ILEP

How to Recognise and Manage Leprosy Reactions

Learning Guide **Two**

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Learning Guide **Two**

This is the second in a series of Learning Guides about leprosy published by ILEP. It is aimed at all health workers who may have to manage the early complications of leprosy. Steroids play an important role in managing such complications, so this book will be of particular use to those health workers authorised and able to prescribe these drugs to their patients.

Many countries have National Guidelines which include policies for managing leprosy reactions. This ILEP Guide will be a useful supplement.

Checking for nerve damage

Introduction

Leprosy is an infection that is very effectively treated with multidrug therapy (MDT). However, some patients develop complications called reactions, which require additional treatment.

This booklet provides the information you need to diagnose and treat leprosy reactions, the main cause of nerve damage and impairment in leprosy. We hope this will allow more people to be treated, so that disability – and the resulting social stigma – can be prevented.

Part 1 explains how to recognise leprosy reactions, how to distinguish between the different types of reaction, and how to tell whether they are mild or severe. It also lists other conditions that could be mistaken for leprosy reactions.

Part 2 tells you how to treat leprosy reactions at the local level. It describes the treatment for both mild and severe reactions, and gives advice on steroid therapy, including prescribing and follow-up. Most people with leprosy reactions can be treated in the local clinic, but some will need to be referred. This section gives advice on who should be referred.

Part 3 offers guidelines for treating people who need referral or special precautions with steroid therapy. There are also guidelines for the management of difficult cases at referral centres. Where different complications are managed will vary and depends on the experience of staff and the availability of the necessary drugs and equipment.

Part 4 explains that long-term management is needed to prevent further disability, once permanent nerve damage has occurred. Only a brief summary can be given here, but other books available from ILEP explain this in more detail.

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CHAPTER ONE

How to recognise leprosy reactions

Reactions are the main cause of nerve damage and impairment in leprosy.

What is a leprosy reaction?

Leprosy is a bacterial disease that affects the skin and nerves. It can cause loss of sensation, muscle weakness and paralysis. One characteristic of leprosy is the occurrence of reactions – periods of inflammation that can affect the nerves. This inflammation is caused by the body's immune system attacking the leprosy bacteria.

Inflammation is the body's usual response to infection, and its typical features are:

- Swelling
- Redness
- Heat
- Pain
- Loss of function

Because leprosy bacilli affect the skin and the nerves, leprosy reactions cause inflammation in those places. Inflammation in a skin patch can be uncomfortable, but it is rarely very serious. Inflammation in a nerve, on the other hand, can cause serious damage, with loss of function caused by swelling and pressure in the nerve.

Skin patches in leprosy reactions

Some people with inflamed nerves have severe symptoms, while others have no obvious signs. You must examine people carefully so that you can detect reactions before they cause damage.

Who can get a leprosy reaction?

Almost any person with leprosy is at risk of getting a reaction – although those with only one or two skin patches and no nerve enlargement have the lowest risk. Probably 25–30 per cent of all people with leprosy experience reactions or nerve damage at one time or another.

The following table shows how you can predict the risk. If people with multibacillary (MB) leprosy, the more serious form of the disease, already have nerve damage when they are diagnosed, you should watch them closely for signs of further nerve damage requiring treatment, as the majority of them (65 per cent) will get further damage.

Risk of new nerve damage developing in new cases of leprosy

	PB	MB
Normal nerve function at diagnosis	1%	16%
Impaired nerve function at diagnosis	16%	65%

Croft RP et al, A clinical prediction rule for nerve-function impairment in leprosy patients. Lancet (2000) 355: 1603-6.

Early detection of leprosy and treatment with MDT remains the best way to prevent disability. Unfortunately many patients are diagnosed late and are at greater risk of developing the reactions and neuritis described here. If these reactions are treated effectively, early nerve damage can be reversed and disability can still be prevented.

When do reactions occur?

A person with leprosy can have a reaction at almost any time:

- Before treatment.
- At diagnosis.
- During treatment.
- After treatment has been completed.

Most reactions occur during the first year after diagnosis. In people with MB leprosy, reactions may appear at any time during treatment and for several years after treatment has been completed.

How to examine for a leprosy reaction

Not all leprosy reactions look the same. Sometimes there is only skin inflammation and the nerves are not affected. More often, however, reactions occur in nerves without causing obvious changes in the skin lesions. The effects on the nerves may be painful and very obvious, or so subtle that the person does not notice them. Reactions can also affect the eyes.

Every time you examine a person with leprosy, you must check skin, nerves and eyes to make sure that there is no reaction present.

Record the results of the examination on the patient's chart. If there is no suitable place, you can use the routine care form shown in Annex A.

Skin

- Ask the person if there is any pain and swelling in the skin patches.
- Examine the patches for signs of inflammation.
- Examine the hands and feet for loss of sweating.

Nerves

- Ask the person if there is any loss of feeling or loss of strength in the hands and feet.
- Ask if they have difficulty with their daily tasks.

- Ask about pain, burning or tingling ('pins and needles') in the nerves.
- Examine the nerves for tenderness.
- Test for loss of feeling in the palms of the hands and soles of the feet, using a ballpoint pen or a monofilament.
- Test the strength of the muscles of the eyelids, hands and feet.
- Compare the results with the records of the previous examination.

Eyes

- Ask the person if there is any pain in the eyes or recent loss of vision.
- Look for signs of inflammation: redness or irregularly shaped pupils.

For further information about eyes see the ILEP Learning Guide: *How to Care for Eye Problems in Leprosy*.

Signs of inflammation in the eye

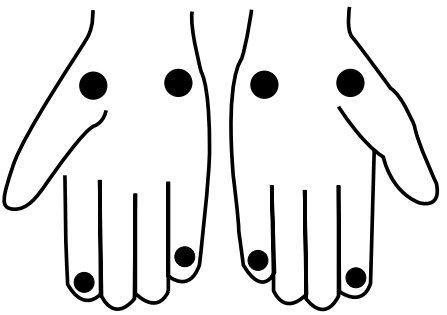
Testing sensation

Nerve damage can cause loss of feeling. In leprosy this most commonly affects the hands and feet. To test for loss of feeling you should test at least four places on the palm of each hand and four places on the sole of each foot – a total of sixteen places to be tested:

- Support the hand or the foot to keep it still. Show the person what you are going to do. Ask them to close their eyes.

- Touch four places on the palm of the hand and the sole of the foot with a ballpoint pen.
- Press gently to make only a small depression in the skin – *do not press too hard*. The weight of the pen itself is usually enough.
- Ask the person to point to the place you have touched.
- If the person doesn't feel any pressure the first time, test that place a second time in the same way – *but do not press any harder*.
- Do the same thing for all the places you want to test.
- Write down on the chart or routine care form the results of your testing at each place:

  ✓ if the person felt the pen at that place.
  ✗ if the person did not feel the pen at that place.



