Imperial College Healthcare NHS Trust

A Paediatric Dietitian Supplementary Prescriber – In Bone Marrow Transplantation

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Dietitian Prescribing

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ACP - 1 stop shop, ease burden, better for patients

1. Introduction

- Dietetic Student training - St George's Hospital, London
- Adult Band 5-6 dietitian North Middlesex Hospital
- Band 6-7 Paediatric Dietitian: Imperial College Healthcare NHS Trust – specialising in haematology / BMT
- Clinical Lead Paediatric Dietitian: Imperial College Healthcare NHS Trust - specialising in haematology / BMT
- ACP masters King's 2019
- NMP (paediatrics) course LSBU 2021

2. Specialty Area

- Paediatric Bone Marrow transplant unit –St Mary's Hospital
- Specialise in haemoglobinopathies & bone marrow failures

HbSS
TDT (transfusion dependent B thalassaemia)
Diamond Blackfan Anaemia
Fanconi Anaemia
Severe Aplastic Anaemia
Dyskeratosis Congenita
Hereditary Spherocytosis

- Approximately 28-30 transplants per year
- Sibling allogeneic / Haploidentical / Matched unrelated / mismatch related / mismatch unrelated
- BMT / cord / PBSC
- Conditioning phase D-7 to D-1, Transplant D0

Role of dietitian in BMT

Monitoring nutritional status (intake / output)	Indications for nutritional support (enteral/parenteral)	Enteral Feeding regimens
Parenteral Nutrition Scripts	Antiemetic Reviews	Monitoring weight loss

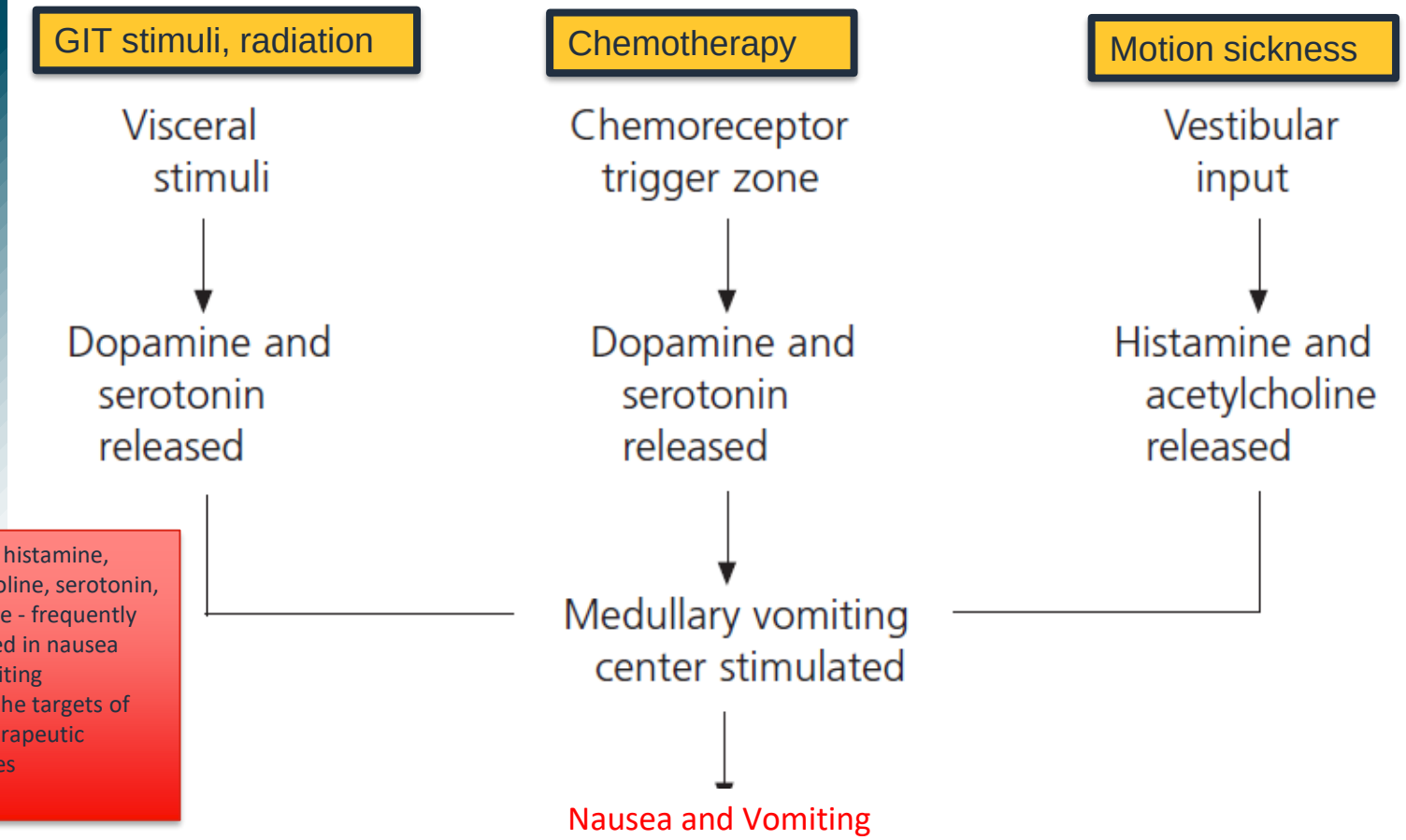
Why Provide nutritional support in BMT?

