7

Immunisation of individuals with underlying medical conditions

Introduction

Some medical conditions increase the risk of complications from infectious diseases, and children and adults with such conditions should be immunised as a matter of priority. These groups may also require additional vaccinations or additional doses of vaccines to provide adequate protection.

Immunosuppression

Individuals with immunosuppression and HIV infection (regardless of CD4 count) should be given inactivated vaccines in accordance with national recommendations. However, these individuals may not mount as good an antibody response as immunocompetent individuals. Therefore, wherever possible, immunisation or boosting of HIV-positive individuals should be either carried out before immunosuppression occurs or deferred until an improvement in immunity has been seen.

Further guidance is provided by the Royal College of Paediatrics and Child Health (http://www.rcpch.ac.uk/), the British HIV Association (BHIVA) immunisation guidelines for HIV-infected adults (BHIVA, 2008; http://www.bhiva.org/Immunization2008.aspx) and the Children's HIV Association (CHIVA) immunisation guidelines (http://www.chiva.org.uk/professionals/health/guidelines/index.html).

For individuals due to commence immunosuppressive treatments, inactivated vaccines should ideally be administered at least two weeks before commencement. In some cases this will not be possible and therefore vaccination may be carried out at any time and re-immunisation considered after treatment is finished and recovery has occurred. In the case of live

vaccines, a longer period before immunosuppression commences may be desirable, but the disadvantages of delaying such treatment are often significant. Specialist advice should be sought from an appropriate physician.

In severely immunosuppressed individuals, re-immunisation should be considered after treatment is finished and/or recovery has occurred. Specialist advice should be sought. Further guidance is provided by the RCPCH (www.rcpch.ac.uk).

Close contacts of immunosuppressed individuals

Some vaccines are contraindicated in immunosuppressed individuals and such individuals may not respond well to other vaccines. Therefore, to minimise the risk of infection, close contacts of immunosuppressed individuals should be fully immunised according to the UK schedule, as a matter of priority. Close contacts of severely immunosuppressed individuals should also be offered vaccination against varicella and influenza. This will reduce the risk of vulnerable individuals being exposed to the serious consequences of vaccine-preventable infections.

Prematurity

It is important that premature infants have their immunisations at the appropriate chronological age, according to the schedule. The occurrence of apnoea following vaccination is especially increased in infants who were born very prematurely.

Very premature infants (born ≤28 weeks of gestation) who are in hospital should have respiratory monitoring for 48-72 hrs when given their first immunisation, particularly those with a previous history of respiratory immaturity. If the child has apnoea, bradycardia or desaturations after the first immunisation, the second immunisation should also be given in hospital, with respiratory monitoring for 48-72 hrs (Pfister *et al*., 2004; Ohlsson *et al*., 2004; Schulzke *et al*., 2005; Pourcyrous *et al*., 2007; Klein *et al*., 2008).

As the benefit of vaccination is high in this group of infants, vaccination should not be withheld or delayed.

Specific indications for immunisation of other vulnerable groups

Some medical conditions or treatments increase the risk of complications from specific infectious diseases. Individuals who have such conditions or receive such treatments require additional protection, as listed in the appropriate chapters, and so the following vaccines are recommended:

Asplenia or splenic dysfunction (see Box 7.1 below)

- Hib/MenC conjugate, meningococcal ACWY conjugate and MenB vaccines (see Chapter 22)
- influenza vaccine (see Chapter 19)
- pneumococcal vaccine (see Chapter 25).

Cochlear implants

- pneumococcal vaccine (see Chapter 25).

Complement disorders (including those receiving complement inhibitor therapy) (see Box 7.1 below)

- Hib/MenC conjugate, meningococcal ACWY conjugate and MenB vaccines (see Chapter 22)
- pneumococcal vaccine (see Chapter 25).

Chronic respiratory and heart conditions

- influenza vaccine (see Chapter 19)
- pneumococcal vaccine (see Chapter 25).

Chronic kidney conditions (including haemodialysis)

- influenza vaccine (see Chapter 19)
- pneumococcal vaccine (see Chapter 25)
- hepatitis B vaccine (see Chapter 18).

Chronic liver conditions

- influenza vaccine (see Chapter 19)
- pneumococcal vaccine (see Chapter 25)
- hepatitis A vaccine (see Chapter 17)
- hepatitis B vaccine (see Chapter 18).