Test at least four places on the palm of the hand

Test at least four places on the sole of the foot

Testing muscle strength

Nerve damage can affect the function and strength of muscles supplied by the affected nerves. In leprosy the nerves most commonly damaged are the nerves that affect the eyelids, hands and feet.

Test four muscles on each side of the person's body: one muscle affecting the eyelid, two muscles in the hand and one muscle controlling the foot.

When you test the strength of a muscle, write down the result as:

- (S) strong when the strength seems normal.
- (W) weak when the strength is definitely reduced.
- (P) paralysed when there is no strength left to produce the movement you are testing for.

To test the strength of the *muscles closing the eyes*, ask the person to close the eyes gently. If there is paralysis of these muscles, measure with a ruler the gap that remains between the upper and lower eyelids.

Lagophthalmos – inability to fully close the eye

To test the *ulnar nerve*, ask the person to hold out their little finger and then try to push it back with your own finger.

To test the *median nerve*, ask the person to point their thumb upwards while you hold the hand flat and then try to press the thumb down with your finger.

Testing the ulnar nerve

To test the *peroneal nerve*, ask the person to raise their foot while you try to press it down with your hand.

Write down the results on the chart or routine care form.

Testing the median nerve

Testing the peroneal nerve

Feeling three important nerves

Nerve damage can result in thickened, tender or painful nerves. In leprosy the nerves most commonly affected are the ulnar, median and peroneal nerves. As the nerves are palpated it is important to look at the person's face to watch for signs of pain or tenderness.

The ulnar nerve – to palpate (examine) the left ulnar nerve, hold the person's left forearm with your left hand; with your right hand feel behind the person's left elbow, where you will find the ulnar nerve in a groove on the medial (inner) side. Reverse your hands to examine the right ulnar nerve.

Palpating the ulnar nerve

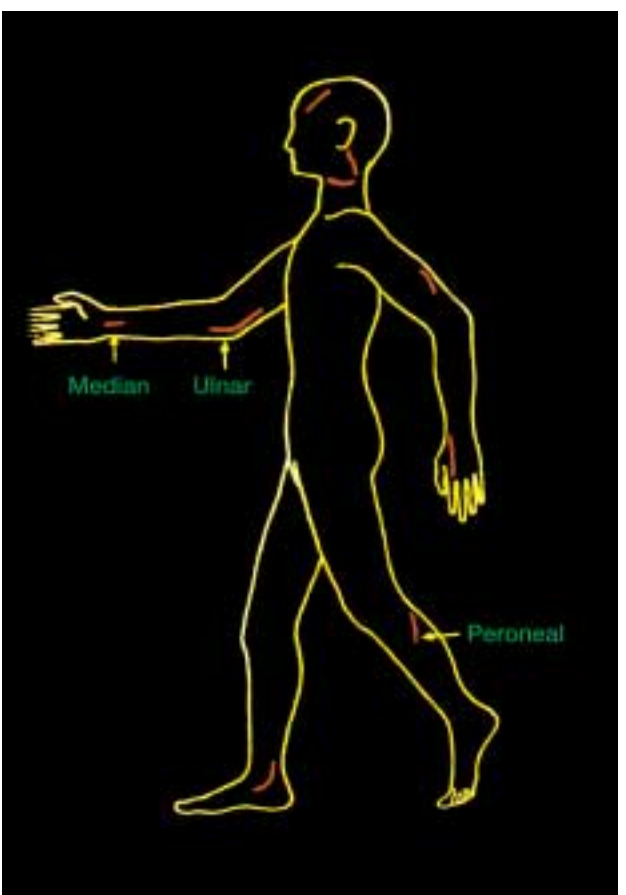
The median nerve – to examine the median nerve, hold the person's wrist with the palm of the hand upwards; gently feel in the centre of the wrist. You may not feel the nerve itself, but you should be able to detect any tenderness.

Palpating the median nerve

The peroneal nerve – to palpate the right peroneal nerve, ask the person to sit in a chair and then sit or kneel down in front of them. With your left hand, feel for the nerve on the outside of the leg, just below the knee; the nerve comes from just behind the knee and curves around the bone below the knee. Use your right hand to examine the left peroneal nerve.

If you find obvious tenderness, note this on the chart or routine care form.

Palpating the peroneal nerve



All these nerves can be affected in leprosy. The three most commonly found to be tender during a leprosy reaction are the ulnar, median and peroneal nerves.

How to diagnose a leprosy reaction

Signs of a reaction

In the skin	– inflamed skin patches
In the nerves	– pain or tenderness in a nerve – new loss of sensation – new muscle weakness
In the eye	– pain and redness in the eye – new loss of vision – new weakness in eye closure

A reaction may involve the skin, the nerves and the eyes, but often it is only obvious in one or two places – perhaps only one nerve is inflamed, or the eye and a nearby skin patch, for example. It is therefore important to look for changes in all three places.

How can you tell if any nerves are involved? Pain and tenderness may be present, but loss of function (that is, loss of sensation or muscle weakness) can occur without pain. So you must look for any change in nerve function that has occurred since the person was last examined.

Compare the results of the nerve examination you are doing now with the examination carried out one month or three months ago, as recorded in the chart or routine care form. There is new nerve damage if

- There are places on hands or feet where the patient could feel before but cannot feel now (sensory loss).
- Any muscle has lost strength compared with the previous examination (motor loss).
- Any nerve has become obviously enlarged, more painful or tender to the touch.

Any new sensory loss or motor loss means that the nerves are being affected by a reaction. Even if there is no pain in the nerve and no inflamed skin patches, urgent treatment is needed to restore the lost sensory or motor function.

Signs of nerve damage at diagnosis

Sometimes the first sign that someone has leprosy is when they come to you with an inflammatory reaction. If this happens, you must first confirm the diagnosis of leprosy: examine the person for other signs of leprosy, assess how their skin and nerves are affected, and start treatment with MDT.

Then examine the nerve damage; because you cannot compare your findings with those of a previous examination, you must ask the person how long the damage has been there. If they say that it has appeared within the last six months, or that they do not know how long it has been there, it is worthwhile treating the nerve damage.

If the damage is older than six months, treatment is less likely to be effective: you may consider referring the person for specialist advice and treatment.

Signs of reaction in the hands and face

New nerve damage may occur without obvious symptoms, so you must search carefully for it each time you see a leprosy patient in the clinic. Test the sensation and muscle strength of each patient, at each routine visit. Remember that reactions can occur even after MDT has been completed.