- Shorter time to engraftment
- Reduced length of stay
- Improved quality of life
- Better tolerance of conditioning
- Improved weight profile
- Decreased risk of infection

Difficulties maintaining optimal nutritional

- Conditioning regimens
- mucositis
- possibility of gut graft-versus-host disease
- **Nausea and vomiting caused by chemotherapy/radiotherapy**
- Poor absorption of food following total body irradiation
- Dental health problems
- Infection of gastrointestinal tract
- Altered taste and dry mouth
- Dislike of food offered and lack of availability of favourite foods
- Anxiety or distress

Aetiology of Nausea and Vomiting



The NT's histamine, acetylcholine, serotonin, dopamine - frequently implicated in nausea and vomiting
and are the targets of most therapeutic modalities

Nausea & Vomiting

Prolonged nausea and vomiting caused by the conditioning therapies can lead to:

- Dehydration
- Physical weakness
- Loss of appetite
- Fractures
- Anorexia
- lethargy
- depression
- Increased hospital stay
- Electrolyte imbalance
- Loss of moral
- Damage to GI Tract
- Poor treatment compliance

Chemotherapy Induced Nausea and Vomiting (CINV)

4 types of Chemotherapy induced nausea and vomiting

- **Acute:** from 1st dose of chemo/radiotherapy. Continues during each consecutive day that conditioning is given and 24 hours after last dose (serotonin pathways)
- **Delayed:** 24 hours after the last dose of chemo or radiotherapy and may persist for up to 7 days.
- **Anticipatory:** learned response (best prevented by adequate antiemetic regimen during first experience with chemotherapy) More common in teenagers, children who suffer motion sickness, or previous negative post chemotherapy nausea or vomiting experience.
- **Breakthrough:** Vomiting, retching or significant nausea despite appropriate antiemetic prophylaxis.

Antiemetic Support

Without antiemetic support 60-100% of BMT patients will experience N&V during conditioning regimen (Kusnierczyk 2002)

- Ablative therapies over several days – mix of acute & delayed N&V simultaneously
- Dose related response to conditioning – N&V worsens through the cycle
- History of emesis with previous therapies -  ncreases likelihood of N&V

Trust Antiemetic Guidelines

- Supportive care SOP
- Based on – London Cancer / London Cancer Alliance – Paediatric Haematology & Oncology Supportive Care Protocols (4th ed 2020)
- Treatments pathways based:
  emetogenicity of the chemotherapy
  Acute / delayed / anticipatory / breakthrough
- Criteria for changing antiemetics:

a) More than two vomits in 4 hours or >4 vomits in 24 hours caused by chemotherapy.

b) The patient experiences nausea, which is prolonged, continuous and interferes with or prevents normal activities


Aim: to prevent nausea and vomiting, from the first course of treatment onwards and therefore facilitate the early recovery of the patient

3. Medications

Regular prophylactic antiemetics used before, during and post treatment

Prevention being easier than a cure

Ondansetron

1st line
Prescribed as regular on admission

Levomepromazine

2nd line
Prescribed PRN on admission – moving to regular at 1st signs of nausea

Add on Antiemetics

Lorazepam

Hyoscine hydrobromide

Domperidone / metoclopramide

Cyclizine

Ondansetron

- Selective serotonin 5-HT3 receptor antagonist (blocks @ receptor site)
- Serotonin is a NT that may cause nausea when present in the stomach
- Damage to intestinal cells → serotonin release → transmission of vomit signals via nerves from intestine to brain → stimulation CTZ → vomiting
- Oral or IV (+ oro-dispersible film)
- Given TDS to provide adequate cover
- Used for Acute CINV – can be stopped 3 days after last dose

Practical weight banding for dosing

Side effects: constipation, flushing, headaches

Levomepromazine

- Phenothiazine - antagonist actions at multiple neurotransmitter receptor sites, including dopaminergic, cholinergic, serotonin and histamine receptors
- It is an antipsychotic agent
- IV – (can give orally). Start lowest dose 0.05mg/kg and increase to maximum 0.1mg/kg
- Given BD (12 hours apart dosing) – recently been giving QDS.
- Covers actions of metoclopramide, cyclizine and hyoscine – but greater number of side effects
- Side effects – asthenia, drowsiness, constipation

- Good for delayed CINV
- Not to be given with cyclizine, metoclopramide, hyoscine patch risk neurological side effects

Lorazepam

- Benzodiazepine
- binds to gamma-aminobutyric acid (GABA) in brain. Producing a calming effect / lowering levels of anxiety that may contribute to N&V
- Start lowest dose 50mcg/kg and increase to 100mcg/kg (max 4mg)
- Given BD – bedtime best
- Best for anticipatory nausea and vomiting – also breakthrough CINV
- Side effects – apnoea, extrapyramidal effects, slurred speech.

