Secondary bacterial infection of eczema and other common skin conditions

NICE guideline

Draft for consultation, August 2020

This guideline sets out an antimicrobial prescribing strategy for secondary bacterial infection of eczema and other common skin conditions. It aims to optimise antibiotic use and reduce antibiotic resistance.

The recommendations in this guideline are for the use of antibiotics to manage secondary bacterial infection of eczema in adults, young people and children aged 72 hours and over. For newborn babies under 72 hours, seek specialist advice.

The committee were unable to make recommendations for the use of antibiotics to manage secondary bacterial infection of other skin conditions such as psoriasis, chicken pox, shingles and scabies. No evidence was found for these other skin conditions and the committee agreed that extrapolating the evidence from infected eczema was not appropriate.

This guideline does not cover diagnosis or managing eczema herpeticum (see the NICE guideline on atopic eczema in under 12s: diagnosis and management).

This guideline will update recommendations on treating infected eczema in the NICE guideline on atopic eczema in under 12s (published December 2007).

For managing other skin and soft tissue infections, see our web pages on skin conditions and infections.

See a 2-page visual summary of the recommendations, including tables to support prescribing decisions.

Who is it for?

- Healthcare professionals
- Adults, young people and children with secondary bacterial infection of eczema, their parents and carers

The guideline contains:

- the recommendations
- the rationales
- summary of the evidence.

Information about how the guideline was developed is on the guideline's page on the NICE website. This includes the full evidence review, details of the committee and any declarations of interest.

Recommendations

1.1 Managing secondary bacterial infections of psoriasis, chicken pox, shingles and scabies

1.1.1 Seek specialist advice for managing infected psoriasis, chicken pox, shingles and scabies, if needed.

To find out why the committee could not make recommendations on managing secondary bacterial infections of psoriasis, chicken pox, shingles and scabies see the rationales.

1.2 Managing secondary bacterial infections of eczema

Treatment

1.2.1 Manage underlying eczema and flares with treatments such as emollients and topical corticosteroids (see the NICE guideline on atopic eczema in under 12s: diagnosis and management and also see NICE's technology appraisal guidance on alitretinoin for the

treatment of severe chronic hand eczema, dupilumab for treating moderate to severe atopic dermatitis, tacrolimus and pimecrolimus for atopic eczema and the frequency of application of topical corticosteroids for atopic eczema).

1.2.2 Be aware that:

- the symptoms and signs of secondary bacterial infection of eczema can include: weeping, pustules, crusts, no response to treatment, rapidly worsening eczema, fever and malaise (for managing eczema in children under 12 see the NICE guideline on atopic eczema in under 12s: diagnosis and management)
- not all eczema flares are caused by a bacterial infection, so will not respond to antibiotics, even if weeping and crusts are present
- eczema is often colonised with bacteria but may not be clinically infected
- eczema can also be infected with herpes simplex virus (eczema herpeticum).

1.2.3 Do not routinely take a skin swab for microbiological testing in people with secondary bacterial infection of eczema at the initial presentation.

1.2.4 Do not routinely offer either a topical or oral antibiotic for people with secondary bacterial infection of eczema who are not systemically unwell. Take into account:

- the evidence, which suggests a limited benefit of antibiotics in addition to topical corticosteroids compared with topical corticosteroids alone
- the risk of antimicrobial resistance with repeated courses of antibiotics
- the extent and severity of symptoms or signs

- the risk of developing complications, which is higher in people with underlying conditions such as immunosuppression.

1.2.5 If an antibiotic is offered (see the recommendations on choice of antibiotic) to someone with secondary bacterial infection of eczema who is systemically well, when choosing between a topical or oral antibiotic, take into account:

- their preferences (and those of their parents and carers as appropriate) for topical or oral administration
- the extent and severity of symptoms or signs (a topical antibiotic may be more appropriate if the infection is localised and not severe; an oral antibiotic may be more appropriate if the infection is widespread or severe)
- possible adverse effects
- previous use of topical antibiotics because antimicrobial resistance can develop rapidly with extended or repeated use.

1.2.6 Offer an oral antibiotic for people with secondary bacterial infection of eczema who are systemically unwell.

1.2.7 Manage flares with stepped topical corticosteroids, whether antibiotics are offered or not (for managing eczema in children under 12 see the NICE guideline on atopic eczema in under 12s: diagnosis and management).

