ASSESSING NUTRITIONAL INTAKE IN CHILDREN WITH NEPHROTIC SYNDROME

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DISCLOSURE STATEMENT

Nonnie Polderman has documented that she has nothing to disclose.

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What is nephrotic syndrome?

- Proteinuria
- Hypoalbuminemia
- Edema
Background
Childhood NS in British Columbia, Canada

- Large geographic area with ~180 NS patients

- BC Children’s Hospital in Vancouver - only tertiary centre for province

- Significant practice variation noted with NS diagnosis, treatment, and surveillance

*NO standard nutrition care plan
NS Clinical Pathway
Resource Publications

ONLINE
http://www.bcchildrens.ca/About-Site/Documents/CNS%20Workbook_021116_FINAL_PDF
Integrating nutrition in a nephrotic syndrome pathway

- Limiting sodium & fluid intake
  - Assists in controlling thirst & edema management
  - Potentially helps maintain normal blood pressure with higher risk of hypertension

- Controlling energy requirements/calories
  - Weight gain common while on corticosteroids

- Maintaining bone health
  - Risk of osteopenia with high dose corticosteroids
  - Need for adequate intake of Vit D and Calcium
# Intervention Schedule

## Scheduled visits during the first year

<table>
<thead>
<tr>
<th>TEST/REVIEW</th>
<th>CLINIC VISIT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 w*</td>
</tr>
<tr>
<td>Confirm and explain diagnosis</td>
<td>✓</td>
</tr>
<tr>
<td>History</td>
<td>✓</td>
</tr>
<tr>
<td>• History of edema</td>
<td></td>
</tr>
<tr>
<td>• Document date and time to remission</td>
<td></td>
</tr>
<tr>
<td>• Review Handbook Worksheets</td>
<td></td>
</tr>
<tr>
<td>• Review prednisone schedule</td>
<td></td>
</tr>
<tr>
<td>Physical examination</td>
<td>✓</td>
</tr>
<tr>
<td>• Blood pressure, heart rate and temperature</td>
<td>✓</td>
</tr>
<tr>
<td>• Record growth (height, weight)</td>
<td>✓</td>
</tr>
<tr>
<td>• Check for edema</td>
<td>✓</td>
</tr>
<tr>
<td>• Other signs of prednisone toxicity (eyes, bone, skin)</td>
<td>✓</td>
</tr>
<tr>
<td>Urine tests</td>
<td></td>
</tr>
<tr>
<td>• Urinalysis, microscopy, and PCR</td>
<td>✓</td>
</tr>
<tr>
<td>Other tests</td>
<td></td>
</tr>
<tr>
<td>• CBC, albumin, urea, creatinine, Na⁺, K⁺, Cl⁻, HCO₃⁻</td>
<td>✓</td>
</tr>
<tr>
<td>• Review immunization status</td>
<td>✓</td>
</tr>
<tr>
<td>• Review prednisone treatment</td>
<td>✓</td>
</tr>
<tr>
<td>Monitoring</td>
<td></td>
</tr>
<tr>
<td>• Review fluid restriction</td>
<td>✓</td>
</tr>
<tr>
<td>• Review dietary recommendations</td>
<td>✓</td>
</tr>
<tr>
<td>• Review home monitoring (urine dipsticks)</td>
<td>✓</td>
</tr>
<tr>
<td>• Nephrology evaluation</td>
<td>✓</td>
</tr>
<tr>
<td>• Ophthalmology evaluation</td>
<td>✓</td>
</tr>
<tr>
<td>• Family given handbook &amp; worksheets</td>
<td>✓</td>
</tr>
<tr>
<td>• Schedule follow-up appointment</td>
<td>✓</td>
</tr>
</tbody>
</table>
Study Objectives

• To introduce our approach of standardizing nutritional management as part of our childhood nephrotic syndrome (NS) clinical pathway

• To compare actual dietary intakes from patient food records to our pathway’s nutrition recommendations
Literature Limited....

No agreement on Sodium restrictions found:

- **50-70 mmol/day (adults)** - Charlesworth
  - $1160 - 1600$ mg/day
- **1.5 gm/day** - "historical" amount used
- **< 2 meQ/kg/day** - Edema study – Kapur, 2008
- **1-2 g “salt” per day** – Indian Pediatrics
  
  Note: sodium is $\frac{23}{58.5} \times 100\% = 39.3\%$ of salt is sodium
  
  Then the amount of sodium in 2 g of salt = $39.3\% \times 2 = 0.786$ g or ~ 800 mg

- **“No added salt” diet** – Watson, 2012
Study Methods

• Retrospective chart review
  • Approval obtained from University of British Columbia ethics board

• Included pediatric patients 1-17 yrs diagnosed with NS between Feb 2013 and May 2018.
  • All patients part of our NS clinical pathway
    • Treated with daily prednisone (60mg/m2/day) x 6 weeks & then alternate day prednisone (40 mg/m2/day) x 6 weeks

