

# **Guideline for the Prevention and Management of Chemotherapy Induced Nausea and Vomiting in Children and Young People with Cancer**

## i Document Control

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<b>Title</b>	Guidelines for the Prevention and Management of Chemotherapy Induced Nausea and Vomiting in Children and Young People with Cancer
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<b>Owner</b>	YHCYPCN Guideline Review Group

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## ii Information Reader Box

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<b>Title</b>	Guideline for the prevention and Management of Chemotherapy Induced Nausea and Vomiting in Children and Young People with Cancer
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# 1 Introduction

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This policy has been developed and agreed in order to ensure that the prophylaxis and treatment of chemotherapy and radiotherapy induced nausea and vomiting is provided in a manner, which aims to take account of the emetogenic stimulus and the known actions of the individual cytotoxic drugs.

It aims to provide a logically consistent framework for the prevention and treatment of chemotherapy induced nausea and vomiting.

A Cochrane systematic review of this subject published in 2010 showed that overall knowledge of the most effective antiemetics to prevent chemotherapy-induced nausea and vomiting in childhood remains incomplete. It indicated that future research should be undertaken, but supported the recommendation of this guideline that 5-HT<sub>3</sub> antagonists with dexamethasone added are effective in patients who are to receive highly emetogenic chemotherapy. It recognised that the risk-benefit profile of additional steroid remains uncertain.

Further work is continuing nationally through the supportive care group of the Children's Cancer and Leukaemia Group on the development of national guidelines which will be locally reviewed and adopted as is deemed appropriate when they are introduced.

## Reference

Phillips RS, Gopaul S, Gibson F, Houghton E, Craig JV, Light K, Pizer B. Antiemetic medication for prevention and treatment of chemotherapy induced nausea and vomiting in childhood. Cochrane Database of Systematic Reviews 2010, Issue 9. Art. No.: CD007786. DOI: 10.1002/14651858.CD007786.pub2.

## 2 Principles of Antiemetic Prescribing

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### 2.1 Drug Choice

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All children and young people should receive antiemetic therapy that as far as can be predicted, is appropriate to the emetogenic potential of the prescribed chemotherapy and their previous experience of receiving chemotherapy.

Consider:

- Emetogenicity of cytotoxic drugs (Refer to page 15)
- Regime emetogenicity on each day of the course.
- Previous adverse drug reactions and drug allergies.
- Patient's antiemetic control with previous chemotherapy
- Any medical complications or concurrent medications that may contribute to nausea and vomiting

### 2.2 Route

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All antiemetics to be prescribed **orally** whenever possible. Those patients who cannot tolerate oral medication or if antiemetics drugs are due overnight, can be given parenteral antiemetics.<sup>2,3</sup> Patients **must not** be discharged home with intravenous antiemetics.

### 2.3 Contra-indications to the prescribing of dexamethasone

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Dexamethasone must not be prescribed to children and young people with brain tumours, acute myeloid leukaemia, those undergoing allogeneic bone marrow transplantation or to children receiving steroids as part of their treatment. It should also be avoided if possible in patients with Osteosarcoma receiving high dose methotrexate. In exceptional circumstances (ie uncontrollable nausea and vomiting) steroids may be indicated but should only be prescribed with consultant approval.

### 2.4 Dopamine antagonists: Use of Domperidone

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Domperidone is no longer recommended for routine use in the policy due to concerns related to cardiac toxicity issued by the MHRA in April 2014<sup>4</sup>. Domperidone could be considered in children who have failed or who cannot tolerate other antiemetic drugs. Such therapy must be initiated by the child's consultant. Any patient on domperidone therapy must have cardiac monitoring before and at appropriate agreed timescales during therapy. Domperidone is contraindicated in any patient with any cardiac abnormalities.

### 2.5 Dopamine antagonists: Use of Metoclopramide

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To minimise the risk of neurological toxicity metoclopramide should usually only be added as second line therapy and should usually not be prescribed for more than seven days<sup>5</sup>. If the drug is continued for more than seven days this should be after medical review and the reason for continuation documented in the medical notes. Metoclopramide is used as first line therapy for very highly emetogenic chemotherapy as local audit has shown it to be beneficial in such patients and alternatives such as levomepromazine and chlorpromazine are more sedating.

