

Treating a patient with an animal bite

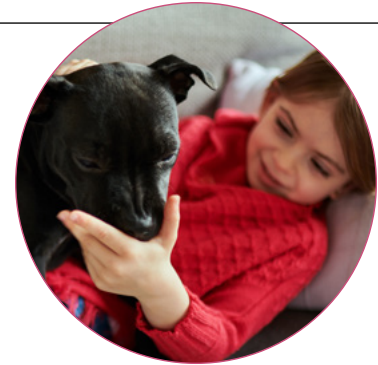
CASE STUDY

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CASE STUDY Human and Animal Bites

Rose is a healthy 8 year old girl who is bitten on her forearm by her friend’s puppy. Rose takes no regular medication, has no known allergies, and is up-to-date with vaccinations.

Rose attends a primary care setting with her parents who are concerned about the wound on her forearm.



How would you assess the bite wound?

When assessing any bite wound, take a detailed history; document how it happened, when it happened, and what caused the bite. In Rose’s case you know it was a domesticated puppy. However, it is always important to clarify whether the animal was wild or exotic (including birds and non-traditional pets such as snakes and lizards), its state of health, and any unusual symptoms that may be present.

On physical assessment it is important to document whether the skin has been broken and whether any blood has been drawn. The location, extent, type, and depth of the wound, and the presence of any foreign bodies (e.g. teeth) should also be noted.

Risk assessment for tetanus, rabies, and blood-borne viruses should be undertaken.

In addition to the above, you should assess for signs or symptoms of sepsis and consider whether the child is at risk of a serious wound infection because of a comorbidity.

It is also important to be aware of potential safeguarding issues in vulnerable adults and children.



The **BNF** and **BNF for Children** treatment summaries for skin infections, antibacterial therapy provide information on the initial assessment of human and animal bites.

The screenshot shows the MedicinesComplete website interface. At the top, there is a navigation bar with the MedicinesComplete logo, a search bar containing 'Skin infections, antibacterial therapy', and several utility icons including 'BNF for Children', 'Stockley's Interactions Checker', 'ADR', 'Martindale's ADR Checker', and a user profile icon. Below the navigation bar, there are 'Highlight search' and 'Evidence grading' options. The main content area is titled 'Human and animal bites'. On the left, there is a sidebar with 'Subsections' and 'Related Content'. The 'Subsections' list includes: Impetigo, Cellulitis and erysipelas, Insect bites and stings, Human and animal bites (highlighted), Secondary bacterial infection of common skin conditions, Staphylococcal scalded skin syndrome, Surgical wound infection, Paronychia or 'septic spots' in neonate, and Useful resources. The 'Related Content' section is currently empty. The main text area contains the following information:

Human and animal bites

Human and animal bites that cause a break in the skin are an infection risk. Contributing factors of infection include the species causing the bite, type and location of the wound, and the child's individual risk factors (such as comorbidities, and age (neonates and infants are at higher risk of infection)).

For guidance on the management of insect bites, see [Insects bites and stings](#).

Management

Children with a human or an animal bite should be assessed for their risk of tetanus, rabies, or a blood-borne viral infection (such as HIV, and hepatitis B and C), and should be managed accordingly. For guidance on the management of tetanus- and rabies-prone wounds, see [Tetanus vaccine](#) or [Rabies vaccine](#).

The child's wound should be cleaned by irrigation and debrided as necessary.

For bites from wild or exotic animals (including birds and non-traditional pets), advice should be sought from a microbiologist as the spectrum of bacteria involved may be different and there may be a risk of other serious non-bacterial infections. Consider seeking advice for bites from unfamiliar domestic animals (including farm animals).

Refer children to hospital if they have signs or symptoms suggesting a more serious illness or condition (such as severe cellulitis, abscess, osteomyelitis, septic arthritis, necrotising fasciitis, or sepsis), or a penetrating wound involving the arteries, joints, nerves, muscles, tendons, bones or the central nervous system.

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What do you need to consider when undertaking a risk assessment for tetanus, rabies, and blood-borne viruses?

Tetanus

Any wound can give rise to tetanus. Clean wounds (less than 6 hours old, non-penetrating and have negligible tissue damage) are considered to have a low likelihood of harbouring tetanus spores and of developing conditions that promote spore germination. Tetanus-prone wounds include certain animal bites and scratches, puncture-type injuries acquired in a contaminated environment (these are likely to contain tetanus spores), wounds with systemic sepsis, and wounds containing foreign bodies—this list is not exhaustive. High-risk tetanus-prone wounds include any tetanus-prone wounds that either show extensive devitalised tissue or require surgical intervention that is delayed more than 6 hours, or wounds that are heavily contaminated with material likely to contain tetanus spores (such as soil or manure).

