2014

Efficacy of nutrition as medication in malnourished hospitalised patients is strongly influenced by environmental factors

Kelly Lambert
*Illawarra Shoalhaven Local Health District, klambert@uow.edu.au*

Jan Potter
*Illawarra Shoalhaven Local Health District, janp@uow.edu.au*

Maureen Lonergan
*Illawarra Shoalhaven Local Health District, maureenl@uow.edu.au*

Linda Tapsell
*University of Wollongong, ltapsell@uow.edu.au*

Karen Charlton
*University of Wollongong, karenc@uow.edu.au*

Publication Details
Efficacy of nutrition as medication in malnourished hospitalised patients is strongly influenced by environmental factors

Abstract
Aim To evaluate the use of Nutrition as Medication (NAM) as a dietary intervention strategy in a sample of malnourished renal and geriatric hospital inpatients. Methods In the study period of 1 July to 30 August 2009, patients admitted to the acute renal or geriatric wards of a large general hospital and assessed as malnourished or at risk of malnutrition and suitable to commence NAM were eligible for inclusion in this pilot clinical cohort study. Medication charts of the study patients were audited and opportunistic observations of patients receiving NAM were conducted. Comparisons of receipt and refusal rates of NAM between chart audits and observations were made. Environmental influences on administration, delivery and consumption were noted. Results Eighteen patients were included in the study. Audits of their medication charts indicated 943 doses of NAM were prescribed in the study period. The receipt rate of NAM was 66.4% and refusal rate was 8.9%. Forty-eight incident observations of the NAM process were conducted noting a receipt rate was 58.3% and refusal rate of 3.6%. Environmental factors such as adequate supplies and location of NAM stock influenced the receipt rate of NAM. Conclusions In the present study, receipt of NAM by renal and geriatric inpatients was suboptimal. The strategy was strongly influenced by environmental factors such as nurse administration of NAM. However, when NAM was received as prescribed, refusal was rare. Further exploration is warranted of NAM receipt and consumption in other malnourished groups and of the environmental factors influencing NAM delivery.

Keywords
patients, strongly, influenced, environmental, factors, medication, malnourished, nutrition, hospitalised, efficacy

Disciplines
Education | Social and Behavioral Sciences

Publication Details

This journal article is available at Research Online: https://ro.uow.edu.au/sspapers/1072
ABSTRACT

Aim: To evaluate the use of Nutrition As Medication (NAM) as a dietary intervention strategy in a sample of malnourished renal and geriatric hospital inpatients. Methods: In the study period of 1 July to 30 August 2009, patients admitted to the acute renal or geriatric wards of a large general hospital and assessed as malnourished or at risk of malnutrition and suitable to commence NAM were eligible for inclusion in this pilot clinical cohort study. Medication charts of the study patients were audited and opportunistic observations of patients receiving NAM were conducted. Comparisons of receipt and refusal rates of NAM between chart audits and observations were made. Environmental influences on administration, delivery and consumption were noted.

Results:

Eighteen patients were included in the study. Audits of their medication charts indicated 943 doses of NAM were prescribed in the study period. The receipt rate of NAM was 66.4% and refusal rate was 8.9%. Forty eight incident observations of the NAM process were conducted noting a receipt rate was 58.3% and refusal rate of 3.6%. Environmental factors such as adequate supplies and location of NAM stock influenced the receipt rate of NAM.

Conclusion: In this study, receipt of NAM by renal and geriatric inpatients was suboptimal. The strategy was strongly influenced by environmental factors such as nurse administration of NAM. However, when NAM was received as prescribed, refusal was rare. Further exploration is warranted of NAM receipt
and consumption in other malnourished groups and of the environmental factors influencing NAM delivery.