Dopamine antagonists (refer to Section 5 for drug classification) can induce acute dystonic reactions. With metoclopramide, dystonic reactions usually occur shortly after starting treatment and subside within 24 hours of stopping it. Any dystonic reaction must be treated immediately with procyclidine.<sup>1</sup> Any child who has experienced an extra pyramidal reaction to metoclopramide can receive chlorpromazine or levomepromazine. There is a reduced incidence of extrapyramidal side effects with these drugs and no cross sensitivity.

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## 2.6 Criteria for changing antiemetics

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Review antiemetics daily. Move to the next stage in protocol if the child experiences either:

- (a) More than two vomits in 12 hours.
- (b) The patient experiences nausea, which is prolonged, continuous and interferes with or prevents normal activities.

Once control of nausea and vomiting is lost within an individual treatment block it is very unlikely to be regained during that block. Adding further drugs to the antiemetic regime which are appropriate to the emetogenicity of the chemotherapy being administered is likely to provide only marginal additional benefits. For the next block of chemotherapy of similar emetogenicity move up to the next line of treatment.

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## 2.7 Prevention of anticipatory nausea and vomiting

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Good symptom control is the best way to prevent anticipatory symptoms. They may be helped, particularly in adolescent patients, by the administration of lorazepam for 48 hours prior to the treatment block.<sup>1,3</sup>

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## 2.8 Guidance for prescribing antiemetics for discharge home

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Ondansetron, dexamethasone and metoclopramide are the agents of choice for preventing delayed symptoms. It is good practice to review past experience with the patients' family and/or patient to find out if any delayed nausea and/or vomiting had occurred in their last course of chemotherapy, which antiemetic agent was used and for how long before prescribing drugs for discharge home. Metoclopramide should not usually be taken for more than 7 days. Further guidance for antiemetics for discharge home can be found in the treatment guidelines.

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## 2.9 Day case chemotherapy

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If single dose chemotherapy with short acting emetogenicity, for example doxorubicin and cyclophosphamide, give a dose of ondansetron before chemotherapy. The patient should be discharged home with a stat dose of ondansetron to take that evening.

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## 2.10 Antiemetics with Mifamurtide

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Mifamurtide has low emetogenicity so antiemetics are not usually required. If the patient is having Cisplatin chemotherapy before or after administration of the Mifamurtide then Dexamethasone therapy must not be given on the same day as the Mifamurtide treatment.

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## 2.11 Cautions when prescribing Ondansetron

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Following advice from the MHRA in 2012 and 2013 to minimise the risks of QT interval prolongation and cardiac arrhythmia for patients on ondansetron the following cautions must be followed :

- Intravenous ondansetron should always be given as a slow IV infusion over 15 mins.
- Ondansetron must be used with caution in patients with risk factors for QT interval prolongation or cardiac arrhythmias. These include: electrolyte abnormalities, use of other medicines that prolong QT interval (including cytotoxic drugs) or that may lead to electrolyte abnormalities, congestive heart failure, bradyarrhythmias, or use of medicines that lower heart rate.
- Hypokalaemia and hypomagnesaemia should be corrected before ondansetron administration

## 3 Antiemetic Treatment Guidelines

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### 3.1 Antiemetic Treatment Guidelines for Children < 6 Years of Age

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**NB Please refer to section 3.3 for the guidelines for children where steroids are contraindicated (see section 2.3) and for children receiving steroids during this course of chemotherapy.**

#### **Antiemetics during chemotherapy.** <sup>2,3,8,9,10</sup>

Very highly emetogenic

- 1st Line: Ondansetron and Dexamethasone
- 2nd Line: Add Metoclopramide
- 3rd Line: Change Metoclopramide to levomepromazine in patients >1 years old.\* <sup>10,11,12,14,15</sup>

