

Immunisation Handbook 2017 (2nd edition) – March 2018

The electronic *Handbook* has been updated, and a new edition published: *Immunisation Handbook 2017 (2nd edition)*.

Major changes, in chapter order, are:

- Chapter 4 Immunisation of Special Groups: updated to include the herpes zoster vaccine funding from 1 April 2018, and new information about immune checkpoint inhibitors
- Chapter 8 Hepatitis B – includes information about the temporary brand change of the single antigen hepatitis B vaccine (from HBvaxPRO to Engerix-B)
- Chapter 10 Influenza – includes the change from trivalent to quadrivalent influenza vaccine (Fluarix Tetra and Influxac Tetra) and new information about immune checkpoint inhibitors
- Chapter 13 Mumps – updated to align with the latest version of the ‘Mumps’ chapter of the Communicable Disease Control Manual 2012
- Chapter 14 Pertussis – updated to align with the latest version of the ‘Pertussis’ chapter of the Communicable Disease Control Manual 2012
- Chapter 22 Zoster – updated to reflect the herpes zoster vaccine funding from 1 April 2018

Detailed changes are described below, by chapter, section and subsection. New text is highlighted in yellow.

Introduction

Changes to National Immunisation Schedule in 2018

The existing text is replaced with information about the influenza and herpes zoster vaccine funding.

Table 1 shows the 2018 National Immunisation Schedule, and Table 2 shows the vaccines funded for special groups at higher risk of some diseases.

Changes to vaccine funding in 2018 are as follows.

1. From 2018, the quadrivalent inactivated influenza vaccine (Influxac Tetra; see chapter 10 ‘Influenza’) will be the Schedule vaccine for pregnant women and for adults aged 65 years and older.
2. From 1 April 2018, one dose of herpes zoster vaccine (HZV, Zostavax; see chapter 22 ‘Zoster’) will be introduced for:
 - individuals at age 65 years, or
 - catch-up of individuals aged 66–80 years, inclusive (the catch-up programme ceases on 31 March 2020).

Table 1: National Immunisation Schedule, commencing 1 April 2018

Added the new influenza and herpes zoster vaccines to the table.

Antigen(s)	Influenza	HZV
Brand	Influxac Tetra	Zostavax
Pregnancy	•	
65 years	• annually	• ^d

^d There is a catch-up programme from 1 April 2018 until 31 March 2020, with 1 dose of HZV funded for individuals aged 66–80 years, inclusive.

2018 changes to targeted programmes for special groups

Updated to reflect vaccine changes.

Vaccines funded for special groups are described in Table 2 below. Changes to existing programmes in 2018 are as follows.

1. Hepatitis B vaccine (HepB, HBvaxPRO; see chapter 8 'Hepatitis B') is funded for individuals with eligible conditions. However, in 2018 there is a shortage of the HBvaxPRO 5 µg and HBvaxPRO 10 µg vaccines. If the HBvaxPRO 5 µg or HBvaxPRO 10 µg vaccines are not available, the Engerix-B 20 µg vaccine may be used instead. (Supplies of the HBvaxPRO 40 µg vaccine are unaffected.)

2. Influenza vaccine is funded for individuals aged 6 months to under 65 years with eligible conditions (see chapter 10 'Influenza'). From 2018, the following quadrivalent inactivated influenza vaccines will be used:

- Fluarix Tetra for children aged 6 months to under 3 years (ie, aged 6–35 months)
- Influvac Tetra for adults and children aged 3 years and older.

Table 2: Funded vaccines for special groups –in addition to the routine schedule

Updated the influenza row to reflect new funding restrictions.

Vaccine	Individuals eligible for funded vaccine
Annual influenza vaccine (see chapter 10)	Patients aged 6 months to <65 years who: <ul style="list-style-type: none">• are children aged under 18 years living in the Seddon/Ward and rural Eastern Marlborough region (within the Nelson Marlborough District Health Board) and Kaikoura and Hurunui areas (within the Canterbury District Health Board)• are children aged under 18 years who have been displaced from their homes in Edgecumbe and the surrounding region.

Notifiable diseases

Added herpes zoster to the list of diseases that are not notifiable:

All diseases preventable by vaccines on the Schedule (or as part of a targeted programme) are notifiable, except for HPV, seasonal influenza, rotavirus, varicella and herpes zoster.

Chapter 1 – General immunisation principles

1.3 The importance of immunisation coverage

Updated with the most recently published immunisation coverage data.

For the three months ending 31 December 2017, 92.2 percent of New Zealand children were fully immunised by age 8 months and 92.3 percent were fully immunised by age 2 years.

Chapter 2 – Processes for safe immunisation

2.1.3 Pre-vaccination screening

Table 2.2: Pre-vaccination screening and actions to take

First row updated to correct the temperature; anaphylaxis row updated to include influenza vaccine; a new row added to the end of the table about immune checkpoint inhibitors.

Condition* or Circumstance	Action	Rationale
Is unwell today: <ul style="list-style-type: none"> • fever $\geq 38^{\circ}\text{C}$ • acute systemic illness 	Defer all vaccines until afebrile. Note: Children with minor illnesses (without acute symptoms/signs) should be vaccinated.	To avoid an adverse event in an already unwell child, or to avoid attributing symptoms to vaccination.
Anaphylaxis to vaccine components (eg, gelatin, egg protein, neomycin)	Refer to the relevant vaccine data sheet (www.medsafe.govt.nz) for the components. If an individual has had anaphylaxis to any component contained in a vaccine, seek specialist advice. Egg allergy, including anaphylactic egg allergy, is not a contraindication to MMR or influenza vaccination (see sections 10.6.3 and 11.6.3).	Vaccinators need to be aware of the possibility that allergic reactions, including anaphylaxis, may occur after any vaccination without any apparent risk factors (see section 2.3.3). Delayed hypersensitivity to a prior vaccine dose or a component of a vaccine is not a contraindication to further doses, but it is important to distinguish these from anaphylaxis.
Individuals who are currently being treated with immune checkpoint inhibitors, as well as those who have discontinued treatment within the past 6 months.	Seek specialist advice.	There is a theoretical risk that vaccines may trigger an autoimmune response in these individuals. See the 'Oncology patients treated with immune checkpoint inhibitors' discussion in section 4.3.3.

2.1.4 Contraindications

Added MMR to the anaphylaxis information in the box, and added a paragraph about immune checkpoint inhibitors.

Anaphylaxis to a previous vaccine dose or any component of the vaccine is an absolute contraindication to further vaccination with that vaccine. (Note that egg-related anaphylaxis and influenza or MMR vaccines are exceptions.) **For more detail on anaphylaxis, see section 2.3.3**

Live viral vaccines should not be given to pregnant women, nor, in general, to immunosuppressed individuals (see chapter 4).

Seek specialist advice for individuals being treated with immune checkpoint inhibitors, as well as those who have discontinued treatment within the past 6 months. See 'Oncology patients treated with immune checkpoint inhibitors' in section 4.3.3.

See the relevant disease chapter section for more specific vaccine contraindications.

Table 2.3: Conditions that are *not* contraindications to immunisation

Corrected the temperature in the first row.

Mildly unwell, with a temperature $\leq 38^{\circ}\text{C}$

2.7 Adult vaccination (aged 18 years and older)

Table 2.5: Adult (≥18 years) vaccination recommendations, excluding travel requirements

Added the HZV row.

Vaccine	Recommended and funded	Recommended but not funded
HZV (chapter 22)	<p>From 1 April 2018, 1 dose of HZV is funded for:</p> <ul style="list-style-type: none"> • individuals at age 65 years, or • catch-up of individuals aged 66–80 years, inclusive (the catch-up programme ceases on 31 March 2020). 	<p>HZV may be considered, but is not funded, for individuals aged 50–64 years who are:</p> <ul style="list-style-type: none"> • at increased risk of shingles and who may benefit from being vaccinated earlier than the routine schedule • household contacts of an immunosuppressed individual.

Chapter 4 – Immunisation of special groups

4.1.2 During pregnancy

Pertussis vaccine (Tdap)

Added information about the UK maternal pertussis vaccination programme.

In October 2012 the UK introduced a pertussis vaccination programme for pregnant women in response to a nationwide pertussis outbreak. An observational study of the programme in England estimated vaccine effectiveness at 91 percent (95% CI: 84–95) for preventing pertussis in infants aged under 3 months.⁸ This high vaccine effectiveness is likely to be a result of protection of infants by both passive antibody transfer and reduced exposure to maternal disease.⁸ Three years after the introduction of the programme, vaccine effectiveness in infants was sustained at 90 percent, despite changing to another acellular vaccine with a different antigen composition.⁹ Disease incidence in infants aged under 3 months remained low, despite high activity persisting in those aged 1 year and older.⁹ Vaccine effectiveness against infant deaths was estimated at 95 percent (95% CI: 79–100).⁹

4.2.3 Infants with liver and renal disease

Table 4.1: Accelerated immunisation schedule (funded) for infants in whom liver or kidney transplant is likely

Added Engerix-B, Fluarix Tetra and Influvac Tetra to the table.

