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Science Internship Program: Applied Medicine

Civic Education
Office of Government and Community Relations
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Science Internship Program: Applied Medicine
Phosphorus Supplementation for Patients with Eating Disorders: What Dose Prevents Refeeding Syndrome?

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• Severely malnourished patients, predominantly from eating disorders, are at very high risk of refeeding syndrome.
• Refeeding syndrome is a potentially fatal shift of fluid and electrolytes that can occur when refeeding a malnourished patient.
As more adenosine triphosphate (ATP) is made from adenosine diphosphate (ADP), the starved body runs out of phosphorus, causing the heart to stop pumping at the cellular level. The patient can then have hypophosphatemia. With no ATP, the heart pump stops at the cellular level, leading to congestive heart failure, elevated liver enzymes, and risk of death.
Background (cont.)

Consequences of refeeding syndrome

- Cardiac Failure
- Respiratory Failure
- Gastrointestinal Complications
- Hemolytic Anemia
- Delirium
- Seizures
- Coma
- Possible Death
Problem/Purpose

- Phosphorus supplements have been normative at some hospitals and reactively given at other hospitals.
- During a nationwide shortage, the dose was changed from 500 mg to 250 mg twice daily for the same 5 day interval.
- This study seeks to determine whether the lower dose was any less effective than the higher dose.
Hypothesis

- Phosphorus supplements at both 500 mg orally twice daily for five days and at 250 mg orally twice daily for five days results in no significant differences in outcome, as measured by electrolyte abnormalities, elevated liver function tests (LFTs), length of hospital stay, and survival.
Methodology

• Retrospective chart review of all patients hospitalized for the Nutritional Insufficiency Carepath (NI) due to disordered eating from 2008 to 2016.

• Patients from 1/1/2008-7/31/2013 received the higher dosing of Neutraphos, while 8/1/2013-6/30/2016 received the lower dosing.
Results

- N = 180 youth hospitalized for NI carepath
  - (1st admissions only for those admitted > 1x)
  - 153 (85%) females, 27 (15%) males
  - Ages 14-19 years
  - Diagnoses: no significant differences in prevalence of the various eating disorders, with 2008-2013 vs 2013-2016:
    - 90 (63%) vs 22 (59%) anorexia nervosa (AN),
    - 4 (3%) vs 2 (5%) bulimia nervosa (BN),
    - 26 (18%) vs 7 (19%) avoidant/ restrictive food intake disorder (ARFID),
    - 23 (16%) vs 6 (16%) atypical anorexia nervosa
Results (cont.)

Phosphorus Drop Below 2.5 mg/dL during admission 1/1/2008-7/31/2013

Phosphorus Drop Below 2.5 mg/dL during admission 8/1/2013-2016
<table>
<thead>
<tr>
<th>Factor</th>
<th>Total (N=180)</th>
<th>1/1/2008-7/31/2013 (N=143)</th>
<th>8/1/2013-2016 (N=37)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age at Admission, Median (Min, Max)</strong></td>
<td>193.4 [173.2, 213.8]</td>
<td>195.4 [179.7, 227.8]</td>
<td>193.0 [169.9, 212.1]</td>
<td>0.34</td>
</tr>
<tr>
<td><strong>Gender, No. (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>153 (85)</td>
<td>124 (87)</td>
<td>29 (78)</td>
<td>0.21</td>
</tr>
<tr>
<td>Male</td>
<td>27 (15)</td>
<td>19 (13)</td>
<td>8 (22)</td>
<td></td>
</tr>
<tr>
<td><strong>Weight, Median (Min, Max)</strong></td>
<td>44.8 [40.4, 52.0]</td>
<td>45.0 [40.1, 52.1]</td>
<td>43.9 [40.8, 51.8]</td>
<td>0.80</td>
</tr>
<tr>
<td><strong>BMI, Median (Min, Max)</strong></td>
<td>16.8 [15.5, 19.0]</td>
<td>16.8 [15.4, 19.1]</td>
<td>17.1 [15.6, 18.8]</td>
<td>0.72</td>
</tr>
<tr>
<td><strong>Length of Stay, Median (Min, Max)</strong></td>
<td>5.0 [3.0, 7.5]</td>
<td>5.0 [3.0, 9.0]</td>
<td>3.0 [2.0, 5.0]</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>AST or ALT rise during admission, No. (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>144 (80)</td>
<td>110 (77)</td>
<td>34 (92)</td>
<td>0.049</td>
</tr>
<tr>
<td>Yes</td>
<td>35 (20)</td>
<td>32 (23)</td>
<td>3 (8)</td>
<td></td>
</tr>
<tr>
<td><strong>BUN, Median (Min, Max)</strong></td>
<td>15.0 [11.5, 19.0]</td>
<td>16.0 [12.0, 20.0]</td>
<td>13.0 [10.0, 17.0]</td>
<td>0.042</td>
</tr>
</tbody>
</table>
Results (cont.)

Elevated LFTs at Admission versus Discharge from 1/1/2008-7/31/2013, Overall, and 8/1/2013-2016
Conclusions

- Lower dose decreases the length of hospitalization.
- Phosphorus supplementation correlates with zero deaths due to refeeding syndrome in our institution.
- Lower dosing of phosphorus supplementation does not result in higher LFTs or more electrolyte abnormalities.
- Lower dosing will cost less.
Recommendations

- Phosphorus supplements at a dose of 250 mg orally twice a day for five days
- Future studies that compare outcomes from a greater area outside of the Cleveland Clinic
- Prospective Study to see the long term fluctuations of electrolytes
- View how the different DSM-5 diagnoses affect the studied variables
References


Special Thanks

- Ellen Rome, MD, MPH
- Leavurne Luton, Karen Flannigan
- Erin Sieke, Sarah Worley, MS, Katelyn Howell
- Cleveland Clinic’s Children’s
- Bryan Pflaum, MFA, Nedra Starling MA, MPH, ABD/DrPH, and the Office of Government and Community Relations’ Civic Education Department