Keywords 3-6
dietetetic practice, protein-energy malnutrition therapy, Med Pass, nutrition supplementation
Title: Factors affecting the implementation of Nutrition as Medication in malnourished hospitalised patients

**Introduction**

Malnutrition is a common and under recognised problem amongst hospitalised patients\(^1,2\). Malnutrition is associated with slower wound healing, compromised immunity, increased risk of infections, longer hospital stays, more frequent hospital re-admissions, increased costs of care and mortality \(^3-6\). Nutritional status has also been shown to deteriorate in patients over the course of their admission\(^7\). Dietitians play a critical role in the detection and management of malnourished patients\(^9\).

Previous work conducted in our local and acute rehabilitation hospital settings indicated the prevalence of malnutrition was 33-49%\(^9,10\). This figure is consistent with previous reports in the literature on malnutrition amongst hospitalised patients\(^11\). Furthermore, the prevalence of malnutrition in chronically ill population groups such as hospitalised geriatric and renal patients may actually be as high as 70% of patients\(^12,13\). The reasons for such high rates of malnutrition in these sub-groups are multifaceted and relate to physiological and psychological changes to appetite and food intake as well as the burden of multiple chronic illnesses\(^14\).

Typical strategies used in the hospital setting to correct nutritional deficits amongst malnourished patients include the provision of high protein high kilojoule nourishing hospital diets, oral nutritional supplements (ONS) and enteral feeding. However the efficacy of these strategies is highly variable\(^15\).
For example, lack of feeding assistance at mealtimes may hinder intake of the hospital meals and patients are often unwilling or unable to consume ONS. As a result, innovative strategies to improve the delivery and consumption of ONS as well as reduce wastage and costs have evolved.

One innovative strategy is the concept of prescribing a calorically dense ONS on the medication chart in small volumes frequently throughout the day. Commonly known as either ‘Med Pass’ or Nutrition as Medication (or NAM) this program’s efficacy in improving energy and protein intake is well described.

Despite clear evidence of benefits associated with NAM and the existence of routine clinical guidelines to implement NAM, we hypothesise that the deficit in practice may lie in the implementation of NAM. The aim of this pilot study was to identify factors influencing the NAM program in acute renal and geriatric wards at a single institution with particular reference to nursing administration, patient consumption and other environmental influences.

METHODS

Patients admitted to the geriatric and renal wards at an Australian tertiary public hospital from 1 July to 30 August 2009 were considered for inclusion in the study. Patients received a routine nutrition assessment on admission by the ward dietitian using a validated nutrition assessment tool – either the Subjective Global Assessment (SGA) or Mini Nutritional Assessment (MNA). Those patients assessed as at risk of malnutrition or already malnourished (MNA score < 17/30 or SGA score of B or C), and considered suitable for commencement on the NAM program were included in the study.
The criteria for commencement on the NAM program included those patients considered unwilling, unsuitable or unable to take nutrition supplementation via the standard hospital procedure (usually 200ml of flavoured milk three times daily). The NAM protocol consisted of a two calorie per ml complete liquid ONS administered as either 80ml tds or 60ml qid and was designed to provide approximately 2000 kilojoules and 17-20g of protein depending on which ONS brand was chosen.

Details about the study aims and objectives were discussed with the relevant Medical Stream Service Directors and permission to undertake the research also sought from each ward Nurse Unit Manager. Usual ward practice was followed: the Dietitian discussed the NAM prescription with the patient; NAM was documented on the medication chart by the Doctor; and Nursing staff administered the NAM.

Data collection included demographic information, anthropometry, nutritional status score (20-21) and length of stay (LOS). Medication charts of all study patients were reviewed retrospectively to obtain information on the type, timing, duration and volume of nutritional supplement prescribed. The number of doses of NAM received or refused by patients was also obtained from the medication chart in addition to the reasons documented by nursing staff for non receipt. The same study patients also consented to a minimum of three observations of the NAM delivery process to determine if there were any additional environmental factors influencing delivery and consumption of NAM. Permission to observe nursing staff on the study wards was obtained from each ward Nurse Unit Manager. Details regarding the study aims were provided by the Nurse Unit
Manager to nursing staff at handover and the research assistant was introduced to nursing staff at the commencement of the data collection period. Observations using a standardised data collection sheet were carried out between the hours of 0800 and 1730 hours by a single investigator (the study research assistant) and were timed to coincide with the various NAM prescription times charted for each patient. Observations were not covert and patients and nursing staff were aware of the observer’s presence on the ward.

