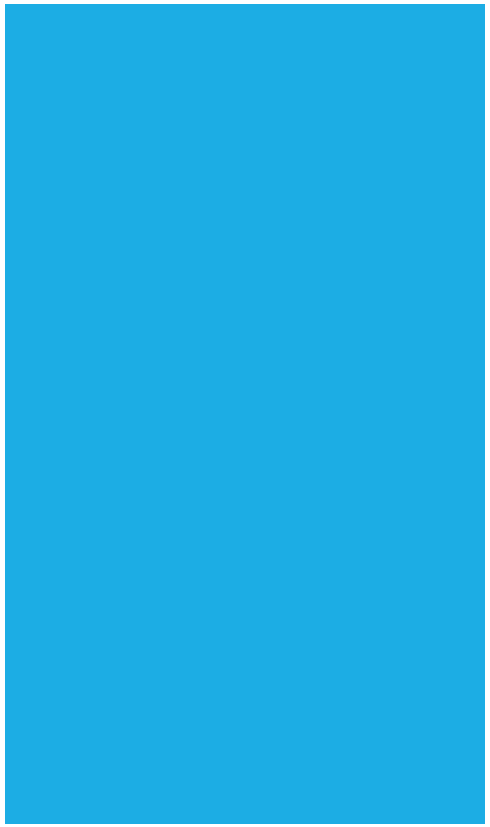
Most clinical experience

Slow infusion/infusion reactions

Dosing issues

- Time to therapeutic levels
- Monitoring

Soft tissue penetration



DAPTOMYCIN

Once daily

Rapid infusion (can give over 5 minutes)

Weight based dosing

Monitor CK levels – consider holding statins

Good soft tissue penetration

LINEZOLID VS TEDIZOLID

Linezolid	Tedizolid
IV and PO	IV and PO
Skin and skin structure infections, pneumonia	Only approved for skin and skin structure infections
Lactic acidosis	Only approved for 6 day course
Myelosuppression (dose and duration)	Expensive
Serotonin syndrome	