To find out why the committee made the recommendations on treatment for secondary skin infections see the rationales.

Advice

1.2.8 Advise people with secondary bacterial infection of eczema (and their parents and carers as appropriate) to seek medical help if:

- symptoms worsen rapidly or significantly at any time (whether they have had antibiotics or not) or

- symptoms have not improved after completing a course of antibiotics.

1.2.9 If an antibiotic is given, advise the person (and their parents and carers as appropriate):

- about possible adverse effects
- that they should continue treatments such as emollients and topical corticosteroids
- that it can take time for secondary bacterial infection of eczema to resolve, and full resolution is not expected until after the antibiotic course is completed.

1.2.10 If an antibiotic is not given, advise the person (and their parents and carers as appropriate):

- the reasons why an antibiotic is unlikely to provide any benefit in this case
- seeking medical help as needed (see recommendation 1.2.8).

To find out why the committee made the recommendation on advice for secondary skin infections see the rationales.

Reassessment

1.2.11 Reassess people with secondary bacterial infection of eczema if:

- they become systemically unwell or have pain that is out of proportion to the infection
- their symptoms worsen rapidly or significantly at any time
- their symptoms have not improved after completing a course of antibiotics.

1.2.12 When reassessing people with secondary bacterial infection of eczema, take account of:

- other possible diagnoses, such as eczema herpeticum

- any symptoms or signs suggesting a more serious illness or condition, such as cellulitis (see the NICE guideline on cellulitis and erysipelas: antimicrobial prescribing), necrotising fasciitis or sepsis
- previous antibiotic use, which may have caused resistant bacteria.

1.2.13 For people with secondary bacterial infection of eczema that is worsening or has not improved as expected, consider sending a skin swab for microbiological testing.

1.2.14 For people with secondary bacterial infection of eczema that recurs frequently:

- send a skin swab for microbiological testing **and**
- consider taking a nasal swab and starting treatment for decolonisation.

1.2.15 If a skin swab has been sent for microbiological testing:

- review the choice of antibiotic when results are available, **and**
- change the antibiotic according to results if symptoms are not improving, using a narrow-spectrum antibiotic if possible.

To find out why the committee made the recommendations on reassessment for secondary skin infection see the rationales.

Referral and seeking specialist advice

1.2.16 Refer people with secondary bacterial infection of eczema to hospital if they have any symptoms or signs suggesting a more serious illness or condition, such as necrotising fasciitis or sepsis.

1.2.17 Consider referral or seeking specialist advice for people with secondary bacterial infection of eczema if they:

- have cellulitis and are severely unwell

- have spreading infection that is not responding to oral antibiotics
- are systemically unwell
- are at high risk of complications
- have infections that recur frequently.

To find out why the committee made the recommendations on referral and seeking specialist advice for secondary skin infection see the rationales.

1.3 Choice of antibiotic

1.3.1 When prescribing an antibiotic for secondary bacterial infection of eczema, take account of local antimicrobial resistance data when available and follow:

- table 1 for adults aged 18 years and over
- table 2 for children and young people under 18 years (for children under 1 month, antibiotic choice is based on specialist advice).

1.3.2 If there are symptoms or signs of cellulitis, follow the guidance on antibiotic choices in the NICE guideline on cellulitis and erysipelas: antimicrobial prescribing.

Table 1 Choice of antibiotics for people aged 18 years and over

Treatment	Antibiotic, dosage and course length
Do not routinely offer either a topical or oral antibiotic for people with secondary bacterial infection of eczema who are not systemically unwell.	-
First-choice topical if: a topical antibiotic is appropriate (see recommendations 1.2.4 and 1.2.5)	**Fusidic acid 2%** Apply three times a day for 5 to 7 days Extended or recurrent use may increase the risk of developing antimicrobial resistance
First-choice oral if: an oral antibiotic is appropriate (see recommendations 1.2.4 to 1.2.6)	**Flucloxacillin** 500 mg four times a day for 5 to 7 days
Alternative oral antibiotic if: the person has a penicillin allergy or	**Clarithromycin** 250 mg twice a day for 5 to 7 days

flucloxacillin is unsuitable	The dosage can be increased to 500 mg twice a day for severe infections
Alternative oral antibiotic if: the person has a penicillin allergy or flucloxacillin is unsuitable, and the person is pregnant	**Erythromycin** 250 mg to 500 mg four times a day for 5 to 7 days
If methicillin-resistant *Staphylococcus aureus* is suspected or confirmed	Consult a microbiologist

See the BNF for appropriate use and dosing of the antibiotics recommended in specific populations, for example, people with hepatic or renal impairment, and in pregnancy and breast-feeding.