The two types of leprosy reaction

Leprosy reactions are classified into two categories: Type 1 and Type 2. However, it is much more urgent to recognise and treat the nerve damage than to decide which type the reaction is; the treatment of nerve damage is much the same whichever type of reaction is present.

Type 1 reactions

These are also called reversal reactions. They are caused by the increased activity of the body's immune system in fighting the leprosy bacillus, or even the remains of dead bacilli. This leads to inflammation wherever there are leprosy bacilli in the body – mainly in the skin and nerves.

Who is likely to get a Type 1 reaction?

People with paucibacillary (PB) leprosy and those with multibacillary (MB) leprosy can both get Type 1 reactions.

How common is it?

About a quarter of all people with leprosy are likely to get a Type 1 reaction.

When do Type 1 reactions occur?

The most common time is within six months of starting treatment.

Some people experience a Type 1 reaction before starting treatment – that is, before leprosy has even been diagnosed. The reaction is often the first sign of the disease and is the reason why the person looks for help.

A few patients get reactions later on in the course of their treatment, or even after the treatment has been successfully completed. On rare occasions, a Type 1 reaction can occur up to five years after treatment.

Reactions occurring after treatment are sometimes mistaken for a leprosy relapse: that is, a return of the disease itself. Guidelines for investigating a possible relapse are given on pages 40-41.

What are the clinical features of a Type 1 reaction?

The most common clinical feature of a Type 1 reaction is inflammation in the skin patches, with swelling, redness and warmth. The patches are not usually painful, but there may be some discomfort. Some patches may not have been very visible before, so you may think that the inflammation has brought out new patches. There may be swelling of the limbs or face. As already mentioned, tenderness of nerves and loss of function are important features.

Because the inflammation is localised in the skin and the nerves, the person does not feel too ill and there is usually no fever. The muscles involved in closing the eyelid may be affected, but the eye itself is not affected by a Type 1 reaction.

The skin in a reversal reaction

What would happen in the long term if the person were not treated?

Most Type 1 reactions settle down within six months, but without treatment, any effects on the nerves would lead to permanent loss of function.

Type 2 reactions

These are also called erythema nodosum leprosum (ENL) reactions. They occur when large numbers of leprosy bacilli are killed and gradually decompose. Proteins from the dead bacilli provoke an allergic reaction. Since these proteins are present in the bloodstream, a Type 2 reaction will involve the whole body, causing generalised symptoms.

Who is likely to get a Type 2 reaction?

Only MB patients get Type 2 reactions.

How common is it?
Type 2 reactions are less common than Type 1 reactions, although the incidence varies from country to country: in Africa, only about 5 per cent of people with MB leprosy get ENL, whereas in South America up to 50 per cent may get it.

When do type 2 reactions occur?
Type 2 reactions occur most commonly during the first three years after the start of leprosy treatment, although they can also occur in the early stages of treatment. Because it takes the body a long time to clear the dead bacilli, people may still have episodes of Type 2 reaction years after stopping treatment.

What are the clinical features of a Type 2 reaction?
Type 2 reactions exhibit the typical signs of erythema nodosum. These are lumps under the skin. There is also inflammation, so that the lumps are painful and red. These lumps may be few or many in number, and can occur on the legs and arms, and less frequently on the trunk. They are not associated with the leprosy skin lesions. Tenderness of the lumps is an important clinical sign of ENL.

The skin in an ENL reaction

The eye may also be involved in a Type 2 reaction, leading to the development of iritis, or inflammation of the iris, the coloured part of the eye. The symptoms are pain and redness of the eye, narrowing and irregularity of the pupil and photophobia (pain in the eye when it is exposed to light).

Iritis is a complication of ENL reactions

Because of its underlying cause, a Type 2 reaction is systemic and affects the whole body: there is general malaise and fever and the patient feels ill.

What would happen in the long term if the person were not treated?

ENL is a chronic disease that can persist for several years, getting better or worse from time to time. Without treatment, a person with the disease would feel very ill much of the time and could even die. Other organs besides the skin and nerves may be involved, such as the eyes, joints, testes and kidneys, and all these could be permanently damaged if the person is not treated.

How to distinguish Type 1 and Type 2 reactions

The following table shows the differences between the two types of reaction:

Sign	Type 1 reaction	Type 2 reaction
Inflammation of the skin	The leprosy patches are inflamed, but the rest of the skin is normal.	New, tender, red lumps, not associated with the leprosy patches.
General condition of the patient	Good, with little or no fever.	Poor, with fever and general malaise.
Timing of presentation and type of patient	Usually early on in the course of MDT; people with both PB and MB.	Usually later in the treatment; only people with MB.
Eye involvement	Weakness of eyelid closure may occur.	Internal eye disease (iritis) is possible.

If there is new nerve damage but no skin inflammation, the person should be treated as if this were a Type 1 reaction. As a general rule, typical ENL skin lesions must be seen before a Type 2 reaction can be diagnosed.

Type 1 reaction

Type 2 reaction

Is the reaction mild or severe?

You will need to decide whether the reaction is mild or severe, as this will affect your choice of treatment:

- A mild reaction is one that occurs in the skin only (as long as it does not occur over a major nerve or in the face); there may be mild fever and slight swelling (oedema) of the limbs.
- Severe reactions affect the nerves or eyes.

Signs of severe reactions include:

- Pain or tenderness in the nerves.
- New loss of feeling.
- New muscle weakness.
- Reaction in a skin lesion lying over a major nerve.
- Reaction in a skin lesion on the face.
- Signs of inflammation in the eye.
- Severe oedema (swelling) of the limbs.
- Involvement of other organs, such as testes, lymph nodes or joints.
- Ulceration of skin lesions.

Conditions that could be mistaken for a leprosy reaction

Other conditions that may be confused with a leprosy reaction are drug reactions and other causes of inflammation, such as local sepsis or infection.

- *Drug reactions* are not common; they are usually accompanied by itching, which is not a typical feature of leprosy reactions. The signs on the skin will not correspond with the leprosy patches and are more likely to be flat lesions (not the raised lumps of ENL), possibly with hyperpigmentation.
- *Local sepsis* will not involve the leprosy patches. It will generally be localised to just one part of the body and the cause may be obvious, such as a wound or an insect bite.

The possibility of leprosy relapse is examined on pages 40-41.

Leprosy reactions can be successfully treated

CHAPTER TWO

How to treat leprosy reactions at the local level

Most people with leprosy reactions can be treated locally, but some will need to be referred. Whether you treat a person or refer them depends upon:

- What type of reaction they have.
- Whether there are any complications or contra-indications that will affect the treatment.
- The type of drugs you have available.
- The level of expertise and the types of examination available in your treatment centre.

Annex B gives a checklist of items needed to diagnose and treat leprosy reactions.

General principles

Before starting treatment, you must identify which type of reaction you are dealing with and whether it is mild or severe (see page 17).

