The impact of the Royal Prince Alfred Hospital Elimination Diet on diet quality and nutritional adequacy

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The research presented in this report was conducted by the candidate under the guidance of the supervisors above. Imogen Hooper (the candidate) contributed to assessment form design and the development of recruitment and data collection protocols. She also recruited participants, and collected and entered data with assistance from Anna-Jane Debenham; and independently undertook data analysis.

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Declaration

1. I, Imogen Hooper, hereby declare that no work presented in this report has been submitted to any other University or Institution for a higher degree and that to the best of my knowledge contains no materials written or published by another person, except where due reference is made in text.

2. The studies described in this report were approved by the Ethics Review Committee (RPAH Zone) of the Sydney Local Health District, and all subjects gave informed consent before participating.

Signature

______________________________

Dated on 31st October, 2014
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The aim of this study was to assess and compare dietary intake and nutritional adequacy of patients at the RPAH Allergy Unit before their initial appointment and during their time on the RPAH elimination diet.

Patients were called one week prior to their initial appointment at the RPAH Allergy Unit to ascertain suitability and interest for the study. A suitable candidate was one who was suffering from symptoms suspected to be food intolerance related, over the age of 16, and had never undertaken the RPAH elimination diet before. 4-day weighed food records were used to record candidates’ dietary intake, which included supplement use, both before and on the elimination diet. Data was combined with early 2014 and 2013 data for analysis. Dietary intake was analysed in FoodWorks7 and compared to the Australian and New Zealand Nutrient Reference Values (NRV) and the Australian Guide to Healthy Eating (AGHE) recommendations.

116 before elimination diet WFRs were analysed and 31 on-elimination diet WFRs were analysed. The study showed an improvement in the average consumption of the recommended serves of core food groups for the on elimination diet group from 61% to 82%. There was a marked decrease in the average consumption of discretionary items by those on the elimination diet from 130% of maximum serves allowed to 90%. Micronutrient intake exceeded the Recommended Dietary Intake and Estimated Average Requirement values for both before and on elimination diet groups for most micronutrients but there were inadequate intakes of folate and calcium, which improved on the elimination diet.

The study shows those on the elimination diet do not face adverse nutritional implications overall. In fact, their diets demonstrate a more closely aligned intake to the AGHE recommendations and NRVs

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Imogen Hooper was the primary author involved in recruitment, data collection, entry and analysis, and writing the manuscript. Anna-Jane Debenham and Kristy-Lee Raso contributed to recruitment, data collection and data entry. Dr Robert Loblay, Dr Anne Swain, Brooke McKinnon, Carling Chan and Kirsty Le Ray were responsible for the study design and supervision.

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Abstract

Aim: The aim of this study was to assess and compare dietary intake and nutritional adequacy of patients at the RPAH Allergy Unit before their initial appointment and during their time on the RPAH elimination diet.

Method: Patients were called one week prior to their initial appointment at the RPAH Allergy Unit to ascertain suitability and interest for the study. A suitable candidate was one who was suffering from symptoms suspected to be food intolerance related, over the age of 16, and had never undertaken the RPAH elimination diet before. 4-day weighed food records were used to record candidates’ dietary intake, which included supplement use, both before and on the elimination diet. Data was combined with early 2014 and 2013 data for analysis. Dietary intake was analysed in FoodWorks7 and compared to the Australian and New Zealand Nutrient Reference Values (NRV) and the Australian Guide to Healthy Eating (AGHE) recommendations.

Results: 116 before elimination diet WFRs were analysed and 31 on-elimination diet WFRs were analysed. The study showed an improvement in the average consumption of the recommended serves of core food groups for the on elimination diet group from 61% to 82%. There was a marked decrease in the average consumption of discretionary items by those on the elimination diet from 130% of maximum serves allowed to 90%. Micronutrient intake exceeded the Recommended Dietary Intake and Estimated Average Requirement values for both before and on elimination diet groups for most micronutrients but there were inadequate intakes of folate and calcium, which improved on the elimination diet.