4.3.1 Introduction

Household contacts

Updated the final paragraph to include HZV.

VV or age-appropriate HZV can be given safely to the household contacts of immunocompromised individuals. VV is funded for non-immune household contacts of patients who are immunocompromised or undergoing a procedure or treatment leading to immunocompromise. If the household contact is immune to varicella (previous history of infection or vaccination) and aged 50 years and older, give HZV (funded at age 65 years with a catch-up, until 31 March 2020, for those aged 66–80 years inclusive; unfunded if aged 50–64 years). If a vaccinated person

develops a varicella- or zoster-like rash, they should cover the rash and avoid contact with persons who are immunocompromised for the duration of the rash.²²

4.3.2 Primary immune deficiencies

B lymphocyte deficiencies (humoral)

X-linked, agammaglobulinaemia and common variable immune deficiency

Updated to include HZV.

- BCG and HZV are contraindicated.

Lymphocyte deficiencies (cell-mediated and humoral)

Complete defects (eg, SCID) and partial defects (eg, Wiskott–Aldrich syndrome, most patients with DiGeorge syndrome)

Updated to include HZV.

- BCG, MMR, VV and HZV are contraindicated.

4.3.3 Secondary (acquired) immune deficiencies

The live viral vaccines paragraph updated to include HZV and checking varicella serostatus.

Live viral vaccines (MMR and VV) should only be given if the patient is non-immune, is not severely immunocompromised and is four or more weeks prior to commencement of immunosuppressive therapy. VV may be given at a shorter interval at the discretion of the specialist. Checking varicella serostatus is recommended in this situation:²² if VZV-seronegative, give VV (funded); if VZV-seropositive and aged 50 years and older, give HZV (funded at age 65 years with a catch-up, until 31 March 2020, for those aged 66–80 years inclusive; unfunded if aged 50–64 years).

Other immunosuppressive agents (eg, for autoimmune diseases, rheumatological diseases, inflammatory bowel disease)

Add the URL to the IMAC factsheet.

For adults, see the IMAC factsheet *Immunisation for adults with immune-mediated inflammatory disease (IMID)* (available for download from: www.immune.org.nz/resources/written-resources).

Oncology patients

Updated to include HZV and immune checkpoint inhibitors.

This section provides general guidelines for vaccination after cancer treatment. Specific vaccination questions should be discussed with an expert paediatrician, infectious diseases physician or oncologist. With the exception of patients receiving immune checkpoint inhibitors, annual influenza vaccine is recommended and can be given even while a patient is on treatment (two doses four weeks apart in the first year).

Household contacts may be safely given MMR (funded; see section 11.5.3), VV (funded; see section 21.5) or age-appropriate HZV (funded at age 65 years with a catch-up, until 31 March 2020, for those aged 66–80 years inclusive; unfunded if aged 50–64 years; see section 22.5); annual influenza vaccination is also recommended (not funded) for contacts (see section 10.5). See also 'Household contacts' in section 4.3.1.

Note: patients being treated with immune checkpoint inhibitors are the exception to these guidelines, where immunisation is relatively contraindicated. See 'Oncology patients treated with immune checkpoint inhibitors (immunostimulants)' below.

Vaccination after chemotherapy

Removal of paragraph about full re-immunisation; added information about HZV and checking varicella serostatus; updated the Starship URL and added the IMAC factsheet URL.

Those who have received routine immunisations prior to cancer diagnosis do not need full re-immunisation.

Booster dose(s) of a diphtheria/tetanus/pertussis-containing vaccine, and hepatitis B, polio (IPV) and pneumococcal vaccines (PCV13 followed by 23PPV) should be given, starting not less than three months after chemotherapy has ended, when the lymphocyte count is $>1.0 \times 10^9/L$.

Parenteral live viral vaccines should be delayed for at least six months after chemotherapy, but MMR and VV or age-appropriate HZV should then be given. Serological confirmation of previous VZV infection is recommended before administering HZV.²² If VZV-seronegative, give VV (funded); if VZV-seropositive and aged 50 years and older, give HZV (funded at age 65 years with a catch-up, until 31 March 2020, for those aged 66–80 years inclusive; unfunded if aged 50–64 years).

For children aged under 18 years, suggested age-appropriate schedules and worksheets are available on the Starship website (<https://www.starship.org.nz/media/199142/immunisation-2017-final.pdf>). For adults, see the IMAC factsheet *Immunisation for adults post-chemotherapy who are not taking immunosuppressive disease modifying drugs* (available for download from: www.immune.org.nz/resources/written-resources).

Vaccination after haematopoietic stem cell transplant (HSCT)/bone marrow transplant

Added information about HZV and checking varicella serostatus; updated the Starship URL and added the IMAC factsheet URL.

Healthy recipients of bone marrow transplant who are immune competent can be given VV or age-appropriate HZV not less than two years after transplant, with MMR given four weeks later if VV/HZV tolerated. Serological confirmation of previous VZV infection is recommended before administering HZV. If VZV-seronegative, give VV (funded); if VZV-seropositive and aged 50 years and older, give HZV (funded at age 65 years with a catch-up, until 31 March 2020, for those aged 66–80 years inclusive; unfunded if aged 50–64 years). Second doses of MMR and VV should be given four weeks or more after the first doses, unless serological response to measles and varicella is demonstrated after the first dose. The vaccines should not be given to individuals suffering from graft versus host disease because of a risk of a resulting chronic latent virus infection leading to central nervous system sequelae.

For children aged under 18 years, suggested age-appropriate schedules and worksheets are available on the Starship website (www.starship.org.nz/media/199142/immunisation-2017-final.pdf). For adults, see the IMAC factsheet *Immunisation for adults post-haematopoietic stem cell transplantation (HSCT)* (available for download from: www.immune.org.nz/resources/written-resources).

Oncology patients treated with immune checkpoint inhibitors (immunostimulants)

This is a new section.

Specialist advice must be sought before administering any vaccine to patients who are currently being treated with immune checkpoint inhibitors, as well as those who have discontinued treatment within the past 6 months.

As this is a rapidly evolving therapy area, there are currently no international consensus statements on the use of vaccines in patients being treated with immune checkpoint inhibitors. Caution is advised, particularly with live vaccines.

Immune checkpoint inhibitors are immunostimulants, monoclonal antibodies that are used to treat several forms of advanced or metastatic cancer.²⁵ These medicines include PD-1 inhibitors (eg, pembrolizumab [Keytruda], nivolumab [Opdivo]), PD-L1 inhibitors (eg, atezolizumab [Tecentriq]) and CTLA-4 inhibitors (eg, ipilimumab [Yervoy]). Immune checkpoint inhibitors target proteins ('checkpoints') on T-cells.²⁶ By blocking these checkpoints, they allow the immune system to boost the immune response against cancer cells. A theoretical side effect of these medicines is an autoimmune-induced condition and, importantly, the autoimmune condition could occur weeks to months after stopping treatment.

While there is currently no clear safety data on the use of vaccines (live or subunit) in patients being treated with one or more immune checkpoint inhibitors, there is a theoretical risk that vaccines may trigger an autoimmune condition in these patients. There have been reports of fatal myositis, myocarditis and rhabdomyolysis in patients being treated with ipilimumab with nivolumab and administered influenza vaccine.²⁷ A prospective study of patients currently being treated with nivolumab or pembrolizumab and administered trivalent influenza vaccine found an increase in immune-related adverse events compared to unvaccinated patients being treated with these medicines.²⁸

The Cancer Institute of New South Wales (Australia) cautions that in patients receiving combination ipilimumab and nivolumab, there have been reported cases of fatal myocarditis, myositis and rhabdomyolysis shortly after administration of the influenza vaccine. Whilst a causative relationship to the use of influenza vaccine has not been demonstrated, caution is advised.²⁷

The British Columbia Cancer Agency (Canada)²⁹ recommends:

- patients receiving PD-1 or PD-L1 inhibitors may receive the inactivated influenza vaccine. Live attenuated influenza vaccine (not currently available in New Zealand) should not be used in these patients
- patients on ipilimumab monotherapy or combination checkpoint inhibitors (eg, ipilimumab plus nivolumab) should not receive any vaccines within 6–8 weeks of starting treatment or within 6–8 weeks of the last dose
- patients on maintenance nivolumab following combination therapy should discuss the timing of vaccination with their doctor.

Alberta Health Services (Canada)³⁰ recommends:

- patients currently receiving ipilimumab alone or in combination with other anti-cancer agents, as well as those who have discontinued ipilimumab in the past six months should not receive the influenza vaccine
- patients receiving nivolumab or pembrolizumab alone or in combination with other anti-cancer agents may be immunised with the inactivated influenza vaccine; the timing of the immunisation is not clearly studied in this population, but can be considered one week post-administration of these agents. Patients should be advised to monitor themselves closely, and to report any adverse events to their oncologist.

Chronic kidney disease (CKD)

Added information about HZV and checking varicella serostatus; updated the Starship URL and added the IMAC factsheet URL.

