How to Recognise and Manage Leprosy Reactions
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Introduction

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

Part 1 of this booklet 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 refer. This section gives advice on who should be referred.

Part 3 offers guidelines for treating people who need referral or special precautions steroid therapy. There are also guidelines for the management of difficult cases at referral centres.

Part 4 explains that long-term management is needed to prevent nerve damage leading to impairment and disability.

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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 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 give the policies for managing leprosy reactions, and this ILEP Guide should be a useful supplement.
Acknowledgements

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- The principal author - Dr Paul Saunderson.
- Dr Guido Groenen.
- The ILEP Medico-Social Commission.
- All those involved in field testing especially ALERT, Jimma Institute of Health Sciences, Schieffelin Leprosy Research and Training Centre, Karigiri and the Christian Medical College, Vellore.

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**Individuals**

- [List of individual contributors]

**Organisations**

- [List of organisations that contributed to the illustrations]

Where there is more than one image on a page, they are numbered in order from left to right and from top to bottom using roman numerals.

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

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.

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 (M B) 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.

<table>
<thead>
<tr>
<th>Risk of new nerve damage developing after diagnosis in new cases of leprosy</th>
<th>Paucibacillary cases</th>
<th>Multibacillary cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal nerve function at diagnosis</td>
<td>1%</td>
<td>16%</td>
</tr>
<tr>
<td>Impaired nerve function at diagnosis</td>
<td>16%</td>
<td>65%</td>
</tr>
</tbody>
</table>


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 M B leprosy, reactions may continue for up to four years after the start of treatment.

How to examine for 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 a Routine Care Form; an example is given 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.

Nerves
- Ask the person if there is any loss of feeling and loss of strength in the hands and feet.
- Ask about pain 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 eyes, 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 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 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. Keep the pen upright.
• Press gently to make a small depression in the skin – but do not press too hard.
• 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 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.
Testing nerve function

Nerve damage can affect function and strength of muscles close to affected nerves. In leprosy the nerves most commonly damaged are the nerves that affect the eyes, hands and feet.

Test four muscles on each side of the person's body: one muscle affecting the eye, 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 eye tightly and then try to open it with your fingers. If there is paralysis of these muscles, measure with a ruler the gap that remains between the upper and lower eyelids.

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 holding the hand flat and then try to press the thumb back with your finger.

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

Write down the results on the Routine Care Form.
How to diagnose a leprosy reaction

How do you recognise new nerve damage – in other words, how do you know if there is a reaction taking place in the nerves? The most unmistakable sign is pain in the nerves, but this does not always happen. So you must look for any change in nerve function that has occurred since the person was last examined.

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.

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 side.

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, just beside where you would palpate the radial pulse. You may not feel the nerve itself, but you should be able to detect any tenderness.

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

For the right ulnar and right peroneal nerves, follow the same procedure but using your left hand.

If you find obvious tenderness, note this on the Routine Care Form.
Signs of a reaction

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the skin</td>
<td>- inflamed skin patches</td>
</tr>
<tr>
<td>In the nerves</td>
<td>- pain or tenderness in a nerve</td>
</tr>
<tr>
<td></td>
<td>- new loss of sensation</td>
</tr>
<tr>
<td></td>
<td>- new muscle weakness</td>
</tr>
<tr>
<td>In the eye</td>
<td>- pain or redness in the eye</td>
</tr>
<tr>
<td></td>
<td>- new loss of vision</td>
</tr>
<tr>
<td></td>
<td>- new weakness of eye closure</td>
</tr>
</tbody>
</table>

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.

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.

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 definitely older than six months, treatment is less likely to be effective; you may consider referring the person to a specialist centre.

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 is much the same for both types.

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 or PB leprosy and those with multibacillary or MB leprosy can both get Type 1 reactions.
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, because there must be large numbers of bacilli present to start the reaction.
How common is it?

Type 2 reactions are not common, 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: if you palpate them, it feels as if there is a small coin under the surface. 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 nodules is an important clinical sign of ENL.

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

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.
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:

- Mild reactions occur in the skin only; there may be mild fever and slight swelling (oedema) of the limbs.
- Severe reactions affect the nerves or eyes, or are likely to do so.

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.

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### How to distinguish between Type 1 and Type 2 reactions

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

<table>
<thead>
<tr>
<th>Sign</th>
<th>Type 1 reaction</th>
<th>Type 2 reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflammation in the skin</td>
<td>Whole patch is inflamed but without pain, lesions are tender.</td>
<td>In the leprosy patches, but ENL lesions, which are tender.</td>
</tr>
<tr>
<td>General condition of the patient</td>
<td>Good, with little or no general malaise.</td>
<td>Poor, with fever and general malaise.</td>
</tr>
<tr>
<td>Timing and type of patient</td>
<td>Usually early on in the course of MDT; people with both PB and MB.</td>
<td>Usually later in the treatment; only people with MB.</td>
</tr>
</tbody>
</table>

If there is new nerve damage but no skin inflammation, it is difficult to make a certain diagnosis, but 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.