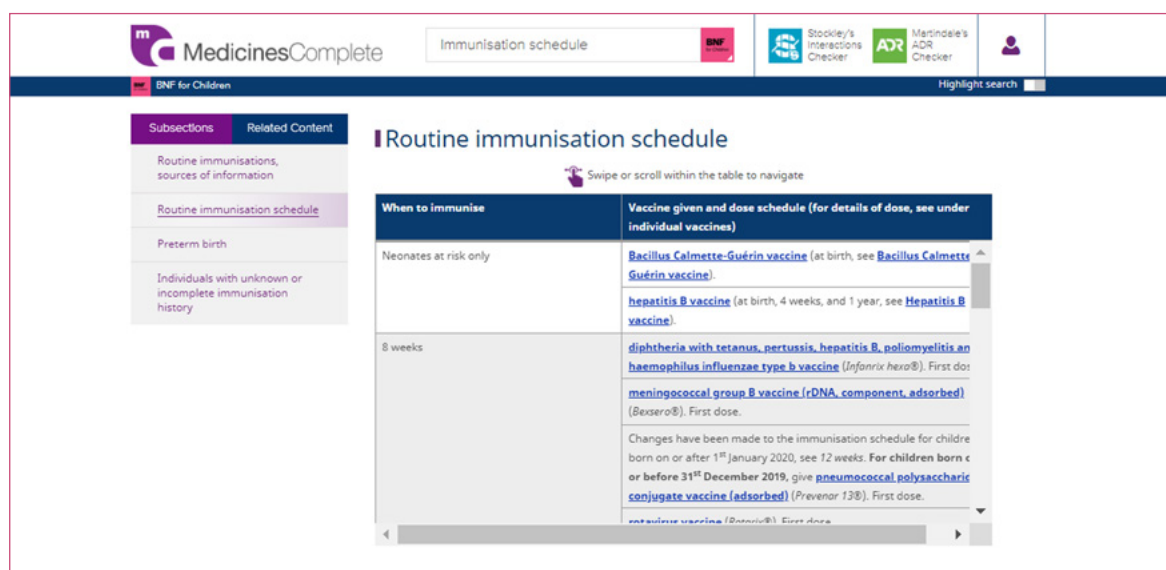
Post-exposure management of tetanus-prone wounds depends on the individual’s immunisation status and wound category (clean, tetanus-prone, or high-risk tetanus-prone). For the risk assessment of tetanus-prone wounds, an adequate priming course of tetanus vaccine is considered to be at least 3 doses of tetanus-containing vaccine at appropriate intervals.

All wounds should be thoroughly cleaned, and surgical debridement of devitalised tissue in high-risk tetanus-prone wounds is essential for the prevention of tetanus infection.

Primary tetanus immunisation for children under 10 years consists of 3 doses of a combined preparation containing adsorbed tetanus vaccine, with an interval of 4 weeks between doses. In the UK, these normally start at the age of 8 weeks. Following a primary course, 2 booster doses are recommended, the first is usually given 3 years after completing the primary course, and the second is usually given 10 years after the first booster. Rose is therefore likely to have received her primary immunisation and her first booster.



The **BNF** and **BNF for Children** immunisation schedule treatment summaries provide details of the routine immunisation schedule.



When to immunise	Vaccine given and dose schedule (for details of dose, see under individual vaccines)
Neonates at risk only	<p>Bacillus Calmette-Guérin vaccine (at birth, see Bacillus Calmette-Guérin vaccine).</p> <p>hepatitis B vaccine (at birth, 4 weeks, and 1 year, see Hepatitis B vaccine).</p>
8 weeks	<p>diphtheria with tetanus, pertussis, hepatitis B, poliomyelitis and haemophilus influenzae type b vaccine (Infanrix hexa®). First dose.</p> <p>meningococcal group B vaccine (rDNA, component, adsorbed) (Bexsero®). First dose.</p> <p>Changes have been made to the immunisation schedule for children born on or after 1st January 2020, see 12 weeks: For children born on or before 31st December 2019, give pneumococcal polysaccharide conjugate vaccine (adsorbed) (Prevenar 13®). First dose.</p>

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For children aged 5-10 years whose tetanus immunisation is up-to-date, no immediate treatment is required regardless of wound category.

