Cellulitis and Abscess: ED Phase v 1.1

Executive Summary

Test Your Knowledge

Explanation of Evidence Ratings

Summary of Version Changes

PHASE I (E.D.)

Inclusion Criteria

- Suspected skin/soft tissue infection in children > 44 weeks CGA

Exclusion Criteria

- Hospital-acquired, surgical site & device-associated infections
- Presumed necrotizing fasciitis
- Orbital/periorbital cellulitis
- Immunodeficiency
- Pressure ulcers
- Solitary dental abscess

! Labs if systemic illness or necrotizing fasciitis suspected

! Consider tetanus immunization status as necessary

If referral call from PMD, request perimeter line be drawn and make patient NPO.

Provider Assessment

Determine if special situation present.

Concern for:

- Deep extremity infection (e.g., tenosynovitis, septic arthritis, osteomyelitis)
- Deep puncture wound of hand/fingers/feet

Yes → • Order labs, then • Involve Orthopedics

No

Concern for:

- Peri-anal abscess (within 1cm of anal verge)
- Breast abscess
- Perineal abscess
- Pilonidal cyst
- Large or complex abscess

Yes → • Involve General Surgery

No

Concern for:

- Neck abscess

Yes → • Involve ENT

No

Concern for:

- Facial cellulitis of dental origin

Yes → • Involve Dental; See antibiotic table → Determine with consultant if suitable for pathway

No → **Go to Simple Cellulitis / Abscess Phase**

Yes → **Go to Simple Cellulitis / Abscess Phase**

No → **Off Pathway**

Last Updated: 08/15/2013
Valid until:08/15/2016

Cellulitis and Abscess: ED simple cellulitis / abscess v.1

Executive Summary | Test Your Knowledge | Explanation of Evidence Ratings | Summary of Version Changes

PHASE I (E.D.)

Inclusion Criteria
- Suspected skin/soft tissue infection in children > 44 weeks CGA

Exclusion Criteria
- Hospital-acquired, surgical site & device-associated infections
- Presumed necrotizing fasciitis
- Orbital/periorbital cellulitis
- Immunodeficiency
- Pressure ulcers
- Solitary dental abscess

! Labs if systemic illness or necrotizing fasciitis suspected

! Alter antibiotic selection if >48h of prior antibiotics given

Simple cellulitis / abscess

Perform bedside ultrasound unless clearly fluctuant or draining

Non-purulent → **No routine labs**

Purulent → Fluctuant or abscess ≥ 1cm on ultrasound:
- Sedation / pain control
- I&D and culture wound

Determine Disposition

Low Risk Criteria
- Simple abscess
- Adequate I&D
- Age ≥1 year
- No fever
- Well-appearing
- No significant comorbidities
- Follow up assured

Inpatient Admit Criteria (any one of the following)
- Systemic illness
- Not tolerating PO
- Treatment failure on >48h of appropriate antibiotics
- Rapidly progressive lesion
- Pain control / wound care
- All < 2 mo; consider if <6 mo
- Inadequate F/U

Purulent Definition
- Actively draining pus
- History of drainage
- Abscess present

Discharged patients

Non-purulent:
- **Medical Treatment**
  - Oral cephalexin
  - Clindamycin if failed outpatient treatment, cephalosporin allergic or if MRSA risks

Purulent:
- **Medical Treatment**
  - No systemic antibiotics after I&D if low risk
  - Oral clinda if not low risk
  - TMP/SMX (or doxycycline if >8 years) if presumed clindamycin-resistant MRSA

! Antibiotic selection by condition

Admitted patients

Non-purulent:
- **Medical Treatment**
  - IV cefazolin
  - Clindamycin if failed outpatient treatment, cephalosporin allergic or if MRSA risks
  - Consider vancomycin if systemic toxicity

Purulent:
- **Medical Treatment**
  - IV clindamycin
  - Vancomycin if presumed clindamycin-resistant MRSA
  - Consider vancomycin if systemic toxicity, failed outpatient clindamycin

Discharge Instructions
- 7-10 days total treatment
- PMD f/u within 24-48 hours

Go to Inpatient Phase

Last Updated: 08/15/2013
Valid until:08/15/2016

Cellulitis and Abscess: Inpatient Phase v.1

Executive Summary | Explanation of Evidence Ratings

Test Your Knowledge | Summary of Version Changes

PHASE II (INPATIENT)

! Labs if systemic illness or necrotizing fasciitis suspected

Inclusion Criteria
Suspected skin/soft tissue infection in children > 44 weeks CGA

INPATIENT Exclusion Criteria
- Hospital-acquired, surgical site & device-associated infections
- Peri-anal or pilonidal abscesses
- Presumed necrotizing fasciitis
- Orbital/periorbital cellulitis
- Pts admitted to surgical service
- Immunodeficiency
- Deep structure infections
  - Pressure ulcers

! Antibiotic selection by condition

Daily re-evaluation
- Clinical exam
- Culture data

Improving

- Tailor antibiotics if culture results are available
- Use narrowest-spectrum agent possible

Not Improving

- Tailor antibiotics if culture results are available
- If rapid progression at any time or no improvement on empiric antibiotics at 48 hours, consider empiric change in antibiotics
- If no improvement on adequate antibiotics, image (U/S preferred) to rule out abscess formation
- If fluctuance develops or abscess ≥1 cm on imaging, consult gen. surgery
- Consult ID as necessary

Discharge Criteria (Meets all)
- Lesion(s) show signs of improvement
- Tolerating PO
- Pain controlled
- Afebrile >24 hours
- F/U assured within 48 hours

