Meningitis and meningococcal disease – adults get it too

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Meningitis is a serious and life-threatening disease. While under five year olds are most at risk of meningitis in Ireland and throughout Europe, it is important to remember that adults contract meningitis as well.

The aim of this article is to discuss meningitis in relation to diagnosis, transmission, treatment and after-effects for adults. It will also include two case studies, one bacterial and one viral. While most individuals recover with no after-effects, recovery from meningitis can take many months. Understanding the range of after-effects can help healthcare professionals appreciate the true impact of the disease.

WHAT IS MENINGITIS?
Meningitis is an inflammation of the meninges, which are the membranous tissues surrounding the brain and part of the spinal cord. Bacteria, viruses and, more rarely, fungi are the main causes of meningitis.

Some bacteria that cause meningitis can also cause septicaemia and the two (meningitis and septicaemia) can occur separately or together. Meningococcal disease is the term used when both meningitis and septicaemia are caused by Neisseria meningitidis.

Bacterial meningitis
Bacterial meningitis is a medical emergency which requires early diagnosis, rapid transport to hospital and urgent medical treatment.

It is usually caused by infection with one of the following organisms: Neisseria meningitidis (meningococcal) (see Figure 1), Streptococcus pneumoniae (pneumococcal) or Haemophilus influenzae B (Hib). The adult population, in particular those aged over 64 years, are the second most at-risk group from meningitis, more commonly pneumococcal meningitis.

Many of the bacteria that cause meningitis occur commonly and are often harmless commensals of the nose and throat (Donovan & Blewitt, 2009). Transmission occurs between individuals who have close, prolonged contact through coughing, sneezing and intimate kissing. Approximately 10 per cent of the general population will carry meningococcus harmlessly in the nasopharynx, developing natural immunity within 14 days. This increases to 25–30 per cent in teenagers due to altered social behaviour, such as smoking (results in carriage of bacteria for longer periods of time) and intimate kissing (MacLennan et al, 2006). Carriage normally helps to improve natural immunity; however, in a small number of individuals, the bacteria crosses the nasopharyngeal membrane into the bloodstream where it multiplies rapidly and crosses the blood–brain barrier leading to inflammation of the meninges.

In 2008, there were 253 reported cases of bacterial meningitis in Ireland, 168 cases of invasive meningococcal disease (IMD) (149 [89 per cent] of those were Neisseria meningitidis serogroup B), 22 cases of pneumococcal disease, 4 cases of Hib, 6 cases of Group B Strep and 38 others (HPSC, 2009).

In 2008, four cases of meningococcal C meningitis were recorded, all four occurred in adults aged 17–46 years. Four (50 per cent) of the deaths due to IMD occurred in adults aged >20 years. The mortality rate for bacterial meningitis is 10 per cent with an estimated 15–25 per cent of survivors being left with varying degrees of after-effects (The Meningitis Trust, 2007).
**Viral meningitis**

Viral meningitis is more common than bacterial meningitis and is rarely life-threatening (Logan & MacMahon, 2008). Many cases are mild and can be mistaken for influenza, but it is important to remember that, in some cases, individuals can become very ill, resulting in a slow recovery. It is commonly caused by infection with enteroviruses, herpes simplex and mumps. Viral meningitis can occur in infants and children but is more commonly reported in adults.

In 2008, 97 cases of viral meningitis were notified in Ireland (HPSC, 2009). Viral meningitis activity tends to be highest in the second half of the year.

**RECOGNITION**

Due to a high mortality rate and rapid deterioration prior to admission to hospital, early recognition, diagnosis and treatment are vital. Early treatment can also affect outcome in relation to the after-effects experienced by an adult who survives meningitis.

In the early stages, the symptoms of meningitis may be similar to other common illnesses, such as influenza and, more recently, swine flu. Differentiating between meningitis and swine flu in the early stages can be difficult. Meningitis can develop quickly and, in some cases, will become life threatening within hours of the first symptoms occurring. A high index of suspicion is vital to avoid missing anyone presenting with early flu-like, non-specific symptoms. Patients should be monitored every four to six hours for any changes or disease progression.

There are, however, characteristic features of meningitis that may be easier to recognise. Adults may complain of neck stiffness, photophobia, muscle or joint pains and a severe headache. They may also be confused, be in respiratory distress or have impaired consciousness. Anyone developing these symptoms should seek medical advice.