---

### No ENL skin lesions

<table>
<thead>
<tr>
<th>Signs of a skin reaction only</th>
<th>M ild Type 1 reaction.</th>
<th>M ild Type 2 reaction.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Involvement of nerves and/or eyes in the reaction</td>
<td>Severe Type 1 reaction.</td>
<td>Severe Type 2 reaction.</td>
</tr>
</tbody>
</table>
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 at primary, secondary and referral level.

General principles

Is the reaction mild or severe?
Before starting treatment, you must identify which type of reaction you are dealing with and whether it is mild or severe (see pages 15-16).

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 500-600mg 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.

Treatment with prednisolone
Prednisolone reduces the inflammation in the nerves. It begins to take effect after one to two weeks, 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 or 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 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 24-27).

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.

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 specialists centre.
4. Under the heading Management, check off the action you have taken.
   • If there are no contraindications to steroids, give mebendazole 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:**

<table>
<thead>
<tr>
<th>RIGHT</th>
<th>LEFT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y/N</td>
<td>Duration in weeks</td>
</tr>
</tbody>
</table>

Hand

Foot

**MOTOR LOSS:**

<table>
<thead>
<tr>
<th>RIGHT</th>
<th>LEFT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y/N</td>
<td>Duration in weeks</td>
</tr>
</tbody>
</table>

Eye closure

Little finger

Thumb up

Foot up

**OTHER SIGNS:**

Yes No

Nerve pain/tenderness

Reacting face patch

Involvement of other organs

**SYMPTOMS AND SIGNS:**

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 signs, you must refer the person.

**FURTHER SYMPTOMS:**

| Persistent cough for three weeks? | Yes | No |
| Bloodstained sputum? | | |
| Conjunctivitis or trachoma? | | |
| Bloody diarrhoea | | |
| Itchy skin patches | | |
| Scabies | | |

If you can write YES next to any of these 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/or 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.

**Psychosis or severe depression**
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 for specialist advice anyone whose nerve function deteriorates, although in the meantime you should continue the same dose of steroids.

**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 be confused. 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, refer the patient for specialist management.
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
- Conjunctivitis and trachoma
- 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 symptoms, explain that untreated nerve damage could lead to disability and deformity. You should also mention that some symptoms might remain after treatment, but that the 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.
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.

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.

Prescribing prednisolone

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:

<table>
<thead>
<tr>
<th>Weeks of course</th>
<th>Daily dose of prednisolone</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>40 mg</td>
</tr>
<tr>
<td>3-4</td>
<td>30 mg</td>
</tr>
<tr>
<td>5-6</td>
<td>20 mg</td>
</tr>
<tr>
<td>7-8</td>
<td>15 mg</td>
</tr>
<tr>
<td>9-10</td>
<td>10 mg</td>
</tr>
<tr>
<td>11-12</td>
<td>5 mg</td>
</tr>
</tbody>
</table>

The total duration of this course is twelve weeks.

For MB patients the standard treatment is as follows:

<table>
<thead>
<tr>
<th>Weeks of course</th>
<th>Daily dose of prednisolone</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4</td>
<td>40 mg</td>
</tr>
<tr>
<td>5-8</td>
<td>30 mg</td>
</tr>
<tr>
<td>9-12</td>
<td>20 mg</td>
</tr>
<tr>
<td>13-16</td>
<td>15 mg</td>
</tr>
<tr>
<td>17-20</td>
<td>10 mg</td>
</tr>
<tr>
<td>21-24</td>
<td>5 mg</td>
</tr>
</tbody>
</table>

This course lasts 24 weeks, exactly double the PB course.
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 in the clinic 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 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 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.

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.
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.

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

Prednisolone

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

<table>
<thead>
<tr>
<th>Week of course</th>
<th>Daily dose of prednisolone</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>40 mg</td>
</tr>
<tr>
<td>2</td>
<td>30 mg</td>
</tr>
<tr>
<td>3</td>
<td>20 mg</td>
</tr>
<tr>
<td>4</td>
<td>15 mg</td>
</tr>
<tr>
<td>5</td>
<td>10 mg</td>
</tr>
<tr>
<td>6</td>
<td>5 mg</td>
</tr>
</tbody>
</table>

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: this is the reason for gradually decreasing the dose. 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 fetus, 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

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.
Diabetes

People who show symptoms that suggest diabetes or whose urine test 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. 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 may resolve itself when steroids are stopped.

People with other illnesses

You must not give steroids to people with diabetes, tuberculosis, eye conditions, deep ulcers or osteomyelitis without first starting adequate treatment for the underlying condition.

Tuberculosis

If you suspect that a person has tuberculosis, diagnosis must be confirmed and started before giving steroids as steroids can make TB worse. 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.

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 conditions of the cornea – the central, transparent part at the front of the eye. They are often
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 can probe an ulcer using a clean, blunt instrument; if the probe can be introduced beyond the superficial layers of the dermis, it is a deep ulcer requiring special care.

