

# Guidelines for immunisation of children following treatment with high dose chemotherapy and Haematopoietic Stem Cell Transplantation (HSCT)

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## **Guidelines for immunisation of children following treatment with high dose chemotherapy and Haematopoietic Stem Cell Transplantation (HSCT)**

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Adapted from Vaccinations For Paediatric Patients Treated With Standard-Dose Chemotherapy And Hematopoietic Stem Cell Transplantation (HSCT) Recipients.  
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### **General Principles**

- All children should be considered for re-vaccination after allogeneic or autologous HSCT.
- In comparison to recipients of allogeneic HSCT, autologous HSCT recipients are less immune suppressed. However, both transplant types follow the same vaccination schedule content.
- The use of live vaccines is potentially dangerous until the child has been off all immunosuppressive treatment for at least 12 months and has no evidence of active chronic GvHD.

### **All Haematopoietic Stem Cell Transplant (HSCT) recipients:**

- Must be 12 months post-transplant
- Should not have any evidence of active chronic GVHD
- Should be off all immunosuppressive treatment for at least 6 months
- Should not be given any live vaccines until the child has been off all immunosuppressive treatment for at least 12 months
- Should be off intravenous immunoglobulins for at least 3 months

**NB** In infants who have undergone allogeneic HSCT for primary immunodeficiency it may be appropriate to start vaccination earlier than specified above after discussion with BMT Team.

### **Vaccines contraindicated for HSCT Recipients**

- BCG (except in specific circumstances – i.e. clear case of need, very good evidence of immune reconstitution and only after discussion with BMT team)
- Rotavirus
- Intranasal live attenuated Influenza vaccine
- VZV vaccine
- Yellow fever
- Live attenuated Typhoid vaccine

### **Other Vaccines**

Hepatitis B vaccine and travel vaccines may be considered for individual cases (after discussion with the transplant team).

### **Recommendations for wounds likely to engender a risk of tetanus in children after HSCT**

Patients suffering wounds likely to engender a risk of tetanus, and who have not been re-immunised yet, should be considered non-immune and should receive a first dose of tetanus vaccine.

Tetanus immunoglobulin (250 – 500 units intramuscularly) should also be given, along with wound toilet and prophylactic antibiotics (intravenous benzylpenicillin or co-amoxiclav).

### **Passive Immunisation**

Significant contact with measles or with VZV infection requires passive immunisation (IVIg or acyclovir). This recommendation is applicable until 12 months post HSCT and 12 months off all immunosuppression.

#### ***a) Passive immunisation following measles contact***

Contact requires action regardless of antibody status.

Children who have significant contact (play or direct contact for more than 15 minutes) with an individual with virologically confirmed measles during the infectious period from up to five days prior to, to four days after, the onset of the rash require passive immunisation. Every effort should be made to confirm the diagnosis of measles in the index case, but this may not always be possible.

If less than 14 days from contact give either intramuscular human normal immunoglobulin (HNIG) or intravenous immunoglobulin. Protection lasts approximately four weeks.

IVIg dose: 0.4g/kg

Intramuscular human normal immunoglobulin dose:

Under one year of age	250mg
1-2 years of age	500mg
Over 2 years	750mg

The benefit of HNIG is likely to be limited in individuals with detectable antibody and so, where an individual is known or likely to have pre-existing measles antibody, HNIG may not be required particularly where the degree of immunosuppression is less severe.

#### ***b) Passive immunisation after varicella zoster contact***

For varicella antibody positive patients no action is necessary.

For varicella antibody negative patients treatment is necessary following significant contact with an individual with chicken pox or disseminated zoster (play or direct contact for more than 15 minutes) during the infectious period from two days prior to the onset of the rash, until crusting of all vesicles, or with herpes zoster\* (direct contact with exposed lesions only).

Treatment required includes either one of the two listed below:

1. Oral aciclovir from 7-21 days following the initial contact.

Aciclovir dose:

Under 2 years	200mg 4 times daily
2-6 years	400mg 4 times daily
> 6 years	800mg 4 times daily

2. If less than 72 hours from contact, give intramuscular zoster immunoglobulin (ZIG) or intravenous immunoglobulin. Protection lasts approximately 4 weeks.