Treatment of mild reactions

Mild reactions of both types (reversal reactions and ENL reactions) can be treated in the local clinic with acetyl-salicylic acid (ASA, Aspirin; adult dosage is 600mg up to six times per day).

Type 1 reactions do not usually last for more than a few weeks. The signs of Type 2 reaction often come and go over a period of several months; treatment suppresses these signs more rapidly than those of a Type 1 reaction, but ENL is much more likely to recur than a Type 1 reaction.

Treatment of severe reactions

The key drugs for treating severe reactions are corticosteroids: prednisolone is the one most commonly used. It is easily absorbed when taken orally and is now available in blister packs.

Basic principles should not be forgotten, however. Rest is important in any inflammatory condition. Splints can be applied to the limbs to rest affected nerves and muscles.

As recovery begins, passive exercises help maintain the range of movement of all affected joints. Later, active exercises help restore muscle strength, even if there is some permanent nerve damage.

In some cases surgery may help chronic nerve pain and restoration of function.

Treatment with prednisolone

Prednisolone reduces the inflammation in the nerves. It begins to take effect in a few days, reducing nerve pain and enabling some recovery of function. However, to obtain maximum benefit and to prevent the inflammation from returning, the person should take a full course of prednisolone of either twelve or twenty-four weeks.

Prednisolone is a very effective drug, but it can cause serious side effects, including some that are potentially fatal. A person may have other medical conditions that make them more vulnerable to side effects if they take steroids. Before starting prednisolone, some people will need to be referred for specialist care and others will need treatment for other medical conditions (see pages 24-26).

Here are the steps involved in treating a person with prednisolone:

- History and examination.
- Refer if necessary.
- Treat other conditions.
- Explain the treatment to the person.
- Prescribe prednisolone.
- Follow-up during and after treatment.

Prescribing and monitoring prednisolone must always be done with great care

History and examination

You must check each person's medical history and then examine them. This will enable you to identify people who need specialist treatment and people who have other conditions that need to be treated before or at the same time as you give them prednisolone.

To make sure that you have not missed anything, use the checklist on the next page for every person you start on steroids.

1. Record any signs that suggest that the person needs steroids: these include new sensory or motor loss or one of the other signs of a severe reaction.
2. Go through the signs and symptoms that suggest that a person needs to be referred to a specialised centre.
3. Go through the list of further symptoms that require investigation before steroids can be given: if you can, carry out the appropriate tests and act on them – or refer the person to a specialist centre.
4. Under the heading *Management*, check off the action you have taken.
   - If there are no contraindications to steroids, you can give mebendazole to treat any worm infestation (see page 48) and start steroids.
   - If you are referring the person, note the details of the referral.
   - If you are treating some other conditions yourself, note this in the person's records.

Checklist for starting steroids

SENSORY LOSS:

	RIGHT		LEFT	
	Y/N	Duration in weeks	Y/N	Duration in weeks
Hand				
Foot				

MOTOR LOSS:

	RIGHT		LEFT	
	Y/N	Duration in weeks	Y/N	Duration in weeks
Eye closure				
Little finger out				
Thumb up				
Foot up				

OTHER SIGNS:

	Yes	No
Nerve pain/tenderness	☐	☐
Reacting face patch	☐	☐
Involvement of other organs	☐	☐

SIGNS AND SYMPTOMS:

	Yes	No
Pregnant?	☐	☐
Under 12 years?	☐	☐
Known diabetic?	☐	☐
Corneal ulcer or iritis?	☐	☐
Deep ulcer or osteomyelitis?	☐	☐
Urine positive for glucose?	☐	☐

If you can write YES next to any of these six signs and symptoms, you must refer the person.

FURTHER SYMPTOMS:

	Yes	No
Persistent cough for three weeks?	☐	☐
Bloodstained sputum?	☐	☐
Any other suggestion of tuberculosis?	☐	☐
Conjunctivitis or trachoma?	☐	☐
Bloody diarrhoea	☐	☐
Itchy skin patches	☐	☐
Scabies	☐	☐

If you can write YES next to any of these seven signs, you must investigate the person and treat them appropriately.

MANAGEMENT:

	Yes	No	Date
Mebendazole 100mg twice daily for 3 days	☐	☐	.....
Steroids started?	☐	☐	.....
Referred?	☐	☐	.....

Referred to: .....

.....(Place)

Reason for referral:.....

.....

.....

Referring patients

People with the conditions described on the next page should, if possible, be managed by a referral centre that has experience in managing reactions and has access to additional resources such as surgical facilities, further laboratory tests, ophthalmological services, radiology and in-patient care.

These pages can be photocopied and used as a checklist.

Conditions that should be referred

Pregnancy
Refer women who are pregnant; to avoid harming the foetus, prednisolone is given in lower doses during pregnancy.

Children
Refer everyone under the age of 12 to minimise the effect of steroids on their growth.

Diabetes
Steroids also make diabetes worse. You should suspect diabetes in anyone who shows symptoms of excessive urination and extreme thirst, usually accompanied by tiredness and lethargy, over a period of a few days to a few weeks. Before giving them steroids, refer people with such symptoms for diagnosis and treatment.

Eye involvement
People who have pain and redness in the eyes, often combined with visual loss, should also be referred; they may have corneal damage or iritis. These conditions should be managed by someone who has had special training. However, you can give emergency treatment, using tetracycline and atropine eye ointments if available, before the person is transferred to the specialist centre.

Ulcers or osteomyelitis
People who have deep or dirty ulcers or osteomyelitis should be referred for septic surgery and antibiotics. Starting them on steroids before carrying out this treatment may make the sepsis worse and cause more permanent damage. Any wound discharging pus should be referred before giving steroids, or osteomyelitis may develop; if the hand or foot is warmer than normal, with or without swelling, osteomyelitis may be the reason.

Tuberculosis
Steroids make tuberculosis worse. You should suspect tuberculosis in anyone who has had a cough for more than three weeks; this may be accompanied by fever and loss of weight. Before giving them steroids, refer people with such symptoms for diagnosis and treatment.

Severe depression or psychosis
Steroids can make these conditions worse. Before giving them steroids, refer anyone with a history of severe mental illness for diagnosis and treatment.

Severe Type 2 reaction
You should refer people with severe Type 2 reactions, to avoid steroid dependence in chronic ENL.

New nerve damage during treatment
The nerve function of people on steroid treatment should be monitored regularly. You should refer anyone whose nerve function deteriorates for specialist advice. They should continue to take the same dose of steroids they are currently taking until they see the specialist.

Late nerve damage
Some people develop nerve damage more than a year after completing MDT. You must make sure that these patients are having a reaction rather than a relapse of leprosy, as the symptoms of the two can look the same. You should suspect a relapse when new skin lesions occur in different places from the old lesions. These patients should be referred (see pages 40-41).

