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## CONFERENCE ABSTRACT

### Abstracts of the 2014 British Dietetic Association Research Symposium

The 2014 BDA Research Symposium was held on the 3rd December in Birmingham, United Kingdom. The objectives of the event were to:

- Provide a forum for the presentation of research findings and methods in the field of nutrition and dietetics
- Foster collaboration between researchers within the dietetic profession
- Identify and share effective interventions and practice within the key topics of the symposium
- Stimulate an increase in the quantity and quality research in dietetics and nutrition
- Promotion of dietitians as leaders in the field of nutrition and dietetic research

#### Public Health Abstracts

##### PH1

#### **Green leafy vegetables increase plasma nitrate and nitrite, and reduce blood pressure – a randomised, crossover trial**

**A. Ashworth, K. Mitchell, J. Blackwell, A. Vanhatalo & A. Jones**

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**Background:** High blood pressure adversely affects many people in the UK and is a major risk factor for cardiovascular disease, costing the NHS approximately £1 billion in 2006<sup>(1)</sup>. Intake of green, leafy vegetables (high in nitrate) is associated with reduced risk of cardiovascular disease<sup>(2)</sup>. A systematic review of studies using inorganic dietary nitrate supplements and beetroot juice suggested that dietary nitrate can significantly reduce blood pressure (BP) via the nitrate-nitrite-nitric oxide pathway<sup>(3)</sup>. This study aimed to investigate the effect of providing green leafy vegetables over a 1-week period to healthy, pre-menopausal women on plasma nitrate, nitrite and BP.

**Method:** Nineteen healthy pre-menopausal women (mean (SD) age 20 (2) years), BMI 22.5 (3.8) kg m<sup>-2</sup>, were recruited via posters and by word of mouth. A randomized, crossover study design was used so that participants either avoided high nitrate vegetables (Control diet) or received a free vegetable box containing green leafy vegetables (HN diet), such as spinach, rocket and lettuce, celery, fennel and leeks, to provide up to five portions a day. Before and after

each 1-week intervention, resting BP and plasma nitrate and nitrite were measured. There was a 3-week wash out period between interventions. Compliance was assessed using self-reported food records. Two-way RM ANOVA was used to assess the effect of both diets on plasma nitrate, nitrite and blood pressure.

**Results:** Plasma nitrate was significantly higher after 1-week on the HN diet than after the Control diet (61 (44) versus 26 (10)  $\mu\text{mol L}^{-1}$ ,  $P = 0.002$ ). Plasma nitrite was significantly higher after 1-week on the HN diet than after the Control diet (185 (146) versus 101 (76)  $\text{nmol L}^{-1}$ ,  $P = 0.027$ ). Participants consumed a mean raw weight of 180 (75) g of HN vegetables/day, equivalent to approximately 339 (133) mg nitrate/day.

	Before Control Diet (mmHg)	After Control Diet (mmHg)	Before HN Diet (mmHg)	After HN Diet (mmHg)	Significance value ( $P$ )
Blood pressure					
Systolic	106 (8)	106 (8)	107 (9)	103 (6)	0.008
Diastolic	62 (5)	61 (6)	63 (7)	61 (5)	0.098
Mean arterial pressure	78 (6)	78 (6)	79 (7)	76 (4)	0.089

All data are shown as mean (SD) for 19 subjects.

**Discussion:** These results suggest that consumption of a variety of HN vegetables increased biomarkers of nitric oxide and reduced BP in pre-menopausal, healthy women by ~4 mmHg. These results are compatible with the findings of a systematic review which found reductions in systolic blood pressure of 4.2–4.5 mmHg, mainly in healthy young men, following inorganic nitrate supplementation<sup>(3)</sup>. Future studies could include individuals with raised blood pressure and investigate the effects of supplementation with HN vegetables on cardiovascular risk.

#### References

1. National Institute for Health and Clinical Excellence (2011) NICE clinical guideline 127: Hypertension: clinical management of primary hypertension in adults.
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3. Siervo M, Lara J, Ogbonmwan I *et al.* Inorganic nitrate and beetroot juice supplementation reduces blood pressure in adults: a systematic review and meta-analysis. *J Nutr* 2013; 143: 818–826.

## PH2

# A cross-sectional analysis to investigate the association between fruit and vegetable intake and mental well-being

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**Background:** Several studies have investigated the relationship between fruit and vegetable intake (FVI) and mental health, although most have used depression and anxiety as outcome measures. Staying mentally healthy is more than the absence of a psychological disorder; it includes life satisfaction and personal development<sup>(1)</sup>. The evidence regarding mental well-being (MWB) and FVI is limited to a longitudinal study from New Zealand<sup>(2)</sup> and a cross-sectional analysis from Scotland<sup>(3)</sup>. Both suggest a positive association between the two variables. The aim of this study was to investigate if there is an association between FVI and MWB in the English population.

**Methods:** This was a cross-sectional analysis which used data from the nationally representative Health Survey for England 2011 ( $n = 8610$ ,  $\geq 16$ ). FVI was measured with a frequency questionnaire. MWB was assessed with the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS)<sup>(1)</sup>. Multiple linear regression was used to investigate the association between FVI and MWB whilst adjusting for age, gender, BMI, alcohol intake, smoking status, income and illness.

**Results:** The mean (SD) FVI was 3.6 (2.6) portions per day. The mean (SD) WEMWBS was 51.6 (8.7) the minimum being 14 (lowest MWB) and the maximum 70 (highest MWB). Unadjusted regression analysis indicated that FVI was associated with a 0.353 (95% CI 0.290–0.417,  $P < 0.001$ ) increase in WEMWBS score. After adjustment the association remained statistically significant: 0.223 (95% CI 0.160–0.286,  $P < 0.001$ ), meaning for every portion of fruit and vegetables consumed, WEMWBS increased by 0.2. Confounding variables accounted for 37% of the association between fruit and vegetable intake and mental well-being.

**Discussion:** The results of this analysis were statistically significant but not clinically important. Putz *et al.*<sup>(4)</sup> suggest that the best estimate of a meaningful change in a WEMWBS score is between 3–8 points. The findings of this study indicate that between 13.5–35.9 portions of fruit and vegetables would need to be consumed daily to be associated with a meaningful change in MWB. These results are inconsistent with the previous studies which showed a meaningful positive association between FVI and MWB. However, the longitudinal study had a small sample size and only included University students limiting external validity, while the results of the cross-sectional analysis were inadequately presented. It is important to note cross-sectional study designs provide data about one time point, limiting causal inferences. FVI is positively associated

with MWB, yet the magnitude of the association here is too small to be clinically important, casting doubt on previous findings.

## References

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## Winner of the Yakult Prize for Public Health Nutrition

### PH3

# Evaluating the potential role of a commercial weight management organisation (CWMO) in type-2 diabetes management

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**Background:** Type-2 diabetes (T2D) is a major public health problem closely linked to being overweight and obese<sup>(1)</sup>. Management of T2D includes a number of lifestyle changes in order to reduce the risk of life-threatening macro- and micro-vascular complications. Weight management is highlighted as the principal strategy for managing blood glucose levels in T2D<sup>(2)</sup>. This research aimed to evaluate the impact of attending a CWMO on outcome measures in members with T2D.

**Methods:** Subjects completed a self-reported 31-point questionnaire, consisting of quantitative and qualitative questions about blood glucose levels, Body mass index (BMI), HbA1c, diet, activity patterns and the impact of weight on quality of life were assessed using a questionnaire which was published on the CWMO website for 2-weeks. Respondents were categorized by length of membership and weight, BMI, blood glucose and HbA1c results were analysed using paired *t*-tests to assess changes with attendance of the CWMO. 5-point Likert scales were used to determine changes in quality of life and activity habits since joining the CWMO. These questions were taken

from the validated Impact of Weight on Quality of Life (IWQOL) questionnaire<sup>(3)</sup>.

**Results:** Of the 2812 respondents with T2D, 552 successfully completed the questionnaire. Mean age was 53.1 ( $\pm$ SD 11.1) years, mean attendance 12.2 ( $\pm$ SD 20.6) months. For this analysis only respondents who had been members for >3 months ( $n = 394$ ) were included.

	Joining CWMO ( $\pm$ SD)	Current Weight ( $\pm$ SD)	% Difference	P Value
Weight (kg)	107.21 (23.40)	95.56 (21.72)	-10.87	$P < 0.001$
BMI(kg m <sup>-2</sup> )	39.33 (7.96)	33.90 (6.89)	-13.79	$P < 0.001$
Blood Glucose (mmol L <sup>-1</sup> )	11.29 (5.03)	6.52 (2.01)	-42.32	$P < 0.001$
HbA1c %	8.65 (2.15)	6.55 (1.32)	-24.36	$P < 0.001$

Summary Statistics for mean weight, HbA1c, blood glucose and HbA1c change, for respondents with T2D who had been members for more than >3 months.

Respondents reported significant improvement in their physical activity levels, physical functionality scores, measures of self-esteem, sexual life, public distress/weight stigma and working experiences ( $P < 0.001$  for all changes). The longer respondents had been members, the more likely they were to report an increased participation in physical activity ( $P = 0.02$ ).

**Discussion:** In this evaluation, CWMO members with T2D lost weight, reported improved blood glucose and HbA1c levels irrespective of how long they had been a member. Improvements in quality of life measures support previous research of CWMO having beneficial outcomes on weight and diabetes management<sup>(4)</sup>. The reported improved glycaemic control warrants further investigation using medical records to determine if CWMO could support weight management in type 2 diabetes.

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## PH4

### Four-week pilot cookery class to increase both confidence to cook and frequency of cooking from scratch in men over 65

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**Background:** Older men living independently have been identified as requiring community based food skills intervention to promote food consumption<sup>(1)</sup>. A case study undertaken in Australia by Byles<sup>(2)</sup> found that cookery classes aimed at men over the age of 65 increased nutritional knowledge and competency and may also prevent malnutrition. Despite an increase in the number of cookery classes for elderly men in the UK, there has been no published evidence to demonstrate the efficacy of these classes. The aim of this study is to evaluate the effect of cooking classes on both confidence to cook and frequency of cooking from scratch amongst men over 65.

**Methods:** Convenience sampling was used to recruit six men over the age of 65 from three 'lunch clubs'. The participants attended weekly 2.5 h cookery classes. Each class included preparation of one main course and one desert. The classes were supplemented by educational activities. All participants completed semi-structured questionnaires assessing both cooking knowledge and confidence before and after the study. Qualitative informal feedback was also collected throughout the study period. Ethical approval was not required for this study.

**Results:** On average five out of six participants attended each class. Of those who took part in the pilot, four lived independently and two lived in supported housing. Pre-questionnaires highlighted physical barriers including poor eye sight and lack of dexterity as the main deterrent to cooking. All participants self-reported an increase of confidence in their cooking ability ( $n = 6$ ), since undertaking the classes. Two participants reported cooking more meals from scratch. Both subjects lived in 'supported housing' rather than 'independent living.'

**Discussion:** Physical barriers posed the most significant constraint for cooking. Subjects reported: 'cookery classes were labour intensive,' adding the need for, 'an individual tutor to guide us.' However, the cost effectiveness of this approach may not be sustainable for future projects. Alternatively, running classes in day centres could potentially reduce costs of venue hire and transportation; allowing funding for added support. The higher subject involvement observed in those in 'supported housing,' is perhaps attributed to motivation from their communal network, with one subject stating: 'I take home leftovers to give to others in the house.' The use of convenience sampling reduces external validity of the findings, in particular in elderly men who do not attend the lunch clubs. Limitations of this study also include the small sample size.

**Conclusion:** These findings suggest elderly male cookery classes may be an effective intervention to build confidence with cooking skills. Their potential to improve overall nutritional

intake and reduce malnutrition warrants further investigation. Future developments of cooking classes should incorporate a cost-effectiveness element in order to maximise sustainability of such interventions.

## References

1. Byles, J. Final report: An Evaluation of the 'Cooking for One or Two' Cookery Skills Program. Research Centre for Gender, Health and Ageing. 2006. <http://www.newcastle.edu.au/Resources/Research%20Centres/GHA/Reports/cookingfor1or2-report.pdf> (Accessed 26th July 2014).
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## Practice Evaluation Abstracts Winner of the Yakult Prize for Practice Evaluation

### PE1

#### Short- and long-term weight loss outcomes of a dietetic led NHS adult weight management service: a service evaluation

**W. Anderson, A. Ashby, Z. Begum, K. Bevan, L. Cary, J. Chapman, L. Copeland, R. Craig, M. Davis, E. Dawson, L. Ferrigon, A. Harley, E. Humphreys, S. James, L. Jones, A. Kaur, J. Lampitt, C. Maddocks, F. Neal, G. Nickless, C. O'Malley, J. O'Sullivan, T. Overd, A. Parsons, N. Parton, S. Pritchard, N. Redpath, J. Reilly, J. Seal, J. Smith, J. Southan & P. Winch**

*Waistlines Adult Weight Management Service, Staffordshire and Stoke on Trent Partnership NHS Trust, Cannock, Staffordshire, UK*

**Background:** A range of weight loss interventions is available in the UK including commercial and NHS programmes. Guidance from the National Institute for Health and Care Excellence<sup>(1)</sup> describes the importance of employing a behavioural approach to support individuals to achieve and maintain lifestyle change. This service evaluation aimed to demonstrate the effectiveness of a patient-centred dietetic led NHS weight management service (DLNHSWMS) that is already meeting the recommendations set out by NICE<sup>(1,2)</sup> through evaluation of weight loss outcomes.

**Methods:** Patients aged  $\geq 16$  with a body mass index  $\geq 30 \text{ kg m}^{-2}$  without co-morbidities, or  $\geq 28 \text{ kg m}^{-2}$  with co-morbidities completing the DLNHSWMS between April 2013 and May 2014 had weight recorded using Marsden MPMS-250 Scales at initial assessment and again at 12, 24 and 52 weeks post-assessment ( $\pm 4$  weeks). All patients were provided with an intervention focussed on individual need, with the option to access one or more of the following: one-to-one appointments,

topic-based group workshops, weekly drop-in weighing sessions, free or reduced rate physical activity and cook and eat workshops. Patients saw a dietitian, weight management advisor/practitioner or a combination of staff depending upon clinical complexity. All staff providing the intervention were trained to deliver a behaviour change approach.

**Results:** 23% ( $n = 285/1227$ ) of patients attending for review achieved 5% or more weight loss at 12 weeks, 44% ( $n = 359/818$ ) achieved 5% or more weight loss at 24 weeks and 79% ( $n = 470/598$ ) of patients who completed the 12 month care pathway maintained weight loss from 24–52 weeks. Results were compared to weight loss outcomes delivered by other providers<sup>(13)</sup>. This showed that weight loss outcomes after 12 months in the DLNHSWMS were statistically greater than commercial providers (at  $P < 0.05$ ).

**Discussion:** Patients achieving 5% weight loss at 12 weeks in DLNHSWMS was 23% which is lower than outcomes achieved by commercial slimming clubs but higher than general practice (15.7%) and NHS group weight loss interventions (18%)<sup>(3)</sup>. However the number of patients achieving 5% weight loss at 12 months in DLNHSWMS was significantly greater than that with commercial slimming clubs thus demonstrating a long-term benefit that is not achieved by the commercial sector. This DLNHSWMS service is based on a patient centred behavioural intervention and adapted to individual patient needs. It is likely that this approach maximises patient engagement and motivation to change providing sustained weight loss benefits.

## References

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2. NICE. (2014) Managing overweight and obesity in adults – lifestyle weight management services. PHG53.
3. Jolly K, Lewis A, Beach J. *et al.* Comparison of range of commercial or primary care led weight reduction programmes with minimal intervention control for weight loss in obesity: Lighten Up randomised controlled trial. *BMJ* 2011; 343:d6500.

### PE2

#### The effects of oats in the diet of individuals with coeliac disease: a systematic review

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**Background:** While the inclusion of oats in the diets of individuals with coeliac disease (CD) can lead to greater diversity in the diet and add nutritional value, the use of oats remains controversial. The World Gastroenterology Organisation<sup>(1)</sup> has stated that  $<5\%$  of those affected with CD should not eat pure oats. Coeliac UK supports this statistic and states that 5% of coeliac individuals may react to pure oats<sup>(2)</sup>. However, recent evidence now suggests that as many as 20% of individuals with CD react to pure oats<sup>(3)</sup>. It has been hypothesised that the



prolamine content, which is thought to trigger the immunological response, is lower in oats compared to that of other grains i.e. 5–15% in oats and 30–50% in wheat, rye and barley<sup>(4)</sup>. Thus, while the intolerant component is present in oats, its activity could be potentially weaker. The aim of this systematic review was to critically appraise the best available evidence on the effects and safety of including oats in the diet of individuals with CD.