Conclusion: The study shows those on the elimination diet do not face adverse nutritional implications overall. In fact, their diets demonstrate a more closely aligned intake to the AGHE recommendations and NRVs.

Introduction

Key words: Food chemical intolerance, nutritional adequacy, dietary intake
Introduction
Food chemical intolerance is a non-immune reaction to specific chemicals within food\(^1\). The symptoms of food intolerance manifest in the GI tract, skin respiratory tract and/or the central nervous system\(^1,2\); giving rise to symptoms which include angioedema, rashes, hives, vomiting, swelling, asthma, migraines and headaches\(^1,3\). The chemicals responsible for these reactions can be naturally occurring (e.g. salicylates, amines and glutamates), additives from the manufacturing process (e.g. colours, flavours and preservatives) and from foods containing soy, gluten and dairy\(^1,5\). Individuals present with reactions that are idiosyncratic in severity, onset and frequency\(^1,3\). As chemical intolerance symptoms and triggers manifest in such individualised patterns, patients undertake the RPAH elimination diet and challenge protocol (RPAH ED&CP) to identify their individual dietary triggers. An elimination diet and challenge protocol is considered to be the gold standard in detecting food chemical intolerances\(^6\). The RPAH ED&CP, has three levels of restriction; strict, moderate and simple, which eliminate sources of naturally occurring and added chemicals to varying degrees\(^5\). Some patients, particularly those with GI symptoms, may also be required to eliminate dairy, soy and gluten from the diet.

For any condition requiring dietary restriction, the nutritional adequacy of the diet should be considered. While diagnostic diets such as the RPAH ED&CP are generally only used in their strictest form for a short period, ensuring nutritional adequacy of micro and macro nutrients is nevertheless important, whilst undertaking the elimination diet, and also in the long term for those who identify food intolerances and will need to follow a limited diet over the longer term to control their symptoms\(^8,9\).

In Australia, nutritional adequacy is most frequently measured by comparing nutrient intakes with the Australian and New Zealand Nutritional Reference Value (NRV) recommendations, which assess whether macronutrient intake is within Acceptable Macronutrient Distribution...
Ranges (AMDR) for protein, fat and carbohydrates; and whether micronutrient intake is meeting the Recommended Dietary Intake (RDI), Estimated Average Requirements (EAR) and/or Adequate Intake (AI) and Upper Level (UL) intake for the correct age and gender category\textsuperscript{10}. Diet quality may be assessed by comparing food and drink intake to the Australian Guide to Healthy Eating food group recommendations\textsuperscript{11-14}. By examining nutritional adequacy and diet quality, this study aims to provide information which will better equip clinicians to advise and ensure nutritional adequacy for patients undertaking the RPAH ED\&CP. The results from this current research can be combined with previous research undertaken in 2014 which examined the nutritional adequacy of patient’s ‘usual’ diet prior to their first appointment at the RPAH Allergy Unit, using the same data collection method and analysis techniques. However, this study extends the scope of previous research by examining the nutritional adequacy of patients’ dietary intake both prior to their first appointment as well as during the period in which they are undertaking the elimination diet. The comparison of dietary adequacy at two time points will provide information on the nutritional adequacy of the elimination diet.

**Method**

This study was carried out at the RPAH Allergy Unit using prospective observational data collected by the University of Sydney student research dietitians. The study was approved by the Ethics Review Committee (RPAH Zone) of the Sydney Local Health District, protocol no: X13-0208 & LNR/13/RPAH/249. Data collected by previous student researchers Neubauer\textsuperscript{15} and Dynana & McGirr\textsuperscript{16} was combined with data from this study period for analysis.

