PATIENT EXPERIENCE, NUTRITIONAL INTAKE AND SATISFACTION WITH HOSPITAL FOOD SERVICE

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ABSTRACT

It has been recognised that hospital food service could be improved, with malnutrition a particular concern. The problem of patients obtaining adequate nutrition in hospital is complex with many constraints at ward level. The hypothesis of this study is that patients able to see and smell the food on offer and with potential for greater server empathy, will achieve better nutritional status and increased meal satisfaction.

Data were collected from two wards, Women's Health and Orthopaedic, (n=62) over two, three-day consecutive periods. Firstly, for a pre-ordered, plated meal service and secondly, nine months later, for a trolley service offering choice at the point of consumption. Food was weighed before and after the meal. Questionnaires were administered and interviews conducted with patients (n= 614) to evaluate patient acceptability of both catering systems and other pertinent data. The research methodology also involved collecting observational data during mealtimes. Focus groups were conducted with ward staff, and patients together with their visitors while open ended interviews were conducted with the catering manager, facilities manager, chief dietitian, orthopaedic ward dietitian and chief pharmacist. This was to enhance and validate information already gathered.

Results show that nutritional intake was not dependent on the catering system and that possibly in hospital; unlike other 'eating out' situations there are barriers to 'complete nutrition'[1]. A theoretical model of patient experience and satisfaction with hospital food service is presented, reflecting data gathered during the case study. Texture and temperature of food were shown to be critical factors impinging on patient satisfaction and the trolley system of delivery is the preferred style of service. Service predisposition demonstrates little significance with patient satisfaction towards the overall meal experience. This research indicates that nutritionally, the method of meal delivery is immaterial but patients do prefer choice at the point of consumption.

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[1] A term used to define the provision of a healthy nutritionally balanced diet which meets and satisfies both physiological and psychological requirements.

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Hartwell, H. and Edwards, J.S.A. (2000) *Comparison of mean energy intake between eating situations in a NHS hospital* - a pilot study. Interactive poster at the Annual Meeting of the British Association for Parenteral and Enteral Nutrition, **28-30 November** and published in the proceedings

Hartwell H. and Edwards J.S.A. (2001) A preliminary assessment of two hospital food service systems using parameters of food safety and consumer opinion. *The Journal of the Royal Society for the Promotion of Health,* **121,** (4) 236-242

Hartwell H. and Edwards J.S.A (2003) *Notational analysis in hospital food service* Paper at CHME: Hospitality Research Conference, **23-24 April** and published in the proceedings

Hartwell H. and Edwards J.S.A. (2003) A comparative analysis of 'plated' and 'bulk trolley' hospital food service systems. *Food Service Technology,* **3**, 133-142

Edwards J.S.A. and Hartwell H. (2004) A comparison of energy intake between eating positions in a NHS hospital – a pilot study. *Appetite*, **43,** 323 - 325

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CHAPTER ONE

INTRODUCTION

1.0 INTRODUCTION

Food service in hospitals is an essential part of patient care and a fundamental factor in aiding recovery (Allison, 1999; Jonkers, 2001)). Meals are often the highlight of a patient's day (Kipps and Middleton, 1990) hence the total food service[2] provision should aim to provide a healthy and nutritionally balanced diet that meets patient expectations and satisfaction, fulfilling both their physiological and psychological requirements.

The importance of hospital food service and the use of food as treatment are not new and can be traced back to one of the earliest medical works, the '*Hwang Ti Nei-chang Su Wen'* (the Yellow Emperor's Classic of Internal Medicine, 722-721 B.C.) (Cardello, 1982). Concern with the role that food may play in the recovery of patients was also highlighted by Florence Nightingale who wrote in her 'Notes on Nursing' in 1859, that *'The most important office of the nurse, after she has taken care of the patients' air, is to take care to observe the effects of his food'* (Nightingale, 1859).

In England and Wales, it has been estimated that in the state sector, the National Health Service (NHS) spends approximately £270 million annually on hospital catering (Audit Commission, 2001), although more recent data suggest the figure is in the region of £500 million (www.betterhospitalfood.com, 2004). As such, the NHS is the third largest purchaser of catering services in the United Kingdom, (U.K.) exceeded only by business and industry and local authority education catering (National Health Service, 1994).

The NHS produces approximately 220 million meals annually, 71% of which are produced by in-house catering departments (Audit Commission, 2001). Hospital food service can present especially complex features and is often considered to be the most complicated process in the hospitality sector with many interrelated factors impinging upon the whole (Wilson *et al.*, 1997). The siting of hospital wards often at considerable

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[2] The term food service and catering have been used interchangeably throughout but their meaning remains the same.

distances from the kitchen adds an additional logistics burden and in consequence, a long stream of possible delays between production, service, delivery and consumption (Kipps and Middleton, 1990). This stretched, continuous and staggered food cycle has potential negative effects on the safety and quality of food (Barrie, 1996) and presents a challenge to any hospital catering manager. In addition, the main impetus of this type of institution is in healing not catering.

The financial constraints and close economic boundaries of hospital catering, does not always permit the provision of food or service that matches the expectations of patients (Dickerson, 1989). The budget for hospital food varies between NHS Trusts[3] in England and Wales but ranges from £1.50 to £8.40 per person per day, for three meals, seven beverages and snacks if desired. Notwithstanding, patient satisfaction shows no relationship to the cost of providing such a service (Audit Commission, 2001).

The existence of malnutrition[4] in hospitals has long been recognised and efforts to reduce it have led to some improvements. In earlier work, both responses to complaints and subsequent improvements have tended to concentrate on palatability and the variety of the menu rather than on nutritional content (Bender, 1984) but there has been very little evaluation of hospital catering systems and their effect on patients' intake (Wilson A. *et al.*, 2000). More recently, there has been increasing concern over the high prevalence of malnutrition among hospital patients and a growing interest in the role food plays in improving clinical outcomes (Allison, 1999). Malnutrition has been identified as an independent factor in increasing morbidity, mortality, length of stay and expense (Naber *et al.*, 1997; Jeejeebhoy, 2003) and has been shown to retrogress during hospitalisation (Kyle, 2003; Thomas, 2003). This problem, though, is not confined to the U.K. but is encountered throughout hospitals in the Western world (Schwartz and Gudzin, 2000; Middleton, 2001; Council of Europe, 2001) and Latin America (Correia and Campos, 2003; Wyszynski *et al.*, 2003). Five major factors, common throughout Europe, have been identified as major barriers to complete nutrition[5] in hospitals (Council of Europe, 2001):

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[3] A Trust may be a single large hospital but generally incorporates a group of hospitals in a geographical area.

[4] Malnutrition is an imbalance of nutrients and may involve either over or underconsumption of energy and nutrients. Undernutition can be defined as the underconsumption of energy and nutrients.

[5] A term used to define the provision of a healthy nutritionally balanced diet which meets and satisfies both physiological and psychological requirements.

- A lack of involvement from the hospital administration (a food policy should have priority)
- A lack of influence of patients (provision of meals should be individualised and flexible)
- A lack of sufficient nutrition education amongst all staff groups
- A lack of clearly defined responsibilities in planning and managing nutritional care
- A lack of co-operation between different staff groups

A resolution (Appendix 1) containing recommendations for improvement has been adopted by the Committee of Health Ministers at the Council of Europe. However, as yet, it is unclear how this will be implemented across the U.K. (Wilson, 2004).

The hospital catering manager has a formidable task co-ordinating a complicated, elongated food operation. One of the main challenges in the current market is operating in a climate of corporate scrutiny and orchestrating diverse staff disciplines. New skills need to be acquired those of negotiation, accounting and psychology. Managers are now required to reduce staff but improve efficiency, add services while working with inadequate facilities, reduce employee turnover but improve customer satisfaction (Anon, 1992). At the same time, greater emphasis has been given to the role of food in clinical outcomes.

Food service in hospitals is important and nutritional intake should not be an 'afterthought' but viewed as a fundamental part of clinical care for all patients. Access to a safe and healthy variety of food is a fundamental human right (Kondrup, 2004) and it is short-sighted to underestimate the therapeutic value of food and drink (Allison, 1999).

The consultation document 'Standards for Better Health' (Department of Health, 2004) goes some way to address the problem and food service is included as a core standard. However, food is not just about service but encompasses the entire patient experience and as such should be viewed as a crucial part in the 'patient journey'.

The hypothesis of this study is that food service is an important element of the patients' hospital experience and that choice at the point of consumption is the preferred style of delivery. Moreover, by being able to see and smell the food on offer, patients will feel more encouraged to eat and together with increased patient/server interaction will therefore feel better satisfied.

1.1 Aim and Objectives:

Aim:

The aim of this research is to critically evaluate patient experience and satisfaction with hospital food service.

Objectives:

In order to achieve this aim, the following objectives have been identified:

1. To identify and assess the current state of knowledge from the published literature
2. To measure and evaluate total daily patient food consumption and hence nutritional intake derived from both a plate and trolley food service system
3. To measure and assess patient satisfaction with the food and service in hospital
4. To critically evaluate the patient meal experience
5. To develop a theoretical model of patient experience and satisfaction with hospital food service
6. To make recommendations accordingly.

1.2 Dissertation Overview

Chapter One provides an overview of the subject area outlining the research aim and objectives that have been the focus of this study.

Primarily, the literature on hospital food service and patient satisfaction was reviewed to enable a baseline of knowledge to be established. This is presented in Chapters Two and Three.

The research rationale and methodology are discussed fully in Chapter Four. A case study approach was taken to gain an in depth understanding of hospital food service. Multiple forms of data were collected giving a detailed appreciation and portrait of the subject. The approach used is embedded in the humanistic perspective, studying subjects within context in contrast to the structuralist perspective that concentrates on organisational and systems theory. Emerging issues were explored and investigated more fully by a series of empirical studies that complemented and developed critical perspectives. It has been suggested that a single case by definition enables a significant contribution to knowledge and theory building (Yin, 2003).

Results are presented and initially interpreted in Chapter Five from which a predictive model for patient satisfaction was developed. Thematic issues are discussed and enlarged in Chapter Six, and a theoretical model describing a holistic appreciation of hospital food service is presented.

Finally, in Chapter Seven, conclusions are drawn and recommendations given for further study and consideration. The prominent contribution to academic knowledge is to view hospital food service from a total approach and to provide evidence to substantiate anecdotal concerns. The food, the consumer and the situation have never been considered in an entirety for an institutional environment and as such make this research unique.

CHAPTER TWO

HOSPITAL FOOD IN CONTEXT, A CRITICAL REVIEW OF THE LITERATURE

2 INTRODUCTION

The purpose of this chapter is to critically review the literature on hospital food service, identifying pertinent issues relating to patient food consumption. Appertaining to that, prevalence of malnutrition among hospital patients will be discussed, together with length of stay and nutritional risk assessment. Management of undernutrition and the personnel involved will then be described before approaching the subject of hospital food service systems. An integral part of patient consumption is how the food is produced and delivered; these topics have been considered including food wastage, an indicator of consumption. Lastly, food temperatures will be discussed before summarising barriers to complete nutrition within a hospital setting and addressing future trends.

2.1 Background.

Before the National Health Service was formed, voluntary hospitals were public institutions for the care of the sick and the poor. Such institutions were run by a matron who was responsible for all domestic activities including cleaning, care of the linen, maintenance of food stores, cooking and distribution of food (Dickerson, 1989). Nutritional standards were dependent on the knowledge and organisational skill of the matron. Medical interventions were limited and therefore maintaining patients' strength through food was crucial (Wood, 1998). In the 1930's, with the expansion of clinical knowledge, nurses became attached to medical and surgical teams and participated increasingly in clinical activities. As a consequence, the distribution of food to patients was handed down to more junior grades (Dickerson, 1989). This process of delegation was facilitated by the development of the tray service with meals plated in the kitchen, compared to the bulk service where sister or staff nurse plated meals on the ward.

As doctors became better informed about the metabolic fluctuations in disease states, the demand for therapeutic diets increased. It was recognised that there was a need for specialised skills which gave impetus for the appointment of dietitians. The British Dietetic Association was founded in 1935 and the new profession was responsible for dietetic advice in the management of disease. This was the prelude to the division of responsibility for the feeding of patients. Moreover, with the foundation of the NHS in 1948, the original role of matron became fragmented. Facility managers were appointed as were catering officers who were responsible for purchasing food and preparing and distributing meals. However, serving meals, usually plating food from a bulk trolley, remained a nursing activity.

The implementation of the Salmon Report in 1966 (Ministry of Health, 1966) further influenced nursing involvement in the feeding of patients. The distribution of meals and the collection of empty plates were no longer a nursing duty but tasks to be performed by ward 'domestics' or 'waitresses'. The nurse was identified as having 'sapiential authority' (field of influence) on all things which go towards the well-being of the patient. That is '*the nurse's views need to be taken into account because of her knowledge of the needs of the patient, but the responsibility rests with the officer to whom the responsibility has been given*'(Wood, 1998). Accountability without authority made the role of the nurse in food service difficult and strained working relationships. Unfortunately, four areas being identified in the report as 'non-nursing' duties (catering, domestic cleaning, linen and laundry) compounded the situation. It was this statement with its underlying message that nurses had no part in domestic care that had the most impact (Wood, 1998). Gradually, complex attitudes and organisational structures were developed which put barriers between the nurse and feeding of patients, which came to be seen as a lowly task requiring little skill.

It was at this time that research identified concern regarding food and nutrition in hospitals (Butterworth, 1974; McWhirter and Pennington, 1994) and in particular from a patients' point of view (Association of Community Health Councils, 1997) leading to the phrase 'hungry in hospital'. The latter report suggested that patients were receiving inadequate food because nurses were not involved at meal times or appeared to be unaware of the patients' nutritional needs and of the help required. This led the United Kingdom Central Council for Nursing to state that '*nurses have a clear responsibility for ensuring that the nutritional needs of patients are met'*

(United Kingdom Central Council for Nursing, 1997).

In the UK, *Nutrition Guidelines for Hospital Catering'* (Department of Health, 1995a) (Appendix 2) were published to highlight the importance of hospital food as an integral part of treatment and to provide appropriate nutrition guidelines and standards for the general hospital population and groups with special requirements. It emphasises that the provision of nutritional quality must not be carried out in isolation and that others, including dietitians, catering staff, nursing and patient representatives also have an important part to play. Guidance is not prescriptive, and recognising the complex nature of food provision within hospitals, accents the need to approach the situation step by step. The variations in demand are complicated and involve not only providing meals with appropriate nutritional content but also taking into account the social, cultural and religious requirements of patients. The key messages are that:

1. Food should be regarded as an integral and important part of total hospital care.
2. Menus should offer a variety of nutritionally appropriate meals and allow for a range of portion sizes.
3. Foods not eaten are of no nutritional value to patients.
4. Taste, colour, smell, temperature, presentation and timing of meals are important.

The purpose was to provide a blueprint for menu planning and standard recipe planning while coincidentally stressing the importance of good inter-disciplinary communications. Pertinent points have been incorporated into Service Level Agreements and Performance management packages; however, practice does not always reflect the recommendations made (Dobson, 1999).

The place of food for hospital patients has also been made with the publication of, *The Patient's Charter and You* (Department of Health, 1995b). This requires patients to be given a written explanation of the hospital's food, nutrition and health policy, and the catering services and standards to be expected. The standards provide for:

- A choice of dishes, including meals suitable for all dietary needs
- Orders to be taken no more than two meals in advance
- A choice of the size of portion

- The name of the catering manager for point of contact

- Help, if needed, to use the catering services, for example, menus printed in other languages and large print.

However, (Farrell, 1999) found that patients knew very little about the contents of the charter and therefore concluded it had been of limited use in raising nutritional awareness amongst this group.

2.2 The Consequences of Malnutrition in Hospital Patients

Malnutrition around the world has long been documented among hospitalised patients (Bollett and Owens, 1973; Prevost and Butterworth, 1974; Moy *et al.*, 1995; Correia and Campos, 2003). Patients who are malnourished experience varying degrees of weight loss, muscle wasting, depleted fat stores, reduced serum albumin levels and impaired immune function (Davis and Bristow, 1999). As a result, they have lowered resistance to infections, delayed wound healing, a general weakness and reduced functional capacity. Any of these impairments can impede recovery and cause serious complications (Bankhead, 1995). Malnutrition also has psychological effects including apathy and depression that in turn lead to a loss of morale and the will to recover (Beese, 1997). A summary of the effects of malnutrition is given in Table 1.

Table 1 Effects of clinical malnutrition

Weight loss, depletion of body fat and protein	Lowered resistance to infection
Impaired muscle and respiratory function	Increased post-operative complications
Increased risk of pressure sores	Weakness/immobility
Poor wound healing	Increased mortality
Lowered resistance to infection	Increased post-operative complications
Weakness/immobility	Increased mortality
Apathy, depression, lethargy	Low morale, reduced will to recover
Longer stay/longer convalescence	Increased likelihood of re-admission
Reduced quality of life	

(Source: adapted from Davis and Bristow, 1999)

Undernutrition, therefore, prolongs recovery, increases the need for high-dependency nursing care and ultimately promotes a reduced quality of life for the patient (Council of Europe, 2001). Patients who have been in reasonably good health prior to admission and who are in hospital for up to seven days are unlikely to be deficient in nutrients. However, patients who spend extended periods in hospital, rely almost entirely on the food provided (McGlone *et al.*, 1995). Studies have demonstrated a downward trend in nutritional parameters during hospitalisation and an apparent increase in mortality rate (Weisner *et al.*, 1979). This concern also extends to obese patients as it is possible to lose tissue rapidly with acute illness.

Theoretical equations (Schofield and Harris Benedict) can be used to calculate Basal Energy Expenditure (BEE), as shown in Figure 1, and are used to determine the resting individual's energy needs.

Women
BEE = 655 + (9.6 x kg) + (1.8 x cm) – (4.7 x age)

Men
BEE = 66 + (13.7 x kg) + (5 x cm) – (6.8 x age)

(Source: Flanigan, 1997)

Figure 1 The Harris Benedict equation for basal energy expenditure (BEE)

The equations account for age, sex and body size and can be adjusted for obesity. (Flanigan, 1997). BEE is multiplied by additional factors accounting for physical activity, surgery and infection. Energy requirements of the average hospital patient have been calculated to be 1.3 x resting metabolic rate to maintain weight or 1.5 x resting metabolic rate to gain weight (Allison, 2003). Energy expenditure can also be estimated based on the patient's weight. The normal or non-stressed level is 20 to 25 kcal/kg/day; bed-bound patients have been shown to require 25 to 30 kcal/kg/day, whereas studies of ambulant patients have shown energy expenditures of 34 to 38 kcal/kg/day, 35 to 40 kcal/kg/day may be needed to heal a severe wound (Flanigan, 1997).

Energy loss has to be sustained and prolonged for some time to be clinically significant. Low food intakes, in combination with disease, have a larger, more rapid impact on body weight and function than simple starvation. Functional deficits are apparent in

normal weight, healthy adults after 10-15 days of semi-starvation and it is probable that in sick hospitalised patients, these impairments occur more rapidly (Townsend *et al*, 1997). It has been suggested that patients in hospital are consuming between 30-70% of the recommended energy intake and up to 70% of recommended protein intake (Kenny, 2000; Henry *et al.*, 2002). In two studies, there was concern that the shortfall in protein was greater than in energy (Gall *et al.*, 1998; Barton *et al.*, 2000). A patient receiving 50% of energy requirement (semi-starvation) is likely to lose 15-20% of body weight in 3-4 weeks (Allison, 1992) and there is evidence that 7-10 days of inadequate oral intake is associated with deleterious consequences to organ morphology and physiological function (Townsend *et al.*, 1997). The majority of patients who become undernourished not only lack dietary energy and protein but also micronutrients (Todd *et al.*, 1984; Corish and Kennedy, 2000).

2.3 Prevalence of Malnutrition in Hospital Patients

Although the existence of undernutrition in hospital is recognised, the prevalence is not clear as there is no universal agreement on the definition or the marker to be used; a practical and workable definition of malnutrition is urgently needed (Edington *et al.*, 2000; Corish *et al.*, 2004).

Currently there is little consensus on the best method for the nutritional assessment of hospitalised patients (Corish and Kennedy, 2000; Sungurtekin *et al.*, 2004). Discussion ranges from the use of anthropometric measurements or functional status to biochemical assessment. One of the most widely used indices of undernutrition is BMI[6] (Watson, 1994). A value of BMI <20 (designated 'underweight' by the Office of Population Census and Surveys, 1994) has been used to benchmark the condition. However the World Health Organisation International Obesity Task Force in 1998 reclassified 'normal or ideal' and it is now redefined as BMI 18.5 - 24.9 (Elia and Stratton, 2000). This reflects the view that some healthy individuals can have a BMI of less than 20 but still be 'medically fit'. Alternatively, it has been suggested that with the secular increase in adult BMI the values for nutritional risk should be altered and in America nutritional risk for the older person is now defined as a BMI below 24 (Corish and Kennedy, 2000). The problems associated with anthropometric measurements include

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[6] BMI is calculated by Wt (kg)/Ht^2 (m). A BMI below 20 is considered underweight, between 20 -25 acceptable, between 25-30 overweight; and >30 obese. (Department of Health, 1991)

interpretation of the data. If used to compare with standard values derived from population surveys these are out of date and last benchmarked in the early 1970s (Corish and Kennedy, 2000). Conversely if a patient's measurements start out well above the average, such as in obesity, nutritional decline will then define the patient as 'normal'. It is also true that any anthropometric measurement only allows an estimation of total body composition and therefore is not completely accurate in the clinical setting (Charney, 1995). As a value for subnormal BMI is not unanimous, caution should be exercised when using this as an indicator (Bachrach-Lindström *et al.*, 2001). Serum Albumin has been a standard measure in research and is still commonly used in practice (Tierney, 1996). Since it has a relatively long half-life, serum albumin decreases gradually and low blood levels are almost always associated with signs of undernutrition. However serum protein levels also vary in response to medical conditions; if undernutrition is defined using anthropometric criteria, not all undernourished patients have low serum protein levels such as patients with anorexia nervosa (Corish and Kennedy, 2000). Therefore for clinical use, recent weight loss and functional status may be more appropriate variables to use in the evaluation of nutritional status on admission to hospital. Weight for height is not a definite measurement of undernutrition, but it is a crucial indicator and measurement over time provides indisputable evidence of deterioration or improvement. In acutely ill patients where height and weight measurements cannot be made, it is suggested that mid-upper arm circumference can be a reliable surrogate (Vlaming *et al.*, 1999). Controversially Flodin *et al.* (2000) suggest that a low BMI (and possibly malnutrition) is a stronger predicting factor for 1 year mortality in geriatric patients than the diagnosis.

Because of the different criteria used to screen for the presence of malnutrition, the reported incidence can vary between 10% and 60% (Elia and Stratton, 2000). McWhirter and Pennington (1994) claim that malnutrition remains a largely unrecognised problem in hospital. They found that 200 out of 500 (40%) patients in an acute hospital were undernourished on admission (BMI<20) and as many as 75% of those reassessed on discharge had lost weight while in hospital. They also confirmed the need for active nutrition intervention and identified a number of factors contributing to the widespread existence of malnutrition. Equally as important, it showed the failure of nursing staff to identify patients at risk.

Regardless of the methods used to assess malnutrition, the conclusion is the same; undernutrition is significant (Council of Europe, 2001). In most European hospitals it is estimated as being between 20-30% (Beck *et al.*, 2001), although less for elective surgery (Wright *et al.*, 2003), while in the UK 20-25% of patients have a BMI less than 20 (Schenker, 2000). In a survey of an American hospital of 131 surgical patients, including some with cancer, it was found that approximately 50% were inadequately nourished (Bistrain *et al.*, 1974). The prevalence of hospital malnutrition from a range of studies is summarised in Table 2.

Patients undergoing major surgery are at greater risk of malnutrition because of the stress and the concomitant increase in metabolic rate caused by surgery (Dempsey *et al.*, 1988; Edwards, 1998; Brooke and Coad, 2000). It has been suggested that in surgical patients, pre-operative nutritional assessment, a course of feeding prior to surgery in malnourished patients and early post-operative feeding in all patients could help reduce the incidence of malnutrition in post operative patients and consequently reduce the cost to the NHS (Brooke and Coad, 2000; Fearon and Luff, 2003). Several factors have been identified which contribute to the development of malnutrition during the peri-operative period (Moynihan, 1994). Firstly, requirements are increased resulting from the metabolic response to surgical trauma, an increase in basal metabolic rate, increased requirements for nutrients involved in the healing process and replacement of losses from haemorrhage or fistula. Secondly, patients risk a low intake of nutrients owing to difficulties in feeding and then waiting for bowel function or normal appetite to resume. Kondrup *et al.* (1997) reiterate concerns and suggest that surgical treatments and investigations may impair appetite or the ability to eat whilst concurrently increasing nutritional requirements and causing further worsening of nutritional status.

Table 2 Prevalence of undernutrition in hospital in-patients

Prevalence (%)	n	Method of assessment	Source
36	148	Total exchangeable potassium	Forse and Shizgal, (1980)
28.5	482	Weight index, MAMC, TSF, serum albumin, transferrin, transthyretin and retinol-binding protein, delayed hypersensitivity skin testing	Ek *et al.*, (1990)
39	2448	Nutrition risk index, Subjective global assessment	Veterans Affairs Total Parenteral Nutrition Cooperative Study Group, (1991)
44	245	Serum aspartate aminotransferase activity, cholesterol, total protein, albumin and transthyretin	Spiekerman *et al.*, (1993)
45	47	Percentage IBW, BMI, MAC, MAMA, TSF and SSF less than the 5th percentile using age and sex specific data	Lansey *et al.*, (1993)
53(males) 61(females)	311	BMI, MAMC, TSF and serum albumin	Mowe *et al.*, (1994)
35	199	Percentage weight loss, weight index, MAMC, TSF, serum albumin and transthyretin	Larsson *et al.*, (1994)
46	100	BMI, MAMC, TSF	McWhirter and Pennington, (1994)
22	69	BMI less than the 5th percentile using age and sex specific data	Potter *et al.*, (1995)
14	219	Body weight less than 80% of age and sex specific values	Muhlethaler *et al.*, (1995)
35	84	Percentage weight loss from normal, BMI, MAMC	Nightingale, *et al.*, (1996)
43	129	Serum albumin <35g/l, weight:height ratio<100%	Giner *et al.*, (1996)
45	155	Subjective global assessment	Naber *et al.*, (1997)
31	201	BMI below 20	Garriballa *et al.*, (1998)
18.3	1561	Percentage weight loss from normal, BMI, MUAC	Powell-Tuck and Hennessy, (2003)
39.9	590	BMI, recent weight loss, recent food intake	(Rasmussen *et al.*, (2004)

Notes: MAMC, mid-arm muscle circumference; TSF, triceps skinfold thickness; IBW, ideal body weight; MAC, mid-arm circumference; MAMA, mid-arm muscle area; SSF, subscapular skinfold thickness; MUAC, Mid upper arm circumference

(Source: adapted from Corish and Kennedy, 2000)

It is suggested that on average most patients lose around 4.1kg following surgery; of this 1.3kg is fat, 1kg is lean body mass and 1.8kg water. Such losses may be exacerbated by post-operative starvation (Hill *et al.*, 1977). Frustratingly, a patient may be nil-by-mouth all morning only to have the treatment delayed or postponed to a later date (Schenker, 1999). However, research has shown that it may only be necessary for patients to fast for 4-6 hours pre- operatively, but in practice this is rarely adhered to (Hung, 1992). Other studies confirm that there is no statistically significant difference between elective and emergency patients' food or fluid fast. The mean fluid fast is typically13 hours and the mean food fast is 14 hours (Brooke and Coad, 2000). All patients fasted for longer than was necessary.

The prevalence of undernutrition is higher amongst teaching hospitals compared to district general hospitals (Edington *et al.*, 2000) and public hospitals compared to private hospitals (Shirley and Moloney, 2000). Low energy intakes, low mean vitamin C intakes and low fibre intakes in patients have been observed in two Dublin teaching hospitals (Rush and Moloney, 1998; Browne and Moloney, 1998), whilst it was found that over 75% of patients in two public hospitals failed to meet the Reference Nutrient Intake (RNI) for vitamin C. All female subjects between 19-50 years of age were deficient in iron and mean calcium intakes for both genders were appreciably less than the RNI (Shirley and Moloney, 2000).

There is also evidence that women with hip fracture show worse nutritional status and greater deterioration post-operatively than age-matched controls (Bachrach-Lindström, 2001). This finding reflects the indication that the prevalence of undernutrition is potentially higher amongst female patients (Paillaud *et al.*, 2000).

Malnutrition is not just confined to adults but also includes children (Rogers *et al.*, 2003). McCarthy and McIvor (2001) found 26% of children malnourished on admission to a children's hospital and concluded that this is still a prevalent feature. However, undernutrition in children in hospital remains largely unrecognised by the medical and nursing staff caring for them (Hendrikse *et al.*, 1996).

2.3.1 The Older Person

Another group of patients of particular concern is the older person (Kyle *et al.*, 2002), as they often rely solely on the food provided by the institution and do not make up any

deficit with food brought in from outside (Frost *et al.*, 1991). Protein-energy malnutrition among hospitalised geriatric patients can reach as high as 60% of the population, due to insufficient dietary intake, illness and the detrimental effect of actually being in hospital (Bos *et al.*, 2001). Older patients account for a high number of acute admissions and a high proportion of occupied bed days (50% occupied by the 65+ age group) in the acute hospital sector (Tierney, 1996). Ill health frequently has an adverse effect on the nutritional status of the older person. Lipski *et al.*, (1993) studying a group of geriatric long-stay hospital patients (n=92) found that they were grossly undernourished and that their dietary intakes based on recommended daily allowances did not satisfy basal metabolic demands. An intake of 30-35kcal/kg/day is desirable in most older patients (Bozzetti, 2001).

Studies of older orthopaedic patients, have shown that post-operative food consumption may provide less than 50% of nutrients recommended for healthy people of the same age (Dickerson *et al.*, 1986; Lumbers *et al.*, 1999; Hamilton *et al.*, 2002). Such findings have important implications; pre-existing deficiencies could be exacerbated and may be further enhanced by surgery which would increase the requirement for vitamins C and B1. A deficiency of vitamin B1 has also been associated with post-operative confusion in older people (Holmes, 1996). Other research has found that in older fracture patients, intakes of thiamin, riboflavin, vitamin C and iron were negligible, whilst the intake of vitamin D was only 33% of the RNI (Older, 1980). Low serum total cholesterol, low albumin and prealbumin have also been found to be reduced and may contribute to increased mortality risk (Bozzetti, 2001; Watson, 1999).

A hypermetabolic[7] state was observed in 40 older patients following hip fracture surgery which persisted for three months post-operative. Nutrient intake, although adapted to meet energy requirements, could not improve nutritional status and it was therefore concluded that stressed older patients were particularly vulnerable (Paillaud *et al.*, 2000).

Undernutrition in the older person is also associated with morbidity and prolonged hospital stays which subsequently increase healthcare costs (Flodin *et al.*, 2000). Results from studies in Sweden (Elmstahl, 1997) correspond with these findings where it was concluded that a high proportion of geriatric long-stay patients have a dietary

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[7] Abnormally high rate of metabolosim, i.e. breakdown of nutrients for use by the body.

intake far below recommendations and are therefore at risk of having or developing malnutrition (Ruiz-Lopez *et al.*, 2003).

2.3.2 Length of Hospital Stay

The 'meal experience' is an essential element within the scope of patient recovery and can impact on the length of stay in hospital (Reilly *et al.*, 1987), with a clear relationship between undernutrition, prolonged hospital stay (Bond, 1997; Pichard *et al.*, 2004) and greater risk of complications (Braunschweig *et al.*, 2000). Edington *et al.* (2000) found the mean stay for malnourished patients was 8.9 days, significantly ($p<0.001$) longer than patients who were not malnourished, who stayed 5.7 days. In addition, severely malnourished patients and those who had a BMI <20 and weight loss of >10% stayed in hospital for 18.3 and 17.5 days respectively. Mortality in the malnourished patient has been found to be 8% greater and hospital costs increased up to 309% (Correia and Waitzberg, 2003).