Discharge Instructions
- 7-10 days total treatment
- PMD f/u within 48 hours

Last Updated: 08/15/2013
Valid until:08/15/2016

Cellulitis and Abscess: Antibiotic Table

Executive Summary | Explanation of Evidence Ratings | Test Your Knowledge | Summary of Version Changes

Cellulitis and Abscess Antibiotic Table

	Condition			
	Non-purulent cellulitis	**Purulent SSTI/ abscess**	**Bite wounds**	**Facial cellulitis of dental origin**
IV choice	Cefazolin	Clindamycin	Ampicillin/sulbactam	Penicillin **OR** Ampicillin/sulbactam
IV Alternatives	Clindamycin if cephalosporin allergic Consider vancomycin if rapidly progressive lesion; hemodynamic instability; ill-appearing	Vancomycin if presumed clindamycin resistant MRSA; rapidly progressive lesion; hemodynamic instability; ill-appearing; failed oral clindamycin as outpatient; abscess in an area difficult to drain completely such as face/hand/genitals Call ID if linezolid desired	Cefoxitin (transition to clindamycin AND ciprofloxacin at discharge) if penicillin allergic	Clindamycin if penicillin allergic
PO choice	Cephalexin	No antibiotics if **low risk criteria*** met and abscess adequately drained Clindamycin otherwise	Amoxicillin/clavulanate	Penicillin **OR** Amoxicillin/clavulanate
PO Alternatives	Clindamycin if cephalosporin allergic	TMP/SMX if presumed clindamycin resistant MRSA Doxycycline if age >8 years and prior clindamycin and TMP/SMX resistant MRSA OR presumed clindamycin resistance and sulfa allergy Call ID if linezolid desired	Doxycycline if age >8 years and penicillin allergy Clindamycin AND ciprofloxacin for penicillin allergic patients Call ID for other scenarios	Clindamycin if penicillin allergic

***Low risk criteria: Age ≥1 year; no fever; well-appearing; adequate I&D; no significant comorbidities**

Low Risk Criteria*

- Simple abscess
- Adequate I&D
- Age ≥1 year
- No fever
- Well-appearing
- No significant comorbidities
- Follow up assured

*** For use in determining the need for PO antibiotics for purulent infection post I&D, outpatient treatment (see above)**

Alternate antibiotic choices

- If fresh or saltwater contact, or other special circumstance, discuss with ID

Return Initial ED phase | Return to ED Simple Cellulitis / Abscess Phase | Return to Inpatient Phase

For questions concerning this pathway, contact: CellulitisandAbscess@seattlechildrens.org

Last Updated: 08/15/2013
Valid until:08/15/2016

Tetanus prophylaxis in routine wound management

(Adapted from the Red Book: 2012 report of the Committee on Infectious Diseases, p. 709)

History of tetanus toxoid (doses)	Clean, minor wounds		All other wounds	
	DTaP, Tdap, or Td	TIG	DTaP, Tdap, or Td	TIG
Fewer than 3 or unknown	Yes	No	Yes	Yes
3 or more	**No - if < 10 years** since last tetanus- containing vaccine dose.	No	**No if < 5 years** since last tetanus- containing vaccine dose.	No
	Yes if ≥ 10 years since last tetanus- containing vaccine dose	No	**Yes if ≥ 5 years** since last tetanus- containing vaccine dose.	No

TIG = Tetanus immune globulin

Other wounds = Such as, but not limited to, wounds contaminated with dirt, feces, soil, and saliva; puncture wounds; avulsions; and wounds resulting from missiles, crushing, burns, and frostbite

Note: DTAP is used for children <7 years of age. Tdap is preferred to Td for underimmunized children 7 years of age or older who have not received Tdap previously.