Individuals with nephrotic syndrome, kidney failure or end-stage kidney disease (CKD stages 4–5) have an increased risk of developing bacterial peritonitis and/or sepsis. Additional pneumococcal vaccines, a Hib booster, conjugate meningococcal vaccines and annual influenza vaccine are recommended. These individuals are also at increased risk of zoster, and may receive HZV upon specialist advice. Serological confirmation of previous VZV infection is recommended before administering HZV. If VZV-seronegative, give VV (funded if prior to transplant); if VZV-seropositive and aged 50 years and older, give HZV (funded at age 65 years with a catch-up, until 31 March 2020, for those aged 66–80 years inclusive; unfunded if aged 50–64 years).

A recommended immunisation schedule and worksheet for paediatric CKD stages 4–5 and dialysis patients is available on the Starship website (www.starship.org.nz/media/286703/vaccination-record-for-paediatic-ckd-august-2017-.pdf). For adults, see the IMAC factsheet *Immunisation for adults with end-stage kidney disease, on dialysis, or pre-post-kidney transplant* (available for download from: www.immune.org.nz/resources/written-resources).

Solid organ transplants

Added the IMAC factsheet URL; added information about HZV and checking varicella serostatus.

An accelerated immunisation schedule is recommended for individuals likely to be listed for solid organ transplant. See Table 4.1 for infant recommendations. For adults, see the IMAC factsheet *Immunisation for adults pre-/post-solid organ transplantation (excluding kidney transplantation)* (available for download from: www.immune.org.nz/resources/written-resources).

Individuals older than 12 months who have been scheduled for solid organ transplantation should receive MMR and VV or age-appropriate HZV at least four weeks before the transplant. Serological confirmation of previous VZV infection is recommended before administering HZV.²² If VZV-seronegative, give VV (funded); if VZV-seropositive and aged 50 years and older, give HZV (funded at age 65 years with a catch-up, until 31 March 2020, for those aged 66–80 years inclusive; unfunded if aged 50–64 years). Measles antibody titres should be measured one to two years after the transplant; immunisation may be repeated if titres are low, but only if the level of immunosuppression permits. It is advisable to check other antibody titres annually and re-immunise where indicated.

HIV infection

Added information about HZV and checking varicella serostatus; added the IMAC factsheet URL.

VV or age-appropriate HZV may be given upon specialist advice to HIV-positive adults (if CD4+ lymphocyte count is ≥ 200 cells/mm³). Serological confirmation of previous VZV infection is recommended before administering HZV.²² If VZV-seronegative, give VV (funded); if VZV-seropositive and aged 50 years and older, give HZV (funded at age 65 years with a catch-up, until 31 March 2020, for those aged 66–80 years inclusive; unfunded if aged 50–64 years).

Tables 4.4 (children aged under 5 years when diagnosed), 4.5 (children aged 5 to under 18 years) and 4.6 (adults aged 18 years and older) summarise the additional vaccine recommendations and schedules for HIV-positive individuals. For adults, see also the IMAC factsheet *Immunisation for adults with HIV infection* (available for download from: www.immune.org.nz/resources/written-resources).

Table 4.4: Children aged under 5 years when diagnosed with HIV: additional vaccine recommendations

Added age-appropriate Fluarix Tetra and Influvac Tetra to the influenza rows.

Table 4.5: Children aged 5 to under 18 years when diagnosed with HIV: additional vaccine recommendations

Added Influvac Tetra to the influenza row.

Table 4.6: Adults aged 18 years and older when diagnosed with HIV: additional vaccine recommendations

Added Influvac Tetra, Zostavax and Engerix-B as follows:

Vaccine (trade name)	Recommended vaccine schedule
Influenza (Influvac Tetra)	Annual immunisation. If previously unvaccinated, give 2 doses ^c 4 weeks apart. Then give 1 dose in each subsequent year.
Varicella ^{d,e} (Varilrix) or Herpes zoster ^{d,e,f} (Zostavax)	If VZV-seronegative and CD4+ lymphocyte count is ≥ 200 cells/mm ³ : <ul style="list-style-type: none"> give 2 doses of VV at least 4 weeks apart. If aged 50 years and older ^f and VZV-seropositive and CD4+ lymphocyte count is ≥ 200 cells/mm ³ : <ul style="list-style-type: none"> give 1 dose of HZV.^f
Hepatitis B (HBvaxPRO 10 µg or Engerix-B 20 µg)	If previously unvaccinated, give 4 doses, at 0, 1, 2 and 12 months. ⁹

- e Give VV or HZV on the advice of an HIV specialist. Serological confirmation of previous VZV infection is recommended before administering HZV.²²
- f HZV is registered for use in adults from age 50 years. Funded for adults at age 65 years (with a catch-up for ages 66–80 years, inclusive). Unfunded for adults aged 50–64 years.

4.3.4 Asplenia

Table 4.7: Additional vaccine recommendations (funded and unfunded) and schedules for individuals with functional or anatomical asplenia

Added age-appropriate Fluarix Tetra and Influvac Tetra to the influenza rows. The Tdap row updated as follows.

Age at diagnosis	Vaccine (trade name)	Recommended vaccine schedule
Adults ≥18 years, pre-a or post-splenectomy or with functional asplenia	Tdap (Boostrix)	<p>If partially immunised or unimmunised:</p> <ul style="list-style-type: none"> give up to 3 doses of Tdap, 4 weeks apart to complete a 3-dose primary course. <p>If fully immunised:</p> <ul style="list-style-type: none"> give 1 dose of Tdap.

Chapter 8 – Hepatitis B

In 2018 there is a shortage of the HBvaxPRO 5 µg and HBvaxPRO 10 µg vaccines, and Engerix-B 20 µg vaccine is the funded replacement.

Key information

Added Engerix-B to the Funded vaccines and Dose, presentation and route rows.

Funded vaccines	HepB (HBvaxPRO as 5, 10 and 40 µg presentations. Engerix-B 20 µg is the funded replacement for the HBvaxPRO 5 and 10 µg presentations while supplies are unavailable).
Dose, presentation, route	<p>HepB:</p> <ul style="list-style-type: none"> 5 µg presentation – 0.5 mL per dose, single dose vial 10 and 40 µg presentations – 1.0 mL per dose, single dose vial 20 µg presentation – 1.0 mL per dose, pre-filled syringe.

8.4.1 Available vaccines

Added Engerix-B to this section.

Note: In 2018 there is a shortage of the HBvaxPRO 5 µg and HBvaxPRO 10 µg vaccines. If the HBvaxPRO 5 µg or HBvaxPRO 10 µg vaccines are unavailable, the Engerix-B 20 µg vaccine can be used instead. (Supplies of the HBvaxPRO 40 µg vaccine are unaffected.) See also the IMAC factsheet *Engerix-B replaces HBvaxPRO 5 mcg and 10 mcg until 2019* (available for download from: www.immune.org.nz/resources/written-resources).

Funded vaccines

- HepB (Engerix-B, GSK): contains 20 µg HBsAg per dose; it does not contain a preservative. Other components and residuals include aluminium hydroxide, sodium chloride, sodium phosphate dehydrate, sodium dihydrogen phosphate and traces of polysorbate 80.

8.4.3 Transport, storage and handling

Added Engerix-B.

DTaP-IPV-HepB/Hib and HepB (Engerix-B) should be stored in the dark.

8.4.4 Dosage and administration

HepB

Added Engerix-B.

The dose of HepB vaccine varies according to the vaccine manufacturer, the age of the individual and/or their health status (see section 8.5 for recommendations):

- HBvaxPRO 5 µg (MSD): 5 µg HBsAg per 0.5 mL
- HBvaxPRO 10 µg (MSD): 10 µg HBsAg per 1.0 mL
- HBvaxPRO 40 µg (MSD): 40 µg HBsAg per 1.0 mL
- Engerix-B 20 µg (GSK): 20 µg HBsAg per 1.0 mL.

8.5.2 Babies born to HBsAg-positive mothers

Added Engerix-B.

The routine schedule for these infants is a birth dose of 5 µg of HepB (HBvaxPRO 5 µg [use Engerix-B 20 µg if HBvaxPRO 5 µg is not available]) plus HBIG, then three doses of hepatitis B (as DTaP-IPV-HepB/Hib) at ages 6 weeks, 3 months and 5 months.

Babies born to HBsAg-positive mothers should receive:

- 100–110 IU HBIG neonatal, at or as close as possible to birth
- a birth dose of HepB (HBvaxPRO 5 µg [use Engerix-B 20 µg if HBvaxPRO 5 µg is not available]), which should be given at or as close as possible to birth (preferably within 12 hours).

Figure 8.2: Management of a baby of an HBsAg-positive woman

Added Engerix-B to the birth row.

At age	Action to be taken
Birth	Give HBIG 100–110 IU and HepB HBvaxPRO 5 µg (use Engerix-B 20 µg if HBvaxPRO 5 µg is not available)

8.5.3 Catch-ups for children and adolescents

Added Engerix-B to the information about adolescents aged 11–15 years.

