

Cellulitis and erysipelas

Definitions

Cellulitis and erysipelas are commonly seen as manifestations of the same condition and the terms are often used interchangeably. They are acute, painful and potentially serious infection of the skin and subcutaneous tissues. The most common causative organisms are *Streptococcus* or *Staphylococcus* spp. but they can be caused by a wide range of both aerobic and anaerobic bacteria.

Cellulitis

- This is infection of the dermis and subcutaneous tissue.
- The infection has poorly demarcated borders.

Erysipelas

- This is essentially a superficial form of cellulitis, involving the dermis and upper subcutaneous tissues.
- It can be very difficult to distinguish cellulitis from erysipelas clinically.
- In erysipelas, borders of infection are sharply demarcated.
- Appearance is that of a fiery red rash that can be painful.
- Erysipelas is also known as St Anthony's fire. This name comes from the Egyptian healer of the Middle Ages who was said to have been able to cure it.

Risk factors for infection

They are more common and more serious in individuals with underlying diseases such as diabetes, cancer or immunodeficiency. Other risk factors include:

- Previous erysipelas or cellulitis.
- Venous insufficiency.
- Elderly age.
- Alcohol dependency.
- Intravenous drug misuse.
- Lymphoedema.
- Overweight/obesity.
- Athlete's foot/skin abrasions.
- Inflammatory dermatoses.
- Insect bites.
- Pregnancy.

Causative organisms

Cellulitis

- Most infections that affect intact skin are thought to be due to streptococci, although other organisms may be responsible if the integrity of the skin is compromised.^[1]
- Rarely, Gram-negative organisms, anaerobes or fungi may cause cellulitis. However, these organisms are more common causes in children, in people with diabetes and in immunocompromised individuals.
- Cellulitis occurring around surgical wounds less than 24 hours postoperatively may result from group A beta-haemolytic streptococci or *Clostridium perfringens*. The latter produces gas, leading to crepitus on examination.

Erysipelas

- Most infections are with group A streptococci but *Streptococcus pneumoniae*, *Klebsiella pneumoniae*, *Haemophilus influenzae* type b, *Yersinia enterocolitica* and *Moraxella* spp. have been found.

Rarer causative organisms

More rarely, cellulitis or erysipelas may be caused by other organisms:

- *H. influenzae* type b – in children less than 6 years of age.
- *Pasteurella multocida*, *Streptococcus anginosus* (formerly known as *Streptococcus milleri*), and *Capnocytophaga canimorsus* – following cat or dog bites.
- *Vibrio vulnificus*, *Aeromonas hydrophila* – following sea or fresh-water exposure.
- *Erysipelothrix rhusiopathiae* – in butchers, vets or fish handlers.
- *Mycobacterium marinum* – in aquarium keepers.

It is therefore prudent to ascertain patients' occupations in poorly healing infections.

Presentation

Cellulitis

- Cellulitis is more commonly seen in the lower limbs and usually affects one limb.
- In many cases, there is an obvious precipitating skin lesion, such as a traumatic wound or ulcer, or other area of damaged skin – eg, athlete's foot.
- There is erythema, pain, swelling and warmth of affected skin.
- Oedema and erythema often gradually blend into the surrounding skin and so the margin of the affected area may be indistinct.
- Blisters and bullae may form.
- Systemic symptoms (eg, fever, malaise) may occur.
- Red lines streaking away from a cellulitic area represent progression of the infection into the lymphatic system. Localised adenopathy is commonly observed with lymphangitis.
- Crepitus is a sign of infection most commonly observed with anaerobic organisms.



Erysipelas

- The face or a leg are commonly affected. The arm or upper thigh are the next most common areas to be affected.
- On the face, the source of bacteria is often the nasopharynx and there may have been a recent nasopharyngeal infection.
- There may have been recent skin trauma but often no precipitating cause is noted. Athlete's foot can be the portal of entry.
- Malaise, chills and high fever (flu-like symptoms) often precede any skin lesion. Vomiting can occur.
- Within 48 hours there is a sudden and rapid onset of skin infection with pruritus, burning and tenderness.
- The lesions begin as a small erythematous patch. This then progresses to a fiery-red, indurated, tense and shiny plaque. The margins are raised, sharply demarcated and advancing, with rapid enlargement over 3 to 6 days. There is local oedema, tenderness and warmth. The overlying skin can show streaking and there may be regional lymphadenopathy if the lymphatics are involved. The skin may then become deeper red with a bruise-like appearance and a bright red leading edge.

- Infection on the face is typically symmetrical and spreads from the paranasal area to the cheeks. Infection elsewhere tends to be unilateral.
- Fever, chills, joint pain, tiredness and loss of appetite can continue once the infection is evident.
- Severe infections may produce vesicles, bullae, petechiae and even frank necrosis.
- The centre of the erythema starts to clear within 7 to 10 days and returns to normal.
- On resolution, desquamation can occur and there may be pigmentary changes that can become permanent.