Initial ED phase

ED simple cellulitis/ abscess

Inpatient Phase

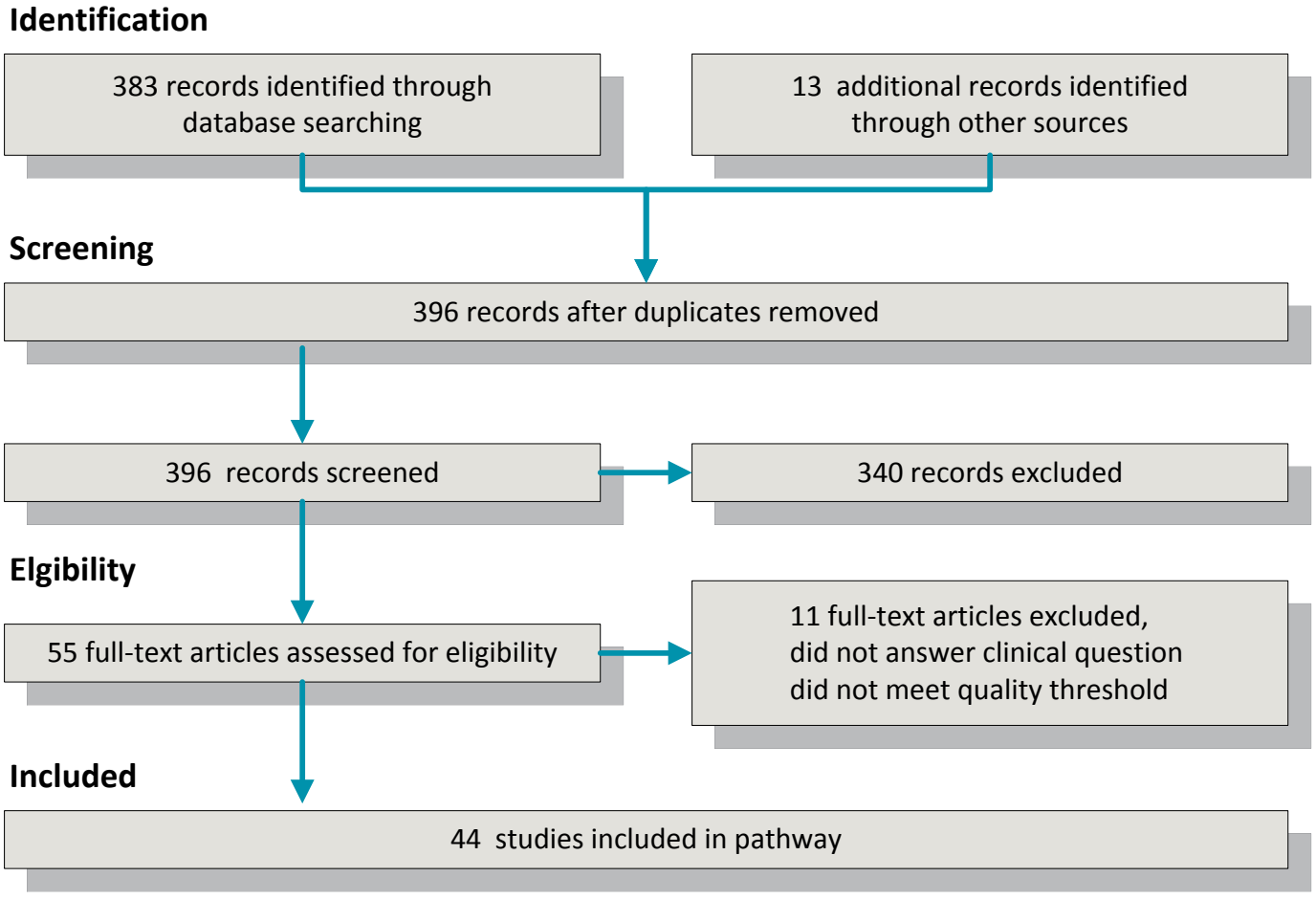
Bibliography

Literature Search

Search Methods, Soft Tissue Infections – Cellulitis, Clinical Standard Work

Studies were identified by searching electronic databases using search strategies developed and executed by a medical librarian, Susan Klawansky. Searches were performed in November 2012 in the following databases – on the Ovid platform: Medline and Cochrane Database of Systematic Reviews; elsewhere: Embase, Clinical Evidence, National Guideline Clearinghouse and TRIP. Retrieval was limited to 2004 to current, humans, and English language. In Medline and Embase, appropriate Medical Subject Headings (MeSH) and Emtree headings were used respectively, along with text words, and the search strategy was adapted for other databases as appropriate. Concepts searched were soft tissue infections, cellulitis and many other related conditions, some of which are skin abscess, bites and stings, impetigo, carbuncle, infectious skin diseases and penetrating wounds. All retrieval was further limited to certain publication types representing high order evidence.

Susan Klawansky, MLS, AHIP April 9, 2013



Flow diagram adapted from Moher D et al. BMJ 2009;339:bmj.b2535

Bibliography

1) Kilburn SA, Featherstone P, Higgins B, Brindle R. Interventions for cellulitis and erysipelas. *Cochrane Database of Systematic Reviews* 2010 (6). DOI:10.1002/14651858.CD004299.pub2.

2) Liu C, Bayer A, Cosgrove SE, Daum RS, Fridkin SK, Gorwitz RJ, Kaplan SL, Karchmer AW, Levine DP, Murray BE, Rybak MJ, Talan DA, Chambers HF. Clinical practice guidelines by the Infectious Diseases Society of America for the treatment of methicillin-resistant staphylococcus aureus infections in adults and children. *Clin Infect Dis* 2011 Feb;52:1-38.

3) JL Robinson, MI Salvadori; Canadian Paediatric Society Infectious Diseases and Immunization Committee, Management of community associated methicillin-resistant Staphylococcus aureus skin abscesses in children. *Paediatr Child Health* 2011; 16(2):115-6

4) May A et al. Treatment of complicated skin and soft tissues infections, Surgical Infection Society Guidelines. Surgical *Infections* 2009 Vol 10, Number 5, 467-501

5) Paydar, K Z, Hansen, SL, Charlebois, ED, Harris, HW, Young, DL. Inappropriate antibiotic use in soft tissue infections. *Archives of Surgery* 2006; 141(9), 850-856.

6) Elliott DJ, Zaoutis TE, Troxel AB, Loh A, Keren R. Empiric antimicrobial therapy for pediatric skin and soft-tissue infections in the era of methicillin-resistant Staphylococcus aureus. *Pediatrics* 2009; 123(6), e959-966.

7) Duong et al, Randomized Controlled Trial of Antibiotics in the Management of Community-Acquired Skin Abscesses in the Pediatric Patient. *Ann Emerg Med* 2010;55(5):401-7.

8) Stevens DL et al. Practice guidelines for the diagnosis and management of skin and soft tissue infections. *Clin Infect Dis* 2005;41:1373-406.

9) Williams DJ et al. Comparative effectiveness of antibiotic treatment strategies for pediatric skin and soft-tissue infections. *Pediatrics* 2011;128(3) e1-e9.

10) Chen AE et al. Randomized Controlled Trial of Cephalexin Versus Clindamycin for Uncomplicated Pediatric Skin Infections. *Pediatrics* 2011;127(3);e573.

11) Squire et al. ABSCESS: Applied Bedside Sonography for Convenient Evaluation of Superficial Soft Tissue Infections. *Acad Emerg Med* 2005 Vol. 12, No. 7, 601-606

12) Tayal, VS, Hasan, N, Norton, HJ et al, The effect of soft-tissue ultrasound on the management of cellulitis in the emergency department. *Acad Emerg Med* 2006, 13, 4, 384-388.

