# NATIONAL GUIDELINES PAEDIATRIC ONCOLOGY AND HAEMATOLOGY

For the Care of Childhood Cancer in Specialist Child Cancer and Shared Care Centres.

# IMMUNISATION OF CHILDREN DURING and AFTER CANCER THERAPY

**Date Approved: 24 November 2017**

**Review date : 31 December 2019**

*The National Child Cancer Network has prepared a set of national guidelines for the supportive care and management of children with cancer throughout New Zealand. They provide guidance for Shared Care Centres that manage the complications of childhood cancer and chemotherapy and aim to harmonise treatment across the country.*

*These guidelines are not intended to replace consultation with the paediatric oncologist at the child's Specialist Cancer Centre. If there is an uncertainty about the guidance provided, you should discuss your queries with your paediatric Oncologist on call. No set of guidelines can cover all variations required for specific patient circumstances. It is the responsibility of the health care practitioners using them to adapt them for safe use within their institutions and for the individual needs of patients.*

NationalChild CancerNetwork NZ

Linking Care / Sharing Knowledge / Advancing Best Practice

# CHILDREN ON MAINTENANCE CHEMOTHERAPY

## Influenza vaccination

Recommended for all children annually (funded) and advise influenza vaccination for household members (unfunded).
**Defer all other immunisations until off chemotherapy.**

## Contact with Chickenpox

Regardless of prior history give Zoster Immunoglobulin (VZIG) or Intragam (IVIG) as soon as possible within 10 days (FDA recommendation 2011) of contact.
If >96 hours, also give oral acyclovir 80mg/kg/day in 4 divided doses commencing day 7 following exposure and continue for 7 days
VZIG and acyclovir recipients still need isolation from day 7 –28 post chicken pox exposure
VZIG/ IVIG protection lasts approximately 4 weeks

**VZIG Dosage and Administration**

| Weight of Patient | Dose | No. of vials |
|---|---|---|
| 0 - 10 kgs | 125 IU | 1 |
| 10.1 – 20 kgs | 250 IU | 2 |
| 20.1 – 30 kgs | 375 IU | 2 |
| 30.1 – 40 kgs | 500 IU | 3 |
| >40 kgs | 600 IU | 3 |

Zoster immunoglobulin should be given slowly by deep intramuscular injection.
If more than 5 mls is required it is advisable to administer it in divided doses at different sites. Hyaluronidase and/ or a suitable local anaesthetic may be added to the injection if required.
*NZ Blood "Transfusion Medicine Handbook 2016) table 5.18 p85*

**Intragam Dosage**
Check with New Zealand Blood Transfusion Service as dosage varies according to different batches of IV IG.

**Acyclovir Dosage**

| Age | Dose Acyclovir |
|---|---|
| <2 years | 200mg qid |
| 2-6 years | 400mg qid |
| >6 years | 800mg qid |

## Contact with Measles

Regardless of prior history give pooled Normal Immunoglobulin for confirmed contact up to 6 days post exposure.
- Dose: 0.6 mls/kg by intramuscular injection.
- Maximum dose: for children < 12mths =5mls and for children> 12mths =15mls
- or, if thrombocytopaenic or CVL in situ, IVIG (Intragam) should be used (0.15g/kg)

# 1. CHILDREN AFTER CANCER THERAPY (excluding stem cell transplant -HSCT)

When off therapy 4-6 months, provided lymphocyte count >1.0, commence re-immunisation (see following worksheets).

**Please note:**

Re-immunisation for diseases to which patients are already immune will do no harm: the minimum number of injections should be used (i.e.: combination vaccines such as Infanrix-hexa), even if this means extra doses of some of the contained antigens.

For patients exposed to varicella or measles who are not immune, prophylaxis should be given as for children on maintenance chemotherapy (see page 2) until they have completed their revaccination programme.

After completion of chemotherapy it is preferable not to give VZIG to patients for chickenpox prophylaxis as VZIG can interfere with the response to live vaccines (MMR and Varicella) so these cannot be given for a further 5 months.

