

Nutritional Status of Irish Older People in Receipt of Meals-on-Wheels and the Nutritional Content of Meals Provided.

Abstract

Background: Research has suggested that meals-on-wheels recipients can be at risk for poor nutritional status. Despite this, few countries have statutory minimum requirements for the nutrient content of meals-on-wheels. This study examined both the nutritional status of a sample of Irish recipients and the nutrient content of a sample of meals provided to determine whether Irish recipients would benefit from statutory minimum nutritional standards.

Methods: The study had two phases. Firstly, a nutritional assessment was carried out in order to analyse the nutritional status of a sample of Irish meals-on-wheels recipients (MNA and 24-hour dietary recall with 63 self-selected respondents). Secondly, an assessment of the nutrient content of a sample of 46 meals from 8 meals-on-wheels services was undertaken in order to characterise the nutritional content of the meals.

Results: Over one-third of recipients (38.5%) were malnourished or at-risk of malnutrition and over half (52.3%) were overweight or obese. The mean energy (kcalorie) content of the meals assessed was 719 kcalories (SD 119.1), contributing 35-40% of the RDA for males aged 65 years and over and 42-45% of the RDA for females aged 65 years and over. In the meals assessed, the levels of vitamin C (25.3%), vitamin D (11.6%), folate (24.8%) and calcium (20.9%) were below one-third of the Irish RDA for these nutrients.

Conclusions: Irish recipients may not be receiving adequate micronutrients from meals-on-wheels. Legislation that sets out minimum standards for the nutrient content of meals-on-wheels and greater variation in the portion sizes offered, may benefit recipients.

Keywords: Meals-on-wheels, nutritional assessments, 24-hour dietary recall, older people.

Introduction

Although studies carried out in the US have shown that meals-on-wheels can help to improve the nutritional status of older people (Daube and Belding, 1997; Millen, 2002), studies carried out elsewhere have had more mixed findings (Asp, 1988; Fogler-Levitt *et al.*, 1995). This may be related to statutory minimum nutritional requirements imposed by the US government on providers, which are not required elsewhere.

American meals-on-wheels providers are required to supply recipients with one-third of the current recommended dietary allowance (RDA) or dietary reference intake (DRI) for nutrients and energy (Wellman *et al.*, 2002), namely two ounces of edible cooked meat, fish, fowl, eggs or meat alternate; three servings of vegetables and/or fruits; two servings of starches/grains; one cup low-fat milk or equivalent; fat serving; as well as a dessert or condiments. Approximately three million participants of the Elderly Nutrition Program (ENP) receive, on average, 40 to 50% of required nutrients from meals provided by the Program (Administration on Aging, 2004). Millen *et al.* (2002) showed that the nutritional status of those availing of the ENP is significantly higher than that of non-participants.

In contrast to the US, neither Australia nor Canada have statutory regulations on the nutritional content of meals-on-wheels. In 1977, the Australian Government Department of Health and Ageing recommended that meals-on-wheels should supply two-thirds of the Australian recommended daily allowance for vitamin C, half the dietary allowance for other vitamins, minerals and protein, and one-third of the total food energy allowance. However, there is no legal obligation placed upon providers to comply with these guidelines and evidence of variation in meal sizes and the nutritional content of meals provided by Australian services has been reported (HDG Consulting Group, 2004). Although many Canadian meals-on-wheels services are guided by general federal guidelines on healthy eating for older people (Health Canada, 2007), Owen *et al.* (1992) established that meals provided to a sample of 44 Canadian female meals-on-wheels clients contained an insufficient amount of calcium and energy.

In the UK, meals-on-wheels are organised by local authorities, who put contracts for the provision of meals-on-wheels out for competitive tender. While there are no legislative minimum standards for the nutritional content of such meals, the majority of local authorities require service providers to adhere to a set of recommended guidelines through a service level agreement (NACC, 2005). The recommended minimum standards suggest that each meal should provide the recipient with 600-650 kcals per meal, 20 g of protein, 3-4 mg of iron and 10 mg of vitamin C.

In Ireland, meals-on-wheels services have been operating for over 100 years. They were originally developed by local community groups and religious services. While approximately 15% are currently provided by local authorities, the majority continue to be provided by local community groups and charitable organisations, with some financial assistance provided by the State. There are currently no statutory minimum standards for the nutrient content of meals-on-wheels in Ireland and no research on the nutritional status of meals-on-wheels recipients nor on the dietary composition of the meals provided had been carried out prior to this study. As a result, service provision, funding and standards vary considerably (O'Dwyer and Timonen, 2008). In general, older Irish people tend to have unhealthy diets, which may have contributed to the increased prevalence of overweight and obesity in recent years among this age cohort (Morgan *et al.*, 2007).

