INESSS
LE SAVOIR PREND FORME

Antibiotic

Cellulitis in adults

Published July 24, 2026
Modified November 5, 2026

TARGET USERS

Frontline health professionals, including those working in emergency departments, detention centres, shelters and home care.

This clinical tool is provided for information purposes only and does not replace the professionals' judgment in the performance of activities reserved to them by law or regulation.

OBJECTIVES

To support early detection and diagnosis, the recognition of warning signs, the optimal use of antibiotics, and the prevention of complications.

TARGET POPULATION

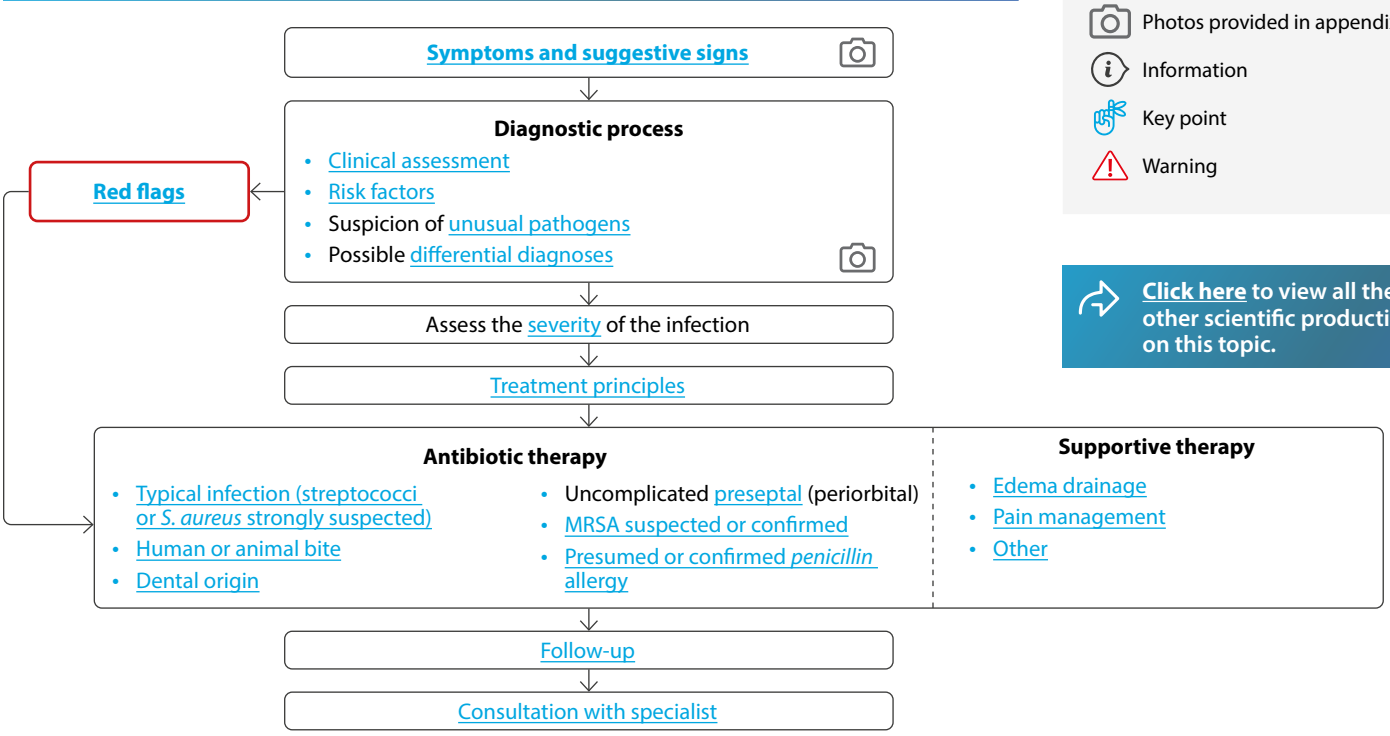
Adults

EXCLUSIONS

The treatment recommendations do not apply to:

- complex cellulitis (e.g., that is associated with osteomyelitis)
- severe cellulitis or cellulitis suspected of being an invasive infection
- cellulitis associated with infected diabetic foot (presence of ulcers)
- cellulitis following prolonged immersion in untreated water
- postsurgical cellulitis
- cellulitis caused by *Pseudomonas aeruginosa* or rapidly growing mycobacteria
- cellulitis during pregnancy or breastfeeding
- children

SUMMARY OF THE CLINICAL APPROACH



LEGEND

- Photos provided in appendix
- Information
- Key point
- Warning

Click here to view all the other scientific productions on this topic.

GENERAL INFORMATION

→ Cellulitis can occur on any area of the skin, but most cases occur on the legs.

RISK FACTORS FOR DEVELOPING CELLULITIS	
Entry point or potential reservoir	**Comorbidities and other factors**

• Break in the skin caused by:
  - A traumatic injury
  - The injection of substances
  - A skin problem (e.g., eczema or other dermatosis, superficial abrasions or an old scar)
  - Interdigital cracks and maceration (e.g., *tinea pedis*)
• Poor hygiene or neglect
• Dental condition
	• Venous or arterial insufficiency
	• Lymphedema
	• Uncontrolled diabetes
	• Immunosuppression
	• History of cellulitis
	ⓘ Advanced age can contribute to a weakened skin barrier due to immunosenescence or the presence of other comorbidities.

Québec

DIAGNOSTIC PROCESS

SUGGESTIVE SYMPTOMS AND SIGNS

- Generally **UNILATERAL** on a limb;
- **ACUTE** onset;
- **CONTINUOUS** erythema with no healthy skin within the area. Lymphangitic streaking strongly suggests cellulitis;
- Edema, warmth, pain and induration. There may be a temperature difference between the two legs;
- The individual may also present with a fever, nausea, vomiting, chills, malaise, and a loss of appetite before the skin signs appear.

Note: Cellulitis and erysipelas are grouped under the single term "cellulitis" because their clinical features often overlap, making differentiation difficult.

KEY STEPS IN THE CLINICAL ASSESSMENT

→ **Assess** the individual's overall condition and **check** for the presence of red flags.

→ **Identify** the source of the infection. A dental or sinus origin should always be suspected and investigated during the initial diagnosis of cervicofacial cellulitis.

→ **Investigate** events or causes suggesting unusual pathogens.

