Nutrition Support PGY-2 Resident Experience at King Faisal Specialist Hospital & Research Centre

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Disclosure Information

Nutrition Support PGY-2 Resident Experience at King Faisal Specialist Hospital & Research Centre (KFSH&RC)

Nora AlBanyan

I have no financial relationship to disclose.

AND

I will not discuss off label use and/or investigational use in my presentation.
Why Nutrition Support Specialty?

• Provide safe and best practice
  • High-alert medication requiring safety-focused practice
  • Limited number of specialized practitioner
  • Limited number of research publication

• Provide more comprehensive and complex care
  • Advanced knowledge and experience
  • Individualized, appropriate and optimal nutrition support

• Own entity
Why Nutrition Support at KFSH&RC?

- It has the history
- Tertiary care
- Patient age group (Neonate – Geriatric)
- Number of patients > 50 PN/day
- Variety of highly complex cases
Learning Objectives

At the completion of this activity, you will be able to:

• Explain the role of nutrition support pharmacist at KFSH&RC
• Describe the nutrition support residency experience
• Discuss two case scenarios
• Identify the challenges and lessons learned
• One of the leading institutions in the Middle East and is considered by many in the region a role model with regards to providing highest quality patient care (HIMS level 6)

• Ranked Number one in the Arab world by webometrics [http://webometrics.info](http://webometrics.info)

• Multi-site, major quaternary care, referral and teaching hospital in the Saudi Arabia

• 1,500 bed with a focus on Oncology, Organ transplant, cardiology and medical genetics and metabolic diseases

• Pharmacy is a leader in the region with regards to clinical services, automation and informatics, training, academia and research
Pharmaceutical Care Division

Pharmacy Services Division

- Medication Safety & Clinical Support Department
- Ambulatory Care Department
- Medical and Critical Care Department
Pharmacy Specific Accreditation

- Accredited by the Saudi Commission for Health Specialties
- PGY-1: Accredited from the American Society of Health-System Pharmacists (ASHP) as the first hospital outside USA
- PGY-2: Solid Organ Transplant: Accredited from the American Society of Health-System Pharmacists (ASHP) as the first and only hospital outside USA
- Accredited by the Accreditation Council for Pharmacy Education (ACPE) as pharmacy education provider as the first hospital outside USA
Pharmacy Residency Program

PGY-2 Specialty:

• Solid organ transplant 2013 (ASHP accredited 2015)
• Nutrition support 2013
• Cardiology 2014
• Infectious Diseases 2015
Parenteral Nutrition Service at KFSH&RC
Parenteral Nutrition Service

• Parenteral nutrition support team was established in 1978

• Largest pharmacy nutrition support team in the region and it is recognized as a leader in the field of specialized nutrition support

• Around 1500 PN orders are written monthly by the pharmacy PN Support Team
Parenteral Nutrition Service

PN Consultation

Adult, Pediatric, Home PN
- Rx
  - PN Pharmacist
- Prepared in Pharmacy

NICU
- Rx
  - MD
Parenteral Nutrition Model

Initiate PN therapy

Physician
- Request for a consultation

Pharmacist
- 1- Reviews
- 2- Prescribe
- 3- Prepare
- 4- Follow up
PGY2 Nutrition Support Experience
Objectives

• Develop patient-specific nutritional regimens and monitoring plans for patients receiving parenteral nutrition support, both inpatient as well as outpatient

• Monitor drug therapy, especially regarding how nutritional status can affect drug therapy and how drugs may affect nutritional therapy

• Utilize current medical literature as a guide to appropriate nutrition and drug therapy

• Teach pharmacy students and other health professionals about nutritional support
PGY2 Nutrition Support

Clinical Experience

Educational Experience

Research
Clinical Experience

Rotation

• **Required:**
  • Adult Nutrition (16 weeks)
  • Pediatric Nutrition (15 weeks)
  • Home Care Nutrition (2-4 weeks)
• **Electives: 10 weeks**
  • Critical Care
  • Solid Organ Transplantation
  • Bone Marrow Transplant
  • Leukemia/Lymphoma
  • Infectious Disease

On-call

• Participate in the PN Pharmacist on-call program
Clinical Experience

Daily activities

• Assess patient nutrition status
• Review indication and confirm eligibility for parenteral nutrition
• Interview the patient to obtain complete history including medical/surgical/medications/diet; review their labs, obtain weights, determine fluid status and vital signs
• Design the PN formula and adjust accordingly to achieve target calories
• Communicate with IV room pharmacist, nurse, and physician
• Document complete assessment and plan in the patient chart
Two Case Studies
Is PN indicated for electrolyte imbalances management?

