

2 General Immunisation Procedures

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In some circumstances, advice in these guidelines may differ from that in the product Summary of Product Characteristics (SmPC). When this occurs, NIAC advises that the recommendations in these guidelines, which are based on current expert advice from NIAC, are followed.

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To view key changes please click [here](#).

Acronyms used in this chapter

BCG	Bacillus Calmette-Guerin
bOPV	bivalent oral polio vaccine
COVID-19	coronavirus disease 19
DTaP	diphtheria, tetanus, acellular pertussis
Tdap	tetanus, diphtheria, acellular pertussis
Td/IPV	tetanus, diphtheria, inactivated polio vaccine
EC	European Commission
EMA	European Medicines Agency
FDA	Food and Drug Administration (US)
HCW	healthcare worker
HbsAg	hepatitis B surface antigen
HBIG	hepatitis B immunoglobulin
HBV	hepatitis B virus
HepB	hepatitis B
Hib	haemophilus influenzae type b
HIV	human immunodeficiency virus
HNIG	human normal immunoglobulin
HPV9	human papillomavirus 9-valent vaccine
HPRA	Health Products Regulatory Authority
IM	intramuscular
INR	international normalised ratio
IPV	inactivated poliomyelitis (polio) vaccine
ITP	idiopathic thrombocytopenia
IVIG	intravenous immunoglobulin
LAIV	live attenuated influenza vaccine
MenACWY	meningococcal ACWY
MenB	meningococcal B
MenC	meningococcal C
MMR	measles, mumps and rubella
MMRV	measles, mumps, rubella and varicella
NIAC	National Immunisation Advisory Committee
NIO	National Immunisation Office
OPV	oral poliomyelitis (polio) vaccine
PCV13	pneumococcal polysaccharide conjugate vaccine (13-valent)
PPV23	pneumococcal polysaccharide vaccine 23
RBCs	red blood cells
RSV	respiratory syncytial virus
RSVab	respiratory syncytial virus monoclonal antibody

SC	subcutaneous
SmPC	Summary of Product Characteristics
tOPV	trivalent oral poliomyelitis (polio) vaccine
UK	United Kingdom
WHO	World Health Organization

Terms used for frequency of adverse events

Very common	$\geq 1/10$
Common	$1/100$ and $< 1/10$
Uncommon	$\geq 1/1,000$ and $< 1/100$
Rare	$\geq 1/10,000$ and $< 1/1,000$
Very rare	$< 1/10,000$

2.1 Introduction

The immunisation schedule for young children is designed to give vaccines as early as possible to protect children against serious diseases. Many vaccines need to be given several times to provide long-lasting protection. Therefore, the immunisation schedule sets out the timing of vaccines and the intervals between doses to provide optimal protection at the optimal age.

Some diseases are more serious in younger children — for example, pertussis, which is more serious in children under six months of age — hence the 6 in 1 vaccine (DTaP/IPV/Hib/Hep B (which contains pertussis vaccine)) is scheduled at two, four and six months. However, a child who gets only one or two doses of the pertussis-containing vaccine is only partly protected against pertussis and may still catch the disease.

For best protection, it is important that children get their vaccines on time every time, as set out in the schedule. If children **fall behind the immunisation schedule by more than one month or one dose, it is recommended that they are given a catch-up schedule** using the minimum interval between doses that is effective. Where a schedule is interrupted, there is no need to restart the schedule; just continue with the outstanding doses at the minimum intervals, and when the child is up to date, resume the routine schedule.

This chapter sets out the immunisation schedule for children and catch-up schedules for children who have fallen behind the recommended immunisation schedule or children who missed out on any scheduled vaccines or are new entrants to Ireland and are unvaccinated or partly vaccinated. Partly-vaccinated individuals should follow these catch-up schedules, while taking into account the vaccines already received. The intervals between vaccines contributes to their effectiveness and these are set out for live and non-live vaccines.

This chapter also covers contraindications and precautions to vaccines; vaccinations of specific groups; blood products and vaccination; vaccine preparation and administration; holding an infant or child during vaccinations pain reduction and antipyretics and vaccination.

2.2 Immunisation schedule

2.2.1 Recommended Childhood Immunisation Schedule

Table 2.1 Recommended Childhood Immunisation Schedule for children born on or after 1 October 2024*

Age	Vaccines	Comment
2 months	DTaP/IPV/Hib/HepB + MenB + PCV13 + rotavirus	3 injections + 1 oral
4 months	DTaP/IPV/Hib/HepB + MenB + rotavirus	2 injections + 1 oral
6 months	DTaP/IPV/Hib/HepB + PCV13	2 injections
12 months	Varicella + MMR + MenB	3 injections
13 months	DTaP/IPV/Hib/HepB + MenC + PCV13	3 injections
4-5 years	DTaP/IPV + MMRV	2 injections
2-17 years	LAIV (annual)	Intranasal
12-13 years	HPV9 + Tdap + MenACWY	3 injections

*Schedule for children born before 1 October 2024 is available on the National Immunisation Office [website](#).

2.2.2 Interchangeability of 6 in 1 vaccines in the Primary Childhood Immunisation Schedule

Three 6 in 1 vaccines are authorised for use in the EU: Vaxelis, Infanrix hexa and Hexyon.¹ NIAC recommends either Vaxelis or Infanrix hexa for use in the Primary Childhood Immunisation Schedule. NIAC recommends using a vaccine from the same manufacturer to complete the 6 in 1 primary series and fourth dose. However, if the original vaccine is unknown or unavailable, an alternative 6 in 1 vaccine from a different manufacturer may be used. Vaccination should never be delayed because the vaccine used for previous doses is not known or unavailable.

¹ NIAC reviewed the available safety and efficacy data for Hexyon in March 2024. At this time, it was noted that data regarding co-administration with meningococcal B vaccine was pending, and a clinical trial was ongoing. NIAC concluded that Hexyon should not be recommended for inclusion in the childhood schedule until these co-administration data are available and can be reviewed.

2.2.3 Interrupted immunisation schedule

If an immunisation schedule is interrupted, it should be resumed as soon as possible. It is not necessary to repeat the course, regardless of the interval from the previous incomplete course, except in the case of the cholera vaccine ([Chapter 5](#)). The course should be completed with the same brand of vaccine if possible.

2.2.4 Optimal and minimum age for vaccinations

The optimal recommended ages and intervals shown in [Table 2.2](#) provide the best

immune response. The minimum interval is shorter than the recommended interval between doses and is the shortest time between two doses of a vaccine in which an adequate response to the second dose can be expected. Every effort should be made to comply with these recommendations.

2.2.5 Intervals between vaccine doses

In exceptional circumstances (for example, imminent international travel, measles outbreak, catch-up), it may be necessary to use an accelerated schedule, that is, to provide one or more vaccines at less than the optimal age or interval. In these instances, the minimum recommended age and intervals shown in [Table 2.2](#) can be used.

This accelerated schedule should not be used routinely. Following the exceptional circumstance, remaining doses should be given at recommended intervals to ensure the best protection.

2.2.6 Vaccination before minimum recommended age or interval

Giving a dose ≤ 4 days before the minimum age or interval (the four-day rule) is unlikely to have a significant adverse effect on the immune response to that dose. Therefore, the dose does not need to be repeated.

If a vaccine is given more than four days before the recommended minimum age or interval, it is not a valid dose. The dose should be disregarded and another dose given after the recommended minimum age or interval and at least four weeks after the disregarded dose.

The four-day rule should **not** be used for:

- i. rabies or Japanese encephalitis vaccines, because of their schedules (1, 7, 28 days)
- ii. the second or third doses of the accelerated hepatitis B schedule (0, 7, 21 days and 12 months)
- iii. the four-week interval between two different live parenteral vaccines not administered at the same visit ([Table 2.5](#)).

Table 2.2 Optimal and minimum recommended ages and intervals between doses of the Primary Childhood Immunisation Schedule (see footnotes 1, 2, 3 and 5 below for changes for children born on or after 1 October 2024)

	Dose 1		Dose 1 to Dose 2		Dose 2 to Dose 3		Dose 3 to Dose 4	
	Optimal age	Minimum age	Optimal interval or age	Minimum interval	Optimal interval or age	Minimum interval	Optimal interval or age	Minimum interval
DTaP/IPV/Hib/HepB (6 in 1 vaccine)	2 months	6 weeks	2 months	4 weeks	2 months (and 4 months after dose 1)	8 weeks (and 16 weeks after dose 1)	Due at 13 months ¹	4 th dose of 6 in 1 ≥4 weeks after 3 rd dose, if 3 rd dose of 6 in 1 given at >6 months and <12 months of age or 1 dose of 4 in 1 (DTaP/IPV) ≥6 months after 3 rd dose, if 3 rd dose of 6 in 1 given ≥12 months of age
MenB	2 months	6 weeks	2 months	4 weeks	2 months (and ≥12 months of age)	8 weeks (and ≥12 months of age)		
MenC²	6 months	6 weeks	2 months (and ≥12 months of age)	4 weeks (and ≥12 months of age)	At 12-13 years as MenACWY, in second-level school			
MMR³	12 months	6 months	4 weeks (and ≥12 months of age)	4 weeks (and ≥12 months of age)				
PCV13	2 months	6 weeks	2 months	4 weeks	2 months	8 weeks (and ≥12 months of age)		
Rotavirus	2 months	6 weeks	2 months	4 weeks (and <8 months 0 days of age)				
Varicella⁴	12 months	12 months	4-5 years old (Junior Infants)	4 weeks				
Influenza intra nasal⁵	2-17 years	2 years						

- ¹ A 4th dose of 6 in 1 is recommended for children born on or after 1 October 2024.
- ² For children born on or after 1 October 2024, vaccination against meningococcal C disease with MenC vaccine is due at 13 months and the next dose is due at 12-13 years as MenACWY vaccine, in second-level school. For children born on or after 1 October 2024, vaccination against meningococcal C disease is not recommended under 12 months of age unless the infant is in an at-risk group, in which case MenACWY vaccine is recommended ([Chapter 3](#) and [Chapter 13](#)).
- ³ Children can be vaccinated with MMR between 6 and 12 months of age — for example, during a measles outbreak. If so, they should have a repeat MMR at 12 months of age, ≥ 4 weeks after the 1st dose with a 3rd dose at 4-5 years of age.
- ⁴ Varicella vaccine is recommended for children born on or after 1 October 2024. The 2nd dose is recommended at 4-5 years old in Junior Infants combined with MMR vaccine as MMRV vaccine, or 4 weeks after the 1st dose if required.
- ⁵ Children aged 2-9 years in a clinically at-risk group should receive 2 doses of LAIV 4 weeks apart if a) receiving influenza vaccine for the first time or b) influenza vaccine history is unknown.

