Hospital foodservice: a comparative analysis of systems and introducing the 'Steamplicity' concept

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Abstract

Patient meals are an integral part of treatment hence the provision and consumption of a balanced diet, essential to aid recovery. A number of food service systems are used to provide meals but recently, the 'Steamplicity' concept has been introduced. This seeks, through the application of a static, extended choice menu, revised patient ordering procedures, new cooking processes and individual patient food cooked at ward level, to address some of the current hospital food service concerns.

The purpose of this study was to directly compare selected aspects (food wastage at ward level; satisfaction with systems and food provided) of a traditional cook-chill food service operation against 'Steamplicity'. Results indicate that patients preferred the 'Steamplicty' system in all areas: food choice, ordering, delivery, food quality and overall. Wastage was considerably less with the 'Steamplicity' system; although care must be taken to ensure that poor operating procedures do not negate this advantage. When the total weight of food consumed in the ward at each meal is divided by the number of main courses served, results show that at lunch, mean intake with the cook-chill system was 202g whilst that for the 'Steamplicity' system was 282g and for the evening meal, 226g compared with 310g.

Introduction

Patient meals are an integral part of hospital treatment and the consumption of a balanced diet, crucial to aid recovery (Stratton *et al,* 2006). Even so, it is well established that up to 40% of patients may be undernourished on admittance to hospital; a situation which is not always rectified during their stay (McWhirter and Pennington, 1994). The relevance and importance of patient meal service, when compared with many clinical activities is not always appreciated and it is often seen as an area where budgetary cuts will have least impact. This is particularly so as nursing staff are under pressure to follow a medical/technical model of healthcare rather than one focused on the fundamentals of nursing. Rapid turnover of patients also prioritises clinical considerations. The provision of a foodservice system that optimises patient food and nutrient intake together with minimising waste, in the most cost effective manner, is therefore seen as essential.

Previous research has shown that food preference and acceptance constitutes 50% of the variability in consumption (Cardello *et al,* 1996), and is not only a result of the intrinsic quality of the food; but can also be related to consumer expectations and the degree to which the food item matches them (Oh, 2000). Sensory characteristics, such as appearance, flavour, texture and temperature have been found to be most important to hospital patients when judging food quality (Clark, 1998). Temperature and texture are key attributes of hospital food that have been shown to indicate patient satisfaction with the food as served (Hartwell, 2004) with the temperature of hot food an area of patient dissatisfaction and a regular cause for complaint (Stanga *et al*, 2003). It should therefore be the goal of any hospital food service manager to prepare, distribute and serve safe food of defined standards in respect of nutritional quality, balance, palatability and temperature (Davis and Bristow, 1999).

Foodservice operations can be classified into three main styles (Jones and Lockwood, 1995):

1. *Integrated foodservice systems*: both food production and foodservice are carried out as part of a single operation.
2. *Food manufacturing systems*: production of meals is separate from the service of those meals, thus there is a decoupling of service from production, such as in hospitals.
3. *Food delivery systems*: the operation involves little or no food production and focuses only on the service of continuously assembled or regenerated meals. Here there is decoupling and production lining.

This model can be developed and since the mid 1970s, a number of food production system have been introduced which have sought to maintain current service levels but at a reduced cost. These have included systems such as 'Cook-Serve', 'Cook-Freeze', 'Cook-Chill' and 'Sous Vide'. More recently; the 'Steamplicity' concept has been developed which has sought, through the use of a static, extended choice menu, revised patient ordering procedures, new cooking processes and individual patient food cooked at ward level, to address some of the current hospital foodservice concerns. Various systems have been applied to increase profitability through bulk buying power, higher productivity, better equipment utilisation and process control (Rogers, 2005). However, selection is dependent on the environment and consumer profile, all physical, financial, technological and operational issues need to be considered.

Cook-Serve

A cook-serve system is a 'traditional' catering operation where food is prepared and cooked on site and distributed at the appropriate temperature to the wards, either already plated or in bulk. This system allows for batch cooking which minimises hot-holding

and nutrient losses and optimises the food's sensory characteristics as it can be prepared close to the time required. However, in practice there can be a substantial time delay between production and consumption as wards are often situated a long way from the kitchens. The result is that many of the potential advantages are not realised.