Although the length of stay has been steadily decreasing in most European hospitals and now averages between 5 and 10 days, those patients who are nutritionally 'at risk' remain in hospital for longer (Beck *et al.*, 2001; Johansen *et al.*, 2003). Inevitably, longer lengths of stay are also associated with significantly higher requirements for prescriptive drugs and cost the NHS an estimated £300 million a year (Lipley, 1999).

2.4 Nutritional Risk Assessment

Nutritional status is known to significantly affect the prognosis of patients admitted to hospital (Holmes, 1999), therefore the screening or assessment for undernutrition is crucial (Smith, 2003); particularly as neglect is beginning to have medico-legal consequences (Kondrup *et al.*, 2003). It has been suggested that there is benefit in preadmission nutrition screening as nutritional intake could be increased before hospital admission and therefore improve patient outcome (Schwartz and Gudzin, 2000).

Even though nutritional screening and assessment has been recognised as an essential component of the clinical care of the hospitalised patient (Tierney, 1996; Council of Europe, 2003), one in four NHS Trusts in the UK do not systematically screen patients to identify nutritional needs (Audit Commission, 2001), concluding that recommendations to assess nutritional risk are not being followed (Campbell *et al.*, 2002).

There is a need to evaluate patients on admission to identify those at risk of developing disease-related malnutrition (Baxter, 1999). Particularly as the costs of hospital services used in treating complications arising from malnutrition are four times greater than those incurred in treating well-nourished patients (Lennard-Jones, 1992). Nutritional screening is a way of identifying individuals who are already malnourished, or who are at risk of becoming so, in order that nutritional support can be implemented to improve patient out-comes (Freebody, 1998). Patients may be malnourished on admission to hospital as a result of a variety of disease-related, social or psychological factors (Schenker, 1999) and crucially this weight loss should not continue. Controversially, it has been suggested that malnutrition in acute hospital admissions apparently goes unrecognised and unmanaged in 70% of cases (Tessier *et al.*, 2000). Since there are serious consequences and effective simple treatment is readily available, increased awareness is required with routine assessment of nutritional status in all patients.

Initially, a screening tool should be used which then highlights any patients requiring a full nutritional assessment. Blanket nutrition assessment of all patients would be an unrealistic goal due to time and budget constraints. However, a 'quick' screening programme would identify any patients at risk. Screening parameters should provide enough information to determine if the present diet is appropriate, if gross deficiencies are present and if a more comprehensive assessment is required (Charney, 1995; Mackintosh and Hankey, 2001). Due to the plethora of screening and assessment tools, some validated, some not (Jones, 2004), ESPEN (European Society of Parenteral and Enteral Nutrition) recommends a simple screening procedure on all patients on admission to hospital (Appendix 3) (Kondrup *et al*, 2003). Simultaneously, BAPEN (British Association of Parenteral and Enteral Nutrition) have also recently launched the 'Malnutrition Universal Screening Tool' (MUST) (Elia, 2004). Notwithstanding, there would be concern for those patients either unable to co-operate with BMI measurements (Strain *et al.*, 1999) or who had oedema (Weekes, 1999).

Other barriers to the use of such a tool would be time implications, paper work burden (Booth, 1998; Wright *et al.*, 2003), management commitment (Campbell *et al.*, 2002) and the controversy regarding the interpretation of any data gained (Pattison *et al.*, 1999). Pattison *et al.* (1999) showed an inconsistency between dietitians and nurses in recognising 'at risk' patients. Using a screening tool, 85% of the under-nourished patients were correctly classified as nutritionally 'at risk' by the dietitian, however only

58% were correctly identified by the nurse. Other research (Field, 1995), has highlighted that patients could be categorised according to pre-determined criteria and then re-weighed and re-evaluated once a week. The categories suggested are:

- Category 1; patients can manage on the hospital food
- Category 2; patients could be at risk – monitor intake for 48 hours
- Category 3; patients require supplementation
- Category 4; patient referred to the dietitian

There is no doubt that with early identification and a combined multi-disciplinary plan of action many of the problems associated with being 'hungry in hospital' could be reduced. Without screening and monitoring, nutritional care is likely to be random, ill directed, inefficient and ineffective (Allison, 1999). Proposals in the U.K. at present suggest that nutritional screening should become routine in all hospitals (Public Involvement Team, 2003) and it is an essential part of Essence of Care benchmarking[8] (Ravenhill and Illingworth, 2002).

2.5 The Management of Undernutrition

Nutritional support has demonstrated clinical benefit in both short-term (weight maintenance, improved function, reduced infection rates, reduced length of stay) and long-term (improved immune function, decreased complications, decreased readmissions and mortality) (Robertson, 1990; Barton *et al.*, 2000; Lauque *et al.*, 2000; Brosnan *et al.*, 2001; Bozzetti, 2001). It has also been suggested that such provision would result in an average five-day reduction in hospital stay for approximately 10% of patients. The consequent saving was estimated to be £266 million annually (Lennard-Jones, 1992), latest figures show that poor nutrition costs the NHS an estimated £300m/year (Lipley, 1999). Relative intervention costs have been calculated and are presented in Table 3.

[8] Essence of Care (Department of Health, 2001) is a process of identifying current practice against national best practice benchmarks and is seen as instituting an ethos of continuous quality improvement.

Table 3 Estimated intervention costs

Intervention	Costs/patient (£)
Nutritional assessment	**150.0**
Dietary advice re: fortified food	**73.0***
Dietary advice re: normal food	**158.0***
Dietary advice re: normal food and nutrition supplementation	**201.0***

*** Excluding costs of supplementation** (Source: Pang *et al.*, 2003)

However, there is no firm evidence available about the benefit of routine supplement use and it is suggested that supplements are no substitute for the adequate provision of normal food and should only be used where there are clear clinical indications (Hankey *et al.*, 1993; Allison, 1999; Council of Europe, 2003). Results were inconclusive for the use of liquid supplements in reversing malnutrition in the elderly (Potter *et al.*, 1998) and benefit from hypercaloric feeding has been difficult to demonstrate (Thomas, 2003). There is also some question as to the compliance of patients towards commercial oral nutritional supplements (Gall *et al.*, 1998; Lawson *et al.*, 1998; Bruce *et al.*, 2003). It is better and less costly on the pharmaceutical budget for patients to consume food rather than supplements and sip feeds[9]. There is concern that expenditure on these products has risen dramatically in recent years and that some prescribing may be inappropriate (Wanstall *et al.*, 2000; Gale *et al.*, 2001; Kyle, 2001). An audit of supplementation consumption revealed that only 47% of the prescribed volume was consumed and that over prescription and poor palatability were the reasons for this (Peake *et al.*, 1998).

Fortification is the simplest way to increase a patient's nutritional intake without increasing the volume of food consumed. Fortifying popular food choices such as soups, puddings and mashed potatoes has been identified as one measure to improve the nutritional status of older hip-fracture patients (Gall *et al.*, 1998; Lumbers *et al.*, 1999), and another, the addition of natural energy-dense ingredients to regular meals (Kondrup *et al.*, 1997; Odlund Olin *et al.*, 2003). Acceptability tests of vitamin C fortified mashed potato have been carried out in a hospital where lunch is provided on a day ward for

[9] Sip feeds are oral nutritional supplements

older patients. Preliminary results show that a fortified product based on a dehydrated mix can be acceptable (West, 2001). Between meal snacks such as fortified cakes served in a 'Traditional English Tea' style or 'smoothies' would also be appropriate for older age groups (Lord, 2001; Fabian, 2001). Offering cake with afternoon tea provides an extra 120kcal and 3-4g of protein (Mullally, 2000), although, it is important to ensure that these are provided as additions to and not instead of normal hospital meals. Food can be a cheap and powerful medicine.

2.6 The Social and Eating Environment

The social environment plays a prominent role in determining human behaviour. Social facilitation of behaviour or an increase in the frequency or intensity of an individuals behaviour in the presence of others engaged in a similar behaviour is a frequently observed phenomenon (Goldman *et al.*, 1991; Berry *et al.*, 1985). Food is a universal medium for expressing sociability and hospitality, social influences operate in the control of normal eating. Hospitalisation can be a socially isolating event and therefore person to person interaction is important. The eating environment has been acknowledged as a factor affecting food consumption (Gibbons and Henry, 2003) and eating is a social activity, which may be enhanced if patients sit together (Hotaling, 1990; Allison, 1999). The act of eating together indicates some degree of compatibility and acceptance. Food served in conducive surroundings and in the company of others stimulates appetites and increases the enjoyment of the meal occasion. Patients will eat more sitting around a table in a social situation than when isolated, a rapport is formed between participants and communication increased which in turn can affect the type of dishes selected (Edelman *et al.*, 1986; Rozin, 1996). The literature in environmental psychology and acquisition of learned behaviour provides a strong theoretical base for understanding the impact of the eating situation on food intake. De Castro and de Castro, (1989) used a diet diary technique in which subjects recorded meal time and location, food and drink consumed during the meal, affective state and the number and identity of other people eating with them. Results of these studies revealed that meals eaten with other people were substantially larger than meals eaten alone. The more people who were present the larger the meal consumed (de Castro and Brewer, 1992). The presence of other individuals may augment food intake by increasing verbal interactions resulting in longer meal duration and therefore food intake (Bell and Pliner,

2003). Moreover the individuals would be more relaxed and there by decreasing the inhibition of food intake.

Preliminary indications from research conducted in hospital suggest that the hypothesis is also true within institutions, where consuming meals in a social situation around a dining table increases energy/macro-nutrient intake (Hartwell and Edwards, 2000).

Engell *et al.*, (1996) agree with this and state that food intake can be affected by the eating behaviour of a social model. Intake is usually enhanced when an experimental confederate eats a relatively large amount and makes positive comments, intake is reduced when the confederate eats a limited amount and makes negative comments. The Council of Europe Resolution (2003) states that all patients should have the possibility to sit at a table when eating their main meals and that the focus should be on the presence and support of other people.

2.7 Nutritional Care Supporters

Most patients (90%) depend on hospital food to optimise their recovery (Elia *et al.*, 1998) therefore hospital food service is a crucial component of treatment. However, despite the evidence in support of a dedicated nutrition team (Daniels and Wright, 1997; Kennedy, 2000), only one in three hospitals in the UK have such an initiative (Elia *et al.*, 1998). In Europe the figures vary from 2 - 37% (Allison, 2001). A multi-disciplinary collaborative team consisting of a consultant, nutrition nurse, dietician and pharmacist is suggested as the optimum means of assessing, treating and monitoring patients with malnutrition (Lewin, 1985; Lennard-Jones, 1992). It has been suggested that the health care model should be based on orchestration, similar to an airport rather than that of a factory (Press, 1999); where experts are assembled and directed toward a common purpose providing integration, specialism and a whole systems approach.

The responsibilities need to be clearly defined and communicated, with all staff committed to alleviating the problem of undernutrition. However, catering, the provision of food for patients and hence the meeting of nutritional needs, has become more and more the responsibility of the catering officer, particularly when the principle remit of dietitians is towards patients with special requirements and those on therapeutic diets. Although, there is an argument that dietitians should be more proactive and responsible for general patient well-being (Williams, 2002). Working tensions between

these two groups have been documented (Moore, 2000) and are epitomised in the comment made by a dietitian, *'well of course, catering is an occupation and dietetics a profession'* (Donelan, 2000). Relationship conflict such as this could adversely affect the quality of feeding hospital patients. Dietetic staff find problems in reporting to both food service and ward managers (Riddiford *et al.*, 2000). Therefore in response to the increasing interest in food as an integral part of nutritional care, The British Dietetic Association has published a statement describing the dietetic interface with food service (The British Dietetic Association, 2002). Notwithstanding, caterers often see nurses as having a major responsibility for the distribution of food (McGlone *et al.*, 1996), endorsed by The United Kingdom Central Council for Nursing, (1997). Although nurses consider nutritional care to be important, many have difficulty in raising its priority above other nursing duties, as a result of time constraints and multi-tasking issues (Wood, 1998; Kowanko *et al.*, 1999). Ward staff, due to the pressure of work, have found it difficult to balance medical and meal requirements, meals often 'interfere' with the domestic medical routine and take second place (Edwards and Nash, 1999). Within the time constraint of drug rounds and other medical duties there is very little time to monitor food intake. It has been proposed and this will exacerbate the current problem that the core traditional role of the nurse, feeding and cleaning patients, will change as they extend their responsibilities towards more sophisticated minor surgery (Templeton, 2004).

There has been a blurring of roles concerning responsibility for nutrition, however ultimately, currently, it is the nurse who has accountability and interfaces between caterer and patient. It would seem that there is potential for operational tension unless roles are clearly defined and communicated. Where separate organizational cultures work in close proximity it is essential that there is successful collaboration (Hemmington and King, 2000), strategies and goals may be different but the process should be coherent.

A new initiative in some hospitals is the appointment of ward hostesses. The philosophy is to increase patient contact with food service personnel who have a service personality and therefore release nursing staff for clinical duties. The time spent by nursing staff in the preparation and serving of meals can equate to as much as 16% of total nursing time (Harris, 1967) or half an hour per patient. Benefits of the hostess programme have been identified as being; a reduction in plate wastage from 35% to 12%, increased provision

of hot meals for patients not on the ward at lunch time, the identification of malnourished patients, increased patient satisfaction and a reduction in complaints from relatives (Waite *et al*, 2000). There was also a subsequent reduction in the cost of sip feeds from £250/month to £60/month in the care of the older person ward. Other research has shown that the percentage of patients who thought that food service was rushed fell from 31.4% to 11.4% (NHS Estates, 2003a). The introduction of a ward hostess system in a NHS hospital in Wales found that patient complaints were reduced by 75% (Gledhill, 2000). Other hospitals have found benefit with the appointment of nutrition assistants (Davis, 2001). This role acts as a liaison between the dietetic department and the relevant clinical area. Nutrition is monitored on a daily basis at ward level and communication is significantly improved between the kitchen, the ward and the dietetic department.

Conversely, a study conducted with acutely ill older person patients found that focused nutritional care was not effective in preventing weight loss and correspondingly, there was a failure to show influence on other outcomes such as length of stay (Hickson *et al.*, 2002). There have also been communication issues between nurses and ward waitresses to the detriment of patient nutrition (Toraman *et al.*, 2002). It appears that more research is required in this area.

2.8 Nutrition Education of Medical Staff

With the expanding base of evidence highlighting the importance of patient nutrition, concern has now been raised regarding the awareness by medical staff. One of the reasons for undernutrition in hospitals could be that physicians fail to recognise the existence of the problem and consequently in many patients nutritional status deteriorates (Brooke and Coad, 2000). Alternatively, the nurse's lack of specialised nutritional knowledge could be a contributor to the problem (Perry, 1997; Kowanko *et al.*, 1999), they are at the forefront of care and can be instrumental in preventing the need for further treatment (Edwards, 1998).

Rollins *et al.*, (2001) used problem-based case studies to determine the level of knowledge and understanding of clinical nutrition amongst nursing staff. It was concluded that knowledge scores were satisfactory; however, poor performance in understanding scores demonstrated the inability of staff to solve nutritional problems.

In a study by Lough, *et al.*, (1999) out of twenty four nurses asked, 71% said they weighed patients on admission and that they all thought that nutrition was important for clinical outcomes. All the nurses received nutrition education at nursing school; however, 75% considered that it was inadequate for day-to-day nutrition care. The beneficial effects of good practice and the detrimental effects of poor practice on clinical outcomes should be documented and incorporated into evidence-based medicine (Corish and Kennedy, 2000).

In an audit of nutritional practice and knowledge in a NHS hospital to establish the level of nutritional awareness amongst medical staff, 7% recorded patient's height, 13% recorded weight on admission and 40% recorded weight at least once after admission. It was concluded that specialist medical wards, such as renal demonstrated the most satisfactory standard of nutritional care and although staff thought that nutritional information was being documented, observation proved this assumption to be wrong. The recommendation was therefore made that staff education should be implemented and the profile of nutrition raised in the day to day care of patients (Rawlinson, 1998). It is essential that all those involved in patient care understand the fundamental aspects of nutrition and are able to apply them when providing food for patients (Cortis, 1997; Touger-Decker, 2004).

One of the key issues identified in preventing malnutrition in hospitals is nutrition education within the curriculum of medical staff (Arrowsmith, 1997; Allison, 1999). Generally, medical staff recognise and accept the need for nutrition education and feel that training in nutrition would improve their work performance (Todorovic *et al.*, 2001). Historically, the emphasis in medical education has been placed on 'the importance of healthy eating' rather than on the problems of undernutrition (Tierney, 1996). Healthy eating policies may be advantageous in determining the foods offered to the overweight but are often inappropriate for feeding the sick or malnourished patient (Allison, 1999). As a first step in the development of national standards, a core curriculum on nutrition for health professionals was developed as part of the U.K. National Nutrition Task Force (Jackson, 2001) and the General Medical Council now requires all doctors to be minimally competent in nutrition (Jackson, 2003; Royal College of Physicians, 2002).

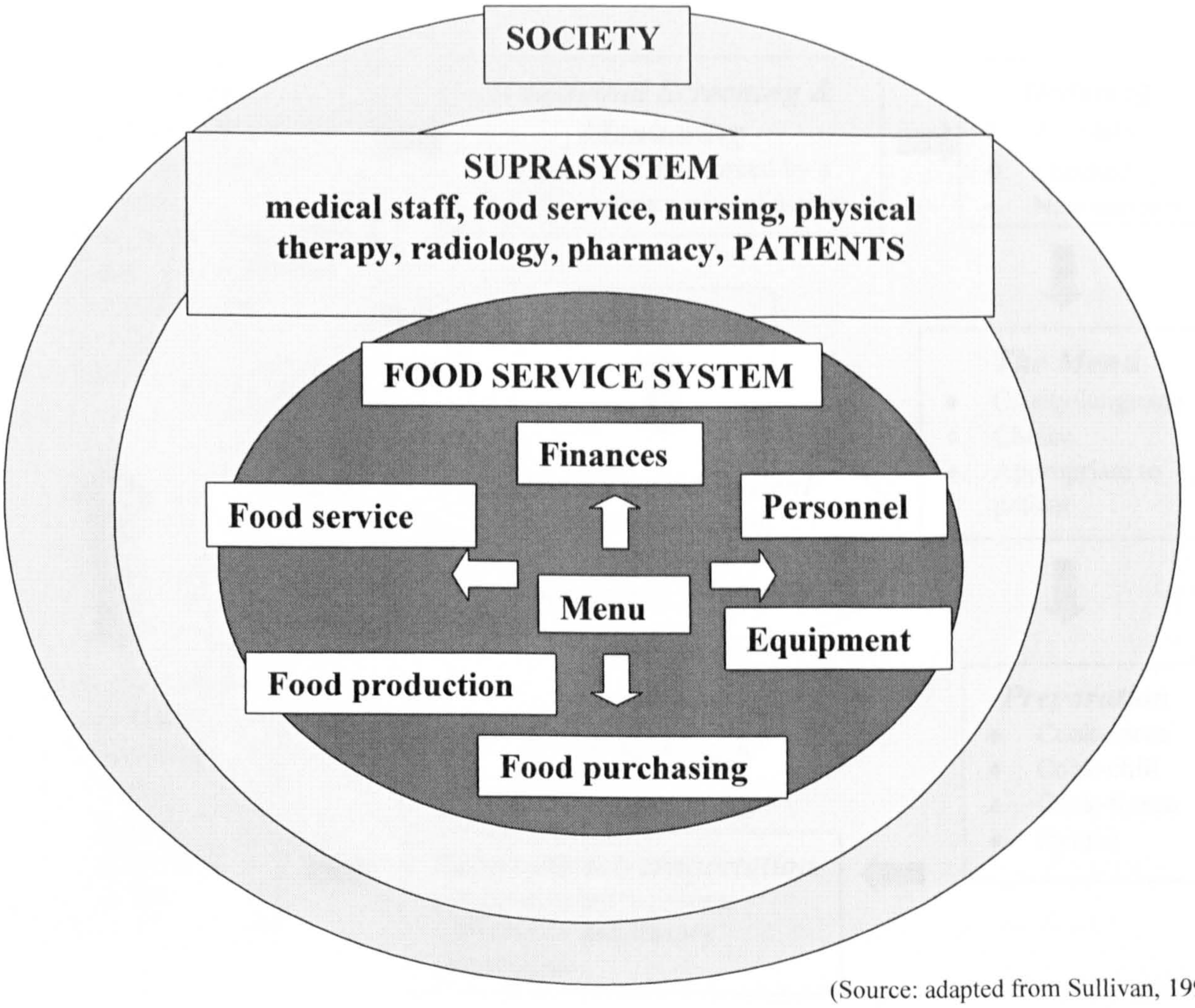
2.8.1 Nutrition Education of Food Service Personnel

There is no requirement for anyone involved in preparing food for public sale to either follow a course in catering or be aware of nutrition and dietary implications of the food that they serve. It is also possible to obtain a catering qualification with little or no nutrition education (Carlson and Kipps, 1988). This is in contradiction to the very stringent requirements of staff with regards to food safety legislation.

If nutrition is included in a catering course syllabus it is often taught as a theoretical subject and not integrated into applied practice (Poulter, 1990; Simpson, 1992). An initiative introduced by the Food Standards Agency, goes some way to address this anomaly (Food Standards Agency, 2001). Catering for Health, is a strategy to encourage chef lecturers and their students to be aware of the importance of food in the maintenance of health and includes guidelines for those working with vulnerable groups, such as in schools and hospitals. It has also been recommended that the education and training of hospital food service managers should differ from that of hotel management by emphasising and preparing staff to cater for the infirm (Council of Europe, 2003). Notwithstanding, it is ironic that non-clinical staff members, who have the closest contact with the patient in relation to food, are the ones who know least about nutrition (Beck *et al.*, 2001).

2.9 Hospital Food Service Systems

Any food service operation is a multi-disciplinary activity and includes the management of a range of issues including food service technology, food purchasing, meal distribution and facilities. These components could be described as subsystems, designed to operate within the system in an integrated manner. The menu is considered the hub of the system, with all activities dependent on the structure, process and outcome. The relationship between system and subsystem is shown in Figure 2.

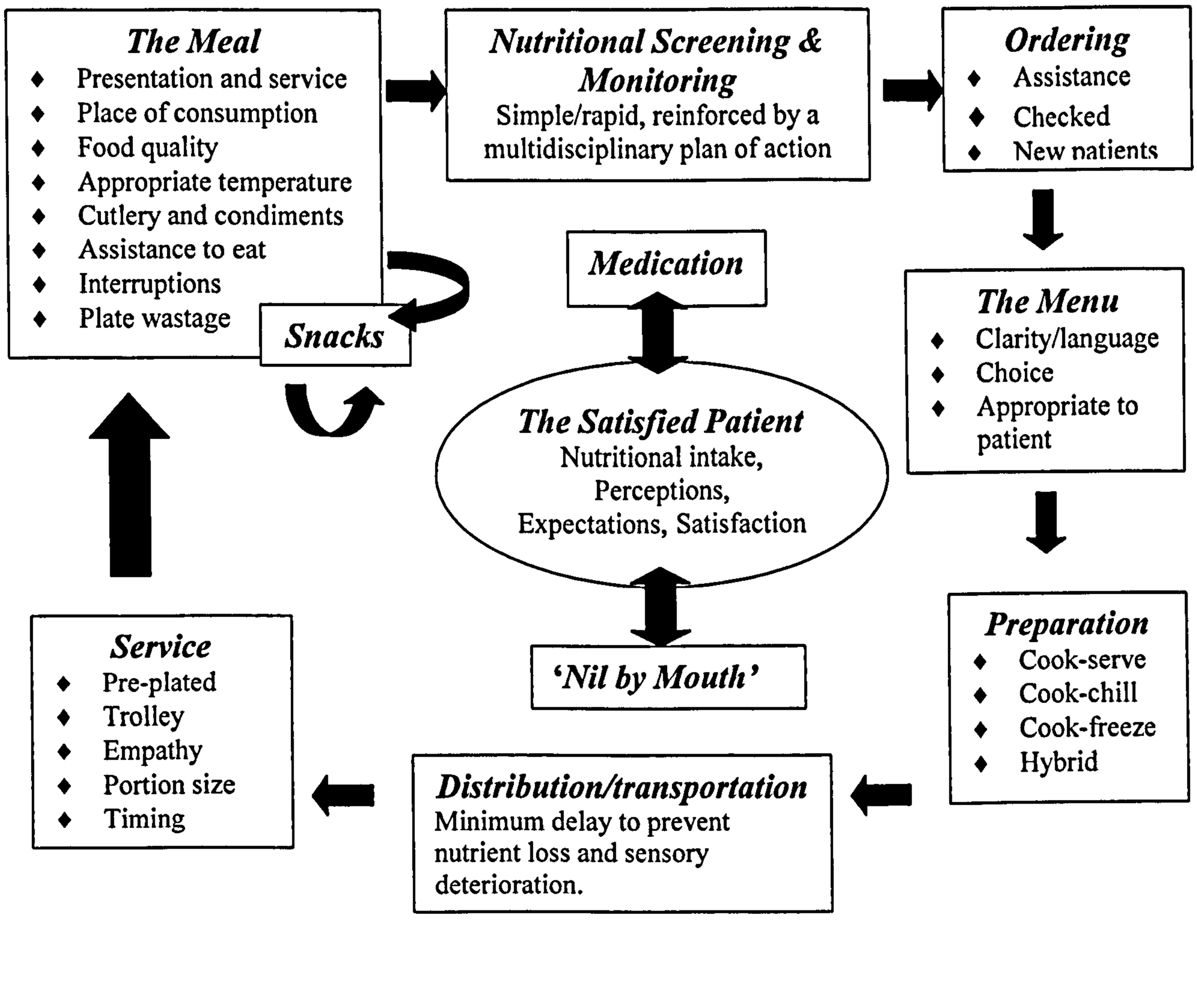


(Source: adapted from Sullivan, 1990)

Figure 2 Conceptual model of system-subsystem relationship in a hospital food service operation

In hospitals, the chain of food production to consumption is especially complex and needs the co-operation of all agencies involved particularly management at administration level. The uniqueness of this type of food service is that the primary objective is to provide direct, individualised, total nutritional care. Hospital food service can be described as an 'open system' in that it does not operate in isolation but is primarily social (Sullivan, 1990). A successful meal includes eating in a conducive setting, having choices, friendly staff, good information about meal options and the possibility to eat with relatives or other patients (Council of Europe, 2001).

A schematic representation of hospital food service is given in Figure 3.



(Source: adapted from Edwards *et al.*, 2000)

Figure 3 A schematic representation of hospital food service

Most NHS hospitals in the U.K. have contracted out their food service provision (Council of Europe, 2001). This has been done for a variety of reasons, including economic, and therefore the supply of food to patients is often the result of the most cost effective tender. Unfortunately, this competitive tendering has not achieved the results required, in that there have been no major cost savings and industrial relations have not been reformed (Kelliher, 1996). Conversely, staff morale was lowered. Conflict has arisen with dual lines of authority where the objectives and goals of caterers and nursing staff have not always aligned. Other potential areas of tension are in the diversity of personnel, who can range from the most highly skilled and educated to the unskilled and uneducated (Sullivan, 1990). Co-ordinating such a complex facility presents a challenge.

2.9.1 Food Production

There are four broad categories of catering system used within the NHS; cook-serve, cook-chill, sous vide and cook-freeze, although many use a hybrid combination.

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).

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).

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).

Hybrid Combination

In practice hospitals have tended not to adopt a single system and have chosen instead to use a hybrid combination. This involves taking aspects of the four systems above and using as appropriate to the situation in context.

2.9.2 Comparison of Systems

In all food service 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 and 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 large (Williams, 1996).

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 and serve, is the most popular system used in medical food service (Silverman *et al*, 2000) 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 catering 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.

2.9.3 Meal Distribution and Service

In hospitals, cooking losses that occur in any catering operation are compounded by the problems of meal distribution to many patients often in distant locations (Williams, 1996). Meal distribution is a crucial step in the food service chain. To maintain nutrient content, temperature and palatability, food should be distributed and served as quickly as possible (Allison, 1999). Maintaining the aesthetic appearance, palatability and nutritional content of food, which together may be said to constitute food quality, presents a substantial challenge to any institutional caterer (Dickerson, 1989; McGlone *et al.*, 1995). Meal service systems can be categorised into centrally plated such as the plated meal service and decentrally plated such as the bulk trolley system.

Plated meal service

In this system food is plated and 'trayed' in a central kitchen. A conveyor belt passes servers and food is served from service stations according to a pre-ordered menu choice. A diagrammatic representation of the process in the case study hospital is given in Figure 4.

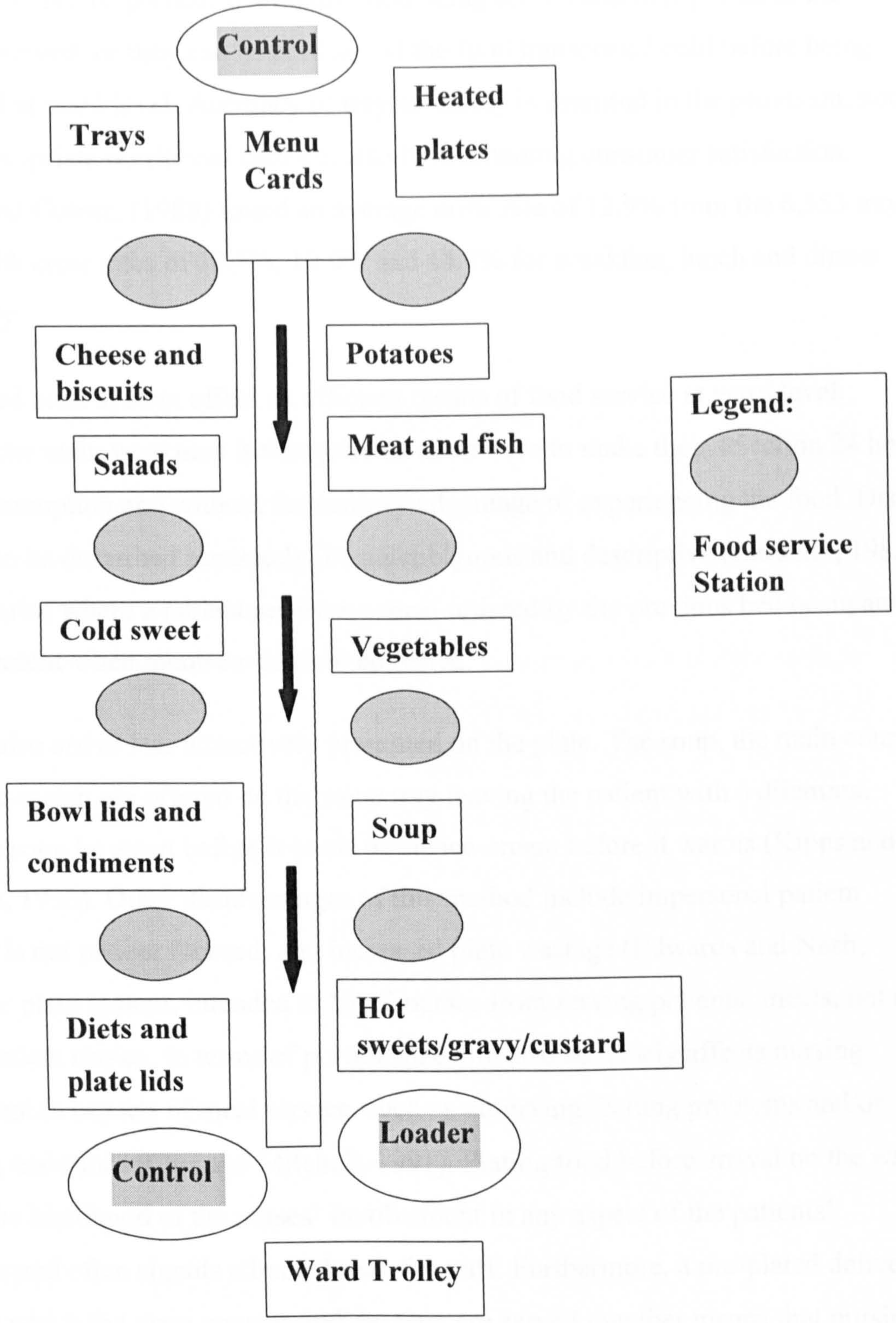


Figure 4 A diagrammatic representation of the plated meal system in the case study hospital

The through-put is approximately 8-10 trays per minute (Harris, 1967). Therefore each operative has less than 10 seconds to determine what is required, select the item from the dishes in front of them and place it on the patient's tray. This may lead to large variations in portion size and content unless rigorous control is exercised (Allison, 1999). Trays are then stacked into trolleys for delivery to the hospital wards. These

trolleys can either be preheated with hot food being served and transported to the ward where it is served; or they can be chilled and the food transported cold before being regenerated at ward level. Accuracy of tray assembly is essential in the provision, not only of appropriate nutritional care but also in maintaining consumer satisfaction. Dowling and Cotner, (1988) found an average error rate of 12.9% from the 6,553 trays studied, with error rates of 12.5%, 10.9% and 15.1% for breakfast, lunch and dinner respectively.