Table 2 Choice of antibiotics for people aged 1 month and over to under 18 years

Treatment	Antibiotic, dosage and course length
Do not routinely offer either a topical or oral antibiotic for people with secondary bacterial infection of eczema who are not systemically unwell.	-
First-choice topical if: a topical antibiotic is appropriate (see recommendations 1.2.4 and 1.2.5)	**Fusidic acid 2%** Apply three times a day for 5 to 7 days Extended or recurrent use may increase the risk of developing antimicrobial resistance
First-choice oral if: an oral antibiotic is appropriate (see recommendations 1.2.4 to 1.2.6)	**Flucloxacillin** (oral solution or capsules) **1 month to 1 year**: 62.5 mg to 125 mg four times a day for 5 to 7 days **2 years to 9 years**: 125 mg to 250 mg four times a day for 5 to 7 days **10 years to 17 years**: 250 mg to 500 mg four times a day for 5 to 7 days
Alternative oral antibiotic if: the person has a penicillin allergy or flucloxacillin is unsuitable	**Clarithromycin** **1 month to 11 years**: under 8 kg: 7.5 mg/kg twice a day for 5 to 7 days 8 kg to 11 kg: 62.5 mg twice a day for 5 to 7 days 12 kg to 19 kg: 125 mg twice a day for 5 to 7 days 20 kg to 29 kg: 187.5 mg twice a day for 5 to 7 days 30 kg to 40 kg: 250 mg twice a day for 5 to 7 days

	12 years to 17 years: 250 mg twice a day for 5 to 7 days The dosage can be increased to 500 mg twice a day for severe infections
Alternative oral antibiotic if the person: has a penicillin allergy or flucloxacillin is unsuitable and the person is pregnant	**Erythromycin** **8 years to 17 years**: 250 mg to 500 mg four times a day for 5 to 7 days
If methicillin-resistant *Staphylococcus aureus* is suspected or confirmed	Consult a local microbiologist

See the BNF for Children for appropriate use and dosing of the antibiotics recommended in specific populations, for example, people with hepatic or renal impairment, and in pregnancy and breast-feeding.

The age bands for children apply to children of average size. In practice, they will be used alongside other factors such as the severity of the condition being treated and the child's size in relation to the average size of children of the same age.

For advice on helping children to swallow medicines, see Medicines for Children, Helping your child to swallow tablets.

To find out why the committee made the recommendations on choice of antibiotic for secondary skin infection see the rationales.

Recommendation for research

The guideline committee has made the following recommendations for research.

Antibiotics (oral route) compared with topical treatments (antiseptics or antibiotics) or placebo for infected psoriasis, chicken pox, shingles or scabies

For who are topical treatments (antiseptics or antibiotics) or placebo as effective as antibiotics for infected psoriasis, chicken pox, shingles or scabies?

To find out why the committee made the research recommendation on antiseptics compared with antibiotics for impetigo, see the rationales.

Antiseptic bath emollient compared with non-antiseptic bath emollient for infected eczema

For who are non-antiseptic (standard) bath emollients as effective as antiseptic bath emollients for infected eczema?

To find out why the committee made the research recommendation on antiseptics compared with antibiotics for impetigo, see the rationales.

Rationales

The recommendations in this guideline are based on the evidence identified and the experience of the committee.

Treatment

Why the committee made the recommendations

Recommendation 1.1.1

For this guideline, the committee considered the management of secondary bacterial infections in people with common skin conditions other than eczema, namely psoriasis, chicken pox, shingles and scabies. However, no evidence was found in these conditions. The committee agreed that it was not appropriate to extrapolate evidence from people with infected eczema to those with infected psoriasis, chicken pox, shingles or scabies. Therefore, no recommendations on the secondary bacterial infection of these other skin conditions were made, and the committee agreed that specialist advice should be sought where needed. The committee agreed that more research was needed on the optimum treatment of infected psoriasis, chicken pox, shingles and scabies, so made a recommendation for research.