→ **Distinguish** between findings suggestive of cellulitis and those suggesting differential diagnoses. Note that a number of conditions may lead to cellulitis by creating a portal of entry for the pathogen.

→ **Palpate** the affected area to assess skin tenderness, the depth of the infection, tissue firmness, and the presence of a fluctuant area (a possible underlying collection of pus) or an area with crepitus (signs of necrotizing fasciitis).

→ **Determine** the severity and complexity of the infection.

→ **Mark** the contours of the infected area or photograph it to track its progression.

RED FLAGS – IN-HOSPITAL CONSULTATION GENERALLY REQUIRED	
Necrotizing fasciitis	• EXCRUCIATING or DISPROPORTIONATE or EXTREME pain, even at rest • Signs of inflammation with subcutaneous swelling • There may be some subcutaneous gas (crepitus) and hemorrhagic phlyctenules • Skin necrosis or discoloration and a malodorous, fluid discharge • Fulminating progression *A common condition in prisons and one that is becoming increasingly prevalent in the general population.*
Suspected orbital involvement	• Severe pain • Limited or painful extraocular movements • Difficulty or inability to open the eye • Chemosis • Proptosis • Vision changes • Recent history of dental treatment • Concomitant rhinosinusitis
Systemic involvement	• Significant and/or persistent deterioration in the person's overall condition • **Severe cellulitis** — hemodynamic instability, fever or hypothermia, tachycardia, tachypnea, hypotension
Other conditions associated with a higher risk of complications	• Rapid progression • Signs of dyspnea or dysphagia, sublingual edema, difficulty opening the mouth or protruding the tongue, extraoral fistulas, edema of the upper jaw extending to the lower eyelid (cervicofacial cellulitis) • Preseptal (periorbital) cellulitis exceeding the scope of an uncomplicated case • Cellulitis in an ischemic limb • Cellulitis with lymphangitic streaking or necrosis • Risk of decompensation of major preexisting comorbidities
Location or suspicion of deep-seated involvement	• Centrofacial area (triangle of death) • Perineal area • Musculoskeletal involvement (osteomyelitis, tenosynovitis or arthritis)

UNUSUAL PATHOGENS

- The sources that raise suspicion of unusual pathogens are:
  - Animal or human bites
  - Cellulitis of dental origin
  - Preseptal (periorbital) cellulitis of sinus origin
  - Other causes not covered by this tool

See Appendix B for the atypical bacteria suspected in these situations.

Microbiological testing of skin samples (bacterial culture and antibiotic susceptibility testing) is recommended only in the presence of a **purulent discharge** or in exceptional circumstances (e.g., deep bites) as described in the wound culture tool.

- Cellulitis is rarely caused by methicillin-resistant *S. aureus* (MRSA).
- **MRSA is suspected in the presence of PURULENCE and any of the following:**
  - Furunculosis or recurrent abscesses
  - Recent MRSA infection/colonization (in the person or their family)
  - Prolonged or recent hospitalization
  - Recent invasive procedures
  - Risk behaviours (e.g., injectable drug use and men having sex with other men)
  - Settings where there is close interpersonal contact (e.g., military bases, correctional facilities, homelessness, certain community settings and certain sports activities)
  - Recent travel to an area with a high prevalence of MRSA (e.g., tourism)

DIFFERENTIAL DIAGNOSES
(list not exhaustive)

Differential diagnosis is a major challenge, as several cutaneous conditions that do not require antibiotic therapy may present with similar symptoms and signs.

Examples of clinical findings suggesting a cause other than cellulitis:

- A specific event linked to the appearance of symptoms and signs (e.g., trauma, dental procedure, sun exposure, etc.)
- Bilateral edema
- A palpable area of fluctuation
- Weeping or discharge in the absence of an abscess
- Epidermal changes (scales, crusts, vesicles, etc.)
- Functional signs (e.g., pain or fatigue in a limb after physical activity or at the end of the day, or pain relieved when elevating the legs)
- Chronic in nature
- Slow progression

General	• Contact dermatitis • Acute eczema • Insect bite • Cutaneous herpes or shingles • Infectious and non-infectious panniculitis	• Hematoma • Uncomplicated abscess, cyst • Skin reaction following the administration of a drug (iatrogenic reaction)
Localized redness on the upper and lower limbs	• Stasis dermatitis • Superficial phlebitis • Acute bursitis	• Joint involvement (septic arthritis, gout or synovitis) • Vaccine reaction
Localized redness on the face	• Conjunctivitis • Dacryocystitis	
Other skin conditions	• Erythema migrans, erythema nodosum, Sweet's neutrophilic dermatosis, etc.	

- The definitions of a number of these conditions are provided in Appendix C.

SEVERITY OF THE INFECTION

→ The severity of the infection **determines the duration and route of administration** of antibiotic therapy.

→ Clinical judgment is based on the following findings:

PROGRESSION OF THE INFECTION

MILD INFECTION	
• **STABLE overall condition** • Mild symptoms and sign	**Antibiotic therapy: total of 5 days** Route: **oral (PO)**

MODERATE INFECTION	
• **STABLE overall condition** • More advanced symptoms and signs • A more extensive affected area • Rapid spread • Systemic symptoms: fever, tachycardia, leukocytosis or lymphadenopathy	**Antibiotic therapy: total of 5 to 10 days** Route: **PO or intravenous (IV) if very extensive or if there is a risk of complications. Then switch to PO as soon as the criteria are met OR stop if the total duration has been reached**

SEVERE INFECTION	
• **UNSTABLE overall condition** • See the red flags to familiarize yourself with the symptoms and signs	Treatments not covered in this tool

→ A mild or moderate infection can be complex. Review the complication risks or complex cases.

> ⚠ **Only uncomplicated cases of preseptal (periorbital) cellulitis should be treated by a frontline health professional.** Such cases are characterized by mild edema and erythema, the absence of severe pain, good eyelid opening, normal and painless extraocular movements, normal vision, the absence of proptosis and chemosis, and the patient's overall condition being good.

TREATMENT PRINCIPLES

GENERAL INFORMATION

→ Treating the **primary source** of the infection (e.g., dental problem, wound or sinusitis, or the removal of a foreign body) and, when possible, the associated risk factors is key to managing cellulitis.

→ **An abscess that has been adequately drained does not require adjunctive antibiotic therapy**. Depending on the situation and clinical judgment, an oral antibiotic targeting *S. aureus* or MRSA – when risk factors are present – may be added to treat **abscess-forming cellulitis** (total diameter greater than 5 cm, including the abscess area).