Cook-Chill

In this system, food is cooked and held at a temperature of 70 - 75^0 C or more for at least two minutes. Chilling occurs within 30 minutes of cooking and the temperature of the food is reduced to 0-3^0C within 90 minutes. This temperature is maintained throughout the storage and distribution cycle until regeneration occurs. Regeneration can either be centrally controlled or carried out at ward level. However, a core temperature of 70 - 75^0C must be reached for a minimum of 2 minutes for microbiological reasons. In this system, dishes may be stored chilled for up to 5 days, however, after reheating the food should be consumed immediately (Department of Health, 1989). Advantages are higher efficiency and lower food costs based on bulk buying and centralised purchasing while disadvantages number temperature control which may compromise food safety and nutritional content (Hwang *et al,* 1999).

Sous Vide

Sous vide is a variation of a cook-chill operation. Systems based upon large scale production methods and the use of vacuum packaging, either before or after cooking, in combination with the chilling techniques of cook-chill, were developed initially for the institutional catering sector in Sweden (Schafheitle and Light, 1989).

Sous vide involves placing the food into heat stable, air and moisture high barrier plastic bags or pouches. Air is then removed creating a vacuum with subsequent sealing of the pouch. A pasteurising cooking process takes place followed by immediate rapid chilling within 90 minutes to 0-3^0C. The product must then be stored within this temperature range until required for consumption, but within five days of the date of production

(Department of Health, 1989). Both the quality and microbiological safety of sous vide foods with extended shelf lives, requires good control and monitoring of critical points throughout manufacture and distribution. The health risk of these products is small as long as the temperature during storage is low (4±0.5°C) (Nissen *et al*, 2002).

Cook-Freeze

This system is similar to cook-chill, except the food is frozen rather than chilled. After cooking, dishes are blast-frozen to a temperature of -20^0C and kept at this temperature until required. Storage at frozen temperatures can be more prolonged, for up to two years. When required the food is defrosted and regenerated to a core temperature of at least 70 - 75^0C (Department of Health, 1989). The disadvantage of this system is a loss of texture owing to the freeze/thaw process involved and subsequent regeneration and distribution to the wards (Hwang *et al*, 1999).

Steamplicity

One of the most radical developments in hospital catering in recent years is the introduction of this new technology which relies on a sealed pack incorporating a valve. The food, both raw and partially cooked, is plated in a centralised production unit, chilled (<5°C) and distributed to satellite kitchens where it remains chilled with an expiry date currently of four days. As required, meals are heated/cooked individually in a microwave to >75°C which allows patient choice at short notice and ensures better quality food. A further advantage is the ability to control the cooking environment, allowing consistent regeneration of the food with the right climate of moist heat, thus avoiding drying out and therefore enhancing texture.

Comparison of Systems

Food temperature and texture are the statistically significant factors in the selection of a system (Nettles *et al*, 1997) and also relate to patient satisfaction (Hartwell, 2004). Notwithstanding, there is no agreement as to which system provides the best food

quality as in most cases, the effect is product specific (Rogers, 2005). It is suggested that chilling is less damaging to texture and juiciness than freezing (Tansey *et al*, 2003) while sous vide is superior in terms of vitamin retention but detrimental to sensory quality (Church and Parsons, 2000; Pontin, 2005).

In all foodservice systems, food preparation and cooking can cause substantial and unavoidable nutrient losses. The vitamins with the greatest losses during hot-holding of food (> 10% after 2 hours) are vitamin C, folate, and vitamin B6; retinol, thiamin, riboflavin and niacin appear to be relatively stable. Under normal operating conditions with hot-holding limited to less than 90 minutes, vitamin retention is better in traditional food service (cook-serve) than in a cook-chill system (Lawson *et al.*, 1983). If chilled food is stored for longer than 3 days or if food is held hot for long periods after bulk reheating vitamin losses can be high (Williams, 1996; McErlain *et al*, 2001).

Traditional systems also give the opportunity for the patient to select portion size and to decide if gravy is required with the meat. However, it has been suggested that menus from hospitals using cook-chill systems provide a greater choice of hot menu items (Williams, 2002) although, do not necessarily support improved dietary intake by patients (McClelland and Williams, 2003). Cook-chill systems are more likely to have trays delivered by food service employees whereas traditional food production systems, where delivery is by trolley, tend to use nursing personnel (Jackson, 1997).