The signs and symptoms of viral meningitis are similar to those of bacterial meningitis thus making it difficult to distinguish between them without further investigation (Logan and MacMahon, 2008).

**SEPTICAEMIC RASH**

Where septicaemia is present, adults will have signs of circulatory failure such as cool peripheries and delayed capillary refill (more than two seconds). Research has highlighted the need to identify the early signs of sepsis (cold hands and feet, leg pains, pale or blotchy skin). Thompson et al (2006) showed that these signs and symptoms occur much earlier than the classic features of meningitis as described above.

The septicaemic rash occurs primarily with meningococcal septicaemia, so it is vital to remember not all types of meningitis will produce a rash. The rash is a result of the high levels of endotoxins produced by the invading bacteria. This leads to damage of the endothelial lining of the capillaries, resulting in capillary leakage and the classic haemorrhagic rash. Figure 2 shows an image of the septicaemic rash with non-blanching petechiae.

Where a rash is present with other signs of a febrile illness in a child or adult, it is important to make a thorough examination as it is easy to miss one petechia amongst a widespread maculopapular rash (Brogan and Raffles, 2000). The rash can be difficult to see on darker skin and it may help to check the conjunctivae, under the lower eyelid, palms of hands, soles of feet and palate.

**Figure 2. Septicaemic rash. (Source: The Meningitis Trust.)**

Adults may not appear severely ill in the early stages of illness, but may rapidly deteriorate even following admission to hospital. Not all the symptoms appear at one time, and the rash may appear very late, if at all. It is therefore important to have a high index of suspicion with patients who present with non-specific signs and symptoms.

**SURVIVING MENINGITIS – CASE 1**

**Nick’s Story**

My name is Nick. I’m 34 years old and I’m from Wales. I’ve lived in Ireland for almost seven years. Back in May 2006, I thought I was coming down with the flu. I was running the electrical side of a new development in Bray, Co Wicklow. I spent nine days lying on my sofa, thinking I only had the flu, although I have never felt so ill in my life. I went into work after the ninth day, I was sweating so badly, even my shins were soaking wet. I was shaking from head to foot. To make matters worse, I was working on top of a 13-foot stepladder all morning.

At around 12.30pm, I took a delivery of cable tray and trunking. I started to feel very ill. As I was waiting for the second delivery van to reverse, I collapsed in the middle of the road.

I woke up talking to two paramedics. I didn’t know my name, age, or where I was from. They took me to St Vincent’s Hospital in Dublin with the blue lights going – that scared me! I knew something was very wrong.

The doctor spoke to my sister and told her it was 50/50 if I’d make it through the night. Thankfully, I made it through. I’m okay, but some people are not so fortunate. I’m a big, strong boy, 5 foot 10 inches and 16 stone. The meningitis nearly killed me. I’m an ex-boxer, and I’ve never lost a fight!

Since I got sick, I’ve developed epilepsy. The depression is something I’ve never known before. I’m a fun-loving guy, but this has changed my life in a very big way. I’ve had about eight fits to date and, as a result, I can’t work. I’ve only ever been an electrician, I don’t know anything else. I can’t do my job, because I have to wait at least one year before I can go onto a building site.

My last seizure was about four weeks ago, cooking dinner would you believe? One minute, I was making shepherd’s pie, the next, I was on the floor with my girlfriend Liz asking me to talk to her. I’m getting there though.

The Meningitis Trust has been there for me from day one. Lisa has been a fantastic help. I’ve been able to call her whenever I’ve felt down.
For your patients with type 2 diabetes struggling to gain glycaemic control on oral monotherapy

**ONGLYZA™ 5mg film-coated tablets (saxagliptin). Abridged prescribing information.**

Consult Summary of Product Characteristics (SmPC) before prescribing.

**Presentation:** 5 mg saxagliptin (as hydrochloride) film-coated tablets.

**Uses:**

- **Adults:**
  - For Type 2 diabetes mellitus patients to improve glycaemic control in combination with: metformin, when metformin alone, with diet and exercise, does not provide adequate glycaemic control; sulphonylurea, when sulphonylurea alone, with diet and exercise, does not provide adequate glycaemic control in patients for whom use of metformin is considered inappropriate; and thiazolidinedione, when thiazolidinedione alone with diet and exercise, does not provide adequate glycaemic control in patients for whom use of a thiazolidinedione is considered appropriate.