Materials and Methods

Study Design

This study analysed the nutritional status of a sample of Irish meals-on-wheels recipients and the nutrient content of a sample of meals in order to examine whether Irish recipients would benefit from statutory minimum nutritional standards. There were two separate elements to the research, firstly, a nutritional assessment, consisting of the Mini-Nutritional Assessment and a 24-hour dietary recall, and secondly, an assessment of the nutrient content of a sample of meals.

Sample

Respondents were accessed through their meals-on-wheels service. A non-probability, self-selecting sampling approach was used as the lack of systematic records of recipients and difficulties in negotiating access to recipients through co-ordinators of services made probability sampling impossible. Information leaflets were distributed by meals-on-wheels drivers, asking recipients to contact the research team if they wished to take part in the study. Eligible participants included those who did not have a severe cognitive impairment and were able to give written informed consent. A total of 63 respondents took part in the study. All respondents were interviewed in their own homes. Of those assessed, 59% were female and 41% male. The mean age of the sample was 78.5 (SD 10.7) years, and the age range was 36-93. The majority of respondents (59; 94%) were aged 65 years or over, of whom four were aged 90 or over. Four respondents were younger than 65, and were using the meals-on-wheels service as a result of a physical disability (n=1), chronic illness (Multiple Sclerosis (n=2) or Motor Neurone Disease (n=1)). Almost all respondents (54; 86%) lived alone; seven lived with their spouse while two lived with another family member. All respondents were of white, Irish ethnicity. Thirty-nine (62%) lived in an urban area, 24 (38%) lived in a small town or rural area (i.e. population \leq 1,500). Twelve (19%) had special dietary requirements; five had diabetes mellitus, two were vegetarian, one was coeliac, three required a low-fat diet (for coronary problems) and two required high-fibre diets.

Study participants were not screened for cognitive impairment in order to minimise the burden on respondents.¹ Only the dietary recalls of individuals who were able to account for their food intake without major difficulties in recalling the events/meals of the previous day were included in the analysis and all respondents were able to give lucid accounts of their experiences and views during the qualitative interviews, suggesting that there were no study participants with significant cognitive impairments. While this is naturally a limitation of the study, it was not feasible to include cognitively impaired individuals due to the practical challenges involved.

¹ Respondents were also asked to participate in a qualitative interview on their views of meals-on-wheels and the role of food in their lives. As a result, the total interview lasted between 60 and 80 minutes in total.

Data Collection

Mini-Nutritional Assessments

The Mini Nutritional Assessment (MNA) (Guigoz *et al.*, 1994) was used to assess the nutritional status of respondents. The MNA is intended for use in community-dwelling and hospitalised older people and assesses four areas of nutritional relevance – anthropometric measurements, dietary intake, global health and self-perception of health status. This assessment tool can be used to identify older people (65+ years) at risk of malnutrition and has two components: screening and assessment (Pirlich and Lochs, 2001; Stuck *et al.*, 1993; Vellas *et al.*, 1999). A score of ≤ 11 on the screen indicates a possible nutritional problem and the need to complete the assessment portion. The assessment score is added to the screening score; if the total score on both parts totals 17-23.5, there is a risk of malnutrition, while a score of < 17 indicates existing malnutrition. The MNAs were completed by professionally qualified dietitians with experience in carrying out such assessments, asking probing questions, reassuring respondents and using props to ‘jog’ the memory of respondents. In cases where doubts were raised as to the validity of the answers, specific answers were coded as ‘missing’, rather than included within the dataset.

24-Hour Dietary Recall

The 24-hour dietary recall was carried out to gauge a typical day’s actual intake in the older population who are receiving meals-on-wheels vis-à-vis the recommended dietary intake (FSAI, 2000). A trained dietitian asked each respondent to recall all of the food and drink they had consumed over the last 24 hours. A Food Atlas was used to estimate portion sizes consumed by recipients (Nelson *et al.*, 2002). The Atlas consists of colour photographs of 78 foods commonly consumed by British adults. Each food has a series of eight photographs showing a range of portion sizes from very small to very large. Respondents were asked to select the portion size that best reflected the amount they usually consumed.

