Management of *Staphylococcus aureus*-infected atopic eczema

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Many community nurses will have encountered atopic eczema, a widespread skin condition resulting in itchy, red, dry and cracked skin and which has a serious effect on patients’ quality of life. When atopic eczema becomes infected with *Staphylococcus aureus*, however, these symptoms can intensify, resulting in outbreaks of folliculitis and widespread infected eczematous lesions. These can be painful and distressing and community nurses need to be aware of the symptoms and treatments in order to deal with the problem themselves or refer on. This article looks at the background to infected atopic eczema as well as the main treatments, including oral antibiotics, antiseptics, combination topical therapies and good hygiene.

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**Keywords:** Skin care  Eczema  Infection  *Staphylococcus aureus*

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**Atopic Eczema**

The exact mechanism of the condition is not yet fully understood, although it is thought to be a complex combination of immunology and genetic and environmental factors.

Whatever its exact cause, atopic eczema renders the skin excessively permeable and more prone to damage from environmental irritants and allergens (Scottish Intercollegiate Guidelines Network [SIGN], 2011).

This disrupts the vital functions of the skin, which include:

- Acting as a physical barrier for the body against mechanical and thermal injury, and hazardous substances
- Helping to regulate the loss of moisture
- Offering a degree of protection from the harmful effects of ultraviolet (UV) radiation
- Providing sensory and autonomic functions, i.e. touch
- Regulating body temperature
- Acting as an immune organ to detect infections
- Producing vitamin D
- Enhancing sociosexual communication.

When the skin is compromised, the body becomes vulnerable to commonly occurring pathogens, e.g. viral, fungal and bacterial infections. This is because healthy skin produces antimicrobial peptides, which help to prevent invasion by dangerous microorganisms (Archer, 2004).

**Treatment**

The first-line treatment for active atopic eczema involves repairing the barrier function of the skin. This treatment is twofold and involves rehydration of the skin through the application of emollients (non-cosmetic moisturisers that come

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*THE SCIENCE — UNDERSTANDING ATOPIC ECZEMA*

The precise cause of atopic eczema is unknown, but it usually develops in those vulnerable to allergies — there is also a genetic component and it can run in families. It is also common to see atopic eczema developing alongside other allergic-type conditions, such as asthma and hay fever. It causes itchy, red and dry skin and is a long-term condition commonly appearing in skin creases such as behind the knees, inside of the elbows or around the eyes and ears. The severity of the condition varies and although most people are only mildly affected, severe symptoms include cracked, painful and bleeding skin. The condition is characterised by flare-ups when the symptoms become more severe and require additional treatment.

*Source: NHS Choices: www.nhs.uk/Conditions/Eczema-(atopic)*
SKIN CARE

in the form of creams, ointments, lotions and gels), as well as disease modification using either:

- Topical corticosteroids: a general term that refers to any sort of cream, gel or ointment containing corticosteroids, which act to reduce the inflammation
- Topical calcineurin inhibitors: a relatively new type of medication encompassing two agents, tacrolimus and pimecrolimus. In simple terms, topical calcineurin inhibitors act on cells in the immune system and prevent them from releasing the chemicals that cause inflammation and itching (Munzenberger and Montejo, 2007).

INFECTION

When the skin becomes colonised with pathogenic microorganisms, the usual treatment strategies for eczema can become less efficient. However, without intervention these microorganisms can invade the body and the patient can become systemically unwell. *Staphylococcus aureus* is a bacterium commonly found on the skin of people with atopic eczema and can be isolated from 90% of atopic eczema skin lesions (Bath-Hextall et al, 2010). This is in direct contrast to the presence of *S. aureus* in non-eczematous skin, which is less than 5% (SIGN, 2011). *S. aureus* is a naturally occurring bacterium, which is usually kept in check by the antimicrobial peptides produced by the skin. However, where there is a reduction of these peptides the skin can become colonised.

The role of *S. aureus* in the exacerbation of previously non-infected atopic eczema has not yet been fully explained. However, it has been theorised that *S. aureus* may be a ‘super antigen’ (Bath-Hextall, 2010), meaning that the exotoxins excreted by the bacterium stimulate a massive activation of T-cells (a type of white blood cell that plays a central role in immunity), which may lead to a flare up of atopic eczema.

It is worth noting that at present neither the National Institute for Health and Care Excellence (NICE, 2007) or SIGN (2011) advocate the use of prophylactic anti-*S. aureus* regimens, either with systemic antibiotics or topical antibiotics/antiseptics, due to a lack of evidence.

Presentation

*S. aureus* infections may present in one of three ways:
- Folliculitis
- Localised infected eczematous lesion/s
- Generally infected eczema.