For children aged 5-10 years who have received an adequate priming course but no booster, give an immediate booster dose of a suitable tetanus-containing vaccine to children with a wound that is tetanus-prone or high-risk tetanus-prone. In addition, for a high-risk tetanus-prone wound, give a single dose of tetanus immunoglobulin at a different site.

For individuals who have not received an adequate priming course of tetanus vaccine (includes those with uncertain immunisation status), give an immediate booster dose of a suitable tetanus-containing vaccine regardless of wound category. In addition, for a tetanus-prone or high-risk tetanus-prone wound, give a single dose of tetanus immunoglobulin at a different site.

As Rose is fully immunised, no post-exposure management for tetanus is required.

Rabies

Rabies is almost invariably fatal once symptoms develop and is generally transmitted through the bite of an infected animal. In the UK there is currently no risk in domestic animals but a low risk from bat bites. Specialist advice on the assessment of the risk and appropriate management is available from centres throughout the UK.

In this case, Rose does not require any post-exposure management for rabies.

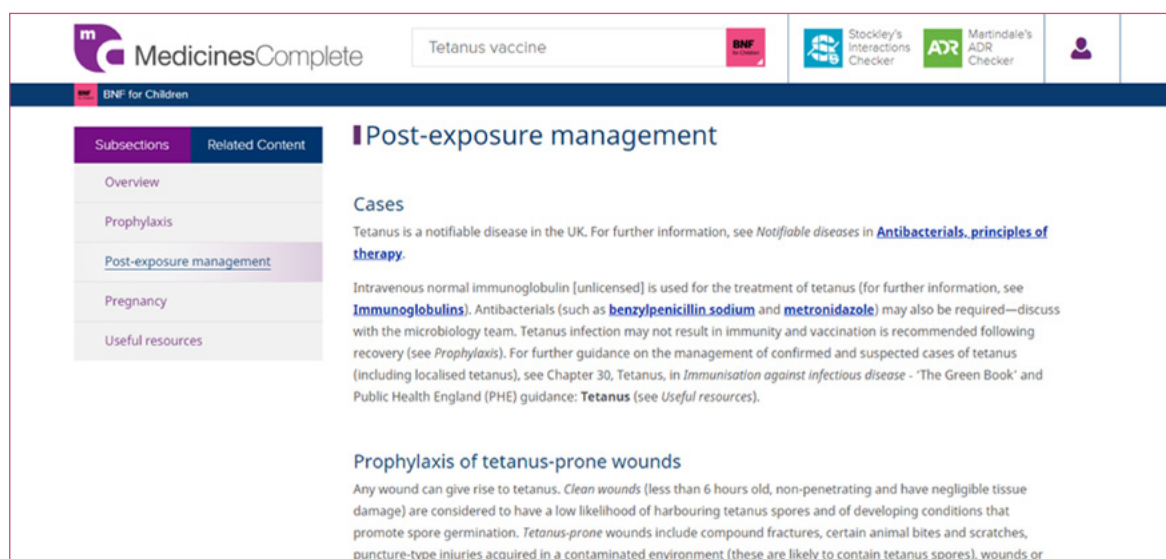
Blood-borne viruses

Risk assessment for blood-borne viruses (such as HIV, and hepatitis B and C) should be undertaken as per local guidance and managed accordingly.

As Rose was bitten by a domesticated puppy, there is no clinical concern about the risk of blood-borne viral infection.



Guidance on the management of tetanus- and rabies-prone wounds can be found in the treatment summaries for tetanus and rabies vaccine in the **BNF** and **BNF for Children**. See online versions of the **BNF** and **BNF for Children** and the **BNF** app for the latest guidance on the management of tetanus-prone wounds.



The screenshot shows the MedicinesComplete website interface. At the top, there is a search bar containing 'Tetanus vaccine' and several utility icons: BNF, Stockley's Interactions Checker, Martindale's ADR Checker, and a user profile icon. Below the search bar, the page title is 'BNF for Children'. A navigation menu on the left lists 'Subsections' and 'Related Content', with 'Post-exposure management' selected. The main content area is titled 'Post-exposure management' and contains a 'Cases' section. The 'Cases' section states: 'Tetanus is a notifiable disease in the UK. For further information, see *Notifiable diseases* in **Antibacterials, principles of therapy**. Intravenous normal immunoglobulin [unlicensed] is used for the treatment of tetanus (for further information, see **Immunoglobulins**). Antibacterials (such as **benzylpenicillin sodium** and **metronidazole**) may also be required—discuss with the microbiology team. Tetanus infection may not result in immunity and vaccination is recommended following recovery (see *Prophylaxis*). For further guidance on the management of confirmed and suspected cases of tetanus (including localised tetanus), see Chapter 30, Tetanus, in *Immunisation against infectious disease - 'The Green Book'* and Public Health England (PHE) guidance: **Tetanus** (see *Useful resources*).