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 before taking steroids, or osteomyelitis may develop.
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 one year 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 following flow chart can be used to manage suspected relapses:

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Flow-chart for distinguishing between late nerve damage and relapse

- **Skin smear for AFB’s**
  - Negative: Manage initially as a Type 1 reaction, with steroids, if indicated for new nerve damage.
  - Positive: Try to arrange a biopsy and have the skin smear slide examined by an experienced technician, who may be able to determine from the shape of the bacilli, if relapse is likely.

- If there is no improvement with anti-reaction treatment, relapse is much more likely to be present and can be treated with PB-MDT.

- Give steroids if indicated for new nerve damage, while waiting for the results of these tests.

- If the biopsy and initial skin smear results are inconclusive, observe the clinical condition and serial skin smears over three months. If relapse still seems likely, treat with MB-MDT.
Detection and treatment of leprosy reactions is essential for preventing disability. Unfortunately, some permanent nerve damage is likely to be present before a reaction is diagnosed, and despite your best efforts to prevent it, some further damage may occur during treatment.

This 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.

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.

Helping people to prevent disability
Tell each person about:
• The type of nerve damage they have.
• The symptoms of this damage.
• How they can tell whether the nerve damage or any secondary damage is getting worse.
• How to prevent further damage.
You must talk to each person individually. Different people have different risk factors, depending on their lifestyle and the work they do.

If a person detects a new injury (it may be a blister or a small wound), they can stop it getting worse by resting the affected limb for some days, allowing the damage to heal by itself. They should also return to the clinic for advice.

### Care of insensitive hands and feet

You should advise on the care of insensitive hands and feet. People should check their hands and feet for damage every day and then soak them in water. They should then rub oil into the skin to prevent it from drying out; the loss of sensation and loss of sweating associated with leprosy make the skin prone to damage. You should also advise people on how to reduce the risk of damage when, for example, cooking or using tools.

### Footwear

People with loss of sensation in their feet must wear protective footwear; suitable examples are often available locally. The footwear should be secure and protect the foot – there should be no seams or buckles that rub the skin. People must check their feet regularly for damage. Some centres have facilities for making special shoes for people with loss of sensation.

### Eyes

People with weakness of eye closure muscles, can easily damage the front of the eye. This can be prevented to some extent by wearing glasses and by using eye drops to prevent drying. At night, the eyes can be covered with a cloth or bandage to keep them closed.

### Self-care groups

Self-care groups made up of people affected by leprosy have proved effective in helping their members to avoid further damage and in promoting self-care. Groups plan their own activities and members assist each other, rather than becoming dependent on health workers.
Annex B: Checklist of items needed to treat reactions in a clinic

For the diagnosis and treatment of mild reaction
• Ballpoint pen for testing sensation.
• Routine Care Forms for monitoring progress.
• Acetyl-salicylic acid (ASA, Aspirin) to treat mild reactions.

For treatment with steroids
• Testing strips for examining the urine for glucose.
• Mebendazole to give to all patients who will be treated with steroids.
• Metronidazole and co-trimoxazole (tablets/capsules).
• Tetracycline eye ointment (Atropine if allowed).
• Benzyl benzoate lotion.
• Clofibrate cream.
• Antacid tablets.
• Prednisolone blister packs.
• If possible, laboratory facilities for examining sputum for TB, skin smears for leprosy and stool for pathogens.

Centres treating referred cases require the facilities and personnel to
• Manage all major eye complications.
• Diagnose and manage tuberculosis.
• Diagnose and manage diabetes.
• Diagnose and manage leprosy relapses.
• Manage steroid treatment in children and pregnant women.
• Manage any side effects or complications of steroid treatment.
• Carry out septic surgery.
• Prescribe clofazimine and thalidomide (if permitted) to treat severe Type 2 reactions (ENL).
Annex C: Common conditions requiring treatment when steroids are given

**Worm infestations**
These are widespread and can become worse as a result of steroid treatment. Ideally, everyone who is given steroids should be treated with mebendazole (100 mg twice daily for three days) or an alternative.

**Diarrhoea, with blood and/or mucus**
A person with these symptoms is likely to be suffering from dysentery (amoebic and/or bacillary) and should be treated according to local guidelines. Amebic dysentery is best treated with metronidazole (adult dose is 800 mg three times daily for five days). Bacillary dysentery would not normally be treated with antibiotics except in severe cases. Prior to giving steroids, however, it can be treated for three to five days with ciprofloxacin (500 mg twice daily) or trimethoprim (200 mg twice daily); co-trimoxazole (960 mg twice daily) is perhaps the most widely available drug that would be effective in most cases – it contains trimethoprim.

**Conjunctivitis and trachoma**
These common conditions have no connection with leprosy, but could be made worse by steroid treatment. If they are present, give the person some health advice (including washing the face daily with soap and water) and then treat the conditions as follows:
- Conjunctivitis: tetracycline eye ointment twice daily for five days.
- Trachoma: tetracycline eye ointment twice daily for three to six months.

**Fungal infections**
Fungal infections such as Tinea corporis are common and may be made worse by steroid treatment. If a person has itchy skin lesions, suspect a fungal infection and treat them with clotrimazole cream (apply twice daily for at least three weeks).

**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 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 (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 IV fluids, if necessary. The person should be admitted to hospital as an emergency.
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
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.