Assessment of a Sample of Meals

A total of 46 meals from eight services throughout the country were assessed to ascertain the extent to which the calculated mean of all meals provided by meals-on-wheels services met the RDAs for older Irish people (Table 1). The number of meals assessed from each organisation varied according to the number of days per week each service operated and the number of choices offered each day.

Insert Table 1 here

The ingredients used in each meal were recorded (by weight), including, where relevant, starters, main courses, desserts, snacks, drinks and sauces. The energy content of each meal was assessed, along with the composition of protein, carbohydrate, fat, calcium, iron, vitamins C, B₁₂, D, and Folate.

Data Analysis

Nutritional Assessment of Meals-on-Wheels Recipients

The results of the 24-hour dietary recall were entered into the WISP software package (Weighted Intake Software Package) (Tinuviel Software, Warrington, UK). The results were compared to the RDAs for the Irish population (FSAI, 1999).

Findings from the MNA were analysed using SPSS version 14.0. The principal nutritional findings from the WISP analysis were included in the statistical analysis. As power calculations showed that the sample size was insufficient to detect a significant body mass index (BMI) difference between well- and malnourished patients (power > 0.95, $P < 0.05$), descriptive statistics were used to identify the nutritional status of recipients; assess the nutritional content of meals provided by meals-on-wheels services; and explore the contribution of meals-on-wheels to recipients' dietary intakes.

Assessment of Sample of Meals

Analysis of the sample meals was carried out using the WISP programme. The extent to which each nutrient met the RDA for older people in Ireland was assessed (FSAI, 2000).

Ethical Approval

This study was approved by the Ethics Committee of the School of Social Work and Social Policy, Trinity College Dublin. Ethical guidance was also provided by the study's Consultative Committee (made up of public and governmental representatives, meals-on-wheels providers and dietitians), established by the funding body to provide advice on the study.

Results

Nutritional Status of Meals-on-Wheels Recipients

Using the MNA, the majority of respondents (63.5%) were found to be well-nourished. However, 27% were at risk of malnutrition and six (9.5%) had protein-energy malnutrition. The mean BMI of those assessed was 25.8kg/m² (SD 5.4) but over half (52.3%) were overweight or obese (see Table 2).

Insert Table 2 in here

Assessment of Meals

Table 3 displays the mean nutrient content of the meals provided. The mean energy (kcalorie) content was 719 kcalories (SD 119.1) which contributed between 35-40% of the RDA for males aged 65 years and over and 42-45% of the RDA for females aged 65 years and over. The average meal² provided 67.5% of male recipients' RDA for protein³ and 76.1% for women⁴. Just over one-third (33.7%) of the RDA for iron was provided by the average meal for both men and women. The RDA for vitamin B₁₂ was surpassed with the average meal containing 1.5µg. However, the average meal contributed 25% or less of the RDA for vitamin C, vitamin D, folate and calcium.

Insert Table 3 in here

² The 'average' meal refers to the calculated mean of all 46 meals analysed.

³ RDA for protein for men calculated as 53.25g/day for a male aged 65-74 years weighing 71kg (50th percentile)

⁴ RDA for protein for women calculated as 47.25g/day for a female aged 64-75 years weighing 63kg (50th percentile)

Contribution of Meals-on-Wheels to Recipients' Dietary Intakes of Nutrients

While the delivered meal provided recipients with between 35-45% of the RDA for energy, it provided, 42.2% of the recipients' mean *actual* daily energy intake (SD 14.9) (i.e. the total number of kcalories actually consumed that day). A quarter of all recipients (25%) received more than 50% of their daily energy from the meal provided by the meals-on-wheels service. Eleven recipients (21%) received less than one-third of their daily energy intake from the meal provided. Similarly, the delivered meal provided between 67.5%-76.1% of the RDA for protein, but 52% of the recipients' mean *actual* daily protein intake (i.e. the total amount of protein actually consumed) (SD 17.1). Twenty-five recipients (44.2%) had more than 50% of their daily protein intake from meals-on-wheels while four (4.8%) had more than 80% of their actual daily intake of protein from the meal. The nutritional status of those with special dietary requirements was good; ten of the twelve were well-nourished, though two were found to be at-risk of malnutrition. All five of those with diabetes were found to be well-nourished, with a mean MNA score of 25.3 (SD 2.1), compared with 23.6 for those without diabetes (SD 3.9). A total of 20 respondents did not eat the whole meal, while just 48 (76.2%) ate the whole meal within a half an hour of the delivery time. This did not appear to affect recipients' nutritional status; the mean MNA score of those who ate the whole meal within a half-an-hour to an hour of its arrival (23.8, SD 3.6) was similar to the mean score of those who either threw away or saved some of the meal (23.6, SD 4.4). There was little difference in the nutritional status of those living in urban versus rural areas; 65.8% (n=25) of those living in urban areas were well-nourished, compared with 60% (n=15) of those in rural areas.