Executive Summary

Objective

To improve the quality and safety of care for uncomplicated community acquired soft tissue infections in children older than 30 days of life, specifically:

- Reduce use of broader spectrum, inappropriate, or more toxic antibiotics for cellulitis and abscess
- Reduce the use of systemic antibiotics for children with simple abscess who meet low risk criteria
- Decrease unnecessary laboratory testing
- Increase the use of laboratory testing that will allow for targeted antimicrobial therapy
- Decrease unnecessary hospital days

Recommendations

1. Use bedside ultrasound where available to improve the accuracy in diagnosis of subcutaneous abscesses.
2. Obtain wound cultures when possible.
3. Do NOT obtain routine blood testing (CBC, CRP, blood culture) for most children with cellulitis or abscess.
4. No incision and drainage is needed for abscesses <1 cm on bedside ultrasound; these patients may be discharged home on antibiotics alone.
5. Do NOT prescribe oral antibiotics for simple abscesses that have been incised and drained completely, if the patient is >1 year of age, afebrile, well-appearing, with no significant comorbidities and adequate follow up assured.
6. Prescribe oral clindamycin for outpatient treatment of abscesses that could **not** have an adequate I&D, or do **not** meet low-risk criteria.
7. Prescribe cephalexin for outpatient treatment of simple cellulitis without an abscess, drainage, history of drainage, or failure of outpatient antibiotic course (>48 h on appropriate antibiotics).
8. Prescribe oral clindamycin for outpatient treatment of purulent cellulitis or cellulitis that has not responded to anti-MSSA therapy (beta lactam, >48 hours).
9. Prescribe cefazolin for inpatient treatment of simple cellulitis without an abscess, drainage, history of drainage, or failure of outpatient antibiotic course (>48 h on appropriate antibiotic).
10. Prescribe IV clindamycin for inpatient treatment of purulent cellulitis or cellulitis that has not responded to anti-MSSA therapy (beta lactam, >48 hours) .
11. Prescribe IV vancomycin for inpatient treatment of cellulitis in patients who are systemically ill (fever >38, tachycardia, vomiting) or have failed antibiotic therapy that covers MRSA .
12. Obtain general surgery, orthopedics, ENT, or dental consultation for the appropriate special clinical scenarios.

Implementation Items

- Created three care algorithms (two for the Emergency Department, and one for inpatients) as well as an antibiotic table to address common clinical scenarios
- Developed a Learning Center training module for the management of community acquired cellulitis and abscess
- Developed a multi-phase PowerPlan, with ED, inpatient, and discharge phases

Metrics Plan

Cellulitis Process Metrics

- **Antibiotic Change/Vancomycin Rate** AIM : fewer than 10% of eligible population should change from clindamycin or cefazolin to vancomycin.
- **ED Antibiotics for Home Rate** – AIM: reduce antibiotic prescription rate to 15% among patients undergoing I&D for abscess who are discharged from the ED

PDCA Plan

Quarterly Review of Metrics, Literature Review, E-Feedback, and Audit Reports will inform Improvement efforts

Revision History

Date Approved: **August, 2013**
Next Review Date: **August, 2016**

Initial ED phase | **ED simple cellulitis/ abscess** | **Inpatient Phase**

Executive Summary

Cellulitis and Abscess

CSW Approval – August, 2013

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

CSW Owner(s): Dr Lauren Wilson, MD and Dr Derya Caglar, MD

Approved by the Cellulitis and Abscess Clinical Standard Work (CSW) Team August 2013

Cellulitis and Abscess CSW Team:
Lauren Wilson, MD
Derya Caglar, MD
George Drugas, MD

Clinical Effectiveness Team:
Boots (Matthew) Kronman, MD, CE Consultant
Pauline Ohare, RN, MBA, CE Project Leader
Wendy Murchie, MN, CNS
Elaine Beardsley, ED CNS
James Johnston, Knowledge Management)
Mike Leu, MD Informaticist
Asa Herrman, Program Coordinator
Susan Klawansky, Librarian

Initial ED phase

ED simple cellulitis/ abscess

Inpatient Phase

Self-Assessment

- **Completion qualifies you for 1 hour of Category II CME credit. If you are taking this self-assessment as a part of required departmental training at Seattle Children's Hospital, you MUST logon to Learning Center.**

Cellulitis and Abscess: Test your knowledge!

1. When evaluating a patient for SSTI, blood cultures should be drawn:
   a) From all patients with suspected SSTI
   b) From patients with cellulitis only
   c) From patients with abscess only
   d) From patients with systemic toxicity or suspected necrotizing fasciitis.
2. Abscesses that have been adequately drained may be discharged home without antibiotics if
   a) >1 year old
   b) Well appearing
   c) Reliable followup within 2 days
   d) All of the above

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Self-Assessment

- **Completion qualifies you for 1 hour of Category II CME credit. If you are taking this self-assessment as a part of required departmental training at Seattle Children's Hospital, you MUST logon to Learning Center.**

Cellulitis and Abscess: Test your knowledge!

3. A patient has an uncomplicated non-suppurative cellulitis. The patient should be discharged home with:
   a) Cephalexin
   b) Trimethoprim-Sulfamethoxazole
   c) Clindamycin
   d) No antibiotics.
4. A patient presents to the ED for evaluation of a suspected pilonidal abscess. You should consult:
   a) Plastic surgery
   b) General surgery
   c) Orthopedic surgery
   d) All of the above

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Self-Assessment

- **Completion qualifies you for 1 hour of Category II CME credit. If you are taking this self-assessment as a part of required departmental training at Seattle Children's Hospital, you MUST logon to Learning Center.**

Cellulitis and Abscess: Test your knowledge!

