

An Observational Study on Meal Provision, Plate Wastage and Nutrient Intake in a Singapore Private Nursing Home

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INTRODUCTION

Plate wastage is a common problem identified in nursing homes which results in inadequate intake of food and fluids by residents (Suominen et al. 2005). This invariably leads to malnutrition and dehydration with its attendant effects on resident morbidity and mortality (Chen, Schilling and Lyder 2001). To date, there has been no formal study conducted in nursing homes in Singapore which measures plate wastage of residents. A study of food provision, plate wastage and nutrient intake of residents is therefore needed to inform efforts to tackle malnutrition and dehydration in Singapore nursing homes.

OBJECTIVES

- To determine the nutritional adequacy of meal provision in a Singapore private nursing home vis-à-vis the energy, nutrient and fluid requirements of its residents
- To determine the gap, if any, between the actual energy, nutrient and fluid intake of residents and the respective requirements
- To quantify the plate wastage of residents and impute a dollar value to the cost of wastage
- To measure the effect of externally provided food on nutrient intake of residents

METHODS

- 60 residents (28 males and 32 females) at a 236 bed private nursing home under Ministry of Health portable subsidy scheme⁴ in Singapore were randomly selected from a list of residents who gave verbal consent for this observational study.
- Mean age of residents was 81.3 years (range 53-101). The mean BMI of all residents was 19.5 kg/m² (range 11.8-32.8kg/m²)
- Tube feeding residents and residents who were unable to give verbal consent to participate in the study were excluded.
- 20 residents from each of the three diet types (full, soft and pureed) offered in this home were initially selected. 1 male resident on pureed diet dropped out of the study due to hospitalisation (n=59).
- Each resident had all food and fluid intake measured by tray weight difference before and after each meal for 3 days (2 weekdays and 1 weekend).
- Food and fluids provided from outside sources were also measured.
- Data collection was done over a 13 hour period for 3-4 days per week over 5 weeks for all meals (breakfast, mid-morning snack, lunch, mid-afternoon snack, dinner and supper)
- Nutrient analysis of the home menu was done using Foodworks[®]7 (Xyris, Australia) and statistical analysis was done using paired and unpaired student's t-test

⁴ Private Nursing homes under this scheme have set aside a certain proportion of their beds for residents who are eligible for MOH subsidies and referred by AIC. This allows for greater private sector participation in the provision of MOH-subsidised care.

KEY RESULTS

- Average plate wastage by weight over 3 days was 25%. When extrapolated to all residents in this nursing home, this translates to a dollar cost of wastage of between SGD114,000 to SGD 149,000 per year
- Fluid wastage was significantly higher than food wastage (32% vs 22%, p<0.05)
- Food wastage for main meals was significantly higher than mid-meals (28% vs 23%, p<0.05). Among main meals, dinner had the highest plate wastage (30%) but the differences were not statistically significant. Among mid-meals, mid-morning snack had the highest plate wastage (33%, p<0.05) (See Figure 1).
- Females had a marginally higher plate wastage than males (26% vs 23%) but the difference was not statistically significant
- Residents who were on the full diets had significantly higher plate wastage than those on pureed diets (31% vs 20%, p<0.05) (See Figure 2).
- Mean energy, protein, fluid and fibre provision generally met the nutrient requirements of residents (See Figure 3), but there was a statistically significant (p<0.05) shortfall between requirements and actual intake of about 200kcal, 200ml of fluid, 9g of protein and 2g of dietary fibre. Between 70-80% of residents were not meeting their nutrient requirements.
- Outside food consumption had minimal impact on nutrient intake of residents

