

Cellulitis: Adult & Pediatric

Skin and Integumentary

Clinical Decision Tools for RNs with Additional Authorized Practice [RN(AAP)s]

Effective Date: February 1, 2022

Background

Cellulitis is an acute, spreading inflammation of the dermis and subcutaneous tissue, often complicating a wound or other skin condition (Garnett, Winland-Brown, & Porter, 2019; Raff & Kroshinsky, 2016). Cellulitis may be further classified by the unique area of the body it affects (e.g., periorbital or orbital, peritonsillar, etc.) (Garnett et al., 2019).

Classification

Cellulitis is classified as mild, moderate, or severe based on the *Anti-infective Guidelines for Community-acquired Infections* (Anti-Infective Review Panel, 2019) and *Bacterial Skin Infections* (Garnett et al., 2019).

Mild	Moderate	Severe
<ul style="list-style-type: none"> • localized limited cellulitis; • small area of erythema, warmth, and induration; • tenderness; and • may or may not be exudative. 	<ul style="list-style-type: none"> • spreading area of erythema, warmth, and induration; • pain; • lymphadenopathy; • fever; • swelling of the affected limb; and • may or may not be exudative. 	<ul style="list-style-type: none"> • extensive cellulitis, • rapidly spreading (consider group A streptococcus), • fever, • lymphadenopathy, • diminished arterial pulse in a cool swollen infected extremity, and • cutaneous necrosis.

Immediate Consultation Requirements

The RN(AAP) should seek immediate consultation from a physician/NP if moderate or severe cellulitis or any of the following circumstances exist: extensive cellulitis (including signs of abscess formation);

- abscess in sensitive areas and/or mucous membrane (e.g., labial, supralelevator, ischioanal, perirectal);
- abscess near major blood vessels;
- abscess that requires extensive incision;
- secondary bacterial cellulitis from a pre-existing wound or trauma (e.g., post-surgery site, burns);
- toxic-appearing infant or child, may be pale or cyanotic and is often lethargic or inconsolably irritable. In addition, tachypnea and tachycardia with poor capillary refill may be present;
- diminished arterial pulse in a cool, swollen, infected extremity;
- cutaneous necrosis;
- rapidly progressing cellulitis (may indicate invasive streptococcal infection);
- cellulitis of the face or a joint;
- peritonsillar abscess in a pediatric client;
- immunocompromised client;
- client with diabetes;
- suspected foreign body; and/or
- six years of age or less.

The RN(AAP) should initiate an intravenous fluid replacement as ordered by the physician/NP or as contained in an applicable RN Clinical Protocol within RN Specialty Practices if any of the Immediate Consultation circumstances exist (Interprofessional Advisory Group [IPAG], personal communication, July 19, 2019).

Predisposing and Risk Factors

The risk of cellulitis infection depends on the wound location, tissue damage, client characteristics (e.g., immunosuppression, age, chronic disease, immunization status), and time elapsed before treatment. Other risk factors for infection include:

- clients with venous or lymphatic compromise, diabetes mellitus, and prior skin lesion(s);
- local trauma;
- bites;
- furuncle;
- carbuncle;
- obesity;
- surgery; or
- underlying skin condition (e.g., atopic dermatitis) (Garnett et al., 2019).

Health History and Physical Exam

Subjective Findings

Clients typically present with the following complaints, which may include:

- an expanding, red, painful area of swelling as the most common presentation;
- a surrounding area that may be firm and indurated; and
- mild constitutional symptoms (with or without fever) (Garnett et al., 2019).

The RN(AAP) should also enquire about:

- symptom onset;
- any pre-existing or recent wounds/injuries of the skin;
- recent surgery;
- pre-existing skin condition (atopic dermatitis, psoriasis, decubitus ulcer);
- previous medical history (trauma, surgery);
- immunization status, including most recent tetanus vaccination;
- visual changes, proptosis, painful or limited eye movements are worrisome for orbital cellulitis;
- painful swallowing, pain with opening of the mouth (trismus), muffled (“hot potato”) voice are classic presenting symptoms of peritonsillar cellulitis/abscess; and/or
- contact with an infected person with similar lesions (Garnett et al., 2019; Government of Saskatchewan, 2019; Raff & Kroshinsky, 2016).

