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## Management of Skin and Soft Tissue Infections

### [Link to Skin and Soft Tissue Infection Algorithm](#)

#### Aim

This clinical practice guideline has been created to assist with diagnosis and management of SSTIs in CHI. It aims to inform clinicians of current available evidence and to promote consistent and high quality evidence-based care. It is hoped that implementation of these guidelines will optimize patient outcomes and reduce the risk of antimicrobial resistance.

Note: This guideline will not address periorbital or orbital cellulitis, post-operative surgical infection or staph scaled skin syndrome

#### Definition of Terms

*Impetigo* occurs when there is infection of the epidermis, commonly occurring at varicella lesions, lacerations, abrasions, insect bites or over intact skin. These lesions are typically honey-crusted and highly contagious.

*Cellulitis* is an acute infection of the epidermis, dermis and subcutaneous tissues. It is characterised by erythema with indistinct margins, swelling, warmth and tenderness. Purulent cellulitis is associated with exudate or drainage and is often caused by *Staphylococcus aureus* infection. Non-purulent cellulitis has no drainage or exudate, and is generally caused by *Streptococcus pyogenes* (Group A streptococcus, GAS) infection.

An *abscess* is a pus-filled cavity that results from bacterial infection (usually *Staphylococcus aureus*). An abscess may be present with or without surrounding cellulitis.

A *furuncle* is a painful, firm abscess originating from a hair follicle and extending through the dermis. They are most commonly found on the face, neck, thighs or buttock. When several furuncles connect via a sinus tract, a *carbuncle* is formed. A carbuncle may be associated with systemic upset.

*Erysipelas* is a form of superficial cellulitis that spreads more rapidly and has notable lymphatic involvement. It presents with raised, sharply demarcating and erythematous margins. It is commonly seen on the face or extremities. It is caused by Group A streptococcal infection.

*Staphylococcal Scalded Skin Syndrome* is a severe, blistering condition that results from circulation of Staphylococcal exfoliative toxins A and B. It may arise following an initial skin infection that later develops local or generalized skin blistering or exfoliation.

*Necrotising fasciitis* is a very severe and life-threatening infection of the deep subcutaneous tissue and fascia associated with systemic upset, severe pain, skin discolouration and tissue crepitus.

#### Introduction

Skin and soft tissue infections (SSTIs) are some of the most common bacterial infections in children. They are commonly encountered in the Emergency Department (ED). The term SSTI encompasses a broad range of disease processes including impetigo, cellulitis, abscess and necrotizing fasciitis.

SSTI occurs more commonly in children with underlying skin disorders such as eczema, insect bites, lacerations and tinea pedis and those with immune compromise such as neonates or patients on

immunosuppressant medications or chemotherapy. Usually, children present with trunk or limb swelling, redness and pain. In severe cases, there may be fever or other signs of systemic toxicity.

Diagnostic testing may be helpful in supporting a clinical diagnosis of SSTIs. However, there is often no definite consensus amongst clinicians as to which specific tests are required. Antibiotic therapy, the mainstay of treatment, also varies in clinical practice in terms of selected antibiotic agent and duration of therapy. Management may be based on local sensitivities and recommendations, personal preference or previous clinical experiences.

## **Assessment**

### **Patient History**

A focused history is vital to the proper care of children with SSTI. Children with underlying skin disorders such as poorly controlled eczema or tinea pedis are at increased risk of developing cellulitis. Skin abrasion, insect bites and varicella lesions also commonly precede the condition. Dental caries commonly lead to intraoral or facial swelling.

Unusual exposures such as a cat scratch, animal or human bite, and freshwater or saltwater exposure may lead to infection with unusual organisms. Ask about an episode of trauma several days preceding the onset of symptoms.

Risk factors for MRSA infection should be sought including previous MRSA soft tissue infection, previous MRSA colonization, personal or in family members, or recent hospitalisation.