Recommendation 1.2.1

The committee agreed, based on their experience, that it is important to optimally manage underlying eczema in people who present with a suspected secondary bacterial infection, for example, with emollients and topical corticosteroids. They also agreed that it is important to optimally manage

flares in all people with stepped topical corticosteroids; for managing eczema in children under 12, there are recommendations on the use of stepped corticosteroids in the NICE guideline on atopic eczema in under 12s: diagnosis and management for managing eczema in children. The committee also noted that information on optimally managing atopic eczema in all people (aged over 1 month) was available in NICE's clinical knowledge summary on atopic eczema.

Recommendation 1.2.2

The committee agreed with the symptoms and signs of secondary bacterial infection of eczema in the NICE guideline on atopic eczema in under 12s: diagnosis and management for managing eczema in children. The committee recognised that in, practice, it can be difficult to tell the difference between a non-infected flare of eczema and eczema that has become infected. There may be no bacterial infection even if there are classic signs of infection such as weeping and crusts. A more useful indicator of infection may be that a person feels systemically unwell with fever or malaise. However, without definitive diagnostic criteria, diagnosing secondary bacterial infection of eczema will be based on history taking and the person's (or parent's or carer's) knowledge of their own condition. The committee also discussed that healthcare professionals should be aware that redness, one of the signs of infection, may be less visible on darker skin tones.

Recommendation 1.2.3

The committee agreed that skin swabs for microbiological testing should not routinely be taken at the initial presentation of a suspected secondary bacterial infection of eczema. The skin of people with eczema is often heavily colonised with *Staphylococcus aureus* bacteria, and bacterial growth from a skin swab is likely regardless of infection status. Taking skin swabs from everyone with a suspected infection could lead to inappropriate antibiotic prescribing. If the eczema is clinically infected, the most likely causative organisms are *S. aureus* or *Streptococcus pyogenes*, so empirical treatment with topical fusidic acid or oral flucloxacillin would be effective.

Recommendation 1.2.4 to 1.2.7

The evidence suggested that using **topical and oral antibiotics** in addition to topical corticosteroids offered little benefit over using topical corticosteroids alone in people with a suspected secondary bacterial infection of eczema. The committee agreed that the evidence is limited because there are no definitive criteria for diagnosing a secondary bacterial infection. The committee went on to discuss that the available evidence was in children (or it was unclear whether the population included adults); they noted that the results from the evidence in children could be extrapolated to adults because the response to treatment would be sufficiently similar across different age groups. The committee also notes that trials have often excluded people with a severe infection or at high risk of complications from an infection.

Because a severe secondary bacterial infection of eczema could lead to a more serious illness or condition, such as cellulitis, the committee agreed that people who are systemically unwell, for example, with fever or malaise, should be offered an oral antibiotic.

However, for people who are not systemically unwell, the committee agreed that an antibiotic is not routinely needed. This was based on evidence from a UK trial in children with clinically infected eczema. In this trial, a 7-day course of topical fusidic acid or oral flucloxacillin had no benefit in terms of clinical effectiveness, quality of life or microbiological outcomes over standard treatment with topical corticosteroids.

Another trial in children, young people and adults with clinically infected eczema showed that topical fusidic acid plus a topical corticosteroid was not more effective than placebo plus a topical corticosteroid for clinical and biological response. The committee agreed, based on their experience, that this reinforced the importance of topical corticosteroid use during a flare. People should continue to use topical corticosteroids if their eczema is infected, matching the potency of the corticosteroid to the severity of eczema. This aligns with recommendations in the NICE guideline on atopic eczema in

under 12s: diagnosis and management for managing eczema in children and in NICE's clinical knowledge summary on atopic eczema.

The committee agreed that if, after considering a person's history and clinical presentation, an antibiotic is clinically needed for infected eczema, a short course of a topical or oral antibiotic may be appropriate. The choice of a topical or oral antibiotic would be an individual clinical decision taking into account the extent and severity of symptoms or signs, and the risk of developing complications. Local antimicrobial resistance data, patient preference, administration practicalities (particularly to large areas), possible adverse effects and previous use would also need to be taken into account.