A pre-plated meal system offers an efficient means of food service at ward level. However, the main weakness is that patients often have to make their selection 24 hours before consumption and without the sensory advantage of experiencing the food. Dishes also need to be described accurately, be unambiguous and descriptive (Cardello, 1982). Problems arise where a patient receives a meal ordered by the previous bed occupant or was not present when menu cards were collected.

Food can also arrive less attractively presented on the plate. The soup, the main course and the ice-cream are offered on the same tray leaving the patient with a dilemma, should the soup be eaten before it cools or the ice-cream before it warms (Kipps and Middleton, 1990). Other disadvantages of this method include impersonal patient service, it is not patient focused, and increased plate wastage (Edwards and Nash, 1999). The plate system, intended to 'free' nurses from serving patients' meals, not only reduces patient choice, in terms of portion size, but also adversely affects nursing involvement in aspects of meal service, such as observing feeding problems and/or providing assistance (Carr and Mitchell, 1991). Plating food before arrival on the ward reduces the likelihood of the nurses' involvement in any aspect of the patients' mealtimes and often signals a lunch break for staff. Furthermore, a pre-plated delivery system in which the main courses and desserts are served together means that nursing staff do not need to return to patients to serve a second course.

Bulk trolley service

This is a more flexible operation where food is transported to the ward in bulk. Some trolleys have gantry lights above and the food can be attractively presented on a heated mobile counter. Meal selection may be made at the point of consumption and ward staff can be attentive to the various needs of their patients. This system helps to ensure that patient's expectations and perceptions are not disillusioned. The following scenario

could therefore be avoided where meals were returned uneaten after being presented to patients (Association of Community Health Councils, 1997);

Menu item ordered:	Chicken and potato
Expectation:	Tender slices of easily digestible chicken and potato
Perception:	Chicken leg in a tough skin and a jacketed potato with hard skin

2.9.4 Comparison of plated and bulk-trolley service systems

Hospital food service departments are continually developing and implementing programmes to enhance the patient meal experience. In America, a centralised, hot tray line is the normal system of meal delivery operated by 81% of hospital food service departments (Silverman *et al.*, 2000). In the U.K., however, a bulk trolley bedside service is the favoured meal distribution method (37%) and recommended by The British Association for Parenteral and Enteral Nutrition (BAPEN), as it allows the patient to select portion sizes according to appetite and needs (Allison, 1999). Other hospitals use either the plated service (35%) or a combination of the two (28%) (Audit Commission, 2001). However, although satisfaction is significantly improved with the trolley system, energy intake appears to remain the same (Folio *et al.*, 2002; Hartwell and Edwards, 2003; Lindgaard *et al.*, 2003).

Changing the food service systems may not necessarily lead to an improvement. Patient satisfaction was evaluated with four different meal distribution systems:

1. Traditional food service
2. Traditional nursing service of food
3. Non-traditional food service (hostess programme)
4. Non-traditional nursing service of food (patient-focus care)

Results from 19 hospitals show that changing meal distribution systems did not enhance the perceived meal experience of patients (Lambert *et al.*, 1996).

These findings are contradicted by Wilson *et al.*, (2000) who found energy, protein, fat and carbohydrate intakes were significantly higher with the trolley method of delivery, the main reason for the differences being a higher total food intake of the main course. These results are confirmed by a study of nursing home residents that also found net

mean increase in food intake however it was also noted that staff were serving larger portions with this method of service (Shatenstein and Ferland, 2000).

In another observational audit of the trolley food service system (Miller and O'Hara, 2000) it was recommended that patients requiring assistance should be fed immediately whilst the food is hot and appetising but to achieve this, food trolleys need to arrive on the wards at set times. In addition, a 'help desk' needs to be established within the catering department so that late orders or mealtime extras can be made and a strategy developed to record and monitor patient food intake.

There is no unanimous agreement among caterers as to whether bulk or plated systems are better. In a survey of 192 acute care hospital trusts, several thought bulk service could increase the quality of food, the inter-personal aspects of the food service and patients' satisfaction and some indicated their intention to change from a plated to a bulk system in the near future. The reasons cited included temperature control of meals and problems with the mass meal production method. Others alternatively felt that the plated meal service could ensure quality presentation and that it enables service to be kept to the highest standards (Hwang *et al.*, 1999).

A summary of the two systems is given in Table 4:

Table 4 **A summary of food distribution by plate and trolley food service systems**

FACTOR	PLATE SERVICE	TROLLEY SERVICE
Menu selection	Up to 24 hours before	Choice at the point of consumption
Portion control	Effective	Haphazard
Food service personnel	Catering staff/domestics	Nursing staff
Person to person interaction	Minimal	Communication is essential
Meal distribution on ward	Quick	Time consuming
Awareness of patient need	Easily overlooked	Observed
Sequence of courses	All arrive at the same time	Potential to be staggered
Size of helping	Less adaptable	Can be varied
Presentation	Variable	Attractive
Temperature of food	Poor	Better
Plate wastage	More plate waste	Less plate waste
Patient experience	Institutionalised	More like home
Patient Satisfaction	Adequate	Better satisfied

(Source: adapted from Dickerson and Booth, 1985)

Notwithstanding, whatever the mode of distribution, the ultimate goal of any hospital catering service is to provide food which is appropriate, palatable, of the correct temperature, attractive, nutritious and free from contamination (Barrie, 1996).

2.10 Food Wastage

Hospital food, school meals and other types of institutional catering share a reputation for predictable awfulness and high food wastage (Bender, 1984). The estimated annual cost of food wastage to the NHS is £155 million (Allison, 2003) and in one hospital with a plated meal service, the 40% food waste observed equated to £139,655 (Barton *et al.*, 2000). The hospital menu could potentially provide over 2000 kcal/day, however

due to the high waste, energy and protein intakes were less than 80% of the recommended intake.

Food wastage can vary between 17% and 67% depending on the service system and hospitals with high food waste are less likely to meet their patient nutritional requirements (Heffernan and Moloney, 2000; Edwards and Nash, 1999). Stephen *et al.* (1997), found in a ward for the older person that food intake did not meet recommended targets and there was a wastage rate of 40%. Reasons cited for this included unpalatable food, poor presentation and receiving food that was not ordered. It is not surprising, therefore, that patients lose weight whilst in hospital and that high wastage has serious nutritional and economical implications. Food waste can be seen as an inverse measure of consumer acceptability and hence a potential determinant of food quality (Hong and Kirk, 1995). Wastage that occurs through over-ordered meals, either using a plate or trolley system, could be described as a management/systems failure. However, wastage occurring from patients' plates could be regarded as an acceptability/consumption failure. Food waste in hospitals can be as much as 60-70g per person per meal compared to school and hotel kitchens where the figure is closer to 30-40g (Hong and Kirk, 1995). Not only is total plate wastage important, but the ratio of nutrients must also be considered. In one study 17.6% of the entrée (main course), 27.7% of the starch and 40.7% of the vegetables were wasted (Frakes *et al.*, 1986). Standards have been suggested for hospital food waste, however there is inconsistency in measurement and techniques used, therefore these differ (Edwards and Hartwell, 2003). In the U.K. it is 10% for plate waste and 12% unserved bulk trolley waste (Department of Health, 1996) and in Australia it is 20% of plated waste together with 5% of unserved bulk trolley waste (Meiselman, 2003).

Wilson *et al.*, (2000) found food wastage to be greater with the plated system although no account was taken of that left on the trolley. It has been well documented that the plate service generates more waste on the tray, but with the trolley service more is left on the trolley (Hackes *et al.*, 1997; Edwards and Nash, 1997).

Historically bulk-trolley food service has had a reputation for more total wastage than a plate served system (Steele and Delaney, 1983). Although, with good management potentially, choice at the point of consumption as in the trolley system, could reduce the total amount of food wasted (Kelly, 1999; Marson *et al.*, 2003). Training hospital staff to minimise wastage disappointingly shows no significant changes in the amount of

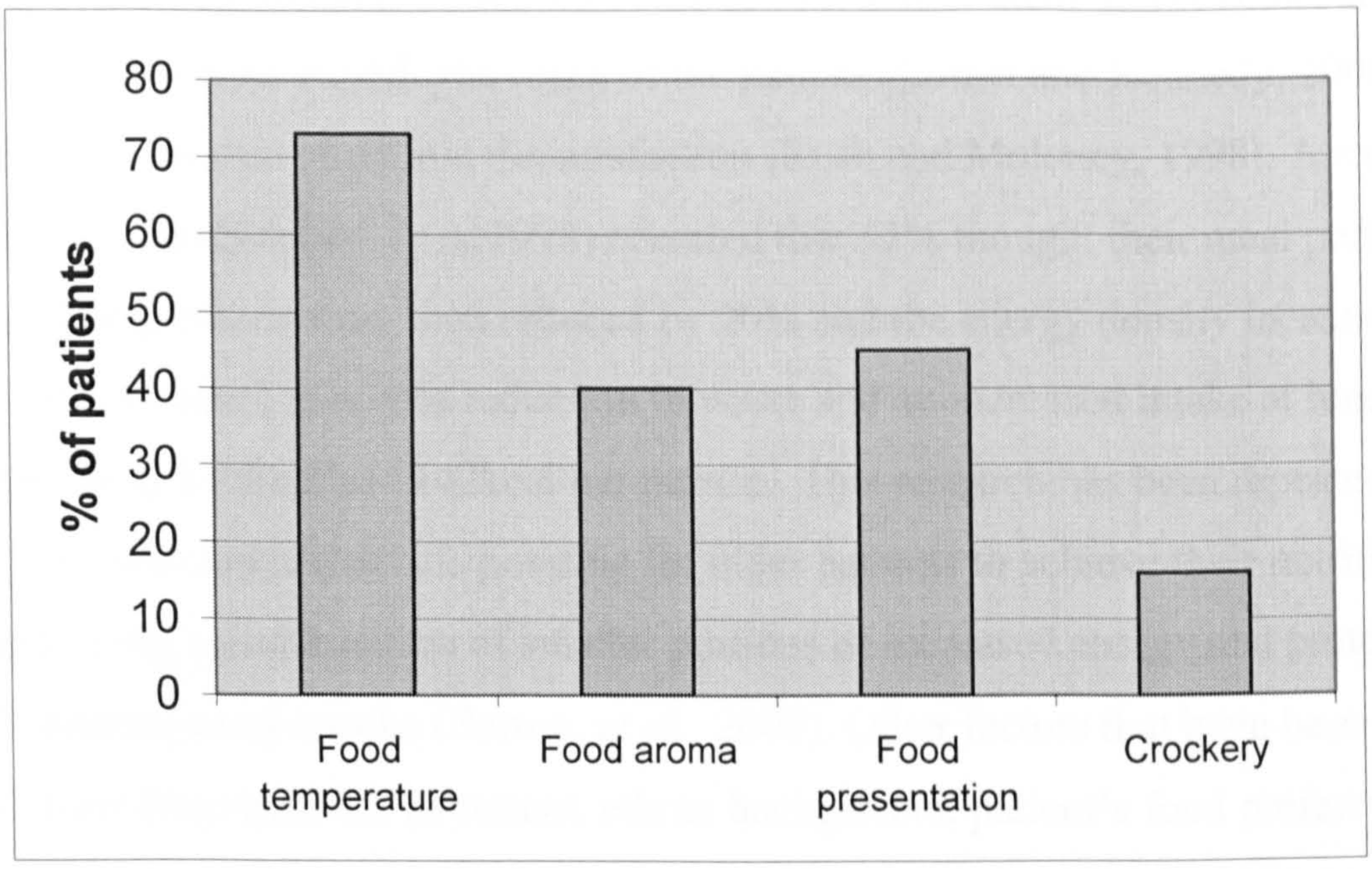
food ordered and wasted (Almdal *et al.*, 2003). Dedicated staff are required with a responsibility for food service. With the introduction of ward housekeepers it has been suggested that food waste could be reduced by as much as 8% (NHS Estates, 2003b).

An audit tool used in the NHS for estimating wastage is the 'Estates Return Information Collection' (ERIC) (NHS Estates, 2001). This is based on visual estimation and is designed as a routine check list. Unfortunately, however, the monitoring of waste has not been translated into wastage reduction and there needs to be a strategy for improvement.

2.11 Food Temperature

All food in the U.K. must comply with The Food Safety (Temperature Control) Regulations 1995 (Department of Health, 1995c). These regulations place stringent requirements on temperature control during receipt, storage, processing and distribution of food. High risk foods should be kept at 63^0C and above or 8^0C and below. Although this might be strictly adhered to within the kitchen environment, food in transit and as served to patients often falls below this requirement (Allison, 1999; Kelly, 1999).

Temperature of hot food is an area of patient dissatisfaction and a regular cause for complaint (O'Hara *et al*, 1997; Association of Community Health Councils, 1997; Rush and Moloney, 1998). Moreover, food temperature has been shown to be the most important aspect of catering to patients (Stanga *et al.*, 2003). Figure 5 illustrates the importance patients assign to each aspect of hospital food service.



(Source:Stanga *et al.*, 2003)

Figure 5 Aspects of catering most important to patients

In America, studies of a plated meal system revealed that approximately 28% of patients were dissatisfied with the temperature of hot food items and approximately 25% were dissatisfied with the temperature of cold food items (Gregoire, 1994). In the plated system although hot food items can be at an acceptable temperature while being plated, after transportation meals are not hot enough when actually served to patients. Hot food temperatures can range from 38.8^0C to 60.3^0C (Hartwell and Edwards, 2001). Although with a bulk trolley system food temperatures are slightly higher, most dishes registered a temperature of below 63^0C by the time service was completed.

Food that should be hot is sometimes cold and congealed by the time it is served and conversely cold food such as ice cream can have melted. Concern has been raised with the plate delivery of food service where cold desserts and salads are left in the kitchen for the duration of the belt run and temperatures can exceed the recommendations (Hartwell and Edwards, 2001). In hospitals the arrangements for food preparation, distribution and service should deliver safe food of defined standards in terms of nutritional quality, balance, palatability and temperature (Davis and Bristow, 1999).

2.12 Barriers to Complete Nutrition

One of the major causes of undernutrition in institutions is not the failure to provide food but to deliver it in a manner appropriate to the particular patient (Allison, 1999).

Meals can be unpalatable or served in a way that makes them inaccessible, either being wrapped or placed outside the reach of the patient (Corish and Kennedy, 2000). Portion size is also an area of patient dissatisfaction (Rush and Moloney, 1998). A study of older patients (Stephen, *et al.*1998) revealed that 42% thought their meal portions too large. The portions were then reduced by 20% and the energy density increased. These measures resulted in a 30% reduction in waste and an increased intake at lunch and supper from 845kcal to 1142kcal per person. This research has been repeated where it was also concluded that it is possible for older patients to achieve their nutritional targets using a combination of smaller portions of increased energy and protein density and between-meal snacks (Barton, *et al.,* 2000). Other factors that have been implicated are; stress from medical treatment, ethnic background, patient's food preferences, food/tray appearance, and food temperature (Hirsch *et al.*, 1979) inability to serve oneself, meal scheduling, unpleasant environment and poor health/appetite (Deutekom *et al.*, 1991).

An added barrier to food intake is the result of the anaesthetic reaction making patients feel nauseous further contributing to nutritional decline. The most commonly reported side effects of drug therapy include taste disturbance, nausea, vomiting and abdominal discomfort, all of which can influence food intake (White and Ashworth, 2000). Certain drugs may have an effect on the sense of taste which will take away the pleasure of eating and therefore the patient will eat less (Holmes, 1999). Poly pharmacy is common among the older age group and aggravates the problem of malnutrition (Hickson *et al.*, 2004).

In clinical practice, particularly during tube-feeding, drug-nutrient interactions may influence outcome. Notwithstanding, if a patient is fed orally, the likelihood of adverse reaction is much reduced (Lourenco, 2001).

Another potential problem is that often when a patient returns to the ward after investigation, no meal has been saved (due to lack of communication or lack of suitable facilities to store hot food) and there may be no other food available. While missing meals is sometimes unavoidable, inflexible hospital meal systems may mean that alternatives are not offered (Millar, 1998). Patients can miss between 11 and 27% of their meals due to the timing of clinical investigations, effects of illness or poor food quality (Eastwood, 1997; Holmes, 1998). The problem is exacerbated by the inability of nurses to provide an alternative. Due to space reallocation, many ward kitchens have

been taken out, therefore nurses are no longer able to prepare a quick 'snack' or provide 'something extra'. Additional food must be ordered from a central kitchen that can take some time to reach the ward.

Nutritional decline therefore may be accelerated by hospitalisation which may itself adversely affect eating behaviour (Holmes, 1999). Disease states will produce distortion in the patient's sense of taste and smell which will then affect perception of food and hence intake (Cardello, 1982).

There are many, often interdependent, factors contributing to this situation which are summarised in Table 5.

Table 5 Barriers to complete nutrition in hospitals

Barrier	Possible solution	Source
Ordering of food	Help may be required due to language, disability or illiteracy. Menus lacking in clarity. Patients' orders not checked	Allison, (1999)
Menu choice	Little account taken of patient preferences. Poor portion control	Rush and Moloney, (1998)
Poor presentation of food	Due to lengthy transportation	O'Hara *et al.*, (1997)
Disruption of mealtime	Ward rounds, investigations or medical procedures	Allison, (1999)
Nil by mouth	Extended unnecessarily	Hung, (1992)
Timing	Inflexible, lack of access to snacks	McGlone *et al.*, (1995)
Medication	Many drugs cause anorexia, nausea, vomiting or constipation therefore reducing food intake	White and Ashworth, (2000)
Assistance for those patients unable to eat	Nurses too busy	Corish and Kennedy, (2000)
Ward environment	Medical conditions of other patients, ambience, social facilitation	Cardello *et al.*, (1996)

(Source: adapted from Allison, 1999)

Other barriers include lack of involvement from hospital administration staff, a lack of clearly defined responsibilities in planning and managing nutritional care, a lack of

education about nutrition and lastly a lack of communication between service groups (Zinck, 2003).

2.13 Current Trends

The hospital food service environment is changing. In America, the dynamic role of dietitians is expanding into management of the food service operation (Chong *et al.*, 2000; Edwards, 2001). Moreover, food service directors expect to serve meals to fewer inpatients, employ fewer staff, have smaller budgets and generate more revenue (Wanstall *et al.*, 2000). There is going to be an increased emphasis on the catering department operating as a profit centre rather than as a cost centre (Santoro, 1999). Initiatives may include self-operated food kiosks and home meal replacement programmes for the hospital staff (Wanstall *et al.*, 2000). This trend has already commenced in the U.K., with hospital caterers offering their facilities as a party venue, or operating as a sandwich factory (Garner, 2004), and nursing staff in some hospitals allowed to buy meals for £1.00 left from the bulk trolley (Gledhill, 2000). Nottingham City Hospital has developed a commercial enterprise of a 50 bed hotel for visiting relatives of patients and convalescents who do not need a clinical bed (Garner, 2004).

Hospital food service in other countries is expanding its customer base outside the patient population, to the local community with street side entrances, a remodelling of space and the addition of brand names to menus (Lapp, 1997).

More hospitals in America and the U.K. are now outsourcing food service with the inevitable cost reduction and downsize in employees (Jackson, 2000a). This enables nursing staff to focus more on patient care. However, caution should be taken, and it is important that the complexity of any relationship is not underestimated (Hemmington and King, 2000).

Another initiative is to structure food service to the style of room service in a hotel (Anon, 1999; Malone, 2001). The programme allows patients to order anything including snacks from the menu anytime the kitchen is open providing their order meets dietary restrictions. Food service personnel have either hand held palm computers (Jackson, 2000b) or radio headsets like those used in fast food restaurants (Lavecchia, 1998). Food is delivered within 30-45 minutes of the order being placed and the hospitals report a 20% increase in patient satisfaction scores. Room service was ranked

higher because timeliness of meals, temperature of food, attractiveness of food tray, taste of food, quality of food and variety of menu choices was improved (Stein, 2000; McLymont *et al.*, 2003).

The cost of such a project will be recouped with annual savings through less food waste. The model being used is one where the meal 'follows' the patient rather than food served at a set time on a given ward.

With the move towards shorter hospital stays, any consideration of malnutrition will be transferred into the community. Expansion of nutritional support will, therefore, be crucial both pre and post hospitalisation with contact between hospital and the primary health care sector essential (Council of Europe, 2001; Kyle *et al.*, 2001). However, the emphasis should always be on 'normal' food as the feeding choice and not supplements. Research has shown that 54% of prescriptions for nutritional supplements within primary care were inappropriate (Wanstall *et al.*, 2000).

In Denmark, Sweden, Finland and Norway, recommendations regarding meal service in hospitals have been issued at a governmental level with the main emphasis being placed on the consumption of normal food. Conversely, France, Germany, Switzerland and the U.K. have guidelines which are followed but not always strictly adhered to. America has the most stringent control where nutrition is made part of the general requirements for the approval of hospitals (Council of Europe, 2001).

2.13.1 Better Hospital Food Project in the UK

The Better Hospital Food Project launched in response to publication of The NHS Plan (Department of Health, 2000) is primarily a food service initiative in the U.K. with the principle aim of improving food quality, rather than concentrating on any nutritional issue (Wilson, 2001). However, the expectation is that if food looks tastes and smells more desirable, then nutritional intake will automatically increase.

The public's perception of healthcare food service is typically less than favourable. A need to focus on the patient as the customer requires a fundamental change in NHS culture (Carr, 1992; Bolton, 2002). Notwithstanding, efforts are now being taken to improve the quality and availability and as a result the image of patient meals.

The rationale for this project stemmed from research highlighting dissatisfaction with hospital food (Garton, 2001a). Patients consistently reported complicated menus with poor descriptions and too long between the time food was ordered and delivered. There were also comments on the onerous complaints procedures and lack of assistance in feeding when needed. Lastly, patients felt that the size of portions, presentation and temperature of food were all areas of complaint (www.betterhospitalfood.com, 2001). The conclusion was reached that hospital food is of variable quality and is not provided in a way that is sufficiently responsive to patients' needs.

The NHS (www.betterhospitalfood.com , 2001) sees three main areas of work to achieve Better Hospital Food and these are:

- A standard menu throughout the country, therefore patients in, say, a town in central England will be guaranteed a similar quality of hospital meal as the patient in the south.

- A 24 hour catering service i.e. food on demand – to include snack boxes both for children and adults together with 'light-bites'(microwavable snacks)

- By 2004 a ward housekeeper on every ward 'to ensure that the quality, presentation and portion size of meals meets patient needs; that the patients, particularly older people, are able to eat the meals on offer; and that the service patients receive is genuinely available round-the clock'.

A Performance Assessment Framework and unannounced inspections will endeavour to evaluate if the food environment has reached the benchmark set. This remit has been given to the Patient Environment Action Team (PEAT). Not all targets have been met and now have been readjusted to 50% of hospitals to have a ward housekeeper by the end of 2004 with full implementation by 2006. Some hospitals have been slow to adopt menu recommendations too and only 40% were meeting the requirements in 2002 (www.betterhospitalfood.com).

Support for Trusts and Primary Care Trusts is given by advice from The Better Hospital Food web page (www.betterhospitalfood.com) , TASKcare listserve and training events such as workshops organised by NHS Estates.

The new NHS menu includes a number of dishes designed by celebrity chefs offering greater choice, more fresh food and more options for vegetarian diets (Garton, 2001b). Eating patterns have also been considered within the new regime and menu choice will reflect as far as possible the lifestyle followed by mainstream society. There have been changes in the eating habits of the general population with the majority now consuming a light breakfast and a main meal in the evening. The exception to this is the older age group who still prefer to eat their main meal in the middle of the day (www.betterhospitalfood.com, 2001). One of the advantages of the new system is flexibility and therefore differences in eating patterns can be accommodated. This is further endorsement of the new menu comprising a continental style breakfast, light lunch and a two-course dinner in the evening. The new initiative has been trialled and a small sample (n=40) of patients asked to comment on choice, timing, packaging and presentation, meal contents, food quality, ease of use and their overall impression. Seventy eight percent felt that the service was excellent or good with a consistency of response on all other items. However, a full evaluation is required before conclusions can be drawn.

There is much criticism that the Better Hospital Food project is too superficial and not tackling fundamental issues such as procurement, production methods and techniques (Afiya, 2001). Notwithstanding, the remit is widening to address such issues and good practice has been identified. Hopefully this will be communicated and disseminated to hospitals throughout the U.K.

2.14 Conclusions

The British Association for Parenteral and Enteral Nutrition (BAPEN) was created in 1992 in an attempt to *'improve the nutritional treatment of all sufferers from illness who have become or are likely to become malnourished'*.

Despite an increased awareness of the issue, there is little evidence of general improvement in U.K. practice, either in the provision and organisation of nutrition care or in the prevalence of malnutrition among patients. This scenario is reflected throughout Europe where few European hospitals have nutritional support teams and there is no clear assigned responsibility between nutritional care and meal service. The lack of status afforded to the whole area of food and nutrition in hospitals has been highlighted in the literature. Eating in company has been identified as a potential

solution together with the recruitment of dedicated food service staff. There is no consensus of opinion with regard to food service systems and food wastage has been highlighted as an area of concern. Many barriers to complete nutrition have been recognised however with increased awareness the future looks positive, particularly as there is now a Europe wide campaign to eradicate malnutrition in hospitals. Even so, the question still remains, how much greater improvement can occur with the food itself? The food, the consumer and the situation have never been considered as an entirety for an institutional environment. Perhaps the time has come, therefore, to take a more holistic approach and consider the barriers to complete nutrition from all perspectives and in particular from the criteria of patient satisfaction. Maybe hospital food service would benefit from changing to a more customer focused operation, prioritising the patient experience, rather than product focused. This will require a fundamental change in culture for the NHS.

CHAPTER THREE

CONSUMER SATISFACTION WITH HOSPITAL FOOD SERVICE

3.0 INTRODUCTION

The purpose of this chapter is to critically review the literature in consumer satisfaction within the hospitality industry, with particular emphasis on hospital food service. Patient satisfaction is a complex phenomenon that is influenced by many factors and an essential component in successful catering management in this environment. The public generally view hospitals as institutions and institutional catering has a reputation for being poor (Bender, 1984). Attitudes, expectations and perceptions of hospital food will be explored together with 'quality factors' both tangible and intangible. Paradigms of customer satisfaction will be presented together with models of service quality. The concept of the 'service encounter' will be introduced resulting in discussion of service design and blue printing. Lastly no research on food intake would be complete without discourse on food quality and preference.

3.1 Hospital Food and Consumer Attitude

Perceptions of hospital food service are evolved from the interaction between previous experiences of 'eating out' and the feeding context itself.

Food has a profound psychological role to play in society and is invariably chosen for non-nutritional reasons (Hartwell, 1983; Shepherd, 1999). There are many influences, which impinge on food intake such as availability, traditional habits, religious practices and social situation. In fact an equally important aspect of food service is the 'situation' (atmosphere, style of operation, time and staff attributes) (Meiselman, 1996). These aspects distinguish what would merely be a refuelling exercise and make food intake a 'meal occasion'. Food is an essential ingredient of patient life and breaks the monotony of what could be a long and uneventful day, therefore as most patients are confined within the boundaries of the ward, mealtimes can take on an inflated significance (Tomes and Chee Peng Ng, 1995).

Hospital food has suffered from a negative stereotype, and consumers, when asked their opinion of institutional food services will often reflect a negative attitude towards the quality and therefore acceptability of these foods (Cardello *et al.*, 1996). Attitude consists of three components, cognitive (beliefs and associations), affective (feelings and state of mind) and behavioural (actions) (Sanzo *et al.*, 2003). The negative image of hospital food is widespread and is therefore not necessarily related to exposure to the food itself (Cardello *et al.*, 1996). This was demonstrated by assessing the anticipated acceptability and the expected quality of twelve food items commonly served in institutional and other food service settings. Food prepared and served at home received the highest rating while responses to hospital food clustered at the lowest ratings along with airline foods (Cardello *et al.*, 1996). Food presentation, food variety and physical setting were the primary factors contributing to consumers' negative perception and attitude towards institutional food.

As 'eating out' increases, consumers are becoming more sophisticated and demanding, and their expectations of quality are high (Mintel, 2000). This is reflected in all areas of the industry including hospitals where the 'patient is king' (Bolton, 2002). Consumerism in public policy is gaining greater emphasis (Avis *et al.*, 1995) and where public sector service users are increasingly being referred to as 'customers'(Keaney, 1999).

It is unfortunate, therefore, that the media tend to massage and reiterate the less than positive image of hospital food not just with headlines but also cartoons and advertisements. An alternative view could, however, be that hospital food is indeed poor and that this information is accurately communicated by the media. Nevertheless there are important influences on the level of consumers' expectations, such as word of mouth, customers' past experiences and influences of external communication, which are not controlled by the service provider (Desombre and Eccles, 1998).

It has been shown that the greatest differences in attitudes toward hospital food are found not among patients of varying characteristics but among the patients residing in hospitals of varying characteristics (Cardello, 1982). The size of the hospital, physical lay out, location, staffing and food service system are all factors that will influence stay.

3.1.2 Branding

An initiative to improve the perception of hospital food could be to devise a strategy incorporating brand orientation. Previous global evaluations the consumer has made of a product influence posterior evaluations, a brand is known and respected thereby influencing evaluation (Sanzo *et al.,* 1999).

In a study conducted on institutionalised stereotyping (Cardello *et al.*, 1996), individuals were asked to rate their anticipated acceptability of two samples of sweetcorn. The actual food samples were identical but one was indicated as branded and the other from an institution. The samples were then tasted and rated again. The unbranded sample was rated lower for both the anticipated and actual acceptability, reflecting preference for branded products. Hence product branding is often used as a sign of quality (Vranešević and Stančec, 2003).

3.2 The Role of Food – a feeding episode or 'meal occasion'

Hospitalisation can be traumatic and therefore personal interaction is important as opposed to simply having a meal 'dropped off' (Lavecchia, 1998). Positive attitudes expressed by staff can influence intake and significantly add or detract from a patient's mealtime experience (Engell, 1996). Other people can control an individual's behaviour in different ways; by their presence, by attention paid to the individual and his activities, through model effects and through persuasive action or communication (Rozin and Tuorila, 1993). Bélanger and Dubé (1996) found that patients perceive and benefit from the emotional support that they receive from staff. Moreover they transfer this 'added value' to their satisfaction judgements.

Protected mealtimes, allowing patients time free from medical interruptions to enjoy their food will also enhance the mealtime occasion (Wilson, 2002; Deutekom *et al.*, 1991). One of the recommendations in the Council of Europe Resolution (2003) is for patients to be permitted to enjoy their meals without unnecessary interruption, therapeutic intervention and diagnostic examination (Wilson, 2004). This is fully endorsed by the Health Caterers Association and The Better Hospital Food project, as it also grants an opportunity for staff to focus priorities on nutrition for two hours a day.

There is also the question of nurture and the debate regarding institutional meals and neglect. Hospital food is prepared by people who have no direct relationship with those

who are served (de Raeve, 1994). There can be no mindfulness, beyond technical information, of the particular needs and preferences of those for whom the meal is cooked. Conversation between patients may be desultory and no shared experience, apart from illness may emerge. On the ward, the trays could still be damp from cleaning and the plates unattractive. Dependent people, as patients' are, can be sensitive to any experience of neglect (de Raeve, 1994) and therefore the concept of nurture is important. Preparing a patient for the meal is crucial, physical problems such as the food being out of reach can often be resolved by correct positioning and thinking ahead (Hotaling, 1990).