The recruitment stage of the study was carried out by research dietitians, who called prospective patients one week prior to their initial appointment date to ascertain suitability and interest to participate in the study. A copy of the inclusion criteria and exclusion criteria is
included in appendix 1. Those identified as suitable for the study were sent an information pack via email or post which included a 4-day weighed food record (WFR) template to be completed prior to their initial appointment. The patient could choose to complete this in hard copy, or using the Australian Calorie Counter – Easy Diet Diary (Xyris software, Brisbane, Australia) app on their iOS device to record their food intake. The WFR asked for quantities, brands and cooking methods of the foods and drink the patient consumed over a 4 day period. Upon presentation to the unit patients had their weight and height recorded using floor scales and a stadiometer. Completed WFRs were collected, checked for missing data and/or clarified as required.

The patient was then assessed by the doctor and if suitable, proceeded to the dietitian for instructions on the elimination diet. For those that were prescribed the elimination diet, a second WFR was collected 3 weeks after starting the elimination diet. Food Works (Professional Version7, Xyris software, Brisbane, Australia. Databases AUSNUT 2007, NUTTAB 2010, AUSFOODS 2012, and AUSBRANDS 2012) were used to analyse the completed food diaries. The overall nutritional adequacy of their diet was assessed by comparing the Estimated Energy Intake (EEI) against the Estimated Energy Requirements (EER), and macro and micronutrient intakes to the NRVs suitable for the individual’s age and gender. The EAR, RDI, AI and/or UL of intake values of nutrients were used to benchmark adequate nutritional intake. The energy contributions from protein, fat and carbohydrates were compared to the AMDR values to assess the overall macronutrient distribution of the patients’ diets. Microsoft Excel spread sheet format (Appendix 2) was used to code all dietary intake into a core food group (fruit, vegetables, grains and cereals, meat and alternatives, dairy and alternatives) or a non-core food group (discretionary foods and excess unsaturated fats and oils) as stipulated by the AGHE. The number of serves consumed within each food group was compared to the AGHE serve recommendations for the appropriate age and gender category. As per the AGHE guidelines, only one serve of fruit juice was coded as ‘fruit’ per day; excess
fruit juice consumed was coded as discretionary. The same was applied for excess intake of unsaturated oils and spreads. Legume intake was added either to the total vegetable group intake, or to the total meat and alternatives intake, being allocated to the group with the lowest total intake, or, if both groups were equal, the amount was distributed across both groups. While the AGHE was used as a guide to code foods into their appropriate food group, clinical judgement was used if there was uncertainty about a particular food item. For example, mixed dishes that were not considered discretionary foods were coded by ingredients as per the recipe provided by the patient, and when not available a standardised recipe created by the researchers was used.

**Results**

Between May and September 2014, a total of 538 patients were called. Of this number, 130 were un-contactable after 3 call attempts, 184 met inclusion criteria and accepted further information on the study, 191 declined to take part in the study and 33 were unsuitable, cancelled or rescheduled their appointments. A total of 83 WFRs were collected from patients who agreed to take part in the study over this time period. There was a total of 147 WFR used for analysis in this study after data was combined with the earlier 2014 and 2013 research. 116 of these were before elimination diet WFRs and 31 of these were on-elimination diet WFRs (Appendix 3).

Of those who gave a WFR whilst on the elimination diet, 74% were following the strict elimination diet and 45% were avoiding dairy, soy and gluten. Any vitamin and mineral supplements consumed were included in the analysis of dietary intake. In the before elimination diet group 22% of patients supplemented their diet with a vitamin and mineral supplement, 52% supplemented their diet on the elimination diet.
Patients’ initial diet before presenting to the RPAH Allergy Unit

Estimated Energy Intake

On average, patients were meeting 77% of EER before commencing the elimination diet (data not shown). 41% of patients had an EEI <70% of EER and 11% had an EEI of >100% EER.

Food Groups

Graph 1a (Figure 1) shows the percentage of patients consuming below 50%, within 50-99% and 100% or greater of the AGHE recommendations. The average recommended serves consumed for vegetables, fruit and grains and cereals, dairy and alternatives and meat and alternatives consumed were 65%, 55%, 51%, 48% and 91% respectively. Average unsaturated oils and spreads consumption was 26% of the maximum serve allowance. Average discretionary food consumption was 144% of the maximum serve allowance. The majority of patients (69%) consumed >100% of the maximum serve allowance of discretionary foods. 30% of patients were consuming below 50% of the recommended number of serves for all core food groups.