Antimicrobial resistance can develop rapidly with topical antibiotics. The committee agreed that repeated doses or extended use of the same topical antibiotic should be avoided. Evidence from a 2016 UK trial showed that there was more resistance to fusidic acid (after a 7-day course) in *S. aureus* skin isolates than with oral flucloxacillin treatment. But there were no statistically significant differences in the trial in clinical effectiveness, adverse events, other antibiotic resistance outcomes or healthcare use between the topical and oral treatment. However, in a Danish trial from 2007 comparing topical fusidic acid plus a topical corticosteroid with placebo, there was no statistically significant difference between the groups in the number of *S. aureus* isolates resistant to fusidic acid after 14 days of treatment.

After discussing the evidence for **antiseptics**, the committee agreed that there was insufficient evidence on whether an antiseptic bath emollient was more effective than a standard bath emollient in children with infected eczema. Therefore, the committee made no recommendations on using antiseptic bath emollients, and made a recommendation for research.

The only evidence found for **bleach baths** (half a cup of 6% bleach in a bath, final concentration 0.005%; bathing for 5 to 10 minutes twice weekly) was a small trial of intranasal mupirocin (for decolonisation) plus a bleach bath compared with placebo in children and young people with secondary bacterial infection of eczema. This combination was more effective than placebo in

children with infected eczema for several clinical-effectiveness outcomes. However, the committee agreed that this trial did not provide evidence that bleach baths alone are effective.

Return to the recommendations.

Advice

Why the committee made the recommendations

Recommendation 1.2.8 to 1.2.10

A severe bacterial infection of eczema could lead to a more serious illness or condition, such as cellulitis. So, the committee agreed that people should be advised to seek medical help if their symptoms worsen rapidly or significantly at any time. This is particularly important if they did not have antibiotics initially, or their symptoms have not improved after completing a course of antibiotics.

However, people should also be advised that it can take time for infected eczema to resolve, and that there may not be full symptom resolution until after they have finished the course of antibiotics.

Return to the recommendations.

Reassessment

Why the committee made the recommendations

Recommendation 1.2.11 to 1.2.15

Based on experience, the committee agreed when people with secondary bacterial infection of eczema should be reassessed. If symptoms of the infection worsen rapidly or significantly at any time, or do not start to improve after completing a course of antibiotics, this may indicate that the person has a more serious illness needing referral, or a resistant infection (possibly because of previous antibiotic use).

The committee agreed that people need to be reassessed if they are systemically unwell or have severe pain that is out of proportion to the infection (this can be a symptom of necrotising fasciitis, which is a rare but serious bacterial infection). The committee discussed that, at reassessment, it is important to consider other possible diagnoses, including viral (rather than bacterial) infection; for example, eczema herpeticum. If the symptoms or signs of infection suggest cellulitis, the committee agreed that people should be managed with antibiotics as outlined in the NICE guideline on cellulitis and erysipelas: antimicrobial prescribing.

The committee agreed that it would be appropriate to send a skin swab for microbiological testing if the infection recurs frequently, and to consider doing this if the symptoms or signs of the infection are worsening or have not improved as expected. This will guide future antibiotic choice if the person has a resistant infection. A nasal swab should also be considered if nasal carriage of *S. aureus* is suspected. A nasal or skin (or both) decolonisation regimen should be considered, based on clinical judgement and microbiological test results, to remove the bacteria causing recurring infection. The committee agreed that decolonisation is supported by the small trial of intranasal mupirocin plus a bleach in children with infected eczema. The committee recognised that family decolonisation may sometimes be appropriate, but did not make a recommendation because this decision should be based on specialist advice.

The committee agreed on good practice for antimicrobial stewardship when reviewing the results of microbiological tests.

Return to the recommendations.

Referral and seeking specialist advice

Why the committee made the recommendations

Recommendations 1.2.16 to 1.2.17

Based on their experience, the committee agreed that people with secondary bacterial infection of eczema who may have a more serious illness or condition need referral for further assessment and treatment in hospital.

Return to the recommendations.

Choice of antibiotic

Why the committee made the recommendations

Recommendation 1.3.1 to 1.3.3

Topical antibiotic

Most of the evidence for topical antibiotics was for fusidic acid. The committee agreed that this was more effective than topical neomycin sulfate for microbiological outcomes in 1 trial. Topical mupirocin was more effective than oral cefalexin for some microbiological outcomes (but not others) in 1 trial. However, there was no evidence comparing topical mupirocin with topical fusidic acid.

