A CROSS-SECTIONAL STUDY OF MEALS SERVED IN RESIDENTIAL HOMES IN SOUTH WALES AND COMPARISON WITH THE NATIONAL STANDARDS

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Student Declaration In Respect of Individual Work

I declare that the whole of this work is the result of my individual effort and that all quotations from other authors have been acknowledged.

In the partial fulfilment of the requirements of Cardiff Metropolitan University for the Degree of Bachelor of Science with Honours

Signed: Farah Nowreen Noor

Date: 25/04/2016
Abstract

Objective: To ascertain whether the meals provided in residential homes (RHs) in Wales fulfil the minimum recommended standards set by the National Association of Care Catering (NACC) and the Food Standards Agency (FSA).

Methods: A cross-sectional study of meal provision among three randomly chosen RHs in South Wales was conducted using the guidelines provided by the NACC and FSA. The menus for meals provided at these RHs on individual days were followed over a period of 14 days per RH. Total number of menus analysed was 42; each menu was considered one unit (n = 42). Further data were obtained by using a structured questionnaire.

Results: Several deficiencies were identified in the practices at RHs with regard to the recommended allocations including bread with every meal, 400 mL of milk per day, five servings of fruit per day, and the provision of meat/meat alternatives at every meal.

Conclusion: Despite certain study limitations such as a smaller study population and limited data availability regarding food preparation, we believe that this study has highlighted the importance of the FSA guidelines and the fact that they are not being followed in practice. Therefore, it sets a foundation for further studies that will provide mechanistic insight for research of nutritional needs and provision of adequate nutrition in RHs. Moreover, our data highlights the importance of implementing certain changes in regulations with regard to nutrition in RHs, perhaps influencing policy at a higher level.
**Introduction**

Advances in science and technology, gradual declines in birth rates, and increases in life expectancy have resulted in an ageing global population (Stanner, 2009 cited in Shepherd, 2010). The percentage of the population aged ≥65 years has risen from 15% to 17% in the last 25 years (ONS, 2012). As people age, they become more dependent on others for their care needs. More than a quarter of a million (291,000) people aged ≥65 years were living in care homes in England and Wales in 2011 (ONS 2014).

**Malnutrition in the elderly**

Malnutrition is common in older populations and is predicted to rise dramatically in the next 30 years (Ahmed and Haboubi, 2010). Malnutrition is a major risk for morbidity and mortality. Around 11% to 51% of elderly people residing in the community, and up to 85% of those in nursing homes had significant nutritional deficits (Mion et al, 1994). The consensus has been that the risk of under nutrition rather than over-nutrition is the main cause for concern in elderly people (Milney et al, 2009). However, the prevalence of overweight (established using standard body mass index [BMI] criteria) older people in westernised countries is also increasing (Flegel, 2010). High BMI is associated with increased risk of mortality from conditions such as diabetes, hypertension, and cardiovascular disease (Ahmed and Haboubi, 2010).

**Risk factors for malnutrition**

It is well recognised that age-related physiological changes influence the nutritional status of the elderly (Gariballa, 2004 and Chapman et al, 2002). Together, the lack of intake, less varied diet, and poor absorption resulted in various nutritional deficiencies (Schiffman, 1997).

Eating less food from the offered portion is a good predictor of malnutrition development (Suominen et al, 2005). Dementia and stroke are also established risk factors. Furthermore, constipation and
dysphagia have been found to be risk factors for poor appetite (Morley, 2001) and pressure sores as a consequence of long-term malnutrition (Singer, 2002).

The lack of awareness on malnutrition among health professionals can leave the poor nutritional status unrecognised in the elderly (Elia, 2001, cited in Milney et al, 2009), but in a study among 2114 nursing home residents in Helsinki, there was no direct link established between malnutrition and poor care or care-related factors. In addition, the findings remain inconclusive regarding whether factors like nutritional intervention, nutritional awareness, or supplement provisions delay malnutrition or improve nutritional status of the residents (Suominen et al, 2005).