• All patients received dietary counselling around diagnosis with standardized recommendations for sodium, energy & fluid intake; calcium & Vit D
STANDARDIZING Energy Sodium and Fluid

Standardized energy, sodium, and fluid recommendations based on **weight, gender, age** and **sedentary activity factor**.

www.canada.ca/en/health-canada/services/nutrients/sodium.html

<table>
<thead>
<tr>
<th>WEIGHT (kg)</th>
<th>SODIUM INTAKE (mg/day)*</th>
<th>FLUID (ml/day)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 kg</td>
<td>BOYS 800</td>
<td>GIRLS 800</td>
</tr>
<tr>
<td>20 kg</td>
<td>1,300</td>
<td>1,300</td>
</tr>
<tr>
<td>30 kg</td>
<td>1,600</td>
<td>1,400</td>
</tr>
<tr>
<td>40 kg</td>
<td>1,700</td>
<td>1,600</td>
</tr>
<tr>
<td>50 kg</td>
<td>2,000</td>
<td>1,700</td>
</tr>
<tr>
<td>60 kg</td>
<td>2,300</td>
<td>1,800</td>
</tr>
<tr>
<td>70 kg</td>
<td>2,400</td>
<td>1,900</td>
</tr>
</tbody>
</table>

* Until the child is in remission
Education Resources

Included:

- sodium content of foods
- sample menus
- label reading
- Individualize counselling

Developed by Dietitians, Division of Nephrology BC Children’s Hosp.
Calcium and Vit D SUPPLEMENTATION

### Vitamin D and calcium recommendations

<table>
<thead>
<tr>
<th>DRI</th>
<th>PATIENT</th>
<th>SUPPLEMENTAL DOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin D: 600 IU</td>
<td>Newly diagnosed (Induction phase)</td>
<td>Vitamin D: 800–1,000 IU Calcium: 500–1,000 mg Supplement in addition to diet during first 24 weeks of prednisone treatment</td>
</tr>
<tr>
<td>Calcium:</td>
<td>Infrequently relapsing*</td>
<td>No supplementation</td>
</tr>
<tr>
<td>1–3 yr</td>
<td>700 mg</td>
<td></td>
</tr>
<tr>
<td>4–8 yr</td>
<td>1,000 mg</td>
<td></td>
</tr>
<tr>
<td>9–18 yr</td>
<td>1,300 mg</td>
<td></td>
</tr>
<tr>
<td>Frequently relapsing/ steroid dependent</td>
<td></td>
<td>Vitamin D: 800–1,000 IU Calcium: 500–1,000 mg Supplement in addition to diet for duration of prednisone treatment</td>
</tr>
</tbody>
</table>

*Less than four relapses per year

Choudhary et al. Calcium and vitamin D for osteoprotection in children with new-onset nephrotic syndrome treated with steroids: a prospective, randomized, controlled, interventional study. PedNephr_June 2014,
Patient Food Records

3 day food intake records including supplementation completed at 4 weeks after diagnosis assessed using: esha® food processor
Analysis of **36 food intake records**. (47% response rate)
Study Results – Energy & Sodium

Energy Intake:
- Median actual vs. recommended energy intakes similar across all age groups.
  - 1169 and 1275 kcal, p=0.52
- 47% pts (17/36) exceeded our energy recommendations
  - 11% exceeded >30%

Sodium Intakes:
- 33% pts (12/36 t) exceeded our sodium recommendations
  - 11% exceeded >50%
Adequacy Dietary Calcium Intake:

- 1-3 yr: 77% meeting DRI Ca
- 4-8 yr: 33% meeting DRI Ca
- 9-18 yr: 38% meeting DRI Ca

Across all ages, mean dietary calcium 75% (+/- 33%) of DRI

Calcium Supplementation:

- 22 pts (61%) reported taking Ca supp of these... 16 (73%) met DRI Ca
Study Results – Vitamin D

Adequacy dietary Vit D Intake:
None 0% of children met DRI Vit D with diet alone.

With Vit D Supplementation:
24/36 pts (66%) met DRI for Vit D with diet and supplements
Younger children more likely to meet DRI for Vit D.
Only 1 pt met total rec Vit D
Limitations / Realities...

Single-centre with small number of patients

Food intake records....
  self-selection
  biased by self-reporting

Calcium and Vit D supplementation
  Clarity re Ca: elemental, tablet weights
  Provision of supplements to patients may lead to more consistent supplementation of diet
Summary

• Energy and sodium recommendations are *reasonable and attainable* for most patients

• Overall, *dietary* Calcium and *dietary* Vit D intakes do not meet age-appropriate DRI’s; therefore, supplementation is justified

• Findings with respect to Ca and Vit D warrant *individualized and age-appropriate* supplementation guidelines
Future Directions

• Revise supplementation dosing based on individual intake and age of patient.
  • Increased clarity re Ca: elemental vs. tablet weight
  • Provision of supplements to patients ✓

• Continue nutrition-related QI initiatives for NS pts

• Additional nutritional monitoring and education may be required in specific patients
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Questions?