

# Antibiotic Guidelines

Antibiotics were first discovered in the middle of the 20<sup>th</sup> century and have since saved millions of lives and practically eradicated previously fatal conditions such as tuberculosis (TB) and smallpox. They remain an important tool in our fight against infection, however overuse and inappropriate use has led to many bacteria becoming resistant to bacteria and has led to “superbugs” such as MRSA which can be fatal. Many previously eradicated conditions such as TB are on the rise again as overuse of antibiotics has led to resistance of bacteria. The rise of “superbugs” and the re-emergence of previously treatable bacteria is likely to be the world’s biggest health treat in the next 30 years.

## Advice given to doctors

Health authorities such as the World Health Organisation give guidelines to doctors to prevent unnecessary antibiotic prescribing and the resulting problems of antibiotic resistance and side effects. The following advice is given to doctors by microbiology experts in relation to antibiotic prescribing:

- Keep antibiotic prescribing to the essential minimum
- Consider the use of a ‘delayed prescription’ where appropriate-this is where a prescription is given to the patient and is only used if really needed. This is a method of reducing antibiotic usage
- Where an antibiotic is not needed, the doctor should consider ‘Non-Prescription’ advice\* (see later in article)
- Prescribe an antibiotic only when there is likely to be a clear medical benefit and for as short a time as possible
- Do not prescribe an antibiotic for viral sore throat, simple coughs and colds; provide a ‘Non-Prescription’ advice\*
- Where antibiotics are prescribed, ensure effective dosage at the upper end of the licensed dosage range
- Doctors should limit prescribing over the telephone to exceptional cases
- Use simple generic antibiotics first whenever possible
- Avoid topical antibiotics (eg. Creams, ointments) which are also available in oral form e.g. fusidic acid (Fucidin cream<sup>®</sup>). Taking antibiotics orally (in capsule or tablet form) leads to faster and more effective treatment and less resistance by bacteria
- Use amoxicillin first-line for chest infections. Streptococcus pneumoniae remains the most common cause of lower respiratory tract infection. Amoxicillin is effective for the great majority of streptococcus pneumonia infections. Doxycycline and rifampicin is an alternative, especially if MRSA positive
- There is little need to ever use ciprofloxacin (Cifox<sup>®</sup>, Ciproxin<sup>®</sup>) or cephalosporins (eg. Zinnat<sup>®</sup>, Distaclor LA<sup>®</sup>, Keflex<sup>®</sup>) in general practice (Non-hospital settings). In general the potential problems outweigh the benefits. They should, therefore, only be used after careful consideration for more serious infections.

## \*Non Prescription advice

An antibiotic prescription is not needed for every patient who presents to a doctor with a suspected infection. Many infections are viral so an antibiotic will **not** be prescribed and the following advice will be given by a doctor to the patient:

- Stay at home and rest if necessary
- Drink plenty of water or soft drinks
- Take paracetamol to reduce your temperature, if feverish or if you are in any discomfort
- You may wish to take other remedies, but please be aware that they may contain paracetamol - do not exceed the maximum daily dose of paracetamol by combining different products - ask your pharmacist
- Ask your pharmacist about other remedies you can safely take to relieve your symptoms
- If you are concerned that your symptoms are getting worse or you are not better in a few days, please phone the surgery for further advice

## Hospital infections

Healthcare associated infections (HCAIs) are infections picked up in a hospital, but also in other healthcare settings such as nursing homes. They affect both patients and healthcare workers.

Medical interventions are associated with a risk of infection for several reasons:

- The underlying illness can leave the patient more vulnerable to infection
- The underlying illness can impair the immune system
- Treatments, including medication, may leave the patient more vulnerable to infections
- Surgery provides opportunities for infection to enter the body
- The use of antibiotics to treat one infection can enable other infection (bacteria, viruses) to thrive in other parts of the body
- The widespread use of antibiotics to treat infection can encourage antibiotic-resistant infection to emerge

## Precautions healthcare staff must take

Infection may be transferred on the hands of healthcare workers or by touching contaminated products or surfaces. It is important for health care workers to:

- Wash or decontaminate hands (with alcohol gel) after contact with each patient
- Have systems in place to avoid introducing or transmitting infection during surgery and other treatments
- Use protective clothing thus minimising the risk of transfer via clothing
- Ensure regular cleaning so that infection are not allowed to build up in the environment
- Doctors must ensure the correct use of antibiotics to minimise the risk of antibiotic resistant infection emerging and to reduce the risk of patients developing clostridium difficile (a serious infection of the intestinal tract caused by over use of antibiotics leading to severe diarrhoea and other complications).