→ Post-exposure prophylaxis (PEP) should be considered, particularly a tetanus vaccination in the event of a skin break or a rabies vaccination in the event of an animal bite and the administration of immunoglobulin (Ig) or a vaccination against the hepatitis B virus (HBV) and antiviral prophylaxis for the human immunodeficiency virus (HIV) if there is a risk of transmission from a human bite. Details in the *Protocole d'immunisation du Québec (PIQ)*, the *Guide pour la prophylaxie et le suivi après exposition au VIH, au VHB et au VHC*, and the decision support tool for anti-HIV PEP. To assess the risk of rabies in a pet, consult the clinical tool on traumatic wounds (see section on bites).

ANTIBIOTIC THERAPY

→ **Systemic antibiotic therapy** is used to treat cellulitis, unlike **topical antibiotic therapy**, which is reserved only for special cases, such as impetigo.

→ Before prescribing antibiotic therapy, check for:

- **the history of antibiotic use in the past 3 months if deemed pertinent, based on the clinical situation;**
- the absence of **significant drug interactions** with the chosen treatment.

→ If necessary, adjusting the antibiotic therapy should be considered based on the results of culture and antibiotic susceptibility tests, when available.

→ **Antibiotic prophylaxis** may be recommended in cases of human or animal bites.

CONDITIONS FOR INITIATING ANTIBIOTIC PROPHYLAXIS IN THE EVENT OF A BITE	
• Immunity compromised by a health condition or its treatment • Asplenia or advanced liver disease • All cases of cat bite • Deep tissue damage	• Edema at the wound site • Moderate to severe injury, particularly to the face, hand, foot or genitals • Involves tendons, ligaments, bones or joints

→ **If the individual has a history of allergic reaction (immediate or delayed) to a *penicillin***, check if the allergy was confirmed by an allergist. If it was not, assess the following:

- The likelihood of a true allergy to the *penicillin* in question (rare), the type of reaction, its severity, and how long ago it occurred;
- The likelihood of experiencing a reaction of similar or greater severity upon re-exposure to this *penicillin* or to another beta-lactam.

ⓘ Consult the algorithm (Appendix F) or the full tool on presumed *penicillin* allergy to guide the assessment.

If a challenge test is being considered, make the necessary logistical arrangements (e.g., managing timeframes and ensuring access to injectable epinephrine) so that it can be performed before the prescription is issued.

CHOICE OF ANTIBIOTIC

→ **Preference should be given to the oral route** to treat mild or moderate cellulitis.

→ If the individual has a history of an allergic reaction to *penicillins*, consult the decision algorithm.

TYPICAL CELLULITIS WITH STRONG SUSPICION OF STREPTOCOCCI OR *S. AUREUS* Other antibiotics in the event of a confirmed allergy If confirmation or strong suspicion of **MRSA**, see Appendix E for the recommended antibiotic therapies		
Antibiotics[1] (one choice/treatment)	**Dosage[2]**	**Preferred duration** *(possible window, depending on clinical judgment)*
ORAL ADMINISTRATION		
Cefadroxil	500 to 1 000 mg PO BID	5 days[3] *(5 to 10 days[4])*
Cephalexin	500 to 1 000 mg PO QID	
Cloxacillin	500 mg PO QID	
INTRAVENOUS ADMINISTRATION **MODERATE INFECTION WITH RISK OF COMPLICATIONS**		
Cefazolin[5]	2 000 mg IV TID	5 days[3] including oral step-down therapy *(5 to 10 days[4])*
If contraindication to cefazolin: Ceftriaxone[6]	2 000 mg IV DIE	
If IV antibiotic therapy is necessary and there are concerns regarding the proposed options (e.g., homelessness or substance abuse), consult a specialist.		

1. The antibiotics are listed in alphabetical order by generic name.
2. The dosage should be adjusted according to weight, renal function and age.
3. A 5-day course is generally sufficient for mild cellulitis or with improving inflammatory signs of a moderate infection without complete resolution of the edema and redness.
4. In the presence of specific factors or clinical justification, the duration may be increased up to 10 days (e.g., severe immunosuppression, more severe cellulitis, very severe obesity, or very slow clinical improvement).
5. Cefazolin may be administered every 24 hours during outpatient intravenous therapy by adding 2000 mg PO of probenecid 15 to 30 minutes before cefazolin administration in healthy individuals with no renal impairment and only for a short period of time (24 to 72 hours).
6. Because of its broad spectrum and the increased risks of *C. difficile* infection and other adverse effects, ceftriaxone should be prescribed only as an alternative to cefazolin in the rare cases where the latter cannot be used. Note that ceftriaxone exhibits less reliable activity against *S. aureus* than against *Streptococcus spp*.

CELLULITIS WITH POSSIBLE UNUSUAL PATHOGENS		
Antibiotics (one choice/treatment)	**Dosage[2]**	**Preferred duration** *(possible window, depending on clinical judgment)*
RESULTING FROM A HUMAN OR COMMON ANIMAL BITE[1] Other antibiotics in the event of a confirmed allergy		
Amoxicillin/clavulanate[3]	875/125 mg PO BID	Prophylaxis: 3 to 5 days Therapy: 5 to 7 days[4]
OF DENTAL ORIGIN Other antibiotics if a confirmed allergy		
Amoxicillin	500 mg PO TID	3 to 7 days
Penicillin V	300 mg PO QID	
Extensive moderate infection or failure of first-line treatment		
Amoxicillin/clavulanate[3]	875/125 mg PO BID	5 to 7 days[4]
UNCOMPLICATED, ATRAUMATIC PRESEPTAL (PERIORBITAL) OF SINUS ORIGIN[5] **Only uncomplicated cases of preseptal cellulitis should be treated by a frontline heath professional** Other antibiotics in the event of a confirmed allergy		
Amoxicillin (close follow-up required)	1 000 mg PO TID	5 to 7 days *(7 to 10 days[6])*
If broader coverage is required		
Amoxicillin/clavulanate[3]	875/125 mg PO BID	5 to 7 days *(7 to 10 days[6])*
Cefuroxime	500 mg PO BID	

1. Common animal bites (from cats or dogs) or human bites (including injuries caused during a fight by contact with another person's teeth). See the tool on traumatic wounds for details.
2. The dosage should be adjusted according to weight, renal function and age.
3. The 7:1 formulation (875/125 mg) of amoxicillin/clavulanate, taken orally twice daily (PO BID), is preferred because of its better gastrointestinal tolerance.
4. A 5-day course is generally sufficient for mild cellulitis or for cases of moderate infection where the inflammatory signs have improved but without the edema and redness having completely resolved.
5. For the recommended supportive treatments for alleviating sinus symptoms, consult INESSS's clinical tool on acute rhinosinusitis.
6. In the presence of specific factors or clinical justification, the treatment duration may be increased up to 10 days (e.g., severe immunosuppression, more severe cellulitis, very severe obesity, or very slow clinical improvement).