Based on committee experience, current practice and limited evidence, the committee agreed that the **first-choice topical antibiotic** in adults, young people and children with secondary bacterial infection of eczema is **fusidic acid 2%** (either as a cream or an ointment). A topical rather than an oral antibiotic is more appropriate if the person is not systemically unwell, and the infection is localised and not severe. The committee discussed that, in the absence of strong evidence, fusidic acid 2% was the most appropriate first-choice topical antibiotic because topical mupirocin should be reserved for treating meticillin-resistant *S. aureus* (MRSA) colonisation.

Based on their experience and limited evidence, the committee agreed that fusidic acid resistance rates are higher than for some other antibiotics, so previous use should be considered to avoid extended or repeated use. National antimicrobial resistance data from Public Health England's voluntary surveillance reports on *Staphylococcus aureus* showed fusidic acid resistance rates of 13% for methicillin-susceptible *S. aureus* bloodstream infections and of 25% for MRSA bloodstream infections. However, the committee discussed

that resistance rates in blood isolates may not be a good indicator of resistance rates in skin isolates. These can vary greatly from person to person based on their history of antibiotic use and between localities.

The committee did not recommend an alternative topical antibiotic for secondary bacterial infection of eczema. This was because, if fusidic acid is unsuitable or ineffective, an oral antibiotic is preferred.

Oral antibiotic

Based on their experience and knowledge of current practice, the committee agreed that the **first-choice oral antibiotic** in adults, young people and children with secondary bacterial infection of eczema is **flucloxacillin**. An oral rather than a topical antibiotic is more appropriate if the person is systemically unwell, or if the infection is widespread or severe. Flucloxacillin is a relatively narrow-spectrum penicillin that is effective against *S. aureus* and *S. pyogenes*. The committee recognised that, if some children cannot tolerate flucloxacillin solution or swallow capsules, one of the alternative oral antibiotics is suitable.

The **alternative oral antibiotics** in adults, young people and children with penicillin allergy or if flucloxacillin is unsuitable are clarithromycin or, in pregnancy, erythromycin. The committee agreed that these antibiotics are effective against the common pathogens that cause secondary bacterial infection of eczema.

The committee noted that, in their experience, MRSA infection in secondary bacterial infection of eczema is rare and that appropriate antibiotic choice may depend on local antimicrobial resistance rates. Therefore, they agreed that, if MRSA is suspected or confirmed, a local microbiologist should be consulted.

Course length and dosage

No evidence was identified for course length. Therefore, the recommendations were based on committee experience of current practice. The committee also agreed that the shortest course that is likely to be effective should be prescribed to reduce the risk of antimicrobial resistance

and adverse effects. Based on their experience that lower doses (250 mg four times a day) of flucloxacillin are not clinically effective because of poor oral bioavailability, the committee agreed that the higher dose for flucloxacillin of 500 mg four times a day is appropriate for treating secondary bacterial infection of eczema in adults. They agreed that dose ranges are appropriate for children because the appropriate dose may vary depending on the severity of the infection and the age and weight of the child.

From their experience, the committee agreed that 5 to 7 days of treatment, based on clinical assessment, would be sufficient for treating people with secondary bacterial infection of eczema if an antibiotic was needed. The committee noted that this was a shorter duration than the previous recommendation in the NICE guideline on atopic eczema in under 12s: diagnosis and management for managing eczema in children, which says to use fusidic acid 2% for 1 to 2 weeks. They also discussed that the shorter duration had been recommended to provide effective treatment for the infection while reducing the risk of resistance occurring.

Return to the recommendations.

Context

Breaks in the skin caused by common skin conditions are particularly susceptible to infection. This is because bacteria that live on the skin may infiltrate the damaged area. The most common bacterial pathogens are *S. aureus* or *S. pyogenes*. The most commonly infected skin conditions are eczema, psoriasis, chicken pox, shingles and scabies.

Summary of the evidence

This is a summary of the evidence. For full details see the evidence review.