Patients have also intimated that they would like to see changes in the ward environment (Department of Health, 2000). The clear priority identified is to have a better care situation, including factors such as:

1. A safe welcoming, healing environment where privacy and dignity is respected
2. High standards of hygiene and cleanliness in the wards and good food
3. To feel that hospital staff are attentive to needs
4. An easily identifiable person on the ward who can be approached for information and who is clinically competent and responsible for overseeing day-to-day care.

Nourishment or empathy may be offered in different ways; however, the importance of nurses' company at mealtimes has been identified (Littlewood and Saeidi, 1994). Mealtimes could be made social events by having nurses eat with their patients (Wykes, 1997) although it has been acknowledged that this would not translate to all clinical situations.

The timing of meals is as equally important as food quality and patients feel more relaxed when meals are served as close to the habitual time as possible (McGlone *et al.*, 1995; Cortis, 1997). A short gap between breakfast and a large lunch has been shown to have implications from a food wastage perspective (Edwards *et al.*, 2000). Patients would prefer their meals slightly later (Royal Commission on the National Health Service, 1978; Fairtlough and Closs, 1996). Observation within this research would suggest that mealtimes are imposed to facilitate the hospital regime rather than the satisfaction of the patients. The Council of Europe Resolution (2003) recommends that meal times should be spread out to cover most of the hours spent awake.

3.3 Consumer Satisfaction

Satisfaction is not a universal phenomenon and patients will derive differing amounts of pleasure from the same hospitality experience. Consumer satisfaction is in the customer's mind and may or may not conform to the reality of the situation. It may be viewed as both a dependable variable, representing the outcome of a patients' interaction with the food service system and a predictor variable predictive of food consumption and therefore health outcome (Schwartz, 1988; Cardello *et al.*, 2000).

Various elements comprise customer satisfaction: technical and functional quality (Grönroos, 1984); performance-delivery quality (Parasuraman *et al.*, 1991); product, behaviour and environmental factors (Philip and Hazlett, 1997); direct (essential) and indirect (subsidiary) factors (Davis and Stone, 1991). Attributes which have been found to correlate positively with satisfaction in a health care setting are access, communication, outcomes, quality and age (Tucker, 2002).

There are two main theories from consumer behaviour research which are used to investigate consumer satisfaction. The disconfirmation theory (Jones and Ioannou, 1993), suggests that consumers develop feelings of satisfaction/dissatisfaction based on levels of expectations, attitudes and intentions towards as yet untried products or services '*matched against their actual experience post-purchase*'. Therefore disconfirmation occurs when there is a discrepancy between expectations and performance. The second theory arising from (Cadotte *et al.*, 1987) is referred to as expectancy-value theory, where emphasis is placed on the weighting difference between product attributes and consumer satisfaction i.e. the customer has different perceptions and their choice/satisfaction is dependent on which attribute is most valued. In conjunctive models, consumers establish a minimum acceptable level for each important product attribute and then become satisfied and in disjunctive models a minimum level is set on only one or few attributes (Pizam and Ellis, 1999).

Positive disconfirmation (satisfaction), occurs when product/service performance is better than expected, while negative disconfirmation (dissatisfaction) occurs when product/service is less than expected (Chu, 2002). Although the relationship is not necessarily linear (Pizam and Ellis, 1999).

The disconfirmation paradigm is presented in Figure 6.

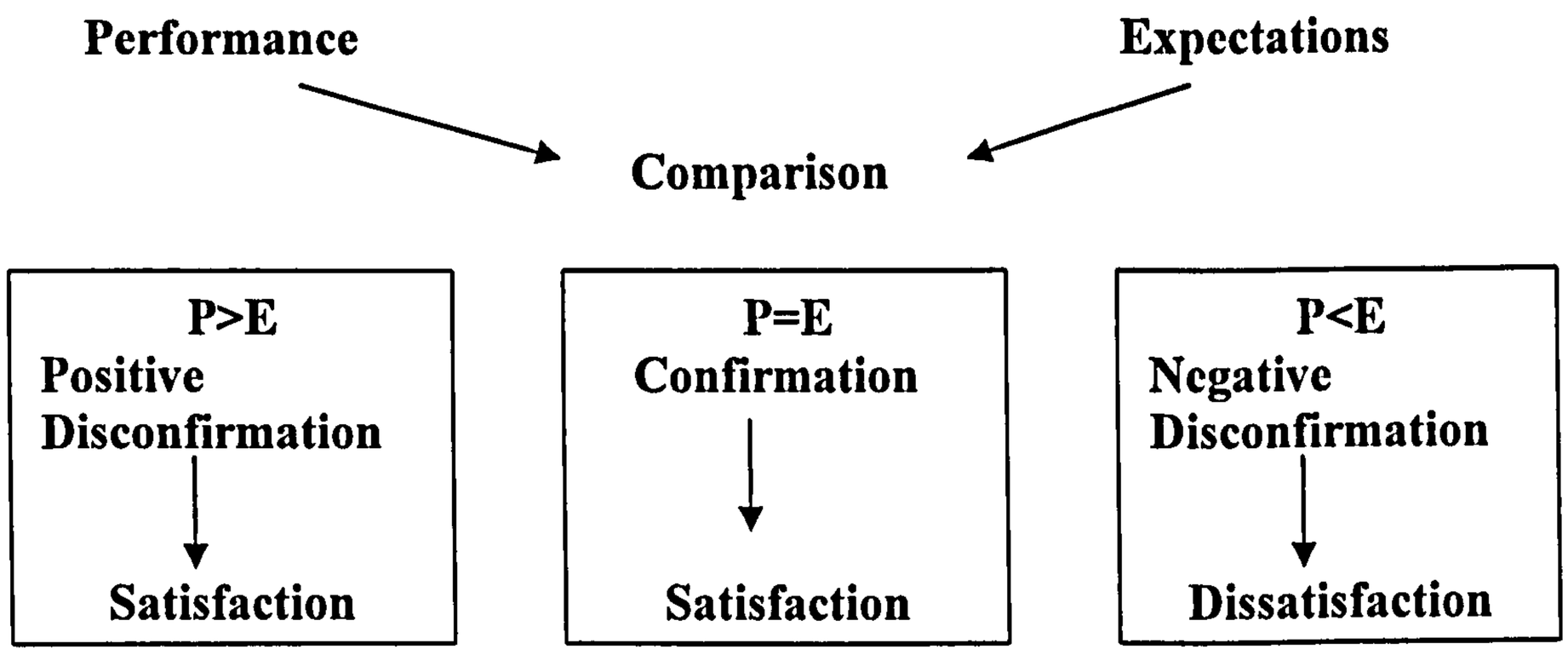


Figure 6 Disconfirmation paradigm

Several psychological theories (Conway and Willcocks, 1997) including expectancy-disconfirmation (Oliver, 1980) have been identified in determining the effects of disconfirmed expectations on perceived product performance and consumer satisfaction:-

1. *Assimilation or cognitive dissonance theory:* proposes that any discrepancy between expectation and performance will be minimised or assimilated by the consumer adjusting perceptions of the product to be more consistent with expectations. In other words, perceived satisfaction can be high despite expectations being disconfirmed.

2. *Contrast theory:* when expectations are not matched by actual performance, the contrast between expectation and outcome will prompt the consumer to exaggerate or magnify the disparity.

3. *Generalised negativity theory:* here any discrepancy between expectations and reality results in a generalised negative hedonic state, causing the product to receive a less favourable rating than if it had coincided with expectations.

4. *Assimilation contrast:* this is a combination of the assimilation and contrast theories. The degree of discrepancy between expectation and experience can have an influence on the degree of perceived satisfaction. A small discrepancy tends to lead to an assimilation effect whereas a large discrepancy tends to lead to the contrast effect.

5. *Adaptation theory:* this theory indicates that satisfaction is influenced by many other factors as well as expectations and that understanding the initial expectation is the key to predicting the likely level of satisfaction.

A summary of the predicted effects on perceived product performance are presented in Table 6.

Table 6 Summary of the predicted effects of disconfirmed consumer expectations on the direction of increase/decrease in perceived product performance.

	Product Performance versus Expectation	
Model	Product better than expected (Positive Disconfirmation)	Product worse than expected (Negative Disconfirmation)
Assimilation	Decrease	Increase
Contrast	Increase	Decrease
Generalized negativity	Decrease	Decrease
Assimilation-Contrast	Decrease (under low disconfirmation) or Increase (under high disconfirmation)	Increase (under low disconfirmation) or Decrease (under high disconfirmation)

(Source: adapted from Cardello, 1995a)

Most recent studies of sensory acceptance favour an 'assimilation' model, whereby consumer judgements tend to shift toward the direction of prior expectations, minimising the apparent discrepancy between what was expected and what was experienced (Mela, 1999). The assimilation model predicts that low expectations of hospital food service will influence the actual acceptance of the food down, regardless of its intrinsic quality, alternatively if expectations can be elevated, acceptance should increase.

Expectations and perceptions can be volatile (Pizam and Ellis, 1999). If performance is significantly below or above expected levels, the consumer may realign expectations. Moreover, expectation levels may rise with constant satisfaction or alternatively, fall with consistent dissatisfaction.

Notwithstanding, although customer satisfaction has been defined in various ways, the underlying conceptualisation is that satisfaction is a factor of both pre and post-experience evaluative judgements, leading to an overall feeling about a specific encounter (Parker and Mathews, 2001). The expectancy-disconfirmation theory has received the widest acceptance because of the broadly applicable hypothesis (Kivela *et al.*, 1999); most other theories have been applied within this framework.

There is debate on the issue of conceptual distinction between satisfaction and perceived quality; both are subjective evaluations of a service experience (Orsingher and Marzocchi, 2003). Even so, quality and customer satisfaction are not identical concepts, they can be differentiated by considering the provider's service system and the customer's service experience. By looking at satisfaction as a process, the definition concentrates on the antecedents to satisfaction rather than satisfaction itself as an outcome (Parker and Mathews, 2001). It is a function of an initial standard and some perceived discrepancy from that reference point. Satisfaction is experiential and linked to emotional feelings while perceived quality is mainly the result of a cognitive process (Orsingher and Marzocchi, 2003; Chu, 2002). Confirmation or disconfirmation leads to an emotional reaction, referred to as 'arousal' (Pine and Gilmore, 1999). That is, if a product or service appears to be performing above or below expectations, the consumer experiences an emotional reaction of significance. This arousal is then followed by a final assessment of satisfaction or dissatisfaction. In fact the predictive power of emotional experience associated with consumption can override the effect of cognitive components in satisfaction judgements (Bélanger. and Dubé, 1996). Possible emotion-induced changes of eating have been demonstrated by differential effects of anger, fear, sadness and joy (Macht and Simons, 2000). Negative emotions, particularly anger (Casado Díaz and Más Ruíz, 2002) appear to have a stronger effect than positive emotions (Liljander and Strandvik, 1997; Dubé and Menon, 2000).

Perceived control over a situation also influences satisfaction (Bélanger and Dubé, 1996). It is predicted that where patients have increased involvement with the process of food service, satisfaction would be increased. For patients, food service, to a certain extent, provides one of the few hospital experiences that they can control. Patient empowerment has been identified as a tool in the provision of a quality service and is advocated in a number of professional guidelines (Faulkner, 2001). It is argued that patients far from being a passive consumer of pre-packed healthcare ought to be

considered as partners in a continuing process of inquiry, the newly empowered consumer-patient. Total Quality Management (TQM) which proclaims that everyone is everyone's customer has helped to refocus organisational attitudes (Keaney, 1999). One way to increase perceived control is to give as much responsibility as possible to every patient in making choices, i.e. choosing a menu compatible with their food preferences. With participation, consumers themselves can ensure their own satisfaction (Bitner *et al.*, 1997).

The hospitality product does not just comprise 'goods' and 'services' but is an amalgam and other components are present that could be described as 'quality factors'. It could be argued that satisfaction really comes from the peripherals that surround the core service (Pine and Gilmore, 1999). Herzberg (Herzberg, 1959) separates motivational factors into two areas, those that create true satisfaction and those 'hygiene' or 'maintenance' factors whose absence will create dissatisfaction, but whose presence will not, in themselves create satisfaction. Application of Herzberg's theory has been extended and attributes have been classified into four categories: satisfiers, dissatisfiers, critical and neutral (Cadotte and Turgeon, 1988; Lockwood, 1994). Critical attributes are capable of eliciting both complaints (dissatisfaction) and compliments (satisfaction). Neutral attributes neither receive compliments or complaints. However, the classification of factors is not permanent and can constantly change.

The quality significance of the whole meal experience has been recognised (Jones and Ioannou, 1983; Hill, 2000) and can be broken down into the following:

- Food and Beverage: originality of menu, variety, style of service, match between consumption and eye expectation.

- Service attributes of staff: number on duty, attentive, clean, smart, friendly, courteous, helpful, efficient and attentive to detail.

- Physical attributes of eating area: space, comfort, noise, lighting, temperature, crockery, menu cards, furnishings and colour

However, while food and environment play an important role during the stay, they soon fade from the patients' minds on leaving hospital. Complaints by patients actually in hospital relate to tangible aspects whereas letters of complaint received after discharge relate almost exclusively to the intangible aspects of care (Tomes and Chee Peng Ng,

1995). However, it has been suggested that the process of complaint in itself is a tool for increased consumer satisfaction (Nyer, 2000).

A reservation regarding patient satisfaction surveys is the reluctance of many patients in the NHS to express critical comments, with typically at least 80% of respondents expressing satisfaction for any given question (Fitzpatrick, 1991; Avis *et al.*, 1995).

Notwithstanding, patient satisfaction with food service has been found to significantly depend on, in decreasing order (Dubé *et al.*, 1994),

- Satisfaction with food quality (flavour, presentation, freshness and temperature of hot meals)
- Customisation (possibility to choose meals, portion size, flexibility of service)
- Attitude of the staff who deliver menus (warmth, attentiveness and courtesy)
- Meal service timeliness (time allowed for eating)
- Meal service reliability (punctuality of food service)

It has been suggested that the length of hospitalisation may be a factor in analysing satisfaction, the longer the length of stay the more important becomes the dimension of food quality compared to service quality (Bolch, 1999). However, a significant positive correlation between duration of hospital stay and decline in satisfaction with meals has been noted (Stanga *et al.*, 2003).

3.4 Service Quality and Consumer Satisfaction

Health care is a service industry, and patients are becoming more discriminating and critical about service quality (DeLuco and Cremer, 1990; Lim and Tang, 2000). However, service quality encompasses the whole of the customer's experience and therefore it is more difficult to measure than product quality.

Quality can be defined in terms of '*the totality of features and characteristics of a product or service that bear on its ability to satisfy a given need*' (BS 4778). This however, does not describe the entirety of the concept, quality should be defined in terms of consumer expectations, which makes a definition problematic (Johns, 1992a). Individual customer demands destandardise the product and at the same time multiply the variety of expectations.

Expectations are an important influence on patients' overall measurement of satisfaction with food service (Conway and Willcocks, 1997) and can significantly influence subsequent judgements in actual tasting or eating (Mela, 1999). Service quality can be defined as conforming to customer expectations on a consistent basis (Gregoire, 1994).

SERVQUAL (measurement of service quality) is a similar paradigm to the expectancy-disconfirmation theory of 'perceptual gap analysis' (Parasuraman *et al.*, 1985). This measures customer expectation versus perception, prior and subsequent to an encounter with any service.

Five generic dimensions of service quality (SERVQUAL) have been identified and must be present in the service delivery for the result to be customer satisfaction (Parasuraman *et al.*, 1991). These are:

Reliability – the ability to perform the promised services dependably and accurately

Responsiveness – the willingness to help customers and provide a prompt service

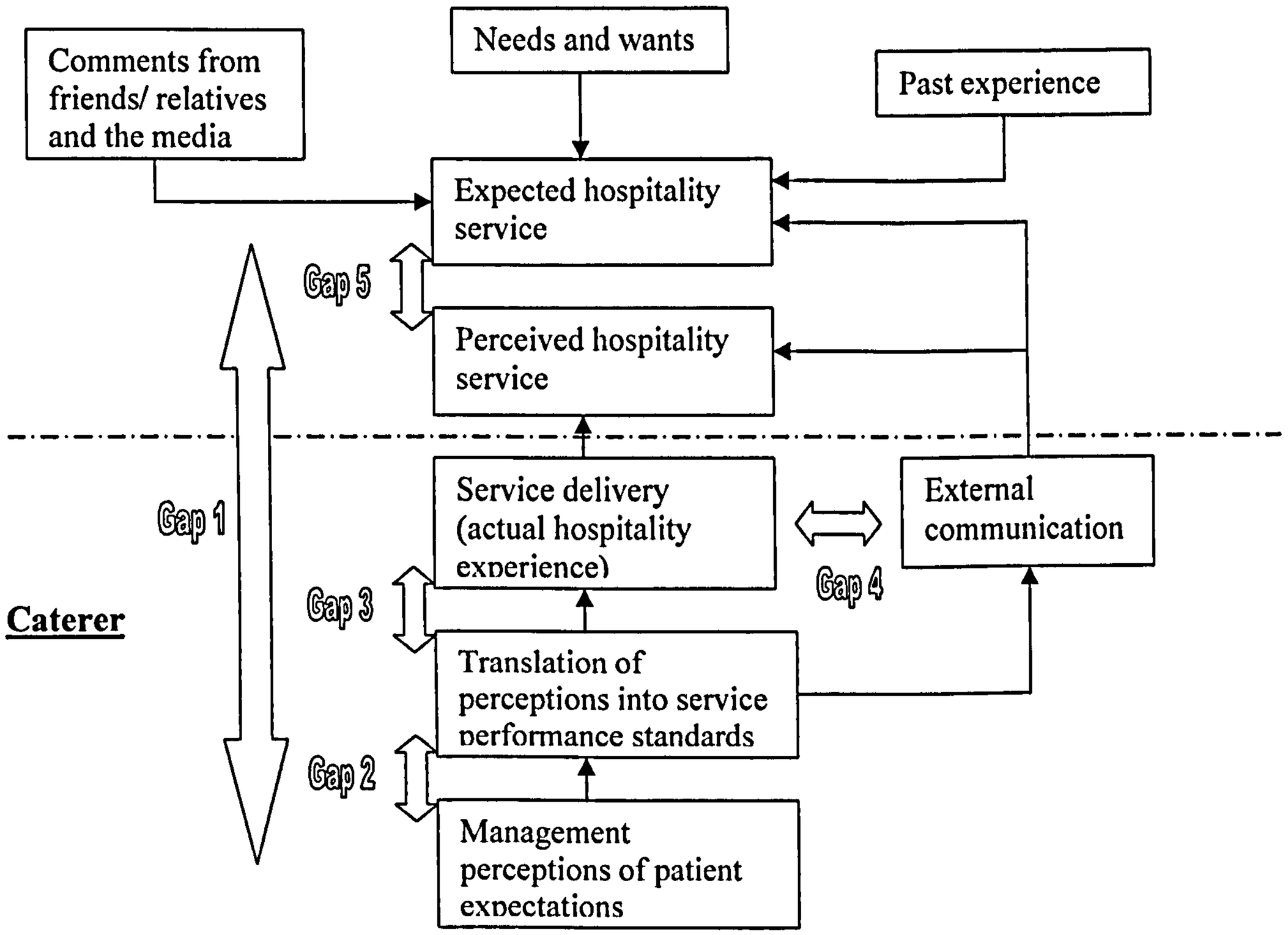
Assurance – the knowledge and courtesy of employees as well as their ability to convey trust and confidence

Empathy – the provision of caring, individualised attention to customers

Tangibles – the appearance of physical facilities, equipment, personnel and communication materials

Expectation of reliability is considered the most important as it is central in meeting expectations, whereas the other dimensions are important for exceeding customer expectations (Conway and Willcocks, 1997).

The SERVQUAL model conceptualises service quality as a gap between consumer's expectations and the perception of the service providers' performance. This is represented in Figure 7.



(Source: Pizam and Ellis, 1999 based on Zeithaml, Berry and Parasuraman, 1988)

Figure 7 Hospitality 'Service Quality' gap

- Gap 1 – The Service Quality Gap: the difference between customer's expectations of a service and their perceptions of the actual service delivered by an organisation.

- Gap 2 – The Understanding Gap: manager's perceptions of customer's expectations are inaccurate and not translated into appropriate operating procedures/systems.

- Gap 3 – The Behavioural Gap: the service that is delivered is different from the specification for that service.

- Gap 4 – The Promotional Gap: what is said about the service differs from the standards actually delivered.

- Gap 5 – The Perception Gap: the level of service perceived by customers differs from the service actually provided.

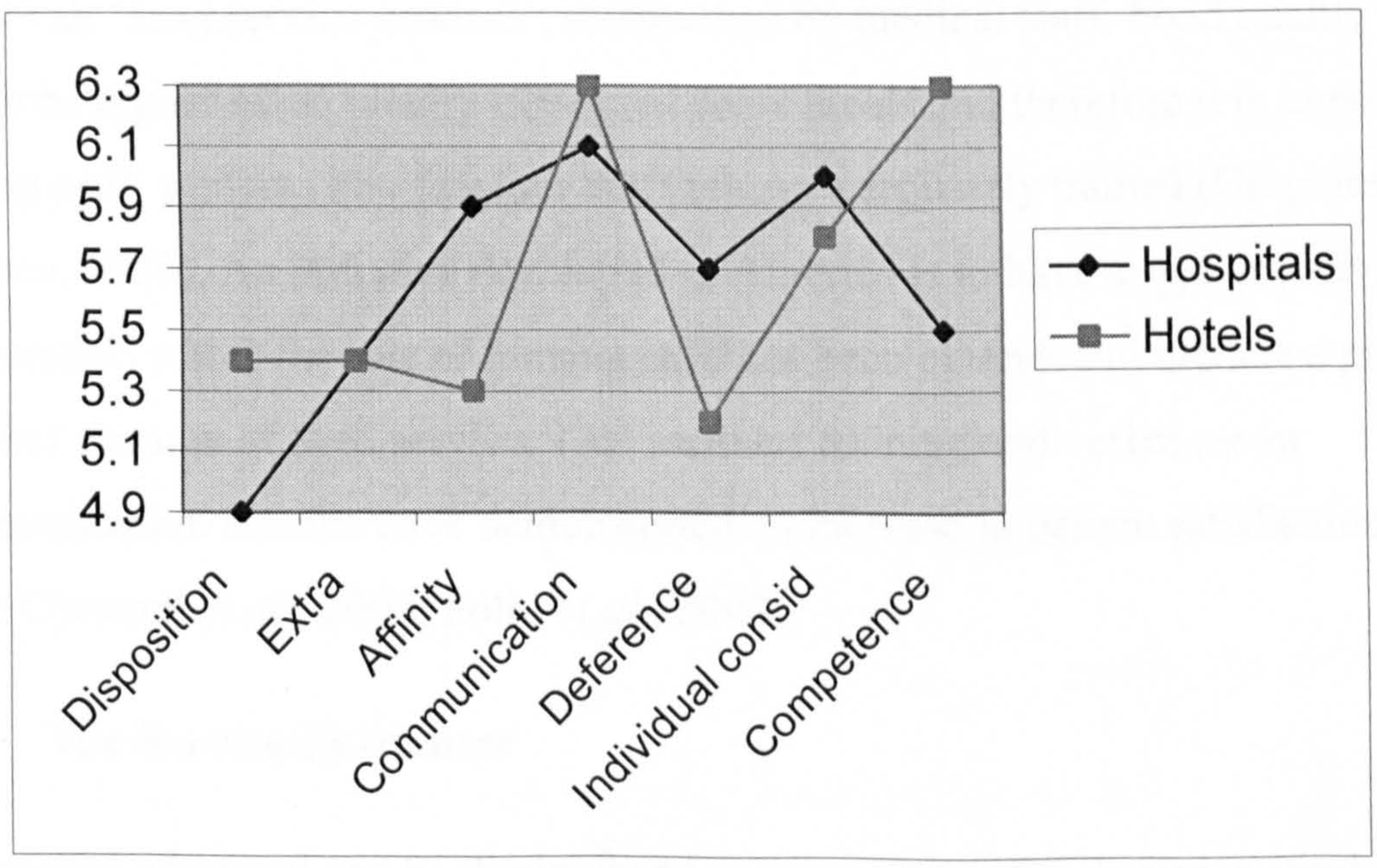
The model is built on the assumption that the smaller the gap, the better the quality of service provided. Even so, it has been suggested that expectations are bound by adequate and desired levels, with a zone of tolerance in between (Parasuraman, 1991). A weakness of this model however, is that there is no factor for 'experience'. Expectations of service quality may be meaningless for respondents who are first time users of a service (O'Neill and Palmer, 2003). SERVQUAL has been subjected to a number of theoretical and operational criticisms (Cronin and Taylor, 1994; Buttle, 1996; Philip and Hazlett, 1997) however; the model is generic and can be 'flexed' to make an effective planning tool.

Tomes and Chee Peng Ng, (1995) developed SERVQUAL and identified eight dimensions, six relating to intangible and two covering tangible aspects of hospital care. These were empathy/understanding, relationship between patients and health care staff, communications, reliability, courtesy, dignity, food and physical environment. Interviews with patients revealed that the physical environment and food was important. The primary reason was that a hospital stay can be a rather boring experience and except for the relatively short periods of time when the patient is attended to by staff the patient is left wondering how to pass the rest of the day. The only thing the patient can look forward to are meals which break the routine monotony, hence food becomes an important factor. It has been suggested that these aspects may have a strong placebo effect on the entire patient experience. For example, an anxious patient awaiting surgery may think 'if this organisation cannot manage to provide clean cutlery and a hot meal, what are my chances in the operating theatre?' (Speedling *et al.,* 1983).

Some researchers have taken a more direct approach to the measurement of service quality and have not sought to distinguish between expectation and perception but to rate the performance of service providers (Cronin and Taylor, 1994). Under the SERVPERF (service performance) model, only the post-consumption perceptions of performance are considered. Therefore the totality of service quality is assessed and its ultimate effect on consumer's perceptions (Douglas and Connor, 2003); the customer is the final arbiter of quality.

3.4.1 Food Service Staff

Staff interpersonal skills have been shown to be an important dimension of patient satisfaction with nutrition services (Ferguson *et al.*, 2001). In commercial operations such as hotels and restaurants, which offer a demand-led service, it is reasonable to assume that providers are predisposed toward providing a service. However, in service organisations supplying a range of services that are mainly necessity-led, this assumption may not be correct (Lee-Ross, 1999). The effective delivery of hospitality based service in hospitals requires server predispositions which are different from those for clinical/nursing provision although in both industries, customer satisfaction is reliant on interaction with the service provider (Winsted, 2000). Even so, motivation towards providing a good service does not differ between food service and nursing staff (Gregoire, 1995), they are equally predisposed towards service provision (Lee-Ross, 1999). Significant differences however, have been observed for certain dimensions. For example, nurses score lower than hotel workers on Disposition and Competence, while the situation is reversed in the dimensions of Affinity and Deference. Figure 8 shows a comparison of service predisposition between NHS nurses and hotel food service workers.



(Source: Lee-Ross, 1999)

Figure 8 A comparison of service predisposition between NHS nurses and hotel food service workers

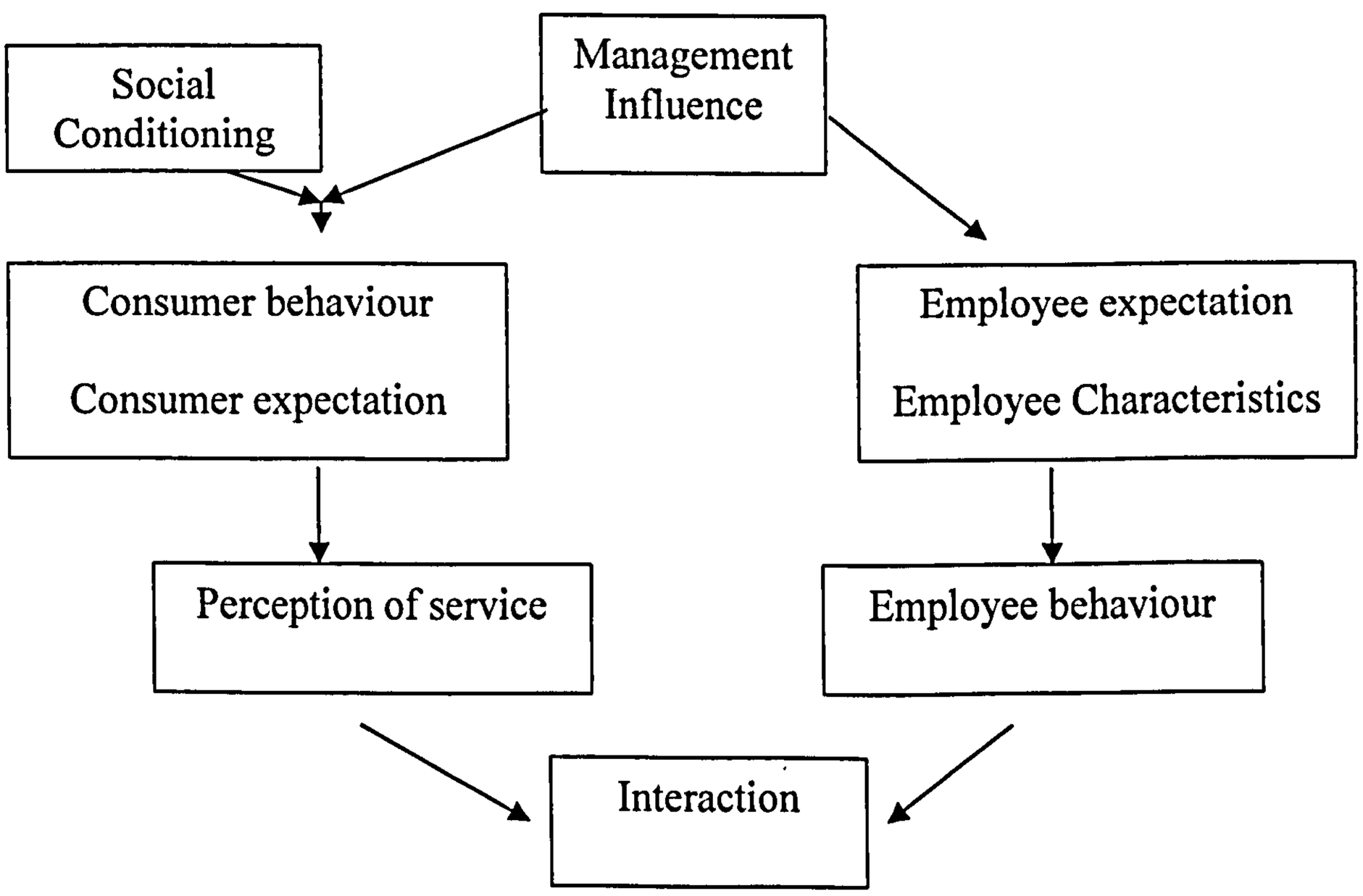
The lower scores among nurses for Disposition and Competence may reflect the limited financial resources and bureaucratic organisational structure that allows limited autonomy. Nurses may not be confident or be prohibited professionally to go beyond the remit of their job scope to satisfy clients. Conversely, the higher scores for Affinity (a clear understanding of clients' requirements) and Deference (manifestation of desire to comply) reflects the relationship that develops between carer and patient (Lee-Ross, 1999).