**Method:** Cochrane Library, Pubmed, EBSCOhost (CINAHL) and Google Scholar searches were conducted by the lead author. Studies that analysed the effects of oats in the diets of adults with a diagnosis of CD were included. Two types of study designs were included: (a) systematic reviews that included RCT's (with other study designs within these systematic reviews being excluded from analysis) and (b) RCT's. Studies that assessed either one or a combination of the following outcomes: histological, serological, reported symptoms and quality of life measures, were included. A good quality systematic review was found, which included a computerised literature search up until the year 2005. Therefore, the search included this systematic review and was targeted to retrieve citations published between 2005–2012, using the key words oat\* and coeliac disease or celiac disease and gluten free or gluten free diet. The searches yielded a total of 75 studies, potentially relevant titles and abstracts. Five studies met all of the inclusion criteria for this review. Studies were appraised using the CASP tool and risk of bias was assessed. Two of the five studies appraised were excluded.

**Results:** Three studies were included: one systematic review with four of its studies meeting the inclusion criteria (total of 286 individuals) and two RCT's (total of 74 individuals). All studies showed that oats were well tolerated in individuals with CD. Considerable variation in study design (e.g. outcome measures, patient inclusion criteria and length of trials) made it difficult to compare the studies. Significant methodological flaws were noted in all studies including small sample sizes, no details of randomisation methods and losses to follow up.

**Discussion:** This systematic review suggests that the studies analysed lack methodological rigour and are substantially flawed. Therefore it cannot be concluded that oats are safe. To ensure oats are safe for individuals with CD and to guide oat trial policies, further research utilising large-scale studies with adequate sampling and sound methodology is required.

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## PE3

### A retrospective evaluation of enteral feeding and nutritional outcomes in head and neck cancer patients

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**Background:** Patients undergoing treatment for head and neck cancers are at an increased risk of malnutrition due to tumour location and treatment toxicities. Enteral feeding is common practice. The optimal method of enteral feeding, nasogastric or gastrostomy, has not been established<sup>(1)</sup>. The aim of this study was to evaluate the use and duration of enteral feeding and weight change at an oncology hospital, considering the different nutritional interventions in order to inform future practice.

**Method:** Fifty-two patients receiving treatment for head and neck cancers were identified retrospectively using a patient management system. Adult patients who received treatment for head and neck cancers between April 2012–2013, were referred to hospital dietitians and who resided locally were selected. Accessing dietetic and medical records enabled the identification of patient demographics, co-morbidities, disease demographics and staging, oncological treatment, feeding route and duration, and weight change pre and post treatment. Subjects were grouped by treatment duration and feeding route.

**Results:** Ninety-six percent of the 7 week treatment group and 68% of all patients experienced clinically significant weight loss of >5% during the study period. Gastrostomy tube-fed patients receiving 6 or 7 weeks of treatment experienced 9% ( $n = 4$ ,  $SD \pm 4$ ) and 8% ( $n = 16$ ,  $SD \pm 4$ ) mean weight loss respectively, by the final week of treatment. Nasogastric tube-fed patients receiving 6 or 7 weeks of treatment experienced 14% ( $n = 3$ ,  $SD \pm 9$ ) mean weight loss as a group. All gastrostomy tubes cited were used to feed for a mean duration of 5 months ( $n = 14$ ,  $SD \pm 5$ ) and were in place for 8 months ( $n = 18$ ,  $SD \pm 5$ ) at the time of audit in April 2013. The mean duration of nasogastric tube feeding was 4 months ( $n = 3$ ,  $SD \pm 1$ ).

**Discussion:** Greater weight loss was associated with nasogastric tube placement. These tubes are, however, often placed reactively after poor intake has occurred and efforts to control treatment-related symptoms have been made. Extended roles to manage first line symptom control and the introduction of an enteral feeding protocol, designed to identify placement criteria, may minimise weight loss. The strength of the findings of the study was limited by heterogeneity of the disease and treatment types, in addition to variable sample sizes. Gastrostomy tube feeding was associated with less mean weight loss in this study. Optimal feeding methods may depend on the expertise and facilities of each treatment centre. Quantification of the duration

of enteral feeding has led to improved informed consent and helped address the expectations of treatment. Future efforts should be focussed on comparing the nutritional management of this patient group between Trusts and researching any link between nutritional status and treatment outcomes.

## References

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## PE4

### Developing measures to assess dietetic effectiveness - therapy outcome measures

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**Background:** It is challenging to identify single measures of the impact of clinical interventions that are appropriate to meet the needs of the whole dietetic caseload. This has led to failure to identify the impact of specific dietetic services and nutritional interventions. There are no validated outcome measures for dietetic interventions and the BDA<sup>(1)</sup> has therefore produced guidance, covering six domains, to improve practice and demonstrate clinical and cost effectiveness. The only measure that included all six of these domains was the Therapy Outcome Measure (TOM)<sup>(2)</sup>. The aim of this study was to develop and implement dietetic TOMs to establish whether interventions are effective. Once an appropriate measure has been developed and implemented we would aim to use this to improve reflection on practice; support service development and improvement. With a suitable measure it will be possible to demonstrate services are clinically and cost effective, efficient, responsive and equitable.

**Methods:** A literature review was undertaken to identify the most suitable measures for a community dietetic caseload and TOMs were identified as the outcome measure of choice. Training in TOM methodology was undertaken and subsequently cascaded to all staff in the Leeds Community Healthcare (LCH) Dietetic Service. Following a review of whole service caseload, commissioning requirements and need, we identified six clinical areas that would provide a TOM for patients accessing the service: obesity; undernutrition; home enteral feeding; diabetes; irritable bowel syndrome (IBS) and cardiovascular disease (CVD). Six working groups were developed for each of the areas. Following training and peer benchmarking, each working group adjusted the relevant TOM data set to ensure consistency. We undertook a 6 month pilot, firstly with case notes, and then with patients, to test usability, validity, reliability, as well as issues of recording and reporting the data, assessed through qualitative focus groups.

**Results:** The findings of the 6 month pilot to develop the tools, are shown in the table below.

Qualitative Findings - Focus Groups on the Development of TOMs

Measure	Method	Findings
Usability	Qualitative Focus Group Discussion	Simple, easy to understand and implement, time effective
Reliability	Qualitative Focus Group Discussion Quantitative Data from Pilot – 1. case notes and, 2. in practice	Consistent measure after training Maximum difference in score 0.5, mean difference in change <0.5
Recording	Qualitative Focus Group Discussion	(Initially paper then electronic) Easy to record on SystmOne
Reporting	Qualitative Focus Group Discussion	(Initially paper then electronic) Needs additional analyst support

**Discussion:** The literature review and development work suggest that TOMs provide a means of demonstrating clinical and cost effectiveness of dietetic interventions. They could be used to discuss interventions at both practitioner and service level, to enable reflection, improvement and job satisfaction. The next stage is to implement these tools and understand their ease of use; reporting and analysis requirements; ability to demonstrate clinical and cost effectiveness and, potential to improve practice. All service users will have at least two outcome measures recorded. The development of dietetic TOM's in LCH is the first step towards enabling us to assess our effectiveness, make improvements, demonstrate to all of our 'customers' the effectiveness of what we do. This helps to ensure that we continue to improve and deliver the best possible care to the population of Leeds. The next stage is implementation and evaluation in clinical practice.

## References

1. British Dietetic Association (2011) Model for Dietetic Outcomes.
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## PE5

### Evaluating clinical dietetic effectiveness using Therapy Outcome Measures (TOMs)

**C. Weir, S. Search & K. Johnson**

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**Background:** The current context of commissioning and service efficiency targets means dietitians are required to demonstrate the quality and impact of their interventions. The aim

of this evaluation was to explore if six dietetic TOMs developed by Leeds Community Healthcare NHS Trust (LCH)<sup>(1)</sup> could be used to enable the service to: identify the effectiveness of dietetic interventions; improve reflection on practice and job satisfaction; support service development and improvement and, provide evidence that services are clinically and cost effective. This study presents the results of the first 6 months of use in practice after a 6-month pilot.

**Methods:** The six TOMs developed were obesity, undernutrition, home enteral feeding (HEF), diabetes, irritable bowel syndrome (IBS) and cardiovascular disease (CVD). After piloting, all service users had a baseline TOM recorded by their dietitian at first appointment from September 2013, with appropriate mid-point and/or discharge TOM data recorded on SystmOne using a template. Quantitative analysis of change in TOM scores over the 6 months were analysed for all interventions, by TOM and by Team. Focus groups were undertaken with the staff to understand how TOMs could contribute to service quality and clinical practice.

#### Results:

**Table 1** Outcomes of the 6-month evaluation.

TOM	Completers	Median Change (arbitrary units)	Range (arbitrary units)
ALL	137	0.5	−0.5 to +2
Adult	18	1	
By team			
Undernutrition	111	0.5	0 to +2
HEF	8	0.5	0 to +1
By TOM			
Undernutrition	112	0.5	0 to +2
HEF	8	0.5	0 to +1
Diabetes	11	1	0 to +1

**Table 2** Qualitative focus group themes

Measure	Key Themes Identified
Effectiveness	Offers a quantitative score to help understand effectiveness
Reflection	Improves opportunity for reflection and guided discussion re areas for improvement
Satisfaction	Improves understanding of effectiveness which improves satisfaction Opportunity to demonstrate value/outcomes to MDTs, commissioners, service users
Areas for Improvement	Not yet embedded in practice – forget to record Insufficient numbers over the 6 month period in some teams/TOMs Analysis needs resourcing
View of TOMs	Beneficial, Supportive of practice, Clinically-led Opportunity for commissioning conversations about effectiveness & complexity of caseload

**Discussion:** The findings demonstrate an average change of 0.6 units which is deemed clinically significant (>0.5) for 137 of 601

service users who completed treatment within 6 months. Qualitative findings identified that developing TOMs has brought about a cultural change in how dietitians perceive their practice and reflect on both practitioner and intervention effectiveness. TOMs have led to change in practice discussions. Further work and greater numbers are required to embed TOMs, and understand how to develop and improve practice. TOMs are just part of the information about effectiveness. They should not be the only measure and it is essential not to give too much importance to a single outcome. TOMs appear to provide a means of demonstrating clinical and cost effectiveness, are a useful tool to discuss interventions at both practitioner and service level, to enable reflection, improvement and job satisfaction. The evaluation of the first 6 months of dietetic TOMs in LCH has demonstrated that TOMs can enable us to demonstrate to our ‘customers’ the effectiveness of what we do, to ensure we continue to improve and deliver the best possible care to the population of Leeds.

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#### PE6

#### A service evaluation of patients diagnosed with a subarachnoid haemorrhage requiring dietetic intervention at a tertiary referral centre

C. Johnson,<sup>1</sup> J. Darzi<sup>1</sup> & K. Green<sup>2</sup>

<sup>1</sup>Diabetes and Nutritional Sciences Division, King's College London, London, UK and <sup>2</sup>Department of Nutrition and Dietetics, National Hospital for Neurology and Neurosurgery (NHNN), London, UK

**Background:** A number of recommendations were found in the literature for estimating the nutritional requirements of patients with subarachnoid haemorrhage (SAH) (see previous abstract). The primary aim of this service evaluation was to establish whether the Taylor<sup>(1)</sup> recommendations for estimating energy and protein requirements requirements after SAH are executed by dietitians at the NHNN.

**Methods:** A retrospective service evaluation was carried out to compare prescribed energy and protein requirements of all patients diagnosed with a SAH and referred to dietetic services at the NHNN over a 2 year period with hypothetical calculations using the Taylor<sup>(1)</sup> recommendations as follows: BMR was calculated using the Harris & Benedict<sup>(2)</sup> calculation, the mild SAH stress factor (SF) was used for patients with a Hunt Hess grade of 1–2 and the severe SAH SF for patients with a Hunt Hess grade<sup>(3)</sup> of 3–5 SAH (requirements were not calculated for patients with an ungraded SAH). Median values were compared using the Wilcoxon Signed Rank statistical test.

**Results:** Data from 139 patients (39% male) aged 18 to 91 years was analysed. Statistical analysis showed median prescribed total energy and energy per kg were both significantly greater than



median recommended total energy and energy per kg (both  $P \leq 0.001$ ). There was no significant difference between prescribed and recommended SF ( $P = 0.391$ ). Median prescribed total protein and N per kg were both significantly lower than median recommended total protein and N per kg (both  $P \leq 0.001$ ).

	Prescribed	Taylor (2007)	<i>P</i> value <sup>1</sup>
<i>N</i>	136	88	
Total energy (kcal day <sup>-1</sup> )	1982 (1829–2265)	1839 (1634–2096)	$\leq 0.001$
Energy per kg (kcal kg <sup>-1</sup> d <sup>-1</sup> )	28.8 (26.0–33.1)	25.7 (24.0–28.4)	$\leq 0.001$
SF (%)	30.0 (20.0–31.9)	38.0 (19.0–38.0)	0.391
<i>N</i>	136	136	
Total protein (g day <sup>-1</sup> )	78.8 (70.0–88.0)	91.9 (78.8–107.3)	$\leq 0.001$
N per kg (g kg <sup>-1</sup> d <sup>-1</sup> )	0.18 (0.18–0.19)	0.21 (0.21–0.21)	$\leq 0.001$

Values displayed as median (IQR), <sup>1</sup>Wilcoxon Signed Rank

**Discussion:** The reason applying the Taylor<sup>(1)</sup> SF to initial energy requirement calculations did not translate into arriving at the recommended total energy and energy per kg values is because the usability of the Taylor<sup>(1)</sup> recommendation is limited by the fact that BMR is calculated using the Harris & Benedict<sup>(2)</sup> equation which is not currently used in clinical practice. The Taylor recommendation<sup>(1)</sup> is also limited by the fact it cannot be applied to patients with an ungraded SAH (35.3% of this cohort). This service evaluation was limited in scope as it was retrospective, restricting the data to what had already been collected. The population only included those patients referred to dietetic services and dietetic management data was only available from time of referral. In conclusion the Taylor recommendations<sup>(1)</sup> for estimating energy and protein requirements after SAH significantly differ from those prescribed by dietitians at the NHNN. The difficulty in interpreting and applying current recommendations is a barrier to dietitians working in this field. Future research should

focus on producing a SF that can be applied to a BMR calculation that is commonly used in clinical practice.

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## PE7

### A literature review of studies investigating the nutritional requirements of patients with subarachnoid haemorrhage

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**Background:** Subarachnoid haemorrhage (SAH) causes a metabolic response that resembles moderate to major trauma. No guidelines or comprehensive reviews on the nutritional requirements of patients following SAH currently exist. The present review aimed to identify and evaluate methods for estimating requirements for this patient group.

**Methods:** Medline was searched using the following method: (subarachnoid haemorrhage OR intracranial haemorrhage OR intracranial aneurysm OR haemorrhagic stroke) AND (nutrition\* OR diet\* OR energy OR protein OR nitrogen). Articles referring exclusively to extradural, subdural or intracerebral haemorrhage or aneurysm were excluded. All articles were reviewed and summarised in the table below.

**Results:** Seven recommendations for estimating energy requirements and one for estimating protein requirements

Author	Year	N	△	Surgery	Cortico-steroids	Sed	Vent	Nut	BMR	Condition	SF (%)	g N/kg/d
Piek et al	1989	19	ICH	Not stated	All	All	None	PN	Boothby et al 1936	N/A	20	
PENG (based on above study)	2011	..	..	..	..	..	..	..	Henry 2005	N/A	30	
Touho et al	1990	24	ICH+SAH	All	None	None	None	IV gluc	Kleiber 1965	Preop Postop	29 41	
Hersio et al	1993	8	SAH	All	All	Not stated	None	IV gluc	Harris&Benedict 1919	Preop Postop	18 25	
Kasuya et al	1998	36	SAH	All	None	None	None	PN	Harris&Benedict 1919	Day 4 Day 10 Discharge	51 72 39	0.21 0.24 0.13
Taylor (based on above study)	2006	..	..	..	..	..	..	..	Harris&Benedict 1919	Grade 1-2 Grade 3-5	19 38	
Esper et al	2006	14	ICH	64.3%	None	68.8%	All	EN	Harris&Benedict 1919	N/A	26	

△=diagnosis, Sed=sedated, Vent=ventilated, Nut=nutrition, BMR=basal metabolic rate, SF=stress factor, ICH=intracerebral haemorrhage, PN=parenteral nutrition, SAH=subarachnoid haemorrhage, IV=intravenous, gluc=glucose, EN=enteral nutrition

after SAH were identified based on five observational studies. In all studies, energy requirements were determined as the difference between predicted energy expenditure (EE) and actual EE measured by indirect calorimetry (IC) in order to produce a stress factor (SF). Protein requirements were derived from 24-h urinary nitrogen excretion per kg.

**Discussion:** Dietitians working in this field should balance the evidence base and clinical reasoning to select which guideline would be more suitable for their patient. Recommendations based on studies with particularly low numbers, that included patients with other forms of brain haemorrhage or were published earlier need to be interpreted with caution. It would also be necessary to use the correct method of calculating basal metabolic rate (BMR) for that study. In conclusion there is a lack of consensus over the nutritional requirements of patients with SAH. In order to resolve this an adequately powered multicentre study using IC and urine analysis under all clinical conditions in order to determine energy expenditure and protein catabolism is needed.