Statistical analysis was performed using SPSS Statistics for Windows version 17, (SPSS, Chicago, IL, USA). The Shapiro-Wilk Test was used to assess the normality of data. Normally distributed data were analysed using Independent samples t test and reported as mean and standard deviation. For non normally distributed data, medians and inter quartile ranges (IQR) were calculated and data analysed using the Mann Whitney U test. The effect of categorical variables was evaluated using the Chi Squared test or Fishers Exact test. These tests were used to investigate differences between wards for relevant variables. A p value of <0.05 was considered significant for all analyses. Ethics approval was granted from the (removed for blind peer review) Human Research Ethics Committee.

RESULTS

Eighteen patients were eligible for inclusion in the study during the nine week study period. Ten patients were recruited from the renal ward and eight from the geriatric ward. Patient characteristics at study entry did not differ significantly between the two wards except that renal patients had a significantly longer LOS in the acute hospital setting compared to geriatric patients (Table 1). Patients
spent 12 days (IQR 8-21.3 days) on the NAM program, with no significant difference between patients in different wards for the number days on the NAM program (Table 1).

The prevalence of malnutrition (MNA score < 17/30 or SGA score of B or C) amongst the group selected for commencing NAM was 83% (15/18), with no difference between renal and geriatric patients. Three of the eighteen study subjects were considered at risk of malnutrition (MNA score 17-23.5/30). Polypharmacy was common amongst both groups of patients. Renal patients were charted for significantly more medications than geriatric patients (Table 1).

Medication chart audits identified that during the nine week study period, a total of 943 NAM doses were prescribed on the medication chart for study patients (Table 2). The median number of doses prescribed for each patient was 44.5 doses (IQR:25.8-70.0), with no differences in prescribing practices between wards for the number of doses prescribed (Table 2). Medication chart auditing indicated that the combined receipt rate for NAM was 66.4% and, again, no differences in receipt rates were found between the two wards (Table 2).

The most frequent reasons documented by nursing staff on the medication chart for non-receipt of NAM was ‘patient refusal’ (8.9%; 84/943 doses) and restrictions due to Nil By Mouth status (2.8%; 26/943). Medication charts with no signature by nursing staff for NAM dose were considered to be ‘not received’ and accounted for 13.5% (127/943) of the number of doses to be delivered. Doses recorded by nursing staff as ‘patient self administered’ accounted for
4.0% (38/943) of doses. There were no differences between renal or geriatric patients regarding reasons of non receipt of NAM (Table 2).

The intended total number of observations was fifty four (consisting of three observations each for eighteen subjects). However, four geriatric patients were discharged prior to completion of all three observations and two renal patients were observed on four occasions. This resulted in a total of n=48 observations on the two study wards. The observed receipt rate of NAM was 58.3% (28/48 doses, Table 3) which was lower than the receipt rate in the medication chart audit. The individual observed receipt rate was 67% (IQR 24.7-81.3%). There were no significant differences between study wards for overall or individual receipt rate. The observed refusal rate of NAM was 3.6% (n=1/28).

Observations of the twenty doses not received by patients indicated that lack of NAM stock on the ward medication trolley (11/20), and nurses not retrieving the item from the ward fridge (3/20) were the main reasons for non receipt. The category of ‘other’ also contributed to NAM non receipt (6/20).

