Nutrition & Pediatric BMT Patients: A Case Study

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Sickle Cell Disease

- Autosomal recessive genetic disorder
- Crescent-shaped RBCs due to abnormal hemoglobin in sickle cells
- Cells can get “stuck” in blood vessels → reduced blood flow → pain, infection, organ damage
- RBCs have shortened lifespan → chronic hemolytic anemia
- Other complications include HTN, stroke
Sickle Cell Disease & Nutrition

- Growth retardation and wasting common
  - Hypophagia
  - Increased RMR
  - Increased metabolic demands especially with sickle cell-related complications
- Wasting can lead to increased hospitalization and poorer clinical outcomes
Stem Cell Transplantation

- Hematopoietic stem cells from bone marrow, peripheral blood, umbilical cord blood
- Prep regimens to prevent formation of sickle cells + make room in bone marrow for new stem cells
- Complications: GVHD, infection, mucositis, HTN, electrolyte imbalances
UCB Transplantation

- More readily available source of stem cells
- Lower occurrence of GVHD
- However, delayed time to engraftment → increased risk for infection
- Side effects of chemotherapy: nausea, vomiting, mucositis, anorexia, taste changes, malabsorption
  - Suboptimal oral intake → potential malnutrition
Mucositis

- Adverse effect of high-dose chemotherapy which act on cells with high turnover rates
- Compromised integrity of mucosal epithelia that line entire GIT, usually ~7-10 days after chemo starts, healing 14-21 days
- Can lead to sepsis, ulceration, bleeding, malabsorption, diarrhea, and pain
- Inadequate oral fluid and food intake → dehydration, malnutrition
- Adequate nutrition support is important
Nutrition Support: Enteral Nutrition

- EN preferable
  - Maintain normal gut function
  - Provide nutrients not available through TPN
  - Decreased risk of infection
  - Maintain gut-associated immune function
  - Cost containment
Nutrition Support: Enteral Nutrition

- Risks: vomiting, tube dislodgement, excess discomfort due to mucositis, occlusion of tube, potential bleeding from placement/replacement secondary to thrombocytopenia
- However, NG tubes have been used in pediatric patients following BMT with good outcomes
Nutrition Support: Enteral Nutrition

○ PEG tubes
  ○ Risks: localized inflammation, infection, insertion site bleeding, feeding intolerance
  ○ Demonstrated optimization of nutrition and successful weight maintenance in pediatric+adult BMT patients
  ○ Due to immunosuppressive therapy for GVHD, extremely difficult decision whether complication of PEG tube placement outweighs benefits in high-risk patients
  ○ Study suggests that ANC should be considered before PEG placement + avoid placing during neutropenic episodes
Nutrition Support: TPN

- Easier to administer as patients already have central venous access for transplantation procedure
- In adults, often argued that EN before PN
- However, normal development and maturation in pediatrics is so important that there is less debate
Nutrition Support: Perceptions

- “I already had a port in for chemo so we used that with the TPN”
- “Having a tube up her nose was a lot of hassle. TPN was more convenient”
- “TPN made life a little more ‘normal’”
- “Don’t want things down my nose or throat”
- “Tube feeding sounds disgusting and uncomfortable”
- “Chose TF because it helped keep digestive system active, making it easier to adjust back to food”
- “TF is helpful in giving meds and not as hard on liver”
Glutamine

- Shown to reduce severity of mucositis in children receiving chemo
  - Glutamine group had reduction in mean # of days of IV narcotics use and TPN versus glycine
- Decreased length of hospitalization → potential $$ savings
3 year old male with sickle cell disease
- FT via NSVD; breastfed
- Admitted January 22 for umbilical cord blood transplant
Diet History

- Good appetite and intake pta
- Favorite foods: omelets with tomatoes, white rice, spaghetti with meat sauce, sometimes vegetable soup
- Dislikes Pediasure
- NKFA
- Home Diet: Regular
- Current diet: Low Bacteria, 1-3 years
  - Working with kitchen to provide favorite foods
Admission

- Admission weight: 18.0 kg
  - 75-90\textsuperscript{th} %ile
- Height: 102 cm
  - 50-75\textsuperscript{th} %ile
- BMI: 17.3
  - 85-90\textsuperscript{th} %ile
Weight-for-age percentiles:
Boys, 2 to 20 years
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<tr>
<th>Medication</th>
<th>Category</th>
<th>Side Effects</th>
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<td>Aprepitant</td>
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<td>Cyclosporine + D5</td>
<td>GVHD prophylaxis</td>
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<td>Fludarabine + NS</td>
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<td>Mycophenolate mofetil + D5</td>
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Nutrition Diagnosis

- Predicted suboptimal energy intake (NI-1.6) related to BMT as evidenced by kcal needs increased 140-160% of BMR and protein needs are 2.0-2.5 g/kg.
Estimated Needs

- Energy: 70-80 kcal/kg
  - BMR x 1.4-1.6
- Protein: 2.0-2.5 g/kg
- Fluids: 1905 ml/day
  - Holliday-Segar method
Nutrition Intervention

- Continue low bacterial diet for age.
- Consider providing 240 ml Pediasure daily to help meet needs during hospitalization.
- BMP, Mg, Phos daily
- LFTs and TG weekly
- Weigh daily to monitor for weight stability during admission
- Follow for regular bowel movements as prep regimen is initiated
Follow-up

- Patient is being followed per low-risk protocol (<7 days)
- Per medical chart, TA’s po intake had decreased. Pediasure TID ordered.
- If po intake does not improve and mother continues to decline EN, TPN will be initiated per RD recommendations.