The traditional system of food production, cook-serve, is the most popular system used in US medical food service (Silverman *et al*, 2000) and especially with smaller hospitals (<100 beds) (Gledhill, 1993; Mibey and Williams, 2002). It is also considered by the Audit Commission (2001) to be the cheapest at £2.20 per average spend compared to £2.40 for a NHS operated cook-chill/freeze service. In Australia there has been a large increase in the use of cook-chill systems from 5% in 1986 to 42% in 2001, despite the fact that managers of such systems report lower levels of patient satisfaction (Williams,

2002). Conversely, other research has demonstrated little difference in satisfaction between production systems (Edwards *et al.,* 1998).

Increasingly in the U.K., a meal assembly foodservice system is being used where no food preparation takes place on site, leaving the operation to focus on assembly, regeneration and service. About a fifth of hospitals in the NHS operate in this way purchasing meals from specialised food manufacturers (West, 2001). This trend looks likely to continue as there is a cost implication. Contrary to the earlier assertion (Audit Commission, 2001), Trusts that use the system of cook-serve may well spend more per patient per day if overhead costs are included than those that buy in ready-made (Deeming, 2002). However, vitamin C retention in vegetables in the meals assembly system has been found to be between 17-80% for chilled vegetables and between 27-83% for frozen vegetables after regeneration (West, 2001). Inevitably, the retention of vitamin C in a meal assembly system would be lower than in a cook-serve due to the number of processing stages involved, a well controlled cook-serve system will always give better retention values for the heat labile vitamins. The benefit of 'Steamplicity' is that the pre-prepared food is sealed and a vacuum created, stored for two days at chilled temperatures and then reheated individually just prior to consumption, thereby reducing potentiality for nutrient degradation while coincidently allowing for appropriate texture and temperature.

The aim of this research, therefore, was to directly compare selected aspects of a traditional cook-chill foodservice operation against 'Steamplicity'. Specifically, the goals were to measure food wastage at ward level; 'stakeholders' (i.e. patients, staff, etc) satisfaction with both systems; and patients' acceptability of the food provided.

Materials and Methods

Context and overview

A large National Health Service (NHS) teaching hospital was selected where developmental work for Steamplicity was taking place. Permission was sought and granted by hospital management to conduct this research and consent was given by participating patients.

Data were collected from a post operative surgical ward where patients (n=52, 48% male and 52% female) presented a mixture of clinical conditions. Over the study, 11 patients had been in this hospital previously 42 had not and the number of days as an 'in patient' ranged from 1 to 240 (thirty-four weeks) with a mean of 28 for the cook-chill, and 24 for the 'Steamplicity' system.

This ward was identified with the help of catering and medical staff as the most suitable in that; these patients are more likely to stay longer, their medical condition would not interfere with food consumption, they are capable of independent judgement and a surgical ward represented a typical realistic hospital situation. The ward was not part of the pilot developmental work for 'Steamplicity'.

The study was conducted in two phases over two, two-week periods; the first phase used the existing cook-chill food service operation, and the second, the 'Steamplicity' system. In both phases, the total amount of food sent to the ward and the total amount remaining once the meal service had been completed was ascertained, over three consecutive days, each week (Tuesday, Wednesday and Thursday) using appropriate food balances.

A mixed methodological approach was used to elucidate the complex nature of satisfaction with the food service system and food. Patient satisfaction with both systems was initially evaluated using a questionnaire. This was administered at the

midday meal on the first day of the study and at the evening meal on the last day of the study. To enhance and validate this information, the research was extended to incorporate observation, focus groups and interviews with both patients and pertinent stakeholders such as medical staff, food service staff, and visitors. Food wastage, both bulk and plate, was directly measured using appropriate balances over three days each week. This approach permitted a direct comparison between the two meal systems.

Methodology

Phase 1 (2 weeks) - Cook-Chill System

This phase utilised a 'traditional' cook-chill system, which was in operation in the ward. Here a cyclical menu was used with food being pre-ordered the day before. On the day of consumption, cold bulk food was loaded into the trolley and transported to the ward. Here it was regenerated, plated and taken to patients' beds. All food loaded into the trolley was weighed by individual food item using 'Teroaka Digital Weighing Scales' (Model DS-50; ± 2g; max 6kg) once it had arrived at the ward, and details recorded. When the meal service had been completed, all food remaining on the trolley was weighed by individual food item and recorded.