DISCUSSION

This small observational study has provided initial evidence on three aspects of the NAM program at our institution. Firstly, provided that patients who are prescribed to receive NAM are offered it at ward level, few (3.6 - 8.9%) refuse to consume it as directed. This finding is consistent with consumption rates of 95 – 96% for NAM that has been reported by other authors. Compared to traditional strategies for provision of ONS (such as with or between meals) this low refusal rate reinforces NAM’s role in our institution as a cost effective first-
line strategy to improve protein and kilojoule intake\textsuperscript{26-27}. Possible reasons for the high level of compliance include a reduced likelihood of inducing ‘taste fatigue’, as well as minimal interference with a patient’s appetite at subsequent mealtimes due to the ‘user friendly’ small volumes dispensed\textsuperscript{28}. Patients may also be more likely to perceive NAM as an important treatment to aid recovery because it is dispensed in a similar manner to other medications.

The second significant finding is the identification of a gap in our institution between ‘best practice’ and ‘real life practice’. Observations indicated that one in three doses were not received by the patient. Furthermore, geriatric patients in this study, were observed to only receive one in every two doses of NAM prescribed. Ward level observations provided additional insights regarding explanations for this suboptimal receipt rate. These include frequent interruptions to dispensing staff by visitors or other ward staff; distraction of nursing staff to attend to other more urgent patient care duties; and poor stock control procedures (especially on the geriatric ward). On some occasions nurses were observed to leave NAM at a patient’s bedside for later consumption but documented that the NAM had been given and was consumed. Studies that investigated provision of ONS at or between meals in a nursing home setting have reported similar problems in administration,\textsuperscript{29,30} with correct procedure being followed in less than 10\% of occasions\textsuperscript{30}. Our study is the first to identify suboptimal receipt rates of NAM in a hospital setting.

Clinicians involved in the prescription of NAM at our institution should be mindful that on many occasions the patient will not receive the NAM as prescribed. A recent systematic review of studies using oral nutrition
supplements found that compliance to the recommended prescription of ONS was lowest when administered as part of medicine rounds\textsuperscript{31} however reasons for this were not described. Strategies to improve the receipt rate of NAM may relate to the need to implement ‘protected dispensing times,’ a strategy well described in the literature\textsuperscript{32}. The use of checklists and procedures in conjunction with signage to not disturb dispensing nurses has been found to result in a significant reduction in medication errors and improvement in adherence to medication dispensing protocols. Prescribing clinicians may also ensure that they are familiar with ward stock control procedures so that this does not contribute to reduced receipt rates.

The third significant finding of this study was the suboptimal documentation of practices related to NAM delivery. Dispensing nurses were recording NAM as ‘self administered’ in approximately one in every twenty NAM orders, regardless of whether the patient actually consumed the NAM dose. Patient compliance with medications is known to be problematic and a reliance on patient self-administration of NAM could further reduce actual consumption rates, especially for those that are cognitively impaired\textsuperscript{33}. In addition, it is concerning that despite clear policies available to guide practice\textsuperscript{34}, there were a large number of NAM doses that were unsigned (13.5%; 127/943 doses). A study of NAM in nursing home patients reported that documentation of NAM was accurate on only 82% of occasions but the reasons for this remained unexplored\textsuperscript{24}. It is important to note that the Australian Commission on Safety and Quality in Healthcare has recommended that the National Inpatient Medication Chart (NIMC) should not be used for the prescribing of nutrition supplements due to
the potential for confusion of nutritional supplements with medicines. The Commission suggests that if health services choose to use the NIMC then risk assessments should be undertaken and appropriate policies, procedures and education provided to staff. Our study identified considerable scope, more broadly, for improvement with medication reconciliation practices in a tertiary hospital setting in regional New South Wales, and attention to this matter could constitute a useful multidisciplinary quality improvement activity. This may also lead to improvements in NAM delivery and improved clinical outcomes for patients.