5. A patient is admitted after an I&D of a buttock abscess with significant surrounding cellulitis. You would treat initially start treatment with:
   a) Vancomycin
   b) Clindamycin
   c) Cefazolin
   d) Trimethoprim-sulfamethoxazole
   e) Cephalexin

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Cellulitis and Abscess: Answer Key!

Answers:

1. d
2. d
3. a
4. b
5. b

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Evidence Ratings

We used the GRADE method of rating evidence quality. Evidence is first assessed as to whether it is from randomized trial, or observational studies. The rating is then adjusted in the following manner:

Quality ratings are *downgraded* if studies:
- Have serious limitations
- Have inconsistent results
- If evidence does not directly address clinical questions
- If estimates are imprecise OR
- If it is felt that there is substantial publication bias

Quality ratings can be *upgraded* if it is felt that:
- The effect size is large
- If studies are designed in a way that confounding would likely underreport the magnitude of the effect OR
- If a dose-response gradient is evident

Quality of Evidence:
✪✪✪✪ High quality
✪✪✪○ Moderate quality
✪✪○○ Low quality
✪○○○ Very low quality
Expert Opinion (E)

Reference: Guyatt G et al. J Clin Epi 2011: 383-394

To Bibliography | Initial ED phase | ED simple cellulitis/ abscess | Inpatient Phase

Summary of Version Changes

- **Version 1 (08/15/2013):** Go live
- **Version 1.1 (11/6/2013):** Clarified which patients should receive Orthopedic consultation in the ED; recommended laboratory studies to be performed prior to Orthopedic consultation; excluded patients with solitary dental abscess from the ED phase

Initial ED phase

Medical Disclaimer

Medicine is an ever-changing science. As new research and clinical experience broaden our knowledge, changes in treatment and drug therapy are required.

The authors have checked with sources believed to be reliable in their efforts to provide information that is complete and generally in accord with the standards accepted at the time of publication.

However, in view of the possibility of human error or changes in medical sciences, neither the authors nor Seattle Children's Healthcare System nor any other party who has been involved in the preparation or publication of this work warrants that the information contained herein is in every respect accurate or complete, and they are not responsible for any errors or omissions or for the results obtained from the use of such information.

Readers should confirm the information contained herein with other sources and are encouraged to consult with their health care provider before making any health care decision.

Background

Many patients present to their health care providers, urgent care clinics, or the emergency department for evaluation and treatment of soft tissue infections. Some have a simple cellulitis that is often easily treated with antibiotics, while others have more complicated infections that require extensive incision and drainage or hospitalization. In addition to *Streptococcus pyogenes* and methicillin-sensitive *Staphylococcus aureus* (MSSA), methicillin-resistant *Staphylococcus aureus* (MRSA) has also become a real consideration in these types of infections.

This pathway's intent is to standardize – to the extent possible – the diagnosis and management of such soft tissue infections at Seattle Children's.

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Initial ED phase | **ED simple cellulitis/ abscess** | **Inpatient Phase**

Introduction – Cellulitis and Abscess

This clinical standard work pathway is meant to guide the diagnosis and management of patients with cellulitis and/or abscess.

- **Inclusion criteria:** Suspected community-acquired skin and soft tissue infection in a child > 44 weeks CGA
- **Exclusion criteria:**
  - Hospital-acquired, surgical site and device-associated infections
  - Pressure ulcers
  - Orbital/periorbital cellulitis
  - Immunodeficiency
  - Presumed necrotizing fasciitis
  - Solitary dental abscesses
  - *Note: For the inpatient phase, we additionally exclude peri-anal abscesses, pilonidal abscesses, deep structure infections, and patients admitted to surgical services. Initial ED management is provided in the ED phase, however.*

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Initial ED phase | ED simple cellulitis/ abscess | Inpatient Phase

Definition: Cellulitis and Abscess

Cellulitis is an infection of the skin and underlying soft tissue. It is characterized by pain, erythema, edema, and warmth.

- **Purulent cellulitis** is cellulitis associated with drainage or exudate, currently or by history. A drainable abscess may or may not be present.
- **Nonpurulent cellulitis** has no drainage, exudate, or abscess present.

An **abscess** is a cavity filled with pus that results from a bacterial infection. An abscess in the subcutaneous tissues can be present with or without surrounding cellulitis.

Abscess, not yet draining

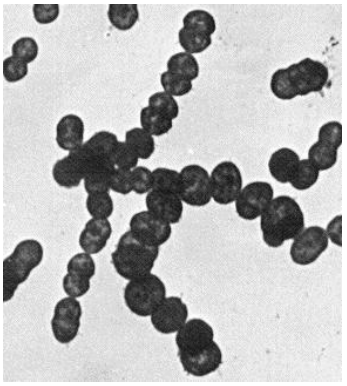
Purulent cellulitis due to MRSA
http://depts.washington.edu/

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Microbiology

- Nonpurulent cellulitis is usually due to group A streptococci (although studies are limited due to the difficulty culturing from these infections)

- Purulent cellulitis may be caused by MSSA, MRSA, or group A streptococci (GAS).
  - Approximately 27% of *S aureus* isolates from wounds are MRSA at Seattle Children's (2012-13 data)



S. pyogenes (GAS)
http://textbookofbacteriology.net/

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Risk factors for MRSA

History in the last 6 months of:

- MRSA in the patient
- MRSA in the family
- Recurrent boils, pustules, “spider bites”, etc. that required antibiotics, in patient or family