Nutrients

Graph 1b (Figure 1) shows the percentage of EAR met by patients that provided a before elimination diet WFR (n=116). All micronutrients exceeded 100% of the EAR except for calcium (78%). All nutrients exceeded 100% RDI except for folate (84%) and calcium (65%). Potassium and sodium, for which an AI value and UL value were used, met 105% of the AI and 89% of the UL respectively.
Figure 1. (Above) Total patients n=116 1a: Percentage of before elimination diet patients meeting Australian Guide to Healthy Eating (AGHE) food group recommendations, as well as all core food group recommendations; 1b: Percentage Estimated Average Requirement (EAR) of micronutrients being met from total dietary intake before elimination diet. Box showing median and interquartile range. Whiskers showing 10-90 percentiles, outliers shown by •.
Patients on the elimination diet at the RPAH Allergy Unit

The initial dietary intake of patients who provided both an initial and on elimination diet WFR (n=31) were found to be representative of the total initial group (n=116) (Appendix 4) as indicated by nutrient and food group intake (Appendix 5).

Estimated Energy Intake

On average patients on the elimination diet met 78% of EER, 5% had an EEI of <70% EER, and 16% reported an EEI of >100% EER.

Food Groups

Table 1 shows the average intake and differences in the consumption of AGHE food group serve recommendations in the diets of patients both before and on the elimination diet. When comparing before and on the elimination diet, the average serve recommendations met increased in vegetables (67% to 98%), grains and cereals (52% to 63%), dairy and alternatives (43% to 48%), unsaturated oils and spreads (21% to 31%) and meat and alternatives (88% to 160%). Discretionary food intake decreased from 130% to 90% of the maximum recommended serves allowance. The percentage of people consuming ≥100% of maximum discretionary food allowance decreased from 61% to 42%. The percentage of people meeting recommendations for all five core food groups increased from 61% to 82%.
Patients consuming <50% AGHE serve recommendations (%)

Patients consuming 50-99% AGHE serve recommendations (%)

Patients consuming ≥ 100% AGHE serve recommendations (%)

Mean number of serves consumed compared to AGHE recommendations (%)

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Before ED</th>
<th>On ED</th>
<th>Before ED</th>
<th>On ED</th>
<th>Before ED</th>
<th>On ED</th>
<th>Before ED</th>
<th>On ED</th>
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<tr>
<td>Before ED</td>
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<td>48</td>
<td>39</td>
<td>48</td>
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<td>6</td>
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<tr>
<td>On ED</td>
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<td>42</td>
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<tr>
<td>Before ED</td>
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<td>55</td>
<td>42</td>
<td>45</td>
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<td>10</td>
<td>6</td>
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<tr>
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<td>52</td>
<td>52</td>
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<td>Grains &amp; cereals</td>
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<tr>
<td>Before ED</td>
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<td>19</td>
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<td>45</td>
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<td>29</td>
<td>10</td>
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<td>Dairy &amp; alternatives</td>
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<td>45</td>
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<td>29</td>
<td>10</td>
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<td>6</td>
<td>6</td>
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<td>Meat &amp; alternatives</td>
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<td>Before ED</td>
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<td>45</td>
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<td>On ED</td>
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<td>Unsaturated oils &amp; spreads</td>
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<td>23</td>
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<tr>
<td>On ED</td>
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<td>26</td>
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<td>Consuming ≥ 100% of all core food group AGHE serve recommendations</td>
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<tr>
<td>Before ED</td>
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<td>74</td>
<td>0</td>
<td>6</td>
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<tr>
<td>On ED</td>
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</table>

Table 1. Total patients n=31, average percentage AGHE food group recommended serves consumed by patients before elimination diet (Before ED) and on elimination diet (On ED)