**Improving nutrition**

The effect of malnutrition in the elderly is immense. The best option to improve the nutritional status is to enhance normal eating and drinking, with emphasis on essential macro- and micronutrients. The UK government provided guidance for healthy eating in the form of ‘The eatwell plate’, which shows preferential food types and the proportions for a healthy, balanced diet (NHS Choice, 2016).

![The eatwell plate](image)

Figure 1: The eatwell plate
The eatwell plate illustrated the main food groups for a healthy balanced diet including items such as potatoes, bread, rice, pasta, or other starchy carbohydrates as base meals and fish, eggs, meats, beans, and pulses for protein.

Moreover, regular intake of fruits and vegetables, sufficient fluid intake and avoiding food high in saturated fat, salt, and sugar was considered beneficial. Although suitable for most people, some groups (e.g., ≥75 years and inactive) may find it prudent to consider use of the revised recommended levels (PHE, 2014).

For elderly populations a menu with foods high in fibre and complex carbohydrates with a preference for vegetables and fruits, is generally recommended. Fat intake should be <30% of total caloric intake (Patterson, 1994 cited in Well and Dumbrell, 2006), and nutritionally compromised patients should be encouraged to consume nutrient-dense foods (Jaceldo-Siegl et al, 2004 cited in Wells and Dumbrell, 2006). For malnourished elderly patients, counselling is effective in improving dietary habits (Willaing et al, 2004; Pedersen, 2005 cited in Well and Dumbrell, 2006). [Discussed further in appendix 1]

Malnutrition in the elderly has significant health and cost implications, thus, improving nutritional status especially in the institutionalised elderly is a pressing issue (Britton and McLaughlin 2013 cited in Remond, et al, 2015). Clear guidelines for food served in an institution can help. In the UK, there were a few recommended guidelines on that aspect.

Based on the data from the National Diet and Nutrition Survey (NDNS) and the report from the Committee on Medical Aspects of Food and Nutrition Policy (COMA) and Scientific Advisory Committee on Nutrition (SACN), the Food Standards Agency (FSA) has developed a guideline for people in residential care home settings (Appendix 2). Although the guideline is aimed at people >75 years of age, it is clearly stated that people <75 years have similar requirements but with additional requirements for some nutrients (FSA, 2007).
In collaboration with Caroline Walker Trust, National Association of Care Catering (NACC) has published a guideline (Appendix 3) to be used by all care catering sectors (Shepherd, 2010). The guideline includes specifications for breakfast, tea, and the main meals to be delivered in the community with an aim to ensure that all older people have access to food with correct nutritional content. The guideline provides a clear benchmark for the nutritional content of food, and advises on various aspects of nutrition such as hydration, food intolerance, special dietary requirements, and food labelling (Shepherd, 2010).

Following the recommended guideline may ensure proper nutrition for the elderly, but implementing it has its own challenges. Studies have identified possible barriers including staff knowledge of the guideline, perceived threats to independence, lack of focused implementation, limited nutritional knowledge, and lack of resources and monitoring (Bamford et al, 2012).

To be successful, the guideline requires that the core issues relate to their perceived value. Education, training, and support should be provided to the staff to develop the required knowledge and skillset, and methods should be developed to evaluate nutritional outcomes of the served population (Bamford et al, 2012).

**Summary**

Provision of good nutrition can contribute greatly towards the general health and well-being of elderly people, particularly for those living in institutions because they are already frail and unable to look after themselves. Optimisation of nutritional needs and successful implementation of recommended guidelines therefore promises to reduce healthcare costs of malnourished people in residential and nursing homes as well as ensures good quality of life.

The aim of this study is to ascertain whether the meals provided in RHs in Wales fulfil the minimum recommended standards as set by the NACC and FSA.
Material and Methods

Ethical Approval

This study had ethical approval from the School of Health Sciences ethics panel of Cardiff Metropolitan University (Appendix 4). Details of all participants in this study have been made anonymous.

Study cohort/Participants

The project was designed as a cross-sectional study regarding meal provision among three randomly chosen RHs in South Wales compared against the guideline provided by FSA and NACC.