Off- treatment patients who are in close contact with chickenpox, with lymphocytes >1.0 and due re immunization, either:
-If VZV seronegative, give oral acyclovir as prophylaxis (20 mg/kg q.i.d. for 7 days, starting 7 days from exposure).
-If VZV seropositive, give neither VZIG nor acyclovir.

# WORKSHEET A: IMMUNISATION OF CHILDREN AFTER CANCER THERAPY aged < 10 years. Page 1 of 2

Attach Patient sticker

Date:

GP signature____________________________

| **Checklist:** | |
|---|---|
| Off therapy >4 months | **YES/NO** |
| Lymphocyte count >1:0 | **YES/NO** |
| Date of last IVIG § | |
| Date of last VZIG§ | |
| | |

## §Previous Immunoglobulin

Immune globulin interferes with antibody responses to LIVE vaccines only (MMR/Varicella) therefore wait 8 months after IVIG or 5 months after VZIG administration before giving these vaccines.

## Influenza Vaccination

Annual Influenza vaccination recommended for patients (funded) and family/household members (not funded unless other eligible condition)

## Varicella Vaccine

Varicella vaccine should be given to all immune competent household members, including adults, with no previous history of disease or vaccination, if not already given.

**Meningococcal Vaccine:**MCV4-D (Menactra) -the quadrivalent meningococcal conjugate A,C,Y and W135 vaccine (Menactra®) is recommended, for children from two years of age, 2 doses, 8 weeks apart. Menactra® should be given at least 4 weeks after the last PCV13 (Prevenar 13®) dose as there is potential interference with antibody responses.

## Human Papilloma Virus Vaccine

Girls and boys age 9 years or older should be given HPV vaccine (Gardasil 9)- 3 doses at 0, 2 and 6 months (this is funded.)

## Notes:

- If 2 live vaccines are scheduled they should be given on the same day or at least 4 weeks apart.

# WORKSHEET A: IMMUNISATION OF CHILDREN AFTER CANCER THERAPY aged < 10 years. Page 2 of 2

Attach Patient sticker

GP signature_______________________________

## Recommended Immunisation Schedule

**GP must sign the sheet as all vaccines must be prescribed by a medical practitioner.**
***#Write "omit" if not indicated to receive vaccine***

| | Vaccine(s) | Notes | Date given | NIR entry | Vaccinator |
|---|---|---|---|---|---|
| **Date 1st dose** | **DTaP-IPV-Hep B/Hib** (Infanrix-hexa) | Funded to age 10 years | | | |
| | **PCV-13** (Prevenar 13) | | | | |
| 4 weeks later Due date: | **DTaP-IPV-Hep B/Hib** (Infanrix-hexa) | | | | |
| 4 weeks later Due date | **PCV-13** (Prevenar 13) **OR** | If < age 5 years | | | |
| | **PPV 23** (Pneumovax) | If > age 5 years Revaccinate with PPV 23 once more in 5 years time only if risk persists | | | |
| | **DTaP-IPV-Hep B/Hib** (Infanrix-hexa) | | | | |
| 4 weeks later Due date: | **MMR** | Do not give within 5 months VZIG or 8 months IV IG | | | |
| | **BLOOD TEST** | **Anti HBsAg *** **VZV serology #** | | | |
| | **MCV4-D** (Menactra) | If > age 18 months | | | |
| 4 weeks later Due date: | **MMR** | Do not give within 5 months VZIG or 8 months IV IG | | | |
| | **Varicella** (Varilrix) | Omit if immune. Do not give within 5 months VZIG or 8 months IVIG | | | |
| | **PPV 23** (Pneumovax) | If age 2, 3 or 4 years Revaccinate with PPV 23 once more in 3 years time only if risk persists | | | |
| 6 weeks later Due date: | **MCV4-D** (Menactra) | 2nd dose | | | |
| | **Varicella** (Varilrix) 2nd dose | Omit if previously immune Do not give within 5 months VZIG or 8 months IV IG | | | |
| At age 4 years or over (Booster) | **DTaP-IPV** (Infanrix IPV) | Give when at least age 4 years AND >12 months since last | | | |

| | | | | | |
|---|---|---|---|---|---|
| | | Infanrix hexa, | | | |
| Then from age 9 years | **HPV** (Gardasil 9) | 3 doses at 0, 2 and 6 months | | | |