Below the 'Cases' section is a 'Prophylaxis of tetanus-prone wounds' section. It states: 'Any wound can give rise to tetanus. *Clean wounds* (less than 6 hours old, non-penetrating and have negligible tissue damage) are considered to have a low likelihood of harbouring tetanus spores and of developing conditions that promote spore germination. *Tetanus-prone wounds* include compound fractures, certain animal bites and scratches, puncture-type injuries acquired in a contaminated environment (these are likely to contain tetanus spores), wounds or

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The bite on Rose's forearm is superficial, with broken skin but no blood has been drawn; she has no signs or symptoms of infection.

Her parents ask you whether Rose needs antibiotics.

How do you assess the need for antibiotics (antibacterials), and how do you respond?

When assessing the need for antibacterial prophylaxis you should determine whether the child is at increased risk of infection. Factors to consider are what caused the bite, the site and depth of the wound, whether it is visibly contaminated (for example with dirt or a tooth), and whether there are any comorbidities which would increase the risk of serious wound infection, such as decompensated liver disease, diabetes, immunosuppression, or asplenia.

Antibacterial treatment should be offered to patients if there are signs or symptoms of infection (such as increased pain, inflammation, fever, discharge, or an unpleasant smell).

In Rose's case you know that she was bitten by a puppy. She has no signs or symptoms of infection and therefore does not require antibacterial treatment. You also know that the wound is superficial and did not draw blood, so you would not offer antibacterial prophylaxis.

You should discuss the parent's views on antibacterials, the benefits and harms of antibacterial prescribing, and why prescribing an antibacterial may not always be the best option. They should be advised to seek medical attention if signs or symptoms of infection develop or worsen rapidly or significantly at any time, or if Rose becomes systemically unwell.

Would her need for antibacterial prophylaxis change if this bite had drawn blood?

Antibacterial prophylaxis should be offered if the bite: had penetrated bone, joint, tendon or vascular structures; was deep, a puncture or crush wound, or had caused significant tissue damage; or was visibly contaminated (for example if there was dirt or a tooth in the wound).

You would consider antibacterial prophylaxis if the bite involved a high-risk area such as the hands, feet, face, genitals, skin overlying cartilaginous structures, or was in an area of poor circulation. Antibacterial prophylaxis should also be considered if there was a risk of a serious wound infection because of a comorbidity.

If none of these risk factors are present, then antibacterial prophylaxis is not required.

How would her need for antibacterial prophylaxis change if she was bitten by a cat, different type of animal, or even by another child?

The need for antibacterial prophylaxis depends on what caused the bite.

If Rose was bitten by a cat, then antibacterial prophylaxis should be offered if the bite had broken the skin and drawn blood, and should be considered if the wound did not draw blood but could be deep.

If the bite was from a wild or exotic animal, advice should be sought from a microbiologist because the spectrum of bacteria involved may be different, and there may be a risk of other serious non-bacterial infections; also consider seeking specialist advice for bites from unfamiliar domestic animals (including farm animals).

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If Rose had sustained a bite from another child that had broken the skin and drawn blood, then she should be offered antibacterial prophylaxis. If the human bite had broken the skin but not drawn blood, antibacterial prophylaxis should be considered if it involved any high-risk areas or if Rose had significant comorbidities that could increase the risk of a serious infection.



The **BNF** and **BNF for Children** treatment summaries for skin infections, antibacterial therapy provide information on the management of human and animal bites, including when antibacterial prophylaxis should be offered or considered, and the choice of antibacterial when prophylaxis for an uninfected bite is required; for choice of alternative oral first line antibacterial in children aged under 12 years, see **BNF for Children**.

Information on appropriate dosing regimens, including duration, can be found in the relevant drug monographs in the **BNF** and **BNF for Children**.

A table outlining when antibacterial prophylaxis for an uninfected bite should be offered or considered can be found in the visual summary which accompanies **NICE guideline NG184**: Human and animal bites: antimicrobial prescribing, see www.nice.org.uk/guidance/ng184.