For adolescents aged 11–15 years, an alternative two-dose hepatitis B catch-up schedule may be considered using the monovalent HepB (HBvaxPRO 10 µg), with the second dose given four to six months after the first. If HBvaxPRO 10 µg is not available, use Engerix-B 20 µg instead. (Note: While not approved for a two-dose schedule, there is no reason to expect that two doses of Engerix-B 20 µg, given four to six months apart, would not provide the same level of protection as two doses of HBvaxPRO 10 µg.)

Children and adolescents with liver or kidney disease

Added Engerix-B.

See Figures 8.3 and 8.4 for serological testing and vaccination recommendations. If non-immune, children aged under 16 years should receive three doses (at 0, 1 and 6 months) of 10 µg HepB (HBvaxPRO 10 µg [use Engerix-B 20 µg if HBvaxPRO 10 µg is not available]), those aged 16 years and older should receive three doses of 40 µg HepB (HBvaxPRO 40 µg). If there is an inadequate immune response to the initial three-dose HepB series (see Figure 8.4), give a further three doses (10 µg, 20 µg or 40 µg, as appropriate).

8.5.4 Eligible adults aged 18 years and older

Table 8.5: Hepatitis B vaccine schedules for eligible adults aged 18 years and older

Added Engerix-B to the table.

Who	Vaccine	Dose	Volum e (mL)	Number of doses	Schedule
Dialysis patients, liver or kidney transplant patients	HepB	40 µg	1.0	3	0, 1, and 6 months ^a
HIV patients	HepB	10 or 20 µg*	1.0	4	0, 1, 2, and 12 months
Other eligible adults (see Table 8.3)	HepB	10 or 20 µg*	1.0	3	0, 1, and 6 months

* Depending upon supply, HBvaxPRO 10 µg or Engerix-B 20 µg may be used.

Adult HIV patients

Added Engerix-B.

Adult HIV patients should receive four doses of HepB (10 µg or 20 µg) at 0, 1, 2 and 12 months.

Other eligible adults

Text updated to reflect the optimal dosing regimen for adults.

The optimal dosing regime is three doses of 10 µg or 20 µg HepB given at 0, 1 and 6 months. See the manufacturer's data sheet for sub-optimal accelerated HepB schedules if dosing is time constrained.

8.9 Variations from the vaccine data sheet

Added a new paragraph about two doses of Engerix-B for adolescents.

Two doses Engerix-B 20 µg, given four to six months apart, may be given to adolescents aged 11–15 years if HBvaxPRO 10 µg is not available. While not approved for a two-dose schedule, there is no reason to expect that two doses of Engerix-B 20 µg, given four to six months apart, would not provide the same level of protection as two doses of HBvaxPRO 10 µg.

Chapter 10 – Influenza

The Influenza chapter has been updated to reflect the quadrivalent vaccines available in 2018:

Key information

The funded vaccines row has been updated. A new egg allergy row has been added; information about immune checkpoint inhibitors added to the Contraindications/Precautions row.

Funded vaccines	Quadrivalent inactivated split virion vaccine: <ul style="list-style-type: none">• children aged 6 months to under 3 years (ie, aged 6–35 months): Fluarix Tetra.• adults and children aged 3 years and older: Influvac Tetra.
Egg allergy	Egg allergy, including anaphylaxis, is not a contraindication to influenza vaccination. Influenza vaccine can be safely administered to people with a history of egg allergy, including anaphylaxis, at general practices, pharmacies or at the workplace.
Contraindications/precautions	Seek specialist advice for individuals who are currently being treated with immune checkpoint inhibitors, as well as those who have discontinued treatment within the past 6 months.

10.1. Virology

Added information about influenza B.

Subtypes which have in the past caused pandemics include the H1N1, H2N2, H3N2 and H1N1pdm09 viruses, while the H3N2 and H1N1pdm09 viruses continue to cause epidemics as seasonal influenza viruses. Influenza B has two lineages of viruses; B/Victoria and B/Yamagata, which are also associated with outbreaks and epidemics, and account for a significant proportion of the overall burden of influenza.¹ Influenza C is associated with mild cases of upper respiratory infection.

10.2 Clinical features

Added information about influenza B; the Asymptomatic influenza subsection has moved from the New Zealand Epidemiology section to the Clinical features section.

Influenza B infections were previously thought to generally cause more mild illness, but numerous studies indicate that there is little difference between clinical symptoms and outcomes of influenza B compared to influenza A.¹ Influenza B-associated hospitalisations and mortality may have previously been underestimated; studies have reported higher mortality following influenza B infection than A in some years.¹ Influenza B infection is more common in children aged 5–17 years than in other age groups, and disease is more likely to be severe in children than in adults.

10.3.2 New Zealand epidemiology

Influenza surveillance

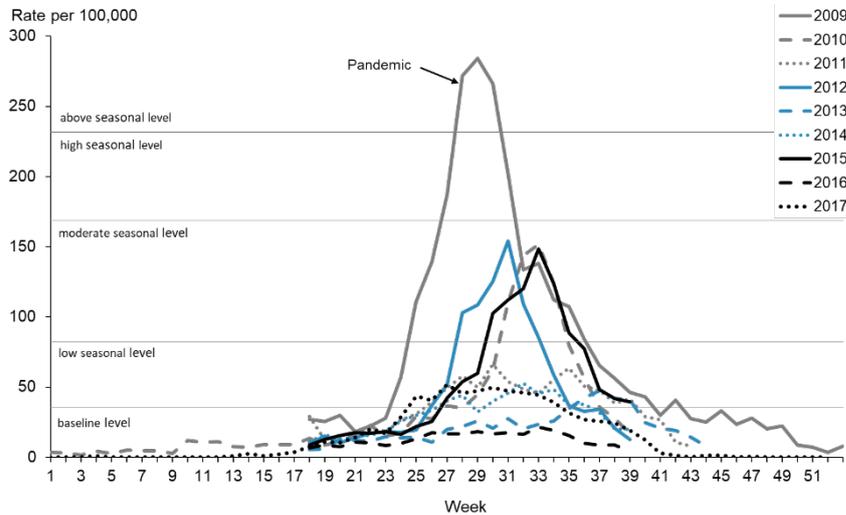
Updated to include provisional high-level surveillance data for 2017.

At the time of writing, only high-level, provisional surveillance data for 2017 was available.

The national weekly consultation rate is used to describe the overall level of influenza-like illness (ILI) activity presenting to the general practice level, using the moving epidemic method to define the start of and intensity level of the influenza season.⁸ Figure 10.1 shows the national weekly ILI consultation rates from 2009 to 2017. Although increased since 2016, the overall ILI activity remained at a low seasonal level (between 35.1 and 82.5 ILI consultations per 100,000 patient

population per week).⁹ There were 2,977 ILI cases identified in 2017, with an ILI cumulative incidence of 724.1 per 100,000 patient population.¹⁰

Figure 10.1: Weekly consultation rates for influenza-like illness in New Zealand, 2009–2017



Influenza-associated severe acute respiratory illness (SARI) hospitalisations were high in 2017 but slightly lower than known high years (2012 and 2014).⁹ However, intensive care unit admissions were low or comparable to these years.

As in 2016,¹¹ influenza A(H3N2) and B(Yamagata) were the predominant influenza strains circulating in 2017, although influenza B(Victoria) co-circulated with B(Yamagata).⁹

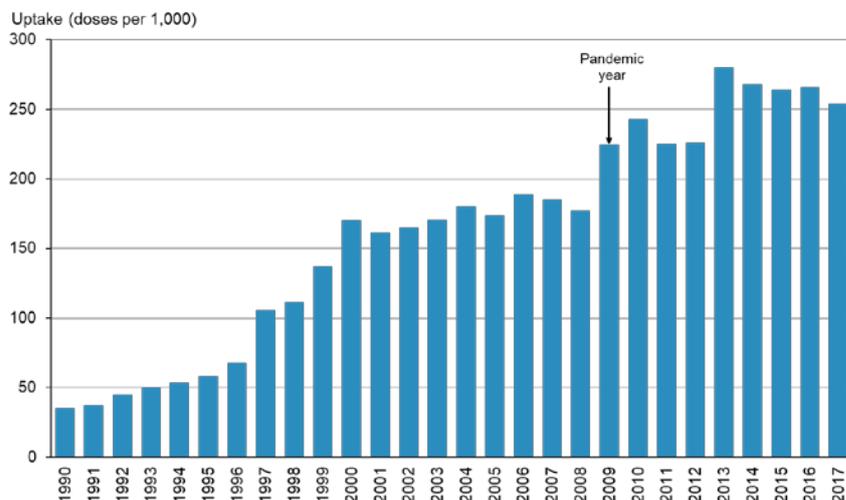
Influenza immunisation uptake

Updated with 2017 data.

In 2017 more than 1.2 million doses of influenza vaccine were distributed.