There is no single study that has evaluated the use of PN in severe electrolyte imbalances.
Case Study

• 11-year old boy; a known case of hyper-IgE syndrome, multiple viral warts and autoimmune hemolytic anemia.

• Admitted electively for allogenic transplant.

• Past Medical History:
  Asthma and viral warts.
# Case Study

<table>
<thead>
<tr>
<th>BMT day</th>
<th>Hospital Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day -15 to Day -1</td>
<td>BMT workup and conditioning</td>
</tr>
<tr>
<td>Day 0</td>
<td>Stem cell infusion</td>
</tr>
<tr>
<td>Day +1 to Day +10</td>
<td>Neutropenia on Cefepime and Gentamicin</td>
</tr>
<tr>
<td>Day +10</td>
<td>CMV reactivation on Foscarnet</td>
</tr>
<tr>
<td>Day +11 to Day +16</td>
<td>Electrolyte imbalance which was managed by bolus and IVF with electrolytes</td>
</tr>
<tr>
<td>Day +16</td>
<td>PN consultation for electrolyte correction</td>
</tr>
</tbody>
</table>
Medications

• Albuterol
• Foscarnet
• Filgrastim
• CycloSPORINE
• Spironolactone
• Furosemide
• Calcium Gluconate x 4 doses in 3 days
• Magnesium Sulfate x 6 doses in 3 days
• Potassium chloride x 8 doses in 3 days
• Sodium phosphahte x 3 doses in 3 days
• D5W+NS+ 40 mmol KCL+16 mmol Mgso4/1l rate 100 ml/hr over 12 hours
• D5W+NS+ 50 mmol KCL+10 mmol NaPo4/1l rate 100 ml/hr over 12 hours
Nutrition Assessment

Subjective
- Diet
  - Oral
  - Fair appetite
- Medical/Surgical
  - Day + 16 post BMT
  - No Nausea, No vomiting, No diarrhea
- Social
  - Supported
  - No issues
- Medication
  - MAR

Objective
- Anthropometric
  - Admission Weigh
    - 27.4 kg
  - IBW
    - 35 kg
  - Height
    - 133 cm
  - Current weight
  - No history of recent weight loss

Labs
<table>
<thead>
<tr>
<th>Date</th>
<th>Na (135-147 MMOL/L)</th>
<th>K (3.5-5 MMOL/L)</th>
<th>Cl (98-111 MMOL/L)</th>
<th>Ca (2.1-2.6 MMOL/L)</th>
<th>Mg (0.7-1 MMOL/L)</th>
<th>PO4 (1-1.6 MMOL/L)</th>
<th>CO2 (22-31 MMOL/L)</th>
<th>ALB (32-48 G/L)</th>
<th>Glu Random</th>
<th>Urea (2.3-6.7 mmol/l)</th>
<th>Creatinine (26-58 umol/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-4</td>
<td>143</td>
<td>2.3</td>
<td>96</td>
<td>1.59</td>
<td>0.45</td>
<td>1.56</td>
<td>31</td>
<td>30.3</td>
<td>4.75</td>
<td>3.6</td>
<td>62</td>
</tr>
<tr>
<td>10-4</td>
<td>139</td>
<td>2.4</td>
<td>95</td>
<td>1.57</td>
<td>1.06</td>
<td>0.84</td>
<td>34</td>
<td>28.5</td>
<td>6.13</td>
<td>2.6</td>
<td>59</td>
</tr>
<tr>
<td>11-4</td>
<td>143</td>
<td>2.9</td>
<td>100</td>
<td>1.43</td>
<td>0.43</td>
<td>0.9</td>
<td>31.8</td>
<td>33</td>
<td>5.39</td>
<td>1.6</td>
<td>57</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>ALT (10-45 U/L)</th>
<th>AST (10-45 U/L)</th>
<th>ALK PHOS (60-350 U/L)</th>
<th>Billirubin, Total (0.0-21 umol/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-4</td>
<td>21.6</td>
<td>19.2</td>
<td>127.4</td>
<td>18.6</td>
</tr>
<tr>
<td>10-4</td>
<td>25.2</td>
<td>28.3</td>
<td>127.1</td>
<td>21.3</td>
</tr>
<tr>
<td>11-4</td>
<td>27.6</td>
<td>30.9</td>
<td>139.8</td>
<td>15.5</td>
</tr>
</tbody>
</table>
Assessment