#### **Highly emetogenic**

- 1st Line: Ondansetron
- 2nd Line: Add Dexamethasone
- 3rd Line: Add Metoclopramide
- 4th Line: Change Metoclopramide to levomepromazine in patients >1 years old.\* <sup>10,11,12,14,15</sup>

#### **Moderately emetogenic**

- 1st Line: Ondansetron
- 2nd Line: Add Dexamethasone
- 3rd Line: Add Metoclopramide
- 4th Line: Change Metoclopramide to levomepromazine in patients >1 years old.\* <sup>10,11,12,14,15</sup>

#### **Low to moderately emetogenic**

Ondansetron if needed only. If required then usually just a stat dose before chemotherapy is sufficient.

\*Patients <1 year old

\*In patients less than 1 years of age change metoclopramide to chlorpromazine <sup>11,12</sup>

#### **Rescue Therapy**

Add Lorazepam (stop chlorpromazine or levomepromazine) <sup>3</sup>

#### **Antiemetics after chemotherapy and for discharge home** <sup>6,7</sup>

##### **Very highly and highly emetogenic chemotherapy**

Ondansetron: Prescribe for two to five days post chemotherapy.

Dexamethasone: For cisplatin only: Prescribe a reducing course for **four** days post chemotherapy.

For all other patients on highly emetogenic chemotherapy dexamethasone should be stopped 24 hours after the last dose of chemotherapy. If a patient had delayed emesis with the last course of highly emetogenic chemotherapy then consider prescribing a reducing course of dexamethasone on completion of chemotherapy.

Metoclopramide: Prescribe if required for a maximum total duration of 7 days.

Levomepromazine and Chlorpromazine should be reviewed and usually stopped 48 hours after completion of chemotherapy. They should not usually be prescribed for discharge home.

##### **Moderately emetogenic chemotherapy**

Continue antiemetics until **24** hours post chemotherapy. If patient has progressed beyond second line therapy then for antiemetics after chemotherapy treat as highly emetogenic.

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## 3.2 Antiemetic Treatment Guidelines for Children over 6 Years of Age and for Teenagers and Young People

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**NB Please refer to section 3.3 and 3.4 for the guidelines when steroids are contraindicated (see section 2.3) and for patient's receiving steroids during this course of chemotherapy.**

### **Antiemetics during chemotherapy** <sup>2,3,8,9,10,12</sup>

#### **Very highly emetogenic**

- 1st line: Ondansetron, Dexamethasone and Metoclopramide  
2nd line: Change Metoclopramide to Levomepromazine. <sup>10,11,12,14,15</sup>

#### **Highly emetogenic**

- 1st line: Ondansetron and Dexamethasone <sup>9</sup>  
2nd line: Add Metoclopramide  
3rd line: Change Metoclopramide to Levomepromazine. <sup>11,12</sup>

#### **Moderately emetogenic**

- 1st line: Ondansetron  
2nd line: Add Dexamethasone  
3rd line: Add Metoclopramide  
4th line: Change Metoclopramide to Levomepromazine

#### **Low to Moderately emetogenic**

Ondansetron if needed only. If required then usually just a stat dose before chemotherapy is sufficient.

#### **Rescue Therapy**

Lorazepam. (Stop Levomepromazine)

#### **Role of Nabilone**

Highly + very highly emetogenic regimes - If treatment failure on 1st, 2nd and 3rd line antiemetics consider nabilone for the next course of treatment. Prescribe with ondansetron + dexamethasone/metoclopramide. Do not prescribe with levomepromazine or lorazepam. <sup>10,15</sup>

### **Antiemetics after chemotherapy** <sup>6,7</sup>

#### **Very highly and highly emetogenic chemotherapy**

Ondansetron: Prescribe for two to five days post chemotherapy.

Dexamethasone: For cisplatin only: Prescribe a reducing course for **four** days post chemotherapy.

For all other patients on highly emetogenic chemotherapy dexamethasone should be stopped 24 hours after the last dose of chemotherapy. If a patient had delayed emesis with the last course of highly emetogenic chemotherapy then consider prescribing a reducing course of dexamethasone on completion of chemotherapy.