2.2.7 Vaccination after the expiry date

The expiry date of a vaccine is generally the last day of the stated month and year. The expiry date for reconstituted vaccines is on the outside of the box.

If a vaccine is given after the expiry date, it is an invalid dose and the dose can be repeated that day.

If the error is detected more than one day later and involves:

- **live** vaccine: wait ≥ 28 days before repeating the dose.
- **non-live** vaccine: repeat the dose as soon as possible.

2.2.8 Delayed immunisation/late entrants to Irish healthcare system

Lack of protection against vaccine-preventable diseases may be due to incomplete vaccination, improper storage or handling of vaccines, or to immune defects such as those that can occur during severe malnutrition.

Those who are not immunised or are incompletely immunised and are older than the recommended age range should be immunised as soon as possible according to the immunisation schedules in [Table 2.3](#) and [Table 2.4](#).

Once a child is back on schedule, the optimal recommended ages and intervals should be followed for the remainder of the required doses.

Children and adults coming to Ireland who do not have a documented or reliable verbal history of immunisation or disease should be assumed to be unimmunised.

This includes:

- those coming from areas of conflict
- marginalised population groups (such as refugees), as they may not have had access to immunisations

- those raised during periods before immunisation services were well developed or when vaccine quality may have been suboptimal.

It may be assumed that undocumented doses have not been received, and the Irish catch-up recommendations for that age should be followed.

Children resident in Ireland should be given vaccines according to the recommended Irish immunisation schedule.

Decisions regarding whether to give or withhold individual vaccines are based on a number of factors, including the slight risk of increased local reactions. The following guidelines may help with decision-making (for more details see [Table 2.3](#) and [Table 2.4](#)).

As a general rule, infants or children **more than one month or one dose behind** the schedule should be on a catch-up schedule, with the intervals between doses reduced to the minimum allowable.

Diphtheria

A fourth dose is recommended at 13 months of age for children born on or after 1 October 2024. A fifth dose should be given from the age of 4-5 years, usually in Junior Infants, at least six months after the fourth dose. If the fourth dose was given aged ≥ 3 years and four months, the fifth dose is not required until 12-13 years of age, as Tdap, in the first year of second-level school. All children aged 10 years and over should receive low-dose diphtheria vaccine (d) as Td or Td/IPV or Tdap, depending on other vaccine requirements.

Hepatitis B

Hepatitis B vaccine is included in the 6 in 1 vaccine and is given if other components of the 6 in 1 vaccine are required. Hepatitis B vaccine is not recommended if this is the only vaccine required unless a child is at increased risk of hepatitis B virus (HBV) infection ([Chapter 9](#)).

Hib

Hib vaccine should be given to unvaccinated children aged <10 years. If aged ≥ 12 months, a single dose of monovalent Hib vaccine can be given if this is the only vaccine that is required.

MenACWY

A child who has had MenACWY vaccine at 10 years or older does not need an adolescent booster.

MenB

Unvaccinated children less than two years of age should be given two or three

doses, two months apart, depending on their age ([Table 2.3](#)). Children at increased risk aged 2-10 years should get two doses four weeks apart as per Table 13.5 in [Chapter 13](#).

MenC

Unvaccinated children aged 1-9 years should be given one dose of MenC vaccine. A booster dose should be given at 12-13 years of age (as MenACWY vaccine).

Unvaccinated persons aged 10-22 years require a single dose of a MenC-containing vaccine.

MMR

Two doses are recommended; the first dose at 12 months of age and the second dose at 4-5 years of age, usually in Junior Infants. There should be an interval of at least four weeks between doses. If in doubt about vaccination status, it is preferable to give the MMR vaccine. Significant adverse reactions to repeat MMR vaccines are rare.

Children can be vaccinated with MMR between 6 and 12 months of age — for example, during a measles outbreak. If so, they should have a repeat MMR at 12 months of age, at least four weeks after the first dose, with a third dose at 4-5 years of age.

Pertussis

A fourth dose is recommended at 13 months of age for children born on or after 1 October 2024. A fifth dose should be given from the age of 4-5 years, usually in Junior Infants, at least six months after the fourth dose. If the fourth dose was given aged ≥ 3 years and four months, the fifth dose is not required until 12-13 years of age, as Tdap, in the first year of second-level school. All children aged 10 years and over should receive low dose pertussis vaccine (ap) as Tdap.

Pneumococcal

One dose of PCV13 vaccine should be given to unvaccinated immunocompetent children aged 12 months to <24 months ([Chapter 16](#), Table 16.2, for vaccination of those at increased risk).

Polio

A fourth dose is recommended at 13 months of age for children born on or after 1 October 2024. A fifth dose should be given at 4-5 years of age, usually in Junior Infants, at least six months after the fourth dose. If the fourth dose was given aged ≥ 3 years and four months, a further dose is not required unless at increased risk of exposure ([Chapter 17](#)).

For those coming to Ireland from countries using oral polio vaccine (OPV),

[recommendations](#) for completion of primary vaccination depend on whether they have received trivalent OPV (tOPV) or bivalent OPV (bOPV). In April 2016, there was a globally synchronised switch to replace tOPV with bOPV, which contains only types 1 and 3, as recommended by the World Health Organization (WHO).

Those vaccinated **since April 2016** in countries using OPV will have received bOPV. Those who have received three doses of bOPV and two doses of inactivated poliovirus (IPV) containing vaccines are considered by the WHO to have completed primary vaccination. Those who have completed primary vaccination require a booster of an IPV-containing vaccine at age 4-5 years, usually in Junior Infants or at least six months after their last polio vaccine if older than this (DTaP/IPV if aged <10 years or Td/IPV if aged ≥10 years).

Recommendations for vaccination if primary vaccination series is incomplete or unknown.

- If they already received three doses of bOPV, they should receive two doses of IPV-containing vaccine as recommended by the WHO to complete the primary series. There should be a minimum interval of four weeks between IPV-containing vaccine doses. A booster dose of an IPV-containing vaccine is recommended at aged 4-5 years, usually in Junior Infants or at least six months after their final catch-up polio vaccine.
- If they have received two doses or less (including none or unknown) of bOPV, they should receive three doses of IPV-containing vaccine (DTaP/Hib/HepB/IPV or DTaP/IPV if aged <10 years and Td/IPV if aged ≥10 years). There should be a minimum interval of four weeks between IPV-containing vaccine doses. A booster dose of an IPV-containing vaccine is recommended at least six months after their third IPV-containing vaccine.

Those coming to Ireland from countries using OPV, **vaccinated prior to April 2016**, should have received three doses of tOPV.

- If they have received three doses of tOPV, then a single booster dose of an IPV-containing vaccine is required (DTaP/IPV if aged <10 years and Td/IPV if aged ≥10 years).
- If they have unknown or incomplete polio vaccination status, they should start or complete a schedule of three doses of an IPV-containing vaccine (depending on how many tOPV they have already received). There should be a minimum interval of four weeks between doses of IPV-containing vaccine. A booster dose of IPV-containing vaccine should be given at least six months after completion of the primary vaccination series (DTaP/IPV if aged <10 years and Td/IPV if aged ≥10 years).

Rotavirus

Two doses of rotavirus vaccine should be given before age eight months and zero days (one dose if aged 7 months to <8 months, as the minimum interval between doses is four weeks).

Tetanus

A fourth dose is recommended at 13 months of age for children born on or after 1 October 2024. A fifth dose should be given at 4-5 years, usually in Junior Infants, at least six months after the fourth dose. If the fourth dose was given aged ≥ 3 years and four months, the fifth dose is not required until 12-13 years of age, as Tdap, in the first year of second-level school. All children aged 10 years and over should receive a tetanus-containing vaccine as Td or Td/IPV or Tdap depending on other vaccine requirements.

Varicella

The first dose of varicella vaccine is recommended at 12 months of age, at the same time as MMR vaccine, as a separate vaccine for children born on or after 1 October 2024. The second dose of varicella vaccine is recommended at 4-5 years, as combined MMRV vaccine, usually given in Junior Infants.

2.2.9 Catch-up schedules for unvaccinated or incompletely vaccinated persons

Those more than one month or one dose behind the schedule should be on a catch-up schedule, with minimum intervals between doses.