**Nutrients**

*Acceptable Macronutrient Distribution Range*

Table 2 shows the macronutrient intake of patients before and on the elimination diet according to the AMDRs. The proportion of patients consuming within the AMDR increased from 58% to 68%. The proportion of patients consuming within the AMDRs for fat and carbohydrates decreased from 77% to 52%, and 48% to 26% respectively. The proportion of patients receiving >35% energy from fat increased from 5% before the elimination diet to 15% on the elimination diet. No patients exceeded the upper limit of the AMDR for carbohydrate intake in either before or on the elimination diet groups.
<table>
<thead>
<tr>
<th></th>
<th>Before ED (%)</th>
<th>On ED (%)</th>
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<tr>
<td>&lt;15% Energy protein</td>
<td>13</td>
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<td>15-25% Energy protein</td>
<td>58</td>
<td>68</td>
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<td>&gt;25% Energy protein</td>
<td>29</td>
<td>16</td>
</tr>
<tr>
<td>&lt;20% Energy fat</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>20-35% Energy fat</td>
<td>77</td>
<td>52</td>
</tr>
<tr>
<td>&gt;35% Energy fat</td>
<td>16</td>
<td>48</td>
</tr>
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<td>&lt;45% Energy carbohydrate</td>
<td>52</td>
<td>74</td>
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<td>45-65% Energy carbohydrate</td>
<td>48</td>
<td>26</td>
</tr>
<tr>
<td>&gt;65% Energy carbohydrate</td>
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</tr>
</tbody>
</table>

Table 2. Total patients n=31, Acceptable Macronutrient Distribution Range (AMDR) distribution before elimination diet (Before ED) and on elimination diet (On ED)

Micronutrients

Table 3 shows micronutrient intakes where both before and on elimination diet patients were meeting RDI and EAR requirements. While both groups met intake requirements for thiamin, riboflavin, niacin and vitamin C these micronutrients were consumed on average at least four times the EAR by the on elimination diet group (926%, 711%, 475% and 411% respectively), while phosphorous, zinc and iron were consumed on average at least two times the EAR by the on elimination diet group (234%, 208% and 214%).
<table>
<thead>
<tr>
<th>Micronutrient</th>
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<tbody>
<tr>
<td>Thiamin</td>
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<td>926</td>
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<tr>
<td>Riboflavin</td>
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<td>711</td>
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<tr>
<td>Niacin</td>
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<td>475</td>
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<tr>
<td>Vitamin A</td>
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<td>Vitamin C</td>
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<td>Iron</td>
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<tr>
<td>Magnesium</td>
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<td>129</td>
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<tr>
<td>Potassium</td>
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</tbody>
</table>

Table 3. Average percentage Estimated Average Requirement (EAR) and Recommended Dietary Intake (RDI) of micronutrients meeting requirements before elimination diet (Before ED) and on elimination diet (On ED)

Figure 2 shows average micronutrient intakes, which were not meeting the RDI or EAR requirements in patient’s diets before the elimination diet, with the exception of folate EAR (105%). The data shows the extent of improvement in consumption of these micronutrients for patients on the elimination diet. Figures 2a shows the average intake for folate on the elimination diet increased from 84% to 125% of the RDI. Figure 2b shows the impact of the elimination diet on the average EAR and RDI intake of calcium. Before the elimination diet, patients were meeting 83% of EAR and 70% of RDI for calcium. On the elimination diet these values increases to 97% of EAR and 82% of RDI. Figure 2c shows the impact of the elimination diet on sodium intake. Before the elimination diet, sodium was being consumed at 93% of the recommended UL, but dropped to 45% for the on elimination diet group.
(2a) Folate intake before and on the elimination diet

(2b) Calcium intake before and on the elimination diet

(2c) Sodium intake before and on the elimination diet
Figure 2. Total patients before and on elimination diet n=31 (2a) Percentage Recommended Dietary Intake (RDI) of calcium consumed before (before ED) and on the elimination diet (on ED); (2b) Percentage RDI and Estimated Average Requirement (EAR) of calcium consumed before and on the elimination diet; (2c) Percentage Upper Level (UL) of sodium consumed before and on the elimination diet. Box showing median and interquartile range. Whiskers showing 10-90 percentiles, outliers shown by ●

Discussion

Overall, patients following the elimination dietary guidelines demonstrated an improved quality of diet when compared to their ‘normal’ diet as indicated by meeting NRVs and improved AGHE recommendation intake.