Metoclopramide: Prescribe if required for a maximum total duration of 7 days.

Levomepromazine and Chlorpromazine should be reviewed and usually stopped 48 hours after completion of chemotherapy. They should not usually be prescribed for discharge home.

Lorazepam/Nabilone: Prescribe for maximum of **two** days post chemotherapy. Stop before discharge home.

#### **Moderately emetogenic chemotherapy**

Continue antiemetics until **24** hours post chemotherapy. If patient has progressed beyond second line therapy then for antiemetics after chemotherapy treat as highly emetogenic.

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### 3.3 Antiemetic Treatment Guidelines for Children < 6 Years of Age where steroids are contraindicated during this course of Chemotherapy

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#### **Antiemetic Drugs During Chemotherapy** <sup>2,3,8,9,10</sup>

**Dexamethasone is contraindicated as an antiemetic.** <sup>13</sup>

#### **Very highly emetogenic**

1st Line: Ondansetron and Metoclopramide

2nd Line: Change Metoclopramide to levomepromazine in patients >1 years old. <sup>\*11,12</sup>

#### **Highly and Moderately emetogenic**

1st Line: Ondansetron

2nd Line: Add Metoclopramide

3rd Line: Change Metoclopramide to levomepromazine in patients >1 years old. <sup>\*11,12</sup>

#### **Low to Moderately emetogenic**

Ondansetron if needed only. If required then usually just a stat dose before chemotherapy is sufficient.

#### **\*Patients <1 year old**

\*In patients less than 1 years of age change metoclopramide to chlorpromazine <sup>11,12</sup>

#### **Rescue Therapy**

Add Lorazepam (Stop Levomepromazine or Chlorpromazine)

#### **Role of Nabilone**

Highly + very highly emetogenic regimes - If treatment failure on 1st, 2nd and 3rd line antiemetics consider nabilone for the next course of treatment. Prescribe with ondansetron and metoclopramide. Do not prescribe with levomepromazine or lorazepam. <sup>12,17</sup> Nabilone should not be prescribed to children under the age of six.

#### **Antiemetics after chemotherapy** <sup>6,7</sup>

##### **Very highly and highly emetogenic chemotherapy**

Ondansetron: Prescribe for two to five days post chemotherapy.

Metoclopramide: Prescribe if required only for discharge home. The total duration of metoclopramide therapy should not exceed **7** days.

Levomepromazine and Chlorpromazine should be reviewed and usually stopped 48 hours after completion of chemotherapy. They should not usually be prescribed for discharge home.

Lorazepam/Nabilone: Prescribe for maximum of **two** days post chemotherapy. Stop before discharge home.

##### **Moderately emetogenic chemotherapy**

Continue antiemetics until **24** hours post chemotherapy. If patient has progressed beyond second line therapy then for antiemetics after chemotherapy treat as highly emetogenic.

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### 3.4 Antiemetic Treatment Guidelines for Children Over 6 Years of Age and Teenagers and Young People where steroids are contraindicated during this course of Chemotherapy

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#### **Antiemetics during chemotherapy** <sup>2,3,8,9,10</sup>

Dexamethasone is contraindicated as an antiemetic. <sup>13</sup>

#### **Very highly and highly emetogenic**

1st Line: Ondansetron and Levomepromazine <sup>10,14,15</sup>

2nd Line: Review dose of Levomepromazine and increase if tolerated

#### **Moderately emetogenic**

1st line: Ondansetron

2nd line: Add Metoclopramide

3rd line: Change Metoclopramide to Levomepromazine.

#### **Low to moderately emetogenic**

Ondansetron if needed only. If required then usually just a stat dose before chemotherapy is sufficient.

#### **Rescue Therapy**

Lorazepam (Stop Levomepromazine)

#### **Role of Nabilone**

Highly + very highly emetogenic regimes - If treatment failure on 1st, 2nd and 3rd line antiemetics consider nabilone for the next course of treatment. Prescribe with ondansetron + metoclopramide. Do not prescribe with levomepromazine or lorazepam. <sup>10,15</sup>

#### **Antiemetics after chemotherapy** <sup>6,7</sup>

#### **Very highly and highly emetogenic chemotherapy**

Ondansetron: Prescribe for two to five days post chemotherapy.