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## Malnutrition Abstracts

### M1

#### Evaluating the effect of Food First nutritional training across the East of England

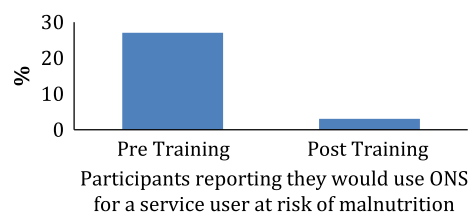
**G. Atwell, C. Forbes, B. Gibbens & V. Romano**  
Dietetic Department, Dunstable Health Centre,  
Bedfordshire, UK

**Background:** Malnutrition in the UK costs the NHS approximately £13 billion per year<sup>(1)</sup>. Research has shown that over a third of the cost of malnutrition can be attributed to the treatment of care home residents<sup>(2)</sup>, although only 5% of malnutrition occurs in this setting<sup>(3)</sup>. One suggestion for reducing costs

is to increase nutritional training available to staff<sup>(4)</sup>. This study reports a preliminary exploration of the impact of Food First (FF) training on nutritional knowledge in the East of England (EOE).

**Methods:** Nursing and residential homes in the EOE registered to provide care to 10 or more residents were invited to attend a 2 h training session at location close to them. The content in each training session was homogeneous and delivered by members of the FF team. Quantitative data was collected by questionnaire pre-training and immediately after training, to assess knowledge and perceptions of nutritional care.

**Results:** One hundred and seventy-one care home staff from 103 care homes, predominantly. Participants reporting they would use ONS for a service user at risk of malnutrition management and catering staff, attended the training. 96% rated nutritional care as 'extremely important'. Following training, 71% of participants stated they would now use 'FF' methods to increase calorie intake and there was a significant decrease (Mann-Whitney *u* test,  $P = 0.008$ ) post-training in the number of participants who reported they would use oral nutritional supplements (ONS) to improve nutritional status (see Figure). Overall 96% of participants reported an increase in their awareness of nutritional care and 99% would recommend the training to others.



**Discussion:** Participants perceived themselves to have increased nutritional knowledge after only 2 h of training and reported they would use techniques learned in their workplace. There is a willingness by staff to provide excellent nutritional care and local and results suggest an interest in further FF training to support this. The trainers did not focus their attention on ONS, but gave advice on 'food based' approaches to tackling malnutrition, which in turn equipped participants with the confidence to reduce reliance on ONS. However, a limitation of this evaluation is that it has not been possible to evaluate the impact of the seminars on behaviour in the workplace. The findings confirm FF training increases perceived nutritional knowledge but the impact of this on the nutritional care delivered needs to be evaluated further.

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## Winner of the Yakult Prize for Malnutrition

### M2

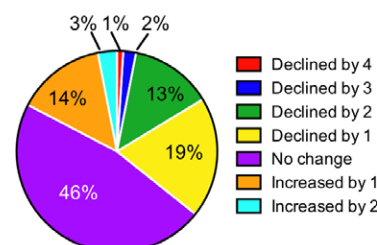
#### Nutritional outcomes of care home residents 6 months after Food First advice

**C. Forbes, S. McIntyre, V. Romano, J. Wells, S. Beames, S. Boxer, M. Dewar & L. Arthur**  
*Department Dietetics, Dunstable Health Centre, Priory Gardens, Dunstable, UK*

**Background:** Since 2010 the SEPT Food First team have worked to improve the identification and management of malnutrition in the community. In care homes, the team support staff to focus on individualising nutritional care, using real food that is familiar and enjoyable rather than relying on prescribed oral nutritional supplements (ONS). Although it has been shown that elderly people can achieve good nutritional status through food fortification and use of high energy snacks<sup>(1)</sup>, it is argued that ONS is the only nutrition support method that has a strong evidence base<sup>(2)</sup>. The aim of this study was to assess whether the use of food based management plans in care homes leads to weight gain and reduced MUST scores 6 months after the episode of dietetic care.

**Methods:** All care homes with more than 10 beds in Luton and South Bedfordshire receive on-going Food First training and support and have open access to a Food First dietitian. Referred residents at risk of malnutrition are managed using food fortification wherever possible. Outcome data, including weight, BMI and MUST score, is collected on referral and 6 months after each dietetic episode of care and this was analysed as a whole sample.

**Results:** From January 2011 to December 2013, 669 care home patients were referred to the Food First team for advice. On referral 20% were at low risk of malnutrition and 50% at high risk of malnutrition on assessment with the MUST tool. Half



**Figure 2** Change in MUST score 6 months dietetic intervention.

of patients reviewed ( $n = 372$ ) were available to have their dietetic outcome collected 6 months after their episode of dietetic care. Of these, 334 (92%) continued to be managed using food based interventions only and their BMI averaged  $20.3 \text{ kg m}^{-2}$  ( $\text{SD} = 4.5 \text{ kg m}^{-2}$ ). The majority, 82%, of patients on food alone had gained or maintained their weight (Figure 1). The highest weight gain seen was 14.9 kg and 13 patients had gained more than 10 kg after dietetic intervention. On average weight gain was just 4.1 kg and almost half of patients saw no change in their MUST score, although 35% did have improved MUST scores (see Figure 2).

**Discussion:** The high percentage of patients who either increased or maintained their weight suggests dietetic advice can improve the nutritional status of patients at risk of malnutrition in care homes. Further investigation of the data to understand the impact on patients at medium and high risk of malnutrition would be useful and also to explore if there are differences between advice based on ONS and food based interventions. The data suggest that MUST scores are not a sensitive outcome measure.

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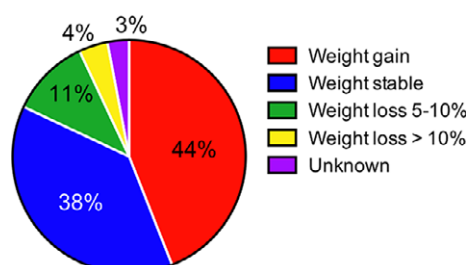
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### M3

#### Initial findings from survey of public perceptions of the food provided in care homes

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*Department of Nutrition and Dietetics, Dunstable Health Centre, Dunstable, UK*

**Background:** A recent YouGov survey family and friends of care home residents found over 80% of respondents felt it was very important to have good quality food available<sup>(1)</sup>, while

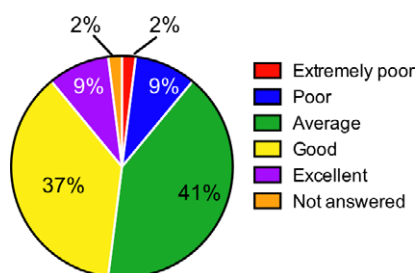


**Figure 1** Weight history 6 months after dietetic intervention.

residents themselves report food is one of the biggest contributors to their quality of life<sup>(2)</sup>. This study reports the findings of a survey which aimed to give the public a further opportunity to share their opinions, from experience, on care home food and their suggestions to improve it.

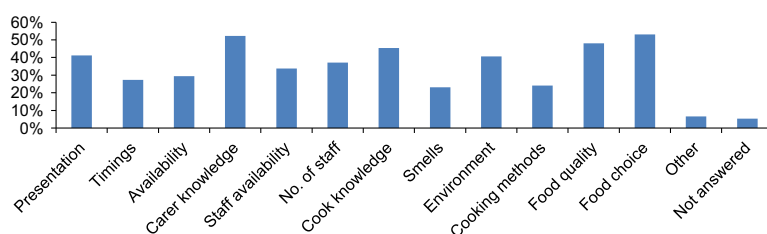
**Methods:** A short survey (15 questions) was set up using SurveyMonkey Inc. to explore views and experiences of food in care homes. Links to the survey were shared through professional and social networks and paper copies handed out at supermarkets and health events. There were no exclusion criteria as the sample was self-selecting with respondents asked to consider the care homes they were most familiar with.

**Results:** Between April and July 2014, 337 responses were received. Most respondents were friends and family of service users (37%), care home staff (32%) or healthcare professionals (27%). Nursing and residential homes were the types of homes most frequently considered. The quality of care home food was considered to be average or better (Figure 1) and 63% of people were satisfied or very satisfied with the food served. Popular improvement suggestions included increasing staff knowledge, food choice and food quality (Figure 2).



**Figure 1** Overall quality of care home food

**Discussion:** Although a sample size was low, and potentially including responses influenced by media reports, the results from this survey are useful. They identify where dietetic input could help care homes provide good quality food, which in turn could reduce the need for nutrition support<sup>(3)</sup>. Training for care home staff and assistance with menu planning, to maximise food choice and quality on a budget, are particular areas where dietetic teams could have a positive impact. The results suggest that although people are satisfied with care home food, there is room for improvement and dietitians could support this in a range of capacities.



**Figure 2** What would improve the food and drink offered in care homes?

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## M4

### Impact of training on nutritional care for those at risk of malnutrition in residential and nursing homes

**B. Gibbens, J. Wells, E. Tildesley, G. Atwell & C. Forbes**

*Department of Dietetics, Dunstable Health Centre, Dunstable, UK*

**Background:** Malnutrition in the UK affects over 3 million people and often goes unrecognised across all health and social care settings, including care homes<sup>(1)</sup>. To decrease cost to the NHS and improve the health of vulnerable people at risk of malnutrition, there needs to be more staff training<sup>(2)</sup>. With little evidence available regarding the impact of training on nutritional care, this study evaluates whether Food First training empowers staff to manage and identify malnutrition in care homes and whether this has led to improvements in nutritional care.

**Method:** Six different residential and nursing homes who received Food First training were invited to six different focus groups with 4–8 participants. In total 34 participants attended the groups (seven management, three nurses, seven catering and 17 carers). All participants agreed to recording and analysis of their discussions to support service improvement. Verbal consent was obtained from managers and participants. The focus groups were semi-structured interviews recorded on a digital recorder and transcribed verbatim. The method of Colaizzi<sup>(3)</sup> and interpretative phenomenological analysis (IPA)<sup>(4)</sup> were used for analysis.

**Results:** Three key themes were identified throughout the analysis, as shown in the table below.

Theme	Definition	Example quote
Knowledge	Awareness of malnutrition and how to manage appropriately	Training was a great help, and when we updated information it was easy for us to do
Self-belief	Reflection following training allows staff to explore change to overcome barriers	On my tea rounds I will make up the drinks differently now
Experience	Comparing past experiences with present experience	Since Food First, not as many residence have pressure sores

**Discussion:** The findings from the focus groups indicated self-reported positive change resulting from multidisciplinary training. Using qualitative data enables us to see practice examples of how staff have changed their practice as a result of the training provided, and also enables the service to take a more individualised approach to care homes who receive the Food First approach. However there were some inconsistencies regarding when and how to refer to dietitians, future training needed to increase knowledge around this area. This research suggests that Food First nutrition training can influence staff knowledge and confidence to improve their practice. Future research is recommended to explore changes to nutritional care.

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## M5

### A prospective audit exploring malnutrition in respiratory inpatients

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**Background:** Chronic obstructive pulmonary disease (COPD) is the second most common reason for emergency admissions to hospital and one of the most costly inpatient conditions to be treated by the National Health Service<sup>(1)</sup>. Nutritional support improves total intake, anthropometric measures and grip

strength in COPD patients<sup>(2)</sup>. The aim of this audit was to compare Malnutrition Universal Screening Tool (MUST) scores against dietetic referrals for respiratory patients.

**Methods:** A prospective audit was conducted on all respiratory inpatients on three respiratory wards in one university hospital over a 3-week period. Patients with cystic fibrosis were excluded. The MUST score of all new admissions were recorded together with information on dietetic referrals over the same time period for comparison.

**Results:** Data was collected for 111 new admissions (29 male, 82 female). MUST was completed in 89 patients (80%). There were 70 patients (78%) with a diagnosis of COPD, of which 38 (54%) were referred to the dietitian. Twenty-one (24%) of these patients had a MUST score of two or above, whereas 32 (45%) patients had a MUST score <2 and were referred on nurses clinical judgment.

**Table 1** MUST and number of referrals comparison

	Total number of patients	Patient with COPD
MUST score > 2	25	21
MUST score 0–1	64	32
MUST not completed	22	17
Total number of patients	111	70
Total number of referrals to dietitian	48	38

**Discussion:** The results of this audit show that MUST appears to underestimate the number of patients at risk of malnutrition on respiratory wards. NICE<sup>(3)</sup> suggests that weight loss of more than 3 kg should be acted upon however MUST does not recognise this guideline. Patients with chronic conditions, such as COPD, often have weight loss over a longer period of time than 6 months, which is not highlighted by MUST. Nursing staff used their clinical judgment as well as MUST when referring patients that were at risk of malnutrition. Although the majority of referrals based on clinical judgment were deemed appropriate by dietitians, it questions whether MUST was completed accurately and whether further training for nursing staff would improve this. MUST was completed for the majority of patients on our respiratory wards, but further training and education is needed to address both MUST completion as well as nursing clinical judgment in making referrals for patients at risk of malnutrition. A proactive outcome could be to consider adding disease specific questions to the screening tool to enhance MUST for this ever-growing patient group.

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## M6

### Evaluation of a community dietetic-led service to improve the care of patients at risk of malnutrition and reduce inappropriate prescribing of oral nutritional supplements

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**Background:** Malnutrition is both a cause and consequence of disease, affecting at least 3 million UK adults<sup>(1)</sup>, costing the NHS £13 billion year<sup>-1</sup> <sup>(2)</sup>. Food should be first line treatment<sup>(3)</sup> but oral nutritional supplements (ONS) are often inappropriately prescribed to treat malnutrition<sup>(4)</sup>. In 2011/12 the annual spend on ONS in Leeds was approximately £1.9 million for around 1500 patients. This study reports the impact of a dietetic-led service to improve care of at-risk patients. In the first year (2013/14) this service, aimed to raise awareness of the need to identify and treat malnutrition; promote 'food first' principles; implement and improve appropriate prescribing practices; improve malnutrition care pathways to ensure the best outcomes for Leeds residents and receive 1000 new patient referrals, with 3000 patient contacts and savings of £300 000.

**Methods:** The service was evaluated quantitatively and qualitatively to assess the measures shown in the table below.

Measure	Method of Measurement
1. Raise awareness - need to identify and treat malnutrition	Quantitative – GP practices engaged, referring to team, nos of referrals Qualitative feedback from stakeholders
2. Promote 'food first' principles	Quantitative – no of service users trying 'food first', never needing ONS
3. Implement & improve prescribing practices	Quantitative – prescribing using formula & savings database Qualitative feedback from stakeholders re prescribing formula
4. Improve malnutrition care pathways to ensure the best outcomes for Leeds residents	Pathways implemented across Leeds, info sharing with Leeds Teaching Hospital Trust & Leeds & York Partnership Foundation Trust Outcome Measure – undernutrition Therapy Outcome Measure (TOM) for all service users implemented and indicating improvement
5. 1000 new patient referrals, with 3000 patient contacts	Quantitative nos – referrals and contacts - SystmOne
6. Achieve savings of £300 000	Quantitative – savings database

**Results:** The achievement of the service aims in the first full financial year of activity (Apr13-Mar14) is shown in the table below.

Outcome	Achieved	Discussion
Raising Awareness: No. of new referrals	2926	Three times greater number of referrals than predicted & >4 times the same time period last year. ALL Leeds GP Practices referring
Food First Approach	832	Leeds Eating and Drinking Team has prevented some patients ever requiring supplements by ensuring a food first approach.
Inappropriate Prescribing	1188	Reduced inappropriate prescriptions by ensuring a food first approach, using a prescribing formula & engaging GPs.
Number of contacts	6866	This is more than twice the number of contacts required.
Potential savings	>£3 million	Savings target exceeded, using commissioner agreed formula regarding potential savings and a reduction in real spend
Outcomes (improvement in TOM score)	>0.5 mean change	Therapy Outcome Measures (TOM) for undernutrition were developed by the department and measured for all service users, showing a >0.5 improvement, which is deemed to be clinically significant.

**Discussion:** Raising awareness of malnutrition led to a four-fold increase in referrals. Savings were generated by ensuring the right patient is on the right product, at the right time and for the right length of time. The increase in referrals, activity and improvements in outcomes demonstrate the need for a community dietetic-led service. Additional and recurrent investment has been secured in recognition of the referral rate, improvements in outcomes and savings. Dietetic-led interventions for reducing the risk of malnutrition can be successful in raising awareness, improving pathways, achieving clinical improvements and significant savings. The findings of this service could be used to demonstrate the benefits of a dietetic-led service to address malnutrition in other areas to achieve similar clinical and cost improvements.

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## Dietitians New to Research Abstracts

### NTR1

#### **A comparison of the nutritional content of 'healthy' ready meals sold in the UK with the 'traffic light' nutrition labelling system, including an investigation of 'healthy' and 'weight-loss' ready meal categories**

**M. Ameen-Khan & D. Lycett**

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**Background:** Ready meals have been associated with poor nutritional quality<sup>(1)</sup> and obesity<sup>(2)</sup>. However, there is a growing range of 'healthy' ready meals available, many of which do not contain 'front of pack labelling', and no studies have yet investigated their nutritional quality. This study aimed to investigate whether 'healthy' ready meals do in fact fall into the healthy category of the 'traffic light (TL)' guidelines.

