ACE CLINICAL GUIDELINE

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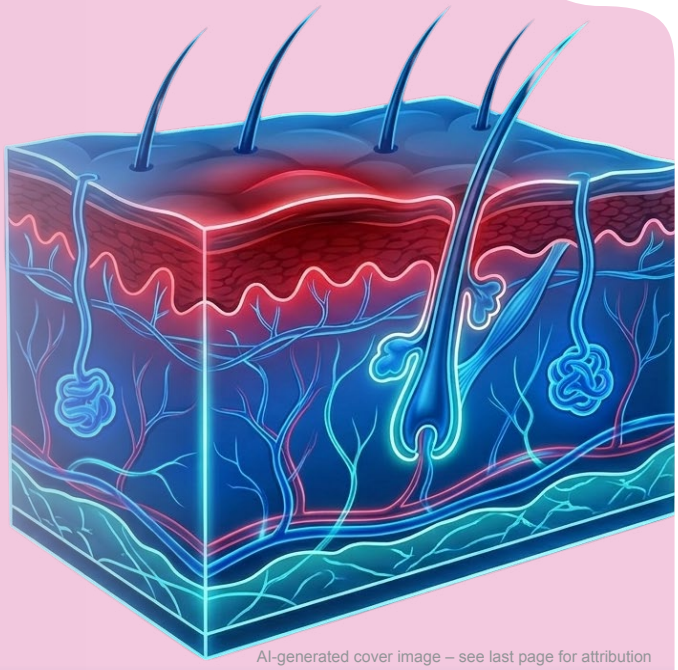
Bacterial skin and soft tissue infections

Diagnosis and antibiotic prescribing



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Objective

To optimise the management of bacterial skin and soft tissue infections (SSTIs) through judicious antibiotic prescribing

Scope

Diagnosis, assessment and management of bacterial SSTIs, especially prescribing of topical, oral, and intravenous antibiotics

Target audience

This clinical guideline is relevant to all healthcare professionals caring for patients presenting with a bacterial SSTI, especially those providing primary or generalist care

Skin and soft tissue infections (SSTIs) – infections of the skin, subcutaneous tissue, fascia, or muscle – may be caused by bacteria, viruses, fungi, or parasites. In clinical practice, bacterial SSTIs are the most common,[1] with beta-haemolytic streptococci and *Staphylococcus aureus* being the main causative organisms.[1,2] In Singapore, SSTIs are among the top 10 causes of hospitalisation,[3] and skin conditions were among the leading indications for prescription of oral antibiotics in primary care clinics between 2020 and 2021.[4] This suggests SSTIs have a considerable impact on local patient morbidity and on antimicrobial prescribing, highlighting the need to optimise bacterial SSTI management and strengthen antimicrobial stewardship.

Statement of Intent

This ACE Clinical Guideline (ACG) provides concise, evidence-based recommendations and serves as a common starting point nationally for clinical decision-making. It is underpinned by a wide array of considerations contextualised to Singapore, based on best available evidence at the time of development. The ACG is not exhaustive of the subject matter and does not replace clinical judgement. The recommendations in the ACG are not mandatory, and the responsibility for making decisions appropriate to the circumstances of the individual patient remains at all times with the healthcare professional.

