Ann & Robert H. Lurie Children's Hospital of Chicago®

M Northwestern Medicine[®] Feinberg School of Medicine

APP Antibiotic Stewardship Series: Skin and Soft Tissue Infections

Ann & Robert H. Lurie Children's Hospital of Chicago Pediatric Infectious Diseases April 21st, 2022

MAGNFT

MERICAN NURSES









Project Origins

Morthwestern Medicine

Feinberg School of Medicine

- Antimicrobial resistance is a significant problem facing the medical community and world
- Most services in the hospital encounter common infectious disease problems
- Most services at LCH engage APP's in a large proportion of all patient care
- ID education is directed mostly at MD/DO trainees and providers

Engage APP's with antibiotic stewardship through APPdirected education

Learning Objectives

- Identify the two most common bacteria that cause skin and soft tissue infections
- Identify the most appropriate first line antibiotic for simple skin and soft tissue infections
- Recognize the utility of institutional and global antibiograms in choosing empiric antibiotics
- Demonstrate how to use microbiology reports to alter therapy based on antibiotic susceptibility



Case Presentation

A 13yo boy comes to clinic because of a rash on his R arm. He thought it was a bug bite, but it continued to grow. He endorses pain, mild swelling and it feels warm to the touch. He denies fever, chills, purulent drainage.

Physical exam is significant for a 4cm area of erythema, without clear borders, that is warm to the touch with mild tenderness to palpation. There is a small area of induration with fluctuance.

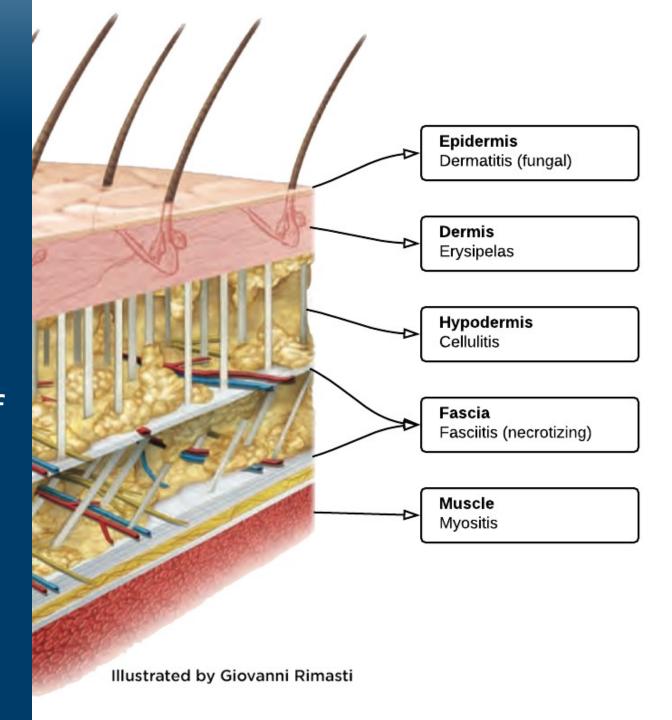
You make a diagnosis of cellulitis with abscess.



Skin Infections

- Cellulitis = bacterial infection of the hypodermis

 Fades off into distance
 Staph aureus > Group A Strep
- Erysipelas = bacterial infection of the dermis
 - Discrete borders
 - Group A Strep > Staph aureus