Notes
* if non immune to hepatitis B (antiHBsAg <10 I.U.) give 3 further doses of HBVax Pro 10mcg at 4 weekly intervals
# if patient was known varicella immune (disease or vaccinated) before chemotherapy, but has not been checked since treatment, serology can be performed and VV omitted if seropositive. Blood test and varicella vaccine must be at least 5 months after VZIG or 8 months after IVIG administration

# WORKSHEET B: IMMUNISATION OF CHILDREN AFTER CANCER THERAPY aged >10 years. Page 1 of 2

| Attach Patient sticker |
|---|

Date:

GP signature___________________________

| Checklist: | |
|---|---|
| Off therapy >4 months | YES/NO |
| Lymphocyte count >1:0 | YES/NO |
| Date of last IVIG § | |
| Date of last VZIG§ | |
| | |

## § Previous Immunoglobulin

Immune globulin interferes with antibody responses to LIVE vaccines only (MMR/Varicella), therefore wait 8 months after IVIG or 5 months after VZIG administration, before giving these vaccines

## Influenza Vaccination

Annual Influenza vaccination recommended for patients and family/household members (not funded unless other eligible condition)

## Varicella Vaccine

Varicella vaccine should be given to all immune competent household members, including adults, with no previous history of disease or vaccination if not already given.

**Meningococcal vaccine:** MCV4-D (Menactra). The quadrivalent meningococcal conjugate A,C,Y and W135 vaccine (Menactra®) is recommended, x 2 doses at least 8 weeks apart.

## Human Papilloma Virus Vaccine

Girls and boys age 9 years or older should be given HPV vaccine (Gardasil 9), 3 doses at 0, 2 and 6 months (funded for females only)- see page 4

## Notes:

-If 2 live vaccines are scheduled they should be given on the same day or at least 4 weeks apart.

# WORKSHEET B: IMMUNISATION OF CHILDREN AFTER CANCER THERAPY aged >10 years. Page 2 of 2

Attach Patient sticker

GP signature________________________________

## Recommended Immunisation Schedule

**GP must sign the sheet as all vaccines must be prescribed by a medical practitioner.**

#***Write "omit" if not indicated to receive vaccine***

| | Vaccine(s) | Notes | Date given | NIR entry | Vaccinator |
|---|---|---|---|---|---|
| **Date 1st dose** | **Tdap** (Boostrix) | | | | |
| | **IPV** (IPOL) | | | | |
| | **HepB** (HBVaxPro 5mcg) | | | | |
| 4 weeks later<br>Due date: | **Tdap** (Boostrix) | | | | |
| | **IPV** (IPOL) | | | | |
| | **HepB** (HBVaxPro 5mcg) | | | | |
| 4 weeks later<br>Due date | **Tdap** (Boostrix) | | | | |
| | **IPV** (IPOL) | | | | |
| | **HepB** (HBVaxPro 5mcg) | | | | |
| 4 weeks later<br>Due date: | **MMR** | Do not give within 5 months VZIG or 8 months IV IG | | | |
| | **PCV-13** Prevenar 13 | | | | |
| | **BLOOD TEST** | **Anti HBsAg ***<br>**VZV serology #** | | | |
| 4 weeks later<br>Due date: | **MMR** | Do not give within 5 months VZIG or 8 months IVIG | | | |
| | **Varicella**<br>(Varilrix) | Omit if immune.<br>Do not give within 5 months VZIG or 8 months IV IG | | | |
| | **MCV4-D** (Menactra) | | | | |
| 4 weeks later<br>Due date: | **PPV 23** (Pneumovax) | | | | |
| | **HiB** | | | | |
| 4 weeks later<br>Due date: | **Varicella**<br>(Varilrix) 2nd dose | Omit if previously immune. Do not give within 5 months VZIG or 8 months IVIG | | | |
| | **MCV4-D** (Menactra) | | | | |
| Then | **HPV** (Gardasil 9) | 3 doses at 0, 2 and 6 months unless previously given in which case 1 additional dose is funded | | | |