Features of systemic toxicity such as high fevers, rigors or vomiting indicate severe disease.

Those at risk of deterioration and disseminated infection include neonates, immunosuppressed patients, or children with other significant co-morbidities (especially diabetes mellitus, chronic kidney and liver disease).

The presence of painful or restricted eye movements, proptosis, visual loss, abnormal pupillary reflexes, vomiting, headaches or seizures suggest orbital involvement and mandate urgent ENT/Ophthalmology referral.

### ***Physical examination***

Bacteria may enter through a skin defect such as an abrasion or laceration, insect bite, varicella lesion or where there is tinea pedis, in the interdigital web spaces of the feet.

Local signs of infection include erythema, swelling, warmth and tenderness. Redness should be marked with a pen on the affected area so that spread of infection over time can be identified objectively. Raised and sharply demarcated borders are suggestive of erysipelas. Check for the presence of regional lymphadenopathy.

The presence of induration or fluctuance is highly suggestive of abscess formation.

A severe SSTI is suggested by the presence of lymphangitic spread, circumferential cellulitis, bullae and rapid spread.

Necrotizing infection is suggested by discolouration of skin, rapid spread of infection, skin anaesthesia or pain out of proportion to exam and gas or crepitus within the tissue.

Examine closely for signs of systemic toxicity such as high-grade fever or hypothermia, rigors, tachycardia, tachypnea, hypotension, peripheral vasodilation, altered mental state and reduced urine output.

## Management

### Blood investigations

- FBC and CRP.
- Blood cultures should only be taken in children with signs of systemic toxicity. They are not useful, cost-effective and are more frequently contaminated in immunocompetent patients with uncomplicated cellulitis but are important to obtain in those with fever or other signs of systemic toxicity.

### Microbiological investigations

- Wound swabs should be taken from those requiring incision and drainage or with active discharge. Routine swabs of the overlying skin are not recommended.
- Eye swabs may be taken in cases of orbital cellulitis. Bacterial culture of nasal swabs is not useful and should not be obtained.

### Radiological investigations

- Ultrasound (US) should be performed if there is induration or fluctuance. US has increased diagnostic accuracy in identifying skin abscess compared with physical examination
- X-ray may be warranted if there is suspicion of an underlying fracture, foreign body or osteomyelitis. Bear in mind that a normal X-ray does not exclude osteomyelitis
- MRI may be useful to demonstrate extent of soft tissue involvement in complicated cellulitis.

### Specialist involvement

- Infectious Disease / Microbiology if there is severe/ complicated infection
- General surgery if there is a drainable abscess or suspicion of necrotizing fasciitis (urgent)
- Orthopaedics if there is limb cellulitis +/- abscess, or suspected joint involvement
- Dental if there is facial cellulitis of dental origin
- ENT if there is a neck abscess
- Ophthalmology if there is orbital cellulitis
- Plastic surgery if there is hand involvement. In the case of necrotizing fasciitis, the primary surgical team may request help from a plastic surgeon for debridement in the acute setting or later reconstruction of a complex or extensive wound
- Dermatology if poorly controlled eczema has been a factor in development.

### Admission criteria

- Systemic symptoms including fever, rapidly spreading disease or features of necrotizing infection
- Immune deficiency
- Co-morbidities
- < 6 months old
- Involving specialized area such as neck or bone/joint
- Failure to respond to or intolerance of oral therapy
- Most patients with periorbital swelling will require admission, unless minimal upper lid oedema and a normal eye examination.

### Outpatient therapy

- Afebrile, well children with mild cellulitis
- Tolerating oral antibiotics

- Follow up is assured.

### Acute management (see [algorithm](#))

#### ***Impetigo***

- Topical fucidic acid is effective for very localised disease
- Oral flucloxacillin or cefalexin is recommended if lesions are multiple or widespread
- Hand washing is important to reduce spread.

