



Popping the Problem: Pediatric Hospitalist Approach to Abscess Management



Akron
Children's

Pediatric Hospital Medicine Providers

Elizabeth Byler APRN,
CNP



Heather Williams APRN,
CNP



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Objectives

- Recognize the spectrum of pediatric abscesses and determine the appropriate level of care.
- Evaluate patient factors and local resistance patterns when selecting empiric and targeted antibiotic therapy.
- Differentiate outpatient management, inpatient management, and indications for pediatric surgical consultation.
- Apply pharmacologic principles—including drug selection, IV-to-PO transition, dosing, adverse effects, and monitoring—to optimize outcomes.



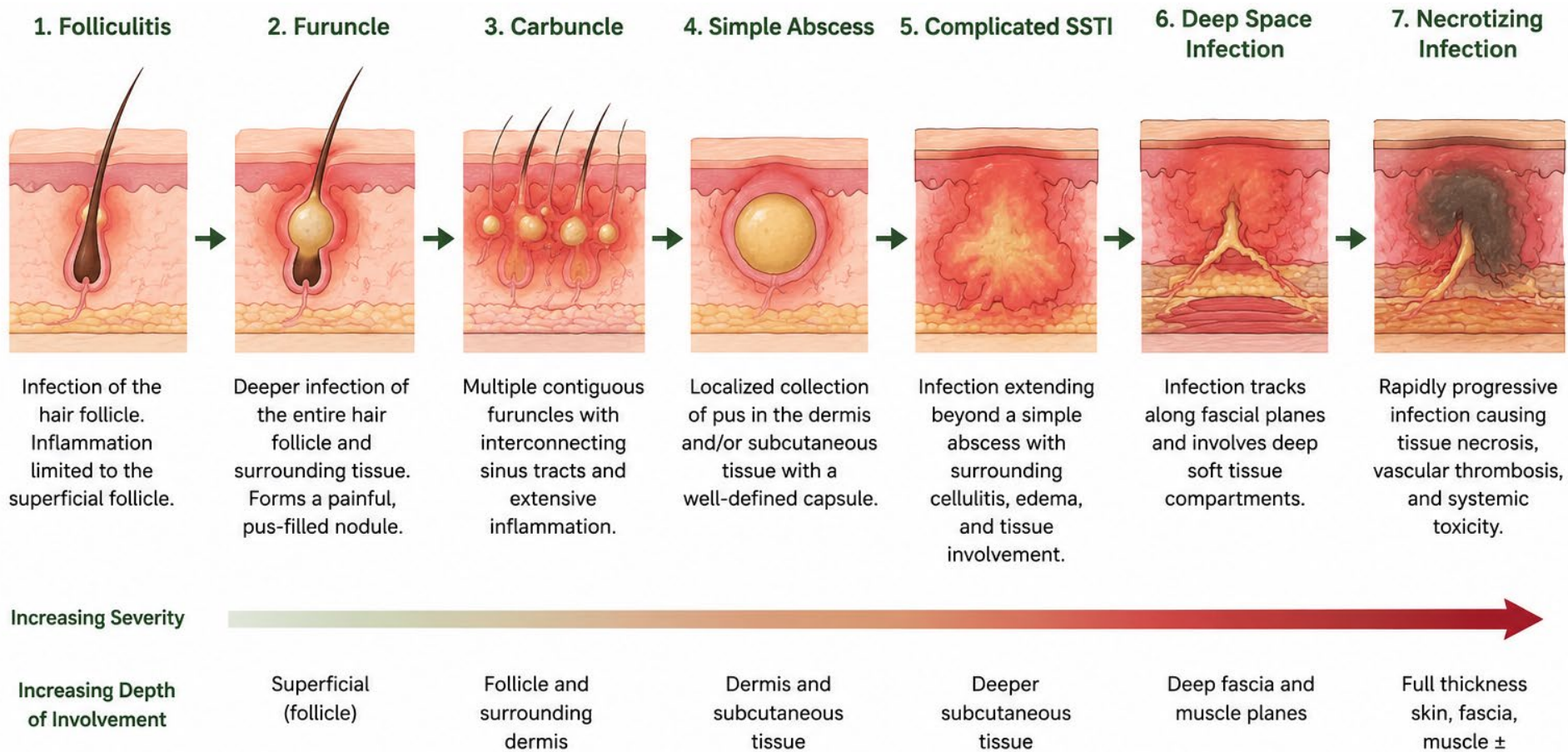
Where Does This Kid Belong?!