SUPPORTIVE TREATMENT

To optimize the treatment, consider doing the following:

- → Edema drainage (e.g., elevating or applying compression to the limb). See the clinical tool on venous ulcers for details;
- → Pain management (e.g., acetaminophen or a nonsteroidal antiinflammatory, which may mask signs of inflammation);
- → Skin care to ensure the integrity of the skin and appendages and prevent recurrences (e.g., the treatment of fungal conditions, such as *tinea pedis*, and the treatment of skin conditions, such as eczema or psoriasis);
- → Decolonization of *S. aureus* and/or MRSA, depending on the severity of the infection, particularly in cases of recurrent cellulitis in individuals who are MRSA carriers (procedure not included in this tool).

FOLLOW-UP

NORMAL COURSE

- A **temporary increase in the inflammatory response** during the first 24 to 48 hours is common and **does not warrant** longer-term treatment if there is:
  - An overall improvement in the individual's condition and
  - A reduction in their pain and fever.
- **During the reassessment**, it is common for edema to persist, despite an improvement in the inflammatory signs, although this alone does not warrant prolonging treatment.
- Consider doing a **follow-up** within **24 to 72** hours after the start of treatment, based on clinical judgment, the spectrum of the chosen antibiotic, and the severity of the infection.
- **A switch from intravenous to oral therapy** should be considered if: a) the individual is afebrile after 48 hours of treatment; b) the area of infection is shrinking or not worsening; c) the diagnosis is well established and the individual tolerates the oral therapy; or d) the total duration of IV therapy has not been reached.
- If an allergic reaction occurs after administering an antibiotic, the standard form for reporting a new drug allergy reaction (AH-707DT-9308) should be used to document it. If necessary, discontinue the antibiotic, treat the reaction as needed, inform the individual, and update the medical record.

INFORMATION TO BE PROVIDED TO THE INDIVIDUAL AND THEIR FAMILY

- Consult a health professional again if systemic or allergic symptoms occur OR if the individual's overall condition and their pain and fever do not improve OR if the cellulitis spreads beyond the marked contour 48 hours after the start of antibiotic therapy.
- Tell them that adhering to the treatment as prescribed (e.g., supportive care and antibiotic therapy) is essential for resolving the infection and preventing complications.
- Remind them that returning unused antibiotics to the pharmacy for recycling and/or responsible disposal helps reduce their environmental impact.

MEDICAL SPECIALIST CONSULTATION

	CLINICAL SITUATIONS
Emergencies	• red flags
According to local trajectory (specialized or dental medicine, Accueil Clinique or experienced colleague)	• Any **complex cases** of cellulitis: - Special circumstances (e.g., infected diabetic foot, bite with risk of viral transmission [HBV or HIV], post-surgery, or unusual pathogens not covered in this tool – injury sustained while immersed in untreated water, and major and/or penetrating trauma); - Immunomodulation or immunosuppression; - Suspected infection of a prosthetic device; - Post-burn cellulitis, depending on the type of burn and clinical judgment; - Abscess-forming cellulitis considered complex (e.g., an abscess requiring extensive debridement or located in a critical area — hands, face, auricle, foot or genitals — or multiple abscesses that are communicating with each other or with a large associated phlegmonous area or that are arousing suspicion of deep involvement, e.g., osteoarticular infection). • Uncertain etiology: - Recurrent cellulitis. Consider a non-infectious differential diagnosis (e.g., venous insufficiency). • An unresolved dental problem or a more severe case of cellulitis of dental origin. • Failure after 72 hours of antibiotic therapy.
Experienced colleague, Conseil numérique or allergy consultation	• Allergies to beta-lactams. If there is uncertainty regarding the factualness or severity of the allergic reaction to the prescribed antibiotic or of a presumed allergy to beta-lactams. Guidelines for determining whether an allergy consultation is necessary are provided in the tool on presumed *penicillin* allergy.

These recommendations were developed using a systematic approach and are supported by the scientific literature as well as by the knowledge and experience of Québec clinicians with various specialties and areas of expertise. For further information, visit inesss.qc.ca.

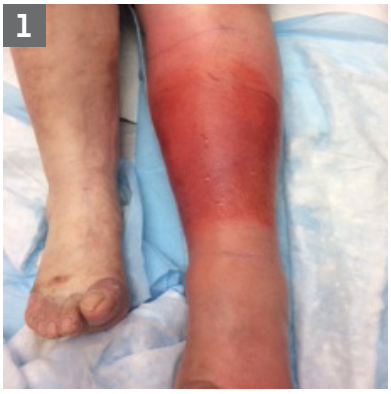
For further details, in particular, to view the references, please refer to *Cellulitis in adults and children* and *Presumed penicillin allergy*.

For any questions regarding clinical tools, write to info-outils.cliniques@inesss.qc.ca.

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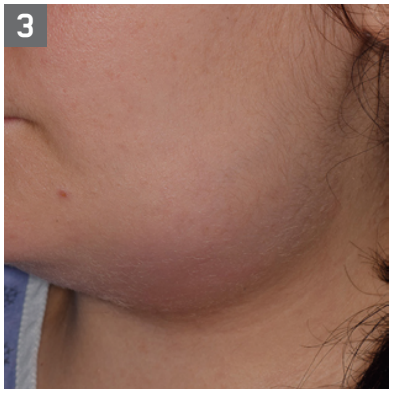
APPENDIX A – CELLULITIS → DIAGNOSTIC AID