Metoclopramide: Prescribe if required only for discharge home. The total duration of metoclopramide therapy should not exceed **7** days.

Levomepromazine and Chlorpromazine should be reviewed and usually stopped 48 hours after completion of chemotherapy. They should not usually be prescribed for discharge home.

Lorazepam/Nabilone: Prescribe for maximum of **two** days post chemotherapy. Stop before discharge home.

#### **Moderately Emetogenic Chemotherapy**

Continue antiemetics until **24** hours post chemotherapy. If patient has progressed beyond second line therapy then for antiemetics after chemotherapy treat as highly emetogenic.

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## 3.5 Antiemetic Treatment Guidelines For Teenagers And Young People Over The Age Of 16 Receiving Cisplatin/Doxorubicin For Osteosarcoma.

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### Antiemetics during chemotherapy <sup>18,19</sup>

1st Line: Ondansetron, Dexamethasone, Aprepitant and Metoclopramide. (NB 50% dose dexamethasone)

2nd Line: Change Metoclopramide to Levomepromazine

#### Aprepitant Prescribing Notes

Aprepitant is an inhibitor of cytochrome p450 3A4 and an inducer of cytochrome p450 2C9. Aprepitant has a number of potentially significant drug interactions and **must not** be given concurrently with the following drugs:

Etoposide, ifosfamide, imatinib, irinotecan, vincristine, vinblastine, vinorelbine, phenytoin, carbamazepine, phenobarbitone, warfarin, benzodiazepines, clarithromycin, rifampicin. These agents **should not** be prescribed for **two weeks** after aprepitant therapy.

Dexamethasone antiemetic doses should be **halved** in patients on aprepitant.

NB: Lorazepam **must not** be prescribed as rescue therapy as contraindicated for two weeks after stopping Aprepitant.

#### Role of Nabilone

If treatment failure on 1st and 2nd line antiemetics consider nabilone for the next course of treatment.

Prescribe with ondansetron + dexamethasone/metoclopramide. Do not prescribe with levomepromazine.  
<sup>10,15</sup>

### Antiemetics after chemotherapy <sup>6,7</sup>

Ondansetron: Prescribe for two to five days post chemotherapy.

Dexamethasone: Prescribe a reducing course for **four** days post chemotherapy. Prescribe 50% dose due to aprepitant therapy. Refer to drug information page 15.

Metoclopramide: Prescribe if required only for discharge home. The total duration of metoclopramide therapy should not exceed **7** days.

Aprepitant: **Three** day course only. Refer to drug information page 15.

Levomepromazine should be reviewed and usually stopped 48 hours after completion of chemotherapy. It should not usually be prescribed for discharge home.

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## 3.6 Antiemetic Treatment Guidelines for patients undergoing Stem Cell Transplantation

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Nausea and vomiting associated with bone marrow transplantation is multifactorial. A combination of chemotherapy, total body irradiation (TBI), altered dietary input can all cause nausea and emesis. Following transplant, infection and Graft Versus Host Disease (GVHD) may also play a role.

As post-transplant causes are varied and individual, this guideline will concentrate with the conditioning period only.

### **Allogeneic Transplant**

The conditioning period can vary in length, occasionally up to a maximum of ten days. During this period, drugs of varying emetogenicity are used and antiemetic use should be titrated as such. It is important to consider the increasing emetogenicity of the regime over time as other chemotherapy agents/TBI are added in and to adjust the antiemetics accordingly.

Anti-emetic use should be reviewed 48-72 hours after the last conditioning agent (including TBI). If nausea and vomiting is not present at this point, then anti-emetics should be stopped. If nausea and vomiting is still a problem, then anti-emetic use should be reviewed daily until it is appropriate to stop. The management of nausea and vomiting after the conditioning period should be reviewed individually and the most appropriate agent for the likely cause should be given.