All evidence identified included people with secondary bacterial infection of eczema. All the evidence was either in children, or the population was not reported, so it is unclear whether any studies included an adult population. The evidence for the efficacy, safety and resistance of antimicrobials is based

on 1 systematic review and meta-analysis of randomised controlled trials (RCTs) (George et al. 2019) and 2 RCTs (Larsen et al. 2007; Francis et al. 2016). The evidence for choice of antibiotics is based on 1 RCT (Pratap et al. 2013). The evidence for route of administration of antibiotics is based on 2 RCTs (Francis et al. 2016 and Rist et al. 2002).

Antimicrobials

Efficacy of oral antibiotics

Evidence was from 1 systematic review of RCTs.

There were no statistically significant differences in clinical effectiveness, quality of life or microbiological outcomes for oral flucloxacillin compared with placebo in children with infected eczema. Both groups were given corticosteroids and encouraged to use emollients.

Some differences were seen in the presence of clinically apparent infection (definition unclear) at the end of treatment for oral cefadroxil compared with placebo in children with infected eczema (it was unclear whether topical corticosteroids were used in either group). However, there were no statistically significant differences in other clinical-effectiveness outcomes.

There were no differences in adverse events or withdrawals caused by adverse events for oral antibiotics (flucloxacillin or cefadroxil) compared with placebo in children with infected eczema.

Efficacy of topical antibiotics

Evidence for efficacy of topical antibiotics was from 1 systematic review of RCTs.

Some statistically significant differences were seen for the following comparison in children with infected eczema:

- topical fusidic acid plus a topical corticosteroid (clobetasone butyrate or hydrocortisone) reduced quality of life (using the Children's Dermatology

Life Quality Index) compared with placebo plus a topical corticosteroid (clobetasone butyrate or hydrocortisone) at the end of treatment

- topical fusidic acid plus a topical corticosteroid (clobetasone butyrate or hydrocortisone) was less effective at reducing the extent and severity of eczema (when measured with the Eczema Area and Severity Index) than placebo plus a topical corticosteroid (clobetasone butyrate or hydrocortisone) at the end of treatment.

There were no statistically significant differences in other quality of life, clinical-effectiveness or microbiological outcomes for the same comparison.

There were no statistically significant differences in clinical outcome for topical gentamicin plus a topical corticosteroid (betamethasone valerate) compared with a topical corticosteroid (betamethasone valerate) alone in children with infected eczema.

There were no statistically significant differences in microbiological outcomes for a topical antibiotic (fusidic acid or gentamicin) plus a topical corticosteroid (clobetasone butyrate, hydrocortisone or betamethasone valerate) compared with a topical corticosteroid (clobetasone butyrate, hydrocortisone or betamethasone valerate) alone in people (age not reported) with infected eczema.

There were no differences in adverse events for topical fusidic acid plus a topical corticosteroid (clobetasone butyrate or hydrocortisone) compared with a topical corticosteroid (clobetasone butyrate or hydrocortisone) alone in children with infected eczema.

Efficacy of an antibiotic and corticosteroid combination compared with placebo alone

Evidence for efficacy of an antibiotic and corticosteroid combination compared with placebo alone was from 1 RCT.

Topical fusidic acid plus a topical corticosteroid (betamethasone valerate) was significantly more effective than placebo for several ‘responders’ (people with a marked improvement or complete clearance of their eczema) and for

several people with a successful biological response (baseline pathogen eradication or no visible target lesions) in children aged over 6 years, young people and adults. It was also significantly more effective in terms of total severity score at end of treatment. There were no statistically significant differences in microbiological outcomes for the same comparison.

There were no differences in the number of people reporting adverse events for topical fusidic acid plus a topical corticosteroid (betamethasone valerate) compared with placebo in children with infected eczema. However, significantly fewer people reported adverse drug reactions with topical fusidic acid plus a topical corticosteroid than with placebo.

Efficacy of topical antiseptics

Evidence was from 1 systematic review of RCTs.

The study did not report any data (no event rates), so no conclusions could be made about the differences in clinical effectiveness for triclosan and benzalkonium chloride emollient in bath water compared with non-antimicrobial emollient in bath water in children with infected eczema.

Efficacy of intranasal antibiotic with a bleach bath

Evidence was from 1 systematic review of RCTs.

Intranasal mupirocin (for decolonisation) plus a bleach bath was significantly more effective than placebo in children with infected eczema for:

- reducing the extent and severity of eczema (when measured with the Eczema Area and Severity Index) at 1 and 3 months after the start of treatment
- the number of children with a reduced Investigators Global Assessment score at 3 months after the start of treatment.

