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

Although many live vaccines are contra-indicated in immunosuppressed individuals (see Chapter 6: Contraindications and special considerations), individuals with immunosuppression and HIV infection (regardless of CD4 count) should be given all inactivated vaccines in accordance with national recommendations. However, these individuals may not mount as good an antibody response as immunocompetent individuals. As immunosuppressed individuals, including those with complement disorders, are at particular risk from certain infections additional vaccines should be offered (see below). Household and close contacts of immunosuppressed individuals may also require additional vaccines (see below).

Wherever possible, immunisation or boosting of immunosuppressed or HIV-positive individuals should be either carried out before immunosuppression occurs or deferred until an improvement in immunity has been seen. The optimal timing for any vaccination should be based upon a judgement about the relative need for rapid protection and the likely response. 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.

Data on long-term antibody levels following vaccination of severely immunosuppressed individuals is limited. Additional booster doses should be considered, depending on the person's underlying condition. In patients who receive bone marrow transplants, any protective antibodies from exposure or vaccination prior to transplantation are likely to be lost and it is unclear whether the recipient acquires the donor's immunity. All such individuals should be considered for a re-immunisation programme after treatment is finished. Specialist advice may be required.

Some new biological therapies, such as those used in auto-immune disorders, are monoclonal antibodies directed against certain components of the immune system. Patients on biologics may therefore be at increased risk of certain infections or may

respond more poorly to vaccination and should be considered for additional vaccination. In particular, individuals receiving complement inhibitor therapy (eculizumab) are at heightened risk of meningococcal infection and should be vaccinated with both MenACWY and MenB vaccines, ideally at least two weeks prior to commencement of therapy (EMA, 2012). Eculizumab (Soliris®) acts by down regulating the terminal complement component and patients are not at increased risk of pneumococcal disease.

Further guidance for the immunisation of HIV-infected individuals is provided by the British HIV Association (BHIVA; https://www.bhiva.org/vaccination-guidelines and CHIVA https://www.chiva.org.uk/guidelines/immunisation/).

Asplenia (absent or dysfunctional spleen)

Individuals with an absent or dysfunctional spleen are at increased risk of severe infection, particularly those caused by encapsulated bacteria. The commonest organism associated with severe infection in these patients is the pneumococcus (*Streptococcus pneumoniae*) but other organisms also appear to be a more common cause of overwhelming infection in these patients, including *Haemophilus influenzae* type b (Hib) and *Neisseria meningitidis*. In addition to surgical splenectomy, certain conditions, such as sickle cell disease and other haemoglobinopathies, are accompanied by functional hyposplenism. Around 30% of adults with coeliac disease have defective splenic function.

All patients with absent or dysfunctional spleens should be fully vaccinated according to the national schedule. Because of the high risk of overwhelming infection, additional vaccination against pneumococcal infection is recommended for all individuals who have or are at high risk of developing splenic dysfunction in the future, including those with coeliac disease and sickle cell disease (see Chapter 25: Pneumococcal). Given the high risk of secondary bacterial infection, annual influenza vaccine is also recommended for these patients. Data on long-term antibody levels in asplenic patients are limited. Additional booster doses of pneumococcal polysaccharide vaccine (PPV) are recommended every five years for this patient group.

Additional vaccination against meningococcal groups A, C, W, Y and B should be offered to patients with absent or dysfunctional spleens, at appropriate opportunities. Hyposplenism in coeliac disease is uncommon in children, and the prevalence correlates with the duration of exposure to gluten (Di Sabatino A, 2013). Therefore, patients diagnosed with coeliac disease early in life and well managed are unlikely to require additional doses of these vaccines beyond those given in the routine immunisation schedule. Only those with known splenic dysfunction should receive additional vaccination against meningococcal infection (see Chapter 22: Meningococcal). Although additional vaccination against *Haemophilus influenzae* type b (Hib) used to be recommended for asplenic patients, current control of Hib is excellent because of a long-standing successful vaccination programme in children and the risk of Hib disease is extremely low. Therefore, additional Hib vaccination is no longer recommended.