ACE agency for care effectiveness

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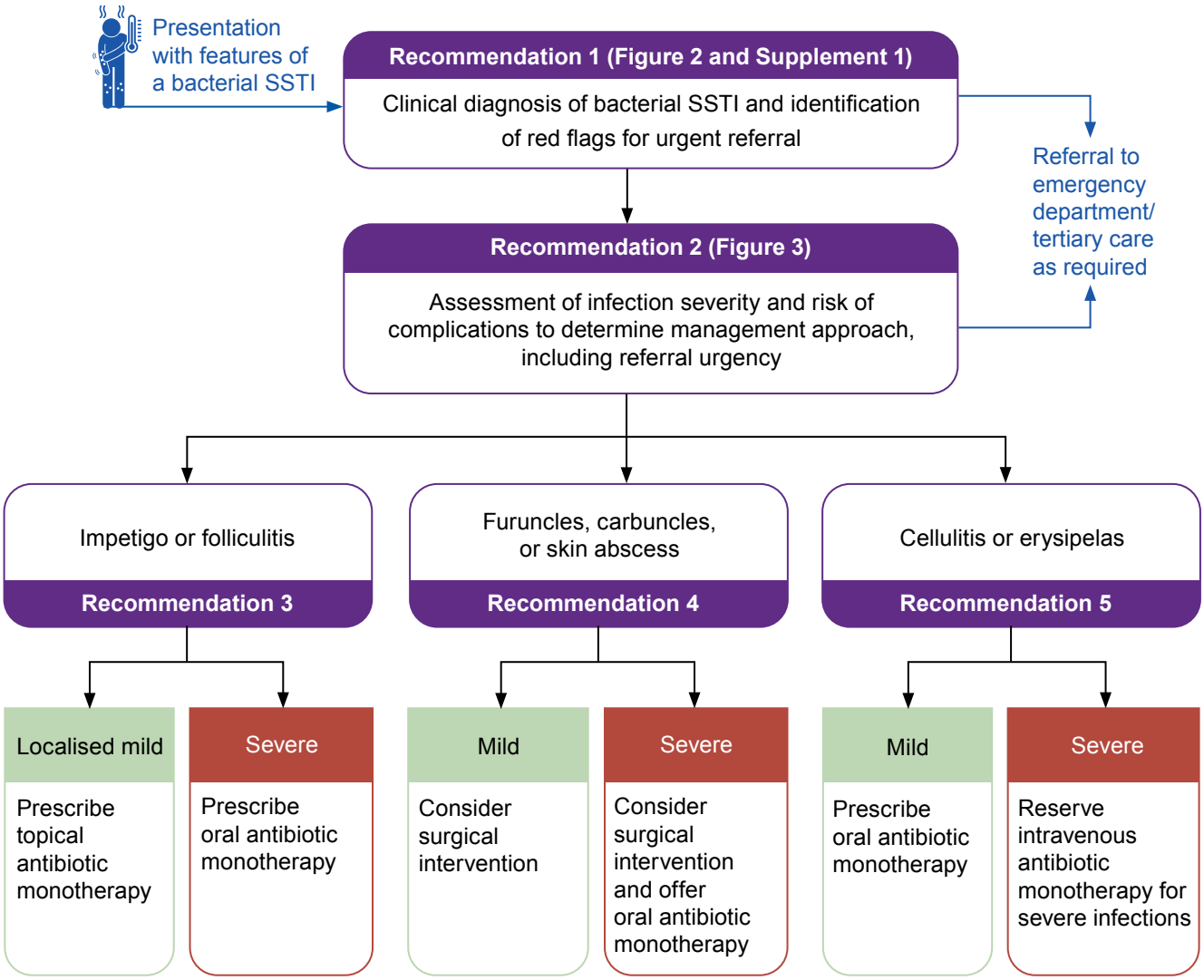
This ACG focuses on diagnosis, assessment, and antibiotic prescribing for bacterial SSTIs in community care settings.

Figure 1. Approach to bacterial skin and soft tissue infection management – at a glance



For patients presenting with mild infections but who are at high risk of complications (e.g. immunocompromised, presence of diabetes mellitus, or co-existing skin conditions), manage as per severe infection.

See **Supplement 2** for antibiotic options for treating bacterial SSTIs.

Adjunctive supportive treatment can be provided for patients with bacterial SSTIs. See section on *Supportive treatment for bacterial SSTIs* for further details.

Diagnosis and assessment

Recommendation 1 **Diagnose bacterial SSTIs clinically, based on history taking and physical examination findings.**

Recent international guidelines support the use of clinical features alone to diagnose bacterial SSTIs.[8-10] Figure 2 lists key features from history and examination suggestive of bacterial SSTIs (based on international guidelines,[8,9,11] available literature,[12-17] and expert input). Referral for further investigations could be made when there is diagnostic uncertainty or for high-risk cases (e.g. immunocompromised status or infections on the face).

Figure 2. Clinical assessment and key features of various bacterial SSTIs

History-taking considerations

- Previous SSTI at any site
- Recent skin barrier disruption (e.g. due to eczema, chronic dermatitis, penetrating injury, insect/animal bites*, intravenous cannulation, surgery or acupuncture)
- Occupational, travel, or environmental exposure to possible pathogens (e.g. exposure to freshwater [rivers or lakes]/sea water/soil)†
- Immunocompromised or on immunosuppressants
- Comorbidities such as diabetes mellitus, chronic kidney disease, obesity, malignancy, peripheral vascular disease, lymphoedema, or chronic venous insufficiency
- Presence of fatigue, malaise, chills, or pain