The authors acknowledge there are several important limitations to this study. These include a lack of generalisability of the findings, as participants were recruited from only two wards at one geographic location. Other limitations include the small sample size of patients for comparison of ward observations with chart audit results; limited patient type studied (i.e. renal and geriatric patients), and potential for influencing behaviour due to overt observations. Despite the context-specific nature of the study, it contributes to the sparse literature exploring factors that impact on the efficacy of the NAM strategy. It is evident that a number of environmental and institutional factors influence the efficacy of the NAM delivery model for provision of nutrition support to high risk nutritionally compromised patients.

In conclusion, the delivery and receipt of NAM in malnourished renal and geriatric inpatients is strongly influenced by institutional level factors. At the institution under study, the role of nursing staff appears pivotal to the success of the NAM program. It is important that clinicians do not assume that patients
receive their NAM as prescribed on every occasion, despite the process being recorded on a medication chart. However, on those occasions when patients do receive the dose of NAM as prescribed, very few refuse it and this strategy has the potential to make a valuable contribution to the energy intake of malnourished patients. Further research on the use of NAM in other malnourished inpatient groups and on other wards is required to confirm these findings. Qualitative research exploring patient and staff perceptions on the use of NAM would further support these preliminary findings.

ACKNOWLEDGEMENTS

This research was funded by the Graham Burnley Memorial Scholarship from the Renal Society of Australasia and Gambro.

COMPETING INTERESTS

None identified
REFERENCES


Table 1: Demographic data and NAM program information Data are shown as median (Interquartile range) except where indicated.

† One patient unable to be weighed and excluded from analysis.

‡ Malnutrition status assessed using either MNA (Mini Nutritional Assessment) or SGA (Subjective Global Assessment) Tools.

§ One patient in geriatric group unable have formal assessment tool completed.

* Significance level p< 0.05.

NAM, Nutrition as Medication
<table>
<thead>
<tr>
<th></th>
<th>Renal patients (n=10)</th>
<th>Geriatric patients (n=8)</th>
<th>Total (n=18)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender: M/F</td>
<td>7/3</td>
<td>4/4</td>
<td>11/7</td>
<td>-</td>
</tr>
<tr>
<td>Age</td>
<td>72.5 (58.0-82.0)</td>
<td>81.5 (78.0-84.5)</td>
<td>78.5 (64.3-83.5)</td>
<td>0.32</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>65.3 (60.8-95.7)</td>
<td>60.0 (46.5-77.0)</td>
<td>63.0 (57.0-82.0)</td>
<td>0.13</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>23.8 (20.4-34.7)</td>
<td>21.3 (19.4-22.7)</td>
<td>22.1 (19.6-25.3)</td>
<td>0.23</td>
</tr>
<tr>
<td>Number malnourished †</td>
<td>8/10</td>
<td>7/8 §</td>
<td>15/18</td>
<td>0.59</td>
</tr>
<tr>
<td>Length of Stay in acute hospital (days)</td>
<td>19.5 (14.8-32.8)</td>
<td>14.0 (10.0-18.8)</td>
<td>16.0 (13.5-25.3)</td>
<td>0.03*</td>
</tr>
<tr>
<td>Days on NAM program</td>
<td>13.5 (8.0-23.8)</td>
<td>11.0 (4.3-13.5)</td>
<td>12.0 (8.0-21.3)</td>
<td>0.15</td>
</tr>
<tr>
<td>Mean number of medications charted</td>
<td>13.1 ± 3.4</td>
<td>6.9 ± 6.0</td>
<td>10.3 ± 1.3</td>
<td>0.02*</td>
</tr>
</tbody>
</table>
Table 2 Medication chart audit of the NAM prescription (n=943). Data are shown as median (Interquartile range) except where indicated