Choose the age-appropriate column in [Table 2.3](#) and [Table 2.4](#):

- If a person is completely unvaccinated, vaccinate using the stated intervals.
- If a person is incompletely vaccinated, provide vaccines not already received. There is no need to restart a course.

Once catch-up has been completed, continue with the routine schedule.

Catch-up schedule for unvaccinated or incompletely vaccinated children aged 4 months to <4 years is presented in [Table 2.3](#).

Note: A fourth dose of 6 in 1 vaccine is recommended at 13 months of age for children born on or after 1 October 2024. If a child is delayed in their 6 in 1 schedule, such that they receive their third dose after six months but before 12 months of age, they should resume the recommended schedule and have their fourth dose of 6 in 1 vaccine at 13 months as scheduled. The fourth dose would be given at least four weeks after the third dose of 6 in 1 vaccine and at the same time as other vaccines due at 13 months, as long as those vaccines are complying with their minimum intervals. For example, if the second dose of PCV13 is given later

than six months of age there is a requirement of a minimum interval of eight weeks between the second and third doses, and the third dose to be given at ≥ 12 months of age.

If a child is delayed in their 6 in 1 schedule such that they receive their third dose of 6 in 1 vaccine at ≥ 12 months of age, the requirement to give a dose of Hib vaccine in the second year of life will be met and, as the hepatitis B vaccine series will be completed, the fourth dose of 6 in 1 vaccine at 13 months is not required. However, a booster dose of 4 in 1 (DTaP/IPV) vaccine is **recommended** at least six months after their third dose of 6 in 1 vaccine (delayed until ≥ 12 months) as part of their catch-up schedule. The administration of other vaccines due at 13 months should not be delayed because of the required minimum interval for 4 in 1 vaccine catch-up. If 4 in 1 vaccine is not available, 6 in 1 vaccine may be used.

Table 2.3 Catch-up schedule for unvaccinated or incompletely vaccinated children* aged 4 months to <4 years

Vaccine	4 months to <12 months	1 to <2 years	2 to <4 years
DTaP/IPV/Hib¹/HepB² (6 in 1)	3 doses ≥ 8 weeks apart	Born before 1 October 2024 3 doses ≥ 8 weeks apart ^{1,2} Born on or after 1 October 2024 3 or 4 doses depending on age at 3 rd dose of 6 in 1 See Section 2.2.9	Born before 1 October 2024 3 doses ≥ 8 weeks apart ^{1,2} Born on or after 1 October 2024 3 doses. 1 dose of 4 in 1 given ≥ 6 months after 3 rd dose of 6 in 1 See Section 2.2.9
DTaP/IPV (4 in 1)³		Born on or after 1 October 2024 1 dose given ≥ 6 months after 3 rd dose of 6 in 1, where 3 rd dose of 6 in 1 is given at ≥ 12 months See Section 2.2.9	Born on or after 1 October 2024 1 dose given ≥ 6 months after 3 rd dose of 6 in 1, where 3 rd dose of 6 in 1 is given at ≥ 12 months. See Section 2.2.9
MenB	2 doses ≥ 8 weeks apart ⁴ (if aged ≥ 10 months, give 1 st dose and then a booster at ≥ 12 months, 8 weeks after 1 st dose)	2 doses ≥ 8 weeks apart	Only for at-risk groups aged ≥ 2 years, as per Table 13.5, Chapter 13

Vaccine	4 months to <12 months	1 to <2 years	2 to <4 years
PCV13	3 doses 2 doses ≥4 weeks apart under 12 months 3 rd dose ≥8 weeks after 2 nd dose (and ≥12 months of age)	1 dose	Only for at-risk groups age ≥2 years, as per Table 16.2, Chapter 16
Rotavirus	2 doses ≥4 weeks apart (No dose after 8 months 0 days)		
MenC	1 dose ⁵	1 dose	1 dose
MMR		1 dose	1 dose
Varicella		1 dose ⁶	Born on or after 1 October 2024 1 dose ⁶
NOTE	Continue with routine childhood immunisation schedule from 12 months of age	Routine school immunisations at age 4-5 years in Junior Infants: <ul style="list-style-type: none"> ▪ DTaP/IPV (4 in 1) ≥6 months after 3rd or 4th dose of 6 in 1⁷ ▪ MMR2 ≥4 weeks after MMR1 	

* For incompletely vaccinated children, take the vaccines already received into account when determining how many catch-up vaccines are required.

¹ 1 dose of monocomponent Hib vaccine should be given to those aged 12 months to <10 years of age if this is the only vaccine required.

² Hep B vaccine is not recommended if this is the only vaccine required unless in an at-risk group (Chapter 9).

³ If 4 in 1 is not available, 6 in 1 may be used

⁴ For those who start MenB catch-up aged 3-10 months, a 3rd dose is recommended at age ≥12 months and >2 months after dose 2.

⁵ For children born on or after 1 October 2024, vaccination against meningococcal C disease with MenC vaccine is due at 13 months and the next dose is due at 12-13 years as MenACWY vaccine, in second-level school. For children born on or after 1 October 2024, vaccination against meningococcal C disease is not recommended under 12 months of age unless the infant is in an at-risk group, in which case MenACWY vaccine is recommended (Chapter 3 and Chapter 13).

⁶ For those born on or after 1 October 2024 the 2nd dose should be administered as MMRV, at age 4-5 years, usually in Junior Infants as part of the Childhood Immunisation Programme.

⁷ If a 4th dose is given aged ≥3 years and 4 months, a 5th dose is not due until age 12-13 years as Tdap.

Table 2.4 Catch-up schedule for unvaccinated or incompletely vaccinated* persons aged 4 years and older

Vaccine	4-9 years	10-17 years	18 years and older
DTaP/IPV/Hib¹/HepB² (6 in 1)	3 doses ≥8 weeks apart ^{1,2}		
MenC	1 dose	1 dose up to 23 years of age, if Men C-containing vaccine not given at age ≥10 years	1 dose up to 23 years of age, if Men C-containing vaccine not given at age ≥10 years
MMR	2 doses ≥4 weeks apart ³	2 doses ≥4 weeks apart	2 doses ⁴ ≥4 weeks apart
Tdap		1 dose ⁵	1 dose ⁵
Td/IPV		3 doses ≥4 weeks apart – leave ≥4-week interval after Tdap	3 doses ≥4 weeks apart – leave ≥4-week interval after Tdap
NOTE	DTaP/IPV (4 in 1) ≥6 months after third dose of 6 in 1 MMR2 ≥4 weeks after MMR1 Routine school immunisations: Tdap, MenACWY and HPV9 at second-level school in first year	Booster of Td/IPV 5 years after primary course; Tdap 10 years later Routine school immunisations: Tdap, MenACWY and HPV9 at second-level school in first year	Booster of Td/IPV 5 years after primary course Consider Tdap booster every 10 years

*For incompletely vaccinated persons, take the vaccines already received into account when determining how many catch-up vaccines are required.

¹ 1 dose of monocomponent Hib vaccine should be given to those aged 12 months to <10 years of age if this is the only vaccine required.

² Hep B vaccine is not recommended if this is the only vaccine required, unless in an at-risk group (Chapter 9).

³ 1 dose of MMR if not yet in primary school; 2nd dose will be given in Junior Infants.

⁴ MMR recommendations for adults are in Chapter 12.

⁵ Only 1 dose of Tdap is required for those aged ≥10 years due to likely previous exposure to pertussis infection.

Catch-up schedules according to age groups

4 to 11 months of age

DTaP/IPV/Hib/Hep B (6 in 1)	3 doses ≥8 weeks apart
MenB	2 doses ≥4 weeks apart (1 dose if aged ≥10 months), and booster when aged ≥12 months, ≥8 weeks after previous dose
MenC	1 dose ¹
PCV13	2 doses 4 weeks apart (3 rd dose aged ≥12 months and 8 weeks after 2 nd dose)
Rotavirus	2 doses 4 weeks apart if aged <8 months 0 days (1 dose if aged 7 to <8 months)
<i>Continue with routine childhood immunisations from one year of age</i>	

¹ No dose recommended under 12 months if born on or after 1 October 2024, unless in an at-risk group, in which case MenACWY is recommended ([Chapter 3](#) and [Chapter 13](#)).

1 to <2 years of age

DTaP/IPV/Hib¹/HepB² (6 in 1)	Born before 1 October 2024 3 doses ≥8 weeks apart Born on or after 1 October 2024 4 th dose recommended ≥4 weeks after 3 rd dose, if 3 rd dose given at >6 months and <12 months of age See Section 2.2.9
DTaP/IPV³ (4 in 1)	Born on or after 1 October 2024 1 dose ≥6 months after 3 rd dose of 6 in 1, if 3 rd dose given ≥12 months of age See Section 2.2.9
MenB	2 doses ≥8 weeks apart
MenC	1 dose
MMR1⁴	1 dose
PCV13	1 dose
Varicella	1 dose
<i>Continue with routine childhood immunisations from 4-5 years of age</i>	

¹ 1 dose of Hib may be given if this is the only vaccine required.

² Hep B vaccine is not recommended if this is the only vaccine required, unless in an at-risk group ([Chapter 9](#)).

³ If 4 in 1 is not available 6 in 1 may be used.

⁴ 2nd dose of MMR is offered in Junior Infants but may be given ≥4 weeks after the 1st dose, if required. MMRV will be offered in junior infants for those born on or after 1 October 2024.