## Pregnancy

In pregnancy avoid tetracyclines, quinolones such as ciprofloxacin(Cifox<sup>®</sup>), ofloxacin(Tarivid<sup>®</sup>), levofloxacin(Tavanic<sup>®</sup>), and high dose metronidazole (Flagyl<sup>®</sup>). If an antibiotic is needed during pregnancy, penicillins are usually the first choice as most are safe to be prescribed during pregnancy. Your doctor will advise you.

## Antibiotic Resistance

Antibiotics are grossly overused in Ireland. This is a major cause of the rise of resistant strains of bacteria including superbugs such as MRSA and previously eradicated tuberculosis. Antibiotics should only be prescribed for confirmed and severe bacterial infections. They should not be prescribed for viral infections which are the cause of over 80% of colds and flus. According to a 2009 report on health care associated infection by the Royal College of Physicians of Ireland, Ireland is one of only three countries in Ireland where antibiotic use is increasing. Unlike other countries, there is no clear policy to limit antibiotic prescribing to when it is actually needed. This has resulted in Ireland having higher antibiotic resistance than other countries and is a ticking time bomb.

## HSE Antibiotic awareness campaign

The HSE launched a new campaign in 2011 with the key message that “Antibiotics are wasted on colds and flu”. By taking antibiotics when they aren’t needed means that they will not work when you really need them for a serious infection. Taking antibiotics for a viral illness, such as a cold or flu, is of no benefit to you and is a waste of a precious life saving resource. If antibiotics are taken when they are not needed, it enables bacteria to become resistant to antibiotics. The bacteria are no longer killed by the antibiotics and this leads to more serious infections. This means that antibiotics may not work for infections when you really need them such as serious blood infections and pneumonia. The bacteria are developing resistance faster than the pharmaceutical industry can develop new antibiotics. The world is fast running out of antibiotics.

## Don’t use antibiotics for coughs and colds

Antibiotics will not speed up your recovery or make you feel better if you have a viral illness. Most common infections such as common colds, coughs or flu don’t need antibiotics, they get better by themselves. Antibiotics are only effective against bacterial infections and can be lifesaving in certain infections such as meningitis, pneumonia and TB. We need to keep antibiotics for when we really need them. Taking antibiotics when they are not needed causes bacteria to become resistant to antibiotic treatments. So when antibiotics are needed in the future they will not work. Antibiotics can cause side effects such as diarrhoea, nausea and skin rashes. About one in five people taking antibiotics get side effects. Taking antibiotics when they are not needed puts your health at risk.

## Clostridium difficile

Clostridium difficile, the major cause of antibiotic-associated diarrhoea and colitis (inflammation of the colon), is an infection that is many picked up in hospitals due to antibiotic use and mostly affects elderly patients with other underlying diseases. It can prove fatal, especially in frail patients. The main risk is to those with one or more of the following factors:

- Being over 65 years of age
- Having previous antibiotics in the last two to three months
- Being debilitated
- Poor immune system
- Having a recent C. difficile infection

*C. difficile* is an anaerobic bacteria present in the gut of less than 5% of healthy adults. It is common in the intestine of babies and infants, but does not cause disease because its toxins do not damage their immature intestinal cells. *C. difficile* can cause diarrhoea, ranging from a mild disturbance to a very severe illness with ulceration and bleeding from the colon (colitis) and at worst, perforation of the intestine leading to peritonitis. It can be fatal. Generally, it is only able to do this when the normal, healthy intestinal bacteria have been killed off by antibiotics. Patients with *C. difficile* produce large numbers of spores in their liquid faeces which can cause aerosol and contact contamination in the general environment. These can survive for a long time. People can become infected by touching contaminated surfaces or faecal material which makes it very contagious. The spores are not killed by alcohol based products and thus hand washing and the use of chlorine-based disinfectant cleaning agents are important. Most infections occur in hospitals, care homes etc. Patients who have been treated with broad spectrum antibiotics within about the last three months are at greatest risk of *C. difficile* disease.

## **MRSA**

*Staphylococcus aureus* (*S. Aureus* for short) is a bacterium that occurs on human skin and mucosa (eg) nose. It can cause severe disease, particularly if there is an opportunity for the bacteria to enter the body. Skin and wound infections, urinary tract infections, pneumonia and bacteraemia (bacteria in the blood) may develop. Most strains of the bacteria are killed by most antibiotics, and infections can be effectively treated. However some *S. Aureus* bacteria are resistant to the antibiotic meticillin. Hence the name: Meticillin Resistant *Staphylococcus Aureus* (MRSA).

*S. aureus* is present on the skin or nostrils of about one third of the population. Less than 1% of the UK population living at home is estimated to have MRSA rising to 22% of patients in a care home, whilst 82% of those with MRSA infection are over 60 years old. It is important to distinguish between colonisation and infection due to MRSA.

Colonisation of a wound is when MRSA occurs on a wound but does not cause infection so will not prevent healing and does not require antibiotic therapy. However, it makes the person more prone to MRSA infection and more likely to spread it to others.

