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2012

# Measuring plate waste in hospitals

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## Publication Details

Walton, K. L. & Krassie, J. 2012, 'Measuring Plate Waste in Hospitals', *Nutrition and Dietetics*, vol. 69, no. 2, pp. 169-173.

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# Measuring plate waste in hospitals

## **Abstract**

It has been suggested that the median plate wastage in hospitals is approximately 30% (range of 6–65%). The level of hospital food wastage is influenced by numerous parameters, including the menu, the setting, diet type, the type of food service distribution system used and its flexibility. Some food wastage is inevitable, as appetites are unpredictable. However, large amounts of food waste have a huge financial cost; and more importantly, it indicates that patients are not likely to be meeting their nutritional requirements. 'Food is an integral and important part of a patient's treatment but the food must be consumed if it is to be of value. Furthermore, food prepared and not consumed is a waste of scarce resources.' The purpose of this quiz is to provide dietitians with an overview of useful techniques to measure and interpret plate waste, as well as strategies to advocate for the role of food services in clinical care. The following case scenario provides the background and context for the questions.

## **Keywords**

hospitals, plate, waste, measuring

## **Disciplines**

Arts and Humanities | Life Sciences | Medicine and Health Sciences | Social and Behavioral Sciences

## **Publication Details**

Walton, K. L. & Krassie, J. 2012, 'Measuring Plate Waste in Hospitals', *Nutrition and Dietetics*, vol. 69, no. 2, pp. 169-173.

## CONTINUING EDUCATION

### MEASURING PLATE WASTE IN HOSPITALS

This quiz has been prepared by Karen Walton and Jacquie Krassie. Correspondence should be addressed to Karen Walton at [kw Walton@uow.edu.au](mailto:kw Walton@uow.edu.au)

It has been suggested that the median plate wastage in hospitals is approximately 30% (range of 6-65%).<sup>1</sup> The level of hospital food wastage is influenced by numerous parameters, including the menu, the setting, diet type, the type of food service distribution system used and its flexibility.<sup>2-4</sup> Some food wastage is inevitable, as appetites are unpredictable and some patients may not be receiving enough food. However large amounts of food waste have a huge financial cost; and more importantly it indicates that patients are not likely to be meeting their nutritional requirements.<sup>5</sup> *“Food is an integral and important part of a patient’s treatment but the food must be consumed if it is to be of value. Furthermore, food prepared and not consumed is a waste of scarce resources”*<sup>6</sup>

The purpose of this quiz is to provide dietitians with an overview of useful techniques to measure and interpret plate waste; as well as strategies to advocate for the role of food services in clinical care. The following case scenario provides the background and context for the questions.

#### Scenario

Sunnyhill Hospital is a 100 bed regional hospital that operates a cook-fresh food service system using a two week menu cycle. The mean age of patients is 75 yrs and the mean length of stay is 10 days. Lately there have been reports of 50% plate wastage and the hospital manager is saying that serving sizes need to be reduced because patients are being given too much, and that the food budget is *‘out of control’*. Feedback from patients suggests an 85% satisfaction score on taste, temperature and presentation, however the amounts of oral supplements used at mid meals have been increasing. Several dietitians are also requesting the availability of chocolate biscuits, chocolate, potato crisps and extra cheese & biscuits (which the hospital manager says are *‘luxury’* items) to be available at mid meals.

The dietitian-in-charge and the food service manager will be having two student dietitians on placement soon and they see this as an opportunity to collect further evidence and investigate the level of waste before making any changes to main meal and mid meal provisions.

1. Dietary intake in hospital is complex and can be influenced by many, often interwoven factors including:

- a) the appetite of the patient, their health status and their interest in food,
- b) the degree of flexibility of the hospital food service and level of packaging
- c) menu cycle length and meal appearance
- d) all of the above

2. Which type of extended stay hospital patient is most likely to be nutritionally at risk from inadequate dietary intakes?