Metoclopramide

- Dopamine antagonist – prokinetic agent. Speeds up gastro-intestinal transit and gastric emptying
- Acts centrally on D2 receptor in the CTZ (like levomepromazine) – also peripheral action in the gut
- IV or oral – practical weight banding for dosing – max dose 10mg
- Given TDS – for maximum 5 days (in-patient) – risk of neurological side effects.
- Great for gastroparesis
- Side effects – apnoea, extrapyramidal effects, slurred speech.

Prevention of delayed CINV

Hyoscine Hydrobromide

- Anticholinergic/Antimuscarinic
- antagonize muscarinic acetylcholine receptors
- Patches – applied to hairless skin behind ear
- Every 72 hours - > 10yrs 1 patch
- Good for secretory nausea
- Side effects – dry mucous membranes – mouth/eyes, blurred vision, drowsiness

Useful in refractory CINV

Cyclizine

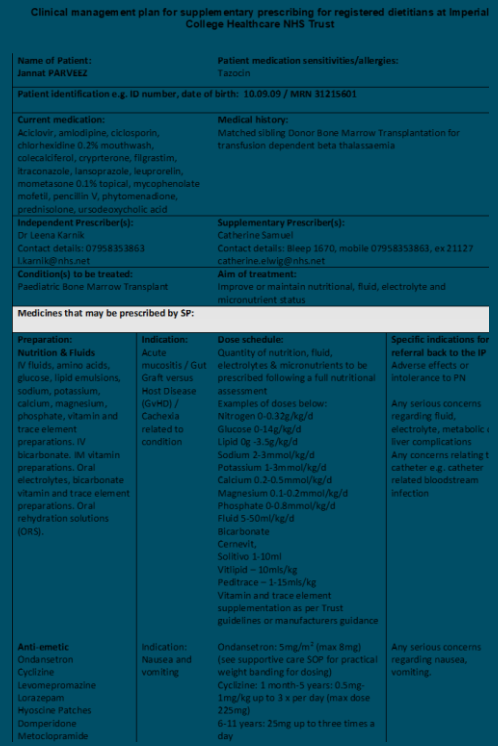
- Antihistamine – antagonist on histamine receptors
- + anti-muscarinic receptor activity
- Useful for irradiation sickness
- Given IV - TDS
- Side effects: blurred vision, drowsiness, dry mouth, extrapyramidal side effects, insomnia, rash, tachycardia, urinary retention,

Supplementary Prescribing

- medicines are prescribed in partnership with a doctor
- The doctor and non-medical prescriber draw up a clinical management plan to be followed, after discussion with patient.
- Signed copy of this plan goes into EHR
- Supplementary prescribers can then go on to prescribe or review the treatment and change medicine, dosage, timing or frequency of the medicine as appropriate

Clinical Management Plan

- CMP created for every new BMT patient admitted to ward – valid for 12 months
- Signed by named consultant – electronic signature on EHR
- Copy filed under “Transplant notes” on EHR



Clinical management plan for supplementary prescribing for registered dietitians at Imperial College Healthcare NHS Trust

Name of Patient: **Jannat PARVEEZ**	**Patient medication sensitivities/allergies:** Tazocin
Patient identification e.g. ID number, date of birth: 10.09.09 / MRN 31215601	
Current medication: Aciclovir, amlodipine, ciclosporin, chlorhexidine 0.2% mouthwash, colecalciferol, cryprterone, filgrastim, itraconazole, lansoprazole, leuprorelin, mometasone 0.1% topical, mycophenolate mofetil, penicillin V, phytomenadione, prednisolone, ursodeoxycholic acid	**Medical history:** Matched sibling Donor Bone Marrow Transplantation for transfusion dependent beta thalassaemia
Independent Prescriber(s): Dr Leena Karnik Contact details: 07958353863 l.karnik@nhs.net	**Supplementary Prescriber(s):** Catherine Samuel Contact details: Bleep 1670, mobile 07958353863, ex 21127 catherine.elwig@nhs.net
Condition(s) to be treated: Paediatric Bone Marrow Transplant	**Aim of treatment:** Improve or maintain nutritional, fluid, electrolyte and micronutrient status

Medicines that may be prescribed by SP:

Preparation:	**Indication:**	**Dose schedule:**	**Specific indications for referral back to the IP**
Nutrition & Fluids IV fluids, amino acids, glucose, lipid emulsions, sodium, potassium, calcium, magnesium, phosphate, vitamin and trace element preparations. IV bicarbonate. IM vitamin preparations. Oral electrolytes, bicarbonate vitamin and trace element preparations. Oral rehydration solutions (ORS).	Acute mucositis / Gut Graft versus Host Disease (GvHD) / Cachexia related to condition	Quantity of nutrition, fluid, electrolytes & micronutrients to be prescribed following a full nutritional assessment Examples of doses below: Nitrogen 0-0.32g/kg/d Glucose 0-14g/kg/d Lipid 0g -3.5g/kg/d Sodium 2-3mmol/kg/d Potassium 1-3mmol/kg/d Calcium 0.2-0.5mmol/kg/d Magnesium 0.1-0.2mmol/kg/d Phosphate 0-0.8mmol/kg/d Fluid 5-50ml/kg/d Bicarbonate Cernevit, Solitivo 1-10ml Vitlipid – 10mls/kg Peditrace – 1-15mls/kg Vitamin and trace element supplementation as per Trust guidelines or manufacturers guidance	Adverse effects or intolerance to PN Any serious concerns regarding fluid, electrolyte, metabolic liver complications Any concerns relating t catheter e.g. catheter related bloodstream infection
Anti-emetic Ondansetron Cyclizine Levomepromazine Lorazepam Hyoscine Patches Domperidone Metoclopramide	Indication: Nausea and vomiting	Ondansetron: 5mg/m² (max 8mg) (see supportive care SOP for practical weight banding for dosing) Cyclizine: 1 month-5 years: 0.5mg-1mg/kg up to 3 x per day (max dose 225mg) 6-11 years: 25mg up to three times a day	Any serious concerns regarding nausea, vomiting.

Governance

- Completed Course Oct 2021
- Updated HCPC with NMP status– SP (Dec 2021)
- Trust NMP Register + personal formulary (Jan 2022)
- Registered to e-prescribe on EHR (Feb 2022)
- Dietitian prescribing process approved by Paediatric Haematology Q&S Committee
- Trust NMP (dietitians) SOP in process of developing

Prescribing Process

- Clinical management plan competed for every new BMT patient
- CINV and Antiemetics discussed on admission with patient
- 1st line antiemetic treatment prescribed on admission by team
- Dietetic reviews – include N&V
- Discuss alterations to antiemetic treatments with MDT
- Once weekly antiemetic review – monitor, prescribe, deprescribe
- Issues! - MDT

4. Dietitian prescribing
Patient perspective

- Best placed to ask about nausea and vomiting
- Discuss sickness with patient on admission and at every review
- Antiemetic review once a week
- Individualised and tailored approach
- Monitor : change dosing, change combination, de-prescribe, preparations

5. Dietitian prescribing
Team perspective

- Expert in antiemetic treatments
- Relieve pressure on team
- Work closely with pharmacy colleagues
- Allow medical team to focus on other areas – infection / chemotherapy / viral monitoring

Case Study

- 12 year old admitted for match unrelated bone marrow transplant for TDT
- Highly emetogenic conditioning – Treosulphan, Thiotepa, Fludarabine
- Ondansetron 6mg TDS oral on D-7, cyclizine 50mg TDS oral PRN
- CINV and escalation of antiemetics discussed D-7
- Reviewed D-4 – patient feeling nauseaous (no vomiting). Recommended to add in regular levomepromazine (lowest dose)

Case Study – continued

- Discussed with SpR – agreed to stop cyclizine and add in regular levomepromazine QDS
- Prescribed levomepromazine. Stopped cyclizine and removed from drug chart. Continue ondansetron
- Review D-1 several episodes of vomiting - anticipatory vomiting related to anxiety around taking medicines. Recommended lowest dose lorazepam once daily (pm) – prescribed
- Antiemetic weekly review D+7 – stop lorazepam, levomepromazine to BD
- Engrafted D+14 – stopped levomepromazine. Ondansetron remains (? Stop)

Beyond Antiemetics

Parenteral Nutrition

Constipation

Anti-diarrheal agents

antispasmodics

Vitamin and mineral preparations

6. Future

Haematology/BMT

- To continue to support the team with antiemetic prescribing
- Continue to develop tailored / individualised approach to antiemetic treatments
- Work with pharmacy to set up patient controlled antiemetic therapy

ACP - prescribing

- Set up ACP led paediatric clinic
- Predominant case load include: Chronic constipation, Poor diets requiring vitamin and mineral supplementation, iron deficiency anaemia
- 1 stop consultation – benefits patient
- Benefits paediatric consultants – reduction in general referrals allowing more specialism

Thank you