**Methods:** A quantitative, descriptive study was conducted to investigate the sugar, fat, saturated fat and salt content per 100 g of 'healthy' ready meals 'healthy' sold by three major UK supermarkets ( $n = 81$ ) and one independent retailer ( $n = 40$ ). The nutrient data was compared to the 'low' threshold for each nutrient in the TL guidance using a one sample *t*-test. The meals were divided into healthy-choice and weight-loss options and the total calorie content and portion size of each meal was also collected. The study investigated variations in the nutritional profile, calorie content and portion sizes per meal between brands.

**Results:** The sugar (2.4 g per 100 g), fat (1.7 g per 100 g) and saturated fat (0.7 g per 100 g) content in the 'healthy' ready meals were significantly lower ( $P < 0.001$ ) than the green/low traffic light threshold. Salt content (0.4 g per 100 g) was significantly higher ( $P < 0.001$ ) than the green/low 'traffic light' threshold per 100 g and fell into the medium/amber category. Fat and energy content were significantly higher in the healthy-choice compared to the weight loss category, by 0.4 g per 100 g, ( $P = 0.008$ ) and by 63 kcal, ( $P < 0.001$ ) respectively. Salt content was higher in the weight-loss than the healthy-choice category (+0.1 g per 100 g,  $P < 0.001$ ). Portion sizes of healthy-choice meals ( $379 \text{ g} \pm 39$ ) were significantly ( $P = 0.003$ ) higher than weight-loss meals ( $357 \pm 56 \text{ g}$ ).

**Discussion:** Excluding salt, sugar, fat and saturated fat content of all healthy ready meals met the low/green traffic light guidelines per 100 g of product. Weight-loss meals were lower in energy and portion size yet higher in salt. However, compared to the recommended daily energy requirements for adults<sup>(3)</sup> (SACN 2011), the overall mean energy content/meal was low, with an energy deficit of 18% in healthy-choice and 23% in weight-loss meals. Apart from salt, healthy ready meals sold in the top four UK supermarkets adhered to traffic light nutritional guidelines per 100 g of content. However, their energy

content and portion size may be too small to constitute a meal and inadequate to meet recommended daily energy intakes among regular consumers.

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### NTR2

#### **Eating while watching television increases the likelihood of children making less healthy dietary choices: a systematic review**

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**Background:** The increasing global prevalence of childhood obesity and the associated impact on physical and psychological wellbeing has been well-documented<sup>(1)</sup> (Government Office for Science, 2007). Whilst previous studies have identified an association between television (TV) use and childhood obesity<sup>(2)</sup>, the basis of this relationship is not well understood. The aim of this review was to provide a possible explanation for this association by examining how the food and drink choices that children make are affected by eating whilst watching TV. We hypothesised that children who ate whilst watching TV would make less healthy food choices.

**Methods:** Two databases (Web of Science and MED-LINE) were searched from 2000 to June 2014. Only cross-sectional, case-control or cohort studies with cross sectional baseline data, measuring effects of eating while watching TV on children's food and/or drink choices were included. Quality of selected papers was assessed and the PRISMA checklist considered.

**Results:** Thirteen studies,  $n = 61\,674$  children aged 1–18 years, met the inclusion criteria of focussing on hours of TV and effects of eating during TV viewing, being carried out in westernised countries and being written in English. Outcomes included unhealthy food habits, consumption of fruit and vegetables and sugar-sweetened beverages (SSBs). Six of the studies considered unhealthy food groups as a category, results of which are summarised in the table below. Of the six studies reporting on fruit and vegetable consumption, five identified a negative association with eating while watching TV ( $P < 0.0001$ ) and one found no significant correlation. Four studies identified a positive association between watching TV while eating and servings of SSBs ( $P < 0.0001$ ).

## Abstracts

Authors	Unhealthy eating outcome
Coon <i>et al.</i> 2001, USA	Children who eat >2 meals per day with the TV on consume more energy from pizza, salty snacks and SSBs ( $P \leq 0.001$ )
Feldman <i>et al.</i> 2007, USA	Increased consumption of fried foods by children who ate family meals with the TV on ( $P \leq 0.05$ )
Hare-Bruun <i>et al.</i> 2011, Denmark	Less healthy food habits in children who watched TV during meals most days ( $P \leq 0.0001$ )
Liang <i>et al.</i> 2009, Canada	Diet quality negatively associated with number of times per week TV was on during supper (OR $-3.74$ , 95% CI $-4.52$ , $-2.96$ )
Lissner <i>et al.</i> 2011, Sweden	Eating while watching TV was associated with more high fat (OR: 1.49, CI: 1.34–1.65) and high sugar items (OR: 1.93, CI: 1.72–2.16) in the diet
Rey-López <i>et al.</i> 2011, Spain	Children who watched >2 h day <sup>-1</sup> were more likely to make energy dense dietary choices while watching TV ( $P \leq 0.05$ )

**Discussion:** The results confirmed the hypothesis that eating while watching TV makes children more likely to make unhealthy food and drink choices, including more frequent consumption of SSBs and high-fat, high-sugar foods. Whilst dietary differences between TV eaters and non-TV eaters are small, the cumulative effect of poor food choices may cause the positive association between eating during TV use and incidence of overweight. Children should be discouraged from eating meals whilst watching TV.

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## NTR3

### A case-control study of dietary intakes in women with fibromyalgia compared to female age-matched control subjects

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**Background:** Fibromyalgia is a condition of widespread pain and fatigue. The aetiology is unknown and there is currently

no cure. Previous research has suggested that fibromyalgia subjects may differ in their body composition (increased BMI)<sup>(1)</sup> and dietary intake (low intakes of micronutrients)<sup>(2,3)</sup> compared with healthy women. There has been no published study to date to evaluate dietary intake in fibromyalgia and control subjects, using robust methodology. The aim of the study was to investigate dietary differences in selected micronutrients and macronutrients between women with fibromyalgia and female age-matched control subjects, and to determine any effect of diet on symptom aggravation.

**Methods:** Eight female cases were recruited through the Fibromyalgia Association UK website and friends and relatives of cases were recruited as female age-matched control subjects ( $n = 8$ ). They were required to either have a diagnosis of fibromyalgia, or to be 'healthy'. Subjects were excluded for a history of lupus, rheumatoid arthritis, multiple sclerosis, epilepsy, psychiatric disorders, drug/alcohol abuse or shift work, or a self-diagnosis of fibromyalgia. All subjects completed an estimated 4-day diet diary and a validated fibromyalgia impact questionnaire. Diet diaries were analysed using Diet Plan 6 software.

**Results:** There was no statistically significant difference in any nutrient intakes between fibromyalgia cases and controls. Caffeine intake was significantly lower ( $P = 0.02$ ) in the fibromyalgia group. BMI was not significantly different between the fibromyalgia and control subjects ( $P = 0.07$ ). There was a significantly lower physical activity level ( $P = 0.05$ ) in fibromyalgia subjects, but no significant differences in reported stress levels. No significant associations were identified between either caffeine intake or BMI and symptomology.

Nutrient intakes in the fibromyalgia (FM) and control groups (all group differences  $P > 0.05$ )

**Discussion:** The small group size limits the capacity of this study to draw firm conclusions. The use of a 4 day diet diary may not reflect habitual intake, and although a longer diet diary may have shown more accurate results, it would have had an increased burden on participants and have poorer compliance. The current study does not support previous research that identified an increased BMI<sup>(1)</sup> in fibromyalgia patients, but it does support research that has found no significant differences in iron<sup>(2)</sup> and vitamin D<sup>(3)</sup> intakes between fibromyalgia and control subjects. The current study has also extended these findings to show that across a wider range of nutrients and trace elements differences in intake are not apparent, but further suggests that fibromyalgia subjects consume less caffeine. This study suggests that fibromyalgia is not linked to a difference in BMI or nutrient intake, and therefore nutritional supplementation is unlikely to be specifically indicated in fibromyalgia subjects. Further analyses into diet choice and composition are underway.

Nutrient	Potassium (mg)	Calcium (mg)	Magnesium (mg)	Iron (mg)	Copper (mg)	Zinc (mg)	Selenium (µg)	Vitamin D (µg)
Mean (±SEM) FM	3557 (527)	802 (118)	309 (47)	12 (1)	1 (0.2)	7 (0.7)	35 (7)	2 (0.5)
Mean (±SEM) control	2880 (355)	1002 (149)	296 (37)	12 (2)	2 (0.2)	8 (0.4)	34 (6)	2 (1)

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## NTR4

### Reviewing the use of a Renal Assessment Nutrition Tool for the identification of renal inpatients at risk of malnutrition

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**Background:** Malnutrition in renal patients is linked to increased mortality with prevalence estimated at 10–60%<sup>(1)</sup>. The Malnutrition Universal Screening Tool (MUST) is not optimally suited to identify renal malnutrition risk<sup>(2)</sup>. No certified universal renal nutritional screening tool (NST) exists. The Royal Devon and Exeter NHS Foundation Trust (RD&E) developed a local NST: Renal Assessment Nutrition Tool (RANT). RANT was adapted from MUST, accounting for renal specific nutritional parameters and fluid overload. This study aimed to ascertain whether RANT is more effective than MUST at detecting renal inpatient malnutrition, and to explore ward staff barriers to accurate RANT completion.

**Methods:** This study was conducted on a convenience sample of 31 inpatients (18 male, 17 female, age range 42–83 years) employing a mixed-methods approach. Assessments were conducted at a RD&E renal ward in 2014. There were three study elements: nutritional screening; NST review and an assessment of barriers via a questionnaire. RANT was completed by both ward staff and dietetic students. Only dietetic students completed MUST. A random selection of RANTs and MUSTs were quality checked by the renal dietitian to verify sensitivity and specificity. These quality checks were considered as gold standard for the purposes of this project.

**Results:** A significant difference in identifying renal malnutrition risk was found between RANT and MUST ( $X^2(2) = 23.67$ ;  $P < 0.001$ ). RANT completed by dietetic students identified 68% high malnutrition risk in inpatients, compared to MUST's 16%. RANT scores varied greatly between dietetic students and ward staff. Quality checking revealed most

discrepancies between ward staff and dietetic students were in weight loss scores (35.5%) and reduced appetite scores (35.2%). Most commonly ward staff assigned lower RANT scores. Insufficient time and inability to weigh the patient emerged from questionnaires as the main barriers to accurate RANT completion. 90% of ward staff reported receiving RANT training.

**Discussion:** The findings suggest a high sensitivity in RANT as it detected a higher incidence of renal malnutrition than previously reported, when used by dietetic students. High sensitivity ensures that all individuals at risk of malnutrition are identified and receive timely treatment<sup>(1)</sup>. A lack of mandatory RANT training and refresher training may have affected accuracy with RANT completion by ward staff. When compared to MUST, RANT continues to identify more renal inpatients at risk of malnutrition but may be too sensitive within its scoring parameters. Mandatory ward staff training, RANT modification and re-evaluation are required to further assess RANT's suitability as an accurate method of screening for malnutrition in renal inpatients. Further research is necessary to investigate and produce a universal renal-specific validated NST for UK-wide use with all renal patients.

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## NTR6

### A systematic narrative literature review of the association between serum hydroxyvitamin D concentrations and glycaemic control in type 2 diabetes mellitus

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**Background:** Type-2 diabetes mellitus and vitamin D deficiency are common problems in the UK and globally<sup>(1)</sup>. Low serum 25-hydroxyvitamin D [25(OH) D] concentrations are increasingly diagnosed in patients presenting with type-2 diabetes mellitus and has been proposed as a risk factor for the disease<sup>(2)</sup>. This study investigated hydroxyvitamin D3 and D2 supplementation in subjects with type-2 diabetes mellitus to assess the evidence for improved glycaemic control.

**Methods:** A literature search of multiple electronic databases using a pre-determined search string was carried out in February and March 2014. The search included studies



published in English between 2009 and 2014. A total of 143 potentially relevant abstracts were generated from 4942 references. Systematic screening of these abstracts for relevance against a pre-defined list of inclusion and exclusion criteria produced a total of nine studies which were included within the review; three observational cohort studies ( $n = 867$ ), three cross-sectional studies ( $n = 16\,770$ ), two randomised controlled trials ( $n = 156$ ) and one non-randomised trial ( $n = 100$ ). Study characteristics and results were extracted and the study quality assessed using the Critical Skills Appraisal Programme-CASP.<sup>3</sup>

**Results:** All nine studies were assessed as being relevant and were included within the results. Five studies examined the effect of vitamin D levels on HbA1c and four reported a significant inverse association between vitamin D levels and HbA1c ( $P < 0.001$ ). Two studies investigating the effect on insulin secretion reported positive associations between serum 25 (OH) D and insulin secretion ( $P > 0.02$ ). The evidence for improved insulin resistance was inconclusive.

**Discussion:** A significant inverse association was demonstrated between serum 25 (OH) D and HbA1c and a significant positive association was demonstrated between serum 25 (OH) D and insulin secretion. Emerging research highlights the importance of vitamin D status in the regulation of pathways involved in the pathophysiology of type-2 diabetes mellitus<sup>(2)</sup>. Higher baseline serum 25 (OH) D levels have also been shown to independently predict better  $\beta$ -cell function and insulin secretion<sup>(4)</sup>. This review has shown an association between raised serum vitamin D levels and low HbA1c levels and improved insulin secretion. Due to the small sample size of some studies and the fact they were conducted in more southern latitudes the generalizability of the results is limited. Further high-quality randomised controlled trials measuring serum hydroxyvitamin D concentrations and relevant glycaemic outcomes in diabetic cohorts residing within the UK and other northern latitudes are needed.

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## NTR7

### Comparison of household measure descriptions and food photographs in determining food portion sizes among young adults

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**Background:** Portion size estimation is one of the largest sources of error in dietary assessment and relies on individuals' perception, memory and conceptual skills<sup>(1)</sup>. Varying methods adopted by researchers and practitioners have led to conflicting conclusions on accuracy of current dietary assessment methods including food photography and household measure estimations. There is also an absence of research focusing on young adults in this area. This study aimed to assess the accuracy of portion size estimations using household measures and food photographs compared to actual weights, among young adults.

**Methods:** In a cross-sectional study design, 35 (18 female, 17 male; aged 18–26 years) participants were recruited by posters distributed around a North England university campus. Participants volunteered by arriving at a designated location indicated on the posters. A short demographic questionnaire was completed before participants self-served a meal consisting of three items with either a definite shape (jacket potato) or amorphous foods of no defined shape (baked beans and grated cheese). Serving dishes were weighed before and after serving, providing the actual weight of foods served. Fifteen minutes after eating, a questionnaire was used to collect dietary information. Participants described portions using household measures e.g. number of spoonfuls or 'small', 'medium' or 'large'. These were quantified using a portion size reference guide<sup>(2)</sup>. A food photograph atlas<sup>(3)</sup> was used for selection of a photograph representing each item and the associated weight recorded. In total each participant provided three weights per component (i.e. actual weight, household measure estimate, food photograph estimate) providing 315 weights overall.

**Results:** For the overall meal, household measure estimations were the most accurate with an average 4% underestimation compared to actual weight. Food photographs overestimated portion weight by 14% on average. For individual meal components food photographs were more accurate in estimating the size of jacket potatoes with no significant difference between estimates and actual weights ( $P = 0.34$ ). Cheese was significantly overestimated by food photographs ( $P = 0.029$ ) and underestimated by household description ( $P = 0.005$ ) compared to actual weights. Baked beans were overestimated by both methods. Females overestimated more frequently, however differences in estimation between males and females were not statistically significant.

**Discussion:** Estimated portion weights of all three food components differed significantly to actual weight for at least one of the methods. It would therefore be inappropriate to suggest



that either method can assess the dietary intake of young adults without error. Household measure descriptions were closer to actual weight than estimations based on food photographs. Amorphous foods may be particularly prone to overestimation regardless of method. Consideration should be given to the likely overestimation in portion size associated with food photographs and underestimation with household measures. Both under- and over-estimation can be associated with household measure descriptions according to the type of food being assessed. Food photographs and household methods are useful portion size assessment tools for use among young adults only when inherent errors in both methods are acknowledged.

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## NTR8

### Healthy eating and cooking sessions for vulnerable young adults in temporary, supported housing

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**Background:** Many studies have shown that those living in supported housing and from a disadvantaged social position have a number of lifestyle and psychosocial issues that can alter nutritional intake, leading to negative health implications later in life<sup>(1)</sup>. A systematic review showed that community-based interventions improved nutritional knowledge and cooking skills in people living in sheltered housing and in people with low income<sup>(2)</sup>. This prospective intervention aimed to determine factors which had an impact on knowledge and cooking behaviour and evaluated the effectiveness of healthy eating and cooking sessions on the nutritional knowledge and cooking skills of young adults living in temporary, supported housing.

**Methods:** A 'cook and eat' programme of three interactive sessions was offered to young people aged 16–30 years living in supported housing provided by the charity Chapter 1 in London and Southampton. The sessions took place in four hostels over 4 months and encompassed healthy eating, food hygiene and cooking on a budget. Participants completed questionnaires (not validated), pre- and post-sessions to

measure nutritional knowledge and food skills. Focus groups allowed participants to express views and knowledge with regards to healthy eating and session content.