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|---|------------|------------|----------------------|------------------------|-------|---|
| | | | rative Policy Manu | | | |
| | ᆂ | Ambulato | ory Protocols | | | Prescribing Resources |
| | | Antimicro | bial Stewardship | | | ✓ Category 🗋 Na |
| open Case 🎽 Open Chart 📲 Print A <u>V</u> S 🔝 Sna <u>p</u> Sh | | Bug Bool | k | | | |
| Filter by Status Total: 0 | | Call List | | | | ▷ + : 01-Optimizing Specimen Collection |
| | 0 | CDC We | bsite | | | + : 02-Clinical Care Guidelines (16) |
| ime A Patient | 3 | Chain of | Responsbility | | | |
| | 9 | Chase Pa | aymenttech | | | ▷ + : 03-Institutional Antibiotic Suscept |
| | T | CLABSI T | Foolkit | | | ▷ + : 04-Dosing Resources (1) |
| | E:: | Clinical C | Care Guidelines | | | |
| | 8 | COG WE | BSITE | | | + : 05-Interpreting Rapid Diagnostics |
| | 6 | Commun | nication Directory | | | ▷ + : 06-True pathogen vs. Contaminati |
| | 8 | COVID-19 | 9 AllConnect (Luri | e Children's intranet) | | |
| | 8 | COVID-19 | 9 Microsoft Sway F | Resource | | ▷ + : 07-Pharmacokinetics & Pharmacok |
| | 8 | COVID-19 | 9 Resources on L | urieChildrens.org | | ▷ + : 08-Therapeutic Drug Monitoring (|
| | 占) | CRU Stu | dy Protocols | | • | + . 08- merapeutic Drug Monitoring (|
| | | DynaMed | t | | | > + : 09-Antimicrobial Adverse Events (|
| | 2 | CSF-Enc | oderPro | | | ▷ + : 10-Choosing Duration of Therapy |
| | 4 | Emergen | ncy Response Res | ources | | |
| | 뗾 | Epic Ess | entials | | | >+ : 11-Perioperative Prophylaxis (5) |
| | | Extravasa | ation | | | No. 12 Communication with Exercision (|
| | ≡ | Feinberg | Education Portal | | | + : 12-Communicating with Families (|
| | ₽ k | Formular | ry | | | |
| | • | Galter Lit | brary | | | |
| | ii | I-CARE P | Portal | | | |
| | | IL Prescri | ription Monitoring F | Program | | |
| | ≔ | Insurance | e Issue Tracker | | | |
| | | | e Prior Authorizatio | n | | To the second second |
| | | KidsHeal | | | | T. S. A. D. S. |
| | U | Lab Tests | S | | | 1. 12 C M. |
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| | ≡ | MedAbbr | rev | | | a bing to the |
| | | | on Schedule Adjus | tment Guide | | N. A. T.Say |
| | 8 | MedlineP | Plus | | | ASR-Gram Negative |
| | 8 | | dex/Poisondex | | | Rods (Non-Urine) |
| | | NAKI Med | | | | |
| | 1.5 | NMH Wel | | | | |
| | ١. | | Policy Manual | | | |
| | ¢٣ | Nutrition | | | • | |
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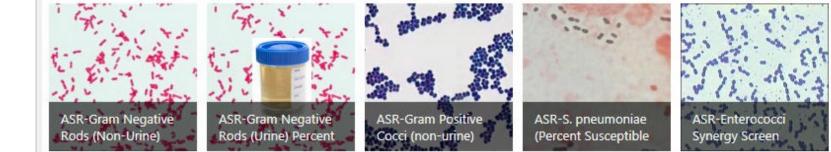
Pain Management Pocket Guide (UNDER REVISION)

| currents | | | | | | |
|---|---|--|--|--|--|--|
| Category Category Name | Antimicrobial Utilization ✓ Category | | | | | |
| 01-Optimizing Specimen Collection (2) 02-Clinical Care Guidelines (16) | ▷ + : A01-ASP Documents (2) ▷ + : A02-Benchmarking (1) | | | | | |
| 03-Institutional Antibiotic Susceptibilities (1) | [▷] + : A03-Lurie Trends (37) | | | | | |
| 04-Dosing Resources (1) 05-Interpreting Rapid Diagnostics (3) | ▷ + : A04-Restricted Antimicrobials (2) | | | | | |
| 06-True pathogen vs. Contamination/Colonization (1) 07-Pharmacokinetics & Pharmacodynamics (1) | Education | | | | | |
| 08-Therapeutic Drug Monitoring (1) 09-Antimicrobial Adverse Events (2) | [▶] + : E01-Public Health (1) | | | | | |
| 10-Choosing Duration of Therapy (1) | + : E02-Resistance Mechanisms (1) + : E03-Spectrum of Activity of Antimicrobials (4) | | | | | |
| 11-Perioperative Prophylaxis (5) 12-Communicating with Families (5) | [▷] + : E04-Susceptibilty Test (2) | | | | | |
| | | | | | | |

Links

| URL | Notes | | | | | | | |
|--|-------|--|--|--|--|--|--|--|
| 4 - : Scholarship and Advocacy (2) | | | | | | | | |
| Areas of Study and Publications | | | | | | | | |
| Collaborations | ••• | | | | | | | |
| - : Lurie Children's Hospital Days of Therapy by Department (1) | | | | | | | | |
| Lurie Children's Hospital Days of Therapy (DOT) by Department | | | | | | | | |

| -: Additional Resources (11) | | |
|--------------------------------------|-----|---------------|
| Antimicrobial Susceptibility Report | | Antibiogram |
| ASP Article of the Month | | |
| ASP Handbook-2021 | | |
| CDC Core Elements | | |
| Health Care Without Harm | | Public Health |
| IDSA | | |
| Illinois Department of Public Health | | Public Health |
| Infection Control Manual | | |
| Joint Commission Guidelines | | |
| U.S.PIRG | | Public Health |
| World Health Organization | ••• | Public Health |