Cellulitis



Facial cellulitis



Cervical cellulitis of dental origin



Mild periorbital cellulitis

EXAMPLES OF RED FLAGS TO LOOK FOR



Cellulitis in an ischemic foot



Orbital involvement



Chemosis

Return to signs and symptoms

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APPENDIX B – POSSIBLE UNUSUAL PATHOGENS DEPENDING ON THE CAUSE

POSSIBLE UNUSUAL PATHOGENS ACCORDING TO THE UNDERLYING CAUSE[1]	
• **Common animal bite** (cat or dog)	• *Pasteurella spp.* • *Capnocytophaga canimorsus* • Oral anaerobes (e.g., *Fusobacterium* spp. and *Peptostreptococcus* spp.)
• **Human bite** (including injuries sustained during a fight or from contact with another person's teeth)	• *Eikenella corrodens* • Oral anaerobes (e.g., *Fusobacterium* spp. and *Peptostreptococcus* spp.)
• **Cellulitis of dental origin**	• Viridans group and anginosus group streptococci • Oral anaerobes (e.g., *Fusobacterium* spp. and *Prevotella* spp.)
• **Periorbital/orbital cellulitis of sinus origin**	• *Streptococcus pneumoniae* • *Haemophilus influenzae* • *Moraxella catarrhalis*
• **Injury sustained while immersed in water** • **Person with neutropenia** • **Infected diabetic foot in an adult** • **Rodent bite** (e.g., rat) • **Primate bite**	• Treatments not covered in this clinical tool, as these circumstances require special management. • The possible pathogens are mentioned in the report associated with this tool.

1. It should be noted that the standard pathogens – β-hemolytic streptococci and *S. aureus* – can also be found in these circumstances.

Return to causes of cellulitis

APPENDIX C – DEFINITIONS OF THE MEDICAL CONDITIONS THAT MAY BE CONSIDERED WHEN MAKING THE DIFFERENTIAL DIAGNOSIS

General	**Contact dermatitis:** Edema that is often pruritic, painless and afebrile. Presence of desquamation or microvesicles, which may fuse together to form bullae. The affected area is very well defined and is the site of contact. Bacitracin and neomycin, found in some over-the-counter antibiotic ointments and creams, are common causes of contact dermatitis.
	Acute eczema: Erythema, often edematous, frequently encountered in cases of allergic contact dermatitis, and interspersed with closely clustered superficial micropapules and/or microvesicles.
	Insect bite: Edema and erythema with a central spot. Pruritic and afebrile, with little or no pain, and sometimes accompanied by a vesicle or a minor subcutaneous ecchymosis.
	Cutaneous herpes or shingles: Presence of vesicles a few millimeters in size clustered on an erythematous base. In the case of shingles, the distribution will be dermatomal.
Localized redness on the upper and lower limbs	**Stasis dermatitis:** Afebrile edema and erythema, often pruritic (may be painful) and bilateral (but not necessarily symmetrical), with a generally subacute to chronic course.
	Superficial phlebitis: Erythema with painful induration along a venous course.
	Joint involvement (septic arthritis, gout or synovitis from another cause): Localized to a joint, with significant pain on movement.
	Acute bursitis: Erythema localized to the site of a bursa, usually around a joint. Bursitis can be caused by an infection, trauma or inflammation.
	Vaccine reaction: Often occurs within the first 24 hours following vaccination (generally: afebrile; individual's overall condition is good).
Redness localized to the face	**Conjunctivitis:** In some cases, it occurs with mild, painless, afebrile eyelid or periorbital edema accompanied by purulent secretions and is often bilateral.
	Dacryocystitis: Edema and erythema localized to the inner canthus (between the eye and the nose) and often accompanied by tearing.
Other skin conditions	**Erythema migrans, erythema nodosum, Sweet's neutrophilic dermatosis, etc.:** Separated by patches of healthy skin or annular erythema

Return to differential diagnosis

APPENDIX D – CELLULITIS → DIFFERENTIAL DIAGNOSTIC AID

GENERAL



Contact dermatitis



Insect bite



Cutaneous herpes

UPPER AND LOWER LIMBS



Stasis dermatitis

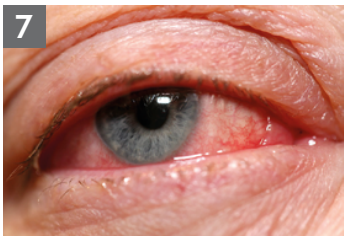


Superficial phlebitis

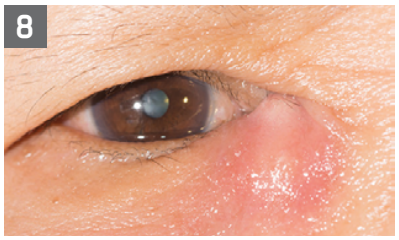


Gout

FACE



Conjunctivitis



Dacryocystitis

OTHER



Sweet's neutrophilic dermatosis



Erythema migrans



Erythema nodosum

Return to differential diagnosis

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APPENDIX E – ANTIBIOTIC THERAPY IF SUSPICION OF MRSA INFECTON

→ **Preference should be given to the oral route** to treat mild or moderate cellulitis.

→ For individuals weighing less than 40 kg, consult the pediatric (under 18 years of age) dosages.

MRSA Antibiotic therapy for MRSA is warranted only after microbiological confirmation OR in the presence of purulence AND its risk factors		
Antibiotics (one choice/treatment)	**Dosage**[1]	**Preferred duration** *(possible window, depending on clinical judgment)*
ORAL ADMINISTRATION		
Doxycycline[2,3]	100 mg PO BID	5 days[7] *(5 to 10 days[8])*
TMP-SMX[2,3,4]	160/800 mg to 320/1600[1,5] mg PO BID	
Clindamycin[2,6]	300 to 600 mg PO TID	
Exception drug: • **Linezolid** ($$$)	Following the advice of an experienced colleague	
INTRAVENOUS ADMINISTRATION **MODERATE INFECTION WITH RISK OF COMPLICATIONS**		
Vancomycin	Following the advice of an experienced colleague or a pharmacist	
Exceptional medications or exception patients (for Québec): • **Dalbavancin** (if risk of non-adherence in an outpatient setting – $$$) • **Daptomycin**, **linezolid** ($$$)		

1. The dosage should be adjusted according to weight, renal function, age and the severity of the infection.
2. Preferred choices for a mild infection and certain uncomplicated moderate infections.
3. Doxycycline and TMP-SMX do not provide very good coverage against Group A streptococci.
4. TMP-SMX is not approved by Health Canada for the treatment of cellulitis. However, it is commonly prescribed for this purpose and is a valid treatment option in cases of suspected MRSA, according to the stakeholders consulted.
5. Based on the experience of the stakeholders consulted, a dose of 8 to 10 mg/kg of TMP can be used for skin infections caused by MRSA, which corresponds to 2 DS tablets PO BID for an average-weight adult.
6. Antibiotic resistance may occur with clindamycin. Taking this antibiotic may lead to diarrhea and intestinal symptoms, which may worsen and require a medical visit. It is important to inform the individual of this.
7. A 5-day course is generally sufficient for mild cellulitis or when the inflammatory signs of a moderate infection have improved, without the edema and redness having completely resolved.
8. In the presence of specific factors or clinical justification, the duration may be increased up to 10 days (e.g., severe immunosuppression, more severe cellulitis, very severe obesity or very slow clinical improvement).