Notes

* if non immune to hepatitis B (antiHBsAg <10 I.U.) give 3 further doses of HBVax Pro 10mcg at 4 weekly intervals

#

if patient was known varicella immune (disease or vaccinated) before chemotherapy, but has not been checked since treatment,

serology can be performed and VV omitted if seropositive. Blood test and varicella vaccine must be at least 5 months after VZIG or 8 months after IVIG administration

## 2. Children Post Haematopoietic Stem Cell transplant (HSCT)

**Children should receive complete re-immunisation starting > 12 months post transplant.**

**NO LIVE vaccines to be given (MMR, Varicella) until 24 months post transplant.**

**For patients exposed to varicella or measles prophylaxis should be given as for children on maintenance chemotherapy (see page 2) until they have completed their revaccination programme.**

# WORKSHEET C: IMMUNISATION OF CHILDREN AFTER HSCT < 10 years. Page1 of 2

| Attach Patient sticker |
|---|
| |

Date:

GP signature________________________________

**Checklist:**

| | |
|---|---|
| Off therapy 12 months | |
| Lymphocyte count >1.0 | |
| CD4 >400 | |
| IgM recovery to normal | |
| Steroids ceased >4 weeks | |
| Cyclosporin ceased >4 weeks | |
| GVHD controlled | |

## Additional vaccines (all funded)

Meningococcal C conjugate vaccine (Neisvac-C) and/ or (depending on age) Quadrivalent

conjugate meningococcal vaccine (Menactra)

23 valent polysaccharide pneumococcal vaccine (Pneumovax)

Household contacts

Varicella vaccine should be given to all immune competent household members, including adults, with no previous history of disease or vaccination, if not already given (funded)

Annual influenza vaccination recommended for adults and children (down to 6 months of age) – not funded unless other eligible condition

## Human Papilloma Virus Vaccine

Girls and boys age 9 years or older should be given HPV vaccine (Gardasil 9), 3 doses at 0, 2 and 6 months. Funded for all post transplant patients. Funded for all – up to aged 26 years

# WORKSHEET C: IMMUNISATION OF CHILDREN AFTER HSCT < 10 years. Page 2 of 3

Attach Patient sticker

Date:

GP signature________________________________

## Recommended Immunisation Schedule

**GP must sign the sheet as all vaccines must be prescribed by a medical practitioner.**

| | Vaccine | Notes | Date given | Vaccinator |
|---|---|---|---|---|
| **1st Dose**<br>12 months post transplant | **DTaP-IPV-HepB/Hib**<br>(Infanrix-hexa) | | | |
| | **PCV-13**<br>(Prevenar 13) | | | |
| | **MenCCV**<br>(Neisvac C) | If aged <2 years | | |
| **8 weeks later**<br><br>**date due** | **DTaP-IPV-HepB/Hib**<br>(Infanrix-hexa) | | | |
| | **PCV-13**<br>(Prevenar 13) | If < 5 years | | |
| | **PPV 23**<br>(Pneumovax) | If > 5 years<br>Revaccinate with PPV23 once more in 5 years' | | |
| **8 weeks later**<br><br>Date due | **DTaP-IPV-HepB/Hib**<br>(Infanrix-hexa) | Check anti-HBs 1 month later and if negative (<10) re-immunise with 3 doses of HBvaxPro 10µg 4 weeks apart | | |
| | **PPV 23**<br>(Pneumovax) | If aged 2, 3 or 4 years old<br>Revaccinate with PPV23 once more in 3 years' time only if risk persists | | |
| | **MCV4-D** (Menactra) | If aged >2 yrs | | |
| **8 weeks later** | **MCV4-D** (Menactra) | If aged>2yrs, 2nd dose | | |
| **24 months post transplant**<br><br>Date due | **DTaP-IPV**<br>(Infanrix-IPV) | Defer to age 4 if aged < 4 years | | |
| | **Varicella**<br>(Varilrix) | | | |
| **4 weeks later**<br><br>Date due | **MMR** | If >9 yrs old also give first of 3 doses HPV (Gardasil) (0,2 and 6 month schedule)at this visit | | |
| **4 weeks later**<br><br>**Date due** | **Varicella**<br>(Varilrix) | | | |
| **4 weeks later**<br><br>Date due | **MMR** | If>9 yrs old also give second of 3 doses HPV (Gardasil) (0,2 and 6 month schedule)at this visit, with 3rd 4months later | | |
| **From age 9 yrs** | **HPV (Gardasil 9)** | 3 doses of HPV (0,2 and 6 month schedule) | | |