The uptake rate of influenza vaccine (both publicly and privately funded), as estimated by vaccine distribution figures, was slightly lower in 2017 (254 doses per 1,000 population) than in the previous three years (see Figure 10.4). Publicly funded uptake for individuals aged 65 years and older was 65 percent. As this is based on immunisation claims data for publicly funded influenza vaccination, it is likely to be an underestimate.

Figure 10.2: Influenza vaccine uptake per 1,000 population, 1990–2017



10.4.1 Available vaccines

Funded vaccines

Updated with the funded quadrivalent vaccines.

Two quadrivalent inactivated split virion influenza vaccines are funded.

- Fluarix Tetra (GSK) for infants and children aged 6 months to under 3 years (ie, aged 6–35 months). Each 0.5 mL dose contains 15 µg of each of the four recommended influenza strains in phosphate buffered saline; other components and excipients include hydrocortisone, gentamicin sulfate, ovalbumin (≤ 0.05 µg), formaldehyde, and sodium deoxycholate.
- Influvac Tetra (Mylan New Zealand Ltd) for adults and children aged 3 years and older. Each 0.5 mL dose contains 15 µg of each of the four recommended influenza strains; other components and excipients include potassium chloride, monobasic potassium phosphate, dibasic sodium phosphate, sodium chloride, calcium chloride dihydrate, magnesium chloride hexahydrate. Each 0.5 mL dose contains residual amounts of ovalbumin (≤ 0.1 µg), formaldehyde, cetrimeronium bromide, sodium citrate, sucrose, gentamicin sulfate, and traces of tylosine tartrate, hydrocortisone and polysorbate 80 which are used during the manufacturing process.

10.4.2 Efficacy and effectiveness

International data

Added information about influenza B and quadrivalent influenza vaccines.

Two influenza B strains can frequently co-circulate, and due to the complexity involved in predicting which B strains will circulate in the upcoming season, mismatches between the B strain selected for TIVs and the circulating B strains have occurred in up to one-half of influenza seasons. Because QIVs contain two influenza B strains, modelling studies suggest that QIVs are expected to prevent more influenza cases, hospitalisations and deaths than TIVs, due to their capacity to broaden the immune response against B strains and reduce the likelihood of a B-mismatched season.¹

10.4.4 Dosage and administration

Individuals aged 9 years and older

Updated to reflect the funded quadrivalent vaccine.

Individuals aged 9 years and older receive a single 0.5 mL intramuscular dose of **Influvac Tetra** vaccine.

Children aged under 9 years

Updated to reflect the funded quadrivalent vaccines.

Children aged under 9 years who have not previously received influenza vaccine require two doses of vaccine four weeks apart to produce a satisfactory immune response. Children aged 6 months to under 3 years (ie, aged 6–35 months) receive a 0.5 mL dose of Fluarix Tetra; children aged 3 years and older receive a 0.5 mL dose of Influvac Tetra (see Table 10.2).

Table 10.2: Recommended influenza vaccine doses in children

Age	Vaccine	Dose	Number of doses
6–35 months	Fluarix Tetra	0.5 mL	1 or 2*
3–8 years	Influvac Tetra	0.5 mL	1 or 2*

* Two doses separated by at least four weeks if the vaccine is being used for the first time.

There is limited data on which to base the recommendations, but the aim is to reduce reactions, particularly febrile reactions (which are increased in young children), while maintaining an adequate immune response.

Co-administration with other vaccines

Updated to include other vaccines that can be co-administered with influenza vaccine.

Influenza vaccine can be administered with other vaccines, such as pneumococcal polysaccharide vaccine, tetanus diphtheria (Td) vaccine, the live attenuated herpes zoster vaccine⁵⁶ and the scheduled childhood vaccines.

10.5 Recommended immunisation schedule

Table 10.3: Influenza vaccine recommendations

In the 'Individuals aged 6 months to under 65 years' row, added new funding restrictions and a footnote about immune checkpoint inhibitors.

Recommended and funded
Individuals aged 6 months to under 65 years who: <ul style="list-style-type: none">• have cardiovascular disease (ischaemic heart disease, congestive heart failure, rheumatic heart disease, congenital heart disease or cerebrovascular disease)• have chronic respiratory disease (asthma if on regular preventive therapy; other chronic respiratory disease with impaired lung function)• have diabetes• have chronic renal disease• have any cancer,^a excluding basal and squamous skin cancers if not invasive• have other conditions (autoimmune disease, immunosuppression or immune deficiency,^a HIV infection, transplant recipients, neuromuscular and central nervous system diseases/disorders, haemoglobinopathies, children on long-term aspirin, have a cochlear implant, errors of metabolism at risk of major metabolic decompensation, pre- or post-splenectomy, Down syndrome)• are pregnant• are children aged 4 years and under who have been hospitalised for respiratory illness or have a history of significant respiratory illness• are children aged under 18 years living in the Seddon/Ward and rural Eastern Marlborough region (within the Nelson Marlborough District Health Board) and Kaikoura and Hurunui areas (within the Canterbury District Health Board)• are children aged under 18 years who have been displaced from their homes in Edgecumbe and the surrounding region• are patients who are compulsorily detained long-term in a forensic unit within a DHB hospital.^b
<p>^a Seek specialist advice for individuals who are currently being treated with immune checkpoint inhibitors, as well as those who have discontinued treatment within the past 6 months. See 'Oncology patients treated with immune checkpoint inhibitors' in section 4.3.3.</p>

10.5.2 At-risk children, 10.5.3 At-risk adults and 10.6 Contraindications and precautions

Added a note about immune checkpoint inhibitors.

Note: Seek specialist advice for individuals who are currently being treated with immune checkpoint inhibitors, as well as those who have discontinued treatment within the past 6 months. See 'Oncology patients treated with immune checkpoint inhibitors' in section 4.3.3.

10.6.1 Contraindications

Updated the information about egg allergy.

Influenza vaccine should not be administered to people with a history of an anaphylactic reaction to a prior dose of influenza vaccine or to a vaccine component. Egg allergy, including anaphylaxis, is **not** a contraindication or precaution, see section 10.6.3.

10.6.2 Precautions

Removed the information about egg allergy.

10.6.3 Egg allergy

This is a new section.

Influenza vaccine can be safely administered to people with a history of egg allergy, including anaphylaxis, at general practices, pharmacies or at the workplace.⁶²

Reported cases of anaphylaxis after influenza vaccination in egg-allergic individuals all occurred over 30 years ago, at a time when vaccine egg (ovalbumin) content was much higher than it is now. Recent studies have shown that influenza vaccines containing less than one microgram (<1 µg) of ovalbumin do not trigger anaphylaxis in sensitive individuals.⁶² The residual ovalbumin in one dose of Influvac Tetra (≤0.1 µg) or Fluarix Tetra (≤0.05 µg) is significantly below this limit.^{63, 64}

10.7 Expected responses and AEFIs

Added information about quadrivalent influenza vaccines.

Inactivated influenza vaccines are generally well tolerated. The safety profile of quadrivalent inactivated vaccines is comparable to that of trivalent inactivated vaccines.¹⁹

Immune checkpoint inhibitors

This is a new section.

There have been reports of fatal myositis, myocarditis and rhabdomyolysis in patients being treated with ipilimumab with nivolumab and administered influenza vaccine.⁷³ A prospective study of patients currently being treated with nivolumab or pembrolizumab and administered trivalent influenza vaccine found an increase in immune-related adverse events compared to unvaccinated patients being treated with these medicines.⁷⁴ See 'Oncology patients treated with immune checkpoint inhibitors' in section 4.3.3.

10.9 Variations from the vaccine data sheet

Removed the paragraph about vaccination in pregnancy, and updated the paragraph about anaphylaxis.

~~The data sheet states that for pregnant high risk patients, the possible risks of clinical influenza infection should be weighed against the possible risks of vaccination. The Ministry of Health recommends that all pregnant women receive influenza vaccination—see section 10.5.1~~

The **Influvac Tetra** data sheet states that hypersensitivity to **the residues of** eggs is a contraindication to receiving influenza vaccination. The Ministry of Health recommends that individuals with hypersensitivity to eggs, **including anaphylaxis**, may receive influenza vaccination— **see section 10.6.3**.

Chapter 13 – Mumps

Chapter updated to align with the latest version of the 'Mumps' chapter of the [Communicable Disease Control Manual 2012](#).

Key information

Period of communicability updated, and a new Public health measures row added.

Period of communicability	For contact tracing purposes, the recommended period of communicability is from 2 days before to 5 days after the onset of parotitis.
Public health measures	<p>Cases: exclude for 5 days from onset of parotitis.</p> <p>Susceptible contacts working in healthcare settings or living or working with immunocompromised people:</p> <ul style="list-style-type: none">exclude from 12 days after the first exposure to 25 days after last exposure to the infectious case.vaccinate with 2 documented doses of MMR. <p>Susceptible contacts in other settings (tertiary education, school, early childhood services or work):</p> <ul style="list-style-type: none">if zero MMR doses, consider exclusion from 12 days after the first exposure to 25 days after last exposure to the infectious case, if there is a high risk of mumps transmission. They can be readmitted immediately after receiving the 1st MMR dose.if a history of 1 MMR dose, they do not need to be excluded but should be offered a 2nd MMR dose.