In hospital attempts are made to eradicate colonisation in order to prevent spread to other patients, especially those with open wounds or invasive devices (eg. Catheters, artificial feeding tubes), who could be at risk of serious infection if they acquired MRSA.

However, decolonisation is rarely necessary in the community, except for patients awaiting hospital admission for certain surgical procedures such as hip replacement or cataract removal. In these circumstances the following regimen is recommended:

- Octenisan<sup>®</sup> wash solution used once a day for bathing and hair wash.
- Mupirocin nasal ointment (Bactroban<sup>®</sup>), applied to the internal surfaces of the nostrils three times daily for ten days.

When there is clinical evidence of infection, antibiotic therapy may be required. When antibiotics, for any reason, are needed in a patient who is MRSA positive, certain antibiotics which can kill MRSA (e.g. doxycycline, rifampicin) is required.

## Penicillin Allergy

Patients commonly report minor skin reactions and stomach upsets as penicillin allergy. However many of these are not actually an allergic reaction, therefore patients are often inaccurately classified as allergic to penicillin. It must be remembered that in general up to one in five people have side effects such as nausea from antibiotics. Up to 10% of patients allergic to penicillin are also allergic to cephalosporins (eg. Zinnat<sup>®</sup>, Distaclor LA<sup>®</sup>, Keflex<sup>®</sup>). Penicillin and the cephalosporins must be avoided where there is a history of immediate allergic reactions to penicillins i.e. anaphylaxis, swelling or rash

## Common Prescribing Dilemmas

### Cephalosporins (eg. Zinnat<sup>®</sup>, Distaclor LA<sup>®</sup>, Keflex<sup>®</sup>)

There is confusion over the place of the cephalosporins in modern antibiotic therapy and concern over the development of resistance to the newer cephalosporin antibiotics.

Their widespread use is unnecessary and may lead to the development of antibiotic resistance.

Antibiotic associated diarrhoea are particularly associated with these broad spectrum antibiotics.

Broad spectrum antibiotics are antibiotics that kill a wide range of bacteria but can lead to more antibiotic resistance. A narrow spectrum antibiotic is one which treats a more specific group of bacteria (eg) Erythromycin, Clarithromycin.

### Quinolones (eg) Ciprofloxacin, ofloxacin

These are the most associated antibiotics with clostridium difficile (severe diarrhoea related infection caused by antibiotic use). Resistance to quinolones is also increasing. Many MRSA strains are resistant. They should be used in severe infections only. They tend to have more side effects than antibiotics such as penicillins. Quinolones are all involved in drug interactions. Of particular concern are tendonitis and tendon rupture with ofloxacin and ciprofloxacin. The interaction of ciprofloxacin and theophyllines (used for asthma) is potentially life threatening. Quinolones may cause seizures in patients with or without a history of seizures; Taking NSAIDs (anti-inflammatory drugs eg. Ibuprofen, Diclofenic) at the same time as quinolones may also induce seizures. They should be used with caution in patients with a history of epilepsy or conditions that predispose to seizures.

### Macrolides (eg) Erythromycin, Clarithromycin

There is evidence that in some patients, clarithromycin is better tolerated than erythromycin.

Haemophilus influenzae is intrinsically resistant to erythromycin. Clarithromycin and azithromycin are therefore preferable for treating COPD (bronchitis infections), pneumonia and some ear infections.

There is no reason to use the more expensive modified release form of clarithromycin (ie) Klacid LA<sup>®</sup>

### Trimethoprim & co-trimoxazole interaction with methotrexate

Co-trimoxazole (Septrin<sup>®</sup>) is now rarely used as it is associated with a number of rare but serious side effects. Trimethoprim is still used, mainly for urinary tract infections. The use of methotrexate tablets for a number of medical conditions including arthritis and ulcerative colitis has increased over recent years. All patients are given a supplement of folic acid to help the body withstand the effects of the methotrexate and reduce some of the side effects. Patients should not take co-trimoxazole or trimethoprim whilst taking methotrexate as the medications can interact.

## Choice of Suitable Drug

Before choosing an antibiotic the doctor must first consider two factors, the patient and the bacteria causing the infection.

Factors related to the patient which must be considered include history of allergy, renal (kidney) and hepatic (liver) function, susceptibility to infection (i.e. immune system is weak due to illness), ability to tolerate drugs by mouth, severity of illness, ethnic origin, age, whether taking any other medication and if female whether pregnant, breast feeding or taking an oral contraception.