The RN(AAP) should suspect Methicillin-resistant *S. aureus* (MRSA) in any client who presents with:

- skin or soft tissue infection in a community where > 10-15% of all *S. aureus* isolates are MRSA,
- personal history of MRSA colonization or documentation of recent MRSA infection,
- past history that is considered high risk (e.g., contact sports, institutionalized, homeless, parenteral substance use disorder, HIV, malnutrition),
- recent hospitalization,
- lack of response to treatment with a β -lactam antibiotic,
- prior antibiotic therapy (especially broad spectrum) in the last six months, or
- past or current history of invasive procedures/devices (e.g., dialysis, indwelling catheter) (Kosar & Laubscher, 2017; Population Health Unit, Northern Saskatchewan, 2014).

Objective Findings

Clients with cellulitis may present with the following signs and symptoms:

- elevated temperature;
- elevated heart rate;
- redness, swelling, tenderness, and warmth to affected area;

- a diffuse edge as opposed to a sharply demarcated area (mark the area for comparison on follow-up);
- small amount of purulent discharge may be present;
- induration; or
- enlarged and tender regional lymph nodes (Garnett et al., 2019; Raff & Kroshinsky, 2016).

Differential Diagnosis

Any one or more of the following should be considered as part of the differential diagnosis:

- folliculitis,
- foreign body,
- abscess,
- contact dermatitis,
- necrotizing fasciitis (ill client, severe local symptoms, bullae, crepitus, or anesthesia of the involved skin),
- erysipelas,
- osteomyelitis,
- septic arthritis,
- allergic angioedema (can be excluded by lack of tenderness and absence of fever), or
- deep vein thrombosis (Garnett et al., 2019).

Making the Diagnosis

Diagnosis of mild cellulitis is usually made by history and clinical assessment. Mild cellulitis is characterized by a local area of diffuse inflammation with redness, warmth, edema, tenderness, and poorly demarcated margins (Garnett et al., 2019; Raff & Kroshinsky, 2016).

Abscess is identified by the area of rim of erythema or swelling; fluctuance, indicating a fluid filled cavity beneath the skin; and a pustule that may be seen at the area where the abscess is closest to the skin (Comer, 2021). Abscess is managed according to the employer policy or potentially, the CRNS Clinical Decision Tool for cutaneous infections.

Investigations and Diagnostic Tests

Swabs for cellulitis are not routinely recommended but a swab for culture and sensitivity may be collected if there is discharge noted.

Management and Interventions

The following interventions are for the management of mild cellulitis, as moderate to severe cellulitis requires immediate consultation as stated earlier.

Goals of Treatment

The primary goals of immediate treatment are to control infection, identify abscess formation, treat MRSA if applicable, and manage pain and/or fever (Garnett et al., 2019).

Non-Pharmacological Interventions

The RN(AAP) should recommend, as appropriate, the following non-pharmacological interventions:

- apply cool sterile saline compresses to affected areas qid to remove any purulent exudates; and
- elevate, rest, and gently splint an affected limb; and
- mark the area of erythema and induration with a pen to be able to later assess the effectiveness of treatment (Garnett et al., 2019).

Pharmacological Interventions

The pharmacological interventions recommended for the treatment of cellulitis are in accordance with the *Management of Impetigo and Cellulitis* (Kosar & Laubscher, 2017), *RxFiles Drug Comparison Charts* (RxFiles Academic Detailing Program, 2021), *Anti-infective Guidelines for Community-acquired Infections* (Anti-infective Review Panel, 2019), and the *Northern Saskatchewan Guidelines (2014) for Skin and Soft Tissue Infections including suspect MRSA in the Community Setting* (Population Health Unit, Northern Saskatchewan, 2014).

Note: Penicillin and amoxicillin are never good empiric choices for even superficial cellulitis (poor *S. aureus* coverage).

Note: Clindamycin is a 3rd line due to higher rates of resistance to MRSA. Topical antibiotics should not be used in the management of cellulitis.