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Examining a soft tissue infection

- Erythema, warmth, edema universally present
- Induration or fluctuance (the latter diagnostic of fluid collection) may be present
- Signs of possible necrotizing infection:
  - Very rapid spread
  - Bluish discoloration, blistering, pain out of proportion or beyond the edges of the lesion, skin anesthesia, rapid progression, or gas in the tissue
  - These signs sometimes appear late in course
- When first examining, draw a line (mark date/time) around lesion's borders, if not already present

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Diagnostic testing

- Use bedside ultrasound where available to improve the accuracy in diagnosis of subcutaneous abscesses (Squire ✪✪✪○, Tayal ✪✪✪○)
- Obtain wound cultures when possible; i.e., in patients who have spontaneously draining lesions and in patients who undergo I&D procedures (Liu ✪✪○○, local consensus [LC])
- Routine blood testing (CBC, CRP, blood culture) is not necessary for most children with SSTI (Stevens ✪○○○, LC)
- Obtain a CBC, CRP, and blood cultures in children with signs of systemic toxicity, including ill-appearance, rapidly spreading lesions, persistent fevers, and age <1yo (Liu ✪○○○, Stevens ✪○○○, LC)

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Initial ED phase | ED simple cellulitis/ abscess | Inpatient Phase

Initial ED phase | ED simple cellulitis/ abscess | Inpatient Phase

Surgical consultation

Specific locations of cellulitis/abscess warrant subspecialist consultation to evaluate for deeper and more serious/complicated extension of infection.

- **Orthopedics:** Infections over joints, infections of hand/fingers/feet
- **General surgery:** Peri-anal abscess (within 1 cm of anal verge), pilonidal abscess, perineal abscess, breast abscess
- **ENT:** Neck abscess
- **Dental:** Facial cellulitis of dental origin

  (LC)

Note: Also consult General Surgery if an inpatient develops any abscess requiring drainage (LC)

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Laboratory studies prior to Orthopedic consultation

Prior to consulting Orthopedics, obtain the following:

- **Blood work:** Complete blood count with differential, C-reactive protein, and erythrocyte sedimentation rate. Consider blood culture for ill-appearing or febrile patients.
- **Radiographs:** Obtain appropriate films of the affected area; typically more than one view is required

(LC)

Note: The above studies will need to be ordered as needed from outside the Cellulitis and Abscess PowerPlan.

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Incision and drainage (I&D)

- No drainage is needed for abscesses <1 cm on bedside ultrasound; these patients may be discharged home on antibiotics alone with close PCP follow-up (Tayal ✪○○○, LC)
- Larger abscesses require thorough I&D of purulent material with adequate sedation and analgesia
    - Ketamine sedation is frequently needed in pediatric patients, though local anesthesia will also provide some pain relief
    - Consider surgical consultation for very large or complicated abscesses that may require extensive exploration or prolonged sedation time
- All patients who have had an I&D procedure should have reliable follow-up for re-evaluation with their PCP in 24 - 48 hours

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Incision and drainage (continued)

Correct incision and drainage technique is the cornerstone of treating abscesses. If you perform I&D, the following video is a good reminder of proper techniques:

http://www.nejm.org/doi/full/10.1056/NEJMvcm071319

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Incision and drainage (continued)

Correct incision and drainage technique is the cornerstone of treating abscesses. If you perform I&D, the following video is a good reminder of proper techniques:

http://www.nejm.org/doi/full/10.1056/NEJMvcm071319

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Antibiotics for abscess post I&D

No oral antibiotics are needed for **simple abscesses that have been incised and drained completely**, (Duong ✪✪✪○, Chen ✪✪○○ , Paydar ✪✪○○, and Hankin ✪○○○) unless the patient has one of the following:

- Severe or extensive disease
- Rapid progression in presence of associated cellulitis
- Signs and symptoms of systemic illness
- Associated comorbidities or immunosuppression
- Extremes of age (<1 year old)
- Abscess in area difficult to drain (face, hand, and genitalia)
- Associated septic phlebitis
- Lack of response to I &D alone (Liu ✪✪○○)

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Antibiotics for abscess (continued)

- Prescribe oral clindamycin for outpatient treatment of abscesses that **could not have an adequate I&D**, or **do not meet low-risk criteria** as summarized below (Liu ✪✪○○)

Low Risk Criteria

- Age ≥1 year
- No fever
- Well-appearing
- Adequate I&D
- No significant comorbidities

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Initial ED phase	ED simple cellulitis/ abscess	Inpatient Phase

Antibiotics for nonpurulent cellulitis

• Prescribe an oral beta lactam (cephalexin) for outpatient treatment of simple cellulitis without an abscess, drainage, history of drainage, or failure of outpatient antibiotic course (>48 h on appropriate antibiotics) (Liu ✪✪✪○, Stevens ✪✪○○, Elliott ✪✪○○, and Williams ✪✪○○)

• Prescribe an IV beta lactam (cefazolin) for inpatient treatment of simple cellulitis without an abscess, drainage, history of drainage, or failure of outpatient antibiotic course (>48 h on appropriate antibiotic) (Liu ✪✪✪○ and Stevens ✪✪○○)

• Prescribe oral clindamycin for cellulitis that has not responded to anti-MSSA therapy (beta lactam, >48 hours) (Liu ✪○○○, LC)

• Consider IV vancomycin for inpatient treatment of cellulitis in patients who are systemically ill (fever >38, tachycardia, vomiting) or have failed an outpatient antibiotic course that covers MRSA (Liu ✪○○○)