2 to <4 years of age

DTaP/IPV/Hib¹/HepB² (6 in 1)	3 doses ≥8 weeks apart Born on or after 1 October 2024 4 th dose recommended ≥4 weeks after 3 rd dose, if 3 rd dose given at >6 months and <12 months of age See Section 2.2.9
DTaP/IPV (4 in 1)³	Born on or after 1 October 2024 1 dose ≥6 months after 3 rd dose of 6 in 1, if 3 rd dose given ≥12 months of age See Section 2.2.9
MenB	Only for at-risk ≥2 years of age – see Chapter 13
MenC	1 dose
MMR⁴	1 dose
PCV13	Only for at-risk groups age ≥2 years, see Chapter 16
<i>Continue with routine school immunisations from 4-5 years of age</i>	

¹ 1 dose of Hib may be given if this is the only vaccine required.

² Hep B vaccine is not recommended if this is the only vaccine required, unless in an at-risk group ([Chapter 9](#)).

³ If 4 in 1 is not available 6 in 1 may be used.

⁴ 2nd dose of MMR is offered in Junior Infants but may be given ≥4 weeks after the 1st dose, if required. MMRV will be offered in junior infants for those born on or after 1 October 2024.

4 to 9 years of age

DTaP/IPV/Hib¹/HepB² (6 in 1)	3 doses ≥8 weeks apart
DTaP/IPV (4 in 1)³	4 th dose ≥6 months after the primary series of 3 doses of 6 in 1
MenC	1 dose
MMR	2 doses ≥4 weeks apart
<i>Continue with routine school immunisations - primary and second level</i>	

¹ 1 dose of Hib may be given if this is the only vaccine required.

² Hep B vaccine is not recommended if this is the only vaccine required, unless in an at-risk group ([Chapter 9](#)).

³ Booster DTaP/IPV (4 in 1) ≥6 months after the 3rd dose of primary series.

10 to 17 years of age

Td/IPV¹	3 doses ≥4 weeks apart – leave ≥4 week interval after Tdap
Tdap	1 dose
MenC	1 dose <23 years of age, if a MenC-containing vaccine not given at ≥10 years
MMR	2 doses ≥4 weeks apart
<i>Continue with routine school immunisations - second level</i>	

¹ Booster doses of Td/IPV after 5 years and Tdap 10 years later.

18 years and older

Td/IPV¹	3 doses ≥ 4 weeks apart – leave ≥ 4 week interval after Tdap
Tdap	1 dose
MenC	1 dose up to <23 years of age if a MenC-containing vaccine not given at ≥ 10 years
MMR²	2 doses ≥ 4 weeks apart

¹ Booster doses of Td/IPV after 5 years and Tdap 10 years later.

² For adult and healthcare worker (HCW) recommendations for MMR vaccine see [Chapter 12](#).

2.2.10 Intervals between live and non-live vaccines

The following table shows the recommended intervals between vaccine doses.

Table 2.5 Recommended intervals between vaccine doses

Antigen combination	Recommended interval between doses
MMR and yellow fever*	MMR and yellow fever should not be administered on the same day; they should be given ≥ 4 weeks apart
MMR and varicella	Can be given on the same day or ≥ 4 weeks apart
BCG, rotavirus, LAIV, MMR, oral typhoid vaccine, varicella, and yellow fever	Apart from the combinations listed in the two rows above, can be given on the same day or at any interval between doses
Non-live vaccines	May be administered simultaneously or at any interval between doses
Non-live and live vaccines	May be administered simultaneously or at any interval between doses

* MMR and yellow fever. If these vaccines are given at the same time there may be reduced immune responses to the mumps, rubella and yellow fever antigens, therefore a ≥ 4 -week interval should be left between them. If protection is required rapidly, the vaccines may be given on the same day and an additional dose of MMR given ≥ 4 weeks later.

2.3 Contraindications and precautions to vaccines

For persons who appear to be healthy, routine physical examination and temperature measurement are not necessary prior to vaccination. Ask if the proposed recipient is well; postpone vaccination if an acute severe febrile illness is present.

The risks of not giving specific vaccines should be carefully considered when precautions exist (see individual chapters). When there are doubts whether or not to give a vaccine, contact a relevant specialist.

2.3.1 Contraindications

- Anaphylaxis to a vaccine or to one of its constituents or a constituent of the syringe, syringe cap or vial (for example, latex anaphylaxis).

If a person has had anaphylaxis caused by latex, vaccines supplied in vials or syringes that contain natural rubber should not be administered unless the benefit of vaccination outweighs the risk for a potential allergic reaction. For those with contact allergy to latex gloves, vaccines supplied in vials or syringes that contain dry natural rubber or rubber latex may be given.

- Live vaccines
 - Rotavirus vaccine ≥ 8 months 0 days of age ([Chapter 19](#))
 - Pregnancy (some vaccines, see individual chapters)
 - Some immunocompromising conditions due to disease or treatment ([Chapter 3](#)).

2.3.2 Precautions

- Acute moderate or severe febrile illness; defer until recovery. The concern in vaccinating someone with moderate or severe illness is that a fever following the vaccine could complicate management of the concurrent illness; it could be difficult to determine if the fever was from the vaccine or due to the concurrent illness.
- Immunoglobulin administration may impair the efficacy of MMR and varicella vaccines ([Chapters 12, 14, 20 and 23](#)).
- Previous Type III (Arthus) hypersensitivity reaction. This is characterised by pain, swelling, erythema and oedema of most of the diameter of the limb between the joint above and below the injection site. It is not associated with fever. It usually begins 2-8 hours after vaccination, is more common in adults and usually resolves without sequelae within one week.

Persons experiencing such a reaction to DTaP-containing vaccines usually have very high IgG tetanus antitoxin levels; they should not be given further routine or emergency booster doses of tetanus- or diphtheria-containing vaccines more frequently than every 10 years.

If the reaction occurs with the first dose of the primary series in a child aged less than six months, it is likely due to high levels of maternal antibodies. Subsequent doses should be deferred until the child is aged six months or older, when circulating maternal antibodies will be greatly reduced.

2.3.3 Conditions that are NOT contraindications to vaccination

- Family history of adverse reaction to vaccination.

- Minor illness with fever <38°C.
- Family or personal history of convulsions.
- History of vaccine-preventable infection.
- Prematurity or low birth weight. However, hepatitis B vaccine should be deferred in those <2kg until one month of age unless there is a maternal history of HBV infection ([Chapter 9](#)).
- Stable neurological conditions — for example, cerebral palsy.
- Recent contact with an infectious disease.
- Corticosteroid treatment which is:
 - short term (<14 days)
 - long term with <20mg/day of prednisolone, or equivalent ([Chapter 3 Table 3.7](#))
 - long-term, alternate-day treatment with short-acting steroids
 - maintenance physiologic doses (replacement therapy)
 - topical (skin or eyes), or by inhalation
 - intra-articular, bursal, or tendon injection.
- Low-dose methotrexate (<0.4 mg/kg/week), azathioprine (<3.0 mg/kg/day) or 6-mercaptopurine (<1.5 mg/kg/day).
- Asthma, eczema, hay fever, or food allergy.
- Treatment with antibiotics.
- Child's mother is pregnant.
- Breastfeeding infant or child.
- History of jaundice.
- Recent or imminent surgery or general anaesthesia ([Section 2.4.8](#)).
- Non-anaphylactic egg allergy.
- For MMR vaccine: anaphylaxis following exposure to egg ([Chapter 12](#)).

2.4 Vaccinations of specific groups

The following groups should receive the vaccines listed below:

2.4.1 Women of reproductive age

- seronegative for rubella: MMR vaccine (unless documented evidence of having received at least one MMR vaccine)

- seronegative for varicella: varicella vaccine (unless documented evidence of having received two varicella vaccines).

2.4.2 Pregnant women

- pertussis vaccine (as Tdap): as early as possible after 16 weeks and before 36 weeks' gestation in each pregnancy ([Chapter 15](#))
- seasonal inactivated influenza vaccine: at any stage of each pregnancy ([Chapter 11](#))
- COVID-19 vaccine: see ([Chapter 5a](#)) for recommendations.

There is no evidence of harm to the fetus from vaccinating pregnant women with non-live vaccines ([Chapter 15](#)).

Live vaccines pose a theoretical risk to a fetus and are contraindicated during pregnancy unless the benefits outweigh this theoretical risk.

2.4.3 Individuals at specific high risk

- Patients with immunocompromise or other medical conditions or from countries with high incidence of specific infections or with age-related risk may require additional vaccines such as BCG, COVID-19, hepatitis A, HepB, Hib, HPV, influenza, MenACWY, MenB, MMR, mpox, pneumococcal, respiratory syncytial virus (RSV), varicella and zoster vaccines (see individual chapters).

2.4.4 Those travelling abroad ([Chapter 5](#))

- travel vaccines
- MMR if there is risk of travel-acquired measles.

2.4.5 Those aged 65 years and older

- pneumococcal polysaccharide vaccine (PPV23) ([Chapter 16](#))
- influenza vaccine (also for those aged 50-64 years) ([Chapter 11](#))
- COVID-19 vaccine (also for those aged 60-64 years) ([Chapter 5a](#))
- RSV ([Chapter 18a](#))
- Zoster ([Chapter 23](#)).

2.4.6 Persons with bleeding disorders or on anticoagulants

Individuals with a bleeding disorder or receiving anticoagulant therapy may develop haematomas at intramuscular (IM) injection sites. Prior to vaccination, inform the recipient about this risk. For those with thrombocytopenia (platelet count $<50 \times 10^9/L$), consult the relevant specialist.

