Nutritional education for the management of osteodystrophy: The impact on quality of life and malnutrition

Mirey KARAVETIAN, Hafez ELZEIN, Rana RIZK, Rime JIBAI, Nanne DE VRIES

Department of Health Promotion, Maastricht University, Maastricht, The Netherlands
Lebanese National Kidney Registry, Beirut, Lebanon;
Department of Health Services, Zayed University

kmirey@gmail.com
Hyperphosphatemia:
the ‘silent killer of patients with renal failure’ (1) &
leading cause of osteodystrophy (2)

Up to 60% of patients are not adherent to the low P diet (3)

1- Locatelli, F. et al Nephrol Dialysis Transplant 2002
2- Block GA et al Clin Nephrol. 2000
3- Denhaerynck K et al, Am J Crit Care 2007
Hyperphosphatemia & Mortality: Serum P

Block GA et al, J Am Soc Nephrol, 2004
Malnutrition is Multifactorial

- Loss of Nutrients & Water soluble Vitamin in Dialysate
- Uremic toxicity
- Anorexia
  - Loss of taste
  - Unpalatable diets
- Inadequate Dialysis dose
- Dietary protein & energy intake
- Anemia
  - loss of blood due to G1 bleed, frequent blood sampling
- Inflammation
  - Infection
  - Superimposed illness
- Declining Residual Renal Function
- Presence of Comorbidity
- Metabolic Acidosis
- Level of counter regulatory hormones
  - Glucagon, PTH
- Hormonal disorders
  - Resistance to anabolic hormones
'More Dietetic Time, Better Outcome?'

A Randomized Prospective Study Investigating the Effect of More Dietetic Time on Phosphate Control in End-Stage Kidney Failure Haemodialysis Patients

Belinda Morey\textsuperscript{a}  Rebecca Walker\textsuperscript{a}  Andrew Davenport\textsuperscript{b}

"Increased frequency of dietetic consultations $\Rightarrow$ improved clinical outcomes."

"minimum dietitian-renal patient" time of 2 hours/month for up to 1 year
Problem Statement

- 55 hospital-based HD units - 2500 patients (1)
- MOPH budget: 7.8% for HD (2)
- No dedicated/specialized dietitians for HD patients. Hospital dietitians among many other duties manage HD patients

1. Kabalan S, et al. (Abstract) AJKD 2010:
The formula for effective dietary education to manage hyperphosphatemia in HD patients.

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Educational material</th>
<th>Timing</th>
<th>Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Patients –to–</td>
<td>1. Individualize education</td>
<td>1. Educate patients</td>
<td>Use of behavioral theories</td>
</tr>
<tr>
<td>dietitian partnership</td>
<td>2. Attractive booklets &amp; Handouts</td>
<td>before the HD sessions</td>
<td></td>
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<tr>
<td>team</td>
<td>4. Games and puzzles</td>
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<td></td>
<td>6. Recipes adapted to the patients’ taste and culture</td>
<td>visits</td>
<td></td>
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</tbody>
</table>
According to the readiness to change of the patient education needs to be given
Study Aims

self management dietary counseling

➔ to identify the cultural specific strategies needed to optimize the nutritional care in national HD units.
THE PROJECT FOLLOWED THE STEPS OF INTERVENTION MAPPING

1. Focus Group (patient & Dietitian)
2. Dietitian knowledge
3. Baseline patient clinical outcomes

- Prochaska’s Model
Dietitian knowledge of KDOQI nutrition guidelines

Only 35.45% ±16.9
(min: 13.04% max: 82.61%)

Frequency of Dietitian – HD patient Consultations

<1 time/year
Randomization on HD units & Patient Assignment to Each Group

Cluster A: 6 HD units
- Dedicated Dietitian (DD) Group
  - Training on KDOQI nutrition guidelines

Cluster B: 6 HD units
- Existing Practice (EP) Group
  - No Training
- Trained Hospital Dietitian (THD) Group
  - Training on KDOQI nutrition guidelines

Baseline (t1) evaluation on all study parameters

Patient education as per study protocol: 2hour/patient/month
- Dedicated Dietitian Group

Patient education as per existing practice
- Existing Practice Group

Patient education as per ability and availability of hospital dietitians
- Trained Hospital Dietitian Group