- Day 1: 3 year old with 2 cm buttock abscess. Afebrile, normal PO.
 - Question: primary care? ED? Hospital?
- Day 3: returns to PCP. Febrile 39.4, increased erythema, unable to sit comfortably.
 - Still outpatient? Need drainage? Hospitalization?
- Day 5: persistent fever despite I&D. Ultrasound shows pyomyositis. Now needs hospital, surgery consult, infectious disease consult.
- Pediatric abscesses are dynamic diseases. The appropriate level of care changes as the infection evolves



Spectrum of SSTI

- SSTI- Skin and Soft Tissue Infection
- Rather than think abscess, think of this process:



Diagnosis of Abscess

- Mainly a clinical diagnosis on exam. Fluctuance?
- Gram stain/culture of purulent material are especially helpful in recurrent cases
- Blood culture if fever, systemic signs of illness, or immunocompromised
- Ultrasound to distinguish abscess from cellulitis, evaluate abscess size, and determine I&D course



Diagnosis of Abscess

- Cellulitis vs abscess
 - Cellulitis is a superficial, spreading skin infection that causes warmth, redness, swelling, and tenderness without abscess formation. Culture is usually not indicated, and MRSA is rarely the cause.
 - Cutaneous abscesses are painful, fluctuant red nodules with surrounding erythema and a collection of pus in the deeper tissue typically caused by *Staphylococcus aureus*. Incision and drainage is the preferred treatment and allows for culture.



Common SSTI Pathogens

- Staphylococcus aureus most common
 - MRSA (methicillin-resistant Staphylococcus aureus)
 - MSSA (methicillin-sensitive Staphylococcus aureus)
 - 411 MRSA vs 1075 on ACH Antibigram
- Streptococcus is next most relevant gram + organism
- Anatomic location changes the microbiology! Example: perianal abscesses E. Coli most common, followed by Klebsiella, with Staph aureus 3rd.
- Risk factors for skin abscesses include a history of atopic dermatitis, skin injuries, insect bites and animal scratches, immunodeficiency, poor hygiene, and skin abscess in a household contact
- MRSA risk factors: Age < 6 months and 8-13 years, male, previous hospitalization of a family member, household member working in health care facility, previous hospitalization, day care ≥ 5 days per week, indwelling catheter or medical device, chronic skin disease, chronic sinusitis





Primary Care Management

- Children appropriate for outpatient management: small (<2-3 cm), easily drained, minimal surrounding cellulitis, no systemic illness, reliable follow up
- First-line – Incision and Drainage
 - Culture is recommended
 - Oral antimicrobials are not indicated for patients with adequate drainage and no systemic symptoms (fever, tachycardia, tachypnea, or abnormal white blood cell count)
- Follow up in 24-48 hours if: worsening pain, expanding erythema, persistent fever, poor drainage



Recognize Failure of Outpatient Therapy

- Red flags: fever, rapid progression, severe pain (out of proportion to exam), inability to tolerate PO, extensive cellulitis, large or multiple abscesses, immunocompromise, infants.
- Failure is often inadequate source control rather than antibiotic resistance.



Hospital Admission

- Consider hospitalization with toxic appearance, sepsis, dehydration, need for pain control, ongoing fever
- Hospital goals: source control, IV antibiotics, observation, pain control, consultation to correct specialty
- When to call Pediatric Surgery?!
 - Consult for large/deep abscesses, failed bedside drainage, perirectal or breast abscesses, necrotizing infection, OR drainage, or need for procedural sedation.
 - Antibiotic treats bacteria and the surgeon treats pus!
 - Abscess location: deep neck (ENT), orbital (ophthalmology), perirectal (GI), hand, facial (ENT vs Plastics), joint involvement/concern for osteomyelitis (orthopedics), pyomyositis (Peds surgery)



Hospital Pharmacology

- Clindamycin is treatment of choice for purulent cellulitis/abscess
- Cefazolin is treatment of choice for cellulitis without abscess
- Unasyn is treatment of choice for cellulitis/abscess secondary to animal bite
- Vancomycin to be used as treatment of choice for Clindamycin allergic patients for purulent cellulitis/abscess or as second line choice for all other patients
- Zosyn to be used for patients with concern for Pseudomonas



Antibiotic Selection by Infection Severity

- **Mild:**
 - PO Cephalexin
 - PO Clindamycin
 - PO TMP-SMX (Bactrim)
- **Moderate:**
 - IV Clindamycin
 - IV Cefazolin
- **Severe:**
 - IV Vancomycin
 - IV Unasyn
 - IV Zosyn