Chronic neurological conditions

- influenza vaccine (see Chapter 19)
- pneumococcal vaccine (see Chapter 25).

Diabetes

- influenza vaccine (see Chapter 19)
- pneumococcal vaccine (see Chapter 25).

Haemophilia

- hepatitis A vaccine (see Chapter 17, including advice on route of administration)
- hepatitis B vaccine (see Chapter 18, including advice on route of administration).

Immunosuppression

- influenza vaccine (see Chapter 19)
- pneumococcal vaccine (see Chapter 25).

Additionally, individuals who receive bone marrow transplants are likely to lose any natural or immunisation-derived protective antibodies against most vaccine-preventable diseases. It is unclear whether they may acquire the donor's immunity, and therefore all individuals should be considered for a re-immunisation programme. Specialist advice should be sought and is available at:
http://www.rcpch.ac.uk/sites/default/files/asset_library/Publications/I/Immunocomp.pdf

Note: *Data on long-term antibody levels in these groups of patients are limited. Additional doses to cover the higher risks of Hib, meningococcal and pneumococcal disease during childhood should be considered, depending on the person's underlying condition. Specialist advice may be required.*

All individuals who are to receive Eculizumab (complement inhibitor) therapy should be vaccinated at least two weeks prior to commencement of therapy (Summary of Product Characteristics for Soliris®, Alexion Europe, 2012). This advice applies to all newly diagnosed patients.

Where an opportunity arises, and depending on individual patient's circumstances, MenACWY conjugate and MenB vaccination should be considered for those that only received MenC conjugate vaccine previously.

Other methods of protecting vulnerable individuals

Immunosuppressed individuals (as above) can be protected against some infections by the administration of passive antibody. After exposure to measles or chickenpox, such individuals should be considered for an injection of the appropriate preparation of immunoglobulin (varicella zoster immunoglobulin (VZIG) or human normal immunoglobulin (HNIG) – see varicella and measles, Chapters 34 and 21 respectively). Individuals exposed to chickenpox may

benefit from prophylactic acyclovir at a dose of 40mg/kg per day in four divided doses (Kumagai *et al*., 1999). This may be considered in addition to VZIG or as an alternative when VZIG is not indicated. Treatment with acyclovir should be commenced promptly in this group.

Prophylaxis with other antibiotic or antiviral drugs may also be indicated in immunosuppressed individuals exposed to infections such as pertussis or influenza. Advice should be sought from the local health protection team.

Antibiotic prophylaxis (usually phenoxymethyl penicillin) is advisable for asplenic and hyposplenic patients. Guidelines have been published (Davies *et al*., 2011) and a patient card and information leaflet are available (details at the end of this chapter).

Box 7.1 Practical schedule for immunising individuals with asplenia, splenic dysfunction or complement disorders (including those receiving complement inhibitor therapy*) depending on the age at which their at-risk condition is diagnosed. Individuals with asplenia or splenic dysfunction aged six months or older should also be offered influenza vaccine (see Chapter 19).

First diagnosed under six months

- Give the MenB vaccine at 2, 3 and 4 months along with the routine infant immunisations (if the routine schedule has already been initiated, then give 3 doses of MenB with an interval at least one month apart)
- If MenC has not yet been given as part of routine schedule, give one dose of MenACWY conjugate vaccine followed by a second dose at least one month apart. If MenC has already been given as part of routine schedule, then give one additional dose of MenACWY at least one month later
- Give the routine 12-month boosters: Hib/MenC, PCV13 and MMR
- Give a MenB booster, an extra dose of PCV13 and one dose of MenACWY conjugate vaccine two months after the 12-month boosters
- After the second birthday, an additional dose of Hib/MenC should be given, along with the pneumococcal polysaccharide vaccine (PPV23).

First diagnosed at 6-11 months

- Give 2 doses of MenB vaccine at least two months apart (the second dose may be given with the routine 12-month boosters)
- If MenC has not yet been given as part of routine schedule, give one dose of MenACWY conjugate vaccine followed by a second dose at least one month apart. If MenC has already been given as part of routine schedule, then give one additional dose of MenACWY at least one month after any MenC dose.
- Give the routine 12-month boosters: Hib/MenC, PCV13 and MMR
- Give a dose of MenACWY conjugate vaccine and an extra dose of PCV13 two months after the Hib/MenC booster
- After the second birthday, an additional dose of Hib/MenC and the MenB booster should be given, along with the pneumococcal polysaccharide vaccine (PPV23).