* Significance level p< 0.05.
<table>
<thead>
<tr>
<th></th>
<th>Renal patients (n=10)</th>
<th>Geriatric patients (n=8)</th>
<th>Total (n=18)</th>
<th>P value *</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NAM orders prescribed</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number of doses prescribed ( % of total doses )</td>
<td>594 (63.0 %)</td>
<td>349 (37.0 %)</td>
<td>943 (100.0 %)</td>
<td>-</td>
</tr>
<tr>
<td>Individual number of doses prescribed</td>
<td>51.5 (25.8-95.8)</td>
<td>41.5 (24.0-46.8)</td>
<td>44.5 (25.8-70.0)</td>
<td>0.27</td>
</tr>
<tr>
<td><strong>NAM receival rate</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total doses documented as received ( %)</td>
<td>403/594 (67.8%)</td>
<td>224/349 (64.2%)</td>
<td>627/943 (66.4%)</td>
<td>0.39</td>
</tr>
<tr>
<td>Individual number of doses documented as received</td>
<td>39 (21.8-50.8)</td>
<td>27.5 (9.75-42.75)</td>
<td>34 (20.5-46.0)</td>
<td>0.61</td>
</tr>
<tr>
<td><strong>Reasons documented for NAM non receival</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient refusal ( % of total doses prescribed)</td>
<td>37 / 594 (6.2%)</td>
<td>47/349 (13.5%)</td>
<td>84/943 (8.9%)</td>
<td>0.44</td>
</tr>
<tr>
<td>Nil by Mouth status ( % of total doses prescribed )</td>
<td>23/594 (3.8%)</td>
<td>3/349 (0.9%)</td>
<td>26/943 (2.8%)</td>
<td>0.53</td>
</tr>
<tr>
<td>No signature ( % of total doses prescribed)</td>
<td>60/594 (10.1%)</td>
<td>67/349 (19.2%)</td>
<td>127 /943 (13.5%)</td>
<td>0.39</td>
</tr>
<tr>
<td>Self administered</td>
<td>38/594 (6.3%)</td>
<td>0/349 (0%)</td>
<td>38/943 (4%)</td>
<td>0.41</td>
</tr>
</tbody>
</table>
Table 3. Observations of NAM delivery and consumption. Data are shown as median (Interquartile range) except where indicated

‡ ‘Other’ includes: no obvious reason, patient absent from ward or NAM contraindicated

* Significance level p< 0.05.

NAM, Nutrition as Medication
### Observed NAM receival rate

<table>
<thead>
<tr>
<th></th>
<th>Renal ward (n=32)</th>
<th>Geriatric ward (n=16)</th>
<th>Combined observations (n=48)</th>
<th>P value *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of observations (%)</td>
<td>32 (75%)</td>
<td>16 (25%)</td>
<td>48 (100%)</td>
<td></td>
</tr>
<tr>
<td>Total observed receival rate (%)</td>
<td>19/32 (59.3 %)</td>
<td>9/16 (56.3 %)</td>
<td>28/48 (58.3 %)</td>
<td>0.50</td>
</tr>
<tr>
<td>Individual observed receival rate of NAM (%)</td>
<td>67 % (33-81.2)</td>
<td>50 % (0.0-91.7)</td>
<td>67 % (24.7-81.2)</td>
<td>0.52</td>
</tr>
</tbody>
</table>

### Observed NAM refusal rate

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient refusal of NAM (%)</td>
<td>1/19 (5.3%)</td>
<td>0/9 (0%)</td>
<td>1/28 (3.6%)</td>
<td></td>
</tr>
</tbody>
</table>

### Observed reasons for NAM non receival

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No NAM stock</td>
<td>6/13</td>
<td>5/7</td>
<td>11/20</td>
<td>-</td>
</tr>
<tr>
<td>Other ‡</td>
<td>4/13</td>
<td>2/7</td>
<td>6/20</td>
<td>-</td>
</tr>
<tr>
<td>Nurse not retrieving stock from fridge</td>
<td>3/13</td>
<td>0/7</td>
<td>3/20</td>
<td>-</td>
</tr>
</tbody>
</table>