### **Antiemetics during conditioning period**

Dexamethasone is contraindicated as an antiemetic for allogeneic transplant patients. Any patients refractory to standard anti-emetics should be discussed with the consultant.

#### **Very highly and highly emetogenic**

1st Line: Ondansetron and Levomepromazine\*  
2nd Line: Review dose of Levomepromazine\* and increase if tolerated

#### **Moderately emetogenic**

1st line: Ondansetron  
2nd line: Add Metoclopramide  
3rd line: Change Metoclopramide to Levomepromazine\*.

#### **\*Patients <1 year old**

In patients less than 1 years of age chlorpromazine should be used instead of levomepromazine

#### **Low emetogenicity:**

Very few chemotherapy agents used in transplant conditioning have low emetogenicity, fludarabine being the exception. Given the cumulative amount of agents over the conditioning period, it is recommended to start with regular ondansetron, even if fludarabine (or another low emetogenicity agent) is the only chemotherapy agent on that day.

#### **Rescue therapy**

If the nausea/vomiting is associated with opioid use, then consider the addition of cyclizine (stop levomepromazine). If secretions or motion appear a contributing factor (ie when travelling for TBI) then consider the use of a hyoscine patch.

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## **Autologous Transplant**

The conditioning period can vary in length, though is often around six or seven days. During this period, drugs of varying emetogenicity are used and antiemetic use should be titrated as such. It is important to consider the increasing emetogenicity of the regime over time as other chemotherapy agents are added in and to adjust the antiemetics accordingly.

Anti-emetic use should be reviewed 48-72 hours after the last conditioning agent. If nausea and vomiting is not present at this point, then anti-emetics should be stopped (except reducing dexamethasone post melphalan) If nausea and vomiting is still a problem, then anti-emetic use should be reviewed daily until it is appropriate to stop. The management of nausea and vomiting after the conditioning period should be reviewed individually and the most appropriate agent for the likely cause should be given.

## **Antiemetics during conditioning period**

### **Very highly emetogenic (Melphalan)**

1st Line: Ondansetron, levomepromazine, dexamethasone. Give a stat dose of dexamethasone before the melphalan and then continue the dexamethasone for 48 hours. Then stop.

### **Highly emetogenic**

1st Line: Ondansetron and Levomepromazine\*  
2nd Line: Review dose of Levomepromazine\* and increase if tolerated  
3rd Line: Consider dexamethasone after discussion with a consultant.

### **Moderately emetogenic**

1st line: Ondansetron  
2nd line: Add Metoclopramide  
3rd line: Change Metoclopramide to Levomepromazine\*.

### **\*Patients <1 year old**

In patients less than 1 years of age chlorpromazine should be used instead of levomepromazine

### **Low emetogenicity:**

Very few chemotherapy agents used in transplant conditioning have low emetogenicity. Given the cumulative amount of agents over the conditioning period, it is recommended to start with regular ondansetron, even if a low emetogenicity agent is the only chemotherapy agent on that day.

### **Rescue therapy**

If the nausea/vomiting is associated with opioid use, then consider the addition of cyclizine (stop levomepromazine). If secretions appear a contributing factor (ie when travelling for TBI) then consider the use of a hyoscine patch.