Post (t2) Evaluation on all study parameters

No Education

Follow up (t3) evaluation on all study parameters

Brief education to "waiting controls" patients

End of Study
Study Methods

**Sample:** 731 adult HD patients from 12 HD units in Lebanon from

**Design:** Cluster (HD unit) Randomized controlled study

**Protocol for the Dedicated Dietitian (DD) group:**
- Weekly new topic introduced (20 min) + recap end of the week (10 min) per patient
- Stage Based Educational Material

![Pre-action
9 lessons](image)

![Action
5 lessons](image)

![Maintenance
5 lessons](image)
2 posters: high P food items and Low P food items

Monthly serum P tracking chart
A pocket book of alternatives + 3 recipe books + 7 Breakfast menus + 7 Lunch menus + 7 Dinner menus

Mأكولات غنية بالفوسفور

النواحي:
- حليب: 6-8 غ بروتين
- بيض: 5-6 غ بروتين
- الدجاج: 15-20 غ بروتين
- المكسرات: 20-25 غ بروتين
- الفواكه والخضروات
- الأرز: 100 غ بروتين

*كوب من البارزولا البيضاوية: 0 غ بروتين
*كوب من البارزولا الحلوة: 0 غ بروتين
*كوب من الأرز الأحمر: 0 غ بروتين
*كوب من الأرز الأبيض: 0 غ بروتين
*كوب من الأرز الأسود: 0 غ بروتين
*كوب من الأرز النباتي: 0 غ بروتين
Outcome variables

- Demographics
- Anthropometrics: Weight (kg), length (cm)
- Dietary intake: 24 hour recall detailed in next slide
- Blood tests: Serum P (mmol/L)
  
  Blood Urea Nitrogen (BUN) mmol/L
- Questionnaires: Malnutrition Inflammation Score (MIS)\(^1\)
  - has 10 components, total score from 0 to 30:
  - 0 (normal), 1–10 (mildly malnourished),
  - 11–20 (moderately malnourished)
  - 21–30 (severely malnourished).\(^3\)

Health related Quality of life (HRQOL- SF36)

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Dietary protein intake

• Dietary protein intake (g) was assessed through
  • 24-hour recall questions,
  • administered to patients on 3 nonconsecutive days during each study phase.

Protein intake was estimated using the renal exchange system and the USDA nutrient database (version 25).

The mean of the 3 days represented the actual daily protein intake of each patient.

Daily protein requirements were calculated as follows: 1.2 g*standard body weight (kg).

Finally, the % Daily Protein Intake was calculated as follows:
  (actual daily protein intake [g]/daily protein needs [g])*100.
Statistical analysis

• Statistical Package for the Social Sciences (SPSS)- 16

• 0.05 significance at 95% confidence level

• **Descriptive analysis** was conducted, categorical data were reported as frequencies and percentage counts: continuous data as means ± standard deviation (SD).

• **Pearson’s Chi Square** \((X^2)\) was used to show group differences for categorical variables.

• **ANOVA** and Duncan’s post hoc test was done to detect group differences for continuous data.

• Within group differences for
  • continuous variables: **General Linear Model (GLM)** and post hoc test (**Bonferoni**) to test the differences between all possible pairs (T0 & T1, T0&T2, T1&T2) within the treatment condition
  • non-parametric variables : **Friedman test** and Post Hoc test (**Wilcoxon** Signed Rank test) to test the differences between all possible pairs (T0 & T1, T0&T2, T1&T2) within the treatment condition.
Results & Discussion
### Table 1: Effect of NEMO trial on study parameters