Adverse Effects

- Highest **C. difficile concern**: Clindamycin is the classic antibiotic associated with C. difficile; virtually any antibiotic can cause it, including Zosyn, Unasyn, Vancomycin (when given systemically), and Cefazolin.
- Most important **renal toxicity**: Vancomycin and Zosyn, particularly when used together. The vancomycin + piperacillin/tazobactam combination is associated with increased AKI risk. Get daily RFP while on Vancomycin, then daily x2 after stopping treatment.
- **Infusion reaction**: Vancomycin can cause flushing, erythema, pruritus, and sometimes hypotension if infused too rapidly. Slowing the infusion generally helps.
- **β -lactam allergy**: Zosyn, Unasyn, and Ancef can cause allergic reactions. Cefazolin is a cephalosporin and has a relatively favorable allergy profile.
- Clindamycin: Think "**C. diff + diarrhea**" as the major adverse-effect association.
- Renal dosing: Vancomycin, Zosyn, Unasyn, and Ancef generally require dose adjustment based on renal function (depending on regimen); clindamycin generally does not require renal dose adjustment.

Most common side effects: Diarrhea, Nausea, Rash



Preparing for Discharge: IV to PO Antibiotic Transition

- Amoxicillin-clavulanate (Augmentin) — often the most straightforward oral step-down when broad gram-positive, gram-negative, & anaerobic coverage is still desired
- Cephalexin — reasonable for uncomplicated nonpurulent cellulitis when primarily targeting streptococci/MSSA
- Clindamycin — an option when β -lactams can't be used and appropriate streptococcal/MSSA $\pm$ MRSA coverage is desired
- TMP-SMX or doxycycline — generally used when MRSA coverage is needed, but they have less reliable streptococcal coverage, so they may need to be combined with a β -lactam for typical nonpurulent cellulitis



Cumulative Antimicrobial Susceptibility of Bacteria from Cultures at Akron Children's Hospital (All Patients)

January 1 – December 31, 2025

Gram positive cocci % Susceptible

Organism	No. of Isolates	Oxacillin	Ampicillin	Penicillin	Cefotaxime	Ceftriaxone	Vancomycin	Linezolid	Levofloxacin	Daptomycin	Gentamicin	Erythromycin	Clindamycin	Trimethoprim/ Sulfamethoxazole	Tetracycline	Nitrofurantoin (urine only)	Gentamicin synergy	Streptomycin synergy
<i>Streptococcus pneumoniae</i>	68	-	-	100/69*	100/95**	100/91**	100	100	100	-	-	65	97	84	90	-	-	-
<i>Streptococcus pyogenes</i> (Grp A)	245	-	100	100	100	100	100	-	96	-	-	91	95	-	94	-	-	-
<i>Streptococcus agalactiae</i> (Grp B)	265	-	100	100	100	100	100	-	99	-	-	21	26	-	12	-	-	-
<i>Streptococcus</i> spp. viridans group ***	59	-	93	88	93	97	100	-	93	-	-	64	75	-	61	-	-	-
<i>Enterococcus faecalis</i>	333	-	100	-	-	-	100	100	97	-	-	-	-	-	-	100	89	95
<i>Enterococcus faecium</i>	24	-	71	-	-	-	88	100	71	-	-	-	-	-	-	38	96	83
Oxacillin-resistant <i>Staphylococcus aureus</i> (MRSA)	411	R	-	-	-	-	100	100	-	100	99	20	84	80	89	99	-	-
Oxacillin-susceptible <i>Staphylococcus aureus</i> (MSSA)	1075	100	-	-	-	-	100	99	-	100	99	58	73	93	91	99	-	-
<i>Staphylococcus epidermidis</i>	125	45	-	-	-	-	100	100	-	100	92	34	51	74	80	100	-	-
<i>Staphylococcus similans</i>	19	95	-	-	-	-	100	100	-	100	100	70	70	90	90	100	-	-
<i>Staphylococcus hominis</i>	16	56	-	-	-	-	100	100	-	100	88	13	56	75	75	100	-	-

* Nonmeningitis breakpoint / meningitis breakpoint

** Nonmeningitis breakpoint / meningitis breakpoint

*** Included *Streptococcus anginosus*, *S. intermedius*, *S. constellatus*, *S. mitis/oralis*, and *S. gallolyticus pasteurianus*.

