GUIDELINES FOR

THE PREVENTION OF SEPSIS IN ASPLENIC PATIENTS

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Policy Reference: HP 5.0  Date of Issue: September 2007
Prepared by: Health Protection Team  Date of Review: September 2009
Lead Reviewer: Helen Tissington  Version: 3.0
Authorised by: Area ICC  Date: 13 September 2007

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Version: 1  Date of Issue: September 2007
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Guidelines for the Prevention of Sepsis in Asplenic Patients

BACKGROUND

The role of the spleen in protecting against overwhelming sepsis due to encapsulated bacteria has long been established.\(^1\) The absence of the spleen results in an increased risk of serious sepsis and associated mortality. The risk of death as a result of overwhelming post splenectomy infection (OPSI) has been calculated to be up to 600 times greater than that in the general population, and the estimated lifetime risk of OPSI is 5%.\(^2\) Although the greatest risk is in the first two years a degree of risk will be lifelong.\(^3\) There is some perception that the risk only applies to people in whom there is underlying haematological disease, but a review has concluded that OPSI after splenectomy for trauma in adults is indeed a potential risk.\(^4\) More recent analysis of Scottish data \(^5\) indicates that:

- the risk of severe infection or death is highest in the first three years after splenectomy and then declines significantly;
- the risk of a second or third infection is particularly high among those who have a first severe infection, particularly within six months of the first occurrence;
- the greatest risk is amongst those who have had a splenectomy for haematological malignancy.

It has been known for several decades that immunisation, antibiotic prophylaxis and good advice can reduce the risk of sepsis. Despite this, there is ample evidence that management of asplenic patients is sub-optimal.\(^6\) In addition to patients who have undergone splenectomy, other categories of patients may be functionally hyposplenic; those suffering from sickle cell anaemia, thalassaemia major, essential thrombocythaemia, lymphoproliferative diseases and coeliac syndrome.

Guidelines were published in 1996\(^7\) and updated electronically in 2001.\(^8\) Research indicates that even since their publication best practice preventive measures are not being followed.\(^9\)

After splenectomy, patients are most at long-term risk of infection from *Streptococcus pneumoniae*, but other encapsulated organisms such as *Haemophilus influenzae* and *Neisseria meningitidis* have also been reported as significant pathogens. There is also a greater risk of infections with *Escherichia coli* and *Pseudomonas aeruginosa*; *Capnocytophaga canimorsus* (formerly DF-2) can cause fulminant sepsis following dog bites; blood-borne protozoal infections such as malaria and babesiosis. *Salmonella* is also a common pathogen in sickle cell disease.

Recommended immunisations

1. **Pneumococcal.** *Streptococcus pneumoniae* is a bacterial pathogen that affects children and adults world-wide. The organism colonises the upper respiratory tract, but severe infection can result from dissemination of the bacteria into the bloodstream and the central nervous system. Asplenic individuals are at the highest risk from pneumococcal infection due to reduced clearance of encapsulated bacteria from the bloodstream. Children in this group are at particular risk of fulminant pneumococcal sepsis and subsequent high mortality. Vaccine with a 23-valent polysaccharide vaccine is recommended for asplenic patients over the age of 2 years, but should not be used in those under 2 years as antibody response to the polysaccharide is poor. Pneumococcal conjugate vaccine should be used in young children, as indicated in the following table:
### Vaccines given and when to immunise

<table>
<thead>
<tr>
<th>Patient age at presentation</th>
<th>Vaccine given and when to immunise</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>At-risk children</strong></td>
<td><strong>7-valent PCV</strong></td>
</tr>
<tr>
<td><strong>2 months to under 12 months of age</strong> with asplenia or splenic dysfunction.</td>
<td>Vaccination according to the routine immunisation schedule at 2, 4 and 13 months of age.</td>
</tr>
<tr>
<td><strong>At-risk children</strong></td>
<td><strong>23-valent PPV</strong></td>
</tr>
<tr>
<td><strong>12 months to under 5 years of age</strong> with asplenia or splenic dysfunction.</td>
<td>Two doses, with an interval of 2 months between doses. One dose after the second birthday and at least 2 months after the final dose of PCV.</td>
</tr>
<tr>
<td><strong>At-risk children aged over 5 years and at-risk adults</strong></td>
<td>PCV is not recommended. One dose.</td>
</tr>
</tbody>
</table>