<table>
<thead>
<tr>
<th></th>
<th>DD (n = 88)</th>
<th>EP (n = 96)</th>
<th>THD (n = 210)</th>
<th>P value (Between group)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum P (mmol/L)</td>
<td></td>
<td></td>
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<tr>
<td>T0</td>
<td>1.78 ± 0.5 a(Y)</td>
<td>1.712 ± 0.47 (Y£)</td>
<td>1.66 ± 0.48 a(£)</td>
<td>0.027</td>
</tr>
<tr>
<td>T1</td>
<td>1.63 ± 0.46 b</td>
<td>1.7 ± 0.5</td>
<td>1.61 ± 0.48 a</td>
<td>0.462</td>
</tr>
<tr>
<td>T2</td>
<td>1.69 ± 0.53 ab(Y£)</td>
<td>1.8 ± 0.65 (Y)</td>
<td>1.64 ± 0.48 a(£)</td>
<td>0.036</td>
</tr>
<tr>
<td>MIS</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>T0</td>
<td>7.26 ± 3.51 a(Y)</td>
<td>6.62 ± 3.16 a(Y£)</td>
<td>6.07 ± 3.90 a(£)</td>
<td>0.07</td>
</tr>
<tr>
<td>T1</td>
<td>7.68 ± 3.49 a</td>
<td>7.87 ± 3.50 b</td>
<td>7.49 ± 3.33 b</td>
<td>0.606</td>
</tr>
<tr>
<td>T2</td>
<td>9.20 ± 3.90 ab(Y£)</td>
<td>9.62 ± 4.56 c(Y)</td>
<td>8.24 ± 4.07 c(£)</td>
<td>0.016</td>
</tr>
<tr>
<td>Daily protein intake (%)</td>
<td></td>
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<tr>
<td>T0</td>
<td>65.72 ± 5.91 a</td>
<td>59.35 ± 2.98 a</td>
<td>56.03 ± 1.64 a</td>
<td>0.125</td>
</tr>
<tr>
<td>T1</td>
<td>50.81 ± 2.48 b(Y)</td>
<td>55.06 ± 2.76 a(Y£)</td>
<td>56.87 ± 1.49 a(£)</td>
<td>0.047</td>
</tr>
<tr>
<td>T2</td>
<td>39.76 ± 1.36 a(Y)</td>
<td>38.65 ± 1.39 b(Y)</td>
<td>49.87 ± 1.48 b(£)</td>
<td>0.00</td>
</tr>
<tr>
<td>BUN (mmol/L)</td>
<td></td>
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<tr>
<td>T0</td>
<td>31.21 ± 12.78 a</td>
<td>35.4 ± 15.90 a</td>
<td>41.61 ± 1.21 a</td>
<td>0.460</td>
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<tr>
<td>T1</td>
<td>29.03 ± 11.63 b</td>
<td>33.85 ± 14.11 b</td>
<td>38.95 ± 1.17 b</td>
<td>0.332</td>
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<tr>
<td>T2</td>
<td>29.74 ± 11.34 ab</td>
<td>34.41 ± 14.21 ab</td>
<td>40.14 ± 1.18 ab</td>
<td>0.921</td>
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<tr>
<td>HRQOL</td>
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<tr>
<td>T0</td>
<td>51 ± 6.34</td>
<td>52 ± 6.53</td>
<td>50 ± 6.6.30</td>
<td>0.07</td>
</tr>
<tr>
<td>T1</td>
<td>53 ± 7.25</td>
<td>52 ± 7.36</td>
<td>52 ± 6.51</td>
<td>0.17</td>
</tr>
<tr>
<td>T2</td>
<td>51 ± 7.56</td>
<td>51 ± 6.73</td>
<td>52 ± 7.39</td>
<td>0.74</td>
</tr>
</tbody>
</table>

a Superscripts (in columns) indicate within group significant differences (P<0.05), based on the General Linear Model repeated measures.

£ Superscripts (in rows) indicate between groups significant differences (P<0.05), based on one-way ANOVA and post hoc Bonferroni tests.
• The success of the intensive dietetic education on HD patients suggests the importance of a dedicated dietitian in the HD unit.

• Moreover, the deterioration of most of the study parameters at follow up, when the frequency of dietitian-patient meetings was nearly non-existent, show the importance of the continuous presence of a dedicated dietitian in the HD unit, when they are given sufficient time for patient education.

• Finally, the modest decrease over time in serum P seen in the DD group should be considered as a positive benefit, as a “drastic” fall (or rise) in serum P is associated with higher mortality risk.

• In the end, the role of the authorities is critical to the improvement in health policies related to nutrition services.
Having a dedicated dietitian improves patient clinical outcomes. The role of the MOPH is critical in improving the current status. Below are suggested steps:

1. provide specialized training to dietitians on KDOQI standards,
2. consider renal dietitians as key health care professionals in the management of HD patients,
3. integrate the standards of dietetic care of renal patients in the accreditation standards of hospitals,
4. allocate budget for employing renal dietitians dedicated to the HD unit.
Thank you

kmirey@gmail.com