Antibiotics for purulent cellulitis

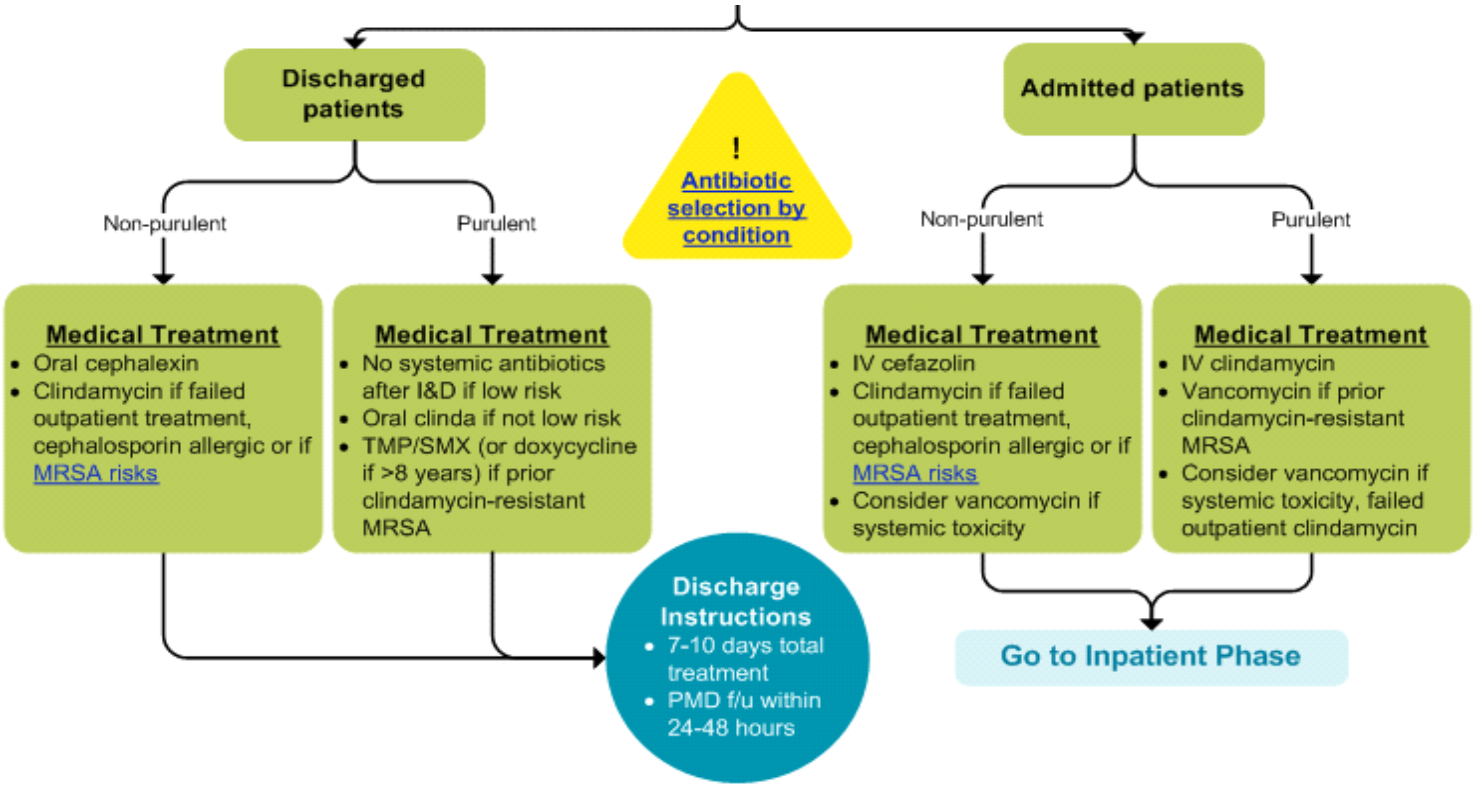
• Prescribe oral clindamycin for outpatient treatment of purulent cellulitis or cellulitis that has not responded to anti-MSSA therapy (beta lactam, >48 hours) (Liu ✪○○○, LC)

• Prescribe IV clindamycin for inpatient treatment of purulent cellulitis or cellulitis that has not responded to anti-MSSA therapy (beta lactam, >48 hours) (Liu ✪○○○, LC)

• Prescribe IV vancomycin for inpatient treatment of cellulitis in patients who are systemically ill (fever >38, tachycardia, vomiting) or have failed antibiotic therapy that covers MRSA (Liu ✪✪○○)

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

ED Cellulitis / Abscess pathway – Antibiotic selection



Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Initial ED phase | ED simple cellulitis/ abscess | Inpatient Phase

Empiric antibiotic selection

	Non-purulent cellulitis	Purulent SSTI/ abscess	Bite wounds	Facial cellulitis of dental origin
IV choice	Cefazolin	Clindamycin	Ampicillin/sulbactam	Penicillin **OR** Ampicillin/sulbactam
IV Alternatives	Clindamycin if cephalosporin allergic Consider vancomycin if rapidly progressive lesion; hemodynamic instability; ill-appearing	Vancomycin if presumed clindamycin resistant MRSA; rapidly progressive lesion; hemodynamic instability; ill-appearing; failed oral clindamycin as outpatient; abscess in an area difficult to drain completely such as face/hand/genitals Call ID if linezolid desired	Cefoxitin (transition to clindamycin AND ciprofloxacin at discharge) if penicillin allergic	Clindamycin if penicillin allergic
PO choice	Cephalexin	No antibiotics if **low risk criteria** met and abscess adequately drained Clindamycin otherwise	Amoxicillin/clavulanate	Penicillin **OR** Amoxicillin/clavulanate
PO Alternatives	Clindamycin if cephalosporin allergic	TMP/SMX if presumed clindamycin resistant MRSA Doxycycline if age >8 years and prior clindamycin and TMP/SMX resistant MRSA OR presumed clindamycin resistance and sulfa allergy Call ID if linezolid desired	Doxycycline if age >8 years and penicillin allergy Clindamycin AND ciprofloxacin for penicillin allergic patients Call ID for other scenarios	Clindamycin if penicillin allergic