**Results:** Forty-four participants attended one or more of the sessions (68% female) and 38 questionnaires were received at baseline with 10 of the participants completing questionnaires after the final session. The mean age was  $22 \pm 4$  years (range 16 to 29 years). Pre-programme questionnaires highlighted food knowledge was good in certain areas. 84% of participants were aware of the recommendation to consume 'a lot' of fruit and vegetables and only 'a little' fat and sugar. The mean intake of fruit was  $1.7 \pm 1.5$  portions daily at baseline and only 4% met the recommendations. At the end of the sessions a trend was apparent for increased daily fruit consumption to  $2.9 \pm 1.3$  portions ( $P = 0.07$ ). There was a strong positive relationship between perceived cooking skills and perceived health score ( $r = 0.43$ ,  $P = 0.007$ ) and also with fruit and vegetable intake ( $r = 0.33$ ,  $P < 0.05$ ). From the focus groups, 66% of participants stated that finance was the main factor affecting food choices. Factors within the hostel environment including, sharing a kitchen and uncertainty regarding length of stay also had an impact on shopping and cooking behaviours. Evaluation forms showed that the participants enjoyed learning new skills and found the sessions very interesting and useful.

**Discussion:** A major limitation of this study and previous studies<sup>(2,3)</sup> was the high dropout rate which will have biased the results. Some improvements in healthy eating behaviour were measured in this study although due to small numbers for pre-post comparisons, few changes were statistically significant. Important relationships were noted between cooking skills, healthy eating and perceived health. Barriers to participants meeting recommendations for healthy eating included their unstable housing situation and low income. In spite of this participants reported that they gained skills and knowledge from the sessions. Making any improvements in the lives of vulnerable young adults is an encouraging outcome for this intervention. A larger sample size and improving the follow-up of the participants would be beneficial for showing the longer-term effectiveness of this intervention.

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## NTR9

### An audit to evaluate adherence and barriers to the successful implementation of the Screening Tool for the Assessment of Malnutrition in Paediatrics (STAMP<sup>®</sup>)

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**Background:** Malnutrition is prevalent among UK in-patients, and the health and economic implications are significant<sup>(1)</sup>. STAMP<sup>®</sup> is the only validated paediatric screening tool for under-nutrition in the UK. It is intended for use among children aged 2–16 years, however, no published audits of implementation have been undertaken<sup>(2)</sup>. This audit aimed to assess adherence to STAMP<sup>®</sup> completion and subsequent appropriate dietetic referral, and to identify potential barriers to it being undertaken, following implementation at King's College Hospital, London in January 2013.

**Methods:** Data was collected prospectively over a 1-month period for all paediatric in-patients meeting the inclusion criteria of  $\geq 24$  h admission. Electronic patient records and bed-end notes were used to gather data on age, gender, height and weight on admission, and STAMP<sup>®</sup> completion status. Referral status of high-risk scores ( $\geq 4$ ) was checked with the paediatric Dietetics Department. Questionnaires using predominantly multiple-choice questions were designed to assess STAMP<sup>®</sup> training and perceived barriers to completion among nursing staff. Anthropometric equipment availability and functionality were also assessed.

**Results:** Less than half (45.7%) of patients meeting the inclusion criteria ( $n = 232$ ) were STAMP<sup>®</sup> screened, of which only 18.9% were complete and only 55.9% of high-risk scores were appropriately referred for dietetic review. The majority (75.0%) of nursing staff had never been STAMP<sup>®</sup> trained, and an overall inadequacy of equipment availability was found. Key barriers to STAMP<sup>®</sup> completion were time constraints (40.7%), inadequate training (22.2%), lack of experience, awareness and support (11.1%), and poor anthropometric equipment availability (7.4%).

**Discussion:** Compliance with STAMP<sup>®</sup> assessments and appropriate referrals was poor. A concerning number of patients scoring as 'high-risk' for malnutrition were not appropriately referred, and further 'at risk' patients may have missed dietetic referral due to incomplete assessment. Findings were consistent with audits of adult malnutrition screening tools, and as there are no published paediatric equivalents, the results of this audit provide useful data of compliance and barriers. Strategies to increase STAMP<sup>®</sup> awareness and implementation and appropriate training among nursing staff, are essential to successfully identify patients at risk of malnutrition and to avoid the negative consequences of malnutrition in this age-group.

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## NTR10

### A single group experimental study investigating the effect of short-term beetroot juice supplementation on biomarkers of oxidative stress

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**Background:** Beetroot juice (BrJ) has been suggested to have a range of health benefits, including reductions in blood pressure<sup>(1)</sup> and improvements in sports performance<sup>(2)</sup>. These effects are largely attributed to its high nitrate content. *In vitro* studies have also shown that BrJ has a high antioxidant capacity<sup>(3,4)</sup>. Whether this translates to functional benefits *in vivo* has not been previously researched. This study therefore aimed to determine the effect of short-term BrJ supplementation on biomarkers of oxidative stress (OS) in human participants.

**Methods:** A single group experimental design was carried out using 29 participants, aged 20–46 years. Participants were recruited from Plymouth University using convenience sampling, and instructed to consume 500 mL of BrJ daily for 7 days. Baseline and post-intervention blood samples were taken to assess changes in OS, measured by malondialdehyde (MDA), reduced ascorbate and ferric reducing ability of plasma (FRAP). Participants were asked to keep their diet and activity levels consistent throughout the study, and completed a record of BrJ consumption to assess compliance.

**Results:** Overall the intervention resulted in a significant increase in MDA (mean (SD), baseline 2.94(0.86)  $\mu\text{mol L}^{-1} \text{L}^{-1}$ , post-intervention 3.32(0.85)  $\mu\text{mol L}^{-1} \text{L}^{-1}$ ,  $P = 0.002$ ), indicating that BrJ had a negative impact on OS. No significant changes were seen in FRAP or reduced ascorbate. Dividing subjects into tertiles for baseline levels of each measured parameter revealed that positive effects of BrJ were seen in those with the highest baseline OS levels, whereas those with low initial OS were most negatively impacted by the intervention. For example individuals with the lowest baseline MDA levels exhibited a significant increase post-intervention (median (range), baseline 1.83 (1.43 to 2.43)  $\mu\text{mol L}^{-1} \text{L}^{-1}$ , post intervention 2.59 (1.82 to 3.91)  $\mu\text{mol L}^{-1} \text{L}^{-1}$ ,  $P = 0.008$ ), whereas those with the highest baseline MDA

exhibited a non-significant reduction (baseline 3.70 (3.39 to 4.74)  $\mu\text{mol L}^{-1} \text{L}^{-1}$ , post-intervention 3.58 (2.69 to 5.62)  $\mu\text{mol L}^{-1} \text{L}^{-1}$ ,  $P = 0.767$ ). Subjects with the highest reduced ascorbate levels demonstrated a significant reduction in these levels (baseline 100.00 (97.35 to 100.00)%, post-intervention 96.72 (80.75 to 100.00)%,  $P = 0.018$ ). In contrast those with the lowest baseline reduced ascorbate exhibited a non-significant increase (baseline 83.85 (41.10 to 90.18)%, post intervention 94.70 (58.64 to 100.00)%,  $P = 0.059$ ).

**Table 1. Biochemical Parameters Pre and Post BrJ Intervention**

	Pre BrJ	Post BrJ	<i>P</i> Value
MDA ( $\mu\text{M/l}$ ) <sup>†</sup>	2.94	3.32	0.002
FRAP (mM Fe2+/l) <sup>†</sup>	1.02	0.99	0.054
Reduced Ascorbate (%) <sup>°</sup>	91.32	94.89	0.551

<sup>†</sup> Mean, <sup>°</sup> Median

**Discussion:** Overall BrJ significantly increased lipid peroxidation, as measured by MDA. This could be a result of the high nitrate content of BrJ mediating the formation of peroxynitrite radicals, or due to the pro-oxidant effect of excess antioxidants. The opposing trends observed in relation to baseline OS levels highlight the importance of antioxidant research interpreting individual redox responses in relation to initial levels. A limitation of the study was the lack of control group, preventing the ability to adjust for natural variations over time. Additionally participant's diet and activity levels were not monitored throughout the study; changes to which could have significantly confounded the results. Further research is therefore needed to support the findings of the current study. Whilst supplementation with antioxidant-rich vegetable juices may be beneficial in some, evidence is inconclusive that it would benefit the population as a whole.

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## NTR11

### A pilot investigation to explore whether individuals with Type 1-diabetes chose to work in healthcare as an approach coping mechanism

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**Background:** The self-regulatory model of illness behaviour of Leventhal<sup>(1)</sup> suggests that approach coping is a mechanism of disease management. The model views people as active problem-solvers who seek out practical solutions in order to help them manage their condition. Duangdao<sup>(2)</sup> found patients with diabetes who adopted approach coping mechanisms had significantly lower HbA1c measurements than those who used other coping mechanisms. This research aimed to investigate if choosing to work in health care was an approach coping mechanism for individuals with type 1-diabetes and if this choice improved individual diabetic management.

**Methods:** A pilot sample of 16 participants (target sample size 91), were recruited over a period of 6 weeks using online media. The inclusion criteria were that they had type-1 diabetes and worked in healthcare. All participants gave their informed consent prior to completing the online questionnaire. Questions were adapted from the illness perception questionnaire (IPQ) developed for use with Leventhal's self-regulatory model of illness behaviour by Moss<sup>(3)</sup>. For all questions participants graded their response to statements using a Likert scale ranging from strongly disagree to strongly agree. Two sets of questions were identified to assess use of approach coping mechanisms and participant diabetes management.

**Results:** Participants reported a good awareness of diabetes and its consequences with over 95% strongly agreeing with questions related to perceptions of personal control over the condition and disease consequences in the IPQ. Over 95% of participants also agreed they enjoyed their role in healthcare because they can help others cope with the condition in addition to having a good relationship with patients because of their own experience. No significant correlation between the questions 'having diabetes influenced my choice to pursue a career in healthcare' and 'I feel because of my career my diabetes is better controlled' was found ( $r = 0.306$ ,  $P = 0.248$ ). However the responses to these questions were polarized, with 14 individuals agreeing that having diabetes influenced their career choice and two individuals disagreeing strongly. Only one participant disagreed with the statement 'I feel because of my career my diabetes is better controlled'. No significant correlation was observed between the questions 'I feel because of my career choice my diabetes is better controlled' and 'My role in healthcare helps me maintain and improve my knowledge' ( $r = 0.074$ ,  $P = 0.785$ ). All participants agreed or strongly agreed that their role helped maintain and improve their knowledge.

**Discussion:** The majority of participants reported good awareness of diabetes and of their own role in managing diabetes,

supporting the finding that their knowledge was improved by their healthcare role. Investigating the use of approach coping mechanisms elicited polarized data suggesting some participants were not utilising this mechanism. However, investigations using larger sample sizes are needed to clarify this. Participants in this pilot study were motivated individuals (i.e. healthcare workers). Further exploration of why not all the participants used, or were able to use, their improved knowledge to improve their own diabetic management and a clearer understanding of how and when approach coping is used successfully, could be used to inform motivation and coping strategies for all people with diabetes. Despite the lack of significant results this study suggests a subset of type-1 diabetics choosing a career in healthcare, may be utilising approach coping mechanisms to improve their diabetic management. A greater sample size is needed to identify how and why this choice is made and assess applicability to the wider diabetic population.

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## NTR12

### Food industry progress towards the 2012 Food Standards Agency salt targets for salt reduction as part of the government's Public Health Responsibility Deal

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**Background:** Excess salt intake a risk factor for high blood pressure. Voluntary salt targets for 2012 were set by the Food Standards Agency (FSA) to encourage salt reductions in processed foods. Very few evaluations have determined the progress towards the 2012 targets. FSA Scotland<sup>(1)</sup> compared salt content of foods (collected in 2011) to 2012 targets. Over 80% of cheddar and bread products met the targets, whilst only 50 and 20% of bacon and ham products respectively met the targets. The aim of this analysis was to provide a more recent comparison of salt content in processed food with the FSA 2012 targets.

**Method:** The highest contributors to salt intake in the United Kingdom diet were identified from the National Diet and Nutrition Survey Rolling Programme<sup>(2)</sup>. The salt content of these, currently available as supermarket own branded foods from four UK supermarkets (Tesco, ASDA, Sainsbury's and Morrison's) was compared with the FSA 2012 salt targets for

their subcategories. Online nutritional information was used to collect salt content per 100 g in 2014. The lowest and highest priced product was sampled for bacon, ham, bread/rolls and natural cheese. All products were sampled for the remaining subcategories due to the small range of products available.

**Results:** One third of product subcategories met the targets, whilst two thirds of subcategories had a mean salt content above salt targets (Table 1).

**Table 1** Average salt content in subcategories (g salt per 100 g) (*n* = 372)

Sub-category	<i>N</i>	Mean $\pm$ SD (range) (g)	<i>P</i>	Salt target	<i>N</i> (%) meeting target
Bacon	60	3.41 $\pm$ 1.07 (1.6–6.8)	0.002	2.88	28 (47)
Ham	39	1.99 $\pm$ 0.50 (1.3–3.9)	<0.001	1.63	11 (28)
Ready meals	34	0.57 $\pm$ 0.15 (0.2–1.0)	<0.001	1.13	34 (100)
Bread/ rolls	55	0.87 $\pm$ 0.16 (0.4–1.1)	<0.001	1	53 (96)
Bread with additions	23	1.03 $\pm$ 0.20 (0.5–1.3)	<0.001	1.2	21 (91)
Morning goods	28	0.96 $\pm$ 0.19 (0.5–1.3)	0.402	1	19 (66)
Natural cheese	42	1.51 $\pm$ 0.27 (0.8–1.9)	<0.001	1.8	41 (98)
Soft cheese	30	0.55 $\pm$ 0.68 (0.40–0.60)	<0.001	0.75	30 (100)
Cottage Cheese	25	0.50 $\pm$ 0.07 (0.35–0.60)	<0.001	0.63	25 (100)
Blue cheese	14	2.15 $\pm$ 0.47 (2.0–2.8)	0.052	2.1	14 (93)
Processed cheese spread	10	1.96 $\pm$ 0.05 (1.9–2.0)	0.046	2.25	10 (100)
Processed cheese slices	12	2.27 $\pm$ 0.40 (2.0–2.9)	0.235	2	8 (67)

**Discussion:** Results suggested that there has been little improvement in the salt content of bacon and ham since the FSA Scotland analysis in 2011. There were wide variations in salt content within subcategories, indicating that a lower content is technically possible in some subcategories. Despite some reduction in the salt content of foods that contribute significantly to the sodium content of UK diets, there is still considerable scope for improvement and consistency.

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**NTR13****Screening for malnutrition on a children's ward is not treated as a priority****O. Gill & J. McClinchy***School of Life and Medical Sciences, University of Hertfordshire, Hatfield, UK*

**Background:** Routine nutritional screening should be conducted as part of every child's initial assessment on admission to hospital<sup>(1)</sup> and nurses should routinely measure weight and height/length of all children admitted and plot these on growth centile charts<sup>(2)</sup>. This study aimed to evaluate the use of a newly implemented paediatric nutritional screening tool (PNST) in children admitted to a paediatric ward.

**Methods:** The medical and nursing notes of 29 children (15 girls and 14 boys) admitted to a general paediatric ward of a district general hospital were reviewed during a 25 day period. The total number of children admitted to the ward was not recorded during the study period due to restricted access to ward records. Children's medical and nursing notes were selected at random (first notes located) by the ward dietitian and were audited by the investigator using a proforma designed for this study. Completion of the PNST, anthropometry, the use of growth charts, enteral/parenteral feeding, and documentation of parent or health professional concerns were registered. Notes were excluded from the audit if the hospital admission was <24 h.

**Results:**

**Table 1** Differences in population characteristics between screened and not screened

Characteristic		Screened n (%)	Not Screened n (%)	Total (n = 29)	P-value
Total	Total	9 (33%)	20 (66%)	29	
Age	<2 years	6 (46)	7 (54)	13	0.030*
	≥2 years	3 (19)	13 (81)	16	
Growth chart in notes	Yes	1 (100)	0	1	0.310
	No	0 (0)	28 (100)	28	
Recording weight	Yes	9 (35)	17 (65)	26	0.532
	No	0 (0)	3 (100)	3	
Recording height	Yes	2 (50)	2 (50)	4	0.568
	No	7 (28)	18 (72)	25	
Enteral/ parenteral feeding	Yes	6 (60)	4 (40)	10	0.032*
	No	3 (16)	16 (84)	19	
Parent/staff concerns documented	Yes	8 (62)	5 (38)	13	0.003*
	No	1 (6)	15 (94)	16	

\*Significant at  $P < 0.05$  (Fisher's Exact Test).

**Discussion:** The screening tool was completed for one third of children whose notes were audited. Documentation of anthropometric measurements other than weight was negligible and the use of growth charts was limited. The screening tool had a greater probability of being completed for children aged <2 years, children requiring enteral/parenteral feeding, or those with parent or healthcare professional concerns documented in the medical/nursing notes. This was a small study conducted over a short time period, therefore, further investigation needs to be repeated in a larger sample to confirm the findings. Nutrition screening and growth documentation did not appear to be treated as a priority on the children's ward. Additional training on nutritional screening should be provided to address this issue and embed screening as part of routine practice<sup>(1)</sup>.