There were no statistically significant differences in microbiological outcomes, withdrawals due to adverse events or minor adverse events for the same comparison.

Antibiotic resistance

Topical antibiotics compared with placebo

In 1 systematic review, there were no statistically significant differences in antibiotic resistance outcomes for topical fusidic acid plus a topical corticosteroid (betamethasone) compared with placebo plus a topical corticosteroid (clobetasone butyrate or hydrocortisone) in children aged over 6 years, young people and adults.

One systematic review found that topical fusidic acid plus a topical corticosteroid (clobetasone butyrate or hydrocortisone) in children aged over 8 years was associated with the presence of more *S. aureus* skin isolates resistant to fusidic acid than placebo plus a topical corticosteroid (clobetasone butyrate or hydrocortisone) at 2-week follow up, but not at 3-month follow up. There was no difference for *S. aureus* nose or mouth skin isolates at 2-week or 3-month follow up.

One systematic review found that topical fusidic acid plus a topical corticosteroid (clobetasone butyrate or hydrocortisone) was not statistically significantly different to placebo plus a topical corticosteroid (clobetasone butyrate or hydrocortisone) in children aged over 8 years for the presence of *S. aureus* nose, mouth or skin isolates resistant to oral flucloxacillin or oral erythromycin at 2-week or 3-month follow up.

Oral antibiotics compared with placebo

In 1 systematic review, there were no statistically significant differences between oral flucloxacillin and placebo plus a topical corticosteroid (clobetasone butyrate or hydrocortisone) in children for the presence of *S. aureus* nose, mouth or skin isolates resistant to oral flucloxacillin, oral erythromycin or topical fusidic acid at 2-week or 3-month follow up.

Topical antibiotics compared with oral antibiotics

In 1 RCT treatment with topical fusidic acid was associated with more resistance to fusidic acid in *S. aureus* skin isolates taken 2 weeks after

treatment than treatment with oral flucloxacillin in children with infected eczema.

No antibiotic resistance outcomes were reported for other comparisons.

Choice of antibiotics

Oral antibiotics

No evidence was identified for choice of oral antibiotic.

Topical antibiotics

In 1 RCT, topical fusidic acid plus a topical corticosteroid (halometasone) was significantly more effective than neomycin sulfate plus a topical corticosteroid (betamethasone) in reducing the number of people with a positive bacterial culture at day 10 or end of treatment (20 or 30 days) in adults with infected eczema. There were no statistically significant differences in clinical effectiveness or adverse events for the same comparison.

Course length

No evidence was identified for course length.

Route of administration

Oral antibiotic compared with topical antibiotic

In 1 RCT there were no statistically significant differences between topical fusidic acid and oral flucloxacillin (both groups had topical corticosteroids) in clinical-effectiveness outcomes, adverse events or healthcare use in children with infected eczema.

In 1 RCT, topical mupirocin was significantly more effective than oral cefalexin at eradicating or improving *S. aureus* isolates in children aged over 8 years, young people and adults with infected eczema. Patient preference for treatment indicated that more people preferred topical treatment. There were no statistically significant differences in other microbiological outcomes, all clinical-effectiveness outcomes and adverse events for the same comparison.

Other considerations

Medicines safety

As with all antibiotics, extended or recurrent use of topical fusidic acid may increase the risk of developing antimicrobial resistance. See the BNF for more information.

About 10% of the general population claim to have a penicillin allergy. This is often because of a skin rash that occurred while taking a course of penicillin as a child. Fewer than 10% of people who think they are allergic to penicillin are truly allergic. See the NICE guideline on drug allergy: diagnosis and management for more information.

Cholestatic jaundice and hepatitis can occur with flucloxacillin up to 2 months after stopping treatment, with risk factors being increasing age and use for more than 14 days (BNF, June 2020).

Macrolides should be used with caution in people with a predisposition to QT-interval prolongation (BNF, June 2020).

See the summaries of product characteristics for information on contraindications, cautions, drug interactions and adverse effects of individual medicines.

Medicines adherence

- Medicines adherence may be a problem for some people taking antibiotics that need frequent dosing or longer treatment duration (see the NICE guideline on medicines adherence).

Resource implications

- Recommended antibiotics are available as generic formulations. See the Drug Tariff for costs.

See the evidence review for more information.