Once patients had finished their meals, or all they could eat, any food remaining on the plate was weighed by food item using either the Teroaka Scales or a 'Soehnle Balance' (± 1g; max 1kg), out of sight of patients and recorded. Where foods had become 'mixed', individual components were separated where possible; otherwise, a value judgement was made as to what the food item was. Note was made of the number of patients who had been served meals at each mealtime and also the number of meals, by mealtime, which were served but not consumed for reasons such as Nil-by-Mouth, discharged or absent from the ward for any other reason. Unfortunately due to

unforeseen circumstances (London bombing) data could not be collected on the final study day and therefore results are presented for five days for this system.

Phase 2 (2 weeks) – 'Steamplicity' System

This phase utilised the 'Steamplicity' system. Patients ordered meals approximately two hours prior to meal service from an extended choice menu, which remained unchanged from midday to evening meals, and throughout the study. Individual, ready-plated chilled meals (incorporating both fresh and partially cooked items) were transported to the ward and cooked, as required, using microwave ovens. The average portion sizes of individual foods and meals were taken from existing production records. All meals (main courses and desserts) sent to the ward were then recorded. Any food items left on the plate, once patients had completed their meals, were weighed out of sight of patients, providing the average weight of food served to patients. Note was also taken of all meals which were served but not consumed for reasons such as Nil-by-Mouth, discharge or absent from the ward for any other reason and where the meal had remained refrigerated and could therefore be used for a subsequent meal.

Patient acceptability of the food service systems and food

In order to assess the overall acceptability of the food service systems and of each food item, a questionnaire was administered on two occasions to patients on the research ward during each week of the study.

Developing the Questionnaire

A questionnaire was developed, informed from the literature and previous hospital research, to ascertain patients' opinions of the food service system and the food provided. Prior to the main research, a small pilot study was conducted to establish the validity and ease of completion of the questionnaire for patients. Two versions of the questionnaire were developed and distributed to eight individuals (male and female age

range 24-55), with recent prior experience of being in hospital. The purpose here was to ensure that both the questions and questionnaire could be understood and had been interpreted correctly. These issues were confirmed by talking with participants immediately after they had completed the questionnaire. Resulting from the responses received, the questionnaire was revised and a further questionnaire distributed. This then only required minor modifications and is given in Appendix A.

Administering the Questionnaire

Questionnaires were administered to each patient at the beginning of their stay (earliest Tuesday midday) and at the end of their stay (or Thursday evening meal). They were not administered to patients who for any reason were not eating, or who were not 'mentally' capable of completing them. Questionnaires were administered immediately before the meal and collected once the meal had been completed and within an hour. Assistance was given where necessary to help patients complete the questionnaires, although those providing assistance had been appropriately trained and did not attempt to 'lead' the responses in any way.

Focus groups/semi-structured interviews

Hospital food service does not operate in isolation but requires the co-operation and integration of several disciplines to provide the ultimate patient experience. It is accepted in the literature that patient assessment of meal service is multidimensional (Gregoire, 1994) and that the hospitality experience is essentially interactive (Hepple *et al*, 1990). Accordingly, stakeholders such as medical staff, food service staff, patients and visitors were consulted after encountering both service systems to identify factors contributing towards patient satisfaction and to elucidate each patient meal experience. Sampling was purposive, that is directed, and data collected until saturation point, thereby giving credibility to the study. A research protocol informed from a review of the relevant literature and past studies was developed, with the main issues around

patient satisfaction and meal experience being explored. Perceived temperature and texture have been previously identified (Hartwell, 2004) as the two most significant factors in the evaluation of patient satisfaction with hospital food service and therefore food quality issues were expanded.

Patients were representative of the patient population and included males and females in the age range 25-68 years with a length of stay ranging from four days to seven weeks. Views and opinions were eagerly expressed and recorded where possible, other wise notes were written-up immediately afterwards.

Data Analysis

Food wastage data were entered directly into a pre-prepared spreadsheet for analysis. Both trolley waste and plate waste were calculated for the cook-chill system and plate waste for 'Steamplicity' using formulae within the spreadsheet.