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**NTR14****A cross-sectional study of the prevalence of malnutrition in community-dwelling older adults who have received the annual flu vaccine****T. Gundersen & A. Squire***Cardiff School of Health Sciences, Cardiff Metropolitan University, Cardiff, UK*

**Background:** Much of malnutrition identified on admission to hospital originates in the community<sup>(1)</sup>. Various initiatives are dedicated to identify and treat malnutrition in this population. However, consistent and integrated strategies to detect malnutrition in community dwelling older adults are lacking. NICE suggested that the annual flu-vaccine could be an opportunity to screen for malnutrition in community dwelling older adults<sup>(2)</sup>, however, there is a lack of research to support this recommendation. In Wales in 2011/12, the uptake of the free annual flu vaccine in adults aged ≥65 years was 68%.

**Method:** A cross-sectional study was performed to investigate the prevalence of malnutrition in community dwelling older adults aged 65–93. Participants were recruited from meetings and a 'drop-in' café organised and run by a charity in South Wales, UK. One hundred and sixty-three older adults were invited to complete a questionnaire specifically designed to ascertain their age, gender, uptake of flu vaccine and nutritional status. The Self Mini Nutritional Assessment Tool was employed to determine nutritional status. The tool has three potential outcomes<sup>(3)</sup> but to improve statistical rigour, two outcomes (malnourished and 'at risk') were combined to form an 'At risk' of malnutrition category.



**Results:** Seventy-five of the older adults were eligible to participate in the study (61 female and 14 male). The mean age of participants was  $76.63 \pm 7.17$  years. 81% of the participants had received the annual flu vaccine. The highest prevalence of 'At risk' nutritional status was found in the recipients of the annual flu-vaccine ( $P = 0.295$ ). Individuals receiving the annual flu vaccine were significantly older than their counterparts ( $P = 0.027$ ).

**Discussion:** This is the first study to investigate the prevalence of 'At risk' nutritional status in this specific population. The results suggest that the flu vaccine could be a convenient opportunity to identify individuals at risk of malnutrition. Utilising the annual flu vaccine has previously been found to be an efficient way to encourage older adults to take vitamin D supplements. The findings of the present study correspond with previous studies that have identified that the uptake for the annual flu vaccine increases significantly with age<sup>(4)</sup>. This is of interest, as increasing age is a significant risk factor for malnutrition<sup>(5)</sup>. The annual flu vaccine is indicated to be an opportunity to identify older adults living in the community who are at risk of malnutrition. The generalizability of these results would depend on further investigations of larger populations.

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## Winner of the Yakult Prize for Dietitians New to Research

### NTR15

#### Iodine status of UK schoolchildren: a cross-sectional study examining dietary sources of iodine and iodine status among 8–10 year olds

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**Background:** Iodine status data from teenage girls and pregnant women suggest that the UK population is mildly iodine deficient<sup>(1,2)</sup>. Population iodine status is typically assessed by collecting spot-urine samples from school-aged children and comparing the median urinary iodine concentration (UIC) to World Health Organisation (WHO) criteria<sup>(3)</sup>. This cross-sectional study aimed to assess the iodine status of UK children, aged eight-to-ten, and to examine the relationship between diet and iodine status in this age group.

**Methods:** In winter 2012/13, 135 children (aged 8–10 years) were recruited from three UK centres (Surrey, Scotland and Northern Ireland). A further 36 children were recruited from Northern Ireland in summer 2013. Children provided a morning urine sample and completed a food-frequency questionnaire (FFQ). Primary analysis of iodine status and dietary intake was carried out on the winter cohort, using UIC and FFQ data.

**Results:** Median UIC of the winter cohort was  $161.2 \mu\text{g L}^{-1}$ , suggesting adequate iodine intake and optimum status (optimum range;  $100\text{--}200 \mu\text{g L}^{-1}$ )<sup>(3)</sup>. Iodine status of children from Northern Ireland was significantly lower in summer than winter ( $131.3$  versus  $196.1 \mu\text{g L}^{-1}$ ;  $P = 0.044$ ). Milk intake was the only dietary factor that significantly correlated with iodine status ( $r = 0.294$ ,  $P = 0.001$ ) and milk and dairy products contributed up to 75% of dietary iodine. Median UIC among children who did not drink milk ( $n = 3$ ), or who consumed soya milk ( $n = 2$ ), was below  $100 \mu\text{g L}^{-1}$  ( $81.3 \mu\text{g L}^{-1}$  and  $43 \mu\text{g L}^{-1}$ , respectively) and in those who consumed more than 425 mL of dairy milk per day ( $n = 25$ ), it was more than  $200 \mu\text{g L}^{-1}$  ( $227.1 \mu\text{g L}^{-1}$ ).

**Discussion:** In contrast to UK adolescent girls and young women, UK children, aged eight-to-ten, have adequate iodine status, by WHO criteria. This is likely to be a result of higher mean milk consumption in this age group than in older adults<sup>(4)</sup>. However, children who do not regularly consume cows' milk or dairy products may be at risk of iodine deficiency. These results support previous findings that cows' milk and dairy products are the most significant sources of

iodine in the UK diet<sup>(1,5)</sup>. Children that regularly consume cows' milk are unlikely to be iodine deficient but future research should attempt to examine the iodine status of children who do not consume milk from animal sources, as there was insufficient data to enable an accurate assessment at this stage.

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## NTR16

### A descriptive cross-sectional study exploring the nutrient intakes of university students who think they eat healthily

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**Background:** It is important to follow a healthy diet as part of a healthy lifestyle to optimise health and reduce the risk of non-communicable diseases. However, with known barriers to students eating healthily<sup>(1)</sup>, increasing sources of accredited and unaccredited nutritional information and a myriad of factors influencing eating practices, misperceptions of what constitutes a healthy diet may lead to unhealthy eating habits. This study aimed to assess the nutrient intakes of students at a UK university who think they eat a healthy diet.

**Methods:** Participants were recruited using non-probability convenience sampling and interviewed by trained student researchers<sup>(2)</sup>. Dietary intake and demographic data were collected using a piloted and validated tool, comprising a structured interview form and a diet history. Dietary intake data for students answering affirmatively to the question 'Do you think you eat healthily?' was analysed using DietPlan-6. Daily energy, protein, fat, total carbohydrate, alcohol and non-starch polysaccharide (NSP) intakes were calculated for each participant. Group mean daily energy & nutrient intakes were then determined by gender and compared to reference values (DRVs)<sup>(3,4)</sup>. Diet history data was validated by comparing nutrient intakes calculated from this and from 7-day weighed food records (for a sub-sample).

**Results:** Of 287 participants, 58.9% were male; mean age: 22 years male, 24 years female; age range 18–48 years. Dietary analysis was not conducted for 5 18-year-olds due to sample size and DRV age category limitations. Results are presented for 282 participants ≥19 years-old. Targets for total CHO, fat, protein and alcohol (% of daily total energy intake) were met by males & females ( $P < 0.05$ ). The DRV for NSP was met by males and females ( $P < 0.05$ ). Mean daily energy intake met estimated average requirement for males ( $P < 0.05$ ) but not females ( $1750 \pm 591.1 \text{ kcal day}^{-1}$ ). 91% stated they did not consume alcohol.

**Discussion:** These results differed to previous studies with similar demographic groups. DRVs were met for more of the nutrients than reported previously<sup>(5,6)</sup>. The high proportion of students who reported being non-consumers of alcohol, contradicts Gil<sup>(7)</sup> and widely held beliefs about students' drinking habits. All participants met DRV for NSP, which is surprising as accessibility to fruit and vegetables is a known barrier to healthy eating amongst students<sup>(1)</sup>. It is important to acknowledge under/over reporting as a potential limitation of the data collection method. Given the convenient nature of the sample, these findings should be generalized to other student populations with some caution. Overall, these university students, who all considered themselves healthy eaters, met macronutrient reference requirements. Their perceptions concerning the healthfulness of their diet appears to be accurate, at least in regard to the nutrients studied. This study challenges current research, which identifies students as a population group struggling to follow a healthy diet due to finance constraint

		Nutrients						
		Energy	Protein	NSP	Protein	Fat	CHO	Alcohol
		(kcal day <sup>-1</sup> )	(g day <sup>-1</sup> )	(g day <sup>-1</sup> )	% of daily total energy intake			
Males	DRV	2605	55.5	18	15	33	47	< 5
(n = 115)	Mean Intake (±SD)	2464 (±959)	117 (±67)*	18 (±9.1)	19 (±7.2)*	31 (±8.9)*	50 (±10.4)*	1 (±5.1)*
Females	DRV	2079	45.0	18	15	33	47	<5
(n = 167)	Mean Intake (±SD)	1750 (±591)*	68 (±24)*	17 (±8.3)	16 (±4.6)*	29 (±8.9)*	54 (±8.7)*	1 (±2.8)*

\* $P < 0.05$  when comparing mean daily nutrient intake to DRV.

and accessibility to unhealthy foods. Evaluation of this group's micronutrient intakes is warranted for a more complete analysis of nutritional adequacy.

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### NTR17

#### A systematic review of aids to decision-making in advanced dementia and enteral feeding

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**Background:** People with advanced dementia can experience difficulties with eating and drinking. Decisions on whether to artificially feed these people need to be made where people lack mental capacity. The Mental Capacity Act<sup>(1)</sup> provides a framework to support decision-making in people who lack mental capacity. There is limited evidence specifically related to how decisions are made regarding artificial feeding for people with dementia. The aim of this review was to explore the effectiveness of aids to decision-making for artificial feeding in people with advanced dementia.

**Methods:** A literature search was conducted using MEDLINE, CINAHL, AMED and PsychINFO with the search terms dementia or cognitive impairment, artificial feeding or nutrition, decision or influence, medical or health professional or surrogate. Included studies were of experimental design, evaluating the effectiveness of decision-making aids. The focus

was on studies where decisions were being taken by clinicians, or other surrogate decision-makers, with regard to whether or not to enterally feed a person with advanced dementia who lacked mental capacity. All studies were conducted after 2001 and were in the English language.

**Results:** The studies were critically appraised using an adapted version of the Critical Appraisal Skills Programme<sup>(2)</sup> tool for randomised controlled trials. Of the five identified studies, three tested the effectiveness of a decision aid<sup>(3)</sup> involving surrogates of people with dementia and two studies evaluated educational interventions for clinicians. Four studies were conducted in the USA and one in Japan. Two of the studies were cluster-randomised trials and three were of pre- and post-study design. The studies had between fifteen and 256 participants. Internal and external reliability and validity varied and a meta-analysis was not possible due to variance in outcome measures utilised. However, although the findings must be treated with caution due to limitations in methodological quality, interventions using decision-making aids provided tentative evidence of increased knowledge regarding tube feeding, decreased decision-making conflict and fewer insertions post-intervention. Studies showed increased knowledge of artificial feeding and dementia post-intervention, with reductions in decisional conflict. There were associated reductions in the numbers of PEG tube insertions post-intervention.

**Discussion:** The findings of this review give sufficient grounds for optimism that some form of intervention may be helpful in enabling proxy decision-makers to be more informed about the implications of tube feeding. Further research on the effectiveness of such interventions to support best interest's decision-making in late stage dementia may be beneficial.

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### NTR18

#### The attitudes of adult nursing students on the use of hand mittens: a qualitative study

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**Background:** Tube dislodgement can cause feeding delays, patient discomfort through reinsertions and aspiration<sup>(1)</sup>. Hand mittens are a form of physical restraint used to prevent enteral feeding tube dislodgement<sup>(2)</sup>. There is little ethically

focused research in this area. The aim of this study was to explore nursing students' attitudes towards, and experiences of the use of hand mittens

**Methods:** A qualitative, phenomenological approach was taken and adult nursing students were recruited ( $n = 4$ ). Convenience sampling was used for recruitment via nursing lectures and a recruitment stand in the Health and Life Sciences building at Coventry University. Individual, face-to-face semi-structured interviews were undertaken, utilising open-ended questions. Interviews lasted between 20–30 min and were digitally recorded and transcribed verbatim. Thematic data analysis<sup>(3)</sup> was used to generate themes and sub-themes.

**Results:** The following themes emerged: Negative feelings towards mittens, with the sub-theme, Visual Impact; Capacity and decision-making, with sub-themes, Questioning capacity and Best option available 'some things in nursing are unavoidable' (P4); Benefits of mittens; Conflicted 'how uncomfortable should a person be to do the things that are going to make them better?' (P1) and Care and assessment around mittens. All agreed that mittens had their place. The ethics of mittens were considered, and reasons for their use regarding lack of capacity were understood. The participants had varying experiences in relation to care and assessment and the importance of regularity of both aspects was highlighted. Due to the visual impact of mittens, both P3 and P4 questioned whether the design could be improved, but were unable to suggest how.

**Discussion:** Overall, the participants understood the ethics related to hand mittens, and had conflicted feelings towards their use, seeing both the positives and negatives. The findings told an overall 'story' of participants seeing positives and negatives of mittens and feeling conflicted towards their use. The conflation of positives and negatives is the core theme shown in the previous study 'A Necessary Evil', as were concerns of infection spreading and the visual appearance<sup>(4)</sup>. Further research is needed into to investigate students' and qualified nurses' opinions of and attitudes towards enteral feeding restraints, and design improvement and/or alternatives to mittens. Additionally, universal guidance should be produced in relation to care and assessment of mittens.

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## NTR19

### A pilot study investigating whether 8 weeks of intermittent fasting (IF) could induce remission of diabetes in obese type 2 diabetic patients

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**Background:** Type-2 diabetes (T2DM) has reached alarming levels in the UK with obesity being a well-known contributory factor<sup>(1)</sup>. Interventions focus on weight loss in an attempt to tackle this growing issue. IF is a newly publicised concept that may play a role in achieving optimal glycaemic control in newly diagnosed T2DM by reducing weight and therefore improving outcomes<sup>(2)</sup>. This pilot study aimed to determine whether 8 weeks of IF could induce remission of T2DM and whether the effects are maintained at 1 year.

**Method:** Participants were recruited once DESMOND education had been attended and in accordance with inclusion/exclusion criteria. Three subjects were recruited. Participants followed the IF diet for 8 weeks; two non-consecutive fast days, 500 kcal for woman and 600 kcal for men and normal habitual diet for 5 days. Participants were given a diet sheet for guidance and recipe ideas. BMI, height, weight, HbA1c, cholesterol, and fasting blood glucose were measured at week 1, week 4 and week 8.

**Results:** Weight loss occurred in all three participants (Table 1). HbA1c measurements taken 5 months post-diet were in the non-diabetic range (Table 2).

**Table 1** Anthropometric measurements before and after 8 weeks of IF diet.

Participant	Weight		Weight		% Loss
	Week 1	BMI Week 1	Week 8	BMI Week 8	
1	99.1 kg	30.9 kg m <sup>-2</sup>	93.1 kg	21.9 kg m <sup>-2</sup>	6%
2	116.5	41.8 kg m <sup>-2</sup>	114.8 kg	41.2 kg m <sup>-2</sup>	1.5%
3	108.1	41.2 kg m <sup>-2</sup>	102 kg	38.9 kg m <sup>-2</sup>	5.6%

**Table 2** Blood measurements before and after IF diet. \*5 months post diet. \*\*Data not available

Participant	HbA1c (mmol mol <sup>-1</sup> )	Cholesterol (mmol L <sup>-1</sup> )	HbA1c (mmol mol <sup>-1</sup> )	Cholesterol (mmol L <sup>-1</sup> )
	Week 1	Week 1	post diet*	post diet*
1	54	4.2	45	3.94
2	45	4.9	40	4.3
3	49	43	44	**

**Discussion:** Results were encouraging for the IF diet improving HbA1c and inducing weight loss in obese, type 2 diabetics. This is consistent with a review carried out by Barnosky *et al.*<sup>(3)</sup>. IF is a promising intervention for reducing HbA1c to the non-diabetic range (cut off 48 mmol mol<sup>-1</sup>) in obese type 2 diabetics. Further research should be aimed towards larger scale studies investigating the potential benefits of providing an additional weight loss intervention which may improve diabetic outcomes.

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## NTR20

### Observational study of eating behaviours, BMI and diet in obese pregnant women

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**Background:** The three-factor eating questionnaire (TFEQ)<sup>(1,2)</sup> is a validated tool that measures the behaviours of cognitive restraint of eating, emotional eating and uncontrolled eating, which have been extensively studied in relation to body mass index and obesity development. To date these behaviours have not been characterised in obese pregnant women, a high risk group who are the focus of public health strategies. The aim of this research was to measure cognitive restraint, emotional eating and uncontrolled eating in a cohort of obese pregnant women participating in the UK Pregnancies Better Eating and Activity Trial (UPBEAT) and to explore associations between these eating behaviours and dietary intake.

**Methods:** This study was a secondary analysis of data collected from participants of the UPBEAT pilot study ( $n = 203$ ) (REC reference 09/H0802/5)<sup>(3)</sup>. Women were eligible to participate if they had a body mass index  $\geq 30$  kg m<sup>-2</sup> and were of 15–17 weeks gestation with a singleton pregnancy. At recruitment eating behaviours were measured using the TFEQ and a range of socio-demographic information was collected by questionnaire<sup>(3)</sup>.