**Dosage:**

- **Adults:** 5 mg once daily as add-on therapy with or without food at any time of the day. When used in combination with a sulphonylurea, consider a lower dose of sulphonylurea to reduce the risk of hypoglycaemia.

**Children and Adolescents:** Not recommended.

**Moderate Hepatic Impairment:**

- Use with caution.

**Severe Hepatic Impairment:**

- Not recommended.

**Moderate & Severe Renal Impairment:**

- Not recommended.

**Elderly ≥ 75 years:**

- Use with caution.

**Contraindications:**

- Hypersensitivity to saxagliptin or to any of the excipients.

**Precautions and warnings:**

- Should not be used for the treatment of Type 1 diabetes mellitus or diabetic ketoadiposis or in patients who have had an serious hypersensitivity reaction to a DPP4 inhibitor. Contains lactose, not recommended in patients with rare hereditary galactose intolerance, the Lapp lactase deficiency or glucose-galactose malabsorption. No experience in cardiac failure (NYHA class III-IV) or immunocompromised patients. Recommend monitoring for evidence of skin disorders. **Interactions:**

- Clinical data suggest low risk for clinically meaningful interactions with co-administered medicinal products. The metabolism of saxagliptin is primarily mediated by cytochrome P450 3A4/5 (CYP3A4/5). Caution with potent CYP3A4/5 inducers as glycaemic lowering effect of Onglyza may be reduced. **Pregnancy and lactation:**

- Avoid use during pregnancy unless clearly necessary. Risk to suckling child cannot be excluded – either discontinue breast-feeding or Onglyza therapy.

**Adverse reactions considered to be at least possibly related to Onglyza: Monotherapy:**

- **Common:** Dizziness and fatigue.

- **Initial combination with metformin:**

- **Common:** Gastritis. **Uncommon:** Arthralgia, myalgia and erectile dysfunction.

- **Add-on to metformin:**

- **Common:** Dyspepsia and myalgia. **Add-on to sulphonylurea:** Uncommon: Fatigue, dyslipidaemia and hypoglycaemia. Laboratory tests: small decreases in absolute lymphocyte count were observed but were not associated with clinically relevant adverse reactions. **Legal Category:** Prescription Only Medicine. Marketing authorisation number: EU/1/09/545/006. Marketing Authorisation holder: Bristol-Myers Squibb / AstraZeneca EEC, Bristol-Myers Squibb House, Ubridge Business Park, Sanderson Road, Ubridge, Middlesex, UB8 1DH, UK. Further information is available from Bristol-Myers Squibb Pharmaceuticals, Tel + 353 (1 800) 749 749. ONGLYZA™ is a trademark of the Bristol-Myers Squibb / AstraZeneca group of companies. ©2009 Bristol-Myers Squibb. Abridged prescribing information prepared: 12-2009.

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**NEW onglyza (saxagliptin) 5 mg tablets**

**URN:** 10/0025

**Date of Preparation:** January 2010.

**Mercury Code:** 421900000015604

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2. Onglyza, Summary of Product Characteristics.
While under five year olds are most at risk of meningitis in Ireland, it is important to remember that adults contract meningitis as well.

**DIAGNOSIS, TREATMENT AND NURSING CARE**

Initial diagnosis of meningitis and septicaemia is usually based on patient history and thorough clinical examination. If meningitis/septicaemia is suspected, patients should be transferred to hospital immediately. First-line treatment with intravenous benzylpenicillin is recommended prior to the patient being transported to hospital. This should be administered by a GP or paramedic before the patient is transferred to hospital. Although not as effective, it can be given intramuscularly in shocked patients. Benzylpenicillin is only contraindicated where there is a history of penicillin anaphylaxis (which is very rare).

**Recommended dosage of benzylpenicillin:**
- Adults and children >10 years 1,200mg
- Children 1-9 years 600mg
- Children <1 year 300mg

Penicillin resistance is very rare in Ireland and meningococcus is also sensitive to third-generation cephalosporins.