Physical examination considerations

- Systemic symptoms such as fever
- Swelling, oedema, skin induration, tenderness, erythema, warmth, purulence, or fluctuance at the affected area
- Presence of lymphangitis

Key features

Impetigo
Weeping and golden yellow crusts

Ecthyma
Deeper infection compared to impetigo and causes ulceration of the skin

Folliculitis
Pustule at hair follicle base

Furuncle
Painful, swollen, purulent nodule involving hair follicle (deeper form of folliculitis)

Carbuncle
A coalescence of several inflamed follicles into an erythematous, painful nodule, with overlying pustules

Abscess
A tender, erythematous area with fluctuancy

Erysipelas
Distinct, swollen, warm, raised and shiny erythematous plaques with clearly defined borders

Cellulitis
Warm, erythematous, swollen and firm skin (less defined borders than erysipelas)

Note that among bacterial SSTIs, cellulitis and erysipelas tend to be non-purulent,[5] while impetigo, furuncles, carbuncles, and abscesses tend to be purulent,[5,10] though there may be exceptions.[11,18]

Red flags for urgent referral to emergency departments

- Clinical features suggestive of a necrotising infection e.g. pain out of proportion to the physical findings, dusky discolouration, or bullae on the skin
- Clinical features suggestive of sepsis such as tachycardia or hypotension
- Moderate or severe diabetic foot infection (refer to the ACG *"Foot assessment in patients with diabetes mellitus"* for further details on classifying severity of diabetic foot infection).
- Severely immunocompromised individuals

*Animal bite wounds are often polymicrobial[19]
†Causative organisms may be atypical for SSTIs that follow exposure to seawater (e.g. Vibrio species),[20] freshwater (e.g. Aeromonas species),[21] or soil (e.g. *Burkholderia pseudomallei*)[22]

Use clinical assessment to establish a working diagnosis for bacterial SSTIs, taking into account that there are various infectious and non-infectious differential diagnoses for bacterial SSTIs (refer to *Supplement 1* for those most significant to local practice).

Scan or click the QR code to access Supplement 1

Recommendation 2 **Assess the severity of infection and risk of complications to determine the management approach, including referral urgency.**

Establishing the severity of infection and risk of complications determines the management approach. Refer to Figure 3 for guidance on differentiating mild and severe bacterial SSTIs, based on international guidelines[5,8,9,11,23] and expert input.

Figure 3. Features of mild and severe bacterial SSTIs, and referral considerations[5,8,23-33]

Type of bacterial SSTI	Features of mild infection	Features of severe infection (any of the following)
Impetigo, ecthyma or folliculitis	Localised infection without systemic illness‡	• Systemic illness‡ • Lack of response to first-line therapy • Widespread infections (e.g. multiple lesions) • Bullous impetigo • Presence of surrounding cellulitis • Presence of deep or extensive lesions • Rapid progression of infection
Furuncles, carbuncles, or skin abscess		• Systemic illness‡ • Lack of response to first-line therapy or surgical intervention alone • Presence of surrounding cellulitis • Widespread infections (e.g. multiple lesions or abscesses) • Presence of deep or extensive lesions • Rapid progression of infection
Cellulitis or erysipelas		• Systemic illness‡ • Lack of response to first-line therapy • Widespread infections • Rapid progression of infection
For patients presenting with mild infections but who are at high risk of complications (e.g. immunocompromised, presence of diabetes mellitus, or co-existing skin conditions), **manage as per severe infection**.[5,9,11,23]		

Severe SSTIs may either be treated in community settings or referred to specialist or tertiary care according to clinical presentation. Referral should also be considered in other clinical scenarios such as:[5,8,23,25-31]

- Suspected atypical pathogen (for example, exposure to water-borne organisms)
- Site-specific:
  - Cellulitis that affects the hand or is located over a joint, especially if a deeper infection (e.g. osteomyelitis or septic arthritis) is suspected
  - Infection of the face (e.g. orbital cellulitis or infections within the 'danger triangle' of the face, which is the area bounded by the corners of the mouth and the bridge of the nose)
  - Perianal abscess
  - Infected graft, prosthesis, or surgical site
- Presence of lymphangitis (especially if accompanied by other symptoms or signs of severe infection)
- Immunocompromised status or on immunosuppressants
- A low threshold for referral is appropriate for infants (<12 months old); neonates (<1 month old) should be evaluated by a paediatrician or a tertiary care specialist
- Confirmed or suspected methicillin-resistant *Staphylococcus aureus* (MRSA) skin and soft tissue infections may be managed in either primary or tertiary care, depending on the clinical severity and the availability of diagnostic, therapeutic, and follow-up capabilities. Uncomplicated MRSA infections can be managed in primary care, with antibiotic selection guided wherever possible by culture and antimicrobial susceptibility results. Referral to tertiary care should be considered for complicated infections, patients with systemic features or significant comorbidities, and cases that fail to respond to an adequate trial of treatment