Before starting therapy the following should be considered:

- Viral infections should not be treated with antibiotics
- Samples should be taken to check which bacteria are present. Antibiotics should only be prescribed for known bacteria that are present. Prescribing antibiotics for the unexplained pyrexia (temperature rise) can lead to further difficulty in establishing diagnosis.
- General narrow spectrum antibiotics are preferred to broad spectrum antibiotics unless there is a clear clinical indication (e.g. life threatening sepsis). The prescribing of the so called “standard” dose in serious infections may result in failure of treatment or even death of the patient. It is therefore important to prescribe the dose appropriate to the condition. An inadequate dose may increase the likelihood of resistance.

## Generic Versions of antibiotics

Most antibiotics have an identical generic substitute available. Generics contain the same drug but can be significantly less expensive. Whelehans stock all the generic equivalent antibiotics. Always ask your pharmacist if there is a generic equivalent of the medicine prescribed for you.

## Summary of Antibiotic Therapy

### Gastrointestinal System

- Gastro-enteritis – Antibacterial not usually indicated. Frequently self limiting and may not be bacterial.
- Campylobacter enteritis – Ciprofloxacin or entromycin. Frequently self limiting treat severe infection.
- Invasive salmonellosis – Ciprofloxacin or cefotaxine.
- Typhoid Fever – Ciprofloxacin or cefotaxine.
- Clostridium Difficile Infection – Oral metronidazole or oral vancomycin treat for 7 to 10 days. Use vancomycin for severe infection or in patients intolerant of metronidazole.

### Cardiovascular System

- Endocarditis: Initial “blind” therapy Flucloxacillin (or benzylpenicillin if symptoms less severe) + Gentomycin
- Endocarditis caused by staphylococci
- Flucloxacillin (or vancomycin + rifampycin if penicillin allergic or infection caused by MRSA)

### Respiratory System

- Haemophilus Influenzae epiglottitis (cefotaxime or chloramphenicol- give intravenously)
- Exacerbation of Chronic Bronchitis- Amoxicillin or tetracycline or macrolides such as erythromycin / clarithromycin
- Uncomplicated Community acquired pneumonia –Amoxicillin or erythromycin (if penicillin allergic)
- Severe Community acquired pneumonia – Cefuroxime (or cefotaxime) + erythromycin/clarithromycin. Add flucloxacillin if staphylococci is suspected

### Urinary Tract

- Acute Pyelonephritis – A broad spectrum cephalosporin (eg) Cefaclor or a quinolone (eg) ciprofloxacin
- Acute prostatitis – A Quinolone or trimethoprim
- Lower urinary tract infection – Trimethoprim or nitrofurantoin or amoxycillin or oral cephalosporin

### Genital Systems

- Syphilis – Doxycycline or erythromycin
- Uncomplicated gonorrhoea- Ciprofloxacin
- Chlamydia – Doxycycline or azithromycin – Treat with doxycycline for 7 days or with azithromycin as a single dose
- Bacterial Vaginosis – Oral or topical metronidazole or topical clindamycin

### Blood

- Septicaemia - -A broad spectrum anti-pseudomonal penicillin (eg) Tazocin<sup>®</sup>, Timentin<sup>®</sup> or a broad spectrum Cephalosporin (eg) Ceftazidime, cefotaxime

### Musculoskeletal system

- Osteomyelitis – Flucloxacillin or Clindamycin if penicillin allergic

### Eye

- Purulent Conjunctivitis – Chloramphenicol or gentamycin eye drops

### Ear / Nose and Oropharynx

- Ulcerative Gingivitis- Metronidazole or amoxicillin. Antibiotics required only if there are signs of infection. Treat for 3 days or until symptoms resolve.
- Dental abscess- Amoxicillin or metronidazole
- Throat Infections- Penicillin (Calvepen<sup>®</sup>) or erythromycin if penicillin allergic. Most throat infections are caused by viruses and many do not require antibiotic therapy. It is best to prescribe antibiotics as precaution if patient is immuno- compromised
- Sinusitis- Amoxicillin or doxycycline or erythromycin

### Skin

- Cellulitis skin infection - Penicillin (Calvepen<sup>®</sup>) + Flucloxacillin (or erythromycin alone if penicillin allergic)
- Animal and Human Bites – Co-Amoxiclav alone (or doxycycline + Metronidazole if penicillin – allergic). Cleanse wound thoroughly. For tetanus prone wound give tetanus vaccine if not tetanus covered
- Acne – treatment of acne should be commenced early to avoid scarring. Mild to moderate acne is generally treated with topical preparations (creams, gels) Systemic treatment with oral antibiotics is generally used for moderate to severe acne or where topical treatment is ineffective. Another oral preparation (for women only) is the contraceptive called Cilest<sup>®</sup>. In severe acne, unresponsive to prolonged courses of antibiotics, referral to a consultant dermatologist is advised who may prescribe isotretinoin (Roaccutane<sup>®</sup>)

**Disclaimer: Information given is general; Please ensure you consult with your healthcare professional before making any changes recommended**

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