Newly diagnosed patients with nerve damage of more than six months' duration
If you find at the moment of diagnosis that a new patient has nerve damage, ask them how long the damage has been present. If it has been there for more than six months, there is a need to find ways to prevent further damage (see Chapter 4, page 43).

Treat other conditions

If a person with recent nerve damage does not have a condition requiring referral, he or she can be treated with steroids in the local clinic. However, before starting the treatment, you should question the person and examine them to make sure that they do not have any of the conditions described below, all of which may be made worse by steroids.

- Worm infestations
- Diarrhoea, with blood and/or mucus
- Fungal infections
- Scabies
- Epigastric pain

Treatment for all these conditions can be started at the same time as steroids are started. Annex C describes the basic treatment and gives the reasons for taking these special precautions.

Explain the treatment to the patient

Before starting treatment with steroids, explain the following to the person:

- The reason for the treatment.
- How long the treatment will last.
- The importance of taking the correct dosage.
- The fact that treatment should never be stopped suddenly.
- What to do if pain or loss of feeling increases or strength decreases.
- The possible side effects of treatment.

The reason for treatment

Explain that the person needs the drugs because of the new nerve damage, and that symptoms such as pain and loss of feeling and/or strength, if present, are likely to improve within one to two weeks. If the person has no pain, explain that untreated nerve damage could lead to disability and deformity.

You should also mention that some symptoms might remain after treatment (for example, sensory loss or muscle weakness may only partially recover), but that treatment is essential to prevent the damage from becoming worse.

How long the treatment will last
Explain that, in order to prevent the problem from recurring, the treatment lasts twelve weeks (PB cases) or twenty-four weeks (MB cases).

Taking the correct dosage
Explain the importance of taking prednisolone daily, according to the instructions given by the health worker. Regular dosage gives the best chance of success.

Treatment should not be stopped suddenly
Steroids have a powerful effect on the body. If a person suddenly stops taking them, he or she can become seriously ill, with symptoms including weakness and low blood pressure. This is why the dosage is gradually decreased during the course. It is important to take the complete course of treatment.

What to do if pain or loss of feeling increases or strength decreases
If the original symptoms in the nerve get worse, the person should come back to the clinic. You may need to give a higher dose of steroids, maintain the same dose for a longer period than usual or refer the patient for more specialised care.

Possible side effects

There are many side effects of steroids, as listed in Annex D. Tell everyone receiving steroids that the drugs may have side effects, and advise them to report any unusual symptoms to their health worker as soon as possible, so that further complications can be prevented.

Prescribing prednisolone for a severe Type 1 reaction

Prednisolone is given by mouth in a decreasing dosage over several months. People with paucibacillary (PB) leprosy receive different dosages of steroids from those with the multibacillary (MB) form. People still on anti-leprosy treatment (MDT) must continue their treatment while on steroids; however, those who have completed their course of MDT do not need anti-leprosy treatment while on steroids.

For PB patients the standard treatment is as follows:

Weeks of course	Daily dose of prednisolone
1–2	40 mg
3–4	30 mg
5–6	20 mg
7–8	15 mg
9–10	10 mg
11–12	5 mg
The total duration of this course is twelve weeks.	

For MB patients the standard treatment is as follows:

Weeks of course	Daily dose of prednisolone
1–4	40 mg
5–8	30 mg
9–12	20 mg
13–16	15 mg
17–20	10 mg
21–24	5 mg
This course lasts 24 weeks, exactly double the PB course.	

Prednisolone is available in blister packs

Prednisolone is now available in convenient blister packs, especially for use in leprosy treatment. The packs are made up of colour-coded tablets containing different doses, so that only one tablet per day needs to be taken throughout the entire course. Each dose should be taken in the morning after a meal.

Each blister strip contains fourteen tablets and therefore provides two weeks of treatment: people with PB leprosy will generally need one strip for each dosage level, while those with MB will need two for each level.

If blister packs are not available, you must take great care to dispense the correct regime of drugs and to ensure that the patient understands how to take them. A card for patients to keep, showing the daily doses of prednisolone to be taken during the course, would be useful.

Follow up during treatment with steroids

Recording steroid treatment

If you prescribe steroids, it is best to record this in the Leprosy Treatment Register or on the Patient Record Card, both of which are kept for people receiving MDT. The dosage of prednisolone can be written in red alongside the record of MDT drugs given. The names of people who have completed MDT can be added to the register for the duration of their steroid course; attendance and dosage should be noted in the same way.

Ideally, you should see people on steroids every two weeks; but if this is difficult for them to arrange, a monthly visit will be adequate. At each visit you should ask the person about any side effects or other problems, carry out a nerve function assessment to monitor changes and give them prednisolone for the next stage of the treatment.

Monitoring nerve function

Monitor each person by using a routine care form (see Annex A), which provides a record of the changes in nerve function. If you discover definite deterioration, refer the patient for specialist advice – but continue with the same dose of prednisolone in the meantime. The specialist may prescribe an increased or prolonged course of steroids under close supervision.

Watching for side effects

Steroids can have a number of serious side effects which you must watch out for; see Annex D.

What happens if a person misses an appointment and their treatment is interrupted?

You will need to:

- Find out how many weeks they have missed.
- Assess their nerve function.

If the break in treatment lasted less than four weeks, continue with the dose that should have been given at the missed appointment and follow the standard course.

If the break lasted four weeks or more, you will need to do one of the following:

- If the original problem no longer exists, stop the steroids altogether.
- If nerve damage of less than six months duration still persists, restart the whole course of steroids – making sure that the person understands how important it is to take the complete course without interruption.
- If the nerve damage has worsened, restart the course of steroids and refer the patient to a specialist.

Follow-up after treatment with steroids

People who have been given a course of steroids for reaction or nerve damage should be followed up closely because of the risk of recurrence.

Each person must understand that a reaction or new nerve damage may recur. They must know how to recognise the early signs of nerve damage and be aware of how important it is to return promptly to the clinic for treatment. These signs include pain or tingling sensations, further loss of feeling or loss of muscle strength and inability to close the eye.

People still on MDT should have their nerve function checked monthly by the health worker when they come to collect their treatment. Any deterioration should be noted and the person referred.

People who have already completed MDT by the time they come to the end of a course of steroids should be asked to come back three months and six months after the end of the course for review and nerve function assessment.

People who still have lagophthalmos (weakness of eyelids) after completion of treatment with steroids should be referred to a specialist centre.