Two days later Rose is brought back in by her parents complaining of increasing pain surrounding the bite wound. On examination there is mild erythema with a small amount of pus discharging from the wound. She has a low-grade fever but is otherwise well.



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How would you treat the wound now?

Rose had not previously received antibacterial prophylaxis and the wound is now showing signs of infection, however she appears to be systemically well. In this case, you should first send a wound swab for culture, stating that the swab is from an infected animal bite, and then clean the wound with irrigation and debride as appropriate. She would now require treatment with an antibacterial.

What antibacterial would you prescribe and for what duration?

Rose should be offered an oral antibacterial as she can take oral medication and the severity of her condition does not require intravenous antibacterials. The oral first line antibacterial for children aged 1 month and over, and for adults, is co-amoxiclav. For children aged under 12 years with a penicillin allergy or if co-amoxiclav is unsuitable, co-trimoxazole [unlicensed] is the recommended alternative because this also has good activity against the range of likely pathogens.

Rose is receiving an antibacterial for the treatment of infection, and a course length of 5 days is appropriate in her case. A 5-day course is appropriate for treating most human or animal bites, but course length can be increased to 7 days (with review) based on clinical assessment of the wound, for example, if there is significant tissue destruction or it has penetrated bone, joint, tendon, or vascular structures.

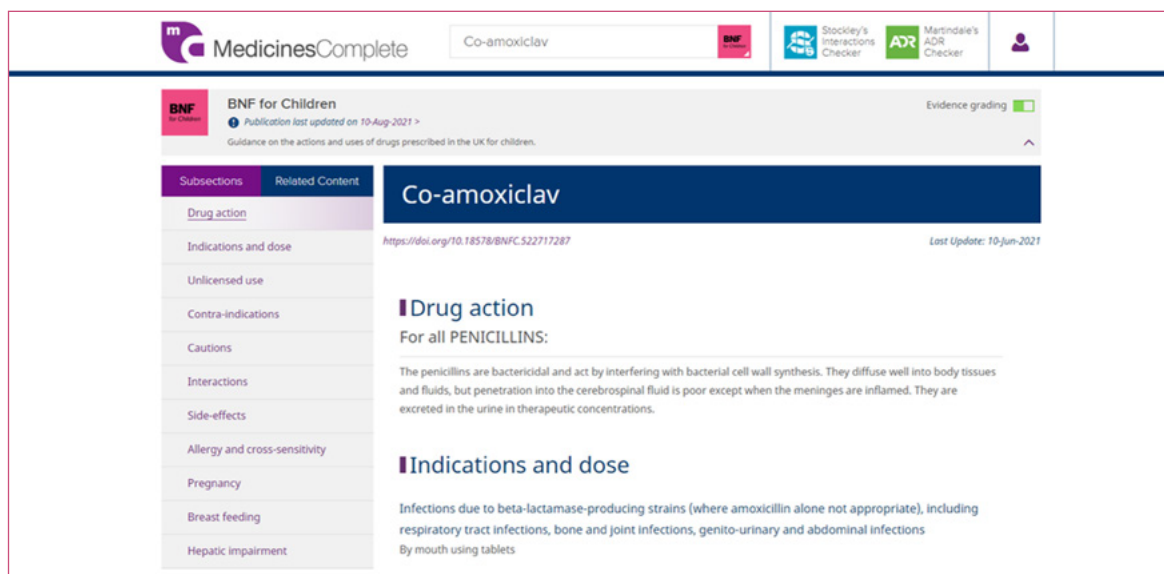
Would the choice of alternative oral antibacterial differ if Rose was older?

For children aged 12 years and over, and for adults, the alternative in penicillin allergy or if co-amoxiclav is unsuitable, is doxycycline with metronidazole (seek specialist advice in pregnancy). Tetracyclines (for example, doxycycline) can deposit in growing bone and teeth (by binding to calcium) causing staining and occasionally dental hypoplasia, and therefore use in children under 12 years is not generally recommended unless for severe infections when there are no alternatives.



The **BNF** and **BNF for Children** treatment summaries for skin infections, antibacterial therapy provide information on the choice of antibacterial for the treatment of infected human and animal bites; for choice of alternative oral first line antibacterial in children aged under 12 years, see **BNF for Children**.

Information on appropriate dosing regimens, including duration, can be found in the relevant drug monographs in the **BNF** and **BNF for Children**.



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What further advice would you give to Rose and her parents?