Dietary component		Cognitive restraint score	Emotional eating score	Uncontrolled eating score
Energy (kilocalories)	rho	-0.20*	0.05	0.15*
	p	0.005	0.46	0.03
Fat (% energy)	rho	-0.08	0.13	0.18*
	p	0.26	0.08	0.01
Saturated fat (% energy)	rho	-0.16*	0.24*	0.21*
	p	0.02	0.001	0.004
Carbohydrate (% energy)	rho	0.06	-0.12	-0.16*
	p	0.38	0.08	0.02
Starch (% energy)	rho	0.14*	-0.05	-0.13
	p	0.05	0.47	0.07
Glycaemic load	rho	-0.18*	-0.01	0.05
	p	0.01	0.91	0.45

% energy = energy from dietary component as a percentage of total energy intake. rho = correlation coefficient. \*Correlation is significant.

**Results:** A total of 203 participants were included in the analysis; median age of 30 years (IQR: 26–34) and median BMI of 35.3 kg m<sup>-2</sup> (IQR: 32.0–38.6). Uncontrolled eating and emotional eating scores were correlated (rho = 0.65,  $P < 0.001$ ). BMI and eating behaviour scores were not associated. Cognitive restraint was associated with healthier dietary patterns, emotional eating was associated with higher energy intake from saturated fat and uncontrolled eating was associated with less healthy dietary patterns (see table).

**Discussion:** Emotional and uncontrolled eating behaviours were associated with each other and with less healthy dietary patterns, therefore tackling these behaviours together, and assisting women in developing strategies to deal with these behaviours, could improve dietary intake. Cognitive restraint was associated with healthier dietary patterns and not associated with the other eating behaviours and thus strategies to develop this behaviour could be beneficial in improving diet. Cognitive restraint and development of strategies to cope with emotional and uncontrolled eating behaviours may be useful tools to improve diet in obese pregnant women.

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## NTR21

# Investigation of perceived and calculated total energy expenditure in working adults undertaken by questionnaire

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**Background:** Obesity is a major public health issue with many adults unable to maintain a healthy body weight<sup>(1)</sup>. Losing excess body weight only occurs when energy intake is less than energy expenditure (EE) so gaining an understanding of EE is important for successful weight loss/maintenance. This study aimed to investigate the effect of body mass index (BMI) on accuracy of perceived total EE (TEE) compared to calculated TEE in working adults.

**Methods:** A cross-sectional quantitative investigation involving 150 adult employees of a healthcare company was undertaken. Participants completed an online questionnaire which collected information on self-reported anthropometry, demography and perception of EE. Physical activity level (PAL) was self-reported as 'less active' (1.49), 'typically active' (1.63) or 'more active' (1.78)<sup>(2)</sup>, and perceived TEE was also self-estimated. The questionnaire was live for 4 weeks and no identifiable information was collected. Answers were used to calculate BMI (weight height<sup>-2</sup>), basal metabolic rate (BMR)<sup>(3)</sup> and TEE (BMR x PAL)<sup>(2)</sup> and the difference between calculated and perceived TEE was determined.

**Results:** Fourteen men and thirty-eight women participated.

	Median	Range
Age (years)	26.0	20–64
Weight (kg)	64.5	50–127
Height (m)	1.66	1.53–1.95
BMI (kg m <sup>-2</sup> )	22.5	17.5–37.1
BMR (kcal day <sup>-1</sup> )	1500	200–2500
Calculated TEE (kcal day <sup>-1</sup> )	1757	1568–2920
Perceived TEE (kcal day <sup>-1</sup> )	2000	500–3500
Calculated - perceived TEE (kcal day <sup>-1</sup> )	–237.2	–1343–1386

Significant relationships were identified between (a) calculated TEE and BMI ( $P < 0.001$ ,  $r = 0.532$ ), (b) difference between calculated and perceived TEE and BMI ( $P = 0.01$ ,  $r = 0.353$ ) but not between (c) perceived TEE and BMI ( $P = 0.24$ ,  $r = -0.166$ ). The difference between median calculated and perceived TEE was not significant ( $P = 0.122$ ).

**Discussion:** The finding that perceived TEE became increasingly different from calculated TEE as BMI increased suggests that people who are overweight are less able to estimate their energy requirements accurately. This agrees with previous research by Headrick *et al.* who investigated 978 adults in the USA<sup>(4)</sup>. These findings do not prove that there is a causative link between inaccuracy in estimating TEE and weight gain.

The role of weight in calculating both TEE and BMI must be considered. Accuracy of predicting TEE using prediction equations is compromised as BMI increases<sup>(5)</sup>. This study was based on self-reported data, therefore future research to examine perceived and measured TEE and BMI, the potential benefit of accurate estimations of TEE on body weight and the reasons for underestimation might contribute useful information to obesity management strategies.

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## NTR22

# NOURISH: a pilot randomised controlled trial to investigate nutritional outcomes of intradialytic oral nutritional supplements in patients receiving haemodialysis

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**Background:** Malnutrition is reported to affect 20–50% of the haemodialysis population. Causes include poor appetite and the catabolic effect of dialysis<sup>(1)</sup>. Nutrition support interventions are known to improve measures of nutritional status<sup>(2)</sup> but the most effective methods of support and specific outcome measures have not been confirmed to date. The aim of this pilot was to assess the feasibility of conducting a trial assessing the use of an intradialytic oral nutritional supplement (ONS) on nutritional status in a UK haemodialysis (HD) population.

**Methods:** NOURISH is a two-arm randomised, parallel group, external pilot trial of intradialytic ONS during HD versus standard care. All patients at the local haemodialysis units were screened for eligibility (HD patients  $\geq 18$  years, dialysis three times per week for  $\geq 6$  months, Body Mass Index (BMI)  $\leq 22$  kg m<sup>-2</sup>) and were randomised to either receive an ONS each HD session or standard care for 2 months. Primary

outcomes were recruitment and feasibility: recruitment rate (recruit to time,  $t = 6$  weeks), barriers, data completion, and acceptability of assessment methods. Secondary outcome measures included palatability of supplements (collected using a questionnaire), oral intake (interview for 48 h dietary recall), handgrip strength (dynamometry) and quality of life (QOL) completed at baseline, 1 and 2 months.

**Results:** Ten participants were recruited, five randomised to each arm, representing 4% of the screened population. The main reason for ineligibility was a BMI  $>22 \text{ kg m}^{-2}$ . Average time for monthly assessments was 35 to 55 min, which patients found acceptable. Questionnaires to identify food intake on HD and ONS preferences were only completed 23.1% of the time. Significance tests were not performed for secondary outcome measures due to small sample size. One hundred and eighty one participants would be needed to identify a significant change in handgrip strength in a definitive trial, requiring 10 centres of approximately 250 HD patients, recruiting for any specified period of time.

**Discussion:** Changes to consider in future trial design include increase the eligible BMI range to  $24 \text{ kg m}^{-2}$  and use of additional measures of muscle mass to better indicate nutritional status. Timing of ONS during the intradialytic period should be clearly defined. Monthly assessments of oral intake, QOL, weight and routine blood results are advised. A definitive trial would be feasible in the UK, but some aspects need further consideration.

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## NTR23

### Body image perceptions within an anorexia nervosa population

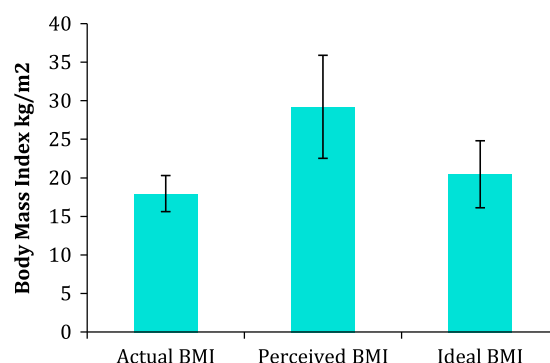
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**Background:** Body image refers to an individual's perception of their body. Body Image Disturbance (BID) is a multidimensional concept<sup>(1)</sup>, consisting of body dissatisfaction and body distortion. BID has been linked to eating disorders (ED) and treating these disturbances is considered essential stage of recovery<sup>(2)</sup>. Testing of BID has involved the use of figural drawing scales (FDS) consisting of a range of human line drawings ranging from the emaciated to the obese. The present study aimed to assess the level of BID displayed within an Anorexia Nervosa (AN) population.

**Methods:** Twenty-one Caucasian females (Mean  $\pm$  SD:  $28.71 \pm 11.86$  years old), with a history of AN, were recruited

through the B-eat website or callforparticipants.com. Participants gave full informed consent before participation. Participants were supplied with a demographic information questionnaire which included questions on weight and height to allow body mass index (BMI) calculation ( $n = 20$ ). Due to participants history of ED, anthropometric data supplied may not be true values. Participants were then asked to observe a figural drawing scale (FDS), the Body Image Assessment Scale-Body Dimensions (BIAS-BD)<sup>(3)</sup>, viewed in a random order to reduce bias. The participants were asked to select their perceived and ideal body image from two alternate randomly ordered FDS, with the difference between BMI values indicating the level of BID. Perceived and ideal BMI were assessed using the images from Gardner *et al.*<sup>(3)</sup> whilst actual BMI was calculated from the demographic data supplied by the participants.



**Figure 1** Participant results for actual, perceived and ideal BMI with standard error of mean.

**Results:** Perceived ( $29.21 \pm 6.68$ ) and ideal ( $20.46 \pm 4.34$ ) BMI were significantly different ( $P < 0.001$ ) suggesting body dissatisfaction. Actual ( $17.96 \pm 2.34$ ) and perceived BMI were shown to be significantly different ( $P < 0.001$ ) suggesting body image distortion. Despite results showing participants were dissatisfied with current body image there was no significant difference between actual and ideal BMI ( $P = 0.055$ ), suggesting a further aspect of body image distortion, which we have termed 'Ideal Distortion'.

**Discussion:** The results of this study demonstrated significant BID within the participants. However, it should be noted that the small sample size agreeing to participate meant that adequate power was not achieved. Other studies have demonstrated BID is also prevalent within the non-ED population<sup>(4)</sup>, so currently it is not known if body dissatisfaction, body image distortion and 'ideal distortion' differ significantly between ED and non ED populations. Further studies could aim to establish the 'normal' level of BID within the non-ED population to determine whether the ED population are significantly different. Despite a small sample size, this study showed BID was prevalent in participants. In addition to this, the effect of Ideal distortion was also noted, and this may add another dimension to our understanding of BID. A greater understanding of these disturbances has the potential to improve treatment methods and recovery rates.

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## NTR24

### A follow up survey to assess physical activity promotion by Registered Dietitians

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**Background:** Physical activity (PA) has been demonstrated to have a role in both prevention and management of numerous chronic diseases, such as cancer, type 2 diabetes mellitus and cardiovascular disease. Physical inactivity has been cited as the fourth leading risk factor for all cause mortality worldwide<sup>(1)</sup>. In 2004, McKenna and colleagues<sup>(2)</sup> conducted a survey of Registered Dietitians to investigate how and if they promote PA. The present study aimed to survey a similar cohort to analyse how dietitians promote PA 10 years later.

**Method:** The validated questionnaire devised by McKenna *et al.*<sup>(2)</sup> was posted to 88 randomly selected UK dietetic departments (six per department, 528 in total) and 227 were returned. Questionnaires were anonymous. The questionnaire investigated five main areas; demographics, personal practice and caseload, PA promotion, respondents attitudes to PA promotion, recent or desire for future training in PA promotion and finally respondents own PA behaviour.

**Results:** 92.5% of dietitians felt promoting PA to be part of their role and 85.4% actively promoted PA to patients. Only 25.7% had received recent training on PA promotion but this made no significant difference to their promotion of PA. 86% stated that they would like training. On average dietitians spent 5.70 (SD 2.9) minutes discussing PA with new patients (versus 8.96 (9.8) minutes reported previously<sup>(2)</sup>). They spent 4.99 (SD 3.21) minutes (versus 6.08 (14.4) reported previously<sup>(2)</sup>) with follow-up patients. Most used some form of written information

and 97.3% of respondents would use a leaflet if it were available. The majority of dietitians reported feeling PA promotion is part of their role and actively promoting it. Dietitians were more likely to give advice to patients with diabetes and obesity and least likely to promote PA if their caseload was dominated by elderly care, ICU or surgery. Dietitians own PA habits did not significantly affect their own promotion of PA.

**Discussion:** Whilst time spent discussing PA was shown to be less than in 2004<sup>(2)</sup>, it still represented a significant proportion of a consultation, which may only be 15–30 min long. The 2007 Health Survey for England<sup>(3)</sup> reported that the general public feels they would be more likely to engage in PA if advised to do so by a doctor or nurse, suggesting that if dietitians can also establish credibility in advising on PA then they are in a position to make a real difference to their patients. The survey did not investigate what type of written information is currently available, if any, but the results suggest some form of suitable written patient information could be useful. Few dietitians have had training on PA promotion despite it taking up a good proportion of consultation time but a high proportion express a desire for training, suggesting a training gap exists. Given the financial cost of inactivity to the State and the time constraints on patient contact, there would seem to be a significant need for more training, access to good quality resources and a greater consensus as to how PA information and advice is delivered by the dietetic profession.

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## NTR25

### A review of the effect of rapid weight loss on performance in athletes

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**Background:** Rapid weight loss (RWL), often achieved through numerous strategies such as vomiting and extreme dehydration, is used by many athletes in preparation for competitions in order to meet weight categories, adjust their power to weight ratio, or for aesthetic reasons<sup>(1)</sup>. Consequently this can cause disordered eating amongst athletes, resulting in increased illness and fatigue, a reduced number of training days and potential permanent damage to an athlete's health<sup>(2)</sup>. This review aims to investigate whether RWL reduces performance in athletes by

looking at psychological tests (Profile of Mood States) and physiological tests including aerobic work capacity, strength and time to exhaustion.

**Methods:** Three databases (SPORTDiscus, Discover and Google Scholar) were searched by one researcher to gather relevant papers for review, with an initial yield of 120 publications. Google scholar was used to search 'grey literature' to reduce bias. The search terms used were: 'WEIGHT REDUCTION or WEIGHT LOSS or WEIGHT CYCLING or MAKING WEIGHT', 'PERFORMANCE or ABILITY', 'RAPID or FAST or QUICK' and 'ATHLETE\*'. Papers were included if they met specific eligibility criteria: RCTs; a study of RWL on athletic performance; a minimum of 10 participants and a consideration for hydration status and weight loss method. It was not possible to select specific sports or specific outcome measures due to the limited number of papers available. After using combined CASP and S.I.G.N quality assessment criteria on the 17 remaining papers, six studies were selected for critical appraisal. These were synthesised in table format to allow for comparisons across studies.

**Results:** Summaries for the six studies meeting the inclusion criteria and included in the review are shown in the table below.

Study	Reduced Ability	No Change	Comments
1: Judo		●	4 h recovery period prior to testing
2: Judo	●		Physiological and psychological states affected
3: Horse Racing	●		Reduction in aerobic work capacity
4: Variety		●	No changes noted in RWL group
5: Judo	●		Physiological and psychological states affected
6: Combat		●	4 h recovery period prior to testing

**Discussion:** Due to limited research within this area, the selected studies were of poor quality and contained a number of methodological flaws. Due to the different methods used within each study to test performance, it is also difficult to make any firm comparisons or conclusions. Some studies omitted taking baseline measurements and many did not provide results from

performance tests carried out after RWL, indicating bias and questions the validity of the studies. More robust studies are required in this area in order to form any conclusion. To provide a critique for this review, greater accuracy could have been achieved in establishing the strengths and weaknesses of the papers by using an appropriate evaluation tool.

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## NTR26

### Retrospective study of health outcomes of patients with IBS: comparison of a low FODMAPs diet with or without a prebiotic galactooligosaccharide (Bimuno)

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**Background:** A low FODMAPs (Fermentable Oligosaccharides Disaccharides Monosaccharides And Polyols) diet has proved effective in the management of Irritable Bowel Syndrome (IBS)<sup>(1)</sup>. Prebiotics are not frequently recommended as part of IBS treatment, as their efficacy is under-researched<sup>(2)</sup>. The aim of this study was to measure the effectiveness of the low FODMAPs diet with or without an additional prebiotic supplement (Bimuno) on symptom relief in IBS patients.