APPENDIX F – ALGORITHM FOR PRESUMED *PENICILLIN* ALLERGY

INDIVIDUAL REPORTING AN ALLERGY TO *PENICILLIN*[1]

ASSESSMENT[4]

Confirmed allergy by an allergologist? — YES → **FOLLOW THE ALLERGOLOGIST'S RECOMMENDATIONSE**
✓ A reassessment may be necessary, especially if tested more than 5 years ago.

NO/INCERTAIN[2]

Clinical picture non suggestive of an allergy?
- No reaction upon re-exposure to same antibiotic;
- Isolated gastrointestinal symptoms, headache, fatigue, chills, exacerbation of fever;
- Family history of allergy to a *penicillin*.

YES → **ABSENCE OF ALLERGY**
✓ Prescribe any beta-lactam WITHOUT specific precautions.
✓ Remove the allergy label from the file.

NO/UNCERTAIN[2]

Type of allergic reaction
Did the presumed allergic reaction:
- appear **IN LESS THAN AN HOUR** following the administration of the **FIRST DOSE** of a *penicillin* treatment **AND**
- disappear in **LESS THAN A DAY**

YES → **IMMEDIATE -TYPE ALLERGIC REACTION**

Go to the next page

NO/INCERTAIN[2]

POSSIBLE DELAYED-TYPE ALLERGIC REACTION
(including certain cases of urticaria or angioedema)[3]

Some clinical presentations may occur in a para-infectious context and be confused with a drug allergy.[3]

Severity criteria present? — YES → **VERY SEVERE CUTANEOUS REACTION**

NO/UNCERTAIN

NON-SEVERE cutaneous reaction
- Isolated
- With or without pruritus
- Without desquamation
- Appeared during or after the end of treatment **AND**
- Disappeared in less than 7 days

Example: MPR or serum sickness-type reaction.[5]

NO/UNCERTAIN

SEVERE cutaneous reaction lasting for 7 days or more, AND:
- affecting a significant portion of the body surface area;
- that may have caused cutaneous desquamation, blisters, vesicles or pustules (especially in adults);
- without systemic involvement (e.g., fever or organ damage);
- not corresponding to urticaria or angioedema.[3]

AGEP, DRESS, SJS/TEN

YES

CONDITIONS FOR ADMINISTRATION

LOW RISK

Of recurrence of a **NON SEVERE** reaction to a *penicillin*.
In such case, prescribe:

WITHOUT any precautions
- Amoxicillin ± clavulanate[6],
- penicillin V[13], cloxacillin[7], cefadroxil[7], cephalexin[7], cefazolin[8], ceftriaxone[8,9], cefuroxime[13]

Consultation not necessary. Re-exposure[10] to be favored.

MODERATE RISK

Of recurrence of a **SEVERE** reaction to a *penicillin*.
In such case, prescribe:

WITHOUT any precautions
- Cefadroxil[7], cephalexin[7], cefazolin[8], ceftriaxone[8,9], cefuroxime[13]

ONLY IF NECESSARY[11]
- Amoxicillin ± clavulanate[6], cloxacillin[7], penicillin V[13]
→ Close monitoring for possible recurrence[12]

Consultation advisable, but re-exposure[10] **also acceptable**

HIGH RISK

Of recurrence of a **VERY SEVERE** reaction to a *penicillin*.
In such case, prescribe:

WITH precautions
- Cefazolin[8], ceftriaxone[8,9], cefuroxime[13] → Close monitoring for possible recurrence[10,12]

ONLY IF NECESSARY[11]
- Cefadroxil[7], cephalexin[7]
→ Close monitoring for possible recurrence[10,12]

AVOID
- Amoxicillin ± clavulanate, cloxacillin, penicillin V[13]

Consultation strongly recommended.

Allergy consultation for confirming true allergy.

AGEP: acute generalized exanthematous pustulosis
MPR: maculopapular rash
DRESS: drug reaction with eosinophilia and systemic symptoms
SJS: Stevens-Johnson syndrome
TEN: toxic epidermal necrolysis

Alternative options[13] – *If refusal or issue with close monitoring*
- Azithromycin, clindamycin, doxycycline, TMP-SMX, vancomycin or, as a last resort, moxifloxacin or levofloxacin.

APPENDIX F – ALGORITHM FOR PRESUMED PENICILLIN ALLERGY (CONTINUED)

⚠ ***Use only after determining the type of allergic reaction during the assessment (see previous page)***

REPORTED IMMEDIATE-TYPE ALLERGIC REACTION

*Reaction occurred **within AN HOUR** of the administration of the **FIRST dose** of penicillin treatment **AND** disappeared in **less than A DAY**.*

ASSESSMENT[5]

Presence of severity criteria?

NO/UNCERTAIN[2]

NON-SEVERE cutaneous reaction
- With or without pruritus
- With redness
- Limited to a single part of the body OR generalized

e.g., urticaria

When did the presumed allergic reaction occur?[12]

More than 5 years ago **OR** during childhood (12 years old or younger)

5 years ago **AND** after the age of 12

YES

Anaphylactic shock WITH intubation OR cardiac arrest?

NO/UNCERTAIN[2]

Skin reaction with diffuse, pruritic redness associated WITH at least one of the following symptoms:
- angioedema
- hypotension or a loss of consciousness
- respiratory distress
- cardiovascular symptoms
- severe gastrointestinal symptoms[15]

e.g., anaphylaxis **WITHOUT** shock nor intubation

YES

ADMINISTRATION DETAILS

LOW RISK

Of recurrence of a **NON SEVERE** reaction to a *penicillin*.
In such case, prescribe:

WITHOUT precautions
- Cefadroxil[7], cephalexin[7], cefazolin[8], ceftriaxone[8,9], cefuroxime[13]

WITH precautions
- Amoxicillin ± clavulanate[6], cloxacillin[7], penicillin V[13] → **1-step** provocation test[16] + observation for **60 minutes**[17].