Nursing homes were not selected for the purpose of this study, as nursing home residents usually require specialised care that cannot be fulfilled by ordinary caregivers (FSA, 2007). They may have different nutritional requirements because of their condition (National Institute of Health Research, 2015).

Initially, five randomly selected RHs in the Newport and Carmarthen areas of South Wales were contacted and requested to take part in the study. The letter inviting their participation is enclosed in Appendix 5. Of the five invited RHs, three institutions agreed to participate. A participation form with detailed study information was provided to the RHs as part of the informed consent process.

The menus for the meals provided at these RHs each day were followed over a period of 14 days. In total, 42 menus were analysed, with each menu considered one sample (42 study samples in total).

Data acquisition/Study tool

The FSA recommended that food provided in RHs for the elderly should fulfil the target recommendation (FSA, 2007). A two-part food frequency questionnaire (FFQ) was formulated with a menu checklist and semi-structured questionnaire (Appendix 6), as it is a less expensive assessment tool for dietary intake over time (Subar, 2004 cited in Carithers et al, 2009). A study of 499 African
Americans employed similar structure and suggested that assessment with FFQ for identifying dietary intake is reasonably valid (Carithers et al, 2009). The menu checklist was designed based on FSA recommendations and in light of the Eatwell plate (2015) concept. A semi-structured questionnaire was developed aiming to gain additional information such as portion sizes, availability of water/hydration, and frequency of using ingredients/food that are important to maintain balance. Clow and Nutbrown (2007) cited in Newton, 2010, described the semi-structured interview as a simple, efficient, and practical way of generating data, as interviewees can speak freely. Reproducibility and validity of the tool were evaluated in a large prospective study among 173 women where a 61-item semi-structured questionnaire was used. The study concluded that the questionnaire could provide useful information about individual nutrient intakes over time (Willett et al, 1985). However, its effectiveness is heavily dependent on the communications skills of the interviewer (Clow and Nutbrown, 2007 cited in Newton, 2010).

Two weekly random menus were collected from the RHs by personal visits.

Using a menu checklist allowed for an ethical and logical approach in data collection and consistency in implementation. Pre-designed menu checklists were filled by reviews of daily menus over a two-week period, and were based on FSA (2007) and NACC guidelines, thus, there was minimal observer bias. Two weeks were randomly selected, with no information regarding periodical menu changes or seasonal variation for these homes. Therefore, a two-week study can be considered a cross-sectional view of the baseline at these institutions.

The second element of data acquisition was a semi-structured questionnaire via a twenty-minute interview with the managers of the three RHs who agreed to take part, since analysis of the menu alone did not provide all of the necessary information to address the question of whether FSA and NACC standards were being met.

One of the RHs outsourced food preparations from a third party supplier called ‘Apetito’, a provider of food for care homes (www.apetito.co.uk). Apetito was unavailable for comment. Hence, it was not
possible to gather the expected information. Most of the information was obtained by detailed menu analysis and cross-referencing with the online supplier information.

As care home managers were responsible for acquisition of the ingredients, it was appropriate to interview them regarding the menus. During the interview, various household measures were used to estimate the actual portion sizes served. The manager of the RHs also showed us the equipment and ingredient packaging for clarification.

**Analyses**

Results obtained were tabulated and analysed using Microsoft Excel 2007® (Microsoft Corporation, Washington, USA) to generate descriptive statistics. Each question was given an individual code and the results for three RHs were compared. The nature of the project indicated that testing for significant difference was unnecessary.
**Results**

Of the three RHs, one (33.33%) did not describe any breakfast information. All three RHs (100%) described lunch and dinner information on the menu. Lunch was described as a main meal by all three (100%) RHs. Two (66.66%) RHs identified the evening meal as light meal while one (33.33%) RH described the evening meal as a main meal. Consistent data were not available regarding the menu options in all three RHs.

**Bread, rice, potatoes, pasta and other starchy foods**

All of the 42 (100%) samples fulfil the requirements of offering at least one portion of starch and a variety of breakfast cereals (including wholemeal).