‡Features of systemic illness include systemic inflammatory response syndrome (e.g. body temperature >38°C or <36°C, tachypnoea >20 breaths per minute, tachycardia >100 beats per minute, hypotension or lymphangitis).[5,9,34,35]

Management of bacterial SSTIs

Principles for selecting and prescribing antibiotics to treat bacterial SSTIs

Management of bacterial SSTIs includes symptomatic treatment, consideration of surgical intervention, and antibiotic prescription when warranted.[5]

Deciding whether to prescribe antibiotics and selecting the appropriate antibiotics are central to managing bacterial SSTIs. The guiding principles for selecting antibiotics when treating bacterial SSTIs in community settings are:

1. Consider the severity of infection and patient's risk of complications (see Figure 3).
2. Select antibiotics with activity against bacteria commonly associated with local SSTIs (*Staphylococcus aureus* and beta-haemolytic streptococci).[1,2]
3. Select the narrowest spectrum antibiotic for the shortest effective course at an appropriate dose (see *Supplement 2*). Tailor the antibiotic course duration according to clinical response (e.g. improvement in swelling and pain, or resolution of fever).[36-38] Note that when treating cellulitis, erythema may not fully resolve by the end of the antibiotic course.[39]
4. Treat with antibiotic **monotherapy**: evidence indicates that dual antibiotic therapy does not enhance treatment efficacy compared with monotherapy when treating SSTIs.[40-42] Therefore, dual antibiotic therapy is not typically required for treating uncomplicated bacterial SSTIs in the community.

Patient-reported drug allergies are common in clinical practice and it has been reported that most self-reported drug allergies are inaccurate.[43,44] Similarly, patients with documented or reported penicillin allergy may not have true penicillin allergy and it is advisable to verify the penicillin allergy (e.g. clarify characteristics of past reactions and review documented medication history to check if the patient has previously tolerated penicillin).

Prevention of SSTIs

After instituting treatment of the presenting SSTI, assess if there are any underlying factors which may cause SSTI recurrence (such as atopic dermatitis, intertrigo, and unsanitary shaving equipment) and address them.

Recommendation 3

For patients with impetigo or bacterial folliculitis:
a) Prescribe topical antibiotic monotherapy for localised mild infections.
b) Prescribe oral antibiotic monotherapy for severe infections.

Current evidence indicates that topical antibiotics have a role in the treatment of impetigo,[40] however antimicrobial resistance is known to develop with frequent and prolonged use. Oral antibiotics should be considered in situations where there is poor clinical response or if the clinical presentation necessitates oral antibiotics (for example, the presence of bullae may indicate that topical application of antibiotics is inadequate to reach the affected area).[23] Ecthyma is a deeper infection (compared to impetigo) which may extend to the dermis.[45] Systemic antibiotics are recommended for treatment of ecthyma.[5,11]

An antibiotic course could typically range from 5 to 7 days[5,23,46] unless extended based on clinical assessment.[a] For mild impetigo or bacterial folliculitis unresponsive to topical monotherapy, offer oral antibiotic monotherapy. If there is still no clinical improvement, consider referring for further testing.[23]