**Method:** This study retrospectively assessed data from 40 IBS patients (20 low FODMAPs only diet, 20 low FODMAPs and Bimuno), treated in Surrey or Kingston-Upon-Thames between 2010–2013 by a single dietitian. Patients whose medical data were readily available and met the set inclusion criteria were included in the study. Using a 10-point Likert scale (10 = significant impact, 1 = no impact) subjects

Symptoms	Low FODMAPs Only			Low FODMAPs and Bimuno			Low FODMAPs Only and Low FODMAPs and Bimuno	
	Baseline*	8 weeks*	P	Baseline*	8 weeks*	P		P
Abdominal pain	6 (2)	2 (1.25)	$P < 0.001$	8 (5)	2 (3.25)	$P < 0.001$	Change in abdominal pain	0.524
Bloating	7 (3.13)	2 (1.63)	$P < 0.001$	8.75 (3.5)	2 (2.75)	$P < 0.001$	Change in bloating	0.277
Wind/flatulence	8 (3)	2 (2)	$P < 0.001$	8 (1.86)	3 (1.25)	$P < 0.001$	Change in wind/flatulence	0.537
Diarrhoea	4.5 (4.25)	1 (1.25)	0.01	6 (5)	1 (1)	$P < 0.001$	Change in diarrhoea	0.018
Constipation	2 (3.25)	1.5 (1)	0.011	4.5 (6)	2 (2.13)	0.006	Change in constipation	0.32
Nausea	1 (3.25)	1 (1)	0.007	4 (3.75)	1 (1.13)	0.001	Change in nausea	0.015
Energy Levels	7.75 (2.63)	5.5 (4.75)	0.008	7 (5)	4 (2.25)	$P < 0.001$	Change in energy levels	0.207

\*Data expressed as median (IQR).



reported their symptoms at baseline and after 8 weeks of treatment for the following: abdominal pain; bloating; wind/flatulence; diarrhoea; constipation; nausea; and energy levels.

**Results:** The table shows median symptom scores at baseline and 8 weeks in both groups and the significance of any within group changes.

**Discussion:** Both groups showed significant changes across all symptoms. After controlling for baseline symptom scores, symptom reductions were not significantly different between the groups except for diarrhoea, which were greater in the low FODMAPs and Bimuno diet group. Results supported the benefits of a low FODMAPs diet in minimising IBS symptoms. Although further research is required to determine additional benefits of prebiotic supplementation, Bimuno did not exhibit any FODMAP properties.

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## NTR27

### A clinical audit of oral nutrition supplements prescribing practice

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**Background:** It is estimated that more than 3 million people within the UK are affected by malnutrition at one time<sup>(1)</sup>. This condition negatively impacts patient prognosis, recovery time, hospital stay and mortality. The use of oral nutritional supplements (ONS) as a treatment is still debated with regards to whether the benefits outweigh the costs. This may be impacted by the suggestion that the majority of ONS prescribing is completed by healthcare professionals that are not specialised in the discipline of nutrition<sup>(2,3)</sup>.

**Method:** The principal aim of this study was to audit the ONS in-patient prescribing practice of dietitians (DT) compared to other Healthcare Professionals (OHCP) within Darent Valley Hospital (DVH). A quantitative clinical standards-based audit was carried out on 13 wards within DVH, over the course of three randomly selected days within 1 month. All patients above the age of 18 years and prescribed ONS were included within the sample. An audit tool was used to assess patient drug charts against a set of defined standards laid out by DVH Medicines Management policy PH006. The MUST score of the patient was also assessed to compare prescribing against current MUST treatment guidelines<sup>(1)</sup>.

**Results:** A total of 64 patients met the inclusion criteria with a median age of 81 years (IQR 13.5). Fifty six percent of the prescriptions were completed by OHCP, leaving 44% completed by DT. Five of the OHCP prescriptions (13.88%) had been completed without a MUST score (DT 0%,  $P = 0.113$ ). A total of 55.6% of the prescriptions written by the OHCP group were written with incorrect ONS names, whereas only 3.6% of those completed by the dietetic group were incorrect ( $P = 0.001$ ). Similarly the DT group were significantly more likely to record the correct dose on the prescription (DT 75%, OHCP 16.7%,  $P = 0.001$ ).

**Discussion:** The difference in practice and high rates of inappropriate record keeping highlighted by this audit, emphasise the need for better education and training of nutrition support for OHCP. The use of incorrect ONS names and doses alone could potentially increase wastage, resulting in poorer clinical outcomes and financial loss. In order for best practice and the economic use of ONS, treatment must be completed in line with a set of defined tested guidelines such as the MUST guidelines and the hospitals prescribing standards.

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## NTR28

### Service evaluation to explore how patients in a low socioeconomic area would prefer to access a diabetes screening programme within a GP surgery

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**Background:** Type-2 diabetes is increasing at an alarming rate. Currently one in three adults are at risk of developing diabetes<sup>(1)</sup>. Deprived populations have a substantially higher risk and are a harder to reach population. Sustained hyperglycaemia directly increases morbidity and mortality, therefore screening services for early detection and prevention are paramount<sup>(2)</sup>. This service evaluation aimed to determine the



efficacy of health promotion in influencing screening uptake within a low socioeconomic area, to improve the service provided within a GP surgery.

**Methods:** Convenience sampling was implemented over a 2-day period in a Plymouth GP surgery. All patients entering the surgery were invited to participate in the health promotion activity and eligible participants ( $\geq 18$  years without diabetes) were delivered information regarding definitions, complications and prevention of type-2 diabetes through a short talk. Supporting information was presented on a stand including visual aids, models and leaflets. Post-intervention mixed-method questionnaires focusing on intention to screen and preference of information delivery, were completed by participants.

**Results:** The response rate was 47% (54/116). The majority of participants (79.6%,  $n = 49$ ) would participate in screening following health promotion, primarily due to raised awareness of type-2 diabetes and screening opportunities. Fifty percent of participants ( $n = 27$ ) wanted the current method to remain the same. Significant variations in the preferred method of delivery (e.g. leaflet, health promotion, online information) were found with age ( $P = 0.029$ ) and education level ( $P = 0.032$ ). Older patients ( $>40$  years) preferred leaflets, whilst younger patients ( $<40$ ) preferred online information. Patients with lower education levels preferred health promotion stands. Being approached by the researcher 44.4% ( $n = 24$ ) encouraged individuals to engage with the health promotion activity.

**Discussion:** Lack of awareness was the primary factor preventing engagement in screening opportunities, indicating the need for a combined approach to focus on improving knowledge and promotion of available services. Contrary to studies reporting reduced engagement in deprived populations<sup>(3)</sup> the majority of participants would consider screening. There was, however, significant variation in preferred method of delivery. These findings emphasise the importance of tailoring services to the population and utilising a broader range of methods to improve engagement and participation. Health care professionals can have a profound impact on engaging service users with a proactive approach highlighted as the most influential feature of the current screening service. Engaging low socioeconomic groups in screening programmes is a complex issue. This evaluation suggests with active engagement, the current service positively influences likelihood to screen. Further research into a variety of methods is required in order to engage a larger proportion of this population in screening programmes.

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## NTR29

### Current food labelling problems and how they influence the ability to adhere to a gluten-free diet

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**Background:** Diagnosis of coeliac disease is becoming increasingly common, affecting one in 100 people in the UK<sup>(1)</sup>. The only treatment is a lifelong gluten-free diet which can have a negative impact on daily living. Food labelling has been highlighted as one of the factors of influence in compliance to a gluten-free diet<sup>(2)</sup>. The aim of this study was to investigate current problems with food labelling in the UK and how these influence adherence to a gluten-free diet.

**Methodology:** A cross-sectional online survey was designed based upon the questionnaire from a US study by Verrill *et al.*<sup>(3)</sup>. The survey was piloted prior to data collection with 10 members of the public, which resulted in alteration of phrases such as 'adherence', to 'following a gluten-free diet' in order to be better understood. It was then posted via a secure link onto two online Facebook Pages (Coeliac UK and Patient.co.uk) together with two online coeliac disease forums where members of the forum were able to access it. The survey assessed difficulty in adherence to a gluten-free diet and the factors associated with this, including perceived understanding and clarity of food labels and opinions regarding current and future food labelling laws.

**Results:** The study recruited 50 participants of whom 16% were male and 84% female and 38% were aged between 45–54 years of age. Of these 32% found reading food labels to increase difficulty in following a gluten-free diet. In those who had been diagnosed more than 4 years, the majority stated they found following the diet 'a little difficult', illustrating a possible correlation between length of diagnosis and difficulty following a gluten-free diet. Of those who believed reading food labels to cause difficulty in adherence to a gluten-free diet, 48% found compliance to be either 'a little difficult' or 'fairly difficult.' A significant association was then confirmed with a Pearson chi square test, between food labelling and difficulty in adherence to a gluten-free diet. A number of problems with food labels were also identified, including print size, confusing statements, inconsistency between brands and the absence of an allergen box.

**Discussion:** Statistical analysis illustrated that, overall, participants (58%) found following a gluten-free diet to be 'a little difficult', a greater proportion than found by Zarkadas *et al.*<sup>(4)</sup>. The main aspects associated with perceived difficulty were dining out and travelling. The findings indicated that the participants knowledge and understanding of food labelling was of good quality, but that the clarity of food labels was inadequate. Confusing 'may contain' statements generate difficulty establishing if a product is safe to consume. This is in line with the US study

conducted by Verrill *et al.*<sup>(3)</sup>, which concluded that individuals with coeliac disease were experienced readers of food labels. Issues with food labelling identified within this study illustrate a need for future research into this area and for recommendations for future food allergen labelling laws.

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## NTR30

### A study into energy cost of common foods and their contribution to reference nutrient intake of five micronutrients for pregnant women

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**Background:** Pregnant women have increased requirements for vitamins A, C and D, folate and riboflavin<sup>(1)</sup>. Higher quality diets have been shown to be more costly per kilocalorie and are more likely to be consumed by persons of higher educational level<sup>(2)</sup>. The aim of this study was to explore whether there was a relationship between financial cost per calorific value (energy cost) of commonly eaten foods and their contribution to Reference Nutrient Intakes (RNI) of these five micronutrients for pregnant adult women.

**Methods:** A retrospective study was conducted in which the thirty most frequently consumed foods eaten by female adults of reproductive age were identified from the National Diet and Nutrition Survey 2008–2011<sup>(3)</sup>. Foods advised against in pregnancy were excluded. Vitamins A, C, D, folate and riboflavin content were estimated using food composition tables and percentage contribution to RNI (% per 100 g) for adult pregnant women calculated. Energy cost of food was calculated by price (pence per 100 g) divided by energy (kcal per 100 g) multiplied by 100.

**Results:** No significant correlation was found between RNI contribution (% per 100 g) and energy cost (per 100 kcal) of foods for vitamin A and C and folate (all  $P > 0.05$ ). A significant positive correlation was found between RNI contribution (% per 100 g) and energy cost (per 100 kcal) for

vitamin D ( $r = 0.416$ ,  $P = 0.028$ ) and riboflavin ( $r = 0.373$ ,  $P = 0.046$ ).

**Discussion:** The finding for vitamin D was in line with others, who found higher quality diets are more costly per calorific energy value<sup>(4)</sup>. Sub-optimal riboflavin and vitamin D status has been found to be widespread amongst young British women<sup>(4)</sup>. Small sample size may have contributed to lack of statistical significance in correlation between contribution RNI and the energy cost for the other micronutrients. For example only one fruit and two vegetable items were included in the sample. Higher cost per energy foods, such as tinned tuna and eggs, contributed significantly more to RNI for vitamin D and riboflavin for pregnant adult women, than lower cost per energy foods such as white bread and sugar. Further research is now needed to explore the reasons for this.

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## NTR31

### Predictors of weight gain among women with non-metastatic breast cancer in Cyprus: a retrospective study

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**Background:** It is well established that certain breast cancer treatments, such as adjuvant chemotherapy, are associated with weight gain. This weight gain is associated with an increased risk of breast cancer recurrence and a poor prognosis<sup>(1)</sup>. For Cypriot women -the incidence rate of breast cancer is high at 104.3/100 000<sup>(2)</sup>. Therefore effective strategies for optimising breast cancer treatment outcomes are needed in this population, for example, early recognition and effective management of treatment side effects including weight gain<sup>(3)</sup>. The aim of

this study was to identify if the BMI of Cypriot women increased during adjuvant chemotherapy (ADJ) and to consider whether menopausal status and/or initial body weight are predictive of increased BMI gain during treatment.

**Methods:** This retrospective study included 111 female patients diagnosed with non-metastatic BC between 2009–2012 and receiving ADJ. Height and weight measurements were obtained from medical records and used to calculate BMI at baseline, 3 and 6 months post diagnosis. Information was also collected on mammary malignancy, chemotherapy and menopausal status at baseline. Change in BMI was determined from the time of diagnosis, at three and then at 6 months ADJ. This was categorised as: weight loss ( $\text{BMI} < 0.5 \text{ kg m}^{-2}$ ); stable weight ( $\text{BMI} = \pm 0.5 \text{ kg m}^{-2}$ ) and weight gain ( $\text{BMI} > 0.5 \text{ kg m}^{-2}$ ).

**Results:** For all subjects BMI, increased significantly over the first 3 months of treatment,  $0.56 \pm 0.11 \text{ kg m}^{-2}$  ( $P < 0.001$ ). At 6 months ADJ, BMI had increased significantly by  $1.23 \pm 0.15 \text{ kg m}^{-2}$  ( $P < 0.001$ ), for all subjects. At 3 months, 53.16% of subjects had increased their BMI by  $> 0.5 \text{ kg m}^{-2}$  (judged clinically significant by Kroenke *et al.*<sup>(4)</sup>); at 6 months ADJ 66.66% of subjects had increased their BMI  $> 0.5 \text{ kg m}^{-2}$ . Mean pre- and post-treatment BMI for all patients in the study was  $26.18 \pm 2.7 \text{ kg m}^{-2}$  and  $29.63 \pm 1.37 \text{ kg m}^{-2}$ , respectively. 48% of the subject population were premenopausal at baseline, 68% subjects post and only 1% changed menopausal status during the study. Pre-menopausal women gained significantly ( $P < 0.05$ ) more weight during treatment than post-menopausal women;  $1.53 \pm 0.19 \text{ kg m}^{-2}$  compared to  $0.88 \pm 0.22 \text{ kg m}^{-2}$ . Baseline BMI was not predictive of BMI change at 3 or 6 months ADJ.

**Discussion:** Significant post-diagnosis increases in BMI were evidenced by this sample of Cypriot women at both 3 and 6 months ADJ. This suggests that it is important to implement appropriate weight management strategies in this group to improve long-term prognosis and minimise breast cancer recurrence. Pre-menopausal status was associated with the largest increases in BMI suggesting this may be a, clinical but not independent, predictor of BMI gain. Further investigation is needed to assess the value of pre-menopausal status as a predictor of increased weight gain in a larger sample size, as degree of weight gain ( $\text{BMI gain} > 0.5 \text{ kg m}^{-2}$ ) is positively correlated with poor prognosis and recurrence<sup>(1)</sup>. In addition longer duration studies are also needed to ascertain if weight gain continues beyond ADJ and if other predictors of weight gain can be identified. This is the first study to confirm that weight gain is common among Cypriot women receiving ADJ within 6 months of BC diagnosis and to identify premenopausal status as a potential predictor of greater weight gain within this population.

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## NTR32

### A qualitative exploration of anorexia nervosa patients' perceptions of macronutrients

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**Background:** Patients with anorexia nervosa (AN) respond differently to the macronutrient content of foods in terms of what they eat, prefer and desire<sup>(1)</sup>. Attitudes and cognitions toward foods have been found to be a good predictor of food consumption<sup>(2)</sup>. However, little research has qualitatively examined AN patients' perceptions of macronutrients and how this might affect their food choices. The aim of this study was, therefore, to qualitatively explore AN patients' perceptions of, and attitudes towards macronutrients and to consider how this might impact upon food choice and potential need for dietetic support.

**Method:** Purposive, convenience sampling was used to recruit in patients with AN from a single independent specialist eating disorders hospital in England. Nine patients aged 18–57 years agreed to take part in the study. Eight of these were white British females and one described herself as mixed-race Chinese. Individual semi-structured interviews were undertaken using a topic guide and audio-taped. Interviews were transcribed verbatim and seven transcripts were analysed manually using a five-step process of thematic analysis<sup>(3)</sup>. Saturation of themes was reached by the end of the seventh interview, with no new themes emerging.

**Results:** Three main themes emerged: emotional responses; physical effects and health. All fats and carbohydrates evoked feelings of guilt and fear but only the 'fat content of proteins' was considered frightening. Fats were viewed as 'fattening' and the cause of 'instantaneous weight gain'. Carbohydrates were associated with feeling 'bloated', 'heavy' and 'too full'. Protein was associated with building muscle which some patients found aesthetically pleasing. Fats and carbohydrates were both seen as being bad for health and the body but only the 'fat content of proteins' contributed to its 'badness'. No macronutri-

ents were deemed to be essential for health. Given the choice, most patients described choosing foods with the least amount of any macronutrient, particularly fats.

**Discussion:** A distinct aversion to dietary fat was clearly observed which is consistent with other studies showing AN patients dislike or avoidance of high-fat foods<sup>(4)</sup>. Unlike fats and carbohydrates, protein was viewed more positively due to its association with building muscle, which could explain why some studies have found that AN patients consume a greater proportion of energy from protein than healthy controls<sup>(5)</sup>. AN patients perceived fats, carbohydrates and proteins to affect their body in different ways and with different emotions and health implications assigned to them that were often inaccurate. This study demonstrates that AN patients have misconceptions about macronutrients which may contribute to poor intake and suggests there is a potential role for dietitians in the treatment of AN.

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