First diagnosed at 12-23 months

- If not yet administered, give the routine 12-month boosters: Hib/MenC, PCV13 and MMR
- Give a dose of MenACWY conjugate vaccine and an extra dose of PCV13 two months after the Hib/MenC and PCV13 boosters
- Give 2 doses of MenB vaccine at least two months apart (either of these doses can be given at the same time as the other vaccine visits)
- After the second birthday, an additional dose of Hib/MenC should be given, along with the pneumococcal polysaccharide vaccine (PPV23)
- This age group should also receive an additional dose of MenB vaccine with an interval of 12 to 23 months after the primary course.

First diagnosed from two years onwards

- Ensure that the child has been immunised according to national schedule, including the 12-month boosters
- Give an additional dose of Hib/MenC and the first dose of MenB vaccine, along with the pneumococcal polysaccharide vaccine (PPV23)**
- Give a dose of MenACWY conjugate vaccine and the second dose of MenB two months after the Hib/MenC booster***.

* Soliris acts by down regulating the terminal complement components so those on Soliris therapy are not at increased risk of pneumococcal disease and do not require PPV23.

** Severely immunocompromised individuals (as described in Chapter 25) aged five years or over should receive one dose of PCV13 followed by PPV at least two months later, as well as annual influenza vaccinations (Chapter 19), but do not require meningococcal conjugate vaccination.

*** In adolescents (from 11 years of age) and adults, this interval can be reduced to one month.

Resources

To obtain copies of the patient card and leaflet *Splenectomy: Information for patients*, contact Health and Social Care Publications, PO Box 777, London SE1 6XH (Tel: 0300 123 1002), http://www.orderline.dh.gov.uk/ecom_dh/public/saleproduct.jsf?catalogueCode=407841

In Scotland the patient card and leaflet can be obtained from The Health Protection Team (Immunisation), Health Directorates, Scottish Government Area 3EN, St Andrews House, Regent Road, Edinburgh EH1 3DG (Tel: 0131 244 2241), E-mail: stephen.mitchell@scotland.gsi.gov.uk

In Wales the leaflet *A guide for people without a working spleen* and a patient card are available from Welsh Government Publications Centre, Health Protection Division, Welsh Government, Cathays Park, Cardiff CF10 3NQ (Tel: 0845 606 4050), E-mail: hplibrary@wales.nhs.uk, http://welshgovernmentpublications.soutron.net/publications/

References

British HIV Association (2008) British HIV Association guidelines for immunization of HIV-infected adults 2008. *HIV Med* **9**(10): 795-848. http://www.bhiva.org/documents/Guidelines/Immunisation/Immunization2008.pdf Accessed March 2014.

Davies JM, Lewis MP, Wimperis J *et al*. (2011) Review of guidelines for the prevention and treatment of infection in patients with an absent or dysfunctional spleen: prepared on behalf of the British Committee for Standards in Haematology by a working party of the Haemato-Oncology task force. *Br J Haematol* **155**(3):308-17.

Klein NP, Massolo ML, Greene J *et al.* (2008) Risk factors for developing apnea after immunization in the neonatal intensive care unit. *Pediatrics* **121**(3): 463-9.

Kumagai T, Kamada M, Igarashi C *et al*. (1999) Varicella-zoster virus-specific cellular immunity in subjects given acyclovir after household chickenpox exposure. *J Infect Dis* **180**(3): 834–7.

Ohlsson A and Lacy JB (2004) Intravenous immunoglobulin for preventing infection in preterm and/or low-birth-weight infants. *Cochrane Database Syst Rev* (1): CD000361.

Pfister RE, Aeschbach V, Niksic-Stuber V *et al.* (2004) Safety of DTaP-based combined immunization in very-low-birth-weight premature infants: frequent but mostly benign cardiorespiratory events. *J Pediatr* **145**(1): 58-66.

Pourcyrous M, Korones SB, Arheart KL *et al.* (2007) Primary immunization of premature infants with gestational age <35 weeks: cardiorespiratory complications and C-reactive protein responses associated with administration of single and multiple separate vaccines simultaneously. *J Pediatr* **151**(2): 167-72.

Schulzke S, Heininger U, Lucking-Famira M *et al.* (2005) Apnoea and bradycardia in preterm infants following immunisation with pentavalent or hexavalent vaccines. *Eur J Pediatr* **164**(7): 432-5.