HEALTHCARE ASSOCIATED INFECTIONS – FACTSHEET / FAQs

There is considerable interest in healthcare associated infections, and it is important that patients understand what their risk of infection might be if they go into hospital or receive healthcare treatment. Healthcare associated infection is a complex subject and unfortunately some of the information currently in circulation can be misleading. This factsheet aims to explain some of the issues and provide a starting point for further discussion with your doctor.

- **What does the term “healthcare associated infection” (HCAI) mean?**

  “Healthcare associated infection” refers to infections that occur as a result of contact with the healthcare system in its widest sense - from care provided in your own home, to primary care, nursing home care and care in acute hospitals. The term has recently been coined in recognition that increasingly complex procedures are undertaken outside hospitals. Previously, when most complex healthcare was hospital based, the term hospital acquired infection was used (see next entry).

- **What does the term “hospital acquired infection” (HAI) (also known as nosocomial infection) mean?**

  “Hospital acquired infection” has a strict definition. It refers to an infection which develops in a patient 48 hours or more after admission to a hospital. Infections that occur within the first 48 hours are considered to be derived from the community and were incubating prior to admission. These are then referred to as community acquired infections (see next entry).

- **What does the term “community acquired infection” (CAI) mean?**

  “Community acquired infection” is any infection which a patient is suffering from when they come into hospital or occurs within the first 48 hours of admission. In this latter case, it is assumed that the patient was already incubating the infection which they picked up in the community prior to admission.

  The 48 hour cut-off is somewhat arbitrary as infections have variable incubation periods. Nevertheless, some standard definition is useful when considering likely sources of infection and 48 hours has remained the standard for many years.

- **What is a “hospital outbreak”?**

  An outbreak is any two or more cases of an infection of the same type, where a common link can be established. A hospital outbreak simply reflects a link with the hospital. Some outbreaks in hospitals may be a reflection of whatever is circulating in the community but the close confines in hospital present opportunities for spread - for example the viral gastroenteritis caused by the norovirus, which is also know as “winter vomiting disease”. (Similar outbreaks are sometimes experienced in other confined locations such as cruise ships). Other hospital outbreaks are as a result of hospital spread - e.g. antibiotic associated diarrhoea caused by the bacterium *Clostridium difficile*.

- **Why do people develop infections linked to healthcare?**

  People are admitted to hospital either because they are already ill or they require some form of procedure. Commonly this will be surgery but people may also be admitted for special investigations.

  In any of these situations the body is compromised and is not behaving in the same way as a healthy body. People who are ill on admission to hospital will already have an immune system that is compromised in some way. This underlying illness makes them more prone to developing infection.
Infections can be caused by bacteria or by viruses. Bacterial infections can be treated with antibiotics; but with most viral infections it is only possible to treat the symptoms, not the virus itself.

Surgery will also suppress the immune system, while at the same time the body’s first line of defence - the skin - will be breached, allowing organisms to gain access to parts of the body where they can multiply and set up an infection. Similarly, many special investigations will introduce instruments into normally sterile parts of the body. While the instruments themselves will normally be sterile, they inevitably pass through parts of the body that contain normal bacteria and if these bacteria gain access to new sites, infections may be established.

**What are the main categories of healthcare associated infection?**

The main types of healthcare associated infections are:

- Urinary tract infections - e.g. cystitis, kidney infections;
- Lower respiratory tract infections - e.g. brocho-pneumonia, lobar pneumonia;
- Surgical Wound Infections - e.g. stitch abscesses associated with the suturing of a surgical wound;
- Skin Infection - e.g. infected diabetic ulcer, infected varicose ulcer;
- Blood Stream Infections - e.g. septicaemia.

Urinary and respiratory infections are the most common.

**What factors can increase a patient’s risk of infection?**

The severity of any underlying condition and the body’s own ability to fight infection will have a role. Equally, the use of medical devices as part of a patient’s management - e.g. intravenous or urinary catheters - breach the body’s normal defences and increase the risk of acquiring infection. For example, sometimes urinary catheters have to be inserted into the bladder, particularly if a patient is unconscious or has had surgery in or around the bladder or kidneys. This artificial access can be associated with initial colonisation by a person’s normal bacteria which can then lead to an ascending infection into the bladder.