A practical schedule for vaccinating asplenic patients, depending on the age of diagnosis is shown in Box 7.1. Additional booster doses of other vaccines should be considered depending on the person's underlying condition. Specialist advice may be required.

Prematurity

It is important that premature infants have their immunisations at the appropriate chronological age, according to the schedule. Advice on the use of prophylactic paracetamol should be followed as recommended for term infants. As the benefit of vaccination is high in this group of infants, vaccination should not be withheld or delayed.

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 vaccinated in hospital should have respiratory monitoring for 48-72 hrs when given the first dose, 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).

Specific indications for immunisation of other vulnerable groups

The following list of medical conditions or treatments may increase the risk of complications from certain infectious diseases. Individuals who have such conditions or receive such treatments may require additional protection, as recommended in the appropriate chapters:

Asplenia or dysfunction of the spleen (including sickle cell) (see Box 7.1 below)

- influenza vaccine (see Chapter 19)
- meningococcal vaccines (see Chapter 22)
- pneumococcal vaccine (see Chapter 25) (also for individuals with coeliac disease)

Cerebrospinal fluid leaks

- pneumococcal vaccine (see Chapter 25)

Chronic heart disease

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

Chronic kidney disease (including haemodialysis patients)

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

Chronic liver disease

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

Chronic neurological disease
- influenza vaccine (see Chapter 19)
- pneumococcal vaccine (see Chapter 25)

Chronic respiratory disease
- influenza vaccine (see Chapter 19)
- pneumococcal vaccine (see Chapter 25)

Cochlear implants
- pneumococcal vaccine (see Chapter 25)

Complement disorders (see Box 7.1)
- influenza vaccine (see Chapter 19)
- meningococcal vaccine (see Chapter 22) (also for those on complement inhibitors)
- pneumococcal vaccine (see Chapter 25)

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

Haemophilia (follow advice on route of administration in Chapter 4)
- hepatitis A vaccine (see Chapter 17)
- hepatitis B vaccine (see Chapter 18)

Immunosuppression (due to disease or treatment)
- influenza vaccine (see Chapter 19)
- pneumococcal vaccine (see Chapter 25)

Morbid obesity
- influenza vaccine (see Chapter 19)

Other methods of protecting vulnerable individuals

To reduce the risk of vulnerable individuals being exposed to vaccine preventable conditions, all household and close contacts of immunosuppressed individuals should be fully vaccinated according to the national schedule. Most live vaccines can be safely given to close contacts of immunosuppressed individuals; although some additional precautions are advised (see Chapter 6: Contraindications and special considerations). Most contacts of patients with immunosuppression can receive live attenuated influenza vaccine but close contacts of patients with very severe immunosuppression (such as those who would normally be in isolation) should receive the inactivated vaccine instead.

In addition to routine vaccination, annual influenza vaccination should also be offered to contacts of immunocompromised individuals, including their carers (see Chapter 19). As measles and chickenpox infections can be severe, or even fatal, in immunosuppression, susceptible contacts of immunosuppressed individuals should be offered measles-mumps-rubella (MMR) vaccine (see Chapter 21) and varicella vaccine (see Chapter 34).

Immunosuppressed individuals (as above) can also 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) for chickenpox (see Chapter 34) or intravenous normal immunoglobulin for measles (see Chapter 21). As administration of these products should be undertaken promptly, it is important to ensure that any past history of measles and varicella disease and/or vaccination is documented, and antibody testing may be indicated. This will help during the assessment and management of possible exposure incidents.

Individuals exposed to chickenpox may also benefit from prophylactic aciclovir for further advice see 'Updated guidelines on post exposure prophylaxis (PEP) for varicella/shingles: advice for health professionals (June 2019)' at https://www.gov.uk/government/publications/varicella-zoster-immunoglobulin. Treatment with aciclovir should also be commenced promptly in this group.