ZIG dose:

Under 5 years	250mg
5-10 years	500mg
Over 10 years	750mg

IVIg dose: 0.4g/kg

NB ZIG is NOT available unless the contact is proven to be antibody negative

### Vaccination of close contacts of HSCT Recipients

Avoid administration of live vaccines to siblings/ close family contacts of HSCT recipients. The exception is MMR, VZV, Shingles vaccine (Zostavax) and Rotavirus vaccines.

- **MMR Vaccine** should be given to contacts as per the national vaccination schedule.
- **Shingles vaccine (Zostavax):** for adults aged 70-79years old, so the patient's grandparents may be offered this vaccine depending on local practise. Rarely the transmission of vaccine virus may occur between those vaccinated who develop a varicella-like rash and susceptible contacts. As a precautionary measure, any person who develops a vesicular rash after receiving Zostavax® should avoid direct contact with the patient until the rash is dry and crusted.
- **Rotavirus vaccine (Rotarix):** Is given to infants aged 6-24 weeks. **Rotarix should not be given to the patient** but can be given to siblings. There is potential for transmission from the infant to immunocompromised contacts through faecal-oral route for at least 14 days post-vaccination. However, vaccination of the infant will offer protection to household contacts from wild-type rotavirus disease and outweigh any risk from transmission of vaccine virus to any immunocompromised close contacts. Good personal hygiene should be observed following administration of Rotarix.

## Re-Vaccination schedule for HSCT Recipients

Time after HSCT	Vaccination for under 10 years of age	Vaccination for over 10 years of age	Recommended Dates
<b>Every autumn (start 6 mths post HSCT )</b>	Inactivated influenza <sup>1</sup>	Inactivated influenza <sup>1</sup>	
<b>12 Months</b>	DTaP / IPV / Hib <sup>2</sup> (Pediace)l PCV13 (Prevenar 13)	dTaP / IPV <sup>2</sup> (Repevax) Hib / Men C (Menitorix) PCV13 (Prevenar 13) HPV <sup>3</sup> (Gardasil)	
<b>13 Months</b>	DTaP / IPV / Hib <sup>2</sup> (Pediace)l Men C	dTaP / IPV <sup>2</sup> (Repevax) HPV <sup>3</sup> (Gardasil)	
<b>14 Months</b>	DTaP / IPV / Hib <sup>2</sup> (Pediace)l PCV13 (Prevenar 13)	dTaP / IPV <sup>2</sup> (Repevax) Hib / Men C (Menitorix) PCV13 (Prevenar 13)	
<b>18 Months</b>	MMR <sup>4</sup>	MMR <sup>4</sup> HPV <sup>3</sup> (Gardasil)	
<b>24 Months</b>	MMR <sup>5</sup> Men ACWY PCV13 or PnPS23	MMR <sup>5</sup> Men ACWY PCV13 or PnPS23	
<b>48 Months</b>	DTaP / IPV (Infanrix-IPV) Hib / Men C (Menitorix)	dTaP / IPV (Repevax) Hib / Men C (Menitorix)	
<b>School leaver booster</b>	dT / IPV (Revaxis) Men C	dT / IPV (Revaxis) Men C	

[DTaP = Diphtheria/ Tetanus/ acellular Pertussis, dTaP = Low dose Diphtheria/ Tetanus/ acellular Pertussis, Hib = *H. influenzae b* conjugate, MMR = Measles/Mumps/Rubella, HPV = Human papillomavirus, IPV = Inactivated polio virus, Men C = Meningococcal C conjugate, Men ACWY = Meninococcal ACWY conjugate, PCV13 = 13 valent Pneumococcal conjugate, PnPS 23 = 23 valent pneumococcal polysaccharide]

<sup>1</sup>The intranasal live-attenuated influenza vaccine should not be used in post-HSCT patients. Note that the immune response to influenza vaccine is not optimal during the first 6 months after HSCT, which is the period of greatest risk; therefore vaccination should be offered to family members and hospital staff.

<sup>2</sup> Can be given as Pediace)l (for <10 years age at administration) or Repevax (for ≥10 years age)

<sup>3</sup> HPV vaccine should be offered to girls ≥12 years old: 3 doses of HPV vaccine (Gardasil) should be given at 0, 1-2 and 6 months from starting re-vaccination.

<sup>4</sup> 1st dose of MMR should be given at 18 months provided patient is at least 12 months off all immunosuppressive treatment, fulfils criteria as above

<sup>5</sup> The 2nd dose of MMR is usually given 6 months after the 1st dose, but can be given 3 months after the 1st or even earlier (1 month after 1st dose) in outbreak situations.