SEROTONIN SYNDROME

Altered Mental Status

-anxiety

-restless

-disorientation

-agitated delerium

Autonomic hyperactivity

-diaphoresis

-tachycardia

-hyperthermia

-hypertension

-vomiting/diarrhea

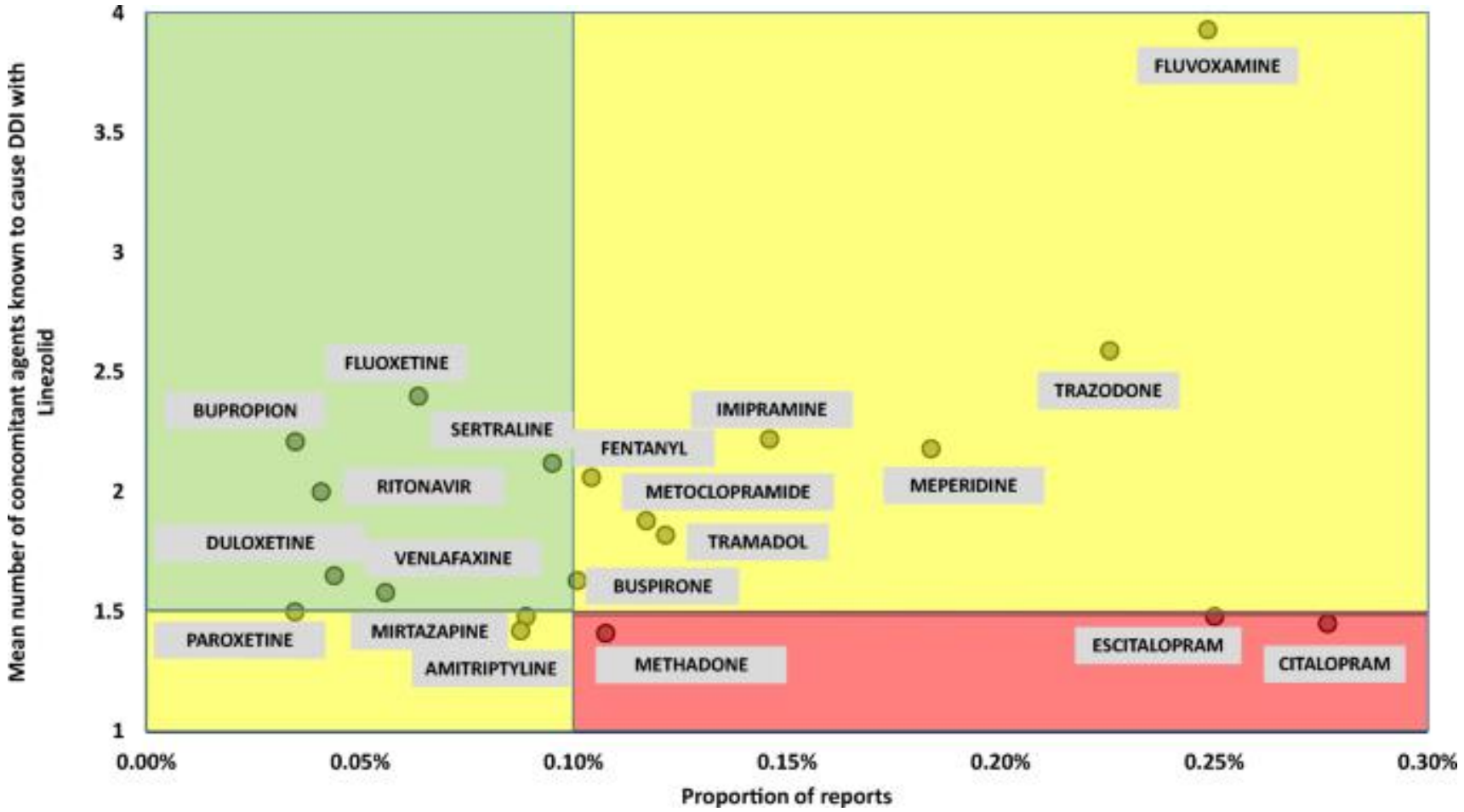
Hyperactivity

-Tremor

-Clonus

-Reflexes

SEROTONIN SYNDROME



•Milo G et al, *European Journal of Clinical Pharmacology* **volume 77**, pages233–239 (2021)

ORAL DRUGS FOR MSSA

Drugs of choice

- Dicloxacillin
- Cephalexin
- Cefadroxil

Alternatives

- Same as MRSA coverage
  - Trimethoprim sulfamethoxazole (Bactrim®, Septra®)
  - Doxycycline
  - Clindamycin
  - Linezolid/tedizolid

TRIMETHOPRIM SULFAMETHOXAZOLE

Good for MRSA – not for Streptococcal cellulitis

Systemic dosing (not cystitis, Nocardia or PJP)

- Creatinine clearance ≥ 50: 2DS bid

Hyperkalemia

Elevated creatinine

- Artifact
- Can also cause interstitial nephritis

DOXYCYCLINE

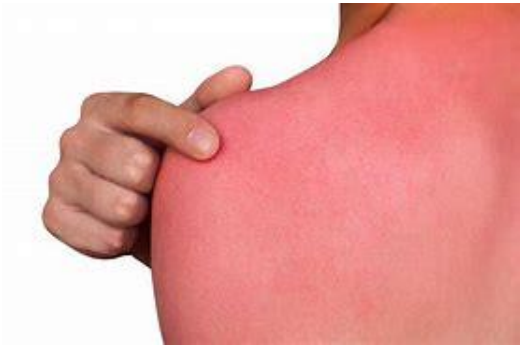
Good for MRSA – not for streptococcal cellulitis

Drug interactions

- Dairy products
- Multivitamins
- Antacids

Sunburn

- Sunscreen before going outside



Esophagitis

- Take medication while upright
- Drink at least 8oz of fluid

CLINDAMYCIN

Covers *S. aureus* and Streptococcal sp.

- UPMC PUH 71% of *S. aureus* isolates are susceptible
- Increasing rates of streptococcal resistance – up to 30-40%

Clostridioides difficile risk

Generally not recommended as first choice

LINEZOLID/TEDIZOLID

Oxazolidinone

Coverage for MRSA and streptococcal infections

Excellent bioavailability

Serotonin syndrome

Myelosuppression

Cost (Good Rx - September, 2022)

- Linezolid – best price $41.99 (10 day supply)
- Tedizolid – best price $2,366 (6 day course)

LONG ACTING DRUGS

Dalbavancin

- 1500mg x 1 dose
- Alternative:1000mg and 500mg 1 week later
- Half life ~14 days
- Adjust dose if creatinine clearance <30

Oritavancin

- 1200mg x 1 dose
- Half life ~10 days
- Interferes with monitoring of aPTT and PT/INR
- No data on use if creatinine clearance <30

DECUBITUS ULCERS

DIAGNOSIS

Does exposed bone = osteomyelitis?