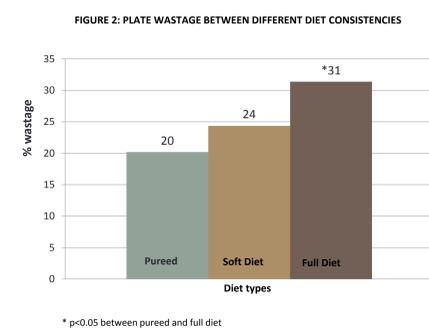
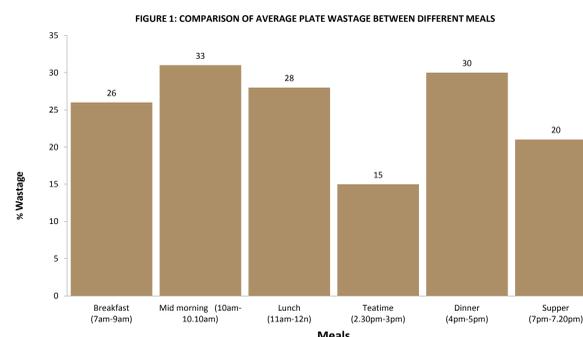


FIGURE 3: NUTRITIONAL ADEQUACY OF MEAL PROVISION

Nutrients	Range of meal provision	Range of nutrient requirements
Energy (kcal)	709-2111	902- 2193
Protein (g)	24-111	29 – 86
Water (mL)	1658-2696	1640 - 2940
Fibre (g)	7-31	9-22

DISCUSSION

- Average plate wastage was higher in this nursing home compared to that in studies conducted in other nursing homes (15-20%) (Nichols 2002; Huang & Shanklin 2008)
- The trend of increasing plate wastage among main meals from breakfast to dinner has been seen in other similar studies (Grieger 2007; Milà Villarroel, et al 2012)
- All residents who were on pureed diets had feeding assistance, unlike those on full diet consistencies. This may explain the significantly lower plate wastage of the residents on pureed diets
- Timing of meals and time given for meal service were identified as possible reasons for high plate wastage at mid-morning snack as well as increasing plate wastage later in the day

CONCLUSION

- Nutrient provision is generally adequate in this nursing home but a majority of residents are not consuming adequate nutrients vis-à-vis their requirements.
- Strategies recommended to improve food and fluid intake include food fortification (Olin et al, 2003), offering a variety of drinks at mid-morning snack, providing for longer meal times at lunch and dinner, providing a serving of fruit at dinner, providing feeding assistance to residents on full diets who are taking poorly, and modifying cooking methods and choice of ingredients for dishes with high plate wastage.

References

- Chen, C., Schilling, L., and Lyder, C., 2001. A concept analysis of malnutrition in the elderly. *Journal of Advanced Nursing*, 36(1), pp. 131-142.
- Grieger, J., and Nowson, C., 2007. Nutrient intake and plate waste from an Australian residential care facility, *European Journal of Clinical Nutrition*, 61(5) pp.655-663.
- Huang, H.C. and Shanklin, C., 2008. An integrated model to measure service management and physical constraints' effect on food consumption in assisted-living facilities. *Journal of American Dietetic Association*, 108(5), pp 785-792.
- Milà, Villarroel, R., Abellana Sangrà, R., Padró Massaguer, L., Farran Codina, A., 2012. Assessment of food consumption, energy, and protein intake in the meals offered in four Spanish nursing homes. *Nutricion Hospitalaria*, 27 (3), pp 914-921.
- Nichols, P.J., Porter, C., Hammond, L., Arjmandi, B.H., 2002. Food Intake may be determined by plate wastage in a retirement living center. *Journal of the American Dietetic Association*, 102(8), pp. 1142-1144.
- Olin, O.A., Armyr, L., Soop, M., Jerstrom, S., Classon, L., Cederholm, T., Ljungren, G., Ljungqvist, O., 2003. Energy-dense meals improve energy intake in elderly residents in a nursing home. *Clinical Nutrition* 22(2) pp. 125-131.
- Suominen, M., 2005. Malnutrition and associated factors among aged residents in all nursing homes in Helsinki. *European Journal Clinical Nutrition*, 59(4), pp. 578-583