## 4 Emetogenicity Of Cytotoxic Drugs Used In Paediatric And Adolescent Oncology / Haematology <sup>20,23,24</sup>

Very High	High	Moderate	Moderate to Low	Low
Cisplatin >50mg/m2 High dose Melphalan	Actinomycin D Carboplatin Carmustine Cisplatin < 50mg/m2 Cyclophosphamide > 1g/m2 Cytarabine > 3g/m2 Dacarbazine Doxorubicin > 60mg/m2 Ifosfamide High dose Methotrexate > 3g/m2 Oxaliplatin* Thiotepa > 300mg/m2	Amsacrine Clofarabine Cyclophosphamide ≤ 1g/m2 Cytarabine 200mg/m2 to < 3g/m2 Daunorubicin Doxorubicin < 60 mg/m2 Epirubicin Irinotecan* Lomustine* Methotrexate 250mg/m2 to 3g/m2 Idarubicin Liposomal Daunorubicin* Mitoxantrone Procarbazine Temozolamide Topotecan*	Alemtuzumab* Busulfan(IV) Docetaxel Etoposide 5-Fluorouracil Gemcitabine* Methotrexate 50mg/m2 to 250mg/m2 Paclitaxel Rituximab* Thiotepa < 300mg/m2 Treosulfan	Asparaginase ( All types) Bevacuzimab* Bleomycin Busulfan (oral) Chlorambucil Cladribine* Cytarabine < 200mg/m2 Dasatinib Fludarabine Hydroxycarbamide Imatinib* Methotrexate < 50mg/m2 Mercaptopurine Mifamurtide (SJUH experience) Tioguanine Vinblastine Vincristine Vindesine Vinorelbine

- Give antiemetic drugs corresponding to the level of most emetogenic cytotoxic drug given each day.
- If two moderately emetogenic drugs are given on the same day the regime emetogenicity should be upgraded to highly emetogenic.
- Review emetogenicity of chemotherapy during treatment and change antiemetics appropriately.

\*assigned Hesketh level by Cancer Care Ontario Practice Guideline Initiative May 2007 <sup>23</sup>

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# 5 Drug Information

DRUG (Class)	Route	Dose			Times per day	Formulations Available	IV Administration details	Comments	Ref
		4 weeks –2 years	2 – 12 years	12 yrs and over					
<b>APREPITANT</b> (Neurokinin receptor antagonist)	Oral	N/A	N/A	16 years and above only: Day 1: 125mg daily. Day 2 and 3: 80mg daily.	1 (first dose to be given 1 hour pre chemo)	Capsules 80mg and 125mg.	NA	Reduce dexamethasone dose to 50%. Caution: drug interactions.	18,19,20,25.
<b>CHLORPROMAZINE</b> (Dopamine antagonist)	IV/Oral	1 month to 2 years 500 microgram/kg	500 microgram/kg Max single dose 25mg. 2 to 5 years: Max daily dose = 40mg. 6 to 12 years: Max daily dose = 75mg.	10 – 25mg	2 to 3 Max BD in <1 year old	Injection 50mg/2ml Tablets 10mg,25mg. Syrup 25mg in 5ml	Give 30 minutes pre chemotherapy. Dilute dose in at least 5 X its volume in sodium chloride 0.9% and give over 30 minutes.	Not to be given at home. Can cause hypotension on rapid administration. Reduce dose to 0.3mg/kg if patient is drowsy.	1,22
<b>DEXAMETHASONE</b> (Steroid) <b>Acute emesis</b>	IV/Oral	<1yr 250 microgram – 1mg 1-2 years 1 mg	Stat dose of 6mg/m2 pre chemotherapy then (max 12mg):  2-5 years 2 mg  6 –12 years 4 mg	Stat dose of 6mg/m2 (max 12mg) pre chemotherapy then:  36 – 45 kg 4mg 46-55kg 5mg > 55kg 6mg	3	Injection 4mg/ml Tablet 500mcg and 2mg Oral solution 2mg in 5ml.	Slow IV bolus over 3 to 5 mins or IV infusion over 15 minutes.	Give for maximum of 5 days.. Give 50% dose if patient prescribed Aprepitant.	1,2,16,23,25.
<b>DEXAMETHASONE</b> (Steroid) <b>Reducing regimen post Cisplatin and Melphalan.</b>	IV/Oral	1 to 2 years 500microgram tds for 1 day, 500 microgram bd for 2 days then 500 microgram daily for 1 day, then stop.	2 to 5 years 1mg tds for 1 day, 1mg bd for 2 days then 1mg od for 1 day. Then stop. 6 to 12 years 2mg tds for 1 day, 2mg bd for 2 days then 2mg od for 1 day. Then stop.	4mg tds 1 day, 4mg bd for 2 days then 4mg od for 1 day. Then stop.	See dose details.	Injection 4mg/ml Tablet 500mcg and 2mg Oral solution 2mg in 5ml.	Slow IV bolus over 3 to 5 mins or IV infusion over 15 minutes.	To start immediately after completion of the last day of highly emetogenic chemotherapy. NB;50% doses for patients who have received aprepitant.	1,2,16,23
<b>LEVOMEPROMAZINE</b> (Dopamine antagonist)	IV	>1years old 0.05mg/kg Reduce dose by 50% if patient is drowsy. If not sedated and still nauseous increase dose by 50%.	0.05mg/kg Reduce dose by 50% if patient is drowsy. If not sedated and still nauseous increase dose by 50%.	0.05mg/kg Reduce dose by 50% if patient is drowsy. If not sedated and still nauseous increase dose by 50%.	2	Injection 25mg/ml.	Short IV infusion over 30 minutes in 50ml sodium chloride 0.9%.	Do not give with metoclopramide, chlorpromazine, or cyclizine. Prescribe IV during chemotherapy	14,15
<b>LEVOMEPROMAZINE</b>	Oral	> 1 year old 0.1mg/kg	0.1mg/kg	0.1mg/kg	2	Tablet 6mg (ULM) Liquid 5mg/5ml (ULM)		Orally if needed for discharge. Refer to guidelines.	14,15,26
<b>LORAZEPAM</b> (Benzodiazepine)	IV/Oral	50 micrograms/kg Maximum dose 2mg		1 to 2mg	1 to 2	Injection 4mg/ml Tablets 1mg,2.5mg.	Slow IV bolus over 3 to 5 minutes. Maximum rate 50 micrograms/kg over 3 minutes.	Give orally whenever possible. Stop chlorpromazine or levomepromazine.	1,12,22