Where possible, the vaccine should be given, together with advice about the increased risk of pneumococcal infection, four to six weeks (but at least two weeks) before splenectomy or the initiation of chemotherapy or other immunosuppressive treatment. In the case of splenectomy following trauma there is evidence that better functional antibody responses seem to occur if vaccination is delayed for 14 days after surgery.\(^\text{10}\)

**Revaccination:** Antibody levels are likely to decline rapidly in individuals who have asplenia or splenic dysfunction and therefore revaccination with 23-valent PPV is recommended every five years. Testing of antibodies prior to vaccination is not required.\(^\text{11}\)

2. **Hib.** Asplenic children and adults, irrespective of age or the interval from splenectomy, should receive the Hib vaccine. Children under 10 years of age should complete the primary immunisation schedule. Children and adults over 10 years who have been fully immunised with Hib as part of the primary schedule should be offered an additional dose of Hib (usually as combined Hib/MenC vaccine). Unimmunised individuals aged 10 years or over should receive two doses of combined Hib/MenC vaccine, two months apart. When splenectomy is performed electively, the vaccine should ideally be given at least 2 weeks earlier.

3. **MenC.** Meningococcal C conjugate (MenC) vaccine is recommended for people with an absent or dysfunctional spleen, although such individuals may have a sub-optimal response.\(^\text{11}\) Children under one year of age should complete the primary immunisation schedule, including a booster of Hib/MenC at 12 months. Children and adults who have been fully immunised with MenC as part of the primary schedule should be offered an additional dose of MenC (usually as combined Hib/MenC vaccine). Unimmunised individuals over one year of age should receive two doses of combined Hib/MenC vaccine, two months apart. When splenectomy is performed electively, the vaccine should ideally be given at least 2 weeks earlier.

When travelling to an area where there is an increased risk of serogroup A, W135 or Y meningococcal infection, asplenic patients require the additional protection conferred by the quadrivalent polysaccharide (ACWY) vaccine.
4. **Influenza.** Annual vaccination against influenza is recommended, preferably in September. Asplenic/hyposplenic individuals are not thought to be at more risk of catching influenza but vaccination may reduce the risk of secondary bacterial infection.

*Guidance on the use of zanamivir, oseltamivir and amantadine for the treatment of influenza* produced by the National Institute for Clinical Excellence (NICE) and endorsed by NHS Quality Improvement Scotland (QIS) should be followed.

This advises that when there is evidence that influenza is circulating in the community at levels above the baseline, antiviral medication for the treatment of influenza in the community may be prescribed for those at risk, provided that treatment can be started within 48 hours of the onset of symptoms.
Antibiotic prophylaxis

The 1996 Guidelines\textsuperscript{6} recommend that prophylactic antibiotics should be offered in all cases. However, it is recognised that compliance may be a problem, and there has also been more recent discussion concerning the increase in penicillin resistance of pneumococci. Though not common in the UK, rates of up to 43\% of isolates with some degree of resistance have been reported in Spain\textsuperscript{13} and travel will bring about increased exposure to resistant strains. The reluctance of some people to take antibiotics on a lifelong basis must also be taken into consideration. Given these factors, people in the following groups should be strongly recommended to receive prophylaxis:

\begin{itemize}
  \item All people in the first three years after splenectomy\textsuperscript{5}
  \item All children up to the age of 16
  \item Individuals in whom there is underlying impaired immune function, (malignancy or haematological condition)
  \item Individuals who have suffered one severe infection – for the following six months\textsuperscript{5}
\end{itemize}

Regardless of whether prophylaxis is used, patient education is of paramount importance regarding:

\begin{itemize}
  \item The fact that immunisation and antibiotic prophylaxis does not guarantee protection against invasive disease.
  \item The need for rapid medical assessment of suspected infections
  \item The requirement to keep a course of antibiotics at home in order to commence treatment prior to medical assessment when this is delayed.
\end{itemize}