Other research has concurred and identified differences in the level of relationship with customer satisfaction between the medical and restaurant industry correlating with service behaviour. In that, for medical encounters, the top three behaviours were caring (0.78), sincere (0.76) and pleasant (0.75), while for the restaurant encounters careful (0.77), attentive (0.76) and pleasant (0.75) scored the highest (Winsted, 2000). Clearly, for satisfaction in both industries it is important that service providers be pleasant however, emotional issues like caring and sincerity are perceived to be more important for medical staff, while caretaking issues like being careful and attentive are more important for food service staff. In some hospitals, nurses serve meals to patients and thus provide a service which encompasses both hospitality and clinical/nursing dimensions. This could mean, therefore, that some consumers may be dissatisfied with the overall 'food service product', if delivered by medical staff. Food quality ratings tend to be higher when dietary personnel serve meals and therefore it is important if nursing staff perform this function that they are adequately trained (Gregoire , 1995; Lambert, 1996). An initiative developed in America is to have a 'patient service partner programme' where the role of nursing staff has been extended to include a proactive and personal element of food service. This includes training and verbal menu communication. Results have demonstrated an increase in patient satisfaction (Gersch, 1996; Oyarzun *et al.*; 2000; Folio *et al.*, 2002).

3.4.2 The Service Encounter

The quality of a meal can be diminished by poor service. Food service employees should therefore exhibit flexibility of behaviour and an ability to empathise with the customer (Johns, 1992b), in essence to demonstrate 'emotional intelligence' (Winsted, 2000). Consumers experiencing 'customised' service encounters will be more satisfied with the interaction than those who experience 'standardised' encounters (Bettencourt and Gwinner, 1996). To turn a mundane experience into a memorable satisfying event

requires a situation to occur outside the normal domain of expectation (Pine and Gilmore, 2000; Mossberg and Hanefors, 2003) and quantify as the 'total customer experience'. In a hospital this could include 'gourmet' menus (Vozenilek, 1999). It has been suggested in commercial operations that the process of service is conceptually very similar to that of a theatrical performance (Solomon, 2004) with service staff as cast members and each service contact a dramatic performance, inclusive of script (Harris, 2003). On the theatre stage as well as in the service theatre, customer satisfaction is dependent on the actors and their performance (Larsen and Aske, 1992). A high priority in training should therefore be on customer orientation and service style rather than specific skills and knowledge (Hill, 1996). Food service staff should be 'empowered' to accept responsibility for the service encounter, interpret and deliver the customer service required (Lashley, 2000). A customer-employee interaction model (Mills, 1990) is presented in Figure 9.



(Source: Mills, 1990)

Figure 9 A customer-employee interaction model

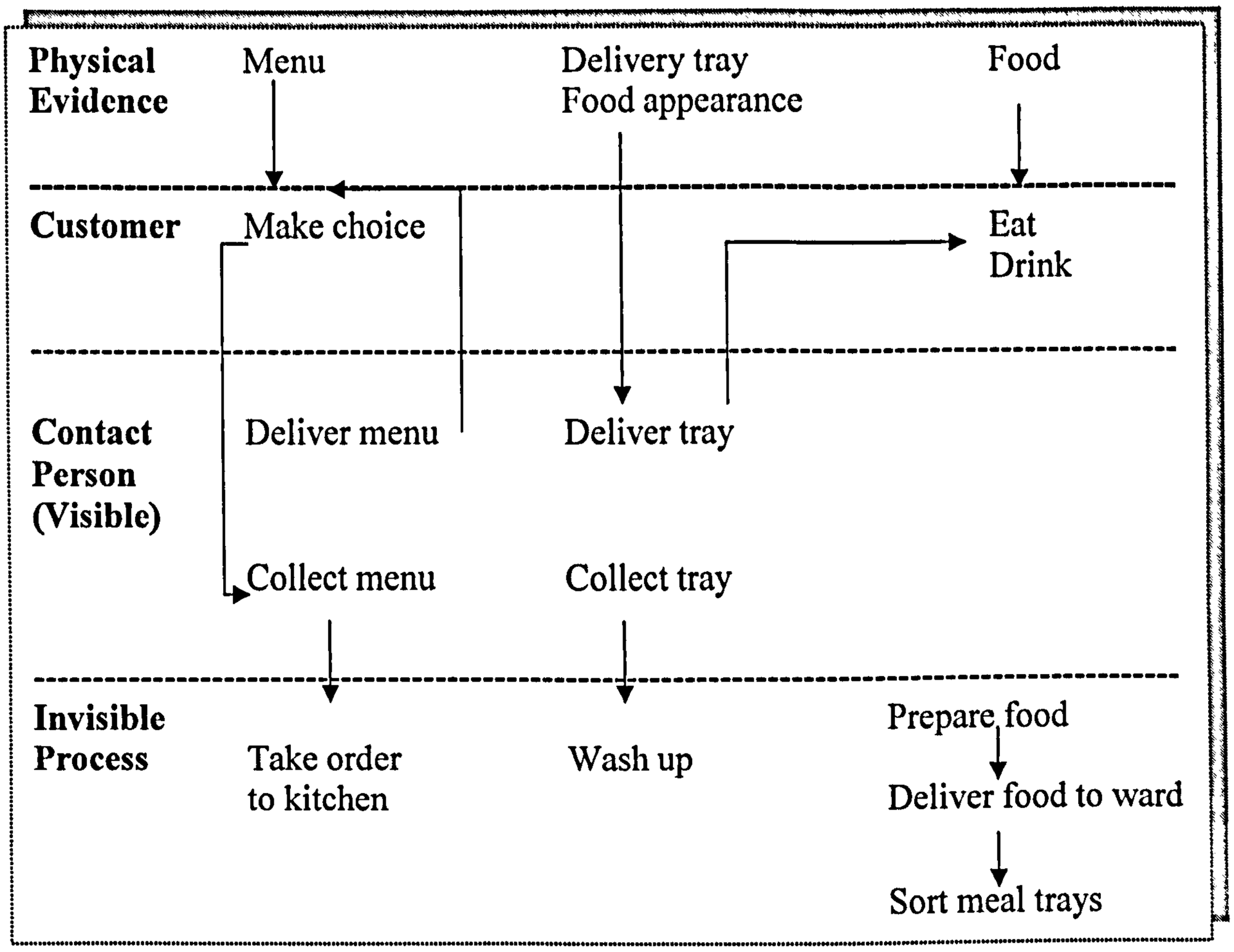
Generally, customers want service providers to demonstrate concern and competence, to be congenial and to be civil (Winsted, 2000), conflicts and failure should be avoided (Nguyen and Leblanc, 2002). Contact personnel make a significant contribution to the service encounter and therefore employee job satisfaction is just as crucial as customer satisfaction. It is unfortunate therefore that food service staff appear to be undervalued

within the hospitality industry, paid a low wage (Pratten, 2003) and perceive their job as being for the 'less intelligent' within the health care industry (Donelan, 2000).

3.4.3 Service Design and Blueprinting

The quality experienced by the consumer is created at the 'moment of truth' when the service provider and the client interface (Pine and Gilmore, 1999). A service blueprint is a detailed planning and diagnostic document that depicts these service events and processes as a flow chart. Thus allowing management and employees to visualise, organise and manipulate the entire service system (Pine and Gilmore, 1999). It has been suggested that many surveys do not accurately measure satisfaction but manager's perceptions of components of customer satisfaction (Bolch, 1999).

'Critical incidents' within interactive processes between service providers and customers can therefore be identified, analysed and information fed back into the process. 'Fail points' can then be plotted onto the service map to be used as a management tool to improve customer satisfaction (Randall, 1993; Randall and Senior, 1994). Figure 10 shows an example of meal service perceptual blueprinting in an NHS hospital.



(Source: Randall and Senior, 1994)

Figure 10 Meal service perceptual blueprinting

An example of a fail point in the NHS study was 'tray clearing' where the patients' perceptions of meal tray clearing did not meet their expectations, and where the employees were unaware that this point was a problem (Randall, 1993).

3.5 Physical Environment

Creating a positive mealtime experience begins with the atmosphere enhanced by the décor of the ward or dining area and the appearance of the tray or table. Careful consideration needs to be given to the wall coverings, table mats and crockery. The physical environment is a contact element that has a strong impact on customer's satisfaction and the perception of service quality (Nguyen and Leblanc, 2002). Good building design can significantly boost patient recovery time and impact on staff morale (McKenzie, 2003). Conversely, poor spatial dimension of the environment can negatively affect employees, especially where the service encounter is carried out in a limited space or in a badly designed environment (Nguyen and Leblanc, 2002).

Atmosphere planning is dependent on an understanding of the perceptual awareness of individuals as sensed through sight, touch, hearing, smell, temperature and movement (Kazarian, 1989).

Sight: perception of visual space, lighting and colours

Touch: perception of bed comfort and fabric used

Hearing: perception of noise levels, conversation and background ward sounds

Smell: perception of cooking aromas, body odours and cleaning materials

Temperature: perception of air temperature, relative humidity, body heat and heat of cooked foods

Movement: perception of staff movement and other patients

If individuals do not feel comfortable in their surroundings, the atmosphere has not been properly designed or considered and this will be reflected in the patients' response to food service. Under certain circumstances background music may be used to influence detrimental mood states and enhance evaluation of service personnel (Herrington and Capella, 1994).

Most services are perishable, they are lost when not consumed at a particular time and place therefore, the setting design must take into consideration the acceptable waiting time for clients and the critical moment affecting the success of the service delivery process (Nguyen and Leblanc, 2002). Research has shown that the perception of waiting time is a better predictor of customer satisfaction than either actual waiting time or the disconfirmation between perceived waiting and expected waiting times (Davis and Heinke, 1998). Even so, delayed food service can be annoying and contribute to satisfaction and quality judgements (Edwards, 1984; Casado Díaz and Más Ruíz, 2002).

3.6 Food Quality

Meal acceptance is not only a result of the intrinsic quality of the food; it can also be related to consumer expectations and the degree to which the food item matches them (Oh, 2000). It is relative to person, place and time (Cardello, 1995b).

Food quality is problematic to define as it is dependent on the evaluation of the consumer; it is both perceptually based and evaluative. Notwithstanding, perceptions of a food product have been shown to be affected by many individual factors including

taste, odour, information from labelling, attitudes and memories of previous experiences (Imram, 1999). Sensory characteristics such as appearance, flavour, texture and temperature have been found to be most important to hospital patients when judging food quality (Cardel1o, 1982; Clark, 1998).

Appearance: refers to those aspects of the food that are appreciated by the sense of sight. These include colour, light reflectance, size and shape.

Flavour: refers to the combined sensations of taste and smell

Texture: refers to the oral tactile sense and the perception of the mechanical, geometrical and moisture properties of food in the mouth.

Temperature: refers to oral-thermal sensations resulting from food that differs in temperature from that of the oral mucosa.

Texture and flavour have a profound effect on perception and acceptability, however 'the first taste is almost always with the eye' (Szczesniak, 1972). The effect of visual sensation should not be underestimated. Human perception of quality is dependent on the visual image and it is well established that colour and appearance can have a halo effect that modifies subsequent flavour perception and food acceptability (Hetherington and MacDougall, 1992). The role of texture is very product dependent however, attributes such as soggy, watery, lumpy, sticky, slimy, crumbly and tough, all which give a lack of control in the mouth are generally disliked (Cardello, 1996). The relative importance of any one attribute is dependent on the particular food item. For example, for chicken soup the predominant factor determining acceptance may be flavour, whereas for bread, texture could be the most important factor (Cardello, 1982).

Food related behaviour is therefore dependent on a number of factors as demonstrated in Figure 11.

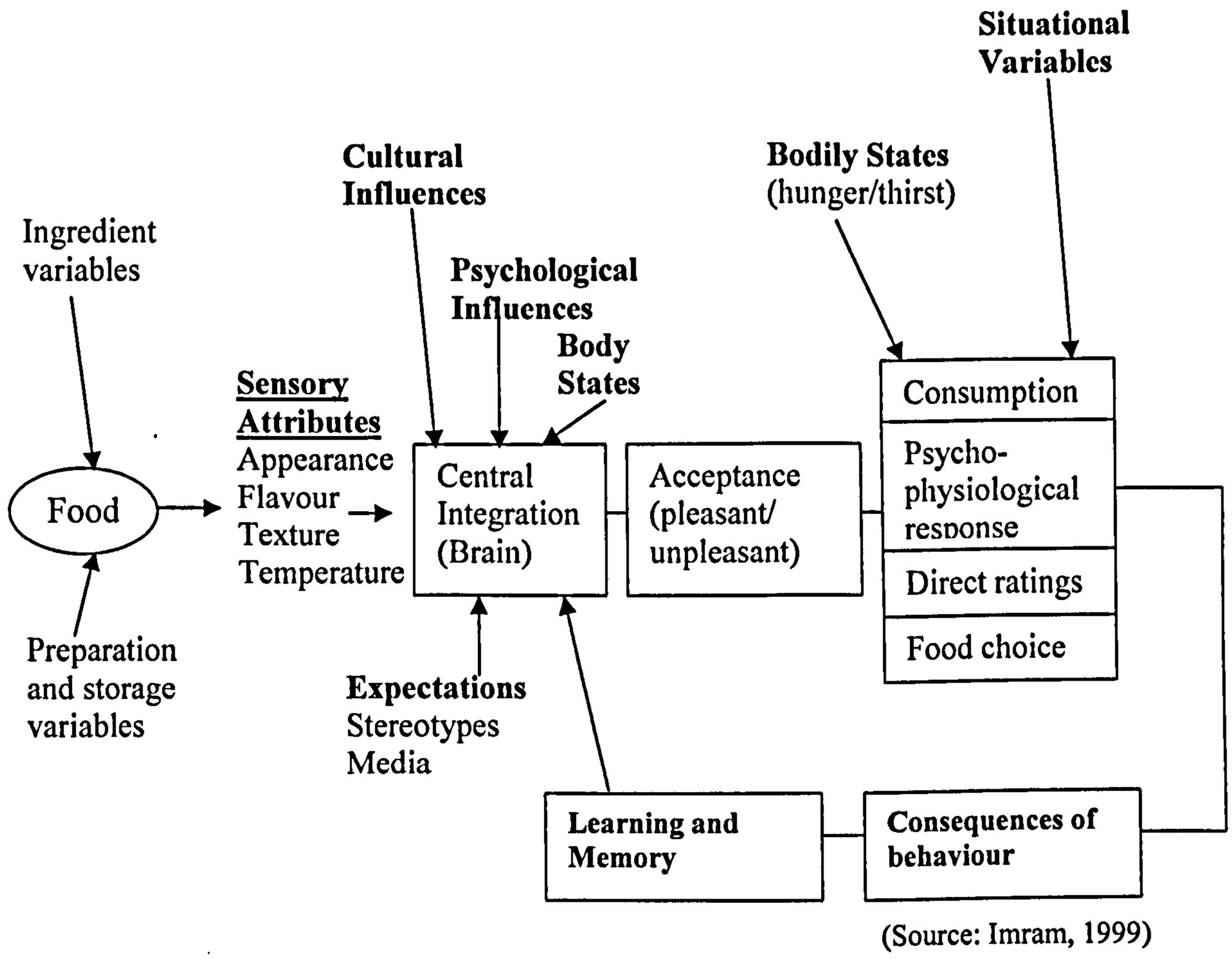


Figure 11 Schematic model of food-related behaviours

Meal acceptability has been found to be significantly higher in male patients than in female patients (Glew, 1970) and in older patients (Gregoire, 1994; Bélanger and Dubé, 1996). The latter, it has been suggested, are more tolerant and less critical of the quality of food because they have diminished taste and olfactory sensitivity (Cardello, 1982).

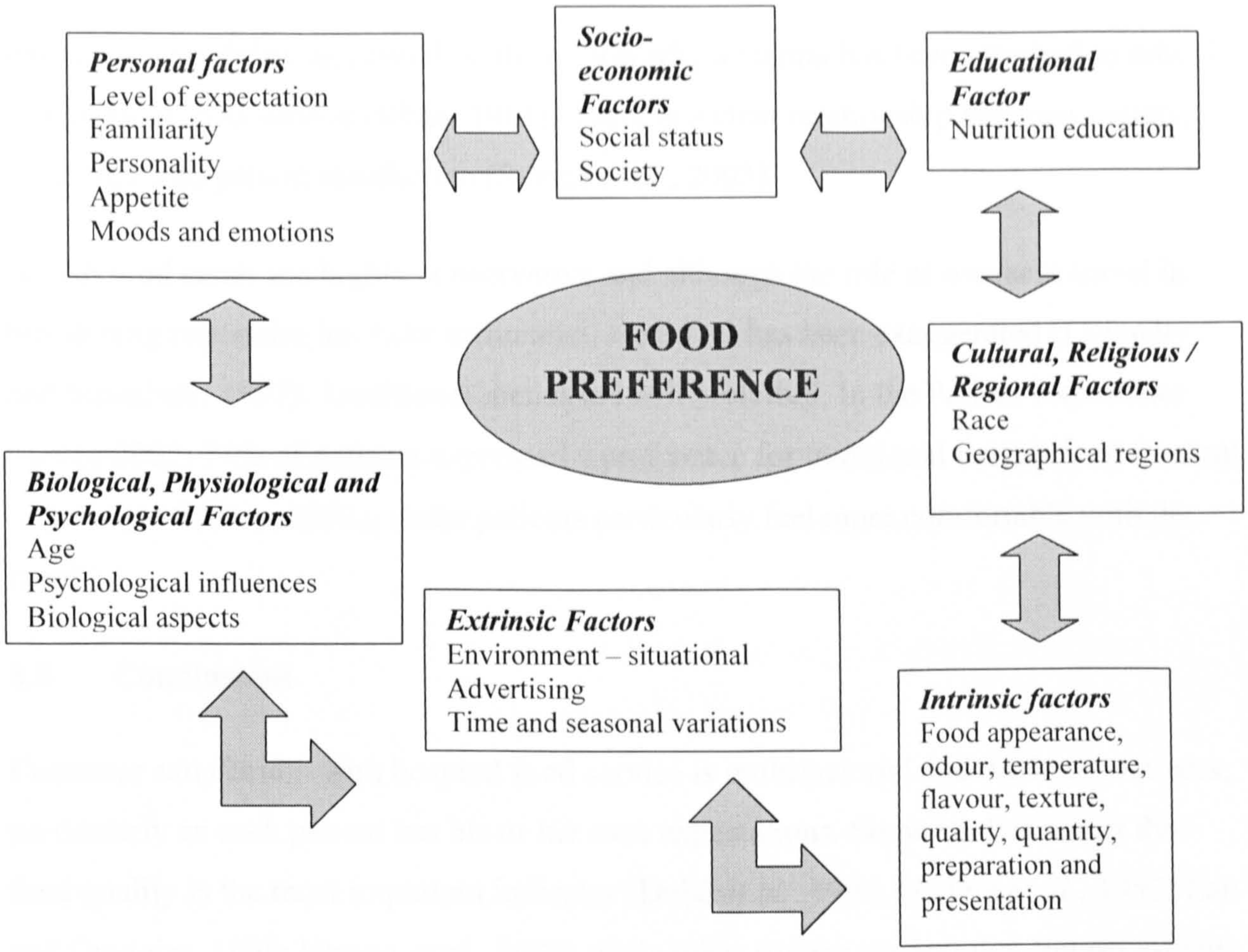
The role of nutritional status, mood, hunger or appetite in the judgement of patients on the qualities of hospital catering was examined in a cohort of 8,140 adult patients hospitalised for a short period (Rigaud *et al.*, 1999). Bad mood was associated with low appetite and patients with the lowest body weight also had the worst mood. Some people react to stress by increasing food intake, others react by decreasing consumption (Benton, 2004). A mood indicator has been used to improve the dining experience of guests in one hospitality setting (Wildes, 2002). Each customer on arrival is given a mood rating between one and ten. If below seven, strategies are put into place by the food service staff to improve the score. Customer satisfaction has been found to significantly increase.

If expectations are low then acceptability will be equally low. Improving the image of hospital food by the involvement of celebrity chefs such as in the Better Hospital Food project could make a marked difference. Maller *et al.* (1980) indicate that if past experience with hospital meals has been positive, it is likely that a meal will be rated more highly than if a past experience has been negative. New and well-liked menus may have a halo effect for the rest of the meals. Although, it has been suggested that satisfaction measurement in a service context may be more susceptible to halo than measurement in a product context (Wirtz, 2003).

3.7 Food Preference

Previous research has shown that food preference and acceptance constitutes 50% of the variability in consumption (Cardello *et al.*, 1996). More complete meals are eaten in the hospital setting than in a 'normal' situation (Meiselman and Edwards, 2004).

Food preference depends on a multitude of factors but the main influences are those related to the food, to the person and to the environment. This is demonstrated in Figure 12.



(Source: adapted from Khan, 1981)

Figure 12 Factors influencing food preferences

The most common factors associated with food preferences include, the quality of food, size of serving and the temperature at which the food is served (Khan, 1981), the influence of gender is slight (Martens, 1997). The hospital environment can also impinge on food preference, in that hospitalisation itself can create a negative effect complicated by the psychological and physiological stresses. However, the inclusion of fresh fruit on the menu has been found to be an important factor in patient satisfaction (Kennewell and Kokkinakos, 2001).

Food items may also be disliked due to monotony or stimulus satiation (Hetherington *et al.*, 2000), repeated presentation of the same foods makes them unpalatable. This phenomenon is influenced by a variety of different factors including characteristics of the food and characteristics of the exposure period (interval, duration and number). Menu fatigue is frequently addressed in institutional settings by menu rotation and latterly in the Better Hospital Food project by the introduction of celebrity dishes. 'Standardisation syndrome' is another factor prevalent in institutional types of food service. The impact of recipe standarisation results in foods which do not have

individual variability and could be the reason why a stigma has been attached to school and hospital food service (Khan, 1981). There is a clear relationship between variety, menu size and patient satisfaction (Stanga *et al.*, 2003).

British food tastes are highly conservative and although the role of overseas travel in broadening repertoire has been influential, the effect has been exaggerated (Liljander and Strandvik, 1997). Traditional menus are still preferred. In the Patient Experience Survey 2002, 71% of patients expressed a preference for traditional British food (Patient Experience Survey, 2002). Older patients particularly feel more comfortable with the familiar.

3.8 Conclusions

Customer satisfaction with hospital food service is multifactorial and difficult to assess, particularly as each patient has his or her own expectations. Some studies report that food quality is the most important indicator (Dubé *et al.*, 1994; O'Hara *et al.*, 1997; Lau and Gregoire, 1998; Hwang *et al.*, 2003) while other studies suggest that 'interpersonal' or service aspects are the most pertinent (DeLuco and Cremer, 1990; Gregoire, 1994; Bélanger and Dubé, 1996). 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. It could be said that consumers even make 'trade-offs', weakness in one attribute is compensated by strength in another (Pizam and Ellis, 1999).

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.

CHAPTER FOUR

METHODOLOGY AND EMPIRICAL STUDIES

4.0 INTRODUCTION

The purpose of this chapter is to present the methodology used and the rationale for the research design. To optimise clarity, the work is organised and presented as a series of sequential studies. Results are given individually in Chapter Five and specific interpretations made. Overall discussion and findings from both the primary and secondary research are presented collectively in Chapter Six.

4.1 Rationale for Research Design

A case study approach was taken involving mixed methodologies to elucidate the complex nature of hospital food service and to investigate the interactions and linkages involved in the process. The rationale for selecting this approach as a single-case study rather than multiple-case design is that it allowed an in-depth analysis of situations and individuals, and enabled relationships to be fully explored; in essence it took a 'focused slice' of the whole field.

Robson (1997) defines case study methodology as follows:

'*case study is a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon in its real life context using multiple sources of evidence*'.

It is a strategy based in empirical research that focuses on the particular 'in context', and like action research, involves using a variety of methods for data collection (Wisker, 2001). The array of evidence is used in a converging manner to define the 'facts' of the case and is modelled on the concept of triangulation (Yin, 1998; Fade, 2003). Patterns of convergence are identified to develop or corroborate an overall interpretation and ensure comprehensiveness.

Case studies are attributed with the ability to enhance understanding and to establish cause and effect (Cohen, 2000). It is suggested that this methodology is eminently

suitable for hospitality research because of the potential arising from the diversity of application and the inherent strength in accessing data about complex social situations (Gibson, 2003). Moreover, narrative from single case studies has been likened to 'virtual reality' and therefore presents a substantial advantage, which is the opportunity to inculcate authenticity and reality (Gomm, 2000; Gibson, 2003). Characteristics of case study research are presented in Table 7.

Table 7 Characteristics of case study research

Case study research characteristically emphasises		
Depth of study	rather than	Breadth of study
The particular	rather than	The general
Relationship/processes	rather than	Outcomes and end-products
Holistic view	rather than	Isolated factors
Natural settings	rather than	Artificial situations
Multiple sources	rather than	One research method

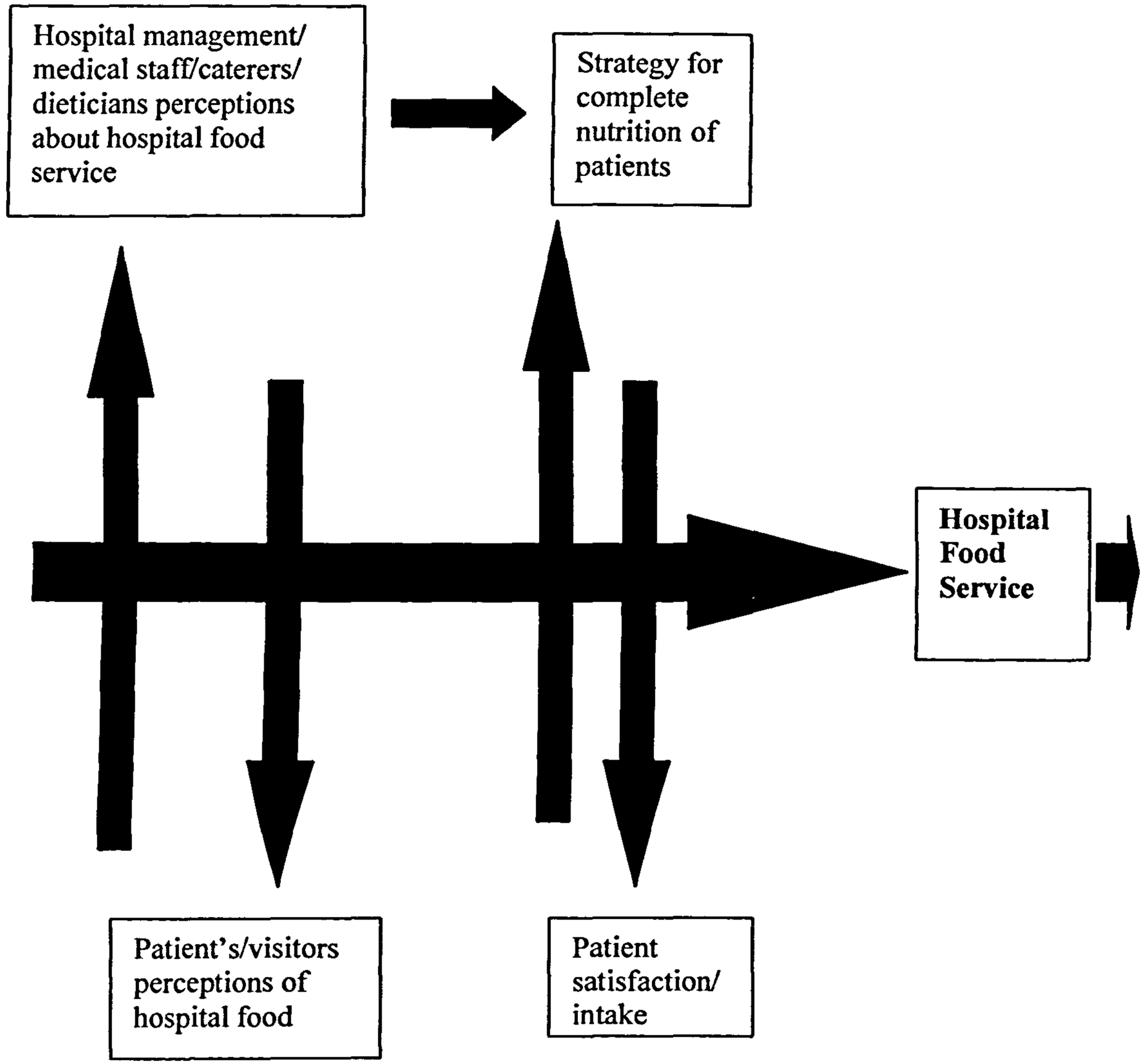
(Source: Denscombe, 2003)

Notwithstanding, a criticism of this type of approach is that recommendations cannot be made beyond the case studied and, therefore, there is restricted external validity (Robson, 1997). However, single case studies can enable generalisations to other cases that represent similar theoretical conditions, it is a matter of analytical generalisation (using a single case study to illustrate, represent or generalise to a theory) (Yin, 1998; Stake, 2000). Mason (1996) refers to this as '*theoretical or conceptual generalisability*' as distinct from the '*statistical generalisability'* seen in quantitative research. Other researchers argue that the purpose of this type of research is to generate an intensive examination of a single case from which theoretical analysis can be developed (Bryman, 2001). The central issue of concern is the quality of the theoretical reasoning (Yin, 1998).

The research design in this study used a combination of quantitative and qualitative methods incorporating elements of phenomenography, ethnographical and grounded theory research. The extent and complexity of data collection are characteristics of case study design. Phenomenography is a theoretical framework that relates to being 'in the

world' and enables the researcher to capture patients' opinions, feelings, experience and the kind of atmosphere and context in which they respond, that is, the hospital environment (Bryman, 2001). A sample question that was asked of patients was '*Describe to me a really good experience of hospital food service'*. Ethnographical research is an interpretative paradigm and is an in-depth study of a single case using a longitudinal time frame (Veal, 1997). The study spanned four years and time was spent working on the wards in a voluntary capacity as a ward hostess.

Questionnaires, interviews and observation, both participant and non-participant, were used as tools for the research design, allowing emerging themes and issues to be identified from the literature reviewed. Subsequently, a model presented at Figure 13 was devised to provide a framework for further investigation and focus groups/interviews were conducted with hospital food service stakeholders to elucidate pertinent points. This approach demonstrates a perspective of grounded theory where qualitative research is used to develop theoretical analysis (Goulding, 1998).



Sequence of Activities

Nutritional Screening/ Monitoring

Simple/rapid reinforced by multidisciplinary plan of action

Menu

- Clarity/language
- Choice
- Appropriate to patient

Ordering

- Assistance
- Checked
- New patients

Preparation

- Cook-Serve
- Cook-Chill
- Cook-freeze

Distribution/transportation

Minimum delay to prevent nutrient loss and sensory deterioration

Service

- Pre-plated
- Trolley
- Empathy
- Portion size
- Timing
- Wastage

Meal

- Place of consumption
- Ward round
- Assistance to eat
- Appropriate temperature
- Presentation
- Food Quality
- Plate wastage

Context: Hospital environment ie medical condition, space, atmosphere, empathy of staff, visitors, patient empowerment

Feedback from Stakeholders

- Management
- Medical staff
- Caterers
- Patients

Better Hospital Food Service

- **Incidence of malnutrition reduced**
- **Shorter patient stay**
- **Improved patient experience**
- **Reduction in cost to NHS**

Figure 13 Conceptual model of hospital food service

4.2 Overview of Methodology

A NHS hospital was identified in the South of England where a plated system of food delivery was in place but where a bulk trolley system was due to be introduced. Permission was sought and granted by the East Dorset Local Research Ethics Committee to conduct this research and an information sheet (Appendix 4) together with a patient consent form (Appendix 5) was given to participating patients.

Data were collected from two types of wards, Women's Health and Orthopaedic. These wards were identified with the help of 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 are highly critical, as evidenced by past surveys conducted by the catering manager. Demographic patient details are given in more detail in the results chapter at page 118.

It was concluded that research findings would then have implications for the rest of the hospital as these patients are the most difficult to satisfy. Wards selected were also last to receive food service either at the end of the 'belt run' for the plated system or the final ward for trolley service. Therefore the research setting would constitute the worst case scenario for food acceptability.

The consistency of the sample was ensured as the wards chosen were for elective surgery. This means that the patient profile generally remains static and the medical conditions are of a similar nature. Caterers and menu choice were identical for both plate and trolley system of delivery and therefore any change observed would be due to the factor of food service system.

Each stage of the research informed the next, with the data collected becoming more focused and in-depth with each phase. A schematic diagram is presented in Figure 14.