Differential diagnosis

- Deep vein thrombosis.
- Insect bite.
- Superficial thrombophlebitis.
- Varicose eczema.
- Pyoderma granulosum.
- Chronic venous insufficiency.

- Contact dermatitis.
- Vasculitis.
- Gout.
- Septic arthritis/osteomyelitis.
- Erythema nodosum.
- Drug reaction.
- Severe ischaemia/[compartment syndrome](#).
- [Necrotising fasciitis](#).
- Metastatic carcinoma (carcinoma erysipeloides).

Investigations

- Usually the diagnosis is purely clinical and no investigations are required.
- If there is an atypical presentation, the patient is very unwell or there is failure to respond to treatment, cultures from possible portals of entry may be valuable. Blood culture and swabs and culture of any blister fluid may also be helpful, usually in those patients where the diagnosis of cellulitis is in doubt.
- There is often a raised CRP level but a normal CRP level does not rule out an infection.^[2]
- Fine-needle aspiration from the leading edge of the lesion may assist in diagnosis.
- X-rays, CT scan or MRI are useful if there is any concern about a foreign body in situ.
- If bullae or abscesses form, culturing the fluid from inside these lesions yields an organism in more than 90% of cases.
- If the lesion is purulent, it should be debrided and cultured.
- Imaging should be considered if bone involvement is suspected.
- If episodes are recurrent, diabetes and immunodeficiency should be excluded.

Management^[3]

Erysipelas should be treated in the same way as cellulitis. Mild or moderate cellulitis can usually be treated in primary care. General measures include rest, elevation of any affected limbs, and analgesia.^[2] Analgesia should be considered as necessary (paracetamol or ibuprofen).

There is still uncertainty regarding the optimal antibiotic choice, duration and route of antibiotic therapy. The following are the recommendations of National Institute of Health and Care Excellence (NICE) guidance from September 2019:^[3]

- Flucloxacillin 500 mg four times daily (in adults) is usually given as first-line in uncomplicated infection. In sufficient doses, this covers both beta-haemolytic streptococci and penicillinase-resistant staphylococci. Flucloxacillin is sometimes given with penicillin V. However, there are no published randomised controlled trials comparing flucloxacillin monotherapy with a combination of flucloxacillin and penicillin V in the management of cellulitis.^[4]
- Oral antimicrobials are as effective as parenteral antimicrobials for the treatment of uncomplicated cellulitis.^[5]
- Erythromycin 500 mg four times daily, clarithromycin (500 mg twice daily) or doxycycline 200 mg on the first day and then 100 mg daily for 5–7 days can be used if the patient is penicillin-allergic.
- Alternative first-line antibiotic if the infection is near the eyes or nose is co-amoxiclav 500/125 mg three times a day orally for 7 days. If the person is allergic to penicillin they can have clarithromycin 500 mg twice a day for 7 days with metronidazole 400 mg three times a day for 7 days.
- Alternatives for severe infection include co-amoxiclav, clindamycin orally or cefuroxime or ceftriaxone intravenously.
- If methicillin-resistant staphylococcus aureus (MRSA) is suspected consider adding one of vancomycin, teicoplanin or linezolid to the standard treatments above.

- Antibiotics for patients with lymphoedema should be continued until all signs of acute inflammation have resolved. This may mean taking antibiotics for 1-2 months and the course of antibiotics should be for no less than 14 days from the time a definite clinical response is observed.^[6]

Editor's note

Dr Sarah Jarvis, 16th May 2022

Antimicrobial prescribing: oritavancin for acute bacterial skin and skin structure infections

NICE has produced new guidance on the above.^[7]

In summary:

Oritavancin may be an option for adults needing treatment in hospital, ambulatory care or through outpatient parental antimicrobial therapy (OPAT) for severe ABSSSI (cellulitis or erysipelas, abscesses and wound infections) when standard oral and intravenous antibiotics are not suitable.

Oritavancin offers the potential for treating skin infections caused by Gram-positive pathogens, including MRSA. It is administered as a single-dose IV treatment.

Oritavancin should be reserved for those people most likely to benefit from it, after specialist microbiological advice to help monitor use and limit antimicrobial resistance.

Other management points

- Rest and elevate the affected area where possible to reduce swelling and pain.
- Use of anti-inflammatory medication - non-steroidal anti-inflammatory drugs (NSAIDS) and corticosteroids - reduces the length of time of recovery and the risk of recurrence.^[8]
- Manage any underlying predisposing conditions - eg, tinea pedis, skin trauma, ulcer. Clean the wound site: irrigate; debride devitalised tissue.
- Advise use of an emollient to keep the skin well hydrated.
- Drawing around the margins of infection may help to identify the spread/resolution.