Recommended doses for antibiotic prophylaxis:\textsuperscript{7,14}

<table>
<thead>
<tr>
<th><strong>PENICILLIN:</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>500mg 12 hourly</td>
</tr>
<tr>
<td>Child aged 5-12</td>
<td>250mg 12 hourly</td>
</tr>
<tr>
<td>Child under 5</td>
<td>125mg 12 hourly</td>
</tr>
<tr>
<td>Child under 5 (seek expert advice for neonatal doses)</td>
<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th><strong>ERYTHROMYCIN:</strong></th>
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</tr>
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<tbody>
<tr>
<td>Adult and child over 8 years</td>
<td>250-500mg daily</td>
</tr>
<tr>
<td>Child aged 2-8</td>
<td>250mg daily</td>
</tr>
<tr>
<td>Child under 2 years</td>
<td>125mg daily</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>AMOXICILLIN/CO-AMOXICLAV:</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>250-500mg daily</td>
</tr>
<tr>
<td>Child aged 5-14</td>
<td>125mg daily</td>
</tr>
<tr>
<td>Child under 5</td>
<td>10mg/kg/day</td>
</tr>
</tbody>
</table>

Oral phenoxymethylpenicillin is the antibiotic of choice, with erythromycin being offered to patients who are allergic to penicillin.
**Guidelines for the Prevention of Sepsis in Asplenic Patients**

**Travel**

Patients should be made aware of the need to seek travel advice early, even for travel in Europe. Those not taking regular antibiotic prophylaxis should be advised to do so on holiday. Asplenic patients can have live vaccines unless there is an underlying immunosuppressive disorder.

1. **Malaria.** All asplenic patients should be made aware of the increased risk of severe falciparum malaria, and the requirement for antimalarial prophylaxis cannot be overemphasised. Travel to areas where malaria is endemic should be discouraged.

2. **Tick bites.** Babesiosis is a rare potentially severe tick-borne disease caused by infection with a protozoan parasite. Most infections are asymptomatic, though the clinical syndrome can include fever, chills, myalgia, fatigue and jaundice secondary to haemolytic anaemia that may last from a few days to several months. Geographic distribution of the species of ticks that carry the disease is worldwide. Asplenic patients should be educated about the need for protective clothing when walking in areas of forestry or long grass.

**Animal Bites**

*Capnocytophaga canimorsus* can cause febrile illness in patients with impaired immune systems who have been licked, bitten or scratched by dogs or cats. Penicillin G, the antibiotic of choice for these infections, should be given prophylactically to high risk individuals who are bitten by a dog or cat.

**Treatment of acute infection**

General Practitioners attending a known asplenic patient with clinically significant infection should (provided there is no history of penicillin allergy) give an immediate dose of intramuscular or intravenous benzylpenicillin before transfer to hospital.

<table>
<thead>
<tr>
<th>Age</th>
<th>Dosage</th>
<th>Dilute with water or sodium chloride 0.9%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>IM</td>
</tr>
<tr>
<td>Infant under 1 year</td>
<td>300mg</td>
<td>1mL</td>
</tr>
<tr>
<td>Child 1 to 9 years</td>
<td>600mg</td>
<td>2mL</td>
</tr>
<tr>
<td>Child 10 years and over and adult</td>
<td>1200mg</td>
<td>4mL</td>
</tr>
</tbody>
</table>

Intravenous administration should be at a rate of 300mg per minute maximum. So for example, 1200mg, reconstitute with 8mL and give over 4 minutes.

In cases of penicillin allergy, use ceftriaxone. In cases of penicillin anaphylaxis, give chloramphenicol.

**General**

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</table>
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All patients on the NHS Highland splenectomy register are sent a leaflet, *Information about splenectomy for patients* which includes an alert card to be carried in a purse/wallet. Some patients may additionally wish to purchase a MedicAlert bracelet and details are available at [www.medicalert.org.uk](http://www.medicalert.org.uk), or by telephoning 0800 581420.
Guidelines for the Prevention of Sepsis in Asplenic Patients

References


4. Zarrabi HA, Rosner F *Serious Infections in Adults*


12. Scottish Executive Health Department (2007) *Antiviral prescribing for seasonal influenza*