Boy showing signs of reaction

How to manage reactions at referral level

Prescribing treatment for severe Type 2 reactions

Type 2 reactions can often last for months or even years, and so there is a risk of people becoming dependent on steroids. This makes the reactions very hard to manage, with the result that it can become difficult to reduce and eventually terminate the treatment. All patients with severe Type 2 reactions should be referred for management by experienced staff, who may be able to minimise these dangers.

At the referral centre, Type 2 reactions can be treated with a combination of prednisolone and clofazimine.

The following regimens are examples (experienced specialists may prefer different schedules).

Prednisolone

Prescribe in the following doses over a short course of six weeks:

Week of course	Daily dose of prednisolone
1	40 mg
2	30 mg
3	20 mg
4	15 mg
5	10 mg
6	5 mg

Clofazimine

Clofazimine is given in decreasing doses as follows:

- 300 mg daily for 1 month.
- 200 mg daily for 3–6 months.
- 100 mg daily for as long as symptoms remain.

Clofazimine is a normal component of MDT, and the usual adult dose is 50 mg per day; however, the higher doses are needed to suppress the ENL reaction. Clofazimine takes some time to have an effect, but by the time the steroid dose is reduced to a low level it should be working well, allowing the steroids to be stopped completely.

If very high doses of clofazimine are given for too long, there is a risk of chronic abdominal pain caused by the effects of the drug on the bowel wall. Gradually decreasing the dose should prevent this, but if it does occur, the drug should be stopped completely. Clofazimine also causes discoloration of the skin, particularly in people with light skins.

Thalidomide

Thalidomide is an effective drug for treating Type 2 reactions, but because of its side effects you must control it very carefully. It should only be considered for patients whose Type 2 reaction cannot be controlled by the first two drugs mentioned above.

Thalidomide can only be prescribed to in-patients by physicians in referral centres. Because it causes serious damage to the developing foetus, **it must never be given to female patients of childbearing age**. The usual dosage is 200–400 mg daily, in divided doses. In some countries, the use of thalidomide is not authorised.

Groups requiring special precautions when prescribing steroids

The following groups of people require special precautions when steroids are required.You must not give steroids to people with tuberculosis, diabetes, deep ulcers, osteomyelitis or other serious conditions without starting treatment for the underlying condition.

Pregnant women

All pregnant women should be treated at referral level, so as to minimise the steroid dose they are given and thus avoid harmful effects, such as growth retardation, on the foetus. If steroids are given in the third trimester, this may cause adrenal suppression in the newborn infant; ideally, such infants should be monitored in a referral centre for a few days after birth.

Here are the doses of prednisolone you should give during pregnancy:

- *PB cases*: give the normal course, but start at 30 mg daily instead of 40 mg and limit the course to ten weeks rather than the normal twelve
- *MB cases*: this should be double the PB course – that is, also starting at 30 mg daily but lasting for twenty weeks.

Children

All children under the age of twelve should be treated at referral level, so as to minimise the effects of steroids on their growth. Children can be given a course similar to that for pregnant women, but the starting dose of prednisolone should not exceed 1 mg per kilogram of body weight per day.

If it can be arranged, giving children steroids on alternate days may reduce the effect on their growth.

A suitable regimen for PB cases would be 30 mg of prednisolone daily for two weeks, then 30 mg on alternate days for two weeks, with a gradually reducing dose over the total course of

ten weeks. For MB cases, you should double the duration of each stage of the course.

Children with nerve damaged hands

Tuberculosis

If you suspect that a person has tuberculosis, the diagnosis must be confirmed and treatment started before giving steroids. A sputum specimen should be examined for acid-fast bacilli. If tuberculosis is diagnosed, you can start the person on steroids as soon as effective anti-TB treatment is begun; always follow the national guidelines for the diagnosis and treatment of tuberculosis.

Diabetes

People who show symptoms that suggest diabetes or whose urine tests positive for glucose should be referred to confirm whether the diagnosis is correct and, if it is, for management of the condition. Steroids may increase the diabetic's requirement for insulin.

A person taking steroids may also develop diabetes for the first time; this possibility must be considered when people develop typical symptoms of diabetes during treatment with steroids –

these symptoms include excessive thirst, increased urination and fluid intake.

If sugar is found in the urine, serial blood sugar examinations must be made, firstly to establish the diagnosis and then to monitor the response to treatment. Insulin (by daily or twice daily injections) may be required in the first instance, but the condition usually resolves itself when steroids are stopped.

Sputum-smear microscopy

Testing urine for glucose

Ulcers or osteomyelitis

People with deep or dirty ulcers or osteomyelitis should be referred for septic surgery and antibiotics. Starting steroids before such treatment may lead to a worsening of the sepsis and more permanent damage, including the need for amputation.

You should suspect osteomyelitis if the person's hand or foot is warmer than normal, with or without swelling.

Any person with a wound discharging pus should be referred for surgical advice and debridement (removal of dead and infected tissue) before taking steroids, or osteomyelitis may develop.

An X-ray showing a foot with osteomyelitis

A deep, possibly infected, ulcer

Eye involvement

People who have corneal damage or iritis should be referred for specialist diagnosis and management at a centre properly equipped for eye care.

Corneal ulcers and keratitis are inflammatory conditions of the cornea – the central, transparent part at the front of the eye. They are often caused by exposure, as a result of the person being unable to close the eye properly: there is pain, redness and often some loss of vision. The treatment usually consists of local antibiotics, sometimes with a pad to keep the eye closed. Steroids, whether taken by mouth or locally applied, may make these conditions worse.

Iritis, uveitis, iridocyclitis and scleritis are all types of inflammation inside the eye and they can all occur as part of a Type 2 reaction. These conditions cause pain, redness, photophobia and loss of vision, although the symptoms are not always severe. The treatment includes atropine eye ointment to prevent adhesion of

A corneal ulcer (stained for examination)

Scleritis

the iris to the lens, and locally applied steroids to reduce the inflammation. In severe cases, oral steroids may be needed.

All these conditions should be managed by someone with special training (and the necessary equipment) to diagnose and treat eye diseases. The correct diagnosis is vital, as steroids are contra-indicated for some conditions but required for others.

A health worker examining the eye

Severe Type 2 reaction

People with severe Type 2 reactions should be treated at referral level to prevent them from becoming dependent on steroids. ENL is frequently a chronic condition that lasts months or even years. Extra care is needed to manage the condition without prescribing long courses of steroids, which make the side effects of these drugs much more of a problem. The recommended treatment is given at the start of this chapter.

New nerve damage during steroid treatment

People whose nerve function deteriorates while they are on steroids should be referred for specialist advice; in the meantime, they should continue to take the same dose of steroids. The specialist may increase the dose of steroids and/or prolong the course, with more frequent review of the person, to manage any complications that may occur.