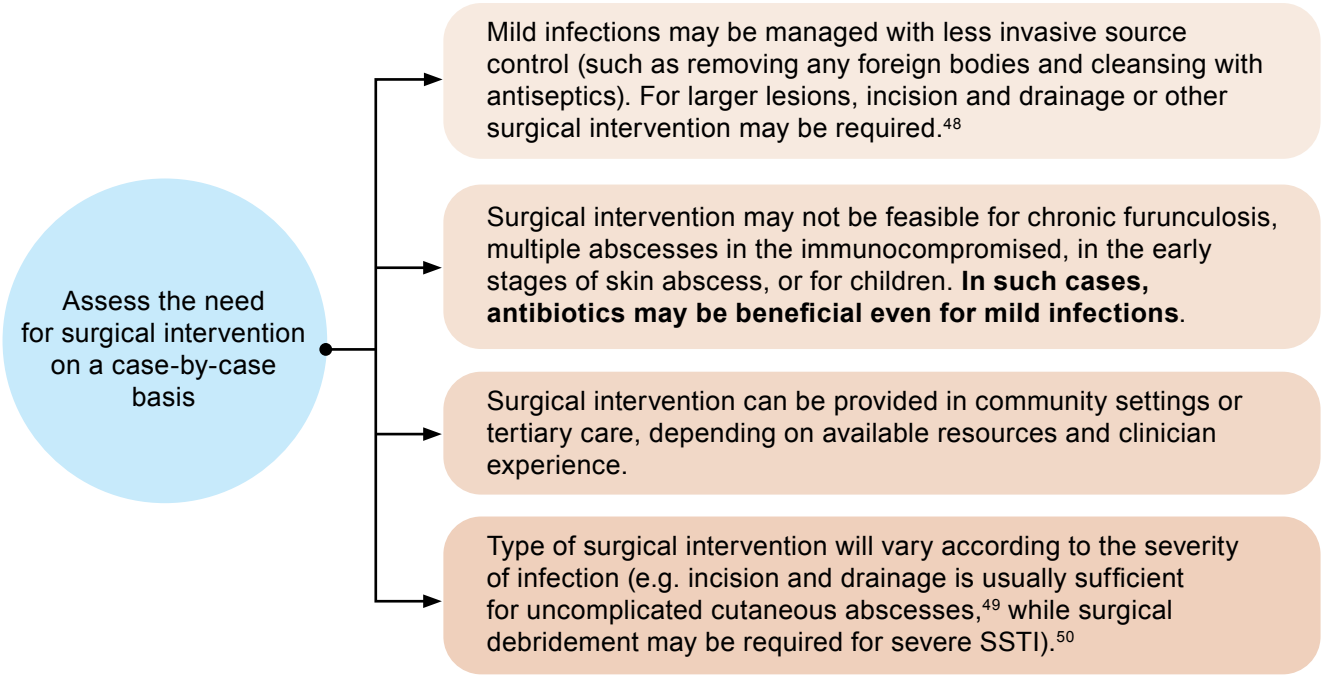
Scan or click the QR code to access Supplement 2. The rationale underpinning the selection of antibiotics may be found in this ACG's Evidence-to-Recommendation framework.

Antibiotic options for treating bacterial SSTIs

[a] Local package inserts for selected antibiotic agents (cefalexin, clindamycin) recommend treatment for at least 10 days for beta-haemolytic streptococcal infections.

Recommendation 4

For patients with bacterial furuncles, carbuncles, or skin abscess:
a) Consider surgical intervention based on clinical presentation, and
b) Reserve oral antibiotic monotherapy for severe infections.
Note that carbuncles tend to present as severe infections[47]



Evidence on efficacy of topical antibiotics in treating these SSTIs is not currently established,[51] with studies evaluating oral antibiotics instead.[52] In line with the current body of evidence, international guidelines do not recommend use of topical antibiotics for the SSTIs listed in this Recommendation.[5,9,11] The absolute benefit of oral antibiotics may be low for mild cases of these SSTIs[52,53] and should therefore be reserved for severe cases (refer to *Supplement 2*). For mild infections, supportive treatment can be provided instead of antibiotics (see section on *Supportive treatment for bacterial SSTIs* and notepad on *Counselling patients when antibiotics are not required*). Nonetheless, where there is high risk of complications (e.g. immunocompromised, presence of diabetes mellitus, co-existing skin conditions), antibiotics may be beneficial even for mild infections.

An antibiotic course could typically range from 7 to 10 days[9] unless clinical assessment warrants a longer treatment course.[b] If oral antibiotic therapy fails to produce clinical improvement, intravenous (IV) antibiotics may be needed.[9]

Counselling patients when antibiotics are not required

Patients presenting with SSTIs may expect to receive antibiotics, although this may not always be necessary. Consider the following tips when counselling patients that antibiotics are not required:[54]

- Affirm that supportive treatment can still be provided (see section *Supportive treatment for bacterial SSTIs* for examples of non-antibiotic treatments).
- Provide a contingency plan. For example, advise the patient to return if infection does not resolve without antibiotics, or if there are signs of worsening infection. Do not routinely dispense antibiotics as 'standby' medications.