People on warfarin should follow their usual schedule for international normalised ratio (INR) testing. They can be vaccinated if the INR is less than 4.0. If the INR is 4.0 or more, the advice of the clinic or practice managing warfarin should be followed and vaccination delayed until the INR is less than 4.0.

Some vaccines recommended for IM injection may be administered SC to persons with a significant bleeding disorder if the immune response and clinical reaction to these vaccines are expected to be comparable by either route of injection. This applies to MMR, influenza and yellow fever vaccines.

Hepatitis B and rabies vaccines administered SC result in a lower antibody response. Additionally, when aluminium-adsorbed vaccines are given SC, an increased incidence of local reactions including subcutaneous nodules has been observed.

Those with inherited coagulopathies receiving factor replacement therapy should be given IM vaccination within a few days after treatment.

Those receiving long-term anticoagulation with either warfarin or heparin are not considered to be at higher risk of bleeding complications following vaccination. There is no reason to expect that there is a greater risk of bleeding complications with the newer types of anticoagulants, such as antiplatelet agents, than with other anticoagulants.

2.4.7 Technique for IM injections in persons with bleeding disorders or on anticoagulants

- Only one injection per muscle mass should be given at each visit. Use a 23- or 25-gauge needle to reduce the pressure gradient and cause less trauma to the tissue. The vaccine should be injected slowly (≥ 5 seconds) to reduce the risk of tissue damage.
- Firm pressure should be applied to the site for 5 to 10 minutes after injection.
- Stabilisation of the limb will reduce the risk of a haematoma.
- The site should not be rubbed or massaged.
- Instruct the patient/parent to monitor the injected limb and to report any concerns to their treating specialist.

2.4.8 Vaccination and anaesthesia or surgery

There is no evidence that any effects of vaccination have an impact on outcomes of either anaesthesia or surgery. Urgent or emergency surgery should never be delayed as a result of recent vaccination.

Delaying vaccination increases the risk of vaccine-preventable infections and has

been shown to result in non-completion of the immunisation schedule in some children. The importance of completing the immunisation schedule both for the child and the community outweighs any concerns about the impact of vaccination upon surgery.

The risk of developing a fever following **live vaccines** is the same as the risk of common febrile illnesses of childhood and should not be considered an indication to delay either vaccination or surgery.

However, it may be wise to postpone elective major surgery for 48 hours after **non-live vaccine** administration in order to avoid diagnostic confusion should the child develop post-vaccination pyrexia.

If consent has been given, it is acceptable to vaccinate while the recipient is under anaesthesia if it is likely that vaccination will otherwise be omitted.

If indicated, vaccination may be given before hospital discharge.

2.4.9 Preterm infants

Preterm infants are more vulnerable than full term infants when exposed to infections — for example, pertussis and rotavirus — and to their complications (see individual chapters). Therefore, routine vaccines should be started at two months chronological age in infants of any gestational age.

Infants vaccinated with rotavirus vaccine while in hospital do not need to be isolated from other infants. Standard infection control precautions should be followed at all times to reduce the risk of transmission of the vaccine virus. The benefits of vaccination for this at-risk population at the appropriate time far outweigh any potential risk of transmission of this highly attenuated vaccine virus.

If an infant born ≤ 28 weeks' gestation is still in hospital, the first and second vaccines should be given under cardiorespiratory monitoring for 48 hours, as there may be an increase in bradycardia and or apnoeic episodes in these infants. Such episodes do not recur after subsequent vaccinations, nor have they been reported in preterm infants given their vaccines after discharge.

Compared with infants born at term, there is a smaller rise and a more rapid decline in antibody levels following vaccination of extremely preterm infants. However, there may be less interference from maternal antibodies, as most antibody transfer occurs in the third trimester.

Hepatitis B vaccine may not give an adequate immune response in infants weighing less than 2kg until they are aged one month or more. However, if a mother is hepatitis B surface antigen (HBsAg) positive, her infant should be given HepB

vaccine and hepatitis B immunoglobulin (HBIG) at birth irrespective of birth weight and further doses (as 6 in 1 vaccine) at two, four and six months of age.

The presence of an intraventricular haemorrhage is not a contraindication to vaccination.

Infants born to mothers given antenatal steroids for fetal lung maturation should be vaccinated according to the recommended schedule.

2.5 Blood products and vaccination

Blood products include red cells and immunoglobulins.

Non-live vaccines and BCG, rotavirus, yellow fever and varicella zoster vaccines can be administered at the same time or at any interval before or after any blood product transfusion.

MMR and varicella vaccines can be given at the same time or at any interval before or after washed red blood cells. These vaccines should be given at least two weeks before and six months after the administration of packed red blood cells as these may interfere with the immune response ([Table 2.6](#)).

Receipt of anti-D immunoglobulin is not a reason to delay vaccination.

2.5.1 Human immunoglobulin

Human normal immunoglobulin (HNIG) can provide passive temporary immunity to specific infections. HNIG is prepared from the pooled blood of donors who are negative to HBsAg, hepatitis C antibody (anti-HCV) and antibody to human immunodeficiency virus (HIV).

HNIG contains antibodies to varicella, hepatitis A and other viruses prevalent in the population from which it was obtained.

Contraindications

Intramuscular HNIG should not be administered to any patient with severe thrombocytopenia or with a significant coagulation disorder. If indicated, intravenous immunoglobulin (IVIG) can be used.

Precautions

Caution should be exercised with any patient who has a history of a significant adverse experience following HNIG administration.

Non-live vaccines can be administered at the same time or at any interval before or after HNIG. If given at the same time, the non-live vaccine and HNIG should be given in different sites.

HNIG may interfere with the immune response to MMR and varicella vaccines. It should not interfere with BCG, LAIV, oral typhoid or yellow fever vaccines.

MMR or varicella vaccine should not be given from two weeks before to 5-11 months after injection of HNIG as it may interfere with their immune response ([Table 2.6](#)). This restriction does not apply to herpes zoster vaccine as the amount of antigen in zoster vaccine is high enough to offset any effect of circulating antibody.

2.5.2 Specific immunoglobulins

These are prepared from the pooled plasma of blood donors who have high antibody titres to specific organisms. Specific immunoglobulins are available for administration following exposure to tetanus¹, hepatitis B², rabies³ and varicella-zoster⁴ virus. Recommendations for their use are found in the relevant chapters.

There is minimal or no interaction between blood products or immunoglobulins and:

- non-live vaccines
- live oral vaccines (rotavirus, oral typhoid)
- live intranasal vaccine (live attenuated influenza vaccine)
- BCG vaccine
- yellow fever vaccine.

These vaccines may be given concomitantly with, or at any time before or after, a blood product has been administered.

MMR or varicella vaccines should not be given from two weeks before to 3-11 months after specific immunoglobulins as they may interfere with the immune response ([Table 2.6](#)).

RSV monoclonal antibody (RSVab), (palivizumab or nirsevimab) is not expected to interfere with live or non-live vaccines.

[Table 2.6](#) is not intended for determining correct indications and doses for using antibody-containing products.

¹ Available through hospital pharmacy

² Available directly from manufacturer

³ Available from the National Cold Chain Service

⁴ Available directly from manufacturer

Table 2.6 Recommended intervals between blood products and MMR or varicella vaccines and estimated IgG dose from blood products

Preparation	Route	Dose	Estimated IgG mgs/kg	Interval ¹ (months)
Blood products				
Washed RBCs	IV	10ml/kg	Negligible	0
Packed RBCs and whole blood	IV	10ml/kg	60	6
Plasma and platelets	IV	10ml/kg	160	7
HNIG				
Immune deficiencies	SC, IV		300-400	8
ITP treatment	IV	400mg/kg/day	400	8
		1,000 mg/kg/day	1,000	10
Kawasaki disease	IV		2,000	11
Measles <i>Immunocompetent contacts</i>	IM		80-200	6
<i>Immunocompromised contacts</i>	IV		400	8
Hepatitis A	SC/IM	1-2.5ml/kg	200-500	6-8
Specific immunoglobulins²				
Cytomegalovirus	IV	3ml/kg	150	6
Hepatitis B	IM	100-500 IU		3
Rabies	IM, wound	20 IU/kg	22	4
Tetanus	IM	250-500 IU	10-20	3
Varicella	IM	15-25 IU/kg		5
RSVab (palivizumab or nirsevimab)				0

¹ Interval between administration of blood products and MMR or varicella vaccines

² MMR or varicella vaccines should not be given from 2 weeks before to 3-11 months after specific immunoglobulins as they may interfere with the immune response.

2.6 Vaccine preparation and administration

2.6.1 Medical care during and after vaccination

Appropriate medical treatment and supervision should always be readily available in case of an anaphylactic event, syncope or other adverse event following the administration of a vaccine. See [Anaphylaxis](#) section.

Anxiety-related reactions, including vasovagal reactions (syncope), hyperventilation

or stress-related reactions may occur in association with vaccination as a psychogenic response to the needle injection. It is important that procedures are in place to avoid injury from fainting.

2.6.2 Recording vaccinations

The name, batch number and expiry date of the administered vaccine should be clearly recorded to improve traceability.

