

Infection and myeloma

Symptoms and complications Infosheet

This Infosheet provides information on explains what an infection is, what increases the risk of infection in myeloma, what the signs and symptoms of infection are and how infection is managed and treated.

What is an infection?

An infection occurs when disease-causing organisms, or 'germs', such as bacteria, fungi or viruses enter the body and begin to multiply. Usually, the immune system quickly kills and removes any bacterial, viral or fungal organism that enters the body, but sometimes the organism survives long enough to cause infection and make you ill.

The immune system is the body's defence system. It is made up of specialised cells, tissues and organs which work together to protect the body against infection. The cells involved in the immune system are called white blood cells.

Frequent or recurrent infection is one of the most common complications of myeloma.

What increases the risk of infection in myeloma?

Myeloma patients are up to 10 times more likely to develop an infection than healthy people. This is for two main reasons: the myeloma itself and the side effects of anti-myeloma treatment.

Myeloma and the immune system

Myeloma affects how well the immune system responds to infection.

Myeloma cells are abnormal plasma cells, a type of white blood cell, which are made in the bone marrow. Normal, healthy plasma cells produce different types of antibodies (also called immunoglobulins) to help fight infection. In myeloma, the plasma cells become abnormal and release a large amount of a single type of antibody, known as paraprotein. This has no useful function and cannot fight infection.

In addition, as the myeloma cells grow and expand within the bone marrow, they suppress the production of normal blood cells and prevent the bone marrow from working properly. This means the bone marrow produces fewer healthy white blood cells which weakens the immune system and its ability to fight infection.

The risk of infection is further increased in patients who have active (symptomatic) myeloma; patients who are undergoing myeloma treatment (especially those undergoing high-dose therapy and stem cell transplantation); and patients who have had slow recovery from infection in the past.

Side effects of anti-myeloma treatment

Some anti-myeloma treatment can lower the levels of white blood cells produced by the body, which increases the risk of infection. One type of white blood cell, called neutrophils, can be particularly affected. Neutrophils are an important part of the body's defences against infections caused by bacteria and fungi. Low neutrophil levels result in a condition known as neutropenia, which is a common but potentially serious side effect in myeloma patients. Adults normally have between 2 and 7.5 billion neutrophils per litre of blood ($2-7.5 \times 10^9/L$). Neutropenia is defined as a neutrophil count of $0.5-1 \times 10^9/L$ (moderate neutropenia) and less than $0.5 \times 10^9/L$ (severe neutropenia).

Myeloma treatments that can cause neutropenia and therefore increase the risk of infection include thalidomide, bortezomib (Velcade®), lenalidomide (Revlimid®), daratumumab (Darzalex®), cyclophosphamide and melphalan. Patients taking these drugs will have their white blood counts carefully monitored throughout treatment.

What are the signs and symptoms of infection?

The signs and symptoms of an infection, depending on the cause of infection, may include:

- Fever (temperature above 38°C)
- A temperature below 35.5°C
- Chills and sweating
- Change in cough or a new cough
- Sore mouth and throat
- Blocked nose and/or ears
- Burning sensation or pain when passing urine, or a frequent need to urinate
- Diarrhoea
- Nausea/vomiting
- Redness or swelling in any area
- Pain in the abdomen
- New onset of pain

- Rash
- Redness, heat or swelling around a HICKMAN®/PICC line or catheter

It is important to recognise the signs and symptoms of infection and to report any suspected infection to your doctor or nurse immediately, even if this is out-of-hours of your usual clinic times.

Even a minor infection in someone with a weakened immune system has the potential to develop into something more serious if not treated promptly.

How is infection diagnosed?

Any number of the signs and symptoms above can strongly indicate that an infection is developing. In addition, your doctor or nurse will carry out routine blood tests regularly to check for signs of a low white blood cell count.

If your blood tests indicate you have a low white blood cell or neutrophil count, your doctor or nurse will perform tests to monitor you for further signs of infection. This will include a full assessment of your temperature, pulse, blood pressure and breathing rate (known as your vital signs).

As many bacterial, fungal and viral infections have similar signs and symptoms, your doctor may perform further tests to identify which type of organism is causing the illness, which can guide how to treat it. These tests can include:

- A swab sample of any suspected sites of infection e.g. the throat
- More detailed blood tests
- A urine analysis
- A stool (poo) sample

Following diagnosis of an infection, a course of treatment will be started.