13.2 Clinical features

Added a new paragraph about infectivity.

People with mumps are most infectious from two days before to five days after the onset of parotitis.¹ For contact tracing purposes, the recommended period of communicability is also from two days before to five days after the onset of parotitis.¹ However, mumps virus has been isolated in saliva from seven days before to nine days after the onset of parotitis.¹ Asymptomatic cases also can be infectious.¹

13.8.1 Diagnosis

Except if there is an epidemiological link with a confirmed case, all suspected mumps cases should have diagnostic testing (eg. by buccal swab and PCR) as there are other causes of parotitis other than the mumps virus. See the latest version of the 'Mumps' chapter of the *Communicable Disease Control Manual 2012*¹ for the specimens required for laboratory confirmation of mumps, or discuss these with the local laboratory.

13.8.2 Susceptible contacts

Updated the information to align with the latest version of the 'Mumps' chapter of the [Communicable Disease Control Manual 2012](#).

A susceptible contact is anyone born after 1981 who has not had mumps infection or has not been fully vaccinated for their age and who has had close contact with the case during the period of communicability (from 7 days before the onset of parotitis until 9 days after the onset of illness).

All susceptible contacts should be offered MMR vaccine. (All vaccinations given should be recorded on the NIR.) The mumps vaccine given after exposure has not been shown to be effective in preventing infection, but immunisation will provide protection against future exposure. There is no increased risk of adverse events after immunisation during the incubation period of mumps or if the recipient is already immune. Immunoglobulin is ineffective after exposure to mumps.

The mumps vaccine given after exposure has not been shown to be effective in preventing infection, but immunisation will provide protection against future exposure and may prevent a third wave of cases from the susceptible contacts.

13.8.3 Exclusion

Updated the information to align with the latest version of the 'Mumps' chapter of the [Communicable Disease Control Manual 2012](#).

Cases

Exclude cases from tertiary education, school, sports, early childhood services or health care employment or other work and from close contact with other susceptible people for 5 days from onset of parotitis.¹ ~~Previously immunised (pre-exposure) contacts need not be excluded.~~

Susceptible contacts

Discuss exclusion of susceptible contacts with the local medical officer of health. ~~Previously immunised (pre-exposure) contacts need not be excluded.~~ Generally, unimmunised contacts who have no previous history of mumps infection should be advised not to attend early childhood services or school because of:

- the risk of catching the disease themselves
- the risk of passing on the disease, when asymptomatic or in the prodromal phase, to other susceptible children.

Health care settings or working or living with immunocompromised people

Advise exclusion of susceptible contacts in health care settings and for those working or living with immunocompromised people from 12 days after the first exposure to 25 days after last exposure to the infectious case.¹ Documented full immunisation with two MMR doses should be required in these situations.¹

Other settings

Consider advising exclusion of susceptible contacts with zero MMR doses from tertiary education, school, early childhood services or work from 12 days after the first exposure to 25 days after last exposure to the infectious case, if there is a high risk of mumps transmission.¹ Exclusion is more important in secondary and tertiary education settings as these settings are more conducive to outbreaks.¹

All excluded contacts in settings other than healthcare or with immunocompromised people can be readmitted immediately after they have received the first MMR dose.¹ Those who have a history of one dose of MMR vaccination should be offered their second vaccine dose and be allowed to remain in tertiary education, school, early childhood services or work (except for health care workers or those working or living with immunocompromised people).¹ However, if the contact subsequently develops mumps symptoms they would need to be excluded.

~~If a susceptible contact is vaccinated following exposure, they still need to be excluded (for the current outbreak) for 25 days. The vaccine given after exposure has not been shown to be effective in preventing infection, but immunisation will provide protection against future exposure. Contacts immunised prior to exposure do not need to be excluded.~~

For more details on control measures, refer to the latest version of the 'Mumps' chapter of the [Communicable Disease Control Manual 2012](#).¹

Chapter 14 – Pertussis

Chapter updated to align with the latest version of the 'Pertussis' chapter of the [Communicable Disease Control Manual 2012](#).

Key information

Period of communicability row updated.

Period of communicability	For control purposes, the communicable stage lasts from the catarrhal stage to 3 weeks after the onset of paroxysmal cough in a case not treated with antimicrobials. When treated with an effective antibiotic (eg, azithromycin), infectivity lasts until 2 days of antibiotics have been taken. This lengthens to 5 days if other antibiotics (eg, erythromycin) are used.
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14.8.4 Antimicrobial treatment of case

Exclusion

Updated to align with the latest version of the 'Pertussis' chapter of the [Communicable Disease Control Manual 2012](#).

Exclude the case from school, early childhood services, other institutions or work until they have received at least two days of an appropriate course of antibiotic treatment (eg, azithromycin; this lengthens to 5 days if other antibiotics [eg, erythromycin] are used), or exclude them for three weeks from the date of onset of typical paroxysms of cough or until the end of the cough, whichever comes first.⁹⁶

14.8.5 Management of contacts

Exclusion

New subheading, and text updated to align with the latest version of the 'Pertussis' chapter of the [Communicable Disease Control Manual 2012](#).

Any contacts, high priority or otherwise, should be advised to avoid attending early childhood services, school, work or community gatherings if they become symptomatic. It is important to clearly explain that the early stage of pertussis is catarrhal, with symptoms that are indistinguishable from those of minor respiratory tract infections, and is highly contagious.⁹⁶

In general, susceptible contacts working or living with someone particularly vulnerable to pertussis (in particular: a young child with fewer than three doses of pertussis-containing vaccine; a woman in the last month of pregnancy; a person with a pre-existing health condition that may be exacerbated by a pertussis infection) should be given prophylaxis with antibiotics and not be excluded while taking prophylaxis as long as they don't have any symptoms, or, in the absence of prophylaxis, be excluded/avoid close contact for 14 days after the last exposure to an infectious case.⁹⁶ Susceptible contacts are defined as those who are not fully immunised for their age, or if they are over 16 years of age and have not received a booster of pertussis-containing vaccine in the last 5 years.⁹⁶

Chapter 16 – Poliomyelitis

16.8 Public health measures

Updated the 'Single human source specimen form' URL.

Contact the polio reference laboratory for specific advice on the specimens required, and on packing and transporting the specimens (see also the 'Single human source specimen form', available on the ESR website: www.esr.cri.nz/our-services/testing/test-request-forms/)

Chapter 21 – Varicella

21.9 Variations from the vaccine data sheet

The second paragraph has been deleted as there is no longer a variation between the Handbook and Varilrix data sheet for the length of time that pregnancy should be avoided after vaccination.

~~The data sheet states that pregnancy should be avoided for three months after vaccination. The Ministry of Health instead recommends avoiding pregnancy for at least four weeks after vaccination.³⁴~~

Chapter 22 – Zoster

The chapter has been updated to reflect the new funding for herpes zoster vaccine.

Key information

Recommended immunisation schedule	<p>From 1 April 2018, 1 dose of HZV is funded for:</p> <ul style="list-style-type: none">• individuals at age 65 years, or• catch-up of individuals aged 66–80 years, inclusive (the catch-up programme ceases on 31 March 2020). <p>HZV may be given to individuals with a prior history of zoster. After the zoster episode has resolved the vaccination benefit is unclear – wait at least 1 year before administering the vaccine.</p>
Vaccine efficacy/effectiveness	<p>Reduces the burden of zoster illness by 61 percent in all adults aged over 60 years, by 66 percent in those aged 60–69 years and by 55 percent in those aged 70 years and older.</p> <p>The role of revaccination is currently unknown.</p>

22.4.2 Efficacy and effectiveness

Duration of protection

Added information about revaccination.

There do not appear to be any safety concerns with administering a second dose of HZV.²⁰ Although not currently recommended, individuals who previously received an unfunded HZV dose may choose to receive a funded HZV dose, if eligible.

22.4.3 Transport, storage and handling

Removed the information about storing the diluent separately.

~~The supplied diluent can be stored separately at +20°C to +25°C, or in the refrigerator at +2°C to +8°C.~~

22.5 Recommended immunisation schedule

Updated to reflect new funding; added conditions where vaccination may be considered but is not funded; added information about individuals with a history of herpes zoster, immunocompromised individuals, and serological testing.

Table 22.1: Herpes zoster vaccine (HZV) recommendations

Note: Neither history of previous varicella infection nor evidence of prior immunity to VZV is required prior to the routine administration of HZV (with the exception of certain immunocompromised persons, refer below).