Depending on how the patient presents, they may require treatment for shock and raised intracranial pressure. Circulatory shock is treated with volume replacement, oxygen therapy and, in severe cases, inotropic support. Where there are signs of raised intracranial pressure and circulatory collapse, lumber puncture is contraindicated and diagnosis should be made on clinical features and blood assays. Raised intracranial pressure can be treated with steroids, such as dexamethasone and, in severe cases, mannitol.

Due to the necessity of early administration of antibiotics, it is not always possible to culture organisms from blood or cerebrospinal fluid (CSF). Other tests, such as polymerase chain reaction (PCR), make it possible to isolate minute quantities of bacterial DNA which is important for relevant treatment and also for accurate epidemiological data.

Viral meningitis can be severe enough to cause raised intracranial pressure and decreased consciousness. Otherwise treatment is primarily symptomatic. Once a diagnosis of viral meningitis has been made, any early anti-biotic therapy is usually stopped. Treatment involves analgesia, hydration and nursing care to alleviate symptoms and discomfort. Unless there are complications, most cases of viral meningitis are self-limiting with recovery occurring in 4-10 days.

**Chemoprophylaxis**

Household contacts (i.e. those living/sleeping in the same household as the index case up to seven days prior to commencement of illness) and those who have come into close contact with a case of meningococcal meningitis and/or septicaemia require antibiotics. Work colleagues and school friends of the patient with meningococcal disease are not at any increased risk unless there has been close, prolonged contact.

If more that one case occurs, antibiotics may be given to a wider group of contacts. Rifampicin is the drug of choice and is given to eliminate the carriage of the organism from the network of close contacts of the case, thereby reducing the spread of the organism to susceptible people.

**After-effects**

The majority of patients survive meningitis and septicaemia and make a full recovery; however, it is estimated that 15 per cent will be left with after-effects. These include complications that arise from damage to various areas of the brain, such as:

- **Visual impairment/cortical blindness** – visual impairment results from raised intracranial pressure which may cause...
neuronal damage to the visual cortex and/or the posterior visual pathways. Visual impairment may be partial or result in cortical blindness.

- **Hearing impairment/sensorineural deafness** – post-meningitic hearing impairment is an important cause of acquired sensorineural deafness. Hearing impairment may be mild to moderate as well as permanent. It is recommended that all patients should have a hearing test, before or soon after discharge from hospital.

- **Neurological complications** – including epilepsy, cerebral palsy, hydrocephalus and cranial nerve palsies are also associated with damage to various parts of the brain, including the cranial nerves.

- **Behaviour problems** – these can include mood swings, aggression and, occasionally, violent temper tantrums.

- **Learning difficulties** – problems can range from subtle issues, such as a mild reduction in IQ and short-term difficulties in concentrating and reading, to severe long-term learning difficulties.

The complications of septicaemia and shock can lead to areas of necrotic tissue and skin loss which may require skin grafting. In more severe cases, limb loss, organ damage and neurological damage can occur.

Alongside the physical complications, anyone who has contracted meningitis may experience other difficulties, such as depression, fatigue and short-term memory loss. These may affect their day-to-day activities including being unable to return to work on a full-time basis, or at all.

The intense tiredness can be very debilitating and recovery involves rest, good diet and gradually increasing exercise. Returning to work too early can lead to exhaustion and can slow down recovery. During this time, patients and their families require a great deal of patience and understanding from themselves and the professionals involved in their care.

Due to the fact that viral meningitis is rarely life-threatening, many sufferers can feel that their illness is taken less seriously and the after-effects they suffer are not always acknowledged. Recovery from viral meningitis can be very slow but is normally complete. However, sufferers can still suffer headaches, tiredness, depression, memory loss and concentration problems.

In more severe cases, limb loss, organ damage and neurological damage can occur.

The after-effects of meningitis and septicaemia are very often complex and affect the whole family. A multidisciplinary team may be required to provide ongoing care and support.

### PREVENTION

Vaccination is the only way to prevent meningitis. There is currently no vaccine available to protect against all types of meningitis but the following vaccines protect against meningitis caused by the relevant bacteria/virus.

**Meningococcal C**

A meningococcal C vaccine is available to everyone up to the age of 23 years and is included in the childhood immunisation schedule. While the risk of the disease is generally low in adults, there is a greater risk for people up to the age of 23 years and again at the age of 64 years and above. Travel vaccines are recommended for people travelling to areas where other types are more prevalent. Travel vaccines include: A&C, A; C, W135 & Y.