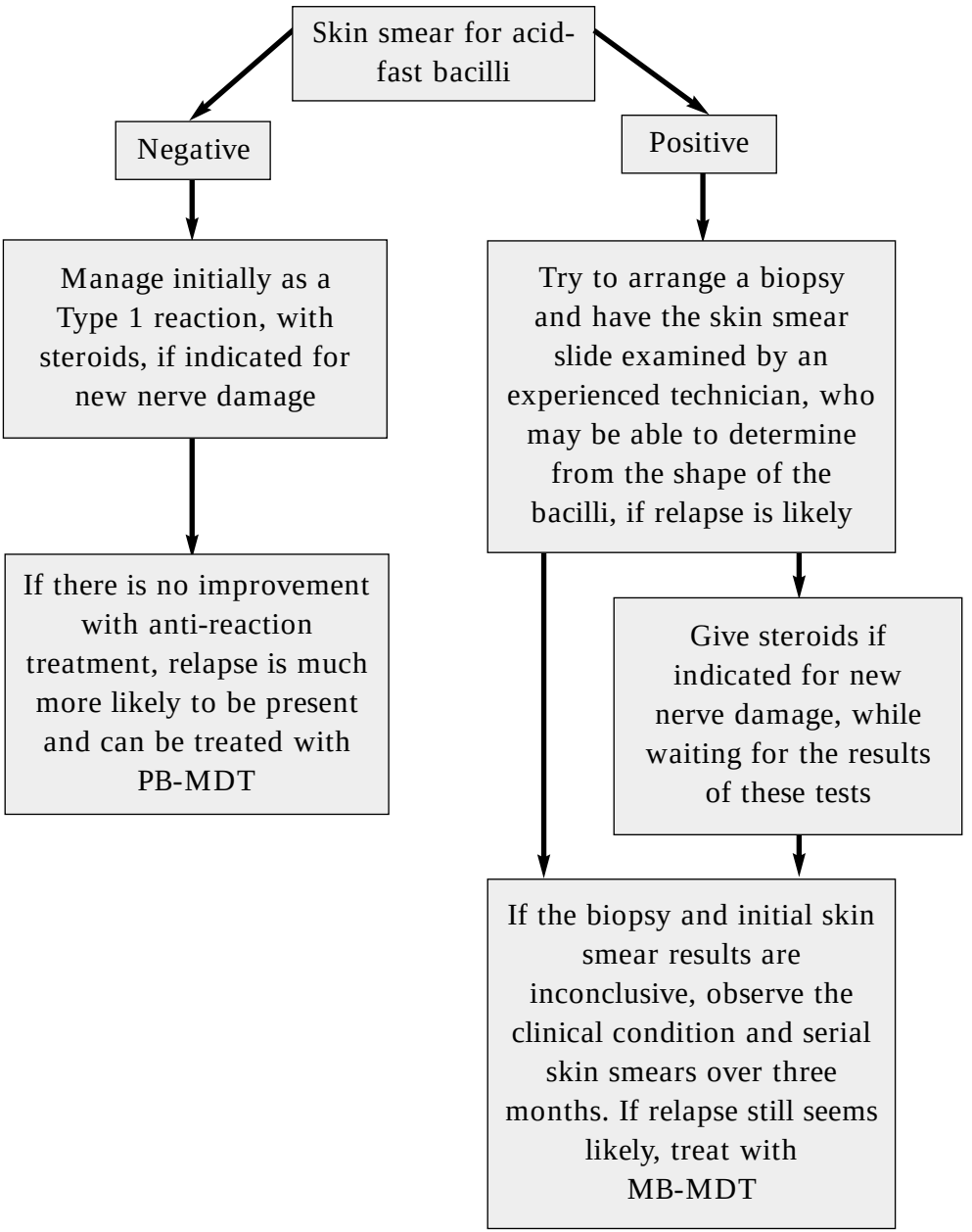
Late nerve damage and possible relapse

If people develop nerve damage more than three years after completing MDT, you must make sure that they are really experiencing a reaction rather than a relapse of leprosy. Relapse is uncommon, but it is a possibility that should be considered. The symptoms of reactions and of relapse can be confused. You should refer these patients to a leprosy specialist, if possible.

Completely new skin lesions occurring in different places from the original lesions, particularly if they show no signs of inflammation, can suggest a relapse. Arrange for a skin smear examination, if at all possible – but remember that the skin smears of many people with MB leprosy remain positive for some years after they have completed MDT.

Biopsies are useful for assessing possible relapses, but they require experience to interpret correctly. The flow chart shown opposite can be used to manage suspected relapses.

Flow-chart for distinguishing between late nerve damage and relapse



Care of nerve damaged feet

Care of the nerve damaged eye

CHAPTER FOUR

Long-term management of nerve damage

Detection and treatment of leprosy reactions is essential for preventing disability. Unfortunately, some permanent nerve damage may occur before leprosy is diagnosed and, despite your best efforts to prevent it, further damage may occur during treatment.

Initial nerve damage is called *primary impairment*. It may consist of muscle weakness and/or sensory loss, and it can vary in severity from insignificant to completely disabling. Loss of sweating is another primary impairment which makes the skin more vulnerable to injury.

Primary impairment can lead to *secondary impairment*. This may include wounds, ulcers, osteomyelitis, loss of tissue (fingers/toes), fixed contractures/deformities of hand or foot, corneal damage and blindness.

The priority is to stop permanent nerve damage or primary impairment developing into secondary impairment. To do this, you must inform and empower the person affected so that they can act to prevent further damage.

Further damage can best be prevented by:

- Avoiding injuries to the hands and feet as much as possible.
- Resting the affected limb as soon as any injury is noticed.
- Protecting the eye by wearing sunglasses or spectacles.

Helping people to prevent disability

Responsibility for looking after the eyes, hands and feet lies principally with the person affected. Health workers may advise, help and encourage, but they cannot take over this task.

Talk to each person individually as different people have different risk factors, depending on their life style and the work they do. Talk with each person about:

- The type of nerve damage they have.
- The symptoms of this damage.
- How they can tell when nerve damage is getting worse.
- How to prevent further damage.

If a person detects a new injury such as a blister or a small wound, healing can be promoted by resting the affected limb for some days. Wounds should be kept clean using water and covering them with clean dressing or cloth. People with injuries should return to the clinic for further advice. Once a wound has healed, care must be taken to reduce the risks of it returning.

Care of insensitive hands and feet

Advice should include the care of insensitive hands and feet.

- Hands and feet should be checked for damage and then soaked in water every day.
- Oil such as vegetable oil or Vaseline should then be applied to the skin to help keep it in good condition.
- People should be advised on how to reduce the risk of damage for example when working, cooking or using tools.
- Taking frequent short rests will help prevent injury caused by repetitive actions.