Of the 42 samples, 18 (42.86%) were found to fulfil the criteria of serving a variety of bread as a starter or meal accompaniment, whereas for the remaining 24 (57.14%) the recommendations were not met.

**Fruits and vegetables**

Fruits and vegetables were offered in most of the samples. Out of the 42 samples, 33 (78.57%) clearly met the requirements of offering a variety (>1) of fruits and vegetables every day. The remaining 9 (21.4%) did not fulfil the criteria (Table 1).

![Table 1: RHs serving variety of fruit & vegetables](image1)

<table>
<thead>
<tr>
<th>Served</th>
<th>Not Served</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>9</td>
</tr>
</tbody>
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![Table 2: RHs serving 5 a day](image2)

<table>
<thead>
<tr>
<th>Served</th>
<th>Not Served</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>16</td>
</tr>
</tbody>
</table>
One to two portions of fruits and vegetables were served with each meal in 33 (78.57%) samples. In 9 (21.42%) samples, 1–2 portions were not offered with every meal.

The target of serving five fruits per day was fulfilled in 26 (61.90%) of the 42 samples (Table 2).

Only 9 (21.42%) of 42 samples offered fruits and vegetable as a snack and 33 (78.57%) were unable to do so.

**Meat, fish, eggs, beans and other non-dairy sources of protein**

According to the analysis, 19 (45.23%) samples had a meat/meat alternative at all main meals. Of the remaining, 23 (54.76%) sample did not offer meat/meat alternatives every day every meal (Table 3).

![Table 3: RHs serving Meat/Alternatives on all main meals](image)

![Table 4: RHs serving oily fish once a week](image)

Offering fish at least twice a week was fulfilled by all 42 (100%) samples, 28 (66.66%) offered at least one oily fish per week and 14 (33.33%) samples did not provide that (Table 4).

**Milk and dairy foods**

Milk and dairy foods were supplied every day in all 42 (100%) samples. The guideline recommendations of serving at least 400 ml of milk per day was met in 20 samples (47.62%) (Table 5).
In addition, all 42 (100%) samples studied did provide additional milk or dairy products such as cheese, yogurt, or milk-based pudding.

**Food and/or drinks high in fat and/or sugar**

Foods offered in 42 samples were documented by type. Of the 42 samples, data regarding ingredients were only collected for 28 (66%) samples as the staff was unable to provide information for 14 (33%) samples due to outsourced food. For the 28 samples where information was available, none (0%) did provide low-fat alternative foods or reduce the frequency of serving food with high saturated fat or sugar or offered food with low saturated fat and low sugar at higher frequencies, as recommended.

**Hydration**

The data were captured based on accessibility and availability of fresh drinking water and offering at least seven beverages per day including water. All 42 (100%) samples fulfilled the standards. The availability of various beverages such as water, fruit juices, tea, and coffee are also documented.

**Snacks**

None of the samples (0%) met the criteria of snack availability for three times per day.

**Portion sizes**

The data of portion sizes of different food groups has been analysed. Portion sizes were based on the interview of the server/RH manager and defined as small, medium, and large. The results showed that
the recommended portion had been served in all 42 (100%) samples for each food group. However, 14 (33%) samples provided foods as a bigger portion whereas 28 (66%) samples offered small to medium portions based on resident demand and requirements. For example, if one medium size potato is one portion, then the potato was cut in half and served as per resident requirement.

**Use of salt**

Of the 42 samples, data regarding use of salt were only collected for 28 (66%) samples as the staff was unable to provide information on remaining 14 (33%) samples due to outsourced food. Data were stratified according to the level (low, medium, high) of salt present in food. However, the salt level was not verified for 28 (100%) samples prior to purchasing ingredients. Addition of salt while cooking was confirmed for all 28 (100%) samples. However, there was no documentation regarding the amount of salt being used during the active cooking process. It was also noted that all 42 (100%) samples had salt availability at the table.

**Nature and frequency of the use of different type of ingredients**

For data collection purposes, the nature of ingredients was identified as fresh, processed, and with added sugar and salt. The frequency was defined on the scale of one to five, five being very frequent and one being never.