Results from the questionnaires were coded and entered into spreadsheet (Excel) and checked for accuracy. The data were then imported into the statistical program "Statistical Package for the Social Sciences" (SPSS) and analysed to address the overall purpose of the study. Means and standard deviations were calculated and t-tests for unrelated scores used to compare the results: levels of statistical significance used were $p = <0.05$. Interviews were analysed by content analysis which allowed for developing themes to be incorporated and a hierarchical flagging system was established. Authenticity was ensured by including raw narrative within discussion.

Results and preliminary discussion

A comparison of the factors associated with the two systems is given in Table 1.

Insert table 1 here

As can be seen from these results, 'Steamplicity' scored higher for all variables, although not all of these were significantly different. Results for the two variables associated with food choice are similar; indicating that despite what at first sight might appear to be a lack of choice with 'Steamplicity', it is sufficient, although care must be taken with this assumption as patients would not have experienced 'Steamplicity' long enough to produced menu fatigue.

Food ordering is important and results for the 'Steamplicity' system are significantly higher; patients are well aware of what is available. This is advantageous in that with pre-information, consumers can mentally plan what to eat, not only for the next meal, but also for subsequent meals. There were no significant differences in the ability of patients to select their own meals; similarly, there were no significant differences for the two variables associated with food delivery. All of these factors have the potential to affect acceptability and enjoyment hence the lack of significance is important.

Food quality scores for 'Steamplicity' were higher for all four attributes although only two of these were significantly different. The most likely reason for this is the high spread of mean values as indicated by the standard deviation, but only further testing would confirm this. Again with the overall impression of the meal, the mean values for 'Steamplicity' were higher with two being significantly different, perhaps because of the higher Standard Deviation. One variable that might be of concern is the portion size, and it is encouraging to note that the mean value was significantly higher for 'Steamplicity' indicating that patients were satisfied with the size of the portion as served.

Food Acceptability

Due to the limited number of different foods selected, foods have been grouped by category, i.e. meat, fish etc and an analysis undertaken. These results are given in Table 2.

Insert table 2

As can be seen, the overall acceptability of the food groups is much higher with the 'Steamplicity' system, in most cases, significantly. However, care must be taken with these results as the number of groups, particularly rice, is quite small, and the comparison is with food groups rather that dish. Even so, there appears to be a clear preference for the food items.

Food Wastage

Food wastage with 'Steamplicity' is considerably lower. The plate waste at the midday meal was 20% and at the evening meal 13%, giving a mean of 16.5%. Wastage with the cook-chill system was 27% from the trolley and 22% from the plates, giving a total of 49%. It is perhaps interesting to note that plate waste was 5.5% higher with the cook-chill, indicative perhaps of food quality.

Patient Food Intake

The total weight of food consumed in the ward at each meal was divided by the number of main courses served. Results for the Cook-chill are given in Table 3 and for 'Steamplicity' in Table 4.

Insert table 3 and table 4 here

As can be seen, the mean food consumption at lunch with the cook-chill was 202g whilst that for the 'Steamplicity' system was 282g. Similarly, at the evening meal, mean consumption was 226g compared with 310g. Care needs to be taken when interpreting these figures as the foods measured were only those for the main course and vegetables, and excluded other items such as 'starters' and 'deserts'. In addition, with the Cook-chill system, the number of patients was based on the number of 'entrees' served; hence it could be feasible that some patients chose not to have an entrée. Notwithstanding, the results suggest that the amount of food consumed using the 'Steamplicity' system are higher for both the lunch and evening meals.

Focus groups and Interviews

Informal interviews were conducted with pertinent stakeholders to ascertain opinions and attitudes enabling a comparison to be made between the two food service systems. Patients (n=5) both male and female (age range 25 – 68 years), short and long stay, visitors (n=4), catering managers (n=3), medical staff (n=4) and a ward hostess were interviewed to gain an in depth understanding from those people who have most interaction with the catering operation. Using such methodology, an in depth comparison can be made between the two food service systems within the research remit. Respondents were articulate and enthusiastic to share comments with the researcher; interviews were conducted for as long as necessary to fulfil the objective of the research as set and until saturation of information. Analysis of data allowed for developing themes to be identified.

Menu

The menu card was well received with words such as *'exciting', 'colourful', and 'well presented'* used to describe the first impressions from patients.