Recommended and funded
1 dose of HZV is recommended and funded for: <ul style="list-style-type: none">• individuals at age 65 years, or• catch-up^a of individuals aged 66–80 years, inclusive.
For consideration, but not funded
1 dose of HZV may be considered, but is not funded, for individuals aged 50–64 years: <ul style="list-style-type: none">• who are at increased risk of zoster^{24, 25, 26, 27} and who may benefit from being vaccinated earlier than the routine schedule:<ul style="list-style-type: none">- with asymptomatic HIV^b (if CD4+ lymphocyte count is ≥ 200 cells/mm³)- with end-stage kidney disease^b (CKD stages 4–5)- at least 4 weeks prior to commencing high-dose immunosuppressive therapy^{b,c} and/or solid organ transplantation^{b,c}- after ceasing high-dose immunosuppressive therapy^{b,c}- at least 2 years post-HSCT^{b,c}- with autoimmune disease^{b,c} (eg, rheumatoid arthritis, systemic lupus erythematosus, inflammatory bowel disease, Crohn's disease, ulcerative colitis)- with a first generation family history of zoster- with depression- with diabetes- with psychiatric disorders- with chronic obstructive pulmonary disease.• who are household contacts of immunocompromised individuals.
a The catch-up programme ceases on 31 March 2020.
b Seek specialist advice. Serological confirmation of previous VZV infection is recommended before administering HZV. If VZV-seronegative, give VV. If VZV-seropositive, give HZV. See also section 4.3.3.
c See Table 22.2: Recommendations for individuals on immunosuppressive therapy.

22.5.1 Recommended and funded

Recommendations for HZV (Zostavax) are in Table 22.1 above. From 1 April 2018, one dose of HZV will be funded for individuals at age 65 years. There will be a catch-up programme from 1 April 2018 until 31 March 2020, with one dose of HZV funded for individuals aged 66 to 80 years, inclusive.

22.5.2 Other considerations

Vaccination of individuals aged 50–64 years (unfunded)

HZV (Zostavax) is registered in New Zealand for individuals aged 50 years or older. It may be considered, but is not funded, for individuals aged 50–64 years who are at increased risk of zoster^{24, 25, 26, 27} and who may benefit from being vaccinated earlier than the routine schedule and/or they are a household contact of an immunocompromised individual (see Table 22.1). However, the exact duration of vaccine efficacy is not known, and it is possible that protection following a single vaccine dose wanes with time.²⁷ The need for revaccination is not yet determined.²⁷ Dosing with HZV is often strategic and based on clinical consideration (see below).

Individuals with a history of HZ (shingles)

Individuals with a history of a previous episode of HZ can be given HZV. It is possible that a history of previous zoster may be inaccurate or a mistaken diagnosis.²⁷ In addition, the risk of a

repeat episode of zoster has been estimated at approximately 5 percent in immunocompetent individuals.²⁷

There are no recognised safety concerns in giving the vaccine to people with prior history of HZ.²⁸ The length of time following an episode of HZ after which it may be beneficial to vaccinate has not been established.²⁷ It is suggested that the vaccine could be given at least one year after the episode of HZ has resolved.²⁷

Household contacts of immunocompromised individuals

HZV is contraindicated in individuals with current or recent severe immunocompromise due to primary and secondary immune-deficiency states, or due to immunosuppressive therapy (see section 22.6). However, VV or age-appropriate HZV can be given safely to their household contacts. VV is funded for non-immune household contacts of patients who are immunocompromised or undergoing a procedure or treatment leading to immunocompromise. If the household contact is immune to varicella and aged 50 years and older, give HZV (funded at age 65 years with a catch-up, until 31 March 2020, for those aged 66–80 years inclusive; unfunded if aged 50–64 years).

If a vaccinated person develops a varicella- or zoster-like rash, they should cover the rash and avoid contact with persons who are immunocompromised for the duration of the rash.²⁷

See also 'Household contacts' in section 4.3.1 for general recommendations for vaccination of household contacts of immunocompromised individuals.

Serological testing

Neither history of previous varicella infection nor evidence of prior immunity to VZV is required prior to the routine administration of the herpes zoster vaccine.²⁷ Most older people in New Zealand are seropositive to VZV due to previous primary varicella infection.

Serological confirmation of previous VZV infection is recommended before administering HZV to individuals with HIV, and in those who are anticipating significant future immunocompromise or who have ceased immunosuppressive therapy (see section 22.6.2).²⁷ Individuals in these categories who have negative VZV IgG should generally not be given HZV. Upon specialist advice, VV may be given instead of HZV to seronegative individuals.

Laboratory testing to check for an immune response after HZV is not recommended.²⁷

22.6.1 Contraindications

Updated the Contraindications section.

HZV is a live attenuated varicella-zoster vaccine and administration to individuals who are immunosuppressed or immunodeficient may result in disseminated varicella-zoster virus disease, including fatal outcomes. If HZV is inadvertently administered to these individuals, seek specialist advice immediately and notify CARM.

Contraindications to HZV include:

- a **history of anaphylactic reaction to neomycin**. A history of hypersensitivity to any other component of the vaccine, including gelatin
- primary and secondary immune-deficiency states due to conditions such as acute and chronic leukaemias, lymphoma, other conditions affecting the bone marrow or lymphatic system, immunosuppression due to HIV/AIDS (**see section 22.6.2 for asymptomatic HIV infection**), cellular immune deficiencies – **see sections 4.3.2 and 4.3.3**
- immunosuppressive therapy (including high-dose corticosteroids and biologics). Note: HZV is *not* contraindicated for use in individuals who are receiving low-level immunosuppressive therapy, for example: topical/inhaled corticosteroids or low-dose systemic corticosteroids; who are receiving corticosteroids as replacement therapy (eg, for adrenal insufficiency); low-dose weekly methotrexate or azathioprine – **see Table 22.2 below and section 4.3.3**
- active untreated TB

- pregnancy.

Do not give to children.

22.6.2 Precautions

This is a new section, with information about individuals with HIV and immunocompromised individuals.

HIV

Asymptomatic HIV-positive individuals with a CD4+ lymphocyte count ≥ 200 cells/mm³ may be vaccinated upon specialist advice. Results of a phase II trial in HIV-infected adults indicated that HZV was generally safe and immunogenic in those with CD4+ lymphocyte count ≥ 200 cells/mm³, with no cases of vaccine strain infection.^{29, 30}

Serological confirmation of previous VZV infection is recommended prior to vaccination.²⁷ If seronegative, give VV (funded); if seropositive give HZV (funded at age 65 years with a catch-up, until 31 March 2020, for those aged 66–80 years inclusive; unfunded if aged 50–64 years).

Individuals with symptomatic HIV infection or AIDS should not be vaccinated.

Immunocompromised individuals

HZV is contraindicated in individuals with current or recent severe immunocompromise due to primary and secondary immune-deficiency states, or due to immunosuppressive therapy. However, individuals receiving low-level immunosuppressive therapy may be considered for vaccination upon specialist advice.

Individuals who anticipate significant future immunocompromise because of an existing illness and/or its treatment may be given HZV upon specialist advice.²⁷ This includes prior to solid organ transplant, chemotherapy or radiation therapy, and individuals with autoimmune disease. Vaccination at least 4 weeks prior to the onset of immunocompromise may be appropriate, upon specialist advice.²⁷ Individuals whose treatment with high-dose systemic immunosuppressive therapy has ceased may be vaccinated upon specialist advice if an appropriate time interval has passed.²⁷ Serological confirmation of previous VZV infection is recommended prior to vaccination. If seronegative, give VV (funded if an eligible condition); if seropositive give HZV (funded at age 65 years with a catch-up, until 31 March 2020, for those aged 66–80 years inclusive; unfunded if aged 50–64 years).

Table 22.2 below provides recommendations for the use of HZV in persons on immunosuppressive therapy.

See also section 4.3.3.

Table 22.2: Recommendations for use of herpes zoster vaccine for individuals on immunosuppressive therapy

Immunosuppressive therapy	Treatment regimen	Potential timing of vaccination
High-dose corticosteroid monotherapy (≥ 20 mg per day of prednisone or equivalent)	<14 days	Immunise 4 weeks before treatment starts OR any time after treatment stops ^a
	≥ 14 days	Immunise 4 weeks before treatment starts OR at least 4 weeks after treatment stops
DMARDs:		
• Azathioprine	>3.0 mg/kg per day	Immunise 4 weeks before treatment starts OR at least 3 months after treatment stops
• Methotrexate	>0.4 mg/kg per week	
• All other DMARDs ^{b,c}	All regimens	
T-cell inhibitors (eg, tacrolimus, cyclosporin)	All regimens	Immunise 4 weeks before treatment starts OR at least 3 months after treatment stops
Other unspecified immunosuppressants (eg, chemotherapy ^d) ^e	All regimens	Immunise 4 weeks before treatment starts OR at least 3 months after treatment stops
Targeted biological therapies (eg, monoclonal antibodies) ^f	All regimens	Immunise 4 weeks before treatment starts OR at least 12 months after treatment stops ^g

a Can be given immediately on discontinuation, but delay 2 weeks if possible.

b See Table 4.3 for a list of other DMARDs.

c Does not include sulfasalazine which is considered safe at any dose.

d For patients who have recently received chemotherapy and/or radiotherapy waiting at least 6 months rather than 3 months may be appropriate.

e This does not include individuals who have received HSCT, who should not receive HZV until at least 2 years post-HSCT. (See also the 'Vaccination after haematopoietic stem cell transplant (HSCT)/bone marrow transplant' discussion in section 4.3.3.)

f See Table 4.3 for a list of targeted biological therapies.

g In some cases immunosuppression that absolutely contraindicates live attenuated vaccines can persist for a year or more after the last dose of therapy. Live attenuated vaccines should preferably not be given to any patient who has previously received biologic immunotherapies, unless this has been approved by the treating specialist after evaluation of the delay since last treatment and in some cases an assessment of immunological recovery.