Following surgery, particularly of the chest or abdomen, pain can lead to restricted breathing which may allow a respiratory infection to develop. This is why many patients require chest physiotherapy after surgery and why pain management is so important. By getting the patient to cough and breathe normally, access to the lungs by pathogens can be avoided.

Finally, the longer a patient remains in hospital, the more opportunity they have of encountering an antibiotic resistant organism, which will require the use of antibiotics that may have more side-effects.

**Are some patients more likely to acquire an infection or to be worse affected if they do get one?**

The sicker a patient is or becomes, the more prone they are to infection. The immune system is not fully developed at birth so the very young are at risk. As the immune system develops, so children are better able to cope with infection. The elderly are also more prone to infection but this may be because they are more likely to have an underlying disease. Patients who are receiving treatment with certain kinds of drugs which suppress the immune system will also be at increased risk.

**Are some surgical procedures more likely to result in an infection than others?**

The more complex a surgical procedure is, the more tissue damage may occur. Where surgery involves sites of the body that are not sterile – for example the gastrointestinal tract - bacteria from the non-sterile sites may gain access to sterile sites and set up infection.
Additionally, where implants are used, some bacteria are able to stick to the plastics and metals and this may help establish an infection.

- **What impact do infections have on patients?**

Infections can range from the mild to the severe and the impact will therefore vary. Any infection, even if mild, will be unpleasant for the patient and can lead to a longer stay in hospital. There can be more complex side effects, including the requirement for further surgery to remove diseased infected tissues and some healthcare associated infections can lead to death.

- **Are some kinds of infection more serious than others?**

Infections do have a spectrum of severity. [The most serious and potentially life-threatening infections are those which affect the organs or which lead to septicaemia.]

Generally, superficial infections are less serious than deep infections. Taking a surgical example, a local skin infection around the wound is easier to manage and treat than a deep abscess associated with surgery. However, all infections have the potential to be severe, depending upon the general state of health of the patient. For example, with urinary tract infections, this may start as a mild infection in the bladder but, with a person who is ill, could go on to affect the kidneys.

With any infection - whether urinary, respiratory, wound or skin - it is possible for the infection to spread into the blood stream and lead to septicaemia and septic shock. This of itself can be fatal if antibiotics are unsuccessful in overcoming the infection.

- **How many deaths occur as a result of healthcare associated infection?**

It is not possible to say with any certainty. Where a patient already has an underlying condition for which they are receiving treatment, it can be difficult to determine whether the condition itself or a subsequent infection was the cause of death.

- **What kinds of bacteria can cause healthcare associated infections?**

Many different kinds of bacteria can cause infection and many can be carried harmlessly in healthy people – this is known as “colonisation”. These bacteria can cause infection when the immune system is compromised or the skin is breached. Certain kinds of bacteria will be associated with certain kinds of infection – for example E. Coli and urinary tract infections; the pneumococcus bacterium with pneumonia; the haemolytic streptococci and Staphylococcus aureus bacteria with skin and wound infections. While some bacteria will be more difficult to treat, the type of bacteria involved is often less important, in terms of the impact on the patient, than the site and kind of infection.

- **What kinds of viruses cause healthcare associated infections?**

The commonest viral cause of healthcare associated infection is probably norovirus, which causes outbreaks of winter vomiting disease every year. However, this is usually a reflection of a community outbreak spilling into the hospital and spreading within the confines of the hospital in particularly vulnerable patients.

- **How are healthcare associated infections identified (diagnosed)?**

Diagnosis of a healthcare associated infection usually requires medical assessment of the patient’s symptoms – for example, redness, swelling, heat and pain. In some cases the diagnosis can be verified by taking samples for laboratory testing. These test results can then be used to monitor
treatment and guide selection of antibiotics. Results from different patients can be collected together to help monitor overall infection rates in hospitals.

It is important to remember that people can carry bacteria harmlessly in and on their bodies. So if they are not displaying clinical symptoms of infection, this will mean they are “colonised” with bacteria, not infected. However it is important to take simple precautions – washing hands and using a handkerchief – to avoid passing your bacteria on to other people who may be more susceptible to developing an infection.