- a. patients under 65 years of age
- b. patients over 65 years of age on texture modified diets
- c. patients provided with meals plated on the wards
- d. all of the above

3. What is some other information that is needed for this evaluation?

- a. a copy of the menu and information about the meal distribution system
- b. patient demographics
- c. standard serving size information and plate wastage
- d. all of the above

4. How could they go about measuring plate waste at each meal?

- a. weighed plate waste
- b. digital photography
- c. visual estimation
- d. any of the above

5. Which of the following statements are true? Fifty percent plate waste means that:

- a. 50% of patients are wasting some of their meals
- b. The main meals are being wasted
- c. 50% of served foods are being returned
- d. 50% of the prepared food is not served or eaten

6. Describe the most accurate calculation of estimated dietary intakes using a weighed plate waste method?

- a. Dietary intake = Amount weighed for each 'standard' meal component, minus the amount of weighed plate waste for each component
- b. Dietary intake = Amount specified from 'standard serving sizes' for each component, minus the amount of weighed plate waste for each component
- c. Dietary intake = Amount weighed for each of the 'standard' meal components
- d. Dietary intake = Amount weighed for each meal component (pre-service), minus the amount of weighed plate waste (post-mealtime).

7. How can more feedback be obtained about the level of patient satisfaction with the food services provided?

- a) Use a combination of validated questionnaires and qualitative methods such as focus groups or interviews
- b) Develop your own questionnaire based on the food provided
- c) Develop your own questionnaire based on the waste reported
- d) Ask for anonymous feedback through drop boxes on the wards

8. Many patients tell you that they have reduced appetites. Although they manage some of the oral supplements, they especially like variety offered by the chocolate bars and other nourishing snacks that they received at some mid meal times. How will you assess the intake of mid meals (snacks, drinks and supplements)?

- a. Audit of midmeal snack and supplement consumption
- b. Questionnaire nominating favourite midmeal choices
- c. Asking nursing staff to nominate midmeal snacks and supplements most likely to be consumed
- d. Asking a sample of patients which midmeal snacks and supplements they prefer and why.

9. Which of the following would you recommend to the hospital manager?

- a) Reduce the size of the servings
- b) Change the foods on offer
- c) Change the meal times
- d) None of the above

10. How would you report your combined findings to the hospital manager?

- a. Organise a luncheon to highlight the quality of the food provided
- b. Ask nursing staff to provide commentary to their supervisors
- c. Provide written formal report and suggestions for qualitative improvement activities
- d. Ask patients to write to hospital management about their food experience

## Answers

1. d

All of the above is correct.

Influences on dietary intakes are multi-factorial and include issues such as the patients' medical diagnosis and physical factors such as their health, vision, hearing, sense of taste and swallowing ability. Other contributing factors include appetite, intakes prior to admission, diet type, choices available, level of nutrition screening and assessment, level of nutrition knowledge by medical staff, priority given to nutrition over other care demands, the degree of food and beverage packaging, the timing of meal choices, the amount of feeding assistance and level of encouragement provided and the monitoring of intakes.<sup>7-11</sup>

2. b

Patients with extended hospital stays depend mostly on the hospital for their food supply. Food wastage has been shown to be higher for patients over 65 years. Elderly patients on textured modified diets are at increased risk of malnutrition due to dysphagia and the requirement of a texture modified diet.<sup>12-13</sup>

Mean plate wastage has been shown to be less in wards where meals are plated on the ward rather than in the kitchen. There are a number of reasons for this. Firstly they can respond efficiently to late diet changes and secondly, they are in a position to offer choice and serving size at the time of service, which enables improved responsiveness to issues related to the appetite and health status of the patient, at the time of the meal.<sup>4, 14</sup>

3. d

All of the above is correct. You certainly need to have a copy of the menu; most recent menu review, serving size information, standard recipes and information

about the food production, distribution and menu ordering system. However you also need to know '*who you are feeding*'. Information about their demographics, length of stay, social and cultural background is important; as is their views and perceptions of the current menu and mealtimes.<sup>15, 16</sup>

4. d

Any of the above is correct. Weighed plate waste<sup>17, 18</sup>, visual estimations (using models such as all eaten,  $\frac{3}{4}$ ,  $\frac{1}{2}$ ,  $\frac{1}{4}$  or none)<sup>19, 20</sup> and digital photography<sup>21</sup> have all been used by researchers; with the findings published in peer reviewed journal articles.