Footwear

People with loss of sensation in their feet are advised to wear footwear that is securely fitted and protects their feet. This type of footwear is usually available in local markets and shops.
Shoes should have:

- A tough under sole that does not allow thorns or nails to penetrate but is flexible when walking.
- A soft cushion insole.
- Well-fitting uppers or straps, with sufficient room for toes (even damaged toes).
- No sharp edges, stitching or nails inside the shoe which may cause wounds.
- Straps, seams, buckles etc should not rub the foot.

Some people with severe impairments of the feet need special footwear available from a footwear or orthopaedic workshop – these are often attached to hospitals or rehabilitation centres.

Eyes

People with loss of eye blink or weakness in closing their eyelids can easily damage their eyes.

- It is important that these people inspect their eyes daily for foreign bodies (using a mirror).
- Wearing a head covering and sunglasses can help prevent the surface of the eye from drying and stop foreign bodies, such as dust, sand and flies damaging the eye.
- Washing the eyes with clean water will help remove any foreign bodies.
- Lubricating eye drops or one drop of castor oil applied morning and evening will help moisten the surface of the eye.
- Conscious efforts to blink may also help.

A self-care group

Protecting hands from injury

Self-care groups

Self-care groups can be effective in helping to prevent impairment and promote self-care. These groups are made up of people with similar problems, in this case nerve damage. Group members assist each other in activities such as wound care, safe working practices and other needs identified by group members. This means that people take on the responsibility of managing their impairments and avoid becoming dependent on health workers.

Annex A: An example of a routine care form

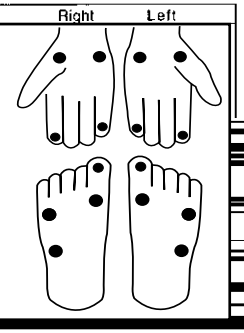
Form for monitoring nerve function in leprosy patients

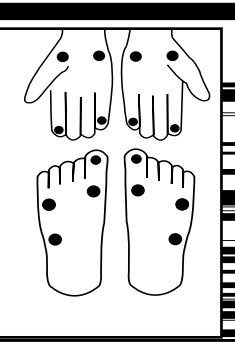
(each patient should be reviewed at least every 3 months, but ideally every month)

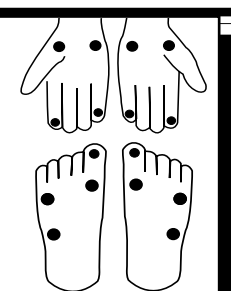
Patient's name: District Leprosy Number:

Muscle strength (write S,W or P)	Eyes - visual acuity	Sensation
R L eye closure lid gap in mm 5th finger out	counting fingers at six metres R L can count	tick where sensation is present put a cross where

Right Left







Scabies

Scabies causes small breaks in the skin, and these could become infected in someone taking steroids. Advise the person about hygiene (the whole family should wash daily with soap and water) and prescribe the following treatment: every member of the household should apply benzyl benzoate to the whole body, except the head, daily for three days.

Epigastric pain

Epigastric pain is common and may be made worse by both asprin and steroids. It can be relieved by antacids, taken as required. More effective relief of symptoms can be obtained by taking the newer and more expensive drug ranitidine (75-150 mg twice daily), if it is available.

Annex D: Side effects of steroids and their management

The following complications can occur during treatment with steroids:

- Worsening of *tuberculosis* in cases where no symptoms were present when the person started taking steroids. If you suspect tuberculosis, examine the sputum for acid-fast bacilli (AFBs) if this can be done locally, or refer the patient to hospital for investigation and treatment.
- Signs of diabetes, such as thirst or excessive urination. Check the person's urine for glucose and if positive, refer them for treatment with insulin or oral hypoglycaemic drugs.
- *Abdominal pain* – this may be caused by peptic ulceration. Make sure the person is not taking aspirin, and give them antacids or ranitidine.
- Worsening of sepsis in hand or foot. Refer the person for septic surgery.
- *Diarrhoea or dysentery*. Give oral rehydration and after stool examination consider antibiotics or anti-amoeba treatment.
- *Swelling of the face, increased hair growth* and *acne*. Requires no treatment and will return to normal when steroids are stopped.

Even if side effects or complications are diagnosed, it is essential that the person should not stop the steroids suddenly, as this can cause even more serious problems.

Complications should be managed appropriately. If it is decided that the steroids should be stopped, this must be done *gradually* over a period of some weeks.

If a person suddenly stops taking steroids while on a high dose, the following symptoms can occur: *hypotension*, weakness and shock. Restart steroids and give supportive treatment, including intra-venous fluids, if necessary. The person should be admitted to hospital as an emergency.

There are other complications of steroids, but they are rarely a problem if the course lasts less than six months. They include hypertension, osteoporosis, growth retardation, cataracts and glaucoma. Whenever possible, measure the blood pressure of people being given steroids. If you see or suspect hypertension or any of these less common complications, refer the person for further investigation.

Abbreviations

- AFB – acid-fast bacilli: a common description of the bacilli that cause both leprosy and tuberculosis. Acid-fast bacilli can be identified with a special stain; they may be found in skin smears from people with leprosy and in sputum smears from those with TB.
- MB – multibacillary leprosy: heavy infection with *Mycobacterium leprae* defined by more than five anaesthetic skin patches or positive identification of leprosy bacilli in a skin smear examination.
- MDT – multi-drug therapy: WHO recommended treatment, consists of a combination of rifampicin, clofazimine and dapsone given over 12 months for multibacillary leprosy and rifampicin and dapsone given over 6 months for paucibacillary leprosy.
- PB – paucibacillary leprosy: lesser infection with *Mycobacterium leprae* defined by up to five anaesthetic skin patches.
- ENL – erythema nodosum leprosum: inflamed lumps under the skin characteristic of Type 2 leprosy reactions.

ILEP Learning Guides on Leprosy

How to diagnose and treat leprosy

How to recognise and manage leprosy reactions

How to care for eye problems in leprosy

How to do a skin smear for leprosy

THIS IS THE SECOND IN A SERIES OF LEARNING GUIDES ABOUT LEPROSY PUBLISHED BY ILEP. THE GUIDES GIVE GENERAL HEALTH WORKERS ALL THE INFORMATION THEY NEED TO CARRY OUT THE ESSENTIAL TASKS OF CONTROLLING LEPROSY AND CARING FOR THE PEOPLE WHO HAVE THE DISEASE.

Learning Guide 2 is for all health workers who may have to manage the complications of leprosy. It contains practical advice on how to recognise leprosy reactions and how to give the correct treatment. It also includes advice on referral of reactions and specialist treatment.

The ILEP Learning Guides are short, clearly written and well illustrated. We hope that you find them easy to use. They will be useful as study aids, as supplements to training programmes, and as reference books in the clinic.

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