Antibiogram

Collection of yearly culture and susceptibility results available on Epic
Used to determine the narrowest, most reasonable empiric therapy

| Gram Positive Cocci (non- urine) | No. of Isolates | Penicillin | Ampicillin | Ampicillin/Sulbactam | Amox / Clav | Cefazolin | Cefepime | Ceftriaxone | Cefotaxime | Clindamycin | Azithromycin | Erythromycin | Gentamicin | Levofloxacin | Oxacillin | Rifampin | Linezoli |
|--|--------------------|------------|------------|----------------------|----------------|-----------|----------|-------------|------------|-------------|--------------|--------------|------------|--------------|-----------|----------|----------|
| Streptococcus pneumoniae | 37 | 100/79* | | | | | | 100/97* | 100/94* | 94 | 61 | | | 97 | | | |
| Streptococcus mitis/oralis | 18 | 67 | | | | | 78 | 89 | 89 | 94 | | | | 88 | | | |
| Other Streptococcus spp. viridans group | 28 | 79 | | | | | 96 | 96 | 95 | 82 | | | | 95 | | | |
| Streptococcus pyogenes (Grp A) | 53 | 100 | | | | | 100 | 100 | | 94 | | 92 | | | | | |
| Streptococcus agalactiae (Grp B) | 8 | 100 | 100 | | | | | | | 57 | | 38 | | | | | |
| Enterococcus faecalis* | 81 | | 99 | | | | | | | | | | | 95 | | 57 | 98 |
| Enterococcus faecium* | 13 | | 83 | | | | | | | | | | | 45 | | 33 | 100 |
| Staphylococcus aureus - MSSA | 573 | 25 | | 100 | 100 | 100 | | | | 71 | | 60 | 98 | 93 | 100 | 99 | 100 |
| Staphylococcus aureus - MRSA | 131 | 0 | | 0 | 0 | 0 | | | | 65 | | 18 | 94 | 52 | 0 | 96 | 100 |
| Staphylococcus epidermidis | 96 | 7 | | 27 | 27 | 27 | | | | 42 | | 15 | 63 | 67 | 28 | 97 | 100 |
| Other Staphylococcus species | 39 | 21 | | 46 | 46 | 46 | | | | 54 | | 34 | 91 | 91 | 44 | 97 | 100 |

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Antibiogram

Cephalexin = Covers 100% of MSSA (573), 0% MRSA (0) → 81% of all
Clindamycin = Covers 71% of MSSA (407), 65% MRSA (85) → 70% of all

| Gram Positive Cocci (non- urine) | No. of Isolates | Penicillin | Ampicillin | Ampicillin/Sulbactam | Amox / Clav | / Cefazolin | Cefepime | Ceftriaxone | Cefotaxime | Clindamycin | Azithromycin | Erythromycin | Gentamicin | Levofloxacin | Oxacillin | Rifampin | Linezoli |
|--|--------------------|------------------|------------|----------------------|----------------|-------------|----------|-------------|------------|-------------|--------------|--------------|------------|--------------|-----------|----------|----------|
| Streptococcus pneumoniae | 37 | 100/ 79 * | | | | | | 100/97* | 100/94* | 94 | 61 | | | 97 | | | |
| Streptococcus mitis/oralis | 18 | 67 | | | | | 78 | 89 | 89 | 94 | | | | 88 | | | |
| Other Streptococcus spp. viridans group | 28 | 79 | | | | | 96 | 96 | 95 | 82 | | | | 95 | | | |
| Streptococcus pyogenes (Grp A) | 53 | 100 | | | | | 100 | 100 | | 94 | | 92 | | | | | |
| Streptococcus agalactiae (Grp B) | 8 | 100 | 100 | | | | | | | 57 | | 38 | | | | | |
| Enterococcus faecalis* | 81 | | 99 | | | | | | | | | | | 95 | | 57 | 98 |
| Enterococcus faecium* | 13 | | 83 | | | | | | | | | | | 45 | | 33 | 100 |
| Staphylococcus aureus - MSSA | 573 | 25 | | 100 | 100 | 100 | | | | 71 | | 60 | 98 | 93 | 100 | 99 | 100 |
| Staphylococcus aureus - MRSA | 131 | 0 | | 0 | 0 | 0 | | | | 65 | | 18 | 94 | 52 | 0 | 96 | 100 |
| Staphylococcus epidermidis | 96 | 7 | | 27 | 27 | 27 | | | | 42 | | 15 | 63 | 67 | 28 | 97 | 100 |
| Other Staphylococcus species | 39 | 21 | | 46 | 46 | 46 | | | | 54 | | 34 | 91 | 91 | 44 | 97 | 100 |

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Cefazolin/Ancef (IV), Cephalexin/Keflex (PO)