2.6.3 Preparation of vaccines

- Vaccines should be prepared according to the SmPC.
- Unless the SmPC requires mixing of vaccines in one syringe (for example, DTaP/IPV/HepB with Hib), multiple vaccines given at the same visit must be given at least 2.5cm apart, and if necessary, in different limbs.
- Some vaccines, for example one brand of 6 in 1, MMR, and some brands of MenACWY require reconstitution.
- It is unnecessary to change needles after a vaccine dose has been drawn into a syringe.
- It is unnecessary to change the needle if it has passed through two stoppers — for example, when a lyophilised (dried) vaccine is reconstituted.
- Filter needles are not indicated for drawing up vaccines in ampoules <1ml, as they could potentially filter out particulate matter such as adjuvants or other active ingredients, making a vaccine less effective. Also, shards are very unlikely to be drawn into needles used for immunisations. Using an alcohol swab when opening the ampoule will reduce the risk of glass shards entering the ampoule. Tap the ampoule lightly to ensure that the contents are in the lower part of the ampoule. Wrap an alcohol swab around the neck of the ampoule. Snap the top off by breaking it away from your body.

Prefilled syringes

- a. If a needle is provided separately:
 - break the rubber seal on the prefilled syringe and remove it;
 - attach the needle and break the seal of the needle cap without removing the cap.
- b. If a needle is attached to the prefilled syringe:
 - break the seal of the needle cap;
 - hold syringe upright by the barrel to check for air bubbles. Small air bubbles (less than the internal diameter of the syringe) do not need to be expelled

except for intradermal injections. Rarely there may be a large air bubble in the prefilled syringe. If so, draw back slightly on the plunger to ensure no vaccine is expelled along with the air and then expel the air through the needle, until the hub is filled with vaccine;

- do not prime the needle with any of the vaccine, as this may cause an increased local reaction.

2.6.4 How to administer oral vaccines

Oral typhoid vaccine (see Chapter 5 and SmPC)

The capsule should be taken approximately one hour before a meal with a cold or lukewarm drink. The vaccine capsule should not be chewed and should be swallowed as soon as possible after placing in the mouth.

Rotavirus vaccines (see Chapter 19 and SmPC)

This vaccine is given orally, straight from the tube. To reduce the likelihood of significant regurgitation:

- the vaccine should be given at the beginning of the visit, while the infant is still happy, and before administering injections. The vaccine contains sucrose, which may help to reduce the pain of subsequent injections.
- Squeeze the liquid gently into the side of the child's mouth, towards the inside of their cheek.
- You may need to squeeze the tube a few times to get all of the vaccine out; it is okay if a drop remains in the tip of the tube. The tube should not be inserted so far back that the infant gags.

In the unlikely event that an infant spits out or regurgitates most of the vaccine dose, a single replacement dose should be given at the same vaccination visit.

2.6.5 How to administer intramuscular injections

Site

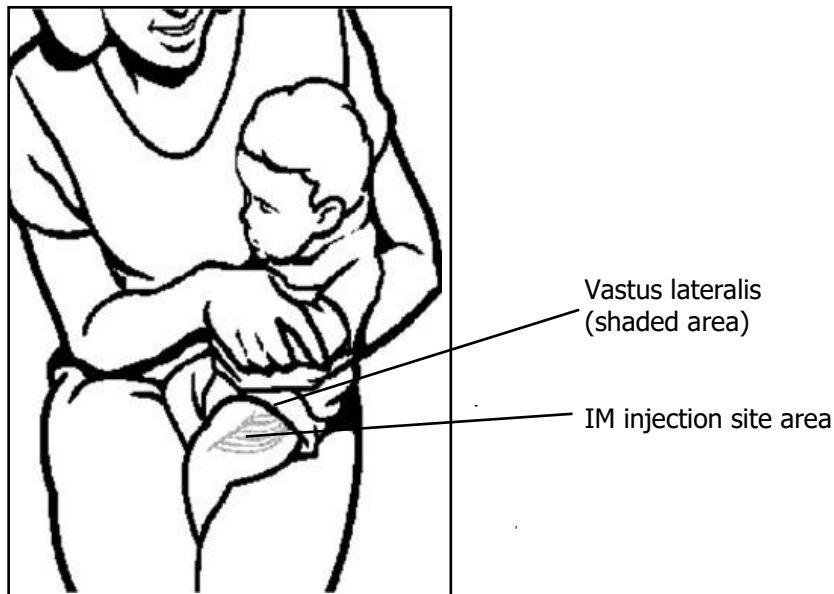
There are only two routinely recommended IM sites for administration of vaccines: the vastus lateralis muscle (anterolateral thigh) and the deltoid muscle (upper arm) (Figures 2.1 and 2.4). Using these sites reduces the chance of involving significantly-sized nerves or blood vessels. The site depends on the age and muscle mass of the recipient.

Vastus lateralis

The vastus lateralis muscle is located on the anterolateral aspect of the thigh, from one of the patient's hand breadths below the greater trochanter to one hand's breadth above the knee. The middle third of the muscle is the site for injections. The

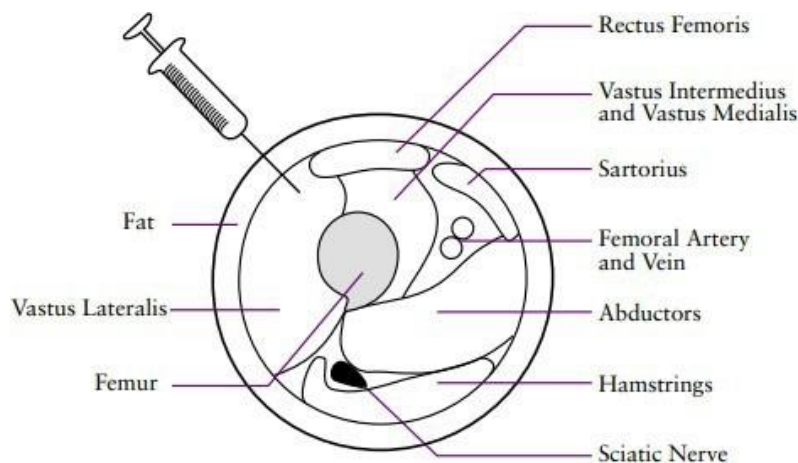
width of the injection site extends from the midline of the thigh anteriorly to the mid-line of the outer thigh (Figures 2.1 and 2.2)

Figure 2.1 Vastus lateralis site for IM injection, birth to 36 months



The injection site is the middle third of the vastus lateralis, in the anterolateral thigh (shaded area above).

Figure 2.2 Site for IM injection, birth to 36 months (cross section of left mid-thigh*)



*Either leg can be used.

Deltoid

The light triangle in Figure 2.3 indicates the site for IM injection into the deltoid muscle for older toddlers, children and adults. The upper border of the triangle is approximately two fingerbreadths below the acromion process and the apex is at the midpoint of the humerus.

The recommended site is in the middle of the triangle. To avoid causing an

injury, do not inject too high or too low. Insert needle at a 90° angle.

Figure 2.3 Deltoid site for IM injection, older toddlers, children and adults



Multiple injections given in the same limb should be separated by at least 2.5cm.

Do not inject into a limb affected by a lymphatic system problem, such as lymphoedema or mastectomy with lymph node curettage. The opposite arm or the vastus lateralis are alternate sites.

No vaccines should be injected into the arm used for BCG administration for at least three months, because of the risk of regional BCG lymphadenitis.

Needle size

The correct needle size is shown in [Table 2.7](#).

A 16mm needle usually is adequate for neonates up to 28 days of age, preterm infants (<37 weeks' gestation) up to two months of age, and very small infants, if the skin is stretched flat between the thumb and forefinger. In small infants and others with little muscle mass, the tissue around the injection site may be gently bunched up (see also [Section 2.6.6](#)).

A 25mm 23G (blue) or 25mm 25G (orange) needle should be used for other infants and children, and most adults. Using a 16mm needle to give vaccines IM to this population may lead to inadvertent SC injection. This can increase the risk of significant local adverse reactions, particularly with aluminium-adjuvanted vaccines (such as HepB, DTaP combination and MenB vaccines).

For very large or obese patients (for example, male weighing >120kg, female weighing >90kg) use a 38-40mm needle for IM injections.

There is little difference in local adverse reactions or immune responses between needles of the same length but different gauges.

Table 2.7 Recommended site and needle size for intramuscular injections

Patient's age	Site (see illustrations below)	Needle length and size
Birth to <12 months	Vastus lateralis muscle (Figure 2.1)	25mm ¹ 23-25 gauge
12 to <36 months	Vastus lateralis or deltoid muscle (depending on muscle mass)	25mm 23-25 gauge
3 years and older	Deltoid muscle (Figure 2.3) ²	25mm ³ 23-25 gauge

¹ Use a 16mm needle in infants under 2.5-3kg.

² The anterolateral thigh may also be used.

³ Use 38-40mm needle in males >120kg, females >90kg.

Technique

It is not necessary to use gloves for vaccine injections, unless contact with potentially infectious body fluids is possible, or unless the healthcare worker has an infected lesion on the hand. If gloves are worn, they should be changed for each patient.

If the skin at the injection site is visibly dirty, it should be cleaned with soap and water. There is no need to use a disinfectant — for example, alcohol swabs.

If an alcohol swab is used, injection should be delayed for ≥30 seconds to ensure the alcohol will have evaporated.