- Assess tetanus risk and status if a puncture wound/laceration has occurred.
- Any patient with crepitus, circumferential cellulitis or necrotic-appearing skin requires rapid surgical intervention. Necrotic skin requires examination of fascial planes to exclude necrotising fasciitis. Crepitus requires immediate debridement of tissue.
- Pain disproportionate to the physical examination or severe pain on passive movement of the extremities may indicate necrotising fasciitis and requires prompt evaluation.
- Consider the possibility of community-acquired meticillin-resistant *Staphylococcus aureus* (CA-MRSA) in risk groups and poorly healing infections.
- Compared with inpatient care, the mean duration of treatment with parenteral antibiotics at home has been shown to be similar, but is almost half the cost. In addition, patient and carer satisfaction with home-based care is high.
- Outpatient parenteral antibiotics should be used where available.^[9]

Consider referral

Referral to hospital should be considered if there is:

- Severe or rapidly worsening infection, especially if there is possible necrotising fasciitis.
- Systemic illness or vomiting.
- Evidence of complications or suspected deep infection.
- Facial infection.
- Suspected orbital/periorbital cellulitis.
- Immunocompromise.
- Diabetes (if blood sugars are unstable).
- Significant comorbidity.
- Lymphoedema present.
- Recurrent infection at the same site.

- A child aged under 1 year.
- Lack of home support/frailty/memory impairment.

Follow-up^[10]

- Arrange follow-up after seven days of treatment with antibiotics.
- Build in a safety net for earlier review as needed. Advise the patient to come back sooner if antibiotics are not tolerated, skin signs worsen after 48 hours or systemic symptoms develop.
- Assess compliance with antibiotics at review.
- Consider hospital referral if there is no response to treatment or there is deterioration.
- Treatment with antibiotics should be for seven days initially. 10–14 days of antibiotics may be needed to ensure complete resolution.

Complications

Complications are uncommon but may include:

- Abscess formation.
- [Gangrene](#).
- [Thrombophlebitis/lymphangitis](#).
- Chronic leg oedema (a late complication which may predispose to further episodes of infection).

Less common complications (occurring in <1%) include:

- [Necrotising fasciitis](#).
- [Osteomyelitis](#).
- [Compartment syndrome](#).
- [Acute glomerulonephritis](#).
- [Endocarditis](#).
- [Septicaemia](#).

- Streptococcal [toxic shock syndrome](#).

Prevention of recurrence^[1]

- Consensus is that any predisposing conditions should be treated to minimise risk of recurrence. This may include:
 - Ensuring adequate glycaemic control.
 - Weight control.
 - Treatment of athlete's foot.
 - For chronic leg swelling: limb elevation, calf muscle exercises and compression stockings.
 - Assessment of peripheral pulses and footwear and for neuropathy in those with [diabetes](#).
 - Avoidance of injury to the skin as far as possible.
- For adults who have had treatment in hospital, or under specialist advice, for at least two separate episodes of cellulitis or erysipelas in the previous 12 months, specialists may consider a trial of antibiotic prophylaxis.^[3] The patient should be involved in discussing and taking account of the severity and frequency of previous symptoms; the risk of developing complications; underlying conditions (such as oedema, diabetes or venous insufficiency) and their management; the risk of resistance with long-term antibiotic use; the person's preference for antibiotic use.
- First-choice antibiotic for prophylaxis is phenoxymethylpenicillin 250 mg twice a day. Erythromycin 250 mg twice a day if the patient is allergic to penicillin.
- Each recurrent episode of cellulitis results in further damage to the lymphatic system and is associated with additional morbidity and healthcare costs.^[1]
- One large study has shown that patients with two or more episodes of leg cellulitis who are given prophylactic penicillin for 12 months have fewer recurrences than those given placebo, without any increase in adverse effects.^[1] Patients with a high BMI, pre-existing oedema or at least three episodes of previous cellulitis were less likely to have a response to prophylaxis than other patients.

- Antibiotic prophylaxis can prevent recurrent cellulitis even in those who have only had one previous episode of cellulitis. ^[12]

NB: besides the management of lymphoedema, there is no evidence to support the active management of other risk factors including diabetes mellitus, peripheral arterial disease and tinea pedis. ^[2]

Prognosis

- Uncomplicated cellulitis or erysipelas has an excellent prognosis and most people make a complete recovery.
- Treatment without hospital admission is effective for well over 90% of patients.
- Of those who fail outpatient therapy or require admission initially, intravenous antibiotics are very effective.

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Further reading

- [Brown BD, Hood Watson KL; Cellulitis](#)

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Authored by:	Peer Reviewed by: Dr Colin Tidy, MRCGP	
Originally Published: 20/11/2023	Next review date: 20/03/2020	Document ID: doc_1921

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