#### ***Cellulitis***

- A narrow-spectrum anti-staphylococcal antibiotic such as flucloxacillin or a first generation cephalosporin (cefazolin if IV required, cefalexin if PO) are the agents of choice as they provide adequate cover for both *Staphylococcus aureus* and *Streptococcus pyogenes*
- In severe infection, a bacteriostatic agent such as clindamycin may be added to combat organisms in the stationary phase of growth and also has the advantage of interrupting toxin production
- Parenteral antibiotic therapy can be switched to oral once there is clinical evidence of a response, the patient is afebrile and is tolerating oral intake
- Duration of therapy is 10 days in most cases
- Failure to respond to empiric therapy may indicate the formation of an abscess. This is best identified with ultrasound, and should be incised and drained in addition to systemic antibiotic therapy.
- Failure to respond also occurs when there is infection with a resistant organism such as MRSA. In a systemically unwell child with suspected MRSA infection, vancomycin should be added. If the child is well, trimethoprim/sulfamethoxazole or clindamycin may be used.

#### ***Abscess***

- Incision and drainage is the cornerstone of therapy. If large, this may require sedation and analgesia. Warm compresses may help to mature the abscess prior to the procedure.
- Patients with abscesses that have not been fully drained should go home with oral antibiotics. If complete drainage is achieved, antimicrobial therapy is not required.

#### ***Necrotising fasciitis***

- This is a surgical emergency and requires an immediate surgical opinion.
- Surgical debridement is often required.
- Parenteral broad-spectrum antibiotics including ceftriaxone or cefotaxime, clindamycin, vancomycin, and gentamycin should be initiated early; however the spectrum should be narrowed once tissue culture data is available.
- Expert advice from Infectious Disease/ Microbiology should be urgently sought.
- Supportive care may be delivered in an intensive care setting.
- IVIG may be indicated if there are signs of shock/toxaemia.

#### ***Recurrent cellulitis***

- Dermatology input should be sought so that underlying skin disorders such as tinea pedis and eczema can be addressed.

#### ***Dental infection***

- If no systemic infection and the child is otherwise healthy, prescribe high dose oral antibiotics and refer to community dental services (HSE or private dentist) for follow up care.
- Admit if systemically unwell and inform dental team (next day if out of hours). Fast from 6am to facilitate early treatment in OT if needed
- Broad spectrum penicillin and anaerobic cover recommended

Condition	Causative organism	Mild	Severe	Duration
Impetigo	MSSA GAS	Mild/ localized: Fucidic acid cream  Widespread/ recurrent: Flucloxacillin PO or cefalexin PO	If severe or in neonates:  Flucloxacillin IV	Total IV & PO 10 days
Cellulitis	MSSA GAS	Flucloxacillin PO  If MRSA suspected in well child, TMP/SMX PO or clindamycin PO	Flucloxacillin or cefazolin IV  Add clindamycin IV if severe or poor response  If MRSA suspected in unwell child, add vancomycin IV	Total IV & PO 10 days
Cellulitis post varicella infection	MSSA GAS		Cefotaxime or ceftriaxone IV  Add clindamycin PO/IV  If suspect MRSA, add vancomycin IV	Consult ID/ Micro
Erysipelas	GAS	Amoxicillin PO	If extensive or involving face:  Benzylpenicillin IV	Total IV & PO 10 days
Animal/human bite	Pasteurella species, oral anaerobes, MSSA, B haemolytic streptococci	Co-amoxiclav PO	Co-amoxiclav IV	3-5 days
Dental infection	Mixed flora	Co-amoxiclav PO	Co-amoxiclav IV	5 – 7 days PO Consult Dental if IV
Necrotising fasciitis	GAS MSSA		Ceftriaxone OR Cefotaxime IV plus Clindamycin IV plus Gentamycin IV Plus Vancomycin IV	Consult ID/ Micro

**Companion Documents:**

[Patient Information Leaflet on Cellulitis](#)

[Skin and Soft Tissue Infection Algorithm](#)