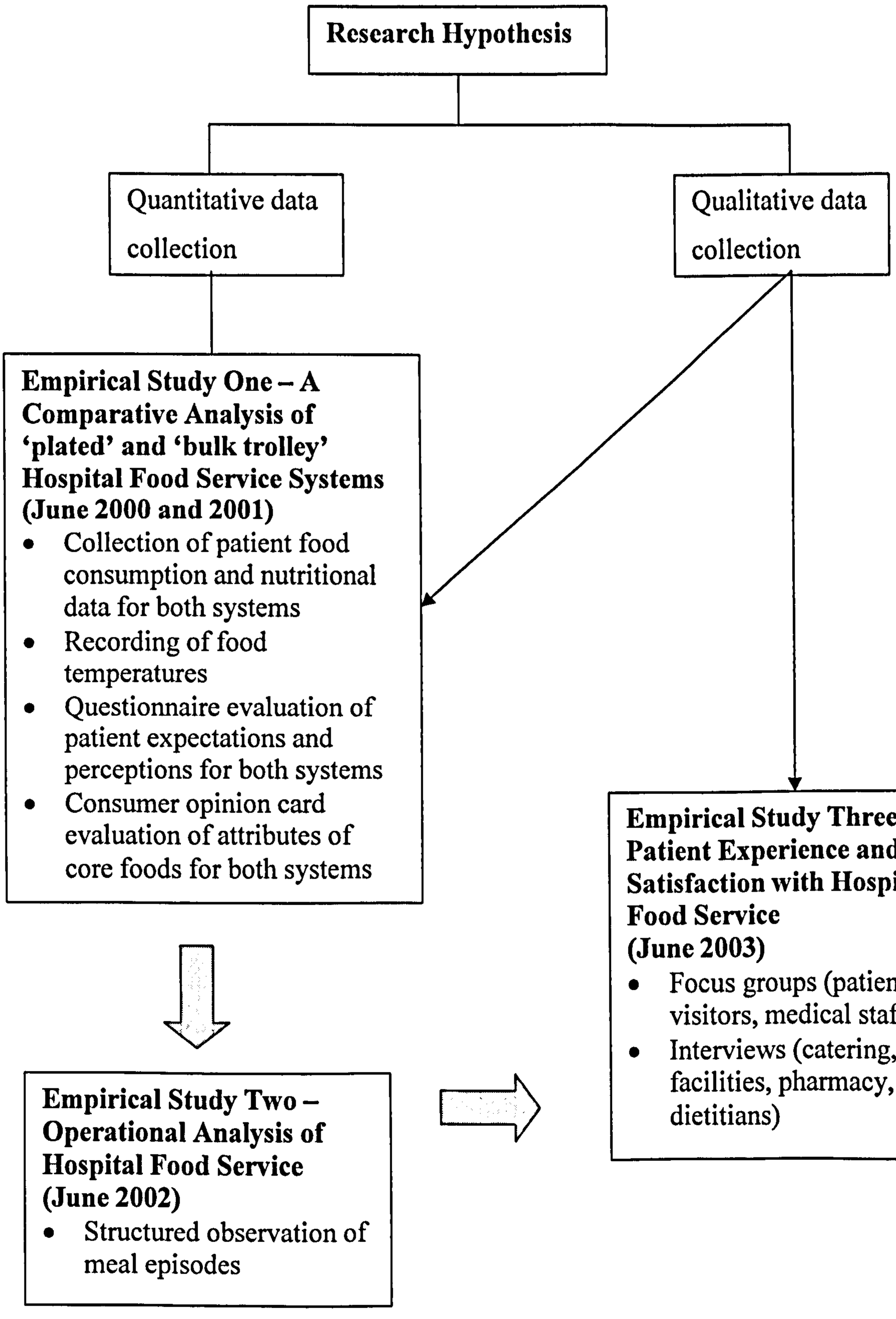


Figure 14 **Overview and triangulation of research methodology**

4.3 Empirical Study One: A Comparative Analysis of 'plated' and 'bulk trolley' Hospital Food Service Systems

In order to meet objectives two, three and five of the research:

'To measure and evaluate total daily patient food consumption and hence nutritional intake derived from both a plate and trolley food service system'

'To measure and assess patient satisfaction with the food and service in hospital'

'To develop a theoretical model of patient experience and satisfaction with hospital food service'

a study was designed to compare and critically evaluate two methods of food distribution most commonly used in hospital food service.

The hypothesis of this part of the study was that a food service system which enables patients to see and smell the food on offer and interact with the staff serving the meals would result in improved patient food intake and increased meal satisfaction.

Case Study Location

The hospital selected for the case study serves approximately 800 meals at each main meal using a four week menu cycle and was allowed £1.98 per patient per day (July 1999) for food and beverage costs.

At breakfast there was a choice of white or brown bread, the option of fruit juice, porridge and cereal. For lunch, the first course was characterised by 'home-made' soup or fruit juice. Main courses comprised sandwiches, meats, fish and vegetarian meals with carbohydrates as accompaniment. There were five choices of main course and a potato dish was offered every day; with creamed potato the most frequent option. 'Milky' puddings and ice cream were available for dessert at lunch time. For the evening meal, fruit juice or soup were offered, however this time, dried soup powder was used. There were five choices of main course, including a vegetarian option, followed by dessert, which could be a trifle/mousse/ice cream or cheese and biscuits. A specimen menu is given in Appendix 6.

4.3.1 Methodology

The research methodology was conducted in two phases. Initially, patient food consumption data were collected from the 'plated system' and then subsequently from the 'bulk trolley system' of meal delivery (approximately 6 months after introduction) for three consecutive days in each case, at the same time of year. Privately purchased snacks and other foods were not included in this research as it was considered that the hospital food service should be capable of providing for the nutritional needs of all the patients.

All data were collected from two wards, Women's Health (n=20) and Orthopaedic (n=42)(total n=62; age range 34–89 years).

To monitor patients' energy status during their hospital stay and to ascertain the appropriateness of using Dietary Reference Values (Department of Health, 1991), as standards for energy intake, BMI was calculated for patients (n=18) on admission and again on discharge during the trolley system of delivery.

Measurement of Nutritional Intake

It has been suggested that a seven-day weighed dietary intake is necessary to accurately assess an individual's nutrient intake in the community (Bingham, 1987) but in the environment of a busy general hospital this period of time is unrealistic. Pearson *et al.* (1982) recommend a period of three days for energy and four days for vitamin C assessment although other studies have used periods of 48 hours (Mitchell, 1999) and 3 days (Browne and Moloney, 1998). McGlone *et al.* (1997) state that three to four days will give results sufficiently accurate for a nutritional assessment of potential clinical value. It was therefore decided to give the accuracy required in this research, weighed intake for three days would be used.

There has also been discussion regarding the inclusion of a weekend day (McGlone *et al.*, 1997). However, unlike many other scenarios, the hospital menu works on a cycle and therefore did not vary at the weekend.

It is possible to estimate the amount of food eaten using standard portions or food frequency questionnaires; however these methods lack accuracy and are open to criticism (Subar, 2004). Furthermore, self-reporting of consumption can lead to over estimation (Forli *et al.*, 1998). The most accurate method for assessing food intake

involves the measurement and recording of the weight of food consumed at the time that it is eaten (Davies, 1993; Bingham *et al.*, 1994).

4.3.2 Sample Size

The sample size was estimated by a power calculation (Owen and Jones, 1994), assuming a sample of less than 30, and given a confidence level of 95%. From the literature this is the sample size found to be valid for nutritional research (Mitchell, 1999; Davies, 1993).

$$n = \frac{(t)^2 \times SD}{\pm E}$$

Where t = 2.04, the confidence level for samples under 30 (standard t distribution) and E is acceptable error

The standard deviation from other pilot studies was found to be ± 372kcal and acceptable error deemed to be ± 100kcal (Elmstahl, 1987).

Theoretical sample:

$$n = \frac{4.16 \times 372}{100} = 15$$

The sample size used in each nutritional analysis was n = 31.

4.3.3 Data Collection

For this part of the research, data were collected on nutritional intake, food temperatures and patient satisfaction. Time was spent in the kitchen and on the wards observing meal provision and becoming familiar with all aspects of hospital food service. Notes were made of kitchen practices before and after meal production together with information regarding food service at ward level. Experience was gained working as an operative on the 'belt' for the plated system and as a ward hostess for the trolley system. This involvement enhanced understanding of food service provision in a hospital setting.

4.3.4 Nutritional Intake

Phase 1: Plated Meal System

Patients, nurses or ward clerks completed menu cards at ward level the day prior to consumption. When meals were assembled in the hospital kitchen, a balance[10] (Hanson Digital Scales accuracy ± 4%) was placed on the patient's tray under the plate on the conveyor belt, tared and each food weighed to the nearest 0.1g, as it was placed onto the plate; a method which is unlikely to influence the portion size served. Similar portion sizes were used for both male and female patients. Completed trays were then loaded into pre-heated cabinets, with cold items positioned in the ambient section. The cabinets were transported to the ward where trays were taken to the patient's bedside by nurses or health care assistants. Once the meal or all that was required had been consumed, trays were collected by domestic staff and any remaining food weighed out of sight of the patients.

Phase 2: Bulk Trolley System

Prior to being loaded on to the trolley, food was weighed and once service was complete, the food remaining was also weighed. Patients did not order in advance but chose freely and in quantity from the trolley (the menu being identical to the plate service).

The weights of individual food components served to patients were measured by placing a balance under the plate and recording the weight of each food item. This had no effect on the style or speed of service. Once patients had finished their meals, any food remaining on the plates and trays was weighed, out of sight of the patients.

4.3.5 Food Temperature

Mean core temperatures of all foods were recorded using a Kane-May temperature probe (KM22, accuracy ± 0.2^0C) as meals were plated on the 'belt' in the plated system or unloaded from the bulk trolley in the trolley system and immediately prior to consumption for both systems of delivery.

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[10] Balances were calibrated using a series of known weights.

4.3.6 Patient Satisfaction Questionnaire

Development of the research instrument

Within the NHS the use of questionnaires is becoming widespread (Desombre and Eccles, 1998) as tools for measuring customer satisfaction and the following criteria are essential for successful design: -

- To include variables that customers presume as important.
- To include a measurement of overall satisfaction.

(Desombre and Eccles, 1998)

A patient satisfaction survey can be a rich source of information but it is crucial that the data collected are relevant and appropriate (Lin and Kelly, 1995).

A questionnaire, administered by the researcher, was therefore chosen to measure patient satisfaction with the food service. This research instrument enables a large amount of data to be collected efficiently. It also ensures a high response rate, accurate sampling and a minimum of interviewer bias while giving the benefit of a degree of personal contact (Oppenheim, 1998).

A category-based approach using a Likert scale was developed to elucidate pertinent points and to identify both strengths and weaknesses in the food service systems. Since the introduction of the Likert scale in 1932, researchers have attempted to find the number of scale points, which maximise reliability. However findings from studies are often contradictory (Philip and Hazlett, 1997), some have claimed that reliability is independent of the number of scale points, while others have maintained that reliability is maximised using seven-points, others five-points, four-points or even three-points. A scale consisting of more than five points was used in this research as there has been debate within the literature of the limiting nature of five levels of experience (Cardello, 1982; Denscombe, 2003).

There is much deliberation about the nature of data generated by Likert scales with criticism centered on a lack of reproducibility (in the technical sense) (Oppenheim, 1998) and evidence of unequal interval measures between categories (Sandiford and Ap, 2003). It is suggested that the distance between each level of variable is not equitable for both respondent and researcher. Likewise the qualifiers used in

differentiating between points on the scale are unlikely to remain qualitatively constant from item to item (Denscombe, 2003). Even so, reliability of these scales tends to be good and, partly because of the greater range of answers permitted to respondents, is often higher than that of corresponding Thurstone scales; a reliability coefficient of 0.85 is regularly achieved (Oppenheim, 1998). It is true that any neutral point on the scale may not indicate the midpoint of response and could be due to disinterest, lack of knowledge or lack of attitude. However, if the pattern of responses is taken into consideration, Likert scales do allow a reliable, broad approximation of attributes and provide more precise information about the respondent's degree of agreement and disagreement (Oppenheim, 1998). This type of measure is commonly considered ordinal in nature particularly when an odd-numbered scale with a neutral point is designed together with the categorisation of those numbers (Sandiford and Ap, 2003). A summary of scale characteristics is presented in Table 8.

Table 8 A comparison of scale characteristics

Scale Type	Characteristics
Nominal	Where numbers represent specific features. The number does not convey any order or value to that which is being measured. Categories are mutually exclusive.
Ordinal	Numbers represent categories that suggest an element of order to the intensity/values/levels of the variable being measured. Numeric differences cannot be seen as representing equally spaced gaps between categories. Some researchers question the use of 'means' in the analysis of this type of data.
Interval	Numbers represent categories and concepts that are ordered and which are equidistant
Ratio	A ratio scale is seen as a type of interval scale and they have a 'true zero point'

(Source: Adapted from Sandiford and Ap, 2003)

The greatest controversial aspect of using Likert scales is in the analysis of data. It has been suggested that a scale with only five possible answers cannot '*possess a normal probability distribution, as the range of answers is discrete, not continuous'* (University of Northern Iowa, 2003). Therefore, the researcher should always check that the distribution of data is bell-shaped. The quality of the data can be overestimated and results from t-tests should be treated with caution, these should be used to indicate trends in the data rather than for hard statistical inference (University

of Northern Iowa, 2003). In essence, the nature of attitudinal data is as a quantitative representation of a qualitative notion.

In summary, there is a divergence of opinion regarding the use and analysis of Likert scales, there is no right or wrong way, it is more a matter of answering the research questions meaningfully and with circumspection.

A questionnaire blueprint was constructed from the literature where it was identified that appropriate food quality rating indicators are; temperature, flavour, portion size, texture, taste and presentation (Booth and Conner, 1990; Cardello 1995; Cardello, 1996). Although these factors can be appreciated independently within foods, all interact in complex ways to determine the acceptability of a particular product. The relative importance of any one attribute will be, to some extent, dependent on the food item. For example, the texture for broccoli may be the predominant factor determining acceptance, whereas temperature may be crucial for ice cream. There is much discussion within the literature regarding the inclusion of the 'importance construct' (Kivela *et al.,* 1999). However, the argument could be said to be philosophical and there is inconclusive evidence for inclusion.

The approach to patient satisfaction was guided by the expectancy-disconfirmation theory, which suggests that consumer satisfaction/ dissatisfaction is likely to be determined by how well the product/service fulfils innate desires. The measurement of expectations is widely accepted in the service literature, however, there could be a bias in linking expectations directly to perceptions, since asking questions about expectations can itself raise expectations (Brown and Bell, 1998). Even so, research suggests that this is an appropriate method of measuring consumer satisfaction (Cadotte *et al.*, 1987).

A matrix was constructed of opinion, attitude and behaviour against perception, expectation/anticipation and acceptance. The underlying theory was that the overall attitude (satisfaction) is a function of beliefs about an object's attributes (Kivela *et al.*, 1999). A questionnaire was, therefore, developed to collect the perceptions and expectations of patients towards the quality of food served by both the plate and trolley system of delivery. The instrument consisted of a matching set of questions completed before and after the meal experience. Satisfaction was evaluated both directly by asking the question *'How satisfied were you with your meal'* and indirectly by asking questions relating to food quality.

Simplicity of the questions was considered to be a priority because of the specialised nature of the respondents i.e. infirm or convalescing. Moreover, it was necessary for the questionnaire design to be easily understood and allowed completion in a short space of time, to accommodate patient fatigue. Several questions were formulated and subsequently refined to produce the pilot questionnaire.

4.3.7 Pilot Study

In order to validate the methodology and reliability of the questionnaire a pilot study was conducted. This was piloted in the hospital on the same wards as the research sample. Involving patients in the design process is essential to focus accurately on areas of patient concern. After the elimination, addition and rephrasing of several questions where it was obvious that patients had misunderstood, the final questionnaires were prepared. Cronbach's alpha[11] was then calculated to test for reliability and internal consistency of the survey instrument. This value was 0.88 (Cronbach's alpha is acceptable at 0.58-0.91) and in line with figures derived from the literature (Oppenheim, 1998).

Patients were asked to fill out the response forms before and after they had received their trays. Response forms were not left on unoccupied beds and anonymity of responses was guaranteed to all respondents in order to ensure valid judgements and candid comments.

Following the administering of the first pilot questionnaire it was decided to keep a nine-point scale only for the last question as respondents reported that it was difficult to decide between the middle categories on food quality issues. A seven-point scale was used for seven variables (hunger, anticipation, appeal, taste, satisfaction, portion size, presentation) and a nine-point scale used for the opinion of overall standard of catering, offering respondents a wider range of rating choices in the final question. A simple 'yes' or 'no' was asked of '*Were the food items served at the correct temperature'?* These factors have been shown to be a valid measure of dimension of a patient's meal experience (Carey and Seibert, 1993).

Positively and negatively worded items were balanced to control for acquiescence and transcribed as appropriate for data analysis. Demographic questions were

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[11]SPSS (Norusis, 1993) was used for all statistical computation

included so that it could be checked whether there were any systematic differences between subsets of the sample. The final questionnaires are presented at Appendix 7.

4.3.8 Sample Size

Sample size was determined by a power calculation (Owen and Jones, 1994) setting a 95% confidence level. For a large sample, that is more than 30, the following sample estimation calculation was used;

$$n = \frac{(z)^2 \times p(1-p)}{r^2}$$

Where z = 1.96, the confidence interval for larger samples, p is population proportion and r is sampling error.

The main question in the pilot questionnaire was taken as reference *'How would you rate the overall standard of catering in this hospital'*, 28% was the largest percentage for any one response which was for *'quite good'*.

Therefore for confidence levels of 95%; the theoretical sample should be:

$$n = \frac{(1.96)^2 \times 0.28 \times (1-0.28)}{0.05^2} = \frac{3.8 \times 0.28 \times 0.72}{0.0025} = 306$$

The sample size used in each food service questionnaire was

plate service n = 312

trolley service n = 302

4.3.9 Administering the Questionnaire

The questionnaires were distributed to patients on the Women's Health and Orthopaedic wards before and after the meal in both plate and bulk trolley food service systems. When required, help was given to complete the form and opportunity taken to clarify points raised.

Expectations must be measured prior to receipt of services, otherwise responses will be biased (Clow and Vorhies, 1993). Specifically, Clow and Vorhies (1993) argue that, '*When expectations and experience evaluations are measured simultaneously, respondents will indicate that their expectations are greater than they actually were before the service encounter'*.

A criticism of an instrument such as SERVQUAL (Parasuraman *et al.*, 1991) from an operational aspect is that two administrations of the instrument cause boredom and confusion (Buttle, 1996). This was not evidenced in the population sampled in this case study; hospital patients welcome the contact and distraction from daily routine.

Questionnaires were collected from patients who were able to complete them; thus a response rate was not calculated. Patients were eager to express their views and appreciated the verbal tag given for the numerical scale as it allowed them to conceptualise their response. A verbal anchor for all scale points makes the procedure less prone to bias and therefore records the respondents' meaning more accurately (Buttle, 1996).

4.3.10 Core Foods

A consumer opinion card (Appendix 8), adapted from Cardello (1982), concentrating on the quality indicators of core foods was used to measure patient satisfaction and compare the two systems of delivery. The rationale for this part of the study was to develop and augment information already gained. The critical aspect of quality assessment of foods is often subjective, however by using contemporary psychophysical (sensory) and psychometric (opinion survey) measures, these subjective variables can be measured objectively (Cardello *et al.*, 1984).

The opinion card was developed at the U.S. Army Natick Research and Development Laboratories to assess patient and staff acceptance for food items served at military hospitals. The reliability and validity of the card has been previously evaluated and has been shown to be superior to other forms with similar formats (Cardello, 1982).

The survey instrument consisted of five, 7-point rating scales, three questions were coded 7=very positive to 1=very negative and two questions coded as a 'just about right' scale. Space for open ended comments was also given. Five attributes of the food were rated; temperature, texture, flavour, portion size, as well as the respondent's overall opinion of the food. To prevent respondent pattern response, categories were inverted for some questions. These were then coded appropriately for data analysis.

Core foods selected were carrots, broccoli, minced beef dish, poached fish dish, creamed potato and cold pudding. These items were chosen as they appeared on

both the plate and trolley system menu and therefore enabled a direct comparison between the two food service systems.

The card was distributed by the researcher on the wards during meal times for both the plate and trolley system of delivery. Patients were asked to complete the opinion cards once they had received their trays while consuming their meal. The responses were then collected for analysis.

4.3.11 Data Analysis

Although subjects were identified by sex, ward, bay and bed number, this was done purely as a means of identifying patients in order to reduce the likelihood of data being transposed. A unique number was used for data analysis and therefore confidentiality of the data ensured.

Nutritional Analysis

Microdiet[12] computer software was used to calculate the nutritional content of the meals consumed by the patients. Some of the recommendations made within The Nutritional Guidelines for Hospital Catering (Department of Health, 1995a), are per meal e.g. fat, protein and energy, whilst the remaining recommendations are per day. Therefore for consistency these nutrients have been calculated per day and then compared against Committee on Medical Aspects of Food Policy (COMA) Dietary Reference Values (Department of Health, 1991) using a Physical Activity Level (PAL) of 1.4. Elmstahl (1997) took PAL 1.33 for a study with geriatric patients and discussed that this might be too low. As the patients sampled were ambulatory it was not considered necessary to go below PAL 1.4. Dietary Reference Values are used as a guide to requirements; they are not prescriptive but aim to give firm scientific basis for giving dietary advice.

Nutritional analysis was confined to those nutrients recommended in The Nutritional Guidelines for Hospital Catering and the standards for orthopaedic patients (Department of Health, 1995a); energy, protein, vitamin C, iron, calcium, zinc, folate and vitamin D. Dietary fibre was not included due to the controversy surrounding its analysis (www.ifst.org).

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[12] A computer programme (Salford University) manipulating McCance and Widdowson's, *The Composition of Foods 5th Edn* (1991) and the current supplements, Royal Society of Chemistry and Ministry of Agriculture, Fisheries and Food, Cambridge.

Vitamin C is necessary for collagen synthesis, wound repair and immune function. Calcium, vitamin D and zinc are essential to the building and repair of bones and aid wound healing. Orthopaedic patients have increased requirements for these nutrients. Folic acid is important for the production of haemoglobin; a deficiency can lead to anaemia. One effect of zinc deprivation has been said to be a reduction in the ability to taste salt, which may further diminish the patients' enjoyment of food (Fenton *et al.*, 1995).

The normality of distribution was tested and confirmed by the Kolmogorov-Smirnov statistic and subsequently independent t-tests were performed to ascertain any significant differences between the means. A one sample t-test was used to compare sample means against nutritional recommendations. Statistical significance at $p \leq 0.05$ was used for all tests.

Food Temperatures

Parametric statistics were used in food temperature analysis, as underlying assumptions were met (normal distribution was confirmed). Independent t-tests were performed to determine significant differences ($p \leq 0.05$) between food temperatures with the two systems of delivery.

Patient Satisfaction

While the primary focus of the questionnaire was to establish the parameters affecting overall perceived food quality, it also allowed a direct comparison of individual attitudes to the overall standard of catering within the hospital and a comparison of the two systems of delivery. Gaps between perception and expectation (P-E) were calculated using the SERVQUAL principle. For measurement of service quality data collected using ordinal scale methods (Likert scales), the question has been raised whether it would be preferable to consider the P-E scores as raw differences (Oliver, 1980). This was a criticism levelled at Parasuraman *et al.*,(1985) who performed analyses suited to interval-level data (factor analysis). Frequencies will therefore be presented and the service level gap calculated between the before and after responses for matched questions.

Discussion within the literature debates the use of mean or median values in the use of satisfaction surveys (Isenring, 2004). Theoretically, these data should be analysed using median values and therefore results were analysed applying standard non-

parametric tests to the data using appropriate procedures in SPSS. Significance between the responses to both food service systems was calculated using the Mann-Whitney U Test. Hunger between meals and service systems was tested separately by non parametric, one way analysis of variance (Kruskal-Wallis). Statistical significance at $p \leq 0.05$ was used for all tests.

Core Foods

Non-parametric statistics were used for the analysis of opinion cards, as normal distribution was not confirmed. Comparison between service style and food attribute was tested using the Mann-Whitney U Test.

Binary logistic regression analysis was used to build a model which would predict food service style on the basis of food attributes measured. Further investigation used multinomial logistic regression to predict opinion for the assessment of each food attribute within food service style. The theoretical distinction between the two is that the former produces predictions at the individual case level while the latter internally aggregates cases to form subpopulations and is therefore, more general.

i. Binary Logistic Regression

This analysis can be used when an outcome is to be predicted based on values of a set of predictor variables. It is suited to models where the dependent variable is dichotomous or binary i.e. food service and is the preferred analytical technique when compared to linear regression and discriminant analysis, as the set of independent variables may be categorical, continuous, discrete, or a mix (Kivela, 1999). Logistic regression coefficients can be used to estimate odds ratios for each of the independent variables in the model.

Temperature and portion size were defined as categorical as the scale used was a 'just about right' scale while flavour and texture items were defined as ordinal. Optimising the model was not pursued as the object of the analysis was to ascertain which of the variables was most influential in making the classification of food service style. The model was therefore estimated using a block entry of variables.

ii. Multinomial Logistic Regression

This type of analysis can be used when subjects are classified based on values of a set of predictor variables. In multinomial logistic regression the dependent variable should be categorical and larger than binary. Quality attributes were used of the selected core foods as predictor variables in a model classifying response in terms of a category opinion scale. A satisfied response was defined as either 'good' or 'very good', for example the top end of the opinion scale (Woods and Heidari, 2003). Again the model was not optimised as the purpose of the analysis was to gain an insight into the variables which were most influential towards satisfaction.

4.4 Empirical Study Two: Operational Analysis of Hospital Food Service

Following the first study, the emerging issues identified included operational/service factors and therefore it was considered that further investigation was required. Accordingly, to meet objective four of the research:

'To critically evaluate the patient meal experience'

a study was designed to investigate in-depth, the patient meal experience with the trolley system of delivery.

The methodology utilised was based on that of notational analysis and included structured observation, involving the systematic and detailed recording of discrete incidences influencing patient consumption and satisfaction. This type of research has been described in the literature as 'naturalistic research', that is qualitative observation taking place in natural settings as opposed to experimental conditions (Mays and Pope, 1995).

The application of notational analysis as a diagnostic tool to analyse and quantify hospital meal service has not been previously applied. However, as an instrument for analysis, it can be used wherever there is a sequential history of distinctive features. If a 'performance' time frame can be split into subsequent parts and coded events, this type of quantitative evaluation can be employed. It is a more sophisticated and refined observational technique (Clayton and Griffith, 2004). The advantage of using such an objective process is that it is not open to operator bias. Emotions and

personal biases are factors, which affect storage and retrieval of memory, and often observers tend to remember highlights without the detail and minutiae (Hughes and Franks, 1997). Furthermore it can be non-invasive, all of which helps to eliminate any errors or bias that might be introduced.

Notational analysis in this research was used fundamentally; by hand and in 'real' time. For sporting performances there has been increasing use of video and slow motion to give extensive and comprehensive feedback to athletes (Hughes and Franks, 1997). However, in hospital or other food service settings it is imperative that the observer is discrete and unobtrusive and by itself does not become a disturbing activity.

An objective assessment allows ward staff and food service managers to identify those occurrences that stand out as distinctive features and enables a quantifiable comparison between situations. Systematic observation allows a researcher to use a protocol to observe, record and analyse fundamental elements within an episode that are deemed important in determining effectiveness, with the assumption that other observers using the same instrument would agree with the recorded data (Hughes and Franks, 1997).

Previous research has suggested that social facilitation (Hartwell and Edwards, 2000) and server/patient empathy (de Raeve, 1994) could be crucial factors in the meal experience. It has also been suggested that interruptions by medical staff and housekeeping personnel could negatively affect food consumed, as the best condition during meal times is that of peace and quiet (Deutekom *et al.*, 1991).

The research design, therefore, was chosen to reflect the distinctive features of social facilitation, empathy and the number of interruptions experienced by patients during meal times in hospital. These factors were identified as the critical elements of food service performance pertinent within the analysis.

4.4.1 Methodology

The research methodology involved collecting observational data during meal times in an orthopaedic ward in the case study hospital. This ward was chosen as the patients had undergone elective surgery, either hip or knee replacement, and therefore, post-operation they could eat as normal and none required assistance. The

sample consisted of both male (n=14) and female (n=16) patients, age range of 65-84 years. Data were collected two days post operation and consisted of structured observation for breakfast, lunch and evening meal episodes. Patients were situated in bays of six and an unobtrusive method of observation was possible, as in this hospital, there are glass panels between the nursing station and patient. It was considered that covert observation would be more appropriate as overt observation may stimulate modifications in behaviour and so exhibit the 'Hawthorne Effect' (Mays and Pope, 1995). The researcher standing at the nursing station could therefore monitor distinctive features such as interruptions, activities and their timings, (using a stopwatch[13]), notating onto a pre-designed form (Appendix 9). Staff and patients were familiar to the researcher, there was no interaction with informants and therefore observer effects were minimal.

A meal episode was defined as starting at the time the meal tray arrived to when it was collected, and the meal time calculated when the patient started to eat until the cutlery was put down to signify that the patient had finished. An interruption was defined as a medical interruption such as visits by consultants, laboratory personnel or medical professionals who disturbed the patient while consuming their meal. Social facilitation was characterised by social intercourse either with other patients, visitors or the ward hostess. Lastly, empathy was interpreted as the number of times medical and other staff smiled, chatted, helped to open packets and generally nurtured the patient.

4.4.2 Data Analysis

Normality of data was tested and then a one way analysis of variance, (ANOVA) conducted to determine significant differences with significance ($p \leq 0.05$) being applied for all tests.

4.5 Empirical Study Three: Patient Experience and Satisfaction with Hospital Food Service

A study was designed to enhance and validate information already gathered. A criticism of questionnaires within hospitals is that the positive responses received are sometimes belied by detailed dissatisfactions contained in patients' qualitative descriptions of their experiences (Avis, 1995). The objective of this part of the

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[13] Philip-Harris ± 1.00sec

research was to explore the antecedents to satisfaction and experience, including the service element.

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, dietitians, hospital managers, pharmaceutical staff, patients and visitors were consulted to identify factors contributing towards patient satisfaction and to elucidate patient meal experience. This type of qualitative study does not seek to show statistical association but adds depth and richness to the research, illuminating social phenomena and human interactions (Fade, 2003). This depth was necessary to enable interpretations to be drawn, being emergent and cumulative, informing the generation of the theoretical model.

4.5.1 Methodology

Four discrete focus groups, each comprising five participants were conducted with doctors, nurses, ward hostesses, and patients together with their visitors while open ended interviews were conducted with the catering manager, facilities manager, chief dietitian, orthopaedic ward dietitan and chief pharmacist. 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 was developed, with the main issues around patient satisfaction and meal experience being explored. Spontaneous dialogue covered themes considered important to respondents and this information was incorporated into the research model. Focus groups took place on the ward and lasted approximately half an hour while open interviews were conducted in the respondent's office and again lasted for approximately half an hour. Patients were representative of the patient population on the orthopaedic ward and included males and females in the age range 66-84 years with length of stay > 7days. All managers had been in post longer than two years. Views and opinions were eagerly expressed and tape-recorded. Throughout the research process, the researcher had to be self-disciplined to retain empathic neutrality, avoiding the intrusion of overt personal judgements and opinions.

4.5.2 Data Analysis

Interviews were transcribed verbatim in their entirety to facilitate analysis. The analysis of text was completed by NUD*IST (Non-numerical Unstructured Data Indexing Searching and Theorizing)[14], a computer assisted qualitative data analysis software package.

Unlike quantitative data analysis programs such as SPSS, which are widely accepted, concerns have been voiced regarding the appropriateness of using a computer to analyse qualitative script (Bryman, 2001). It has been suggested that the fragmentation process of coding text into sections risks decontextualising data and as a result the narrative flow of interview transcripts may be lost (Bryman, 2001). However, other researchers argue that this type of software makes coding and retrieval faster and more efficient, moreover it also allows the analyst to consider possible connections between codes (Creswell, 1998).