Consultation generally not recommended.
Re-exposure preferred.

MODERATE RISK

Of recurrence of a **NON SEVERE** reaction to a *penicillin*.
In such case, prescribe:

WITHOUT precautions
- Cefadroxil[7], cephalexin[7], cefazolin[8], ceftriaxone[8,9], cefuroxime[13]

WITH precautions
- Amoxicillin ± clavulanate[6], cloxacillin[7], penicillin V[13] → **2-step** provocation test[16] + observation for **60 minutes**.

Consultation advisable, but provocation test also **acceptable.**

MODERATE RISK

Of recurrence of a **SEVERE** reaction to a *penicillin*.
In such case, prescribe:

WITHOUT precautions
- Cefazolie[8], ceftriaxone[8,9], cefuroxime[13]

WITH precautions
- Cefadroxil[7], cephalexin[7] → **1-step** provocation test[16] + observation for **60 minutes**.

ONLY IF NECESSARY[11]
- Amoxicillin ± clavulanate[6], cloxacillin[7], penicillin V[13] → **3-step** provocation test[16,18] + observation for **60 minutes** or desensitization if complex medical problem.

Consultation generally recommended.

HIGH RISK

Of recurrence of a **VERY SEVERE** reaction to a *penicillin*.
In such case, prescribe:

WITH precautions
- Cefazolin[8], ceftriaxone[8,9], cefuroxime[13] → **2-step** challenge test[16] + observation for **60 minutes.**

ONLY IF NECESSARY[11]
- Cefadroxil[7], cephalexin[7] → **3-step** provocation test[16, 18] + observation for 60 minutes.

AVOID
- Amoxicillin ± clavulanate[6], cloxacillin[7], penicillin V[13]

Consultation strongly recommended.

Alternative options [13] – *If refusal or issue with performing a drug provocation test*
- **Azithromycin**, **clindamycin**, doxycycline, TMP-SMX, vancomycin or, as a last resort, moxifloxacin or levofloxacin

1. Person with no major neurocognitive disorder.
2. If vague description: reaction probably non-severe and with no severity criteria.
3. Urticaria or angioedema lasting for more than 24 hours is rarely of allergic etiology, but is often of para-infectious etiology.
4. Vigilance: repeated or prolonged exposure to an antibiotic or a severe skin reaction after amoxicillin during mononucleosis: increased likelihood of a true allergy.
5. A serum sickness-type reaction is quite rare following penicillin administration. It is often of para-infectious etiology.
6. Use only for atypical cellulitis (human or animal bite, of dental origin or preseptal of sinus origin).
7. Use only for typical cellulitis (strong suspicion of streptococci or of *S. aureus*).
8. Use only if the oral route cannot be used for typical cellulitis (strong suspicion of streptococci or of *S. aureus*).
9. Ceftriaxone: use only as an alternative to cefazolin when the latter cannot be used.
10. Drug provocation test possible: 1/10 or full dose with monitoring for 48 to 72 hours in clinic or at home.
11. To be used only when the clinical situation so warrants or if the drug is deemed essential, based on clinical judgment and the individual's preferences.
12. It is important that the person be aware of the risk of recurrence and that they be able to stop taking the antibiotic if symptoms occur.
13. Depending on the person's specific circumstances and the type of cellulitis.
14. The longer ago a reaction occurred, the less likely the person is still allergic and the lower the risk is of recurrence.
15. Severe abdominal pain, repeated vomiting, sudden, abundant diarrhea: rare and atypical in penicillin anaphylaxis.
16. Provocation tests are performed under medical monitoring with access to injectable epinephrine (IM).
17. The duration of the monitoring test can vary according to the local protocol and clinical judgment.
18. Ideally, a 3-step provocation test, but adjustable to 2 steps, depending on the situation, clinical judgment and the person's individual risk.

ANTIBIOTIC DOSAGES WHEN THERE IS A PRESUMED *PENICILLIN* ALLERGY

→ **Preference should be given to the oral route** to treat mild or moderate cellulitis.

→ For individuals weighing less than 40 kg, consult the pediatric (under 18 years of age) dosages.

IF PRESUMED *PENICILLIN* ALLERGY
TYPICAL CELLULITIS
WITH STRONG SUSPICION OF STREPTOCOCCI OR OF *S. AUREUS*

True *penicillin* allergy is rare, and alternatives to beta-lactams carry greater risks and are generally less effective.

Before opting for an alternative to the first-line choice, make sure that you have carefully assessed the likelihood of a true *penicillin* allergy, what type the previous reaction was, its severity, the time that has elapsed since that reaction, and the risk of experiencing a similar or worse severe reaction upon re-exposure to a *penicillin* or another beta-lactam.

Antibiotics (one choice/treatment)	**Dosage**[1]	**Preferred duration** *(possible window, depending on clinical judgment)*
ORAL ADMINISTRATION		
Cefuroxime[2]	500 mg PO BID	5 days[6] *(5 to 10 days[7])*
Doxycycline[3,4]	100 mg PO BID	
TMP-SMX[3,4]	160/800 mg PO BID	
If the infection requires an antibiotic other than the proposed alternatives		
Clindamycin[4,5]	300 PO QID or 450 mg PO TID	5 days[6] *(5 to 10 days[7])*
BROAD-SPECTRUM ANTIBIOTICS TO BE USED AS A LAST RESORT **Fluoroquinolones**		
Levofloxacin	500 to 750 mg PO DIE	5 days[6] *(5 to 10 days[7])*
Moxifloxacin	400 mg PO DIE	
INTRAVENOUS ADMINISTRATION MODERATE INFECTION WITH RISK OF COMPLICATIONS		
Clindamycin[5] (if contraindication to cefazolin or ceftriaxone)	600 to 900 mg IV TID	5 days[6] including oral step-down therapy *(5 to 10 days[7])*
Vancomycin (if contraindication to cefazolin or ceftriaxone)	Following the advice of an experienced colleague or a pharmacist	

1. The dosage should be adjusted according to weight, renal function, age and the severity of the infection.
2. Cefuroxime is a cephalosporin with structural and physicochemical properties that differ from those of *penicillins*. Depending on the type of allergic reaction, the risk of recurrence, the severity, and the time elapsed since the previous reaction, precautions may be required when administering this drug. See the algorithms for details.
3. Does not provide very good coverage against Group A streptococci.
4. Preferred options for a mild infection and certain uncomplicated moderate infections.
5. Antibiotic resistance may occur with clindamycin. Taking this antibiotic may lead to diarrhea and intestinal symptoms, which may worsen and require a medical visit. It is important to inform the individual of this.
6. A 5-day course is generally sufficient for mild cellulitis or when the inflammatory signs of a moderate infection have improved, without the edema and redness having completely resolved.
7. In the presence of specific factors or clinical justification, the duration may be increased up to 10 days (e.g., severe immunosuppression, more severe cellulitis, very severe obesity or very slow clinical improvement).