- No evidence of malnutrition (No Nausea, vomiting, or diarrhea)
- No history of weigh loss
- Medication induced electrolyte imbalances failed to be corrected with multiple electrolytes replacement

Plan:

- Start PN targeted calories 45 kcal/kg/d
- DC IV electrolytes once PN started
- Recommend changing Fosacarnet to Ganciclovir
# PN

## Day 0 Before starting PN

<table>
<thead>
<tr>
<th></th>
<th>Na (135-147 MMOL/L)</th>
<th>K (3.5-5 MMOL/L)</th>
<th>Cl (98-111 MMOL/L)</th>
<th>Ca (2.1-2.6 MMOL/L)</th>
<th>Mg (0.7-1 MMOL/L)</th>
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<td></td>
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<td>2.9</td>
<td>100</td>
<td>1.43</td>
<td>0.43</td>
<td>0.9</td>
<td>31.8</td>
</tr>
</tbody>
</table>

## Day 4 of PN

<table>
<thead>
<tr>
<th></th>
<th>Na</th>
<th>K</th>
<th>Cl</th>
<th>Ca</th>
<th>Mg</th>
<th>PO4</th>
<th>Alb</th>
<th>T.BIL</th>
<th>Glu</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>141</td>
<td>4.6</td>
<td>98</td>
<td>2.12</td>
<td>0.88</td>
<td>1.28</td>
<td>33.3</td>
<td>11.1</td>
<td>6.4</td>
</tr>
</tbody>
</table>
Partial PN Benefits in Electrolyte Management

- Avoiding fluid overload
- Avoid interrupting IV fluid containing electrolytes that are not compatible with electrolyte boluses
- Adding all electrolytes to one solution
- Saving time for medical, pharmacy and nursing staff
- Patients safety
Case Study

Copper Deficiency
Case Study

• 16 year-old boy, known to have chronic intractable diarrhea of unknown cause. He is a parenteral nutrition dependent since age of 2 years

• Admitted electively with pancytopenia

• History of present illness: Started to become pale since one month with progressive pallor

• Past Medical History
  • Attention deficit hyperactivity disorder
  • Mild-to-moderate cognitive dysfunction
  • History of recurrent iron deficiency anemia required iron IV replacement

• Home medication
  • Cholecalciferol 800 units once daily
  • Zinc gluconate 30 mg orally once daily
  • Parenteral nutrition (cyclic)
<table>
<thead>
<tr>
<th>Vital signs</th>
<th>T: 36.4</th>
<th>HR: 102</th>
<th>BP: 101/59</th>
<th>O2%: 100 RA</th>
<th>RR: 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBC</td>
<td>WBC: 1.79</td>
<td>Hgb: 58</td>
<td>Plt: 69</td>
<td>Neut: 0.16</td>
<td>Lymp: 1.15</td>
</tr>
<tr>
<td></td>
<td>MCV: 93</td>
<td>MCH: 30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coagulation</td>
<td>PT: 14</td>
<td>INR:1.2</td>
<td>Ptt:36</td>
<td>Ptt ratio: 1</td>
<td></td>
</tr>
<tr>
<td>Chem</td>
<td>Urea: 5.7</td>
<td>SrCr: 36</td>
<td>K: 3.8</td>
<td>Na: 137</td>
<td>Ca: 2.1</td>
</tr>
<tr>
<td>Pos</td>
<td>1.26</td>
<td>Iron: 9.2</td>
<td>Sat: 0.14</td>
<td>TIBC: 66</td>
<td>Ferritin: 248</td>
</tr>
</tbody>
</table>