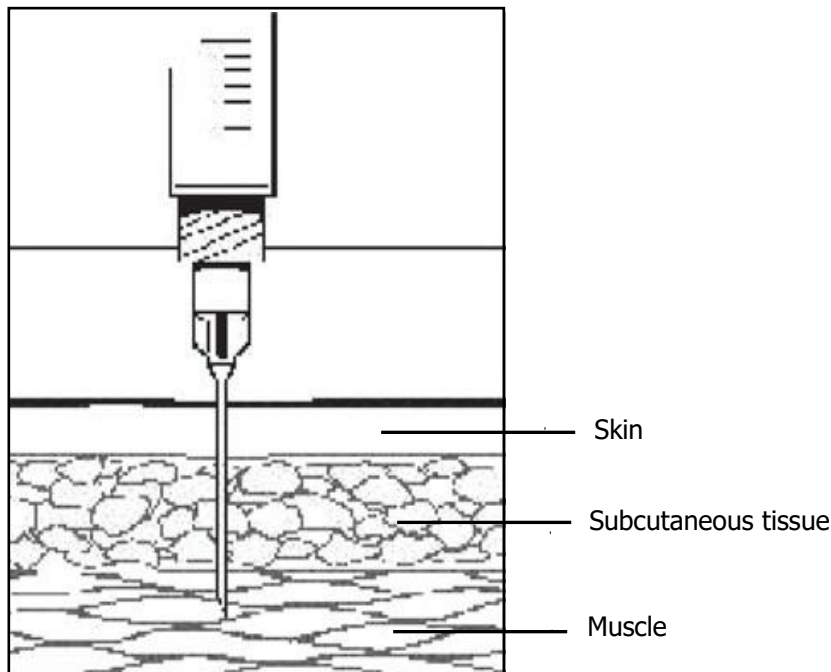
Spread the skin of the administration site taut between the thumb and forefinger (to avoid injecting into subcutaneous tissue and to isolate the muscle).

In small infants and others with little subcutaneous tissue or muscle mass, the tissue around the injection site may be gently bunched up.

Insert the needle rapidly and fully at a 90° angle to the skin (Figure 2.4). It is not necessary to aspirate the syringe before depressing the plunger. Inject the vaccine over 1-2 seconds.

Rapidly withdraw the needle and apply light pressure to the injection site for several seconds with a dry cotton ball or gauze.

Figure 2.4 Intramuscular injection – correct angle and depth of insertion



Do not massage the area after injection, as this can damage the underlying tissue or force vaccine up the needle track.

Application of a plaster is not routinely recommended. Reactions to plasters may also be confused as a reaction to the vaccine. If parents request plasters, they may be used.

If some of the vaccine leaks out of the syringe during administration, this is not a valid dose. A further dose of the vaccine should be administered at a separate site at the same visit.

Multiple vaccines given at the same visit must be given at least 2.5cm apart at the same site (where administered in the same limb), and if necessary, in different limbs.

If a vaccine licenced for IM administration is inadvertently given SC, it may need to be repeated.

Vaccines that should be repeated if given subcutaneously

- **Hepatitis B vaccines** should usually be repeated IM if inadvertently given SC, because of reduced immunogenicity. However, some hepatitis B vaccines may be given SC in special circumstances. An example is in people with significant bleeding disorders (see [Section 2.4.7](#) and the relevant SmPCs).

- **HPV vaccines** should be repeated IM if inadvertently given SC, as that route of administration has been not studied.
- **Rabies vaccine** should be repeated IM if inadvertently given SC, as immunogenicity is sub-optimal or unknown if given SC.

If in doubt, refer to the relevant SmPC.

Vaccine providers should consider observing patients (seated or supine) for 15 minutes following administration of any vaccine to decrease the risk of injury should syncope occur.

2.6.6 Infants in a hip spica cast

Infants in a hip spica cast should ideally be vaccinated when the cast is being changed. Alternatively, vaccines may be administered using a 16mm needle in the deltoid muscle. It is important to note that the radial nerve is more superficial in infants so the deltoid muscle should be bunched up prior to vaccine administration and only one vaccine should be given in either deltoid at any one time.

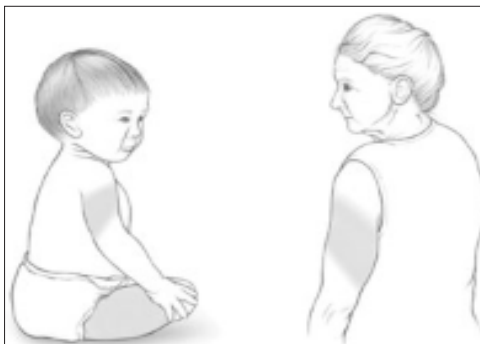
2.6.7 How to administer subcutaneous injections

Use this route for yellow fever vaccine. It may also be used for varicella and MMR vaccines and in those with severe bleeding disorders.

Site

Recommended sites for SC administration of vaccines are the anterolateral thigh, the deltoid region, and the upper outer triceps region (Figure 2.5). A 16mm, 23- to 25-gauge needle should be used for all ages.

Figure 2.5 Sites for SC injection, birth to adults



If a vaccine can be administered either IM or SC (for example, influenza, MMR, yellow fever), the IM route is preferred because it causes fewer local adverse reactions.

Table 2.8 Preferred site and needle size for subcutaneous injections

Patient's age	Site (see illustrations below)	Needle size
Birth to <12 months	Anterolateral thigh	16mm 23-25 gauge
12 to <36 months	Anterolateral thigh or deltoid region	16mm 23-25 gauge
3 years and older	Deltoid region	16mm 23-25 gauge

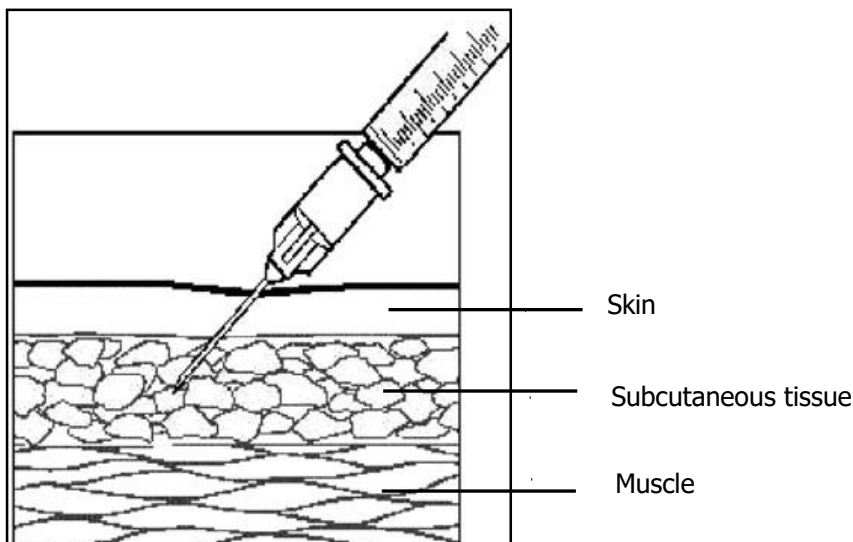
Technique

Insert needle at 45° angle to the skin (Figure 2.6).

Gently pinch up SC tissue to prevent injecting into muscle.

There is no need to aspirate prior to injection as there are no large blood vessels at the recommended injection sites.

Figure 2.6 Subcutaneous injection – correct angle and depth of insertion



2.6.8 How to administer intradermal injections

For example, intradermal injections are used for BCG and purified protein derivative (PPD).

Site

BCG is given as a single injection into the skin over the lower part of the left deltoid muscle (approximately one third down the lateral side of the upper arm).

PPD is generally injected into the ventral surface of the mid-forearm as a tuberculin skin test (TST) which is also known as the Mantoux test.

Local anaesthetic cream should not be applied.

Technique

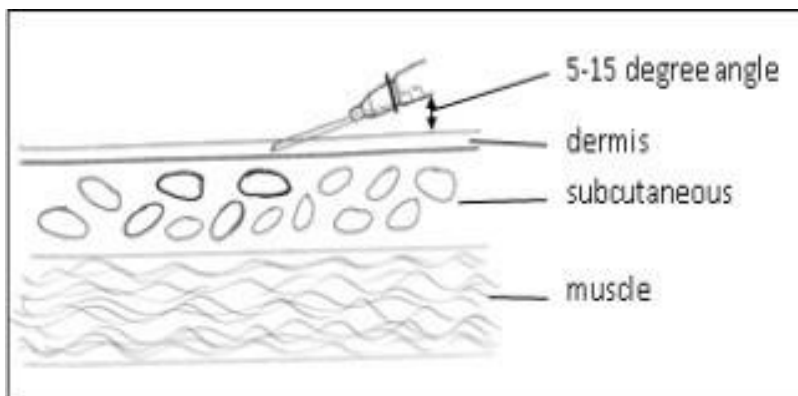
Use a 1ml syringe with a 10-16mm, 25-26 gauge short-bevelled needle.

Expel all air bubbles.

Slightly stretch the skin over the injection site with thumb and index finger of the non-dominant hand.

Insert the needle almost parallel (5-15°) to the surface, bevel upwards, to a length of approximately 5mm and slowly inject the dose ([Figure 2.7](#)).

Figure 2.7 Intradermal injection – correct angle and depth of insertion



Release the stretched skin and hold the syringe in place with thumb and forefinger of your non-dominant hand. Maintain the stability of the limb and needle at all times.

Grip the body of the syringe between the first and middle fingers of your dominant hand. Do not aspirate. Slowly depress the plunger with your thumb. You should feel fairly firm resistance during depression.