[b] Local package inserts for selected antibiotic agents (cefalexin, clindamycin, cefazolin) recommend treatment for at least 10 days for beta-haemolytic streptococcal infections.

Special consideration for eyelid infections and diabetic foot infections

Eyelid infections are commonly seen in local primary care. Non-antibiotic treatment could include warm, wet compresses to the eyes and gentle cleaning of the eyelid margins.[55] If these measures are ineffective, provide antibiotic treatment:[56] for example, topical antibiotics can be used for treatment of anterior blepharitis, while oral antibiotics can used to treat posterior blepharitis. Note that choice of antibiotic agent differs compared to typical SSTIs.[57-59]

Diabetic foot infections are also commonly encountered in ambulatory settings.[1] Patients with diabetic foot infections may be more likely to require systemic antibiotics even for mild infections.[60] For patients with moderate and severe infection, refer them immediately to the emergency department (see the ACG "*Foot assessment in patients with diabetes mellitus*" for further details on classifying severity of diabetic foot infection).

Recommendation 5

For patients with bacterial cellulitis or erysipelas:
a) Prescribe oral antibiotic monotherapy for mild infections.
b) Reserve intravenous antibiotic monotherapy for severe infections.

Overall, current evidence shows that oral antibiotics are not statistically inferior compared to IV antibiotics for the treatment of cellulitis or erysipelas.[41,61] However, IV antibiotics may provide greater tissue penetration, and a tiered approach is prudent (oral antibiotics are provided for mild infections, and IV antibiotics are reserved for severe infections, when patients are unable to tolerate oral antibiotics, or when oral treatment may not provide sufficient tissue penetration).[30] This approach is in line with international SSTI treatment guidelines.[5,8,11,30] Refer to *Supplement 2* for oral and IV antibiotic options for cellulitis or erysipelas. An antibiotic treatment course could typically range from 5 to 7 days,[5,8,30,46] unless a longer course length is warranted based on clinical judgement.[30,c] If oral antibiotic therapy fails to produce clinical improvement, IV antibiotics may be needed.[8] Provision of IV antibiotics could be at the community or tertiary care level, depending on availability and the severity of the patient's condition.

For patients with recurrent cellulitis (three to four episodes per year),[5,11] refer to specialist care to evaluate underlying risk factors and causes, as well as to assess the need for prophylactic antibiotic treatment.

Intramuscular antibiotics

Intramuscular (IM) antibiotics are an alternative, but less established,[61] option for treating cellulitis and erysipelas. Evidence suggests comparable efficacy with oral[40] and IV antibiotics,[62] but they may also be associated with greater risk of adverse effects (e.g. injection-site pain and requiring analgesia) compared to oral antibiotics.[40,63] IM antibiotics are therefore not first-line treatment options. They may be considered when patients are unable to tolerate oral antibiotics and are unwilling to be admitted for IV antibiotic treatment.

Supportive treatment for bacterial SSTIs

Supportive treatment may include a warm compress for purulent SSTIs and elevation of affected area to reduce swelling in cellulitis and erysipelas.[5] Evidence suggests improved clinical response rates with a non-steroidal anti-inflammatory drug (NSAID) as an adjunct to antibiotic treatment, although effect estimates are inconsistent and imprecise.[6] An NSAID could be considered as an adjunct to antibiotic treatment to address inflammation in cellulitis on a case-by-case basis. As they can mask an underlying necrotic infection,[7] it is advisable to rule out a necrotic infection before prescribing an adjunctive NSAID. There is insufficient evidence to support the use of corticosteroids as adjunctive treatment for cellulitis.[6]

For patients with underlying eczema, continue to optimise treatment with provision of appropriate medication such as topical corticosteroids.[64] Refer to the ACG "*Mild and moderate atopic dermatitis (eczema)*" for further details on the management of atopic dermatitis, including secondary infection of atopic dermatitis.

[c] Local package inserts for selected antibiotic agents (cefalexin, clindamycin, cefazolin) recommend treatment for at least 10 days for beta-haemolytic streptococcal infections.

References

Click or scan the QR code for the reference list to this clinical guideline

Evidence-to-Recommendation Framework

Click or scan the QR code to view the Evidence-to-Recommendation Framework for the recommendations in this clinical guideline

Google Gemini was used to portray a cross-section of a skin infection. (Google Gemini, accessed 2026)

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About the Agency

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