5. c

Fifty percent plate waste means that 50% of *served foods* are being returned. This figure provides an estimate of the amount of served food that is wasted.<sup>1</sup> However it does not tell you which components are wasted more often in terms of nutritional value or cost (e.g. bread vs high protein dessert) unless these items are specified in the results. The result only reflects the amount of food wasted after distribution. There is also (bulk) wastage associated with food that has been produced, that was not used for service.

6. d

Dietary intake = Amount weighed for each meal component (pre-service), minus the amount of weighed plate waste (post-mealtime).

Ideally you would weigh each food item on the tray pre, and post the mealtime.<sup>17, 18</sup> However it is not always practicable, or preferable to weigh each item on the meal tray prior to service. In practice, weighed plate waste (which can be used to estimate dietary intakes) is measured in a number of other ways (responses a and b).

'Standard' or 'Spare' meals may be a starting point when one is unable to measure the starting weights of each patient's actual meal components in an efficient and heat preserving way. At such times, the weight of each meal component of these meals are used as a reference point to then deduct the weighed plate waste for each



meal tray post mealtime. This enables an estimate of dietary intakes to be estimated for each patient.<sup>22</sup>

The 'standard serving sizes' reported by each food service unit is another comparison point, if regular 'standard' or 'spare' meals are not available. If using this method it is advisable to obtain some 'standard' or 'spare' meals on each occasion so that you can compare the degree of variation from the stated 'standard serving sizes'.<sup>22</sup>

#### 7. a

Validated questionnaires are an effective and efficient way of obtaining quantitative feedback about patient satisfaction. It is important to source a validated tool, rather than develop your own tool. Short and long versions of validated patient satisfaction questionnaires for hospitals and residential aged care are available.<sup>23-25</sup> Individual interviews or focus groups are another useful method of exploring patient views and perceptions of the food services provided. These may take more resources to conduct, but can elicit very detailed responses from patients about positive and negative aspects of the menu and the overall meal experience (e.g. mealtimes, meal setting, assistance available).<sup>26, 27</sup> The validated food satisfaction questionnaires that have been referenced did use focus groups as their starting point for development.

#### 8. a, b, c, or d

An audit of HPHE supplements and snacks that are delivered and consumed at mid meals is ultimately what is required. A note of warning – this is much harder to do efficiently and accurately than for main meal audits. As many items are packaged and don't require collection; any crockery and cutlery is often not collected until the next meal. This means that there is not usually a tray that you can collect and weigh what is left. Any rubbish from packaged items is often placed in the bin by patients or staff any time between the midmeals and the next meal. Some items may be kept for patients or their family members (in the drawer or bedside table) for later. For these reasons, a, b, c or d, or a combination could be suitable options for your setting. The key point is to evaluate as accurately as possible for the oral supplements and snacks: what the preferences are; what the costs are (dollars per 100g/mL and per

-serving); what the nutrient provision is (e.g. grams protein per 100g/mL and serving; kJ of energy per 100g/mL and serving and serving what the wastage is; and what the actual intake is in terms of nutrients

It is advisable to discuss intakes of these items with the patients as intakes can easily be missed unless you are observing intakes across the day, which isn't practical in an audit. Overt observations of ward routines and intakes are more likely in a research study.

It would be ideal to highlight what the food items (main meals, snacks and nourishing snacks) are that have the highest waste. Presenting the cost per serving and the amount of protein and energy provided would also be advantageous. You may provide a case for less reliance on items of lower nutritional value, which are wasted more often.

*“Waste represents a major clinical problem because it reflects inadequate food intake. It is also an economic problem”.*<sup>28</sup> It should not be expected that extra funds will be provided if we can't provide evidence about what is, and isn't consumed well, and a case put forward about how we may use savings from one area to fund another.

It is also recommended that the cost per unit be determined for each snack and each oral supplement. The serving size for each item should be included in a summary table; along with comparative information about the grams of protein per serve and the kJ of energy per unit.

A further step would be to compare all snacks and oral supplements in terms of cost per gram of protein and per 100kJ of energy.