Wong et al CID 2019

DIAGNOSIS

Does exposed bone = osteomyelitis?

Patients with stage IV decubitus ulcers

- >50% of cases with bone biopsy did not show osteomyelitis[1-3]
- Biopsy findings included
  - No inflammation of the bone
  - Reactive new bone formation
  - Fibrotic remodelling bony involvement with suppurative soft tissue disease
  - Osteomyelitis
- Systemic symptoms of infection are more likely due to the extent of soft tissue infection

1 Turk et al. Arch Path Lab Med 2003
2 Darouiche et al. Arch Intern Med 1994
3 Sugarman et al. Arch Intern Med 1983

IMAGING

Bone biopsy as the gold standard

CT imaging

- Sensitivity 11-61%[1,2]
- Specificity 69%[1]

MRI imaging[3]

- Senstivity 94%
- Specificity 22%

1 Larson et al. Plast Reconstr Surg 2011
2 Lewis et al. Plast Reconstr Surg 1988
3 Brunel et al Clin Microbiol Infect 2016

SUMMARY

Not all chronic sacral pressure ulcers have osteomyelitis

When osteomyelitis is present, no role for prolonged antibiotics without plans for wound coverage

Short term (≤1 week) of antibiotics may be adequate to treat an acute soft tissue infection extending from the ulcer – no benefit to prolonged courses

If there is a plan for debridement and wound coverage, get a biopsy and cultures to determine the type and duration of treatment

- Empiric antibiotics should be held until bone biopsy is complete

Maximum duration of treatment 4-6 weeks if medullary bone is affected

Wong D et al, Clin Infect Dis 2019;68(2):338-342.

DIABETIC FOOT INFECTIONS

Incidence of foot ulcers with diabetes is up to 25%

Diabetic foot infections occur in up to 60% of patients with diabetic foot ulcers

Most diabetic foot infections can be treated with local wound care and oral antibiotics

How do you decide who requires surgery? Who has osteomyelitis?

Lam et al. Cliin Infect Dis 2016;63(7):944-948.
Singh et al. JAMA 2005;293:217-228.

"PROBE TO BONE"

Sterile metal probe

If you can probe to bone, so can bacteria

Bacteria get to the bone from contiguous spread

In high risk patients, a positive test can help to confirm osteomyelitis

In low risk patients, a negative test can help to exclude osteomyelitis

Lam K et al. Clin Infect Dis 2016;63(7):944-8.

CLASSIFICATION

Mild

- Superficial
- Limited in size and depth

Moderate

- Deeper or more extensive

Severe

- Accompanied by systemic signs or metabolic derangements

Vascular surgery evaluation

RECURRENT INFECTIONS

MRSA

Don't we all carry MRSA?

- Community dwellers – 5%[1]
- Healthcare workers working in ERs in Pittsburgh, PA – 4.3%[2]
- Healthcare workers at a tertiary care community hospital in Chicago – 15.2%[3]

1CDC MRSA information
2 Suffoletto BP et al. Ann Emerg Med 2008;52(5):529-533
3 Bisaga A et al. Ann Emerg Med 2008;52(5)

RECURRENT MRSA INFECTIONS

MRSA decolonization

- 5 days
- Chlorhexidine wash
- Intranasal mupirocin
- Daily decontamination of personal items (towels, sheets, clothes)

Stevens D et al. Clin Infect Dis 2014;59(2):10-52

RECURRENT CELLULITIS

Is it truly cellulitis?

- Not usually bilateral
- Edema can mimic infection

Commonly due to streptococcus

Prophylaxis?

PENICILLIN PROPHYLAXIS

Patients with recurrent cellulitis

- At least 2 episodes in the last 3 years

Penicillin VK 250mg bid vs placebo

Thomas KS et al. NEJM 2013;368:1695-1703

RESULTS

Median time to recurrence

- 532 days in placebo group
- 626 days in penicillin group

Frequency of recurrence

- 37% in placebo group
- 22% in penicillin group
- 45% reduction in risk of repeat episode of cellulitis when compared with placebo (hazard ratio, 0.55;95% CI 0.35-0.86, p=0.01

Benefit was not sustained after prophylaxis was discontinued

Thomas KS et al. NEJM 2013;368:1695-1703