Source: Adapted from: Australian Technical Advisory Group on Immunisation (ATAGI). 2017. *The Australian Immunisation Handbook* 10th edition (2017 update), Table 4.24.1. Canberra: Australian Government Department of Health. URL: <http://www.immunise.health.gov.au/internet/immunise/publishing.nsf/Content/Handbook10-home> (accessed 17 January 2018). © Commonwealth of Australia 2016.

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22.8 Variations from the vaccine data sheet

Added a new variation.

The HZV data sheet states that HZV should not be given to individuals with HIV/AIDS. The Ministry of Health recommends that asymptomatic HIV-positive individuals with a CD4+ lymphocyte count ≥ 200 cells/mm³ may be vaccinated upon specialist advice (see section 22.6.2).

Appendix 1 – The history of immunisation in New Zealand

A1.1 History of the Schedule – summary tables

Table A1.1: Summary of when each vaccine was introduced to New Zealand

Added information about herpes zoster vaccine.

Vaccine	Year the vaccine was introduced, plus comments
Herpes zoster (HZV)	2018 From 1 April, HZV was introduced onto the Schedule as a single dose for adults aged 65 years, with a catch-up programme for adults aged 66–80 years inclusive (the catch-up programme ceases on 31 March 2020).

A1.2 Previous national immunisation schedules

Table A1.2: July 2017 immunisation schedule

Added the 2017 national immunisation schedule table.

	DTaP-IPV-HepB/Hib	PCV10	RV1	Hib	MMR	VV	DTaP-IPV	Tdap	HPV9	Td	Influenza
Pregnancy								•			•
6 weeks	•	•	•								
3 months	•	•	•								
5 months	•	•									
15 months		•		•	•	•					
4 years					•		•				
11 or 12 years								•	•		
45 years										•	
65 years										•	•

A1.3 History of the Schedule: background information

A1.3.5 Influenza vaccines

Added information about quadrivalent influenza vaccine.

Funded influenza immunisation was introduced in 1997 for people aged 65 years and older. From 1999 the vaccine became funded for younger people (aged from 6 months to 64 years) who were at increased risk of influenza complications. In 2010 funded vaccine was extended to pregnant women, and in 2013 to children aged under 5 years who have been hospitalised for respiratory illness or have a history of significant respiratory illness. In 2015, funding was extended to include other high-risk conditions. In 2018, quadrivalent influenza vaccine replaced the previously used trivalent vaccine.

A1.3.16 Herpes zoster vaccines

This is a new section.

HZV was introduced onto the Schedule on 1 April 2018, as a single dose for adults aged 65 years, with a catch-up programme for adults aged 66–80 years inclusive (the catch-up programme ceases on 31 March 2020).

Appendix 2 – Planning immunisation catch-ups

A2.2.2 Principles of catch-up for children and adolescents aged 10 to under 18 years

Point 7 updated to include Engerix-B.

- For individuals aged 11–15 years, an alternative two-dose hepatitis B catch-up schedule may be considered using the monovalent HepB (HBvaxPRO 10 µg; use Engerix B 20 µg if HBvaxPRO 10 µg is not available), with the second dose given four to six months after the first. (Note: While not approved for a two-dose schedule, there is no reason to expect that two doses of Engerix-B 20 µg, given four to six months apart, would not provide the same level of protection as two doses of HBvaxPRO 10 µg.)

Table A2.2: Minimum number of antigens required by individuals aged 10 to under 18 years at the time of presentation

Footnote c updated to include Engerix-B.

10 years to <18 years

3 HepB (5 µg) for children aged 10 to <18 years; or 2 HepB doses (10 µg) for children aged 11–15 years^c

- c If aged 10 years to under 18 years, 3 doses of HepB (HBvaxPRO 5 µg) are required. An alternative 2-dose schedule of HepB (HBvaxPRO 10 µg) may be used for children aged 11–15 years with the 2nd dose given 4–6 months after the 1st. If HBvaxPRO 5 µg or 10 µg are not available, use Engerix B 20 µg instead (2 or 3 doses, depending on age at 1st dose).

A2.2.3 National Immunisation Schedule catch-up guides for infants, children and adolescents aged under 18 years

Table A2.9: Age at presentation: 10 years to under 18 years – excluding HPV

Footnote c updated to include Engerix-B.

Dose	Vaccines			
First dose	Tdap ^a	IPV ^b	HepB ^c	MMR
4 weeks later	Tdap ^a	IPV ^b	HepB	MMR
4 weeks later	Tdap ^a	IPV ^b	HepB	
6 months later, or at age 11 years	Tdap			
At age ≥11 years				VV ^d

- c If aged 10 years to under 18 years, 3 doses of HepB (HBvaxPRO 5 µg) are required. An alternative 2-dose schedule of HepB (HBvaxPRO 10 µg) may be used for children aged 11–15 years with the 2nd dose given 4–6 months after the 1st. If HBvaxPRO 5 µg or 10 µg are not available, use Engerix B 20 µg instead (2 or 3 doses, depending on age at 1st dose).

A2.3 Immunisation catch-up for eligible adults aged 18 years and older

Added a new point about herpes zoster vaccine.

7. From 1 April 2018, one dose of HZV will be funded for individuals at age 65 years. There will be a catch-up programme from 1 April 2018 until 31 March 2020, with one dose of HZV funded for individuals aged 66 to 80 years, inclusive.

Appendix 3 – Immunisation standards

A3.1 Purpose

Third paragraph updated to reflect the number of vaccine-preventable diseases the Schedule protects against (due to new funding for herpes zoster vaccine).

The Schedule aims to protect children and adults against 15 serious vaccine-preventable diseases and offers publicly funded immunisation to individuals at risk of hepatitis A, influenza, varicella, TB, meningococcal and/or pneumococcal disease.

Appendix 9 – Websites

A9.1 New Zealand-based websites

Institute of Environmental Science and Research Ltd (ESR)

Added the Public Health Surveillance website.

www.esr.cri.nz

A source of New Zealand infectious disease epidemiology, including regular surveillance reports for a number of diseases (www.surv.esr.cri.nz).

A9.2 International websites

Healthychildren.org – American Academy of Pediatrics

Added the immunisation URL.

www.healthychildren.org

Information for parents and clinicians, which includes colourful (and graphic) pictures (www.healthychildren.org/immunizations). Useful articles include 'Why immunize your child?' and 'Vaccine safety: examine the evidence'.

A9.3 Influenza-related websites

Institute of Environmental Science and Research Ltd

Removed the SHIVERS URL as this data is now included in the virological surveillance reports.

Virological surveillance

Updated the Virological surveillance URL.

www.surv.esr.cri.nz/virology/virology.php

Weekly, monthly and annual influenza surveillance reports.

A9.4 Travel-related websites

Ministry of Foreign Affairs and Trade – Safe Travel

Added this website.

www.safetravel.govt.nz

Anaphylaxis

This page is copied directly from the inside back cover of the printed *Handbook*.

Call for help – send for professional assistance (ambulance, doctor). Never leave the individual alone.

Assess – Assess responsiveness, and check Airway, Breathing, Circulation.

- If they are conscious, lie the individual down in the recovery position.
- If they are unconscious and breathing normally, lie the individual down in the recovery position, ensuring that the airway is open.
- If they are unconscious and not breathing normally, institute standard procedures for basic life support. If cardiorespiratory arrest occurs, administer age-appropriate CPR and life-support measures.

Administer 1:1,000 adrenaline by deep intramuscular injection – see below for dosage. If necessary, adrenaline can be repeated at 5–15-minute intervals, to a maximum of three doses.

Administer oxygen at high flow rates where there is respiratory distress, stridor or wheeze.

If hypotensive, elevate legs. **If stridor is present**, elevate head and chest.

Record vital signs every 5–10 minutes and document fully all symptoms and treatment given.

Admit to hospital – all cases of anaphylaxis should be admitted to hospital for observation.

Adrenaline dosage for 1:1,000 formulation is 0.01 mL/kg, up to a maximum of 0.5 mL.

If weight unknown:

Recipient	Age	Adrenaline (1:1,000 mL)
Infant	Under 1 year	0.05–0.1 mL
Child	Under 2 years	0.1 mL
Child	2–4 years	0.2 mL
Child	5–10 years	0.3 mL
Adolescent	≥11 years	0.3–0.5 mL
Adult		0.5 mL