Treatment Duration & De-escalation

- Typically **5 days** for uncomplicated cellulitis
- Mild/Nonpurulent cellulitis is typically 5 days but can be extended to 7-10 days if improvement is slow
- Purulent infection/abscess: duration varies depending on drainage and severity, often 5–10 days.
- More severe or complicated infections: may require longer courses and/or IV antibiotics, guided by clinical response.
- **Improvement** should generally begin within **48–72 hours**, although redness and swelling can take longer to fully resolve
 - **If +MSSA stop Vancomycin**
 - **If MRSA susceptible to Clindamycin, transition to PO**
 - **De-escalation based on wound culture results/susceptibility**

** Per UpToDate: The total duration of systemic therapy for staphylococcal or streptococcal SSTI is not well studied and depends upon the antimicrobial agent, clinical syndrome, and clinical response.



Key Point/Bedside Management

- Cellulitis can sometimes look worse during the first day or two despite effective treatment. If there is rapidly spreading redness, severe pain, fever, low blood pressure, confusion, blistering/skin discoloration, or concern for a deeper infection, urgent medical evaluation is warranted.
- Bedside assessment/management:
 - Mark extent of erythema
 - Elevate affected limb
 - Heat to affected area
 - Warm moist compress to affected area



When to Consult Pediatric Surgery

- Large or deep abscess, particularly when drainage is difficult at the bedside.
- Abscess involving high-risk/anatomically complex areas, such as the face, periorbital region, hand, genital/perineal area, or near major vessels/nerves.
- Failure to improve or worsening despite appropriate antibiotics and initial drainage.
- Rapidly progressive infection, severe pain, skin discoloration, bullae, crepitus, or concern for necrotizing soft-tissue infection — this requires urgent surgical evaluation.
- Extensive cellulitis with suspected deeper involvement or an infection crossing tissue planes.
- Recurrent or multiloculated abscesses requiring more extensive source control.
- Suspected foreign body, infected congenital lesion, or underlying structural abnormality.
- Immunocompromised child or patient with significant comorbidities when operative management may be more likely.
- Need for operative drainage/debridement because adequate bedside drainage cannot be achieved or tolerated.

****For suspected necrotizing infection, do not wait for imaging or prolonged antibiotic response. Obtain immediate surgical consultation while initiating resuscitation and broad-spectrum IV antibiotics.****



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When to Consult ID

- Pediatric ID is particularly valuable when there is **treatment failure, bacteremia (*S. aureus*), resistant/unusual pathogens, recurrent disease, immunocompromise, or concern for a deeper/complicated infection.**

Other Reasons to Consult ID:

- Need for guidance on culture interpretation, antimicrobial narrowing, duration of therapy, or transition from IV to oral antibiotics.
- Complex antibiotic management, including drug allergies, intolerance, significant drug interactions, prolonged IV therapy, or uncertainty regarding duration/route.
- Unusual organisms or exposure history, including animal bites, water exposure, travel-associated infections, or unusual environmental exposures.



Skin and Soft Tissue Infection

General Consideration

- Most skin and soft tissue infections are caused by *Staphylococcus aureus* and/or β -hemolytic *Streptococcus*
- Culture of pus or exudates can help guide antimicrobial selection
- Cephalexin is not indicated for treatment of infections caused by methicillin-resistant *Staph aureus* (MRSA)
- Trimethoprim/Sulfamethoxazole is not indicated for treatment of infections caused by β -hemolytic *Streptococcus*
- Therapy should be reevaluated if no clinical improvement within 5 days
- These recommendations do not apply to patients who are immune compromised or who have had penetrating trauma

Diagnosis

- Impetigo begins as erythematous papules that evolve into vesicles and pustules that form honey-colored crusts on an erythematous base
- Ecthyma is a deeper infection that involves ulcerating vesicles with surrounding erythema
- Cellulitis is a superficial, spreading skin infection that causes warmth, redness, swelling, and tenderness without abscess formation. Culture is usually not indicated, and MRSA is rarely the cause.
- Cutaneous abscesses are painful, fluctuant red nodules with surrounding erythema and a collection of pus in the deeper tissue typically caused by *Staph aureus*. Incision and drainage is the preferred treatment and allows for culture.