In essence the NUD*ST program uses the philosophy of content analysis as a research tool and there are several examples within the context of hospitality research where this type of technique has been used (Brotherton, 1999; Jones, 2003). Content analysis is particularly relevant when trying to establish meaning and patterns within text. In this research it was used to find factors relating to patient satisfaction together with factors regarding hospital food service that were most important to the people who are most involved.

Coding was directed by the literature and based on the conceptual framework, allowing for developing themes to be incorporated. A hierarchical flagging system was established from which theory was developed. Authenticity is ensured by including raw narrative within discussion.

4.6 Summary

A variety of methodologies were utilised in this research reflecting a case study approach and triangulation of data. Results are given individually in Chapter Five and specific interpretations made. Overall discussion and findings from both the primary and secondary research are presented collectively in Chapter Six.

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[14] This programme can be downloaded from the distributor's internet site: http://www.scolari.co.uk

CHAPTER FIVE

RESULTS AND PRELIMINARY INTERPRETATION

5.0 INTRODUCTION

In this chapter, the results for the individual empirical studies are presented together with a preliminary interpretation. A preliminary interpretation is considered important at this stage in order to draw out and highlight pertinent issues. A predictive model for hospital food service was then developed. The results from primary research together with the literature review are discussed fully in Chapter Six.

5.1 Empirical Study One: A Comparative Analysis of 'plated' and 'bulk trolley' Hospital Food Service Systems

5.1.1 Nutritional Intake

Methodology for this part of the study involved collecting food consumption data from the 'plated system' and 'bulk trolley' system of delivery for a period of three consecutive days in each case.

5.1.1.1 Results

The gender and age ranges of patients participating in this part of the study are given in Table 9, where the nutritional intake for both systems is also summarised.

Consumption of energy, iron, calcium, zinc and vitamin D for both male and female patients was significantly ($p < 0.05$) below recommendations. While intake of protein and folate was lower than recommended, this was not significant. Protein intake met the guidelines suggested by BAPEN (Allison, 1999) of providing 15 – 20% of total energy intake.

Vitamin C intake was adequate and inline with the recommendation of 40mg per day. There were no statistically significant differences between the nutrient intakes from individual meals served with the two food service systems by gender.

Table 9 Gender, age ranges and nutritional intake by meal service system

Nutrient/day	Male Age Range 54-86 yrs			Female Age Range 34-89 yrs		
	Recommended/ day	Plate system (n = 8)	Trolley system (n = 9)	Recommended/ day	Plate system (n = 23)	Trolley system (n = 22)
Energy (kcal)*	50-59yr 2550 60-64yr 2380 65-74yr 2330 75+ yr 2100 ♦	1492 ± 299	1184 ± 331	19-49yr 1940 50-74yr 1900 75+ 1810 ♦	1309 ± 399	1134 ± 252
Energy (MJ)*	50-59yr 10.60 60-64yr 9.93 65-74yr 9.70 75+ yr 8.77 ♦	5.5 ± 1.2	5.0 ± 1.4	19-49yr 8.10 50-74yr 7.96 75+ 7.61 ♦	5.5 ± 1.7	4.8 ± 1.0
Protein (g)* %	53.3 • 15 - 20	51 ± 15 15	50.3 ± 13.5 17	46.5 • 15 - 20	48.3 ± 13 14	45.1 ± 13 16
Fat (% Energy)*	35	37	34	35	38	37
CHO (% Energy)*	50	48	49	50	48	47
Vitamin C (mg)**	40	78 ± 42	64 ± 29	40	94 ± 68	75 ± 23
Iron (mg)**	8.7	7.0 ± 2.0	7.3 ± 2.5	19-50yr 14.8 50+yr 8.7	7.0 ± 2.1	7.4 ± 2.4
Calcium (mg) *	700 •	615± 127	521± 126	700 •	600± 232	479± 127
Zinc (mg) **	9.5	5.2± 1.3	5.5± 1.9	7.0	5.3± 1.7	5.3± 2.0
Folate (µg)**	200	139 ± 45	144 ± 67	200	153 ± 49	145 ± 47
Vitamin D (µg)*	65+ yr 10	1.4 ± 0.4	2.0 ± 0.6	65+ yr 10	1.8 ± 1.0	1.7 ± 0.7

*Recommendations from Dietary Reference Values (Department of Health 1991)
**Recommendations from The Nutrition Guidelines for Hospital Catering (Department of Health 1995)
♦ Estimated Average Requirement (EAR) with PAL=1.4
• Reference Nutrient Intake (RNI)

Figure 15 identifies the percentage of patients meeting dietary recommendations as described in The Dietary Reference Values (1991) and The Nutrition Guidelines for Hospital Catering, (1995a). Results for the trolley food service system are given as contribution to nutritional intake and are similar for both styles of delivery.

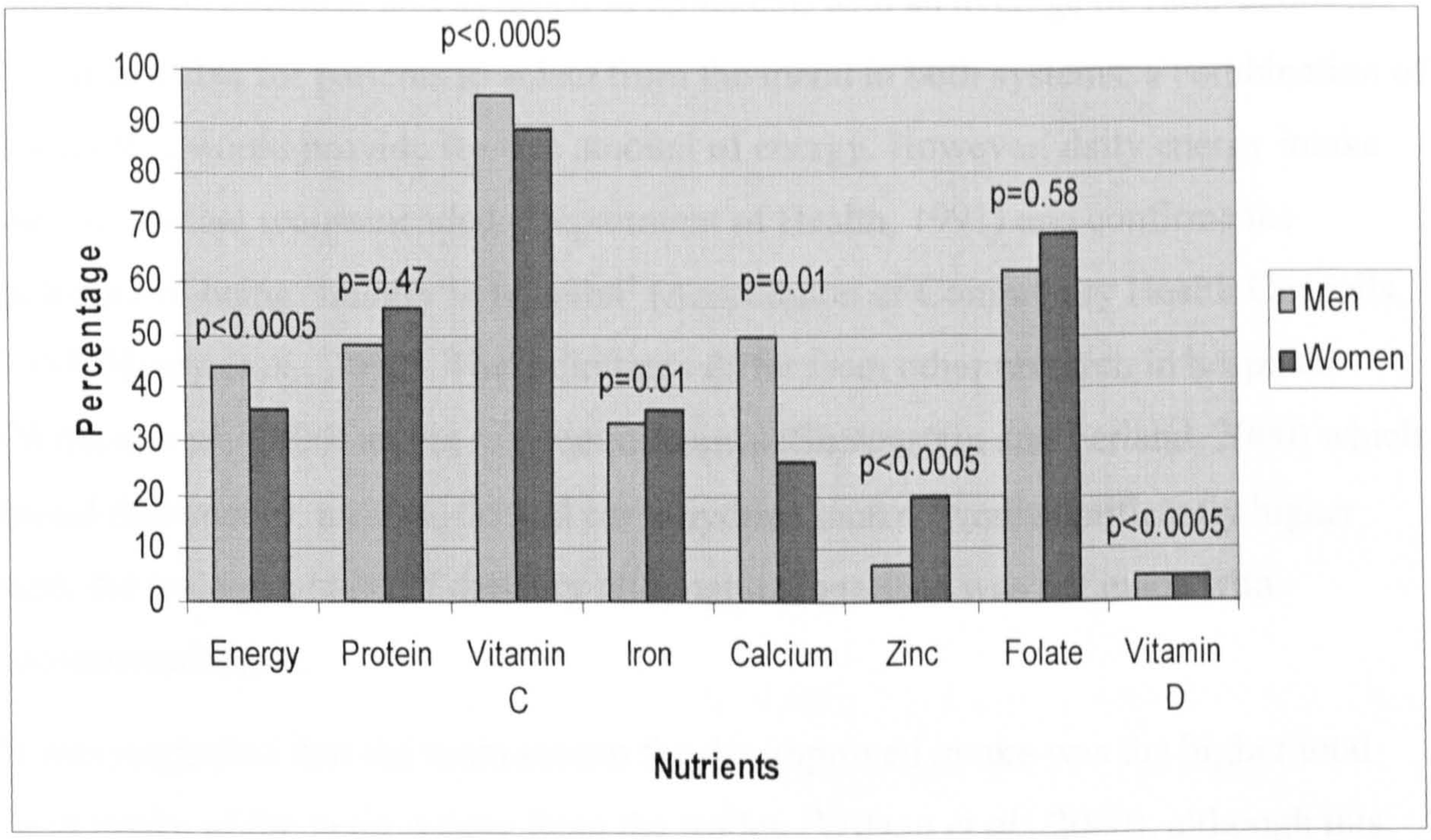

Figure 15 Patients meeting dietary recommendations according to The Dietary Reference Values, 1991 and The Nutrition Guidelines for Hospital Catering, 1995 for the trolley system of delivery

Body Mass Index (BMI)

Changes in body weight are a crude but useful indicator to ascertain if patients are being adequately fed, 1lb in body weight equates to 3640kcal (Food Standards Agency, 1995).

Mean BMI on admission (n=18) for patients during the trolley system of delivery varied between 20.7 (normal weight) and 41.8 (obese). The length of stay was between 6 and 14 days. There was no statistical difference in the figures for BMI on discharge.

5.1.1.2 Interpretation

Energy

The Nutrition Guidelines for Hospital Catering (Department of Health, 1995a) recommend that throughout the day, the menu should be capable of providing a minimum of 1200kcal and as much as 2500kcal, with an average of 1800-2200kcal. It was possible for patients to select from the menu in both systems, a combination of dishes that would provide for this amount of energy. However, daily energy intake was below that recommended (Department of Health, 1991) and confirms the potential of being 'hungry in hospital' (Association of Community Health Councils, 1997; Henry *et al.*, 2002). These findings differ from other research in hospitals (Wilson *et al.*, 2000) and in residential homes (Shatenstein and Ferland, 2000) which found that energy, protein, fat and carbohydrate intakes were significantly higher with the trolley method of delivery although comparison was not made with recommendations.

It was suggested that the main reason for the improved intake was the higher total food intake of the main course from the trolley (Wilson *et al.*, 2000), although this study was small, 51 meals for the plate service and 57 meals for the trolley service were weighed; and increased portion sizes (Shatenstein and Ferland, 2000), although in the latter research visual estimation of patient intake was conducted. In the present study neither increased main course intake or portion size was observed with the trolley system of delivery.

Using the estimated energy expenditure based on patient's weight (Flanigan, 1997), the calorie requirement for the patients weighed and measured (n=18) would be between 1,100 and 2,000 kcal (however, no correction has been made for metabolic response to stress). Data show that patients' energy consumption were within this range particularly, if the nutritional value of snack intake is considered, although not measured in this study. If snacks were also to be taken into account they would certainly contribute to the overall daily nutrient intake and could provide as much as 22% of daily energy intake and 17% of protein intake (Dupertuis *et al.*, 2003). However, to be consistent, as not all patients have visitors, particularly the elderly who often rely solely on the food provided by the institution and do not make up any deficit, (Frost *et al.*, 1991)) snacks were not included in the analysis.

Notwithstanding, comparison with BMIs would suggest that in this case study, energy intake was sufficient and therefore it can be surmised, either Dietary Reference Values (Department of Health, 1991) may not be an appropriate standard for energy intake evaluation of hospital patients or the contribution of snacks to energy intake is an important factor. Other research has demonstrated that there is a discrepancy between minimum needs and recommended needs. Dupertius *et al.* (2003) found 43% of patients in hospital were below their minimum needs whereas the number increased to 70% when the recommended needs were considered.

There is also a variation in the methods and factors used to estimate energy needs, resulting in a wide range of calculated requirements. Research has shown that estimates by dietitians using the Schofield equations calculate the highest mean energy intake and the selection of injury factors can be inconsistent (Reeves and Capra, 2003).

A point to consider when setting minimum standards is food wastage (Frost, 2003). Should the recommendations be based on the amount served or the amount consumed? There is confusion and inconsistency with regard to appropriate energy recommendations for hospital patients, debate needs to be extended and current, relevant guidance given.

Healthy eating guidelines were followed by the caterers as demonstrated by the energy contribution to the meal of both fat and carbohydrate. Although the concept of healthy eating is a good one it may not always promote adequate intake in hospital (Allison, 1999).

Protein

The Nutrition Guidelines for Hospital Catering (Department of Health, 1995a) state that each main meal should provide a minimum of 18g protein (a main meal is defined as one which includes accompaniments such as potatoes and other vegetables but does not include a sweet), this equates to 0.7g/kg/day of protein. It is suggested by the British Association for Parenteral and Enteral Nutrition (BAPEN) (Allison, 1999), that the requirements of hospital patients are greater than this due to the varied metabolic effects of different disease states and wound healing. Therefore a recommendation of 1.1 to 1.5g/kg/day, or 15-20% of total energy intake is made.

This level of intake needs to be accompanied by an adequate energy intake if optimal protein utilisation is to be achieved.

Results (Table 9) from this study indicate that protein intake may be unsatisfactory for hospital patients recovering from surgery.

Vitamin C and Folate

The Nutrition Guidelines for Hospital Catering (Department of Health, 1995a) state that the menu should provide for an adequate intake of vitamin C by offering fruit juice once a day and by offering fresh fruit and vegetables or salad at the midday and evening meals. Patients in this hospital were able to, and freely select fruit juice offered at breakfast, midday and evening meals, thus ensuring a good intake of this nutrient. A healthy adult requires 40mg/day although for promotion of wound healing 100-200mg/day is advised (Flanigan, 1997). Therefore, intake again for this nutrient may not be sufficient for patients recovering from surgery.

Intake of folate was lower than recommended; however, nutritional data from a study such as this also need to take into consideration deterioration in water-soluble and heat labile nutrients which occur during the cooking, and distribution of food. The time lapse between food being cooked and actual consumption is important. Potatoes kept hot for one to two hours will have lost most of their vitamin C and green vegetables will have lost three-quarters of this vitamin (McGlone *et al.*, 1997). Folic Acid is particularly heat labile and losses during cooking and hot-holding may therefore be considerable (Fenton *et al.*, 1995).

Caterers took an hour to assemble trays on the plated belt system with the two wards selected as the sample at the end of the 'run'. Delivery then took another thirty minutes by 'train'. Food was therefore kept hot for between one and two hours and the nutritional integrity of the meal as consumed would have been compromised. The trolley service was swifter with the trolleys being loaded just prior to distribution.

Iron, Calcium, Zinc and Vitamin D

The mean intake of iron was less than the EAR (6.7mg) suggesting that over half the patients were receiving less than their requirements. Mean calcium, zinc and vitamin D intake was also significantly lowered compared to recommendations. Orthopaedic patients are identified as having additional requirements for these nutrients

(Department of Health, 1995a). Vitamin D intake is particularly important when lack of exposure to sunlight is considered as in the case of hospital patients.

5.1.2 Food Temperatures

5.1.2.1 Results

Plated Meal System

The temperatures of hot food items on the conveyor belt were within the Food Safety (Temperature Control) Regulations 1995, and for example, the temperatures of selected foods served at the evening meal are summarised in Table 10. All foods including high risk[15] were between 70^0C and 80^0C. However, although the hot food items were at an appropriate temperature while being plated, they were not hot enough when actually served to the patients.

Table 10 Mean core temperature of foods served at the evening meal by the plate system of food delivery

Food	Temp^{0}C (belt)	Temp^{0}C (plate as served)	Temp^{0}C (difference)
Chicken soup	82.0	51.3	-30.7
Beef lasagne	86.0	52.0	-34.0
Ham (gammon)	87.0	38.8	-48.2
Shepherds pie	78.8	58.0	-20.8
Cauliflower cheese	80.0	60.3	-19.7
Tuna/sweetcorn (cold)	<5	25.1	+20.1
Cold boiled egg (on plate)	17.8	18.9	+1.1
Fruit trifle	<5	16.8	+11.8

Bulk Trolley System

Dishes are kept hot even when opened with the assistance of overhead heating lamps and remain hot as the nurses' progress around the ward. Therefore, foods were significantly hotter ($p<0.05$) when served as summarised in Table 11. However, some dissipation of heat was found from foods such as soups with a large surface area and most dishes registered a temperature of below 63^0C by the time service was completed.

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[15] High risk foods are defined as those most likely to be microbiologically contaminated and/or are intended for consumption without further treatment

Table 11 Mean core temperature of foods served at the evening meal by the trolley system of food delivery

Food	Temp^{0}C (service commence)	Temp^{0}C (service finish)	Temp^{0}C (difference)
Minestrone soup	73.2	58.0	-15.2
Minced beef	69.0	66.0	-3.0
Pork cutlet	64.0	59.7	-4.3
Sausages	63.0	58.2	-4.8
Fish fingers	68.5	60.8	-7.7
Jacket potato	68.0	66.1	-1.9
Macaroni cheese	65.0	62.0	-3.0
Carrots	76.0	50.0	-26
Rice pudding	73.0	63.2	-9.8
Ice-cream	-3.2	-3.2	0
Chilled Mousse	-4.1	-4.1	0

5.1.2.2 Interpretation

Within The Food Safety (Temperature Control) Regulations, 1995, there is some flexibility (tolerances) where food normally requiring temperature control may be kept above 8^{0}C for a single period of up to four hours. However, when dealing with a vulnerable group, extreme care should be taken and four hours should be regarded as an absolute maximum period.

Plated Meal System

There is cause for concern with the plated system of food delivery, not only for the hot foods cooling down, but also for the chilled foods warming up and this ambient temperature being sustained.

Cold desserts and salads, where they were left in the kitchen for the duration of the belt run in the plated service system, (approximately one hour), reached temperatures in excess of the recommendations. The temperature of a boiled egg for an egg salad, for example, was 17.8^{0}C. This variance was also because, once a ward food order had been 'plated', the trays were stored in a pre-heated cabinet with the chilled foods in an ambient compartment, awaiting delivery by a kitchen porter. In some instances, chilled food was at room temperature in excess of two hours.

The temperature of the pre-heated hot cabinet for the plated system reached 118^{0}C. However due to the antiquated nature of this equipment, and the time taken to arrive on the wards, heat dissipated quite quickly. Cabinets registered temperatures of 88^{0}C

after a journey that in some instances took up to 30 minutes. Temperatures of hot dishes on the belt were within Food Hygiene Regulations, however when delivered to patients were as low as 39^0C. The food may only keep hot with varying degrees of success and for a relatively short time, cabinets are not capable of being plugged into an electrical point when on the ward. Temperatures therefore are very much dependent on the integrity of the cabinet equipment.

On the ward, nurses or health care assistants, when free, delivered the trays to patients. Quite often, meal times were delayed due to ward rounds and 'medical emergencies'. Therefore, the temperature of food delivered to the patient was less than satisfactory. Steps were subsequently taken by the caterers to rectify this situation by, for example, putting the ice cream in insulated beakers. Unfortunately due to the length of delivery time from belt to patient, the ice cream still melted.

Bulk Trolley System

In the bulk trolley system, the hostess trolley is plugged into a power supply before being loaded in the kitchen, and remains so until collected by a porter for delivery to the ward. The temperature integrity of the food is, therefore, easier to maintain, particularly as the trolley, arriving on the ward is again plugged in.

5.1.3 Food Wastage

5.1.3.1 Results

Methodology for this part of the study involved weighing food waste remaining on the plate for both systems and on the service trolley for the trolley system.

Wastage is defined as avoidable waste, that is food which could have been eaten but was not (Kirk and Osner, 1981). Food delivered by the trolley system is more prone to wastage, and results from this research confirm these findings as demonstrated in Table 12. However, plate waste was significantly less with this mode of delivery.

Table 12 **Food wastage by meal service system**

Plate system of delivery Waste (%)		Trolley system of delivery Waste (%)	
Plate (n=31)	**Belt**	**Plate (n=31)**	**Trolley (n=9)**
11.6 ±3.0%	None (any food remaining goes into staff restaurant)	5.9 ±1.9%	20.5 ±5.2%

5.1.3.2 Interpretation

Wastage rates from this study reflect the literature which shows that the plate service generates more waste on the tray, but with the trolley service more is left on the trolley (Hackes *et al.*, 1997; Edwards and Nash, 1997). Waste from the plate system of food delivery was comparable to figures achieved by other meal sectors such as schools (Osner, 1982) and plate waste for both these food service systems was within guidelines of 10-15%, suggested by Wilson, (2000). However, the waste left on the trolley was high at 20.5%. Although inevitable if a wide choice is to be provided, this could be a consequence of poor ordering. One of the initiatives now being piloted in this hospital is to telephone wards two hours before service for final meal numbers. Preliminary results suggest that this could reduce total wastage by 30%.

5.1.4 Patient Satisfaction with Hospital Food

Methodology for this part of the study involved administering questionnaires before and after midday and evening meals for both plated and bulk trolley system of delivery.

The demographic distribution of respondents is summarised in Table 13.

Table 13 The demographic characteristics of patients (n=614)

CHARACTERISTIC	Plate system of delivery %	Trolley system of delivery %
SEX		
Female	59.0	59.0
Male	41.0	41.0
AGE		
20-29	3.6	3.6
30-39	4.6	2.6
40-49	4.3	5.9
50-59	10.9	16.5
60-69	22.8	26.1
70-79	39.7	30.4
80-89	13.9	14.9
LENGTH OF STAY		
1 day	10.3	16.2
1-3 days	17.9	15.2
1 week	23.3	9.2
More than 1 week	47.8	59.4

Slightly more females than males completed questionnaires and the age profile was towards the older population. The length of stay was influenced by the nature of orthopaedic surgery, with over half the patients staying for more than one week. Eighty eight percent of respondents had either been admitted or visited someone in hospital and therefore had previous experience of this environment. There were no significant differences between the sample groups, male and female.

5.1.4.1 Results

The results of the patient satisfaction questionnaire for both midday and evening meals are summarised in Table 14.

Table 14 Patient satisfaction rating by food service system[a]

	Plate system (n=312)		Trolley system (n=302)		
Questions	**Mean**	**Median**	**Mean**	**Median**	**p value**
Before the meal					
1. How do you rate your hunger?	3.6 ±1.7	4.0	4.1 ±1.7	4.0	.557
2. How much are you looking forward to your meal?	4.5 ±1.6	5.0	4.9 ±1.5	5.0	.001
3. How appealing do you think that the meal will be?	4.8 ±1.4	5.0	4.8 ±1.3	5.0	.948
4. How tasty do you think the food will be?	4.6 ±2.0	5.0	4.9 ±1.3	5.0	.271
5. How satisfied do you expect to be with your meal?	5.0 ±1.7	5.0	5.1 ±1.2	5.0	.201
After the meal					
6. How do you rate your hunger?	5.4 ±1.8	6.0	5.8 ±1.5	7.0	.976
7. How well did the portion size match expectation?	5.5 ±1.2	6.0	5.9 ±1.0	6.0	.001
8. How would you rate the presentation of your meal?	5.1 ±1.4	5.0	5.6 ±1.0	6.0	<0.0005
9. How appealing was the meal?	4.6 ±1.5	5.0	5.3 ±1.2	5.0	<0.0005
10. How tasty was your food?	5.0 ±1.5	5.0	5.6 ±1.1	6.0	<0.0005
11. How satisfied were you with your meal?	5.1 ±1.9	5.0	5.7 ±1.1	6.0	<0.0005
12. How would you rate the overall standard of catering in this hospital?	5.8 ±2.3	6.0	6.8 ±1.4	7.0	<0.0005

[a] scoring system; questions 1 – 9, seven point scale where 7= very good, 6=quite good, 5=fairly good, 4=neither, 3=fairly poor, 2=quite poor, 1= very poor question 10, nine point scale where 9= excellent, 8= very good, 7=quite good, 6=fairly good, 5=neither, 4=fairly poor, 3=quite poor; 2= very poor, 1= extremely poor. Questions 1 and 6, the scoring system is transposed: before a meal, very hungry = 7 and after the meal, very hungry = 1.

Patients were hungry before their meals and satisfied post consumption with no significant difference between meals and service system; although, there is evidence that the trolley system was more likely to leave the patient less hungry after eating a meal.

The expectations of patients did not vary significantly between the two food service systems and with both systems of delivery, the patients were satisfied. Patients had higher feelings of anticipation without prior knowledge of the menu as in the trolley system of delivery (Table 14; question 2) but more significant differences were present in post consumption questions. There are no significant differences in the predicted appeal (Table 14; question 3) of the meal between the two service systems. However, although diminished by plate delivery, actual appeal was significantly enhanced by the trolley. Portion size was obviously easier to match to expectation with this type of delivery. The menu in the plate system offered different portion sizes but more specific portion measurements or future explanations were not given. Results indicate that presentation, temperature, flavour and satisfaction were all rated significantly higher with the trolley system of food service. This was also reflected in the evaluation of the overall standard of catering which was significantly enhanced when patients were allowed to make their choice at the point of consumption as in the trolley service. Ninety three percent of patients scored the overall standard of catering with a rating of 5 or higher with the trolley food service system compared to 76% with the plate system.

There was much criticism identified in this research from patients regarding menu ordering with the plate system,

'...this is not what I ordered'

'...the menu card was taken away too quickly'

'...I'm a new patient and haven't ordered'

Fifty percent of the patients on one ward with plated service did not have the opportunity to order their own evening meal and 58% could not remember what they had ordered. The former was due to a variety of reasons such as the ward clerk ordering for them, they were a new patient or they had been absent when the menu cards were collected.

Although comments from patients would suggest that the temperature of food was not satisfactory, there are conflicting results from the patient satisfaction survey.

The reoccurring theme from respondents was that the vegetables were too cold and the ice-cream 'mushy'. Other comments included,

'Every time it [the food] comes it's cold and I don't like the look of it on the plate'

'Anything cold is at room temperature; I wish that the ice cream could be solid'.

'Having the pudding with the main meal means that if it is hot, the pudding is then cold by the time you eat it'.

However, in response to the direct question 'Were the food items served at the correct temperature?' 76% responded in the affirmative for the plate system and 86% in the affirmative for the trolley system of delivery.

The service level gaps between expectation and perception as shown in Table 15 were significant ($p<0.005$) and revealed that patients were disappointed when food was delivered on the plate, particularly from the attribute of appeal. Conversely, patients were far more satisfied than they expected to be when food was delivered by trolley, thereby demonstrating positive disconfirmation. Meeting and exceeding patients' expectations is an important factor for satisfaction.

Table 15 Service level gap between patient perception and expectation for both systems of delivery using matched questions

Questions (Fairly/quite response)	Percentage Gap					
	Plate system of delivery			Trolley system of delivery		
	Before	After	Gap	Before	After	Gap
How appealing do/did you think that the meal will be/was?	63	61	-2	64	67	+3
How tasty do/did you think that the meal will be/was?	64	62	-2	64	71	+7
How satisfied do you expect to be/were you with your meal?	70	61	-9	78	92	+14

Patient specific characteristics such as age and gender were not significantly related to overall satisfaction.

5.1.4.2 Interpretation

Patient's expectations of hospital food were not high,

'...having heard so much criticism of hospital food in general, I was not expecting too much and therefore was pleasantly surprised'

'...can anyone look forward to meals in hospitals?'

Satisfaction, therefore, may be a reflection of patients' low expectations and a reluctance to complain about food when care is a priority. Notwithstanding, the trolley system of food delivery better matches patient expectation, enhances meal experience and subsequently consumer satisfaction.

5.1.5 Patient Satisfaction with Core Foods

Methodology for this part of the study involved administering a consumer opinion card during both food service systems while patients were consuming their meal. Questions were asked relating to the temperature, texture, flavour, portion size and opinion of core foods; carrots, broccoli, minced beef fish, poached fish dish, creamed potato and a cold pudding.

5.1.5.1 Results

Mann-Whitney U Analysis

Results of the consumer opinion/satisfaction card (n= 62) are summarised in Table 16. A significant effect of temperature for the minced beef, poached fish and potato dish was shown. Further investigation revealed that these dishes were significantly hotter served by the trolley system. However, it was observed that the vegetables; carrots and broccoli, were spread out in the gastronome pan on the bulk trolley, dissipating heat, mirroring the situation found on a plate. Temperature, therefore, of these items demonstrated no significant difference between the two food service systems. Flavour of the vegetables and fish dish together with texture for all foods however, were significantly enhanced by the bulk trolley system of food delivery. There was a significant difference ($p \leq 0.05$) in portion size for broccoli and potato. Overall patients' opinion showed that the broccoli, creamed potato, and fish dish benefited by choice at the point of consumption. Satisfaction with cold desserts such as trifles was found not to be dependent on the delivery system.

Table 16 Comparison of core foods (hot) by food service system (n=62)

	Broccoli		Carrots		Potato		Poached Fish		Minced Beef	
Attributes	**U***	**p**	**U***	**p**	**U***	**p**	**U***	**p**	**U***	**p**
Temperature	372	0.286	363	0.056	374	0.007	264	0.001	188	<0.0005
Flavour	109	<0.0005	205	<0.0005	416	0.072	213	0.001	355	0.302
Portion Size	121	<0.0005	480	1.00	445	0.015	420	0.734	344	0.154
Texture	292	0.023	250	0.001	291	0.001	234	0.002	228	0.002
Overall Opinion/ Satisfaction	219	0.001	356	0.065	356	0.011	211	0.001	325	0.131

*U is the Mann-Whitney statistic

Binary Logistic Regression Analysis

Table 17 shows the summary statistics of binary logistic regression for the model of food service that was calculated before the procedure terminated. This procedure initially classifies all cases to the plate service (0). As the model progresses and terminates, some cases are reassigned to the trolley service (1) and a predicted probability of membership to food service system is achieved. The overall 'goodness of fit' of the model was assessed using the Hosmer and Lemeshow test, and was found not to be significant showing that the model reasonably fitted the data. The Nagelkerke R-squared statistic indicates that the model as fitted explains 20.6 % of the variability and classification improved by 15%. The conclusions that can be drawn, therefore, are only a tentative indication of strength of relationship. The results of the logistic regression analysis indicate that there was a significant influence between the two independent variables, portion size and texture and the dependent variable, food service style. This suggests that the texture of food is influential in assigning a case to the trolley system of delivery, whereas the attribute portion size is related to the plate system.

Table 17 **Summary of statistics of Binary Logistic Regression for food service model**

Variables	B	S.E.	Wald	df	p	Exp(B)
Temp			5.59	4	0.23	
Temp(1)	-20.93	21983.5	0.00	1	1.00	0.00
Temp(2)	-0.95	1.34	0.51	1	0.48	0.39
Temp(3)	0.25	1.26	0.40	1	0.84	1.28
Temp(4)	0.30	1.25	0.06	1	0.81	1.35
Flavour	0.01	0.14	0.01	1	0.96	1.00
Size			24.07	5	<0.0005	
Size(1)	-3.30	1.70	3.78	1	0.05	0.04
Size(2)	-3.90	1.12	12.13	1	<0.0005	0.02
Size(3)	-3.54	0.93	14.51	1	<0.0005	0.03
Size(4)	-2.28	0.87	6.85	1	0.01	0.10
Size(5)	-1.98	0.95	4.36	1	0.04	0.14
Texture	0.41	0.13	10.39	1	0.001	1.51
Constant	0.42	1.52	0.08	1	0.78	1.52

Where B=log-likelihood if term is removed from model (raw coefficient), S.E=standard error of B, Wald=statistic answering question which parameters are not necessary in the model, i.e. the model is not significantly degraded by deletion of this parameter, df=degrees of freedom, $p \leq 0.05$ significance to 95%, Exp(B)=coefficient or the multiplier of a variable category that determines the probability that a case is assigned to plate (0) or trolley (1) service style.

A diagrammatic representation is presented in Figure 16.