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DRUG (Class)	Route	Dose			Times per day	Formulations Available	IV Administration details	Comments	Ref
		4 weeks –2 years	2 – 12 years	12 yrs and over					
<b>METOCLOPRAMIDE</b> (Dopamine antagonist)	IV/Oral	100 microgram/kg (Maximum single dose 10mg)  Increase to 200microgram/kg only if tolerated and if not effective at the lower dose.	100 microgram/kg (Maximum single dose 10mg)  Increase to 200microgram/kg only if tolerated and if not effective at the lower dose.	100 microgram/kg (Maximum single dose 10mg)  Increase to 200microgram/kg only if tolerated and if not effective at the lower dose.	3 to 6	Injection 5mg/ml Tablet 10mg Liquid 1mg/ml Syrup 1mg/ml	Slow IV bolus over 3 to 5 minutes. Give 30 minutes pre chemotherapy	Give orally if tolerated. Treat any dystonic reaction with procyclidine. Do not give with , levomepromazine or chlorpromazine.	1,12,22
<b>NABILONE</b> (Cannabinoid)	Oral		< 18kg 0.5mg >18kg 1mg Use in children over 6 years only	1 – 2 mg	2	Capsule 1mg		Start the night before chemotherapy.	10,20
<b>ONDANSETRON</b> (5HT3 antagonists)	IV	5mg/m <sup>2</sup> (maximum dose = 8mg) Round dose to the nearest mg		8mg	2	Injection 2mg/ml. 2ml and 4ml ampoules.	IV infusion over 15 minutes in Sodium Chloride 0.9% or Glucose 5%..	Only give IV if oral not tolerated.	1,2,22
	Oral	< 0.3m <sup>2</sup> 1mg 0.3-0.6m <sup>2</sup> 2mg 0.6-1m <sup>2</sup> 4mg	0.6-1m <sup>2</sup> 4mg > 1m <sup>2</sup> 8mg	8mg	2	Tablets 4mg,8mg. Tablet melt formulation 4mg,8mg. Oral solution 4mg in 5ml.			1,2,22
<b>PROCYCLIDINE</b> (Antimuscarinic - antidote for dopamine antagonists)	IV	500 microgram to 2mg	2mg to 5mg	5 to 10mg	Single dose	Injection 5mg/ml	Slow IV injection over 2 – 5 minutes	For the treatment of dystonic reactions. Repeat after 20 to 30 minutes if needed.	1,22

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