# WORKSHEET D: IMMUNISATION OF CHILDREN AFTER HSCT
# Aged between 10 and 18 years. Page1 of 2

| Attach Patient sticker |
|---|
| |

Date:

GP signature________________________________

**Checklist:**

| | |
|---|---|
| Off therapy 12 months | |
| Lymphocyte count >1.0 | |
| CD4 >400 | |
| IgM recovery to normal | |
| Steroids ceased >4 weeks | |
| Cyclosporin ceased >4 weeks | |
| GVHD controlled | |

## Additional vaccines (all funded)

Quadrivalent conjugate meningococcal vaccine(Menactra);

23 valent polysaccharide pneumococcal vaccine (Pneumovax) ;

Annual Influenza vaccination recommended

Household contacts

Varicella vaccine should be given to all immune competent household members, including adults, with no previous history of disease or vaccination, if not already given (funded)

Annual influenza vaccination recommended for adults and children(down to 6 months of age) – not funded unless other eligible condition

## Human Papilloma Virus Vaccine

HPV vaccine (Gardasil 9), 3 doses at 0, 2 and 6 months. Funded for all post transplant patients

# WORKSHEET D: IMMUNISATION OF CHILDREN AFTER HSCT aged between10 and 18 years. Page 2 of 2

Attach Patient sticker

Date:

GP signature_______________________________

## Recommended Immunisation Schedule

**GP must sign the sheet as all vaccines must be prescribed by a medical practitioner.**

| | Vaccine | Notes | Date given | Vaccinator |
|---|---|---|---|---|
| **1st dose 12 months post transplant**<br><br>**date** | **Tdap** (Boostrix) *AND*<br>**IPV** (IPOL) | | | |
| | **PCV-13**<br>(Prevenar 13) | | | |
| **4weeks later**<br><br>Date due | **Tdap** (Boostrix) *AND*<br>**IPV** (IPOL) | | | |
| | **HBvaxPro 5µg**<br>(Hep B) | | | |
| **4 weeks later**<br><br>Date due | **Tdap** (Boostrix) *AND*<br>**IPV** (IPOL) | | | |
| | **HBvaxPro 5µg** (Hep B)<br>**Hib** | 1st dose | | |
| **4weeks later**<br><br>Date due | **HBvaxPro 5µg** (Hep B) | Check anti-HBs 1 month later and if negative (<10) re-immunise with 3 doses of HBvaxPro 10µg 4 weeks apart | | |
| | **MCV4-D** (Menactra)<br>**Hib** | 1st dose<br>2nd dose | | |
| **8 weeks later**<br>Date due | **MCV4-D** (Menactra)<br>**Hib** | 2nd dose<br>3rd dose | | |
| | **PPV 23**<br>(Pneumovax) | Revaccinate with PPV23 once more in 5 years' time only if risk persists | | |
| **24 months post transplant**<br>Date due | **Varicella**<br>(Varilrix)<br>**HPV** (Gardasil 9)-1st dose | | | |
| **4 weeks later**<br><br>Date due | **MMR** | | | |
| **4 weeks later**<br><br>Date due | **varicella (varilrix) 2nd dose AND**<br>**HPV** (Gardasil 9)-2nd | | | |
| **4 weeks later**<br>**Date due** | **MMR second dose** | | | |
| **3 months later**<br><br>Date due | **HPV** (Gardasil 9)-3rd dose | Needs to be 4 months after second dose | | |
| **2 years after last pertussis-containing vaccine** | **Tdap** (Boostrix) | | | |