How is infection treated?

Serious infection can cause other complications, reduce quality of life and may even be fatal. For these reasons, it is important to treat infection as it occurs or, in some circumstances, to take prophylactic (preventative) treatment.

The treatment for infection depends on the cause, location and severity of the infection.

Bacterial infection

Infection caused by bacteria, for example urinary tract infections and most types of pneumonia, are treated using antibiotics. Depending on the severity of the

infection, you may be treated at home or may need to be admitted to hospital. Most GPs make this decision using a scoring system known as the CRB-65, which evaluates confusion, respiratory rate and blood pressure. Mental confusion, a high respiratory rate (significantly more breaths per minute than usual) and low blood pressure can all be signs of a more serious infection.

If you are admitted to hospital for treatment, you may be given antibiotic tablets or antibiotics through an intravenous (into the vein) infusion. Treatment at home usually consists of a course of antibiotic tablets (typically over a period of 7 days) and plenty of rest and fluids.

It is essential to finish taking a prescribed course of antibiotics, even if you feel better, unless a healthcare professional tells you otherwise. If you stop taking an antibiotic part way through a course, the infection may return or the bacteria can become resistant to the antibiotic.

Vaccination is possible for some types of bacterial infection. An example is the pneumococcal vaccine, which offers protection against some types of pneumonia, meningitis and septicaemia. It is

recommended that all myeloma patients get the pneumococcal vaccine every five years.

Viral infection

Antibiotics are not effective against viral infections. Viral infections include influenza (flu) and varicella zoster virus (the virus that causes chickenpox and shingles). Some viral infections may be treated with antiviral medications (e.g. aciclovir). People with weakened immune systems, such as myeloma patients, may be given prophylactic antiviral medication alongside their anti-myeloma treatment.

Vaccination is also possible against some viral infections; an example is the flu vaccine, which myeloma patients are recommended to have every year. New flu vaccines are produced every year because the viruses that cause flu rapidly change. An annual vaccine is therefore developed to protect against the strains of flu virus most likely to be circulating over the forthcoming winter.

For more information see the [Vaccines and myeloma Infosheet](#) from Myeloma UK

Fungal infection

Fungal infections are not as common as bacterial or viral infections. Fungal infections commonly found in myeloma patients include candida, which can cause candidiasis (commonly referred to as thrush or a yeast infection) and aspergillosis, which usually affects the lungs.

Minor fungal infections, such as those infecting the skin, can be treated using antifungal creams. More serious fungal infections will need antifungal tablets (e.g. fluconazole) or an intravenous (into the vein) antifungal infusion.

Immunoglobulin treatment

Some myeloma patients may be given intravenous immunoglobulins (IGs). These are antibodies collected from donated blood, which give added protection against common infections. Intravenous IGs are given to some myeloma patients who have low levels of IGs of their own, and who are getting repeated infections despite antibiotic treatment.

Reducing the risk of infection

By taking reasonable precautions and remaining vigilant against any signs and symptoms, myeloma patients can reduce their risk of infection.

Some of the risk of infection is reduced when the underlying myeloma is brought under control with treatment. The bone marrow is often able to recover and will start producing normal amounts of neutrophils and other white blood cells, which allows the immune system to function more effectively.

If your white blood cell levels do not begin to improve after anti-myeloma treatment your doctor might prescribe granulocyte-colony stimulating factor (G-CSF) treatment, which stimulates your bone marrow to make more white blood cells.

If your anti-myeloma treatment itself is lowering your white blood cell counts, it may be necessary to temporarily postpone treatment or reduce your treatment dose until your white blood cell levels begin to return to normal. Your doctor will advise you.

It is usually more effective to prevent rather than treat infection, though this is not always easy to do. Occasionally, treatment may

be given when there are no signs of infection. For example, patients undergoing high-dose therapy and stem cell transplantation will usually be given prophylactic (preventative) antibiotic, antifungal and antiviral treatment. This is because their immune system will be extremely weakened as a consequence of receiving the high-dose chemotherapy that forms part of the transplant process. Prophylactic treatment in these patients helps to prevent potentially serious infections from taking hold.