- **Can healthcare associated infections be prevented?**

  The majority of infections cannot be prevented. This is because most infections occur as a result of bacteria which we routinely carry on and in our own bodies either gaining access through surgery to sites which are normally sterile or being able to overcome the body's immune system as a result of illness. However it has been estimated that about 15% of healthcare associated infections can be prevented. This is because some healthcare associated infections will occur through cross-infection – that is bacteria may be transferred from one person to another - and it is this source of infection which we aim to tackle through prevention and control practices.

- **What do hospitals do to prevent infection?**

  There are a whole range of systems and procedures. Among many other practices, these can include decontamination of equipment, single use instruments, isolation facilities, hand-hygiene, and sterile services for use in theatres.

- **Is there a link between hospital cleanliness and their rates of infection?**

  Research studies have not so far been able to demonstrate a link between general cleaning standards in hospitals and their rates of infection. But there is a lot of evidence that hygiene failure associated with medical devices can lead to infection. That is why infection control systems focus more on those aspects of care which involve direct contact with, or into, the patient’s body.

  Some people express concern that the spread of MRSA might be linked to hospital cleaning standards. In fact the main driver for the spread of antibiotic resistant bacteria, such as MRSA, is the use of antibiotics.

  But regardless of the implications for infection control, it is reasonable for patients to expect to receive their healthcare treatment in as clean, safe and pleasant an environment as is possible.

- **What is antibiotic resistance?**

  Antibiotic resistance is a term used to describe the ability of bacteria to evade being killed by that antibiotic. Many bacteria are naturally resistant to some antibiotics. This will be because the antibiotic is aimed at a biochemical process that is only present in some bacteria. Other antibiotics attach themselves to particular bits of the bacterium. If a bacterium does not have these elements, the antibiotic cannot attack it.

  In other situations, the bacteria are able to either develop enzymes that destroy the antibiotic or mutate to a form that will not be killed by the antibiotic. This essentially describes the process that has occurred over the years with Staphylococcus aureus (see next entry).

- **What is MRSA?**

  MRSA stands for Methicillin Resistant Staphylococcus aureus. Staphylococcus aureus is a bacterium that can cause infections. It lives on the skin and in the noses of up to 30% of the population, where it
is carried harmlessly. However, it can cause infections that range from mild to severe e.g. boils, abscesses, osteomyelitis.

Most Staphylococcus aureus strains are now resistant to penicillin because the common strains are able to produce an enzyme which attack penicillin. As this resistance first developed in the 1950’s, chemists developed an antibiotic, called methicillin, that was not destroyed by the penicillin-resistant bacteria. However, soon after the introduction of methicillin, strains of Staphylococcus aureus which were resistant to it began to appear. This was due to a structural change in the cell wall of the bacteria. The penetration of these strains into the population spread rapidly during the 1990’s.

- **Are most healthcare associated infections caused by MRSA?**

No. Monitoring of bloodstream infections in Welsh hospitals shows that the majority of bloodstream infections are caused by other kinds of bacteria. Only about 4% of infections are caused by the antibiotic resistant strain of Staphylococcus aureus, while another 4% are caused by strains of Staph aureus which can be treated with antibiotics. More than 90% of infections are caused by other bacteria.

- **Where can I get more information?**

A new publication scheme is being developed that will make available general information on rates of infection within your local hospital trust. However, this can only give a general picture. It is important for individual patients who are going into hospital to talk to their doctor about the risks that are associated with their admission. Infection is only one of the risks, and the patient’s individual circumstances are best understood and explained by their medical advisors.

**Glossary of Terms**

- **Infection** – when bacteria and other micro-organisms are deposited or multiply in tissues or on the surface of the body. The process by which a disease is communicated from one person to another.

- **Bacterium** – small micro-organisms of a primitive form. Equivalent to terms like “germs”, “microbes” and “micro-organisms”.

- **Virus** – infective agents responsible for some of the most important diseases affecting man e.g. influenza and smallpox.

- **Colonisation** - bacteria and micro-organisms are present but the response is slight or absent. For example, a normal area of skin, or the nose, where organisms are multiplying, but without any response.

- **Pathogen** – disease causing organisms.

- **Incubation period** – period between when a person first becomes infected by some agent and the first appearance of symptoms of the disease.