All 42 samples (100%) used fresh ingredients and the frequency was defined as three (moderate). Processed foods were used in all 42 samples and the mean average frequency of processed food use was 2.33 on the frequency scale. Similarly, a mean average was identified on the use of sugar and salt for all 42 samples.

**4.11. Comparison of data between the residential homes**

Table 6: comparison of data between three residential homes
Significant differences were observed in three RHs on various aspects of menus. RH3 offered a variety of bread as a meal accompaniment in all the units analysed. RH 2 did that in 29% of cases and RH1 did not provide that option in any of their samples.

A variety of fruit and vegetables were offered in all samples of RH1 (100%) but RH2 and RH3 offered this in 71% and 64% of their samples respectively. RH1 offered one or two portions of fruits and vegetables with each meal in all samples (100%). RH3 did that in 43% and RH2 in 86% of the samples. Five portions of fruits and vegetables were available on 100% samples in RH1 but only 43% samples fulfilled that in both RH2 and RH3. Use of fruits and vegetables as snacks were only observed in 50% of samples in RH1. None of the samples in RH2 offered that and only 14% of samples in RH3 did. In RH1, 79% of the samples had meat/meat alternative options in all main meals. RH2 did not have any samples with that option and 57% of RH3 samples did have that option on their samples. Minimum 400 mL of milk was offered in all the samples (100%) of RH1. In RH2, 36% offered this, and only 7% of the RH3 samples did. All of the residential homes had the options of alternative menus in case of special needs.
**Discussion**

The aim of this project was to identify the compliance in the meal provision to the residents of RHs of South Wales in accordance with the recommendations of FSA and NACC.

**Bread, rice, potatoes, pasta and other starchy foods**

Starch is an important energy source in human diets. Various epidemiological and clinical studies demonstrated that consumption of dietary fibre has a positive impact on obesity (Tucker and Thomas, 2009), type II diabetes (Meyer et al, 2000), cancer (Park et al, 2009) and cardiovascular disease (Streppel et al, 2008). The current study found that all 42 samples were able to serve an adequate variety of breakfast cereal and offered at least one portion of starchy food with each meal, but only 18 samples (42.86%) clearly fulfil the criteria of serving a variety of bread as a starter or meal accompaniment whereas the remaining samples (57.14%) did not fulfil the target set up by the FSA.

The reasons behind this are not clear and it can only be assumed that the person or persons in charge of setting the menu were not aware of the guidelines or chose to ignore them; there is clearly room for improvement. Elderly people often eat slower and sometimes have reduced masticatory capacity. (Carlsson, 1984; Leake, 1990 cited in Shimazaki, 2001) Therefore, during menu design it could be felt that overemphasis on the starter menu could prevent the residents from being able to completely eat their main course.

**Fruits and vegetables**

The health benefits present in fruits and vegetables is well established (Salminen et al, 2012). Studies have shown that consumption of fruits and vegetables regularly helps to improve cognition, lessen the impacts of other malnutrition-associated diseases (Remond et al, 2015), protect against bone loss, and reduce chronic low-grade inflammation (Welch et al, 2014). According to the World Health Organisation (WHO), consuming more than 400 g of fruits and vegetables every day may reduce the risk of developing chronic diseases such as coronary heart disease and some cancers (WHO, 1990). The FSA has recommended that more than one variety of fruit and vegetable should be consumed by a resident each day. These data were collected via RH staff interviews, where vegetable preparation on
certain days contains a single type and variety is often not considered. It was found that only 33 (78.57%) samples clearly met the recommendations. The FSA also recommends that 1–2 portions of fruits and vegetables be served with each meal; we discovered that 33 samples (78.57%) were compliant. Furthermore, the target serving of five fruits/vegetables a day was only fulfilled in 26 (61.90%) cases.

The FSA recommends the use of fruits as a snack in everyday meals. Use of fruits as snacks could reduce the consumption of traditional snacks that are generally rich in saturated fat, salt, or sugar. Only 9 (21.42%) of 42 samples offered fruits and vegetables as a snack.