ANTIBIOTIC DOSAGES WHEN THERE IS A PRESUMED PENICILLIN ALLERGY

→ For individuals weighing less than 40 kg, consult the pediatric (under 18 years of age) dosages.

IF PRESUMED *PENICILLIN* ALLERGY
CELLULITIS RESULTING FROM A HUMAN OR COMMON ANIMAL BITE
(cat or dog) or human (including injuries caused during a fight from contact with another person's teeth)

True *penicillin* allergy is rare, and alternatives to beta-lactams carry greater risks and are generally less effective.
Before opting for an alternative to the first-line choice, make sure that you have carefully assessed the likelihood of a true *penicillin* allergy, what type the previous reaction was, its severity, the time that has elapsed since that reaction, and the risk of experiencing a similar or worse severe reaction upon re-exposure to a *penicillin* or another beta-lactam.

Antibiotics (one choice/treatment)	**Dosage**[1]	**Preferred duration** *(possible window, depending on clinical judgment)*
Doxycycline[2] **AND in combination with ONE of the following antibiotics**[3]**:** metronidazole **OR** clindamycin[4]	100 mg PO BID **AND** 500 mg PO TID **OR** 300 mg PO QID or 450 mg PO TID	Prophylaxis: 3 to 5 days
		Therapy: 5 to 7 days[5]
TMP-SMX **AND in combination with ONE of the following antibiotics**[3]**:** metronidazole **OR** clindamycin[4]	160/800 mg PO BID **AND** 500 mg PO TID **OR** 300 mg PO QID or 450 mg PO TID	Prophylaxis: 3 to 5 days
		Therapy: 5 to 7 days[5]

IF PRESUMED *PENICILLIN* ALLERGY
CELLULITIS OF DENTAL ORIGIN

True *penicillin* allergy is rare, and alternatives to beta-lactam carry greater risks and are generally less effective.
Before opting for an alternative to the first-line choice, make sure that you have carefully assessed the likelihood of a true *penicillin* allergy, what type the previous reaction was, its severity, the time that has elapsed since that reaction, and the risk of experiencing a similar or worse severe reaction upon re-exposure to a *penicillin* or another beta-lactam.

Antibiotics[6] **(one choice/treatment)**	**Dosage**[1]	**Preferred duration** *(possible window, depending on clinical judgment)*
Cefalexin[7]	500 mg PO QID	5 to 7 days[5]
Azithromycin	500 mg PO DIE on day 1 and 250 mg PO DIE on subsequent days	2 to 5 days
Clindamycin[4]	300 PO QID or 450 mg PO TID	5 to 7 days[5]

1. The dosage should be adjusted according to weight, renal function, age and the severity of the infection.
2. Doxycycline may be an alternative to TMP-SMX if the latter cannot be used (e.g., due to resistance) or in the case of human bites.
3. For anaerobic coverage if necessary.
4. Antibiotic resistance may occur with clindamycin. Taking this antibiotic may lead to diarrhea and intestinal symptoms, which may worsen and require a medical visit. It is important to inform the individual of this.
5. A 5-day course is generally sufficient for mild cellulitis or when the inflammatory signs of a moderate infection have improved, without the edema and redness having completely resolved.
6. The antibiotics are listed in an order that takes into account efficacy, resistance and toxicity.
7. Cefalexin is a cephalosporin with structural and physicochemical properties similar to those of *penicillins*. Depending on the type of allergic reaction, the risk of recurrence, the severity, and the time elapsed since the previous reaction, precautions may be required when administering this drug. See the algorithms for details.

ANTIBIOTIC DOSAGES WHEN THERE IS A PRESUMED *PENICILLIN* ALLERGY

→ For individuals weighing less than 40 kg, consult the pediatric (under 18 years of age) dosages.

IF PRESUMED *PENICILLIN* ALLERGY
UNCOMPLICATED ATRAMAUTIC PRESEPTAL (PERIORBITAL) CELLULITIS OF SINUS ORIGIN[1]

Consult with specialists if there is any doubt regarding the course of preseptal cellulitis of sinus origin.

ⓘ True *penicillin* allergy is rare, and alternatives to beta-lactams carry greater risks and are generally less effective.

Before opting for an alternative to the first-line choice, make sure that you have carefully assessed the likelihood of a true *penicillin* allergy, what type the previous reaction was, its severity, the time that has elapsed since that reaction, and the risk of experiencing a similar or worse severe reaction upon re-exposure to a *penicillin* or another beta-lactam.

Antibiotics[2] (one choice/treatment)	**Dosage[3]**	**Preferred duration** *(possible window, depending on clinical judgment)*
Cefuroxime[4]	500 mg PO BID	5 to 7 days *(7 to 10 days[7])*
Doxycycline[5,6]	100 mg PO BID	
BROAD-SPECTRUM ANTIBIOTIC TO BE USED AS A LAST RESORT Fluoroquinolone		
Moxifloxacin	400 mg PO DIE	5 to 7 days *(7 to 10 days[7])*

1. For the recommended supportive treatments for alleviating sinus symptoms, consult INESSS's clinical tool on acute rhinosinusitis.
2. The antibiotics are listed in alphabetical order by generic name.
3. The dosage should be adjusted according to weight, renal function, age and the severity of the infection.
4. Cefuroxime is a cephalosporin with structural and physicochemical properties that differ from those of penicillins. Depending on the type of allergic reaction, the risk of recurrence, the severity, and the time elapsed since the previous reaction, precautions may be required when administering this drug. See the algorithms for details.
5. Does not provide very good coverage against Group A streptococci.
6. Preferred options for a mild infection and certain uncomplicated moderate infections.
7. In the presence of specific factors or clinical justification, the duration may be increased up to 10 days (e.g., severe immunosuppression, more severe cellulitis, very severe obesity or very slow clinical improvement).