….'*it could be a restaurant'* articulated one patient.

Patients also felt that dishes were appropriately described and accurately reflected their expectation of the meal. In addition, staff commented on the fact that the menus looked a lot nicer and more appealing than previous systems. A broad range of menu items is offered within the 'Steamplicity' system with the emphasis on the classical, traditional dish. Notwithstanding, although the balance of dishes was identified as sufficient for short stay patients, for longer stay patients, menu fatigue was an issue raised. An especial concern was for those patients who have individual requirements such as vegetarians/vegans, ethnic minorities who do not eat pork and for those patients who could only consume a 'soft' diet. Provision for this group was very limited and dissatisfaction was voiced most strongly. For strict vegetarians who do not eat fish there was only a choice of four main meal menu items.

There was no issue regarding the composite nature of the dishes served in the 'Steamplicity' system, in that the vegetables and sauce arrive as one with no opportunity to deselect an item if not required. However, patients are quite happy to leave food if not consumed and did not feel pressurised to finish the plate as served. Even so, it was noted by younger patients that chips were not offered on the new menu alternatives and there was no opportunity to order them as a side dish. This was felt to be disappointing and lead to minor dissatisfaction.

Portion size was sufficient for the male patients although maybe rather large for female patients recovering from surgery. There were some disadvantages identified in the lack of portion size choice, in that one female patient thought the meal might have been too large, but this aspect did not appear to affect her enjoyment and consumption of the food. Criticism from patients was voiced from the perspective of 'soup of the day' and 'hot dessert of the day' on the 'Steamplicity' menu as there seemed to be a lack of communication from kitchen to ward hostess. Correct information was not always

available and frustration ensued when patients found the menu misinterpreted. Menu monotony is a factor that should be guarded against particularly in a hospital environment.

Ordering

All stakeholders agreed that the ordering system was much improved from a patient perspective in the food service system under trial. A two-hour lead-time allows for greater patient flexibility and individuality of choice, dependent on the medical situation. It also means that patients are less likely to have forgotten what they have ordered making meal management easier for the ward hostess. This system can also accommodate those patients who are late back from appointments with x-ray for example, a situation that is much appreciated by the medical staff. However, from a holistic operational perspective, the 24-hour ordering system is easier to manage. There is longer time for orders to be placed and therefore less pressure on operatives in working to a tight deadline.

Food Quality

Patients were enthusiastic and positive regarding the quality of food as served with 'Steamplicity'. Dishes are well presented, of appropriate colour and temperature and in addition the texture particularly of vegetables is excellent. When asked to 'Recount your best hospital food experience' patients were fulsome in their praise of 'Steamplicity' and reflected comments such as:

……*'the beef casserole is delicious, the sauce is brilliant, I have had some worst pub lunches'* (patient)

……*'the mash potato is excellent, I never eat mash at home but I will order it here all the time'* (patient)

…*'.it is lovely to have freshly prepared fruit in hospital'* (patient)

When asked to 'Recount your worst hospital food experience' patients commented on previous hospital experiences of '*soggy vegetables'*, '*cold vegetables'* and '*chewy meat'* all issues not evidenced in the 'Steamplicity' style of food service.

'Steamplicity'

All stakeholders agreed that patients are generally more satisfied with the 'Steamplicity' system. There is greater interaction with food service staff and the operation better mirrors hospitality found outside an institution in a commercial environment. Menus are distributed with a drink; the patient then has time to reflect on their food choice before the order is taken. The food arrives attractively presented, and at the appropriate temperature.

Ward hostesses also perceive the system to be an improvement particularly from a Health and Safety aspect; putting a meal in a microwave is preferable to dealing with hot plates and ovens. Medical staff also prefer this system, they feel that the pressure at meal times has been taken off them, so that they can concentrate on medical issues such as handover and vital sign monitoring. It is less problematic dealing with late patients and they have noticed a decrease in wastage. In summary the final comment from the ward hostess reflects the general consensus from stakeholders

……*'patients like steamplicity which makes my job easier as there are fewer complaints and a happier ward, even nursing staff are enthusiastic'* (ward hostess)