When we compared the data among the three RHs, we found that RH1 fulfilled all recommendations but RH2 and RH3 failed to do so, with RH2 failing to provide any fruits as snacks, although generally being more compliant than RH3.

Various factors could be contributing to the reasons for RHs’ non-compliance when it comes to fruits and vegetables. Due to economic choice and logistics, it is not always possible to supply fresh fruits and vegetables. Age, disease, or drug-related dysgeusia/anosmia need to be compensated for by flavour-rich food. Moreover, peeling or cutting of supplied fruits by the resident is sometimes not possible (Raynaud-Simon and Aussel, 2012). We strongly recommended that every effort be made to ensure adequate intake of fruits and vegetables.

**Meat, fish, eggs, beans and other non-dairy sources of protein**

Protein is considered a source of energy in the absence of other sources. Protein energy ratio increases with age; hence, the supply of sufficient dietary protein is an important consideration (Nowson and O’Connell, 2015). A survey has shown that around 10% of the community-dwelling and frail elderly and 35% of the institutionalised elderly showed a protein intake below the estimated average requirement.

The study found a significant proportion of the samples being unable to fulfil the recommendations, especially when providing a meat/meat alternative in every meal except RH3. Although the other two
RHs provided meat/meat alternatives in most of their main meals, they did not do so for breakfast. According to FSA recommendations, fish should be offered at least twice per week, which was fulfilled by all study samples. However, in terms of provision of oily fish, RH2 failed to do so; they used store-bought fish fingers from which the nature of the fish was unidentifiable. In addition, RH1 offered fish thrice a week (once was oily fish) and RH3 offered it every day (not in every option). Thus, there is potential for residents to skip taking fish if they desire. Oily fish provides long chain omega-3 fatty acids, which are vital in cardiovascular health; it is also a rich source of vitamins A and D and iron (FSA, 2007), so the provision of oily fish on the menu and its active promotion is essential.

The study did not focus on what proportion of the resident population has special dietary requirements when it comes to meat; however, information provided by the staffs identified the option of special meals if needed. A number of the residents might be vegetarian, vegan, or have special dietary requirements due to religious restrictions. The dietary preferences of residents have also not been taken into account, but should be in future studies. Therefore, further investigation should be made as to why these guidelines are not being followed.

Milk and dairy foods

Milk and dairy products are the easiest and most cost-efficient way to maintain the calcium requirements of the elderly because they contain several key nutrients (Heaney, 2001). The NACC recommends at least 400 mL milk as a part of the daily fluid requirements for the elderly. Osteoporosis is the most common metabolic bone disorder in the elderly; and, the role of vitamin D and calcium in the prevention of osteoporosis is well established (Avenell et al, 2005). Data showed that milk and dairy products were offered daily, but no information was available on milk product allergies or intolerances amongst residents, nor was there any information on the type of milk provided. When it comes to nutrition, it was agreed that a ‘one size fits all’ approach is inappropriate. Keeping in mind basic standard requirements, nutritional needs should be individualised. For example, older people with small appetites who may need to gain weight or who are of low weight should be encouraged to have full-fat milk, yoghurt, and regular dairy products. Although milk was offered in all RHs, only 47.2% of the collected samples had met the set provision criteria of at least 400 mL milk per day. However, foods such as
cheese, butter, yogurt, and milk-based pudding were offered as well and one RH admitted that they offered tea and coffee at regular intervals. All three RHs stated that their residents were quite happy to drink milk and dairy products. Therefore, it was assumed that together, various milk and dairy products were offered in all three RHs on a daily basis but we cannot accurately conclude whether requirements were met. Furthermore, no information was available regarding whether the product served to the residents was fortified with vitamin D. Fortified whole milk is a good source of vitamin D and use of milk or dairy products as evening or bedtime snacks could significantly increase the chance of fulfilment of the requirements.