Patients’ dietary intake before commencing the elimination diet showed that overall there was an inadequate consumption of all AGHE food group recommendations. Patients were over consuming maximum recommended discretionary serve allowances (130%), and under consuming recommended serves for all core food groups (0%) before the elimination diet. When comparing the elimination diet to their before elimination diet intakes, there was an increase in the average serve consumption of all core food groups (61% to 82%) and an increase in percentage of those meeting all AGHE core food group recommendations (16%), which resulted in patients on the elimination diet being closer to the AGHE recommendations than before starting the elimination diet.

Vegetable food group average serves consumed increased from 67% before the elimination diet to 98% on the elimination diet, an encouraging result. However, in comparison to the evaluation of the 1995 NNS findings by17,18 that 30% of Australian adults are consuming all 5 recommended serves of vegetables, there are still large inadequacies in the consumption patterns of this studies patients, with only 23% meeting 100% of recommended serves.
Average serves of fruit consumed on the elimination diet decreased from 53% to 45%, this result is unsurprising given the variety of fruits available on the elimination diet is decreased to varying degrees depending on the level of dietary restriction.

Grains and cereals average serves consumed improved from 52% to 63% despite more restrictions on the consumption of gluten. Those meeting recommendations for the grains and cereals food group increased from 10% to 16% but fell short of matching the percentage of the Australian population meeting recommendations (21%)\(^1\)\(^9\).

Dairy and alternative average consumption of recommended serves improved from 43% to 48% on the elimination diet whereas the Australian adult population on average only met 37% of recommendations\(^2\)\(^0\).

Meat and alternatives average consumption of recommended serves majorly increased from 88% to 160%, the majority of patients met their recommendations for this food group (65%). Contrary to the restriction of a lot of foods on the elimination diet, fresh meat and fish products are unrestricted and perhaps the increase seen in consumption is a representation of the substitution of restricted foods by meat products.

Maximum allowance of discretionary food items consumption decreased from 130% to 90%. The elimination diet limits the intake of many additives (and sometimes gluten, dairy and soy) and this results in the decreased availability of discretionary foods in particular.

On average, these results reveal that the elimination diet provides a diet more closely aligned with the majority of AGHE food group recommendations.

Macronutrient intake of patients before the elimination diet show the majority of patients had protein and fat intakes within the respective AMDRs, which is reflective of the NNS findings for the general Australian population\(^1\)\(^7\). However both fat and protein macronutrient contributions to energy increased on the elimination diet. This finding could possibly be accounted for when
the increased consumption of meat and alternatives and unsaturated oils and spreads are considered (Table 1).

Micronutrient intake shows that patients both before and on the elimination diet were meeting the RDIs and EARS for thiamin, riboflavin, niacin, vitamin A, vitamin C, phosphorous, zinc, iron and magnesium. Patients were also meeting the AI for potassium and not exceeding the UL for sodium (Table 3). On average, patients before and on the elimination diet did not meet the RDI for folate, although the EAR was met. The before elimination diet group did not meet the RDI or EAR for calcium. On the elimination diet, patients’ folate intake was improved to exceed RDI from 84% to 174%. Calcium intake improved on the elimination diet, but still fell short of meeting EAR and RDI recommendations. These findings are similar to the NNS results, which showed that Australian adults generally have sufficient micronutrient intake, except for calcium\(^\text{17}\). The effect of dairy, soy and gluten restriction may have contributed to these results but will need to be further examined in future studies.