As Rose was prescribed an antibacterial, Rose and her parents should be provided with verbal and written information on the correct use of antibacterials, and be advised to look for possible adverse effects to the antibacterial.

You should also advise that they seek medical help if signs or symptoms of infection worsen rapidly or significantly at any time, or do not improve within 24 to 48 hours of starting the antibacterial, or if Rose becomes systemically unwell or has severe pain out of proportion to the infection.



Advice on the use of antibacterials for patients and their family and/or carers can be found in the antibacterial, principles of therapy and antimicrobial stewardship treatment summaries in the **BNF** and **BNF for Children**.



The screenshot shows the MedicinesComplete website interface. The search bar contains 'Antibacterials, principles of therapy'. The page title is 'Advice to be given to children and their parents and/or carers'. The main content area contains three paragraphs of advice:

- If an antibacterial is given, advice should be given about directions for correct use and possible side-effects using verbal and written information.
- If an antibacterial is **not** given, advice should be given about an antibacterial not being needed currently—discuss alternative options as appropriate, such as self-care with over-the-counter preparations, back-up (delayed) prescribing, or other non-pharmacological interventions.
- Children and their parents, or carers should be advised to seek medical help if symptoms worsen rapidly or significantly at any time, if symptoms do not start to improve within an agreed time, if problems arise as a result of treatment, or if the child becomes systemically very unwell.

 A sidebar on the left lists subsections: Antibacterial drug choice, Antibacterials, considerations before starting therapy, **Advice to be given to children and their parents and/or carers** (highlighted), Antibacterials, considerations during therapy, Superinfection, and Antibacterials, switching from parenteral to oral treatment.



The screenshot shows the MedicinesComplete website interface. The search bar contains 'Antimicrobial stewardship'. The page title is 'Antimicrobial stewardship'. The main content area contains an 'Overview' section with the following text:

Effective antimicrobials are required for preventive and curative measures, protecting patients from potentially fatal diseases, and ensuring that complex procedures can be provided at low risk of infection. Antimicrobial resistance (AMR) is the loss of antimicrobial effectiveness, and although it evolves naturally, this process is accelerated by the inappropriate or incorrect use of antimicrobials. Direct consequences of infection with resistant microorganisms can be severe and affect all areas of health, such as prolonged illnesses and hospital stays, increased costs and mortality, and reduced protection for patients undergoing operations or procedures. AMR is an international problem with an increasing prevalence that has consequences for the whole of society. The UK Government has recognised AMR as a significant area of concern and have committed global action to address this as a priority. For information and resources on the UK's plans for AMR, see the Public Health England (PHE) collection: **Antimicrobial resistance** (<https://www.gov.uk/government/collections/antimicrobial-resistance-amr-information-and-resources>).

Antimicrobial stewardship (AMS) refers to an organisational or healthcare system-wide approach to promoting and monitoring judicious use of antimicrobials to preserve their future effectiveness. Addressing AMR through improving stewardship is a national medicines optimisation priority, led by NHS England and supported by PHE.

 A sidebar on the left lists subsections: Overview, Guidance for organisations (commissioners and providers), Guidance for health and social care staff, Guidance on antimicrobial prescribing, and Useful resources.

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A day later Rose presents again with increasing erythema around the bite wound with a red line tracking upwards towards an enlarged lymph node.

How would you treat this wound now?

Rose's infection has not improved after starting an oral antibacterial and she has developed signs of lymphadenitis. You should review the choice of antibacterial and change according to the skin swab results if needed, using a narrower-spectrum antibacterial if possible. She may require intravenous antibacterials. Referral to hospital or seeking specialist advice should be considered.

In what other situations would you consider referral to hospital or seeking specialist advice?

Patients with human or animal bites should be referred to hospital for specialist assessment if they have signs or symptoms which suggest more serious illness. This includes sepsis, severe cellulitis, abscess, necrotising fasciitis, osteomyelitis, or septic arthritis. Equally, patients who have a bite wound that involves significant underlying structures (arteries, joints, peripheral or central nerves, muscles, tendons, or bones) should be referred.

Consider referral to hospital or seeking specialist advice if the patient has developed signs or symptoms of infection despite taking prophylactic antibacterials, or if the patient cannot take oral antibacterials. Referral to hospital or seeking specialist advice should also be considered if the bite is in an area of poor circulation, or the patient is at risk of a serious wound infection because of a pre-existing medical condition.

About the authors

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BNF *for Children* aims to provide prescribers, pharmacists, and other healthcare professionals with sound up-to-date information on the use of medicines for treating children.

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