A bleb 7-10mm in diameter should result (~3mm if the dose is 0.05ml as for BCG for infants aged <12 months ([Figure 2.8](#)).

Figure 2.8 BCG intradermal injection-resulting bleb



Remove the needle. Use a cotton ball to lightly blot any blood. Do not press down or massage the area. Bandages should not be used.

If little resistance is felt when injecting and a diffuse swelling occurs rather than a tense bleb, the needle is too deep. If this occurs, the needle should be withdrawn and the procedure repeated correctly at the same visit at a site at least 5cm below the first site.

No further immunisation should be given in the arm used for BCG for at least three months, because of an increased risk of regional lymphadenitis.

2.6.9 How to administer intranasal vaccine

The vaccine SmPC or PIL will have instructions on how to administer their intranasal vaccine and these should be checked before administration of the vaccine.

Technique

1. Thoroughly clean hands using soap and water or hand sanitiser before and after vaccinating.
2. Remove rubber tip protector. DO NOT remove dose divider clip on plunger rod.
3. Patient should be sitting upright with head tilted slightly backwards. Patient should not be standing, as there is a risk they may faint and fall.
4. Place tip just inside nostril and angle syringe parallel to the bridge of the nose.
5. As rapidly as possible, depress plunger until the dose-divider clip prevents you

from going further. DO NOT have the patient actively inhale the mist.

6. Pinch and remove the dose-divider clip from plunger. Repeat steps above for the other nostril.
7. Once all documentation is complete, discard empty applicator into the sharps container.

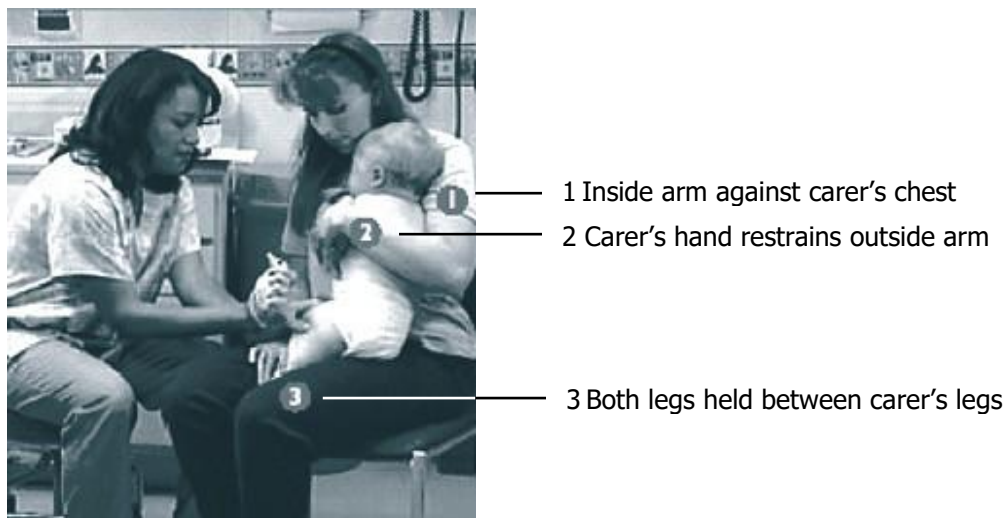
2.7 How to hold an infant or child during vaccinations

This method involves a carer embracing the child and controlling all four limbs. It avoids 'holding down' or overpowering the child, but it helps steady and control the limb of the injection site.

For infants and toddlers

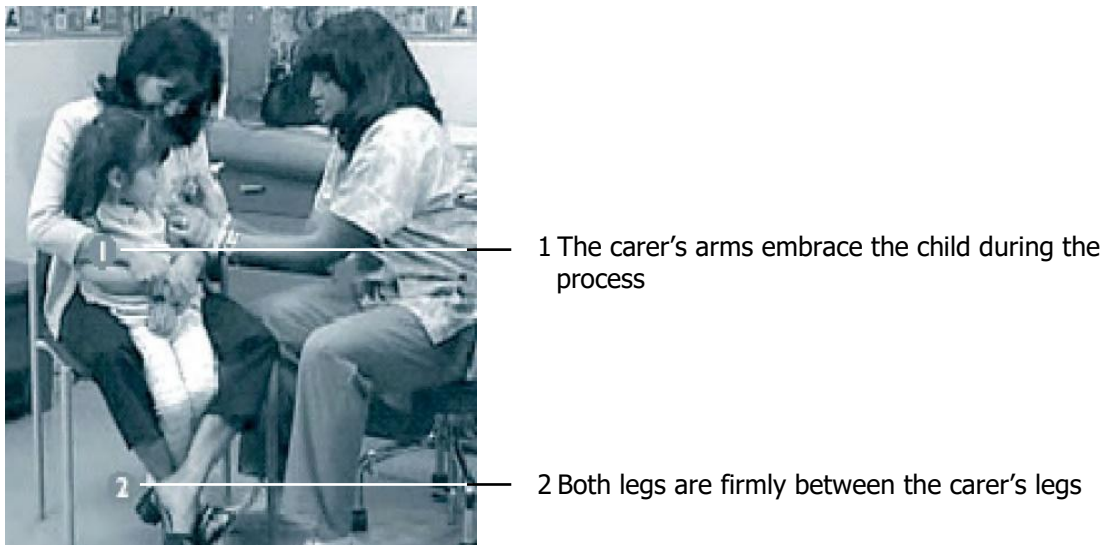
Have the carer hold the child on his/her lap.

Figure 2.9 Holding an infant or young child for IM injection



1. One of the child's arms embraces the carer's back and is held by the carer's arm.
2. The child's other arm is controlled by the carer's arm and hand. For infants, the carer can control both arms with one hand.
3. Both legs are anchored by holding the child's lower legs firmly between the carer's thighs and controlled by the carer's other arm.

Figure 2.10 Holding an older child for IM injection



The child is held on the carer's lap or stands in front of the seated parent.

1. The carer's arms embrace the child during the process.
2. Both legs are firmly between the carer's legs.

2.8 Pain reduction

The following have been shown to reduce pain from injections:

2.8.1 Distraction techniques

Age-appropriate, non-pharmacologic techniques may provide distraction from pain associated with injections. Holding by the caregiver and sitting upright may reduce pain in infants and young children. Psychological interventions such as distraction in children have been shown to be effective at reducing stress and the perception of pain from the injection. Distraction can be accomplished through a variety of techniques (for example, playing music, books, pretending to blow away the pain, deep-breathing techniques).

2.8.2 Breastfeeding or ingestion of a sweet-tasting liquid

Breastfeeding and formula feeding are effective, non-costly, feasible and safe pain-reducing interventions which should be used prior to vaccinations. There is some evidence that breastfeeding can decrease the incidence of fever after vaccinations.

Several studies have demonstrated a reduction in crying after injections when children one year or younger ingest a small amount (a few drops to half a teaspoon) of a 24-30% sugar solution just prior to an injection.

Both licensed rotavirus vaccines contain approximately 20% sucrose; if indicated, they should be administered just before recommended injections instead of a

sucrose solution.

2.8.3 Order of injections

Injecting the most painful vaccine (for example, MMR, PCV, or HPV) last when multiple injections are being administered may also decrease the pain of injections.

2.8.4 Tactile stimulation

Rubbing, stroking or applying pressure close to the injection site before and during injection may decrease pain in older children (four years and older) and adults.

2.8.5 Administration technique

Rapid needle insertion, depressing the plunger over one to two seconds, and withdrawal without aspiration has been shown to reduce pain.

2.8.6 Simultaneously administering vaccines at separate sites

The evidence for or against this technique is insufficient to make a recommendation.

2.9 Antipyretics and vaccination

Fever is a normal part of the inflammatory response and commonly occurs after vaccination. It is associated with improved antigen recognition, increased T-cell activity and immune responses. Fever which occurs after vaccination is generally mild, benign, and self-limiting; it rarely rises above 39°C.

Antipyretic drugs do not prevent febrile convulsions in at-risk children.

Either paracetamol or ibuprofen may be considered for treatment of a fever above 39°C, for a significant reaction at the site of vaccination, or if a child remains significantly distressed.

Prophylactic use of paracetamol at the time of or closely after MenB vaccination is recommended, as fever >39°C may occur when MenB vaccine is given with other childhood vaccines in infancy. This has been shown to reduce the incidence and height of fever in children aged <1 year by up to 50%. This is only recommended when MenB vaccine is given with other vaccines <1 year of age.

Children receiving the vaccines recommended at 2 and 4 months should be given three doses of paracetamol as follows:

- Dose one of liquid infant paracetamol (2.5ml/60mg) as or just after MenB vaccine is given.
- Dose two (2.5ml/60mg) 4-6 hours after dose one.
- Dose three (2.5ml/60 mg) 4-6 hours after dose two.

- If a fever $\geq 39^{\circ}\text{C}$ persists, a fourth dose (2.5ml/60mg) may be given 4-6 hours after the third dose.

A child weighing less than 3.5kg at their six-week check should be reweighed at the time of vaccination. Any child weighing less than 4kg should be given paracetamol at a dosage of 15mg/kg.

A post-vaccination fever may still develop after paracetamol administration, but this is usually mild and not long-lasting.

Prophylactic paracetamol is not recommended after MenB vaccine at age ≥ 12 months, as the rate of fever is similar to that following other routine childhood vaccines.

There is no evidence of a decrease in the immune response when paracetamol is given with the MenB vaccine and other primary childhood immunisations.

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