Patient total dietary intakes included food and supplement intake. The increase in supplement consumption (225 of patients before the elimination diet vs. 52% of patients on the elimination diet) may account for the large values of some micronutrients such as thiamin, riboflavin, niacin and vitamin C, which were recorded at an average intake of at least four times the EAR on the elimination diet (Table 3). Importantly average sodium intake was decreased from 93% of the UL to 45% on the elimination diet. This is despite table salt being an option for people on the elimination diet. This decrease was likely due to the decreased intake of discretionary food items as these items are often the main contributors of sodium in the diet\(^\text{21}\). Notably, a 40% decrease in sodium intake was found in a similar study by Soutar\(^\text{22}\), and attributed to a decreased consumption in the processed food and bread.
The majority of patients both before and on the elimination diet consumed carbohydrates at lower than the recommended AMDR of 45-65% of energy intake (Table 2). This result is in line with the consumption levels of the majority of Australian adults\textsuperscript{17}. However, may be in part explainable by their consumption of grains and cereals, and dairy and alternatives at lower than the AGHE recommendations. It is possible that intake may be further impacted by the additional dietary restrictions of dairy, soy and gluten.

**Conclusion**

The findings of this research show that those on the elimination diet have nutritional intakes that are generally better than before the elimination diet. Patients on the elimination diet demonstrated diets more closely aligned with the AGHE food group recommendations and, on average, demonstrated an increased in meeting the NRV recommendations of folate.

This research demonstrates that AGHE food group serve recommendations are not necessarily a sole marker for overall nutritional adequacy, nor is assessing NRVs. While no patient’s, met all AGHE food group recommendations, almost all patients met micronutrient requirements and demonstrated macronutrient contributions to energy intake that lie within the AMDRs.

Average energy intake before and on the elimination diet was meeting only 77-78% of EER. While this appears to be a significant under consumption, the NNS estimates that adult males and females may generally under report by as much as 21%, as they desire to show dietary intakes that seem more aligned with a ‘healthy’ diet\textsuperscript{17}. There was also room for error in this study with those patients using the Easy Diet Diary iOS application, because it did not allow for recipes or supplements to be recorded, and there can be large variances in similar dishes/foods available to choose from. Effort was made to ensure all WFRs that were collected were double-checked for missing information with clarification of supplement intake, physical activity levels and cooking methods. Whilst there maybe underreporting in energy
intake for both before and on elimination diet groups, it seems to be at the same level with the
before elimination diet group reporting and average intake of 77% and the on elimination diet
group reporting an average intake of 78%.

It is recommended that future research assess the impact of supplements on the nutritional
adequacy of the elimination diet. The information gathered would be useful in determining the
need for multivitamin and mineral supplements during the elimination diet. With further
recruitment, the impact of varying degrees of dietary restriction of gluten, dairy and soy will
further inform dietary advice.

The results of this study provide information useful in the advice/recommendations given to
those undergoing the RPAH ED&CP.
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Conflict of interest

There is no conflict of interest to report.

Authorship

Imogen Hooper was the primary author involved in recruitment, data collection, entry and analysis, and writing the manuscript. Anna-Jane Debenham and Kristy-Lee Raso contributed to recruitment, data collection and data entry. Dr Robert Loblay, Dr Anne Swain, Brooke McKinnon, Carling Chan and Kirsty Le Ray were responsible for the study design and supervision.
References


Appendix 1. Telephone script used to identify suitable patients for the study, including the inclusion and exclusion criteria.
Appendix 2. Example of the spreadsheet used to code foods into their correct food groups and calculate quantity consumed.
Appendix 3. The above flow chart displays patient recruitment methods and sample size.

Appendix 4. The above flow chart represents how patients were split into groups for dietary intake analysis.
Appendix 5. Table 5a and 5b show the comparison of baseline dietary intake of; all initial weighed food records (n=116), all the initial weighed food records of those who were prescribed the elimination diet (n=88), all the initial weighed food records of those not prescribed the elimination diet (n=28) and all the initial weighed food records of those who gave both a before and on elimination diet weighed food record (n=31). This was done to ascertain whether the three subgroups of; prescribed elimination diet, not prescribed elimination diet and gave both WFR were representative of the all initial WFR group.