Outpatient Treatment

Treatment Recommendations – Impetigo and Ecthyma

1. First-line for bullous and non-bullous impetigo - **Mupirocin**
 - Topically twice daily for 5 days
2. First-line for ecthyma or multiple areas of impetigo - **Cephalexin**
 - 50 mg/kg divided three times daily for 7 days
 - Max dose: 500 mg per dose
3. Penicillin allergy or concern for MRSA – **Clindamycin**
 - 20 mg/kg divided three times daily for 7 days
 - Max dose 300 mg per dose

Treatment Recommendations – Cellulitis

1. First-line - **Cephalexin**
 - 50 mg/kg divided three times daily for 5 days
 - Max dose: 500 mg per dose
2. Penicillin allergy or concern for MRSA – **Clindamycin**
 - 30 mg/kg divided three times daily for 5 days
 - Max dose: 450 mg per dose



Outpatient Treatment

Treatment Recommendations – Cutaneous Abscess

1. First-line – **Incision and Drainage**
 - Culture is recommended
 - Oral antimicrobials are not indicated for patients with adequate drainage and no systemic symptoms (fever, tachycardia, tachypnea, or abnormal white blood cell count)
2. First-line – **Trimethoprim/Sulfamethoxazole**
 - 12 mg TMP/kg divided twice daily for 5 days
 - Max dose: 160 mg TMP per dose
- Sulfa allergy – **Clindamycin**
 - 40 mg/kg divided three times daily for 5 days
 - Max dose: 450 mg per dose

Treatment Recommendations – Recurrent Cutaneous Abscess

1. First-line – **Incision and Drainage and appropriate antimicrobial**
 - Treat for 10 days if previous abscess was recent
 - Culture is recommended
2. Consider 5-day decolonization
 - Twice daily intranasal mupirocin
 - Daily chlorhexidine washes

Not Recommended

- Trimethoprim/Sulfamethoxazole if there is concern for β -hemolytic *Streptococcus*
- Amoxicillin if there is concern for *Staphylococcus aureus*



Discharge Planning

- Criteria for Discharge:
 - Afebrile
 - Improving cellulitis
 - Adequate drainage
 - Good pain control
 - Taking PO
 - Reliable follow up with PCP and/or surgery if indicated



Discharge Planning

- Home Care Instructions
 - **GOOD HAND HYGIENE ABOVE ALL**
 - Wound care (keep clean/dry/covered)
DON'T PICK AT WOUND!!
 - Medication adherence
 - Warning signs
 - Timely PCP follow up





Case 1: Primary Care Management

A 7-year-old child presents with 2 days of redness, warmth, swelling, and tenderness of the lower leg following a minor scrape. The child has a temperature of 37.5°C (99.5°F), is active and well-appearing, and has no purulent drainage or systemic symptoms.

- Diagnosis?
- Management?
- Follow up?





Case 2: Primary Care Management

A 7-year-old child presents with a 2-day history of a painful, red swelling on the thigh. Examination reveals a 3-cm fluctuant, tender abscess with mild surrounding erythema. The child is afebrile, active, and otherwise well.

- Diagnosis?
- Management?
- Follow up?





Case 3: Hospital Admission

- **Case Study:** Pediatric Abscess and Cellulitis
- **Patient:** 8-year-old child with no significant past medical history.
- **Chief Complaint:** Painful, enlarging swelling and redness of the right lower leg for 3 days, associated with fever and decreased activity.
- **Assessment:**
Temperature 38.8° C. Examination reveals a 5-cm fluctuant abscess with approximately 10-cm surrounding erythema, warmth, tenderness, and mild edema. The child is uncomfortable but hemodynamically stable. Ultrasound confirms a localized fluid collection consistent with an abscess.
- **Diagnosis:**
Skin and soft tissue infection (SSTI) consisting of a cutaneous abscess with surrounding cellulitis, with concern for a moderate-to-severe infection requiring inpatient management.



Case 3: Key Point

- **Key Learning Point:**

Pediatric SSTIs involving a significant abscess and extensive cellulitis may require hospitalization for source control, IV antimicrobial therapy, monitoring, and supportive care. Early recognition of systemic illness or rapidly progressive infection is essential.



Final Take-Home Pearls

- Every abscess needs source control evaluation
- Choose appropriate level of care, not just appropriate antibiotic
- Escalate care based on patient, infection, and family circumstances
- Use cultures & clinical response to guide de-escalation
- Successful management is multidisciplinary



Sources

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- Galli et al. 2019 Common community-acquired bacterial skin and soft-tissue infections in children: an intersociety consensus on impetigo, abscess, and cellulitis treatment
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