Folliculitis

Folliculitis presents with inflamed pustules within the hair follicle and can be due to infection, occlusion (blockage), irritation and various skin diseases such as acne. Folliculitis can be distinguished from other cutaneous pustular eruptions by the presence of a hair emerging out of the pustule. A swab from one of the pustules will confirm if it is has been caused by a bacterial infection (Figure 1).

Typically, folliculitis in individuals with atopic eczema is due to the application of emollients. Emollients should not be applied with a circular rubbing motion, but downward in the direction of hair growth. The application of very thick emollients can be responsible for causing occlusion. Folliculitis can often be resolved simply by the use of a lighter emollient and by using the correct method of application.

Localised infected lesions

Localised infected lesions (including those infected with *S. aureus*, other bacterial infections or viral infections) often have a honey-coloured crust (Figure 2) and exhibit ‘weeping’ (release of exudate) with the accompanying inflammation.

Generally infected eczema

Generally infected eczema manifests in widespread serous exudate, pustules and crusts, with rapidly worsening atopic eczema, and the accompanying systemic symptoms such as fever and malaise. Differential diagnosis of *S. aureus*-infected eczema include:
- Eczema herpeticum (which is due to herpes simplex, herpes zoster and varicella zoster)
- Contact dermatitis
- Scabies.

It is also imperative that any viral infections are ruled out as they may be potentially life-threatening and can be mistaken for bacterial infections. A thorough medical history and

![Figure 1. Example of skin affected by folliculitis — inflamed pustules in the hair follicle.](image)

![Figure 2. A patch of skin affected by infected eczema showing honey-coloured, crusted pustules.](image)
infection with their usage (Hindley et al, 2006). SIGN, in particular, do not advocate the routine use of wet wraps, as an increase in the use of antibiotics has been demonstrated during their use (SIGN, 2011).

**Oral antibiotics**

Oral antibiotics are the primary treatment for *S. aureus*-infected atopic eczema, as the NICE (2007) guidelines state:

Flucloxacillin should be used as the first-line treatment for bacterial infections in children with atopic eczema for both *S. aureus* and streptococcal infections.

NICE adds that swabs should only be taken if resistance or other microorganisms are suspected (NICE, 2007), e.g. where the eczema did not resolve or began to worsen.

Systemic antibiotics should be used for 1–2 weeks dependent on the clinical response. However, in the case of a patient with a flucloxacillin allergy or bacterial resistance, erythromycin should be used and if this is not tolerated, clarithromycin (NICE, 2007).

Despite this advice, the use of oral antibiotics in infected atopic eczema has been questioned. Travers et al (2011) stated that:

**Systemic antibiotics do not appear necessary in secondary impetiginised atopic dermatitis.**

However, although there is as yet no clear evidence base for their usage, SIGN (2011) concluded that:

The current standard practice of short-term oral antibiotic treatment for patients with clinically infected eczema should continue.

**Topical antibiotic therapies**

Historically, the rise of resistant strains of Staphylococcal infection has been well documented (Barber, 1947) and clinicians should be cautious not to contribute to this problem. As Heng et al (2013) concluded in their work on antimicrobial resistance, physicians should ‘prescribe topical fusidic acid discerningly’.

**Antiseptics**

Antiseptics, mainly in the form of creams and lotions, should be used as an adjunct therapy rather than as a long-term solution because of the associated risk of sensitisation (NICE, 2007). Antiseptics can compromise the skin’s cutaneous barrier function, potentially causing the ingress of allergens and irritants and triggering an immunological response, which further worsens the atopic eczema.

Chlorhexidine-containing solutions are widely used in hospital-based meticillin-resistant *S. aureus* (MRSA) decolonisation programmes. However, while there is a potential risk of irritation from chlorhexidine, a number of preparations have been developed for sensitive skin, including octenisan® (Schülke) and the Dermol® range (Dermal Laboratories). Antiseptics also benefit from the fact that organisms rarely develop resistance to them (Wollenberg et al, 2012).

Anecdotally, the author has seen an increase in the use of bleach baths in both primary and secondary care. However, although Bath-Hextall (2010) found that, when added to bath water, bleach reduced the severity of the infected eczema and Fitz et al (2011) reported that bleach baths were superior to chlorhexidine in the eradication of *S. aureus*, it should be noted that both were very small studies. Until more robust clinical evidence is available the use of bleach baths should not be advocated.