General Discussion

Great efforts have been devoted to improve hospital catering since malnutrition among patients is a widespread phenomenon (Council of Europe, 2002; Singh *et al*, 2006). This improvement is expected to be done in a cost effective way (Mikkelson *et al*, 2003) and thus new solutions including increased use of semi processed foods are becoming increasingly important. 'Steamplicity' as a system follows the model of an

uninterrupted supply chain where production, distribution, serving and ordering are achieved in a seamless, efficient way to the benefit of the consumer. An evaluation of two hospital food service systems, cook-chill and 'Steamplicity' has shown the latter to have a number of inherent advantages. As indicated from the questionnaires, patients preferred the 'Steamplicty' system in all areas: food choice, ordering, delivery, food quality and overall. A number of these differences were statistically significant, and in many of the others, numerical differences are high; it would seem that if the spread of responses had been lower, these might also be significant. The focus groups and unstructured interviews showed broad agreement with the questionnaires but highlighted and emphasised a number of pertinent issues adding richness to the data.

Food wastage is an emotive, but important subject, particularly for hospital food service where wastage at ward level has consistently been reported to be in excess of 60% (Edwards and Nash, 1997). Not only is this an inefficient use of valuable resources, but also hospitals with high food waste are less likely to meet their patients' nutritional requirements. In addition, this can be viewed as an inverse measure of consumer acceptability. The wastage figures for both systems exceed the current guidelines (NHS Estates, 2005) although these guidelines need to be interpreted in relation to the patients involved. This ward was chosen in part because it was surgical and therefore the systems could be tested in a realistic environment. Clearly though, the wastage was considerably less with the 'Steamplicity' system; although poor operating procedures could easily negate this advantage.

Conclusion

Researching factors that impinge on patient satisfaction with hospital foodservice allows an understanding and appreciation to be gained of the interconnected, ordered set of relationships underlying a positive experience. Food quality has been shown to be a defining element within this environment and any service system that can enhance consumption should be embraced. In reality, satisfaction with a hospitality experience is a sum total of satisfactions with the individual elements or attributes of all the products and services that make up the experience. Notwithstanding, food quality, preference and satisfaction of each patient group will need to be addressed if hospital food service is to fulfil both physiological and psychological requirements.

The following recommendations are therefore made to ensure the optimisation of the 'Steamplicity' system:

- Operating procedures, which enhance and take advantage of the 'Steamplicity' system, should be clearly established and laid down. These should be regularly monitored to ensure compliance.
- Training and ongoing training should be the norm.
- Menus should be explicit in terms of what patients can order.
- A weekly/fortnightly change of menus should be considered.
- Greater choice should be available for groups such as vegetarians/vegans.
- The availability of diets for groups such as ethnic patients and those on specialist diets, for example, 'soft' should be quite clear.

Addendum

This research was conducted in 2004 and since commencement many of these recommendations have been progressed and implemented.

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Table 1. A Comparison of Selected Parameters: Cook-Chill and 'Steamplicity'

		Cook-Chill (n=28)			Steamplicity (n=24)		
Variable	Question	n	Mean	SD	n	Mean	SD
Food Choice							
	Good choice/variety of dishes	27	5.52	1.65	22	5.55	2.13
	Like to see greater choice	25	4.88	1.81	21	5.10	1.17
Food Ordering							
	Know choice available at meals¶	**25**	**5.76**	**1.92**	**20**	**6.70**	**0.80**
	Able to select own meal	26	6.58	0.76	20	6.80	0.70
Food Delivery							
	Receive meal ordered	27	6.93	0.27	23	6.91	0.28
	Did not order own meal	27	6.11	0.32	17	6.12	0.33
Food Quality							
	Good flavour	29	5.31	1.61	22	6.05	1.65
	Good texture¶	**28**	**5.21**	**1.62**	**21**	**6.48**	**0.98**
	Well presented on plate¶	**28**	**5.64**	**1.52**	**22**	**6.68**	**0.78**
	Served at appropriate temperature	29	5.66	1.63	22	6.27	1.52
Overall Meal							
	Enjoyed food served	28	5.36	1.73	23	6.13	1.66
	Satisfied with meal¶	**28**	**5.11**	**1.93**	**23**	**6.13**	**1.84**
	Portion size sufficient¶	**29**	**5.97**	**1.35**	**23**	**6.96**	**0.21**
	Able to eat without assistance	27	6.81	0.48	23	6.48	1.73
	Didn't feel like eating	25	1.76	1.59	19	1.89	2.13