Discussion

Our study found that meals-on-wheels provided Irish recipients with over one-third of their total daily energy requirements, suggesting that meals-on-wheels can play an important role in maintaining the nutritional status of community-dwelling older people. The meals were also particularly helpful for those with special dietary requirements, such as diabetes, gluten-free diets and diets high in fibre (Wellman *et al.*, 2002). However, meals-on-wheels provided recipients with over one-third of their

mean *actual energy intake* (42%), suggesting that some respondents relied heavily on meals-on-wheels for nutrients, perhaps due to difficulties in carrying out grocery shopping or a lack of interest in food (Gollub and Weddle, 2004). Approximately one-fifth received less than one-third of their daily energy intake from meals-on-wheels, suggesting that other meals contained overly-high levels of energy, which may explain the high levels of overweight and obesity observed. The provision of meals of varying sizes may suit recipients' differing energy requirements (Krassie *et al.*, 2000).

Although the meals assessed had adequate energy and protein, dietary intakes did not meet recommendations for many key micronutrients, a finding also reported elsewhere (Asp and Darling, 1988; Owen *et al.*, 1992; Pargeter *et al.*, 1986), emphasising the need for more calcium-rich foods and fruit and vegetables to maintain the nutritional status of older people at an optimum level (FSAI, 2000). Given the reduced chemosensory satiety of older people, recipients would also be likely to benefit from varied and tasty meals (Hollis and Henry, 2007).

This study suffers from a number of methodological limitations. While it was necessary to use self-selected respondents, it is possible that respondents self-selected on the basis of being fit and well, or, alternatively, had specifically sought to be involved due to their concerns about their weight or nutritional status. In addition, both the MNA and the 24-hour dietary recall method rely on the memory of respondents and may be subject to a response bias. It is also important to reiterate that respondents were not screened for cognitive impairment in order to minimise the response burden on each individual, although care was taken in each interview to assess the respondent's ability to give reliable information. Interviewers endeavoured to ensure that information provided was reliable, either by checking with a spouse or other family member, or by asking probing questions. Where information was felt to be unreliable, it was excluded from data analysis. It is widely acknowledged that the collection of accurate dietary data is particularly difficult in older people (Briefel *et al.*, 1997) and methods of dietary data reporting that might be assumed to be more accurate may not be so in this cohort. One of the major shortcomings of the 24-hour dietary recall is that it assumes that the intake described is a typical day's intake (Forster *et al.*, 1990). While interviewers endeavoured to ascertain whether each respondent ate the whole meal straight away, or threw out all or part of the meal (or

stored some for later), it is possible that this information was not entirely accurate. However, given that older people tend to have both reduced variability in their diets (Pirlich and Lochs, 2001), the 24-hour dietary recall can be considered to be a reasonably appropriate assessment tool in this age group (Ferrari *et al.*, 2002), although ideally such data would have been collected on more than one occasion. To improve the quality of the dietary data collected, qualified dietitians were employed who were trained to ask probing questions, for instance about the timing of meals and about snacks. Use of the 24-hour dietary recall in this study facilitated an estimation of the number of meals eaten per day, as well as the type and quantity of foods consumed and enabled calculation of the contribution of meals-on-wheels to the total daily dietary intake of each individual.

As noted earlier, US providers are obliged to supply meals that contain at least one-third of the current dietary guidelines for Americans (Administration on Aging, 2004). Meals-on-wheels services in Australia, Canada and the UK are not subject to such regulations, and studies on the contribution of meals-on-wheels to dietary intakes in these countries highlight some shortcomings in the nutritional value of meals supplied (Fogler-Levitt *et al.*, 1995; MacLellan, 1997). Regulations on the nutrient content of meals provided may be a factor in the better nutritional status of US recipients. The literature reviewed, and the findings from our study, suggest that meals-on-wheels services should be governed by legislation that sets out minimum standards for the nutrient content of meals.

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