**Combination topical therapies**

Combination topical therapies, which feature a corticosteroid and an antibiotic, may have little clinical effect, with NICE (2007) recommending that their use ‘should be reserved for cases of clinical infection in localised areas’. Similarly, SIGN (2011) guidelines state that ‘it is not possible to provide an evidence-based recommendation for practice’ and Bath-Hextall et al (2010) found no significant difference in clinical effectiveness between combination preparations or the use of topical corticosteroids on their own. Combination therapies also carry the risk of increased identification of risk factors should be undertaken, i.e. whether the patient has come into contact with someone with cold sores or chicken pox, and, if appropriate, viral swabs should be taken. If there is a suspicion that the infection is caused by the herpes simplex virus, treatment with oral aciclovir (an antiviral medicine) should be started even if the infection is localised (NICE, 2007).

**Five-minute test**

Answer the following questions about this topic, either to test the new knowledge you have gained or to form part of your ongoing practice development portfolio.

1. What are the main functions of the skin?
2. Name the most common symptoms of atopic eczema.
3. Can you identify the main cause of infected eczema?
4. List the main treatment techniques for infected eczema.
5. Can you explain the importance of good hygiene in combating infected eczema?

In the case of *S. aureus*-infected atopic eczema, it is not only the infection that needs to be treated — poorly controlled untreated atopic eczema will itself contribute to the spread and severity of the infection. This means that as well as taking any medication for the infection, the individual also needs to continue applying topical emollients and corticosteroids.

However, during a period of infection both calcineurin inhibitors and wet wraps should be stopped — calcineurin inhibitors as a precaution against the possibility that they may suppress the normal immunological response to infection (SIGN, 2011) and wet wraps because questions remain over their overall efficacy, and there is also a risk of increased resistance, erythromycin should be used and if this is not tolerated, clarithromycin (NICE, 2007).

Despite this advice, the use of oral antibiotics in infected atopic eczema has been questioned. Travers et al (2011) stated that:

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resistant strains of *S. aureus* due to their antibiotic content.

**Hygiene**

Perhaps the simplest yet most overlooked intervention for infected atopic eczema is good hygiene, i.e. a daily bath or shower using a soap substitute. Using pump dispensers or decanting emollients into clean containers with a spoon is also important, as is decanting topical therapeutic agents so that people’s fingers do not contaminate the tube (in the author’s experience, all topical products should be discarded and replaced once the infection has cleared). Bed linen should be changed daily, with the sheets and pillow cases washed at 60°C. Recurrent infections should be referred to a dermatologist to eliminate secondary infections (SIGN 2011), and the patient and any carers/family members should have swabs taken from potential *S. aureus* carriage sites (SIGN 2011), such as the nasal, underarm and groin areas.

While routine prophylactic treatment of non-infected atopic eczema is not advocated in the case of recurrent infections, *S. aureus* eradication should be considered (SIGN, 2011). Eradication therapy usually involves a chlorhexidine body wash and the application of antibacterial nasal ointment. Practitioners should refer to local guidelines and liaise with their local microbiology department.

**DISCUSSION**

While the exact mechanism of the interaction between *S. aureus* and eczematous flares is not fully understood, there would appear to be a correlation between *S. aureus* infection and poorly controlled atopic eczema, resulting in a potentially severe non-responsive eczematous flare, which can lead to hospitalisation.

Although at present there are no evidence-based strategies for preventing secondary infection of eczema, a vigorous topical treatment plan should be adhered to, including a soap substitute, regularly applied emollient and a ready source of topical corticosteroid that should be applied at the very first sign of a flare.

Both the patient and carers/family members should be educated in recognising the early signs of bacterial infection, e.g. non-responding eczema and an increase in exudate, and be able to access timely clinical support. Community nurses should respond immediately, ensuring an appropriate diagnosis and treatment, especially where there is suspicion of viral secondary infection.

**CONCLUSION**

Atopic eczema is a common condition in all age groups resulting in dry, cracked and painful skin — this means that it has a serious effect on patients’ quality of life. When atopic eczema becomes infected with *S. aureus*, these symptoms can worsen resulting in widespread infected eczematous lesions.

Community nurses need to be aware of the symptoms and treatments in order to deal with infected eczema and this article has provided a discussion of clear treatment strategies — including oral antibiotics, antiseptics, combination topical therapies and good hygiene — that can be employed to improve the symptoms and thereby quality of life for patients.  

**REFERENCES**


**KEY POINTS**

- Many community nurses will have encountered atopic eczema, a widespread skin condition resulting in itchy, red, dry and cracked skin.

- When atopic eczema becomes infected with *Staphylococcus aureus*, these symptoms can intensify resulting in outbreaks of folliculitis and widespread infected eczematous lesions.

- These are painful and distressing symptoms and nurses need to be aware of the treatments in order to deal with the problem themselves or refer on.

- This article looks at the background to infected atopic eczema as well as the main treatments, including oral antibiotics, antiseptics, combination topical therapies and good hygiene.