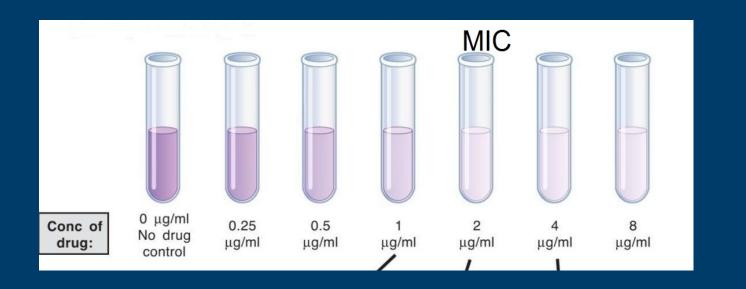
70% coverage of *S. aureus*

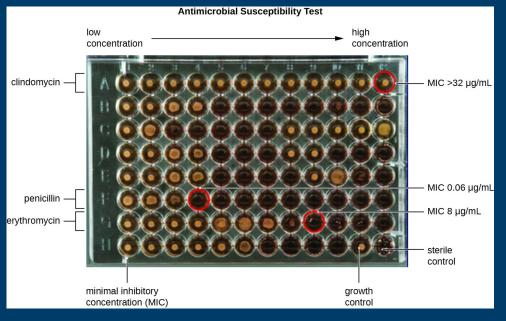
| Coast | I IM CRAM A | Sportrum: Cram | nocitivo cocci | | | | | | | |
|-----------------------------|--|---|-------------------|--|--|--|--|--|--|--|
| Skin/Soft Tissue Infection | | | | | | | | | | |
| Impetigo | S. aureus, GAS | Mupirocin topical BID If multiple lesions or in outbreaks to reduce transmission | Duration 5-7 days | | | | | | | |
| | | Cephalexin 50 mg/kg/day PO divided TID | | | | | | | | |
| Ervsipleas | GAS and other beta- hemolytic Streptococci | Cephalexin 16.7 mg/kg/dose PO TID <u>Severe B-lactam allergy</u> Clindamycin 10 mg/kg/dose every 8 hours (max dose 600 mg) OR | Duration 5-7 days | | | | | | | |
| Cellulitis w/o purulence | GAS and other beta- hemolytic Streptococci, | <u>Outpatient:</u> Cephalexin 16.7 mg/kg/dose PO TID Inpatient: Cefazolin 25 mg/kg/day IV q8h | Duration 5-7 days | | | | | | | |

- -Skin/Soft Lissue Infection
- -Simple Cystitis, Pyelonephritis
- Poor oral bioavailability

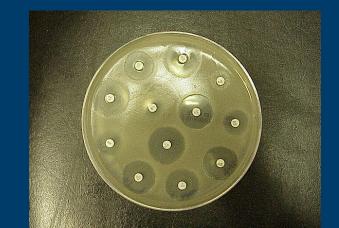
- High oral bioavailability
- Significant increased risk of *Clostridium difficile*

Minimum Inhibitory concentration





| Antimicrobial | Staphylococcus spp. | Disk | Zone | | ter Breakpo t whole mm | | MIC Breakpoints, µg/mL | | | | | |
|--|------------------------|------------|------------|-----------|---------------------------|----------|---------------------------|-----------|--------------|------------|--|--|
| Agent | Indications | Content | S | SDD | I. | S | SDD | I. | R | | | |
| PTIDES | | | | | | | | | | | | |
| ests should be pe | erformed to determine | e the susc | eptibility | of all is | olates of sta | aphyloco | cci to van | comycin. | The disk | test does | | |
| | ncomycin-intermediat | | | | t differentiat | e among | vancomyc | in-suscep | otible, -int | ermediate, | | |
| han S. aureus, all of which give similar size zones of inhibition. | | | | | | | | | | | | |
| Vancomycin | S. aureus | - | - | _ | _ | - | ≤2 | . – | 4–8 | : ≥16 | | |
| | | | | | | | | - | - | | | |



TMP-SMX/Bactrim (IV/PO)

- Spectrum: Gram positive cocci, gram negative rods
 - -MRSA/MSSA, Group A *Strep*
- Common indications

 Skin/Soft Tissue Infection
 Simple Cystitis, Pyelonephritis
 PJP Prophylaxis/Disease

| Antibiotic | MIC | Interpretation |
|-----------------------------|----------------|----------------|
| Amoxicillin/Clavulan ate | 16/4 | Resistant |
| Ampicillin/Sulbacta m | 32/16 | Resistant |
| Cefazolin | 8 | Resistant |
| Clindamycin | 8 | Resistant |
| Gentamicin | ≤ 1 | Susceptible |
| Levofloxacin | ≤ 0.5 | Susceptible |
| Vancomycin | 1 | Susceptible |
| Meropenem | 8 | Resistant |
| Oxacillin | 8 | Resistant |
| Penicillin | 8 | Resistant |
| TMP-SMX | $\leq 0.5/9.5$ | Susceptible |
| Daptomycin | ≤ 0.5 | Susceptible |
| Linezolid | 2 | Susceptible |
| Tetracycline | ≤ 1 | Susceptible |