There is currently no vaccine to protect against meningococcal group B (Men B), the most common cause of bacterial meningitis in adults in Ireland.

**Pneumococcal**

Two vaccines are currently available, a conjugate vaccine is available for those aged under five years and is currently

attending. My last hurdle was to get the all clear and be able to drive again following the seizure. A year later, I did just that.

When I returned home I got in touch with The Meningitis Trust and their support and understanding was invaluable – they listened, they understood, they supported. They still do and somehow I think they will be in my life forever. I will be always grateful for the support I’ve received and the friendship that has been shown.

At the end of June, I felt well enough to go back to work. Initially on a part-time basis and gradually built up to going back full time in late July. I still get very tired very quickly and have to take regular, short breaks. I have also managed to negotiate a condensed week where I work five days in four, allowing me Fridays off or, if not, allowing me to work from home. This takes its toll but gives me a much-needed three-day weekend and does make a difference.

I have been though an incredible experience. I survived. I still ask the question ‘why?’ but know I’ll never have the answer. I am just thankful for every day and pray that I’ll make the most of each one that presents itself.
included in the immunisation schedule. A polysaccharide vaccine is also available and is currently recommended for all adults over the age of 65 years. It is also recommended for adults and children who have experienced any of the following:

- Diabetes mellitus.
- Chronic heart, respiratory or liver disease.
- Chronic renal disease or nephrotic syndrome.
- Sickle cell disease.
- Those with missing or non-functioning spleens.
- Those with immunodeficiency due to disease or treatment.
- Persons with HIV infection or AIDS.
- Vaccination is not recommended for healthy young adults, as there is little risk of pneumococcal infection.

(Source: HSE, 2008.)

Hib
An effective vaccine against Hib disease was successfully introduced into the childhood immunisation programme in 1992. Most recently, there has been a catch-up booster campaign targeted at those aged under five years due to a slight increase in the incidence of Hib meningitis in the last few years. This vaccine does not protect against any other type of meningitis.

MMR
Prior to the introduction of MMR, mumps was the most common cause of viral meningitis in children aged under five years.

BCG
BCG is routinely offered at birth to all babies. Unlike other types of meningitis that develop quickly, TB meningitis usually develops slowly with vague symptoms, such as aches and pains, loss of appetite and tiredness, usually with a persistent headache. These vague symptoms can last for several weeks before the more specific symptoms of meningitis, such as severe headache, dislike of bright lights and neck stiffness, occur. The slow progression of the disease makes it difficult to diagnose and it is often advanced before treatment begins.

SUPPORT FOR LIFE – THE MENINGITIS TRUST
The Meningitis Trust is a registered charity which focuses on providing 24-hour support through a range of professional services nationwide for people of all ages affected by meningitis. The Trust’s support services include:

- **24-hour nurse-staffed helpline** – that provides information and emotional support (Tel. 1800 523 196).
- **Professional counselling and bereavement support** – confidential face-to-face counselling and bereavement support for people who have had meningitis and their families.
- **Home visits** – trained staff members offer information and support in people’s homes.
- **One-to-one contacts** – these provide an opportunity for individuals to share their experience with others affected by meningitis.

Contact details and further information
If any readers would like to avail of a training session, order literature for your workplace or would like to find out more about support services please contact: Lisa M Slattery RGN BSc MA MSc, Community Services Nurse, The Meningitis Trust, Tel. (01) 845 9488 or email: support@meningitis-trust.ie <mailto:support@meningitis-trust.ie>

For further information, please contact the Meningitis Trust’s 24-hour Freephone nurse-staffed helpline on 1800 523 196 or visit: www.meningitis-trust.ie

The after-effects...are very often complex and affect the whole family. A multidisciplinary team may be required to provide ongoing care and support.

Family days – a fun day and an opportunity for families affected by meningitis to meet and share their experiences.

The Trust also provides education programmes for the public and healthcare professionals and all training sessions can be tailored to suit the needs of any audience.

It produces a wide range of literature which can be obtained free of charge, including symptoms cards, factsheets, posters, leaflets, early years guides for childminders, a teacher handbook, employers’ packs and a children’s book called When Monty had Meningitis for families with a child that has survived meningitis.

References