Although there is little you can do to prevent your white blood cell count from dropping because of the myeloma or the effects of treatment, there is a lot you can do to help reduce the risk of getting an infection:

Tips for avoiding infection

- Regularly washing your hands with soapy water to avoid the transfer of germs. This is the most important factor when it comes to reducing the risk of picking up an infection
- Carrying sanitising hand gel for occasions where you do not have access to soap and water

- Encouraging close family and friends to also regularly wash their hands
 - Keeping your skin moisturised to reduce the risk of skin cracks and wounds
 - Avoiding sharing of towels or clothes
 - Practising good kitchen hygiene i.e. chilling foods, separating raw and cooked meats, only eating food that is in date and using separate chopping boards for preparation of different foods
 - Keeping wounds or sores clean. Try to avoid getting cuts and scratches, particularly when gardening
 - Maintaining good oral hygiene, using antimicrobial mouth rinses if necessary
 - Keeping your vaccinations up-to-date e.g. the annual flu vaccine and 5-yearly pneumococcal vaccine
 - Encouraging close family members to also get the annual flu vaccine
 - Being vigilant for the signs and symptoms of infection and reporting them immediately to your doctor or nurse
 - Taking your temperature if you suspect you have an infection. A raised or lowered temperature is one of the first signs of infection. Therefore, it's a good idea to get a thermometer. Your clinic should be able to provide you with one
- If you have a low white blood cell count you may need to take some extra precautions to avoid infection. These include:
- Only eating fruit or vegetables that have been washed, peeled or cooked
 - Avoiding unpasteurised food and drink (e.g. soft cheeses or unpasteurised milk) and raw or undercooked eggs or meat
 - Avoiding activities that increase the risk of exposure to infection such as damp environments (e.g. Jacuzzis and saunas) and handling pet litter
 - Where possible, avoiding crowded public spaces or public transport immediately after treatment or when white blood counts are particularly low
 - If you find that you are particularly vulnerable to frequent infections, you may find it helpful to wear a facemask on long flights or when taking public transport

Avoiding infection after HDT-SCT

During the period after you have had high-dose therapy and stem cell transplantation (HDT-SCT), you will be especially at risk from infection. Until the transplanted stem cells have had time to get established and start producing new white blood cells, the white blood cell count in your blood will be very low. During this time you will be monitored closely, and will be given strict guidelines to help reduce your risk of infection. This will include advice about diet (as above), and additional measures, such as daily baths/showers, and changing your clothes, towels and bedding daily.

Future directions

Research into new treatments for myeloma aims to develop drugs that target myeloma more effectively as well as minimise side effects such as lowered white blood cell counts.

However, many myeloma treatments have direct effects on the immune system as part of the way they work, and this can cause reduced white blood cell counts and increased risk of infection. Patients taking these drugs will be

carefully monitored for infection and may be given prophylactic antibiotics.

There is also ongoing research into the benefits of prophylactic antibiotics in myeloma. In a recent clinical trial, 977 newly diagnosed patients were given either prophylactic antibiotics or placebo (dummy) tablets during the first stages of their myeloma treatment. The patients given antibiotics had fewer infections, and there was no sign that the antibiotics were becoming less effective against infections (antibiotic resistance). However, a previous study in 212 patients did not show a similar effect in reducing early infections. At present, prophylactic antibiotics are not recommended routinely for newly diagnosed myeloma patients.

About this Infosheet

The information in this Infosheet is not meant to replace the advice of your medical team. They are the people to ask if you have questions about your individual situation.

For a list of references used to develop our resources, visit myeloma.org.uk/references

To give feedback about this publication, email myelomauk@myeloma.org.uk or fill in a short survey at myeloma.org.uk/pifeedback

Other information available from Myeloma UK

Myeloma UK has a range of publications available covering all areas of myeloma, its treatment and management. Download or order them from myeloma.org.uk/publications

To talk to one of our Myeloma Information Specialists about any aspect of myeloma, call our Myeloma Infoline on **0800 980 3332** or **1800 937 773** from Ireland.

The Infoline is open from Monday to Friday, 9am to 5pm and is free to phone from anywhere in the UK and Ireland.

Information and support about myeloma is also available around the clock at myeloma.org.uk

Notes

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We're here for everything a diagnosis of myeloma brings

Get in touch to find out more about how we can support you

Call the Myeloma Infoline on

 **0800 980 3332**

Email Ask the Nurse at

 **AskTheNurse@myeloma.org.uk**

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