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Initial ED phase | ED simple cellulitis/ abscess | Inpatient Phase

Admission criteria

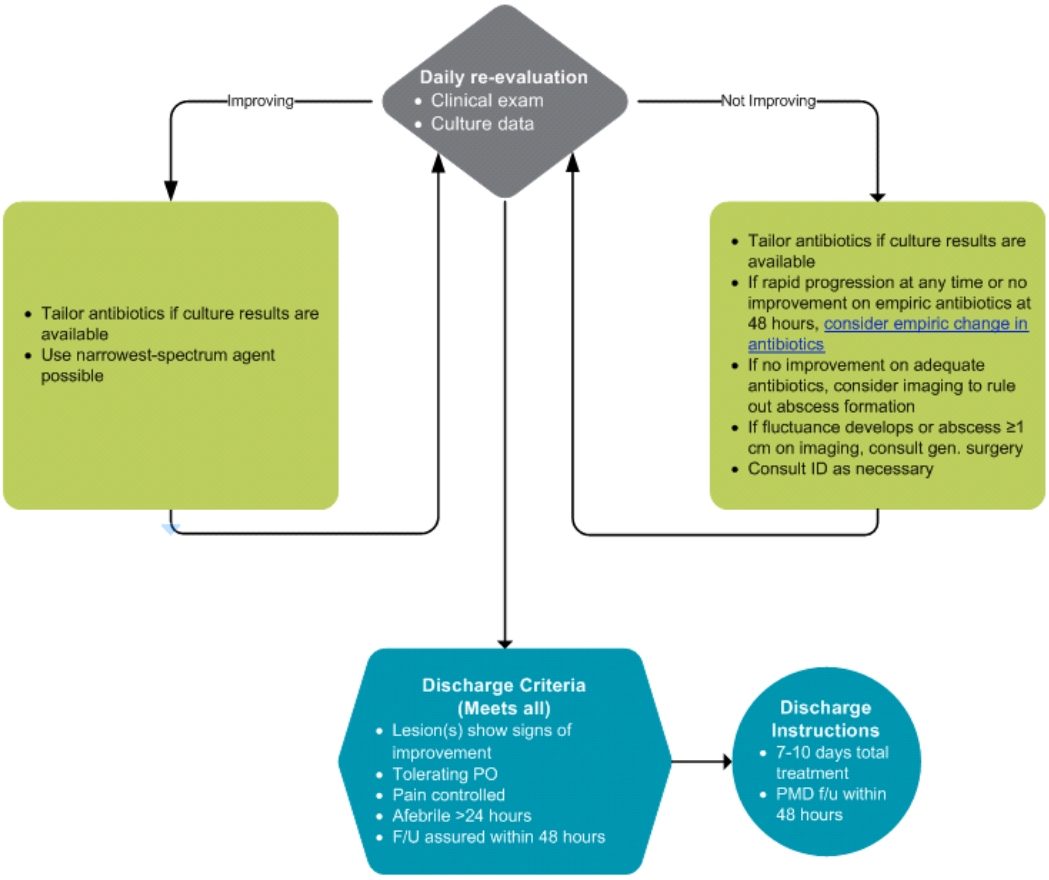
Patients who should be admitted:

- Are systemically ill (ill-appearance, persistent fevers, hemodynamic instability etc.)
- Are unable to tolerate oral therapy
- Fail appropriate outpatient therapy (48 hours of treatment and not showing signs of improvement)
- Have rapidly progressive lesions
- Need pain control or wound care
- Consider if < 6 months of age
- Adequate follow up not available

(LC)

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Inpatient pathway daily flow



Reevaluate lesion daily or with significant changes

Follow microbiology cultures, and change to the narrowest spectrum antibiotic once sensitivities are available

Consult general surgery if an abscess develops that necessitates drainage

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Initial ED phase | **ED simple cellulitis/ abscess** | **Inpatient Phase**

Treatment failure

- Treatment failure occurs if there is:
  - **Significant or rapid expansion** of cellulitis at any point in the course of treatment (i.e. more than just one or two centimeters beyond margins), *or*
  - Cellulitis is **not showing improvement after 48 hours** of effective antibiotic treatment (LC)
- The development of a new abscess within an area of previous infection while on antibiotics does not in and of itself constitute treatment failure

Note: *Referring physicians will be asked to outline lesions with permanent marker if possible before sending patients to the ED and make the patient NPO; lesions will be outlined in ED triage if not already done*

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Switching to oral antibiotics

- Conversion from an IV to oral antibiotic prior to discharge is not necessary (LC)
- If worries about palatability or concerns about administration exist, a single oral antibiotic dose may be given prior to discharge (LC)

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Initial ED phase | **ED simple cellulitis/ abscess** | **Inpatient Phase**

Discharge criteria

A patient is ready for discharge when:

- Lesion(s) show signs of improvement
- Tolerating PO
- Pain well controlled
- No fever > 24 hours
- Follow up assured within 48 hours

(LC)

Patients should complete 7-10 total days of antibiotic treatment. (LC, Liu ✪○○○).

Antibiotic treatment can be extended by the PCP if the lesion is not completely resolved at the end of this course.

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Initial ED phase | ED simple cellulitis/ abscess | Inpatient Phase