Oral Antibiotics

	Drug	Dose	Route	Frequency	Duration
Pediatric (without penicillin allergy)					
	Cephalexin	50-100 mg/kg/day (maximum 2 g/day)	p.o.	divided q6h	5-7 days
OR	Cloxacillin	50 mg/kg/day (do not exceed adult dose)	p.o.	divided q6h	5-7 days
Adult (without penicillin allergy)					
	Cephalexin	500 mg	p.o.	q.i.d.	5-7 days

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OR	Cloxacillin	500 mg	p.o.	q.i.d.	5-7 days
	Drug	Dose	Route	Frequency	Duration
Pediatric (with penicillin allergy)					
	Sulfamethoxazole-Trimethoprim (SMX-TMP)	8-12 mg/kg/day (TMP is used for calculations; do not exceed adult dose)	p.o.	divided q12h	5-7 days
OR	Doxycycline (≥ 8 years of age)	4 mg/kg/day	p.o.	divided b.i.d.	5-7 days
Adult (with penicillin allergy)					
	Sulfamethoxazole-Trimethoprim (SMX-TMP)	1-2 DS tabs (800/160 mg)	p.o.	b.i.d.	5-7 days
OR	Doxycycline	100 mg	p.o.	b.i.d.	5-7 days
Pediatric [with Methicillin-resistant <i>S. aureus</i> (MRSA)]					
	Sulfamethoxazole-Trimethoprim (SMX-TMP)	8-12 mg/kg/day (dosage is calculated using TMP component; do not exceed adult dose)	p.o.	divided q12h	5-7 days
OR	Doxycycline (≥ 8 years of age)	4 mg/kg/day	p.o.	divided b.i.d.	5-7 days
OR	Clindamycin	20-40 mg/kg/day (do not exceed adult dose)	p.o.	divided into 3 or 4 doses	5-7 days
Adult (with MRSA)					
	Sulfamethoxazole-Trimethoprim (SMX-TMP)	1-2 DS tabs (800/160 mg)	p.o.	b.i.d.	5-7 days
OR	Doxycycline	100 mg	p.o.	b.i.d.	5-7 days

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OR	Clindamycin	300 mg	p.o.	q.i.d.	5-7 days
OR	Clindamycin	450 mg	p.o.	t.i.d.	5-7 days

Analgesics and Antipyretics

	Drug	Dose	Route	Frequency	Duration
Pediatric					
	Acetaminophen	15 mg/kg (maximum dose 75 mg/kg/day) not to exceed 5 doses per day	p.o.	q4-6h prn not to exceed 5 doses per day	5-7 days
AND/ OR	Ibuprofen	10 mg/kg (maximum dose 40 mg/kg/day)	p.o.	q6-8h prn	5-7 days
Adult					
	Acetaminophen	500-1000 mg (maximum dose of 4 g/day)	p.o.	q4-6h prn	5-7 days
AND/ OR	Ibuprofen	400-600 mg (maximum dose of 3200 mg/day)	p.o.	q6-8h prn	5-7 days

Client and Caregiver Education

The RN(AAP) provides client and caregiver education as follows:

- Counsel about appropriate use of medications (dose, frequency, compliance, etc.).
- Inform that the appearance may worsen for a few days following initiation of treatment, but that improvement is usually obvious within 48-72 hours of treatment.
- Advise that fever should decrease in 24-48 hours, but the tissue swelling is not likely to resolve for one to two weeks.
- Encourage proper hygiene of all skin wounds to prevent future infections (e.g., keeping fingernails short, avoid scratching lesions) (Garnett et al., 2019).

Monitoring and Follow-Up

The RN(AAP) should advise the client to return in 24-48 hours and again in 10 days for evaluation of therapeutic response or to return immediately if lesion becomes fluctuant, pain increases, if fever develops or becomes worse (Garnett et al., 2019).

Complications

The following complications may occur:

- local or distant spread of infection (e.g., meningitis, brain abscess);
- suppuration and abscess formation;
- extension of extremity cellulitis into deep tissues to produce arthritis or osteomyelitis, or proximal extension as lymphangitis;
- visual loss and/or cavernous sinus thrombosis associated with orbital cellulitis;
- scarring and/or hyperpigmentation;
- facial cellulitis associated with pneumonia, meningitis, pericarditis, epiglottitis, arthritis, and osteomyelitis was common prior to widespread immunization against *Haemophilus influenzae* type B, bacteremia, so there must be consideration for this in populations with low vaccination rates (Garnett et al., 2019; Raff & Kroshinsky, 2016).

Referral

Refer to a physician/NP if client presentation is consistent with those identified in the *Immediate Consultation Requirements* section, treatment failure, or recurrent cellulitis (IPAG, personal communication, July 19, 2019).

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