**Plan:**
Admit the patient for blood transfusion and further work up
## Hospital Course

<table>
<thead>
<tr>
<th>Day</th>
<th>Hospital Course</th>
</tr>
</thead>
</table>
| Day 1-4 | Pancytopenia – Vit B12 deficiency? Malignancy?  
• Investigate deficiency/toxicity of trace elements  
• Bone marrow biopsy  
• Transfuse 2 liters of blood  
• Iron sucrose 100 mg IV once  
• Cholecalciferol 800 units once daily  
• Zinc gluconate 30 mg orally once daily |
| Day 5   | Copper 0.7, WBC 2.18, Neut 0.48, Lymph 1.5  
Pancytopenia due to copper deficiency  
Copper 2 mg orally BID |
| Day 5-10| WBC 4.4, Neut 1.37, Lymph 2.3, Copper 2.3  
Pancytopenia resolved  
• Keep the patient on maintenance copper supplements  
• Follow up with hematology  
• Full CBC monthly |
Copper Deficiency on PN Dependent Patients

• Limited literature on trace elements for PN patients

• Periodic examinations should include evaluation for symptoms of trace element toxicities or deficiencies

• Delay in diagnosis and appropriate treatment may lead to permanent neurologic damage
Educational Experience

• Grand Rounds Presentation
• Presentations (case presentation and topic review)
• Journal club
• Presenting quarterly progress report to residency advisory committee members
• Teaching
  • Pharmacy practice residents
  • Pharmacy students
  • Nursing staff
Educational Experience

• Co-preceptor
  • Pharmacy practice residents
  • Pharmacy students

• Preparation for American Board in Nutrition Support Pharmacist Certification
PGY2 Nutrition Support

Clinical Experience

Educational Experience

Research
The Role of an On-Call Parenteral Nutrition Pharmacist: A Tertiary Care Hospital Experience
Background

- Unique service provided by the PN pharmacy team at KFSH&RC and is considered the only specialized service in the Middle East

- Pharmacy parenteral nutrition team works to improve communication between health care providers by answering queries related to parenteral nutrition 24 hours and seven days a week
Objectives

• Evaluate and describe inquiries of an after-hours on-call PN pharmacist service (2005–2014)

• Identify the role of on-call PN pharmacist in responding to calls related to PN and providing the safe recommendation for PN administration
<table>
<thead>
<tr>
<th>Task</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finalize project idea</td>
<td>January, 2015</td>
</tr>
<tr>
<td>Completing 1st draft of proposal</td>
<td>January, 2015</td>
</tr>
<tr>
<td>Formulate data collection sheet</td>
<td>February, 2015</td>
</tr>
<tr>
<td>Completion of National Institute of Health (NIH) certificate</td>
<td>March, 2015</td>
</tr>
<tr>
<td>Completing final draft of proposal</td>
<td>April, 2015</td>
</tr>
<tr>
<td>Finalize project proposal and review ancillary documentation for submission</td>
<td>May 2015</td>
</tr>
<tr>
<td>Submission of proposal to IRB</td>
<td>May 2015</td>
</tr>
<tr>
<td>Data collection + data entry (upon receiving IRB approval)</td>
<td>May- June 2015</td>
</tr>
<tr>
<td>Evaluation and interpretation of results</td>
<td>August 2015</td>
</tr>
<tr>
<td>Submission of final report to IRB</td>
<td>September, 2015</td>
</tr>
<tr>
<td>Completion of 1st draft of manuscript</td>
<td>October 2015</td>
</tr>
<tr>
<td>Finalize manuscript for publication (if time allows)</td>
<td>December 2015</td>
</tr>
</tbody>
</table>
Challenges and Lessons Learned
Challenges

1. Limited evidence-based medicine that supports positive outcomes in many PN situations, it mainly depends on experience and expert opinion
2. Improve communication between dietitian and PN pharmacist
3. Multiple systems
4. Reading time
Lessons learned

PN cannot be learned in books!

*It is all about preceptors and mentors*
Thank You