3. **Pre/post splenectomy – refer Starship guideline (https://www.starship.org.nz/for-health-professionals/starship-clinical-guidelines/a/asplenia/**

**4. Asplenic/hyposplenic neonates refer Starship guideline (https://www.starship.org.nz/for-health-professionals/starship-clinical-guidelines/a/asplenia/)**

**Medic Alert bracelet to be worn at all times**

# Recommended immunisation schedule for the asplenic neonate

| | Vaccine | | | | | | |
|---|---|---|---|---|---|---|---|
| **Age** | **Rotavirus** | **Diph/tet/pertussis-containing vaccine** | **Pneumococcal vaccines** | **Meningococcal vaccines** | **Varicella** one dose funded | **MMR** | **Hib** |
| **6 weeks** | RV1 | DTaP-IPV-HepB/Hib | PCV13 | | | | |
| **8 weeks** | | | | MenCCV (or give with 3 month vaccines) | | | |
| **3 months** | RV1 | DTaP-IPV-HepB/Hib | PCV13 | | | | |
| **5 months** | | DTaP-IPV-HepB/Hib | PCV13 | MenCCV (or 8 weeks after 1st MenCCV dose) | | | |
| **12 months** | | | | MenCCV | | | |
| **15 months** | | | PCV13 | | Varicella | MMR | Hib |
| **2 years** | | | PPV23 | MCV4-D | | | |
| **2 years, 2 months** | | | | MCV4-D | | | |
| **4 years** | | DTaP-IPV | | | varicella | MMR | |
| **5 years** | | | | MCV4-D Then 5 yearly | | | |
| **7 years** | | | PPV23 | | | | |
| | | | | | | | |
| **Annual** | **Influenza vaccine** | | | | | | |

No vaccines are contraindicated in asplenia/hyposplenia.
Unshaded boxes are routine schedule vaccines.
Dark shaded boxes are funded additional vaccines.
Light shaded boxes are recommended but *not funded vaccines*.

See Immunisation handbook 2016 section 4.3.4 and table 4.7 for more information and recommendations when asplenia diagnosed at different ages

## References:


1) Red Book- Report of the Committee on Infectious Diseases-
American Academy of Pediatrics, 2015

2) Guidelines for Preventing Opportunistic Infections Among Hematopoietic Stem Cell Transplant Recipients.- MMWR (Morbidity and Mortality Weekly Report- October 20, 2000 )
http://www.cdc.gov/mmwr/mmwr_rr.html

3) Immunisation of the Immunocompromised Child Best Practice Statement February 2002 (Royal College of Paediatrics and Child Health)
http://www.rcpch.ac.uk

4) Immunisation Handbook 2017 http://www.moh.govt.nz/moh.

5) NZ Blood “Transfusion Medicine Handbook” 2008

6) 2013 IDSA clinical practice guideline for vaccination of the immunocompromised host
http://cid.oxfordjournals.org/content/early/2013/11/26/cid.cit684.full

7) Pharmac- Changes to the National Immunisation Schedule 28 July 2016



**Dr Jane Skeen /Dr Karen Tsui** - for the Starship Paediatric Haematology/Oncology Team
**Dr Elizabeth Wilson** -for the Starship Paediatric Infectious Diseases Team
**Dr Siobhan Cross** -for the Christchurch Paediatric Haematology/Oncology Centre
**Dr Tony Walls** -for the Christchurch Paediatric Infectious Disease Team
**Diane Bos** **-**Pegasus Health Immunisation Coordinator, Christchurch