Prophylaxis with immunoglobulins, other antibiotic or antiviral drugs may also be indicated in immunosuppressed or other vulnerable individuals exposed to infections such as hepatitis A (see Chapter 17), pertussis (see Chapter 24) or influenza (see Chapter 19). Advice on the management of exposed individuals should be sought from the local health protection team. PHE guidance on the use of immunoglobulin is also available at https://www.gov.uk/government/publications/immunoglobulin-when-to-use.

Antibiotic prophylaxis (usually phenoxymethyl penicillin) is advisable for asplenic and hyposplenic patients and for patients with complement disorders (including those taking complement inhibitors). Guidelines on patients with splenic dysfunction have been published (Davies *et al.*, 2011) and patient resources are available (details at the end of this chapter).

Box 7.1 Practical schedule for immunising individuals with asplenia, splenic dysfunction or complement disorders*

Note: Since these vaccines do not protect against all strains, antibiotic prophylaxis should also be strongly considered

First diagnosed or presenting under 1 year of age

Children should be fully immunised according to the national schedule, and should also receive:

- two doses of MenACWY vaccine at least 4 weeks apart during their first year
- an additional priming dose of PCV13, such as to receive a total of two priming doses of PCV13 with an 8-week interval in their first year
- a booster dose of MenACWY conjugate vaccine 8 weeks after the vaccinations scheduled at one year of age
- an additional booster dose of PCV13, to be administered at least 8 weeks after the routine PCV13 booster scheduled at 1 year of age, and
- one dose of PPV23 after the second birthday¥ and at least 8 weeks after the last dose of PCV13

First diagnosed or presenting at 1 year to under 2 years of age

If not yet administered, give the routine vaccines due at 1 year of age: Hib/MenC, PCV13, MMR and MenB vaccines, plus:

- one dose of MenACWY conjugate vaccine at least 8 weeks after the vaccines scheduled at 1 year of age
- an additional booster dose of PCV13, to be administered at least 8 weeks after the routine PCV13 booster scheduled at 1 year of age, and
- one dose of PPV23¥ after the second birthday

First diagnosed or presenting from two years to under ten years of age

Ensure children are immunised according to the national schedule, and they should also receive:

- one dose of MenACWY conjugate vaccine and
- one dose of PPV23¥
- If they have not received the routine 2+1 schedule for MenB, ensure they have received two doses of MenB 8 weeks apart since first birthday
- If they have not received any PCV previously, they should receive a dose of this first followed by the dose of PPV23 at least 8 weeks later

First diagnosed at age ten years onwards

Older children and adults, regardless of previous vaccination, should receive:

- one dose of PPV23¥, MenB and MenACWY conjugate vaccine
- an additional MenB vaccine dose 4 weeks later

All patients aged over 6 months

Annual influenza vaccine each season (see Chapter 19)

* Patients on complement inhibitor therapy (Eculizumab or Soliris®) are not at increased risk of pneumococcal disease and do not require PPV23 or additional doses of PCV13 (see Chapter 25).

¥ Patients with asplenia and splenic dysfunction should receive boosters of PPV23 at five yearly intervals.

Resources

The Public Health England leaflet and card for patients who have had their spleen removed, whose spleen isn't present or doesn't work can be accessed here: www.gov.uk/government/publications/splenectomy-leaflet-and-card

The NHS Health Scotland *A guide for people without a working spleen* can be accessed here: www.healthscotland.com/documents/25070.aspx

The Welsh Government *A guide for people without a working spleen* can be accessed here: www.nhsdirect.wales.nhs.uk/pdfs/WGSpleenE.pdf

In Northern Ireland, '*Splenectomy factsheet for health professionals*', '*Splenectomy patient leaflet*' and a Splenectomy wallet card for patients are available from The Public Health Agency:

https://www.publichealth.hscni.net/publications/splenectomy-factsheet-health-professionals-0 https://www.publichealth.hscni.net/publications/splenectomy-patient-leaflet

http://www.publichealth.hscni.net/publications/splenectomy-wallet-card

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