9. d

The answer is none of the above as there is not enough information given. Reducing the serving size would mean that patients do not have the opportunity to meet their nutritional requirements. Serving sizes are usually prescribed so as to meet the estimated daily nutrient requirements of a 'reference person'.<sup>15, 16</sup> Further some

patients may be consuming all of their meals, and would be very unsatisfied if the serving sizes are reduced (Remember 50% wastage was the mean in the scenario).

Some changes to the menu and meal times may be needed. However an evaluation of the menu, current serving sizes, plate wastage, mid meal intakes and patient satisfaction is necessary before any changes are recommended. This is an important opportunity to conduct a thorough evaluation and a great learning experience for the student Dietitians. Systematically collecting appropriate data will allow an informed report to hospital management which will highlight recommendations that consider meals and midmeals available for the future.

#### 10. c

While a luncheon to showcase options available and further discussion with nursing staff should not be ruled out; a concise and well written report along with a verbal presentation would be the most advantageous. An executive summary as the first typed page would highlight the issues being investigated and the key recommendations. The rest of the report would highlight the background, aim, methods used, keys results, discussion and recommendations, conclusion, and references.

The report is likely to take a risk management approach and highlight the issues of hospital malnutrition.<sup>29</sup> It would also incorporate important cost/benefit related findings regarding the costs and intakes of meals and midmeals. The results may give further weight in favour of the *luxury food* items, and the original issue about serving sizes. It is essential that further questions are asked of data before one is tempted to reduce meal sizes or limit meal or midmeal options.

An annual Quality Plan; linked to a Business Plan and Food Safety Program is sound strategy to document quality improvement activities. Timeframes and positions responsible for each are highlighted against the quality activities, which may include: menu review, review of standard serving sizes with 'spare' meals, review of plate waste, review of oral supplements and nourishing snack intakes and

six monthly review of patient satisfaction with a validated food service satisfaction questionnaire.

## References

1. Williams P & Walton K (2011). Plate waste in hospitals and strategies for change. E-SPEN, the European e-Journal of Clinical Nutrition and Metabolism; e1-7.
2. Council of Europe (2002). *Food and nutritional care in hospitals: How to prevent undernutrition*. Council of Europe Publishing, Stasbourg.
3. Barton AD, Beigg CL, MacDonald IA, Allison SP (2000). High food wastage and low nutritional intakes in hospital patients. *Clinical Nutrition*;19(6):445-449.
4. Schenker S (2003). Briefing Paper. Undernutrition in the UK. *Nutrition Bulletin*;28:87-120.
5. Edwards JSA & Nash AHM (1999). The nutritional implications of food wastage in hospital food service management. *Nutrition and Food Science*;2:89-98.
6. Edwards JSA, Edwards A & Salmon JA (2000). Food service management in hospitals. *International Journal of Contemporary Hospitality Management*;12(4):262-266.