Notes:
Variables in bold italics and annotated ¶ are significantly different, p = <0.05
1 = Totally Disagree, 7 = Totally Agree (numbers have been transposed from the questionnaire; therefore, the higher the number the more patients agree with the statement)

Table 2. A Comparison of Foods: Cook-Chill and 'Steamplicity'

Food Group	Cook-Chill			Steamplicity		
	n	Mean	SD	n	Mean	SD
Meat	16	5.06	1.91	8	6.63	0.74
Fish	9	4.56	1.81	9	6.44	1.01
Potatoes	19	5.11	1.50	10	6.70	0.48
Rice	2	4.00	0	2	6.50	0.71
Pasta	2	2.50	2.12	--	--	--
Vegetables	11	4.09	2.02	12	5.25	2.42

Notes:
All food groups except Pasta and Vegetables are significantly different $p = <0.05$
1 = Totally Disliked, 7 = Totally Like

Table 3. Mean Patient Food Consumption Cook-Chill

		Lunch			Evening	
Day	Total Food Consumed in Ward	Number of Main Courses Served	Mean Patient Food Consumption	Total Food Consumed in Ward	Number of Main Courses Served	Mean Patient Food Consumption
	g		g	g		g
Day 1	4037	17	237	5387	21	257
Day 2	3760	16	235	4776	18	265
Day 3	1794	15	120	3650	20	183
Day 4	4377	19	230	4379	22	199
Day 5	2624	15	175	4904	21	234
Total	16592	82	202	23096	102	226

Table 4. Mean Patient Food Consumption 'Steamplicity'

	Lunch			Lunch		
Day	Total Food Consumed the Ward	Number of Main Courses Served	Mean Patient Food Consumption	Total Food Consumed the Ward	Number of Main Courses Served	Mean Patient Food Consumption
	g		g	g		g
Day 1	3894	14	278	3892	13	299
Day 2	4129	14	295	3865	12	322
Day 3	3932	14	281	4248	15	283
Day 4	4504	16	282	2367	8	296
Day 5	5117	19	269	3929	12	327
Day 6	2680	9	298	2146	6	358
Total	24256	86	282	20447	66	310

Appendix A

Final Questionnaire

Ward Name/Number: | Date: | Lunch/Evening

Patient Questionnaire

Ve are always looking to improve the standards of food and service provided o our patients, and would like to know your views about the selection and uality of food available. After you have eaten your meal, please tell us bout it by completing the form below.

Please tell us about yourself

How many days have you been in hospital? .....days

Have you previously been a patient in this ospital this year? Yes ☐ No ☐

What is your gender? Female ☐ Male ☐

How old are you? Under 25 ☐ 26-45 ☐ 46-65 ☐ over 66 ☐

Please give your views on the meal you have just eaten

imply tick (✓) one box per line which pplies using the scale 1 - 7	Totally Agree			Neither Agree nor Disagree			Totally Disagree
ood Choice	1	2	3	4	5	6	7
here was a good choice/variety f food dishes							
would like to see a greater ariety of food dishes							
ood Ordering							
know the choice available to ne at each meal							
was able to select my own neal from the list supplied							
ood Delivery							
received the meal that I ordered	Yes ☐			No ☐			
did not order my own meal ut ate the meal provided	Yes ☐			No ☐			

Simply tick (✓) one box per line which applies using the scale 1 - 7	Totally Agree			Neither Agree nor Disagree			Totally Disagree
Food Quality	1	2	3	4	5	6	7
The food had good flavour							
The food had good texture							
The food was well presented on the plate							
The food was served at the 'appropriate' temperature, i.e. either hot or cold							
The meal overall							
I enjoyed the food served to me							
I was satisfied with the meal							
The portion size was sufficient							
I was able to eat without assistance							
I didn't feel like eating the food							

What did you have?

Please write the name of the dish below and tick (✓) one box which applies using the scale 1 - 7	Totally Disliked			Neither Liked nor Disliked			Totally Liked
	1	2	3	4	5	6	7
Meat							
Fish							
Potato							
Rice							
Pasta							
Vegetable 1							
Vegetable 2							
Pudding / Desert							

If you wish to make any other comments about the meal you have just eaten please do so overleaf.

Thank you for completing this questionnaire.