**Food and/ or drinks high in fat and sugar**

Foods rich in high saturated and trans fats increase cardiovascular risk significantly (De Souza et al, 2015). FSA guidelines suggest the use of less fat or low-fat alternatives. They also discourage the use of sugary drinks or snacks throughout the day as these can cause tooth decay. In this study, only 66.66% of the collected samples had information regarding the type and amount of fat used. The remaining 33.33% of the samples did not have any information, due to outsourced food supply. Low-fat alternatives or low saturated, low sugar and salt options were not available in any samples. Information obtained from catering staff identified the use of processed food and common ingredients, which usually were high in saturated fat, sugar, and salt. None of the three RHs fulfilled the goal of reducing the amount of sugar and/or salt or high saturated fat consumption by reducing the frequency of serving food rich in sugar, salt, or saturated fat. However, there was an option for alternative food if required, based on health needs. Detailed data were not available to quantify the severity and nature of health conditions that required lower fat/sugar/salt-containing food. No RHs were able to provide three snacks in a period of 24 hours. Upon further questioning, RH staff explained that they did occasionally provide snacks and on demand but not as mentioned in the guideline. The choice of snacks varied but generally all three RHs supplied chocolate, biscuits and crisps as snacks but RH staff were not aware of the salt and sugar content of the supplied snacks.

Based on the information taken from interviewees, all the RHs in the study served a typical portion size, however, it was not clear what their protocols are for weight management.
All three RHs generally use fresh ingredients in their food. However, the statements were taken based on assumptions, as it was not possible to calculate the actual frequency due to time constraints.

**Hydration**

Physiological changes affect the hydration status of the elderly, but other factors such as physical and mental frailty and disease state also contribute. In our study, all samples fulfil the recommendation set up by the FSA. Although the targets were achieved, there is scope for further improvement. The cause of poor hydration in elderly residents is multi-factorial (Bunn et al, 2013 cited in BNF, 2015).

Increasing assistance in addition to choice and availability of drinks and serving container types may also be helpful.

The choice of beverages should be carefully thought out, because an increased consumption of tea and coffee can often alter valuable absorption of micronutrients, which might be important for nutrition in the elderly (Zijp et al, 2010).

**Limitations and Recommendations**

This study was only carried out in three RHs and over a consecutive two-week period. This reduces the power and reliability of the study. Therefore, to increase the significance of the data obtained, a randomised study with a larger number of RHs over a longer period should be carried out.

Furthermore, we were unable to ascertain the actual ingredients that were used in one of the RHs, as they outsourced the food from another company. The details of the ingredients were not available on their website. It would be interesting to carry out a study comparing the differences between nutrition provided in RHs that procure and prepare food on site as opposed to those who buy from companies such as ‘Apetito’ to see if there are significant differences in following FSA guidelines and in economic efficiency.
Another limitation of this study is that the RHs in which this study was carried out are actually located in quite affluent neighbourhoods. A larger scale study carried out in areas with different socio-economic conditions might reveal that the actual landscape is more at risk than described in this study.

We were unable to speak with the actual people in charge of preparing the food and did not physically measure the quantity of ingredients being used. This can be arranged in future studies by carrying out randomised visits to RH kitchens with permission from the management. RHs personnel can be hesitant to take part in the study leading to a barrier in understanding the reality of events. Moreover, the general practices in RHs could change with the knowledge that the processes would be analysed, thereby creating a potential for bias.

It would be also being appropriate to carry out personalised interviews assessing the knowledge of FSA and NACC guidelines amongst staff and dieticians responsible for menu design in RHs and design further study in light with the new ‘Eatwell Guide 2016’.

Conclusion

This study has identified certain deficiencies in the diet provided to elderly residents in RHs. Despite certain study limitations such as a smaller study population and limited data availability regarding food preparation, this study highlighted the importance of the FSA and NACC guidelines. Although the RHs fulfilling most of the recommendation there are still room for improvement. Therefore, it sets a foundation for further studies that will provide insight for the research of adequate nutritional provision in RHs. Moreover, the study highlights the importance of implementing changes in the regulations with regards to nutrition in RHs.


[Ref. for appendix]