7. Vanderkroft D, Collins CE, FitzGerald M, Lewis S, Neve M & Capra S (2007) Minimising undernutrition in the older patient. *International Journal of Evidence Based Healthcare*;5:110-181.
8. Kowanko I, Simon S & Wood J (2001). Energy and nutrient intake of patients in acute care. *Journal of Clinical Nursing*;10:51-57.
9. Mahoney S, Zulli A & Walton K (2009). Patient satisfaction and energy intakes are enhanced by Point of Service (POS) meal provision: a systematic review. *Nutrition & Dietetics*; 66(4):212-220.
10. Tsang MF (2008). Is there adequate feeding assistance for the hospitalised elderly who are unable to feed themselves? *Nutrition & Dietetics*;65(3):222-228.
11. Vivanti AP & Banks MD (2007). Length of stay patterns for patients of an acute care hospital: implications for nutrition and food services. *Australian Health Review*;31(2):282-287.
12. Germain I, Dufresne T & Gray-Donald K (2006). A novel dysphagia diet improves the nutrient intake of institutionalised elders. *Journal of the American Dietetic Association*;106:1614-1623.
13. Wright L, Cotter D, Hickson M, Frost G (2005). Comparison of energy and protein intakes of older people consuming a texture modified diet with a normal hospital diet. *Journal of Human Nutrition and Dietetics*;18:213-219.
14. Kelly L (1999). Audit of food wastage: differences between a plated and bulk system of meal provision. *Journal of Human Nutrition and Dietetics*;12:415- 424.
15. Department of Human Services (Victoria). (2009). Nutrition Standards for Menu Items in Victorian Hospitals and Residential Aged Care Facilities. [cited 9 April 2012]; Available from: [http://www.health.vic.gov.au/archive/archive2011/patientfood/nutrition\\_standards.pdf](http://www.health.vic.gov.au/archive/archive2011/patientfood/nutrition_standards.pdf)
16. NSW Agency for Clinical Innovation (ACI) (2011). Nutrition Standards for Adult Inpatients in NSW Hospitals. [cited 9 April 2012]; Available from: [http://www.aci.health.nsw.gov.au/data/assets/pdf\\_file/0004/160555/ACI\\_Adult\\_Nutrition\\_web.pdf](http://www.aci.health.nsw.gov.au/data/assets/pdf_file/0004/160555/ACI_Adult_Nutrition_web.pdf)
17. Wilson A, Evans S & Frost G (2000). A comparison of the amount of food served and consumed according to the meal service system. *Journal of Human Nutrition and Dietetics*;13: 271-275.
18. Hartwell HJ & Edwards JSA (2003). A comparative analysis of 'plated' and 'bulk trolley' hospital food service systems. *Food Service Technology*;3:133-142.
19. Nowson, CA, Sherwin, AJ, McPhee, JG, Wark, JD, Flicker, L (2003). Energy, protein, calcium, vitamin D and fibre intakes from meals in residential care establishments in Australia. *Asia Pacific Journal of Clinical Nutrition*;12(2):172-177.
20. Kandiah J, Stinnett L & Lutton D (2006). Visual plate waste in hospitalized patients: Length of stay and diet order. *Journal of the American Dietetic Association*;106(10):1663-1666.
21. Williamson DA, Allen HR, Martin PD, Alfonso AJ, Gerald B & Hunt A (2003). Comparison of digital photography to weighed visual estimation of portion sizes. *Journal of the American Dietetic Association*; 103(9):1139-1145.

22. Walton KL, Williams P, Tapsell LC & Batterham M (2007). Rehabilitation inpatients are not meeting their energy and protein needs. *e-SPEN the European e-Journal of Clinical Nutrition and Metabolism*; 2 (6): e120 - e126.
23. Wright O (surveys) Wright O, Capra S & Aliakbari J (2003). A comparison of two measures of hospital foodservice satisfaction. *Australian Health Review*;26(1):70-75.
24. Capra S, Wright O, Sardie M, Bauer J & Askew D (2005). The acute hospital foodservice patient satisfaction questionnaire: the development of a valid and reliable tool to measure patient satisfaction with acute care hospital foodservices. *Foodservice Research International*;16:1-14
25. Fallon A, Gurr S, Hannan-Jones M & Bauer JD (2008). Use of the Acute Care Hospital Foodservice Patient Satisfaction Questionnaire to monitor trends in patient satisfaction with foodservice at an acute care private hospital. *Nutrition and Dietetics*;65(1):41-46
26. Watters CA, Sorensen J, Fiala A & Wismer W (2003). Exploring patient satisfaction with foodservice through focus groups and meal rounds. *Journal of the American Dietetic Association*;103:1347-1349.
27. Walton K, Williams PG & Tapsell L (2006). What do stakeholders consider the key issues affecting the quality of food service provision for long stay patients? *J Foodservice*;17(5/6):212-225.
28. Donini LM, Castellaneta E, De Guglielmi S, De Felice MR, Savina C, Coletti C, Paolini M & Cannella C (2008). Improvement in the quality of the catering service of a rehabilitation hospital. *Clinical Nutrition*;27(1):105-14.
29. Watterson C, Fraser A, Banks M, Isenring E, Miller M, Silvester C, Hoevenaars R, Bauer J, Vivanti A & Ferguson M (2009). Evidence Based Practice Guidelines for Nutritional Management of Malnutrition in Adult Patients across the Continuum of Care. *Nutrition and Dietetics*; 66(S3):S1-S34.