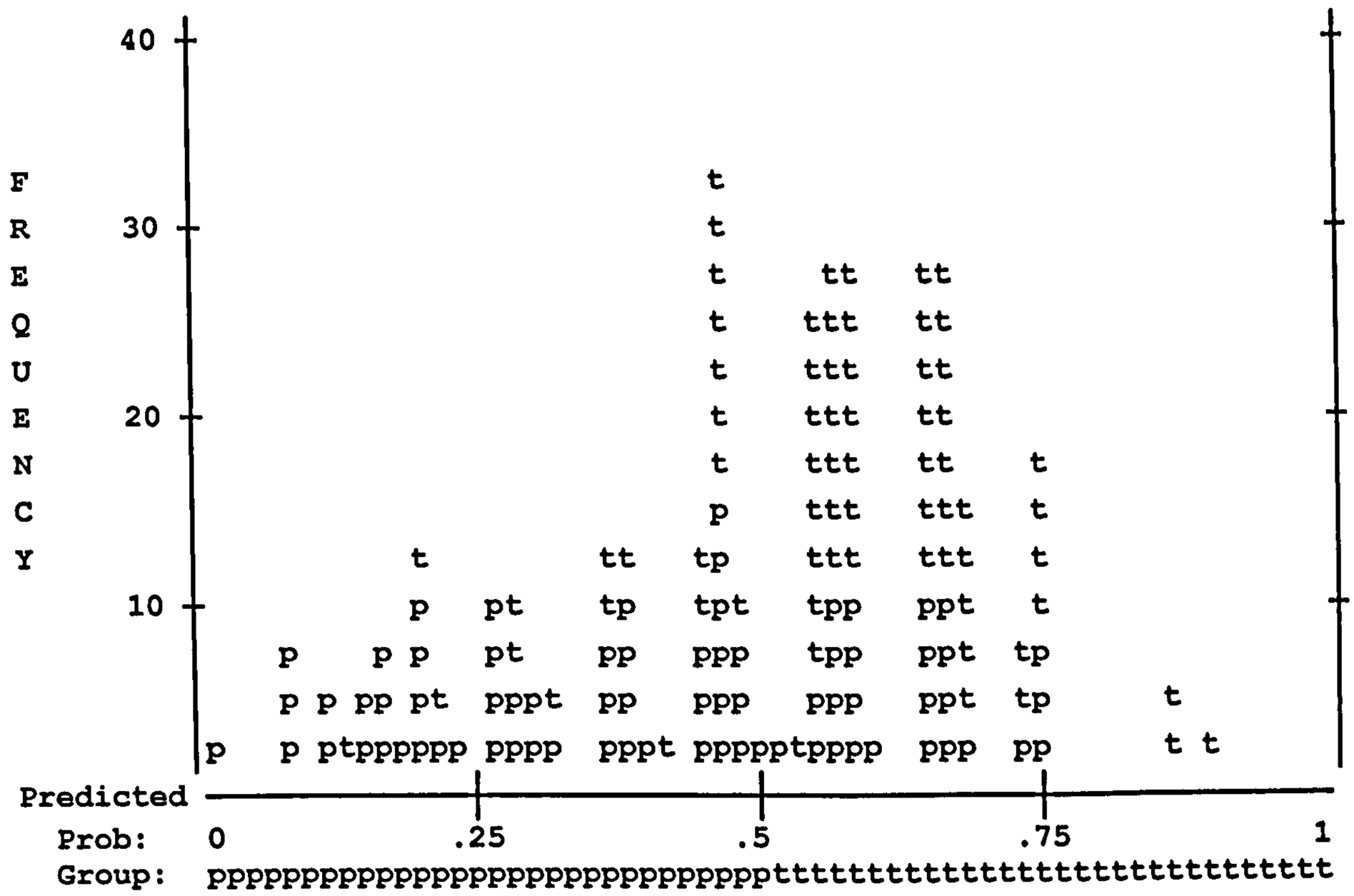

Figure 16 A diagrammatic representation of food service system by Binary Logistic Regression Analysis

Multinomial Logistic Regression Analysis

Multinomial logistic regression was used to predict opinion using the quality attributes of selected core foods. The categorical variables, temperature and portion size, were recoded from a 'just about right' scale into an ordinal scale (level 1-4) and then multinomial logistic regression analysis conducted on both serving systems, plate and trolley.

Plate system of delivery

The Nagelkerke R-squared value (0.72) demonstrated that 72% of the variance was explained by the model and classification improved by 29%. Results are presented in Table 18.

Table 18 **Summary of statistics of Multinomial Logistic Regression for plate food service model and satisfaction**

OPINION[a]		B	Std. Error	Wald	df	Sig.	Exp(B)
2.00	Intercept	39.860	7.175	30.865	1	.000	
	TEMP	-2.879	1.008	8.157	1	.004	.056
	FLAVOUR	-4.362	.995	19.216	1	.000	.013
	SIZE	-1.511	1.210	1.559	1	.212	.221
	TEXTURE	-2.746	.829	10.965	1	.001	.064
3.00	Intercept	35.371	6.258	31.947	1	.000	
	TEMP	-2.313	.889	6.761	1	.009	.099
	FLAVOUR	-3.050	.707	18.600	1	.000	.047
	SIZE	-1.608	.919	3.061	1	.080	.200
	TEXTURE	-2.586	.656	15.564	1	.000	.075
4.00	Intercept	24.061	4.218	32.542	1	.000	
	TEMP	-1.876	.691	7.374	1	.007	.153
	FLAVOUR	-1.977	.428	21.310	1	.000	.139
	SIZE	-.343	.608	.319	1	.572	.709
	TEXTURE	-1.469	.365	16.194	1	.000	.230
5.00	Intercept	18.592	3.956	22.087	1	.000	
	TEMP	-1.915	.674	8.085	1	.004	.147
	FLAVOUR	-1.504	.392	14.715	1	.000	.222
	SIZE	.327	.590	.307	1	.579	1.387
	TEXTURE	-1.127	.339	11.069	1	.001	.324
6.00	Intercept	13.735	3.481	15.565	1	.000	
	TEMP	-1.839	.652	7.970	1	.005	.159
	FLAVOUR	-.656	.353	3.452	1	.063	.519
	SIZE	-.027	.463	.003	1	.954	.973
	TEXTURE	-.656	.303	4.695	1	.030	.519

a The reference category is: 7.00.

Where opinion 7 = very good, 6 = good, 5 = slightly good, 4 = neutral, 3 = slightly bad, 2 = bad and 1= very bad

Where B=log-likelihood if term is removed from model (raw coefficient), S.E=standard error of B, Wald=statistic answering question which parameters are not necessary in the model, i.e. the model is not significantly degraded by deletion of this parameter, df=degrees of freedom, $p \leq 0.05$ significance to 95%, Exp(B)=coefficient or the multiplier of a variable category that determines the probability of that category (above 1 increases the probability and less than 1 deceases the probability).

Trolley system of delivery

The Nagelkerke R-squared value (0.72) demonstrated that 72% of the variance was explained by the model and classification improved by 24%. Results are presented in Table 19.

Table 19 **Summary of statistics of Multinomial Logistic Regression for trolley food service model and satisfaction**

OPINION[a]		B	Std. Error	Wald	df	Sig.	Exp(B)
2.00	Intercept	50.836	8.578	35.121	1	.000	
	TEMP	-7.976	1.639	23.671	1	.000	.000
	FLAVOUR	-.545	1.041	.274	1	.601	.580
	SIZE	-2.591	1.435	3.260	1	.071	.075
	TEXTURE	-2.778	1.138	5.959	1	.015	.062
3.00	Intercept	40.207	7.079	32.258	1	.000	
	TEMP	-4.899	1.104	19.682	1	.000	.007
	FLAVOUR	-2.680	.774	11.986	1	.001	.069
	SIZE	-1.422	1.101	1.669	1	.196	.241
	TEXTURE	-.908	.698	1.689	1	.194	.404
4.00	Intercept	33.312	6.627	25.270	1	.000	
	TEMP	-3.613	.976	13.699	1	.000	.027
	FLAVOUR	-2.962	.676	19.175	1	.000	.052
	SIZE	-.419	1.067	.154	1	.694	.658
	TEXTURE	-.743	.546	1.852	1	.174	.476
5.00	Intercept	15.592	5.423	8.266	1	.004	
	TEMP	-.833	.836	.993	1	.319	.435
	FLAVOUR	-1.483	.409	13.184	1	.000	.227
	SIZE	-.256	.640	.159	1	.690	.774
	TEXTURE	-.539	.376	2.061	1	.151	.583
6.00	Intercept	12.111	4.516	7.194	1	.007	
	TEMP	-1.576	.700	5.068	1	.024	.207
	FLAVOUR	-.455	.358	1.620	1	.203	.634
	SIZE	.329	.544	.365	1	.546	1.389
	TEXTURE	-.722	.330	4.783	1	.029	.486

a The reference category is: 7.00.

Where opinion 7 = very good, 6 = good, 5 = slightly good, 4 = neutral, 3 = slightly bad, 2 = bad and 1= very bad

Where B=log-likelihood if term is removed from model (raw coefficient), S.E=standard error of B, Wald=statistic answering question which parameters are not necessary in the model, i.e. the model is not significantly degraded by deletion of this parameter, df=degrees of freedom, $p \leq 0.05$ significance to 95%, Exp(B)=coefficient or the multiplier of a category that increases probability of that category (above 1 increases the probability and less than 1 deceases the probability).

When overall satisfaction is considered in a continuous way for both styles of food service, it is predicted by the attributes of temperature and texture. As satisfaction groups are created (bad opinion, slightly bad, neutral, slightly good and good) it can be seen that for the plate system of delivery the attribute flavour could be important too. Results are rather contradictory for the trolley system of delivery. The literature

suggests that in reality there may be little substantive difference between someone who is very satisfied and someone who is somewhat satisfied (O'Hara *et al*, 1997).

5.1.5.2 Interpretation

Taking an overview and using the three different approaches to data analysis (Mann-Whitney U, Binary Logistic Regression and Multinomial Regression), it is reasonable to assert that, temperature and overall flavour attributes were not significantly different between the two styles of food service, conversely portion size and texture of food are different. However, consumer satisfaction is dependent on temperature and texture attributes. Portion size was not found to influence satisfaction and therefore the attribute 'texture' appears to be the main dimension in this case study which relates patient satisfaction with food service and the trolley system of delivery. A predictive model of the factors involved in consumer satisfaction with two food service systems is presented in Figure 17.

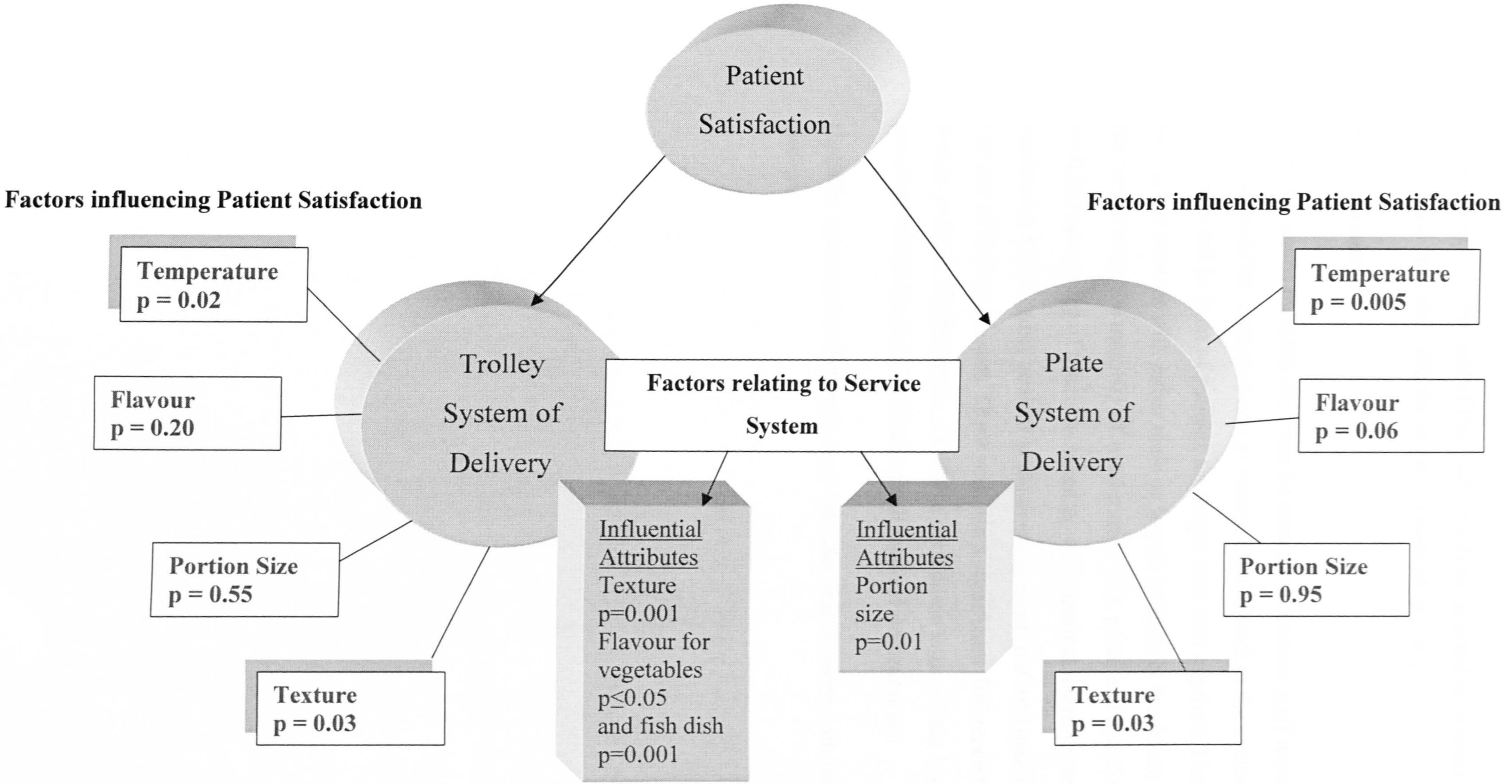

Figure 17 **A predictive model of patient satisfaction with two food service systems**

(Significance of terms within the model are shown and influential terms are shadowed)

5.2 Empirical Study Two: Operational Analysis of Hospital Food Service

Methodology for this part of the study involved detailed structured observation during meal episodes with the trolley system of delivery.

5.2.1 Results

From the results in Table 20, it can be seen that domestic staff were quick to clear the trays at breakfast. However due to change over of staff at the evening meal, used trays were left in front of patients for longer than was required. There was no social facilitation evident with either male or female patients at breakfast; however this was the period when the majority of ward rounds took place and therefore a significant ($p \leq 0.05$) percentage of time was taken up with medical interruptions. Social facilitation significantly peaked at the evening meal ($p \leq 0.05$) mainly due to the number of visitors present. There was also a significant difference between male and female patients. Furthermore, a positive correlation was evident between length of mealtime and both social facilitation and medical interruptions.

Empathy was constant between meal episodes and between both male and female patients.

Table 20 Results of operational analysis for male and female patients

Meal	Mean meal episode length∂ (minutes)	Mean time taken to eat meal (minutes)	Median number of interruptions	Median number of times staff empathise with patient	% of mealtime taken in social facilitation	% of mealtime taken in medical occurrences
Male	**Age range 65-84 years**					
Breakfast (n=6)	30 ±3.0	23 ±3.6	2.0	2.0	0.0 ±0.0[b]	10.9 ±2.3[ab]
Lunch (n=4)	44 ±2.3	22 ±4.4	1.0	2.0	2.0 ±1.0[a]	2.0 ±1.0[a]
Evening Meal (n=4)	89 ±2.4	31 ±4.5	0.0	3.0	10.8 ±5.4[ab]	0.0 ±0.0[b]
Female	**Age range 66-84 years**					
Breakfast (n=5)	33 ±4.9	27 ±2.3	1.0	1.0	0.0 ±0.0[a]	5.5 ±3.3[ab]
Lunch (n=6)	40 ±4.8	30 ±2.6	0.0	3.0	11.3 ±2.1[a]	0.0 ±0.0[a]
Evening Meal (n=5)	59 ±3.9	38 ±3.5	0.0	2.0	19.8 ±3.9[a]	0.0 ±0.0[b]

∂ meal episode = time from when food was delivered to bed and tray removed
Superscript letters denote significant differences ($p \leq 0.05$)

5.2.2 Interpretation

Empathy/understanding, relationship between patients and food service staff, communication, reliability and courtesy are all factors which have been identified important to patients (Tomes and Chee Peng Ng, 1995). Furthermore, patients wish to have a quiet and undisturbed meal (Deutekom *et al.*, 1991). Meal interruptions should therefore be kept to a minimum, and measures taken to curtail disturbances. Breakfast in this hospital was particularly busy, with consultant ward rounds, nursing hand overs and blood samples taken for analysis.

Staff interacting with patients during meal service can influence their food service satisfaction (Watters, 2003) and is beneficial because patients perceive emotional support (Bélanger and Dubé, 1996). Patient neglect can be manifested in a scenario as simple and mundane as a cold cup of coffee and therefore staff/patient empathy is

vital in the healing process (de Raeve, 1994). Nurses and ward hostesses were attentive to patients particularly during the midday and evening meals.

A congenial atmosphere and social facilitation have also been identified as factors to encourage intake (Hartwell and Edwards, 2000; Gibbons and Henry, 2003). Female patients were more likely to discuss the menus and encourage consumption than their male counterparts.

Although nursing staff or hostesses served the food and had oversight of meal times, discarded trays were collected by domestic employees. There appeared to be little communication regarding how much food was consumed and wasted as some of the domestic staff did not speak English. Time taken to clear dirty trays may well be influential in patient satisfaction and as such recommendations have been incorporated within the NHS Standard Service Level Specification (www.nhsestates.gov.uk). These are that:

'*dirty crockery, cutlery and uneaten food should be removed no more than 10 minutes after a patient has finished eating his/her food*'.

In this study, enough time was given for the slowest eater to finish their meal with the majority of meal episodes lasting longer than 30 minutes.

Feedback is of fundamental importance in any service situation not just for management issues but also crucial in identifying training needs. As long as enough data have been collected to define the performance profile fully, meaningful interpretation can be made and measures taken to improve practice. Hospital food service is an important link in the chain of treatment; however, constraints at ward level have been identified as factors contributing to nutritional decline (Toraman *et al.*, 2002).

5.3 Empirical Study Three: Patient Experience and Satisfaction with Hospital Food Service

Methodology for this part of the study involved conducting focus groups with doctors, nurses, ward hostesses, and patients together with their visitors while open ended interviews were conducted with the catering manager, facilities manager, chief dietician, orthopaedic ward dietitian and chief pharmacist.

Transcripts were analysed and themes formed through thematic hierarchical analysis augmented by previous research and centred on 'patients', 'food service' and 'meal times'. The tree diagram generated from analysis by NUD*ST is presented in Figure 18.

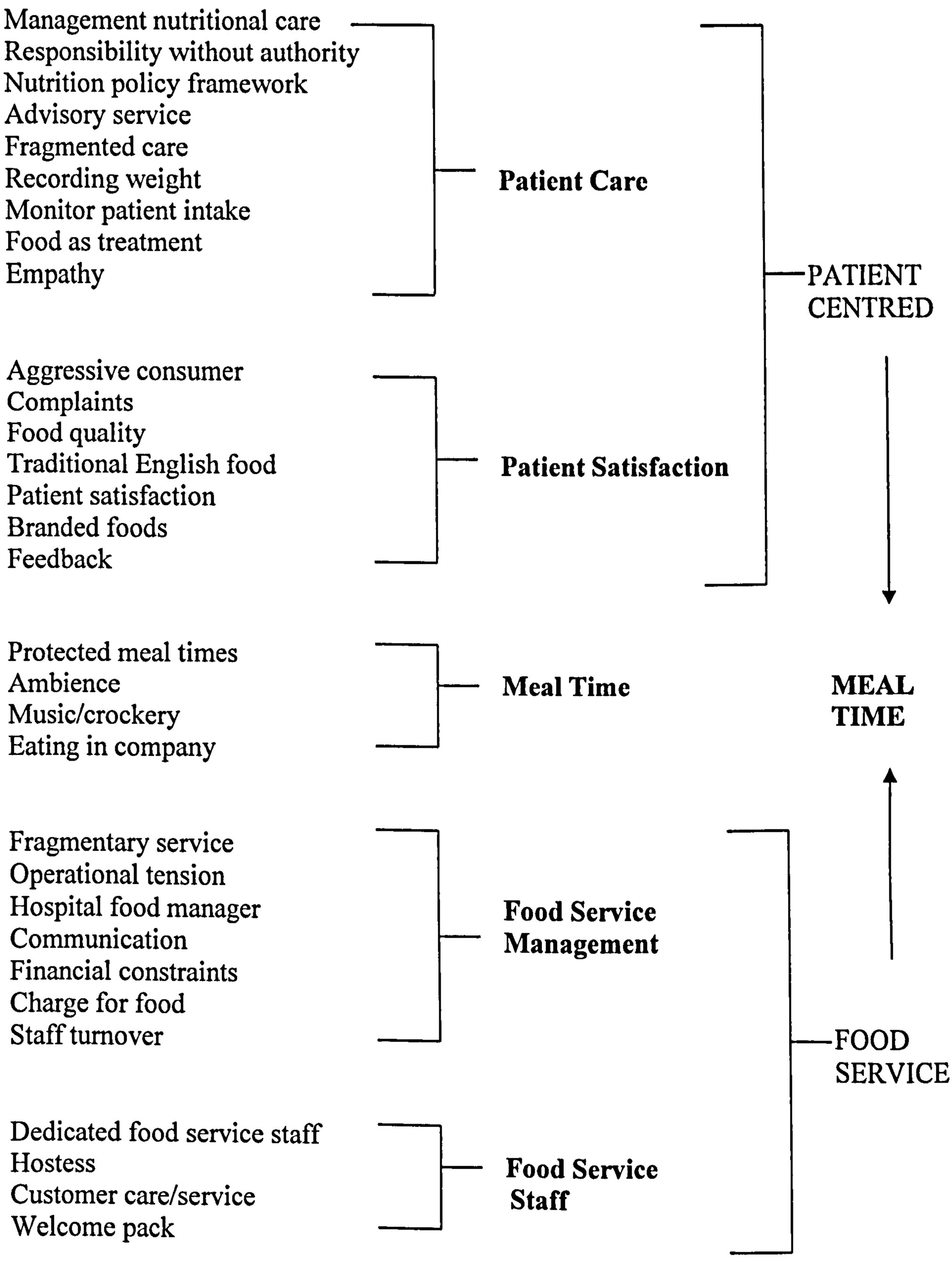

Figure 18 **Tree diagram for hospital food service using NUD*IST software program**

5.3.1 Patient Care

All clinical stakeholders were in accord, that there should be a nutritional policy framework and that this should be under the nursing directorate,

'...a clinical champion is needed for food' – chief pharmacist

'...an advocate (voice) is required at directorate level' - dietitian and nurse

The consensus amongst dietitians is that their function is more of an advisory service and they feel undermined in their role towards patient care. They have responsibility without authority as recommendations are made but not always implemented. An example was given where the chief dietitian had directed whole milk to be used on wards rather than semi-skimmed milk. However, this recommendation was over ruled by the ward manager and there was no further recourse on the matter.

It was agreed by medical staff that the management of nutritional care was not joined- up and communication was a problem particularly between hospital and primary health care teams. Patients are admitted to hospital, often compromised nutritionally and discharge information is not always followed up. The failure to recognise malnutrition is exacerbated by the lack of nutrition screening including the regular weighing of patients on admission and discharge. Several reasons were given by nurses for weighing not taking place, such as time factors, work loads and equipment availability, particularly for those patients in wheel chairs. However, all nurses agreed they saw themselves having the responsibility for the management of nutritional care and that recording of weight is fundamental and should be done,

'...there should be mandatory recording of weight on admission, you can't do nutritional assessment unless you've got a weight' - nurse

Doctors, however, were less forthright and agreed in principle but admitted, due to work schedules and other priorities, that nutritional screening was not automatic. They assumed that all pre-checks were completed prior to admission, as for elective surgery, the patient must be 'medically fit'. Continuous monitoring during a patient's stay was dismissed as,

'...this is a working hospital and we would expect the nursing staff to inform us if there was a problem' – doctor

Paradoxically, nursing staff expect the ward hostess to inform them of patients' experiencing difficulties. The monitoring of patient food and fluid intake is therefore

spasmodic, compounded by the division of duties on the ward. The hostess delivers the meal and checks patient status but domestics collect the used trays with little communication between the two. One solution suggested by a ward hostess was for them to be part of hand-over between duty teams so that they could be proactive in patient care. Nursing staff dismissed this idea as it was considered to be inappropriate and time consuming.

The chief dietitian suggested that there should be a '*weigh day*' once a week in hospital where every patient was weighed and monitored. A culture of check, document and assess should be encouraged and become routine, as currently takes place for blood pressure and temperature. It was also mooted that there should be differing reliance on food depending on the focus of the hospital. Rehabilitation hospitals should rely heavily on food as treatment, hospitals concentrating on elective surgery should have some concern and for acute hospitals maintaining vital signs/critical care should be the top priority with food an important adjunct.

The facilities manager recognised that the emphasis on food was changing and that its role in treatment was being highlighted. Even so,

'...models demonstrating that nutrition affects length of stay are published however, this is not being driven forward as an argument to increase the quality of food and help deliver a better service to the patient. 'They' seem to be too busy running around doing less strategic jobs' – facilities manager

Communication and empathy were considered to be essential components of patient care but unfortunately,

'...everybody is looking at things from their own perspective, coming from different directions and the poor patient is in the middle' – chief dietitian

5.3.2 Patient Satisfaction

Medical staff identified that patients are becoming more demanding and more critical, however, from the patient satisfaction survey in this study it is apparent that patients were reluctant to criticise the food and service too vociferously. One patient summarised their feelings,

'It's a hospital not a restaurant, everything is free, we are so grateful for the medical care'.

Notwithstanding, the caterers recognised that some patients came to hospital expecting a '*hotel like service'*, with the younger patient the most demanding,

'...the patients want a restaurant service from non-restaurant funding' – facilities manager

Generally though, patients thought the quality of food was better than expected and had improved from past experiences with this hospital. When asked to recount 'the best meal experience in hospital', answers reflected the importance to patients of correct temperature and food quality,

'*...my best hospital meal experience was where the food was just like at home, hot, and we ate it sitting around a table'*

'...the rice was nice yesterday, savoury rice with chicken – it was not stodgy at all'

'...the best dish was the lamb casserole; it was well cooked hot and tender'

These issues were also highlighted when asked to recount 'the worst meal experience in hospital',

'...hard cold cauliflower and watery mince'

'*...when I saw savoury mince on the menu I thought I'll go for that, but when it arrived it was bland watery and awful - patient.*

There was no mention in patient responses of empathy and/or delivery service attributes. Patients were then asked to rate in importance the criteria for an excellent hospital meal, and in descending order these were,

- *'Well cooked – hot food'*
- *'Tasty'*
- *'Well presented'*
- *'A smiley face and personality on meal delivery'*

Patient-server empathy and delivery service/experience did not rate as highly in a patient's cognitive schema for excellence as food quality. The ward hostesses confirm that the main complaints from patients refer to the temperature and texture of the food,

'...temperature and quality are the most important things about food' – patient

'...I put temperature on top, I would like to have my food heated up in the microwave but I don't like disturbing the nurses, they are always so busy. But there should be no need for that, it should be hot already. You never get a cold meal served in a restaurant and if you did you would complain' – patient

'...potatoes as hard as bullets – ugh' – patient

Patients are concerned and recognise the importance of food in their treatment,

'...food is important – if you are eating well you will not take so long to recover'

Generally though, there is disappointment about the quality,

'...we can put men on the moon but we can't get hot food in hospital' - patient.

Patients also commented on their preference for traditional food, such as,

'...chicken and mushroom pie, fish and chips and roast dinner'

This was endorsed by the catering manager who said that a popular dish in this hospital is pilchard salad.

Unfortunately, the Better Hospital Food menus were not met with universal approval,

'...it has not made a lot of difference' – catering manager

'...I haven't tried the dishes with chefs' hats' – patient

'...my wife said that looks horrible – the beef curry, and it did look very sad, it looked like I felt this morning, and it was stone cold but I ate it because I was hungry' – patient

'...chef's hats – patients don't understand the names, the food is dry, patients want good old fashioned meat and two veg' – ward manager

Initiatives to improve patient satisfaction have been introduced such as sliced cake for a snack and foil covered oranges, unfortunately though these individual packages are often difficult for patients to open. This then makes food service time consuming for the hostesses.

Another idea under discussion within this hospital is the use of branded foods for items such as coffee and soup,

'...patients would feel safe and secure, know what they were getting – rather like a comfort blanket, hopefully this would improve satisfaction' – catering manager

Patients were quite enthusiastic about the suggestion and felt that they would have trust in a known product.

'I would love a cup of Nescafé and Heinz tomato soup' - patient

Those patients who had experienced both the plate and trolley system of food delivery commented that they much preferred the latter.

'*One important factor I find in enjoying the meal is being able to see the choice before making a selection'*

'There is usually sufficient choice. I much prefer this method of distribution to the menu system because you cannot foresee how hungry you will be' – patient

There was also endorsement from dietitians,

'...with the plate it was like a ten second interchange, now it's 'would you like more carrots, how are you feeling today', far more interaction which must be good for the patient'

and from nursing staff who agreed that the trolley system of delivery did allow for greater patient/server interaction.

A common theme from patients was their inability and difficulty in providing feedback to the catering staff. The perception was that food was prepared some distance away by anonymous people who rarely came on the ward. Dissatisfaction was also expressed with the menu system where items were described without interpretation.

'Description on the menu does not fit reality' - patient

'I don't understand what a B.L.T. sandwich is or macedione of vegetables'- patient.

5.3.3 Meal Time

The potential of protected meal periods was greeted with enthusiasm by patients and hostesses,

'...we are all falling over each other in the morning – what with the blood lady, nurses and consultants' – hostess

but with caution by medical staff. Nurses' comments were,

'*...good in theory but impossible to work in practice'*

The doctors' response was equally as negative,

'...we don't know when the trolley is going to come on the ward, patients are washed in the morning and then visitors come – it's difficult to fit everything in'

However, medical staff recognised the importance from a patients' perspective,

'Meal times should be protected. I don't think there should be ward rounds, hand overs, I don't think we should stand at the end of the bed when someone is eating a meal. If there were half a dozen nurses standing at the bottom of my bed I don't think I'd want my dinner'. - nurse

Ambience of the ward was discussed and it was agreed by patients and medical staff alike that music would disturb,

'...patients may become confused particularly the elderly' - doctor

However, the opportunity to sit and eat a meal in company was welcomed especially by visitors,

'...eating with others is a good idea – a social thing, it's bad enough being in hospital' - visitor

Notwithstanding, nurses had reservations regarding space and intimated that patients were encouraged to get out of bed but often they were *'lazy'*.

There were no particular concerns regarding crockery, although a preference from patients was for china rather than stainless steel,

'...with the metal dishes, the lids are difficult to get off' - patient

5.3.4 Food Service Management

The main theme with regard to food service management was the fragmentary nature and difficulty of communication between the kitchen and wards. Caterers have to rely on kitchen porters for food delivery, ward staff have difficulty in communicating with caterers and dietitians/doctors are reliant on nurses to communicate any concern regarding patients. There was also evidence of tension between the hostesses and other ward staff such as nurses,

'...with the hostess system we don't see what they [patients] are being given and we don't see what they have eaten. I think we've got less knowledge of how much they are eating because we don't see it now. Unless the HCA (Health Care Assistant) notices, I don't think the communication is good enough with the ward staff - nurse

'...everybody argues and it is confusing, people have different priorities' – catering manager

'...the whole service needs to be better orchestrated' - facilities manager

'...hospital food service should be less fragmented and a smoother, seamless service, there needs to be one person in control – catering manager

This was endorsed by dietitians who were in agreement that a post of hospital food manager was essential to oversee the whole meal process from kitchen to consumption,

'...we loose control of our food once it is out of the kitchen door, we don't know what happens but we get the flack'- catering manager

Dietitians feel that they should consider more about food and less about nutrients and admit that they are not as proactive as they should be in taking responsibility for the main hospital food service,

'...therapeutic diets are far more interesting'- dietitian

Financial constraints were a prominent part of the concern of the catering and facilities managers, with budgets continually being reduced and not ring-fenced,

'...if it is the case of drugs or food, my budget is the one to suffer – we are trying now to hire our facilities for functions to increase revenue' – catering manager

Conversely, there is no clearly established budget for dietetic problems and, sip feeds although controlled, are not always used appropriately,

'...we send patients home with trayfuls and we've no idea what goes on at home' – chief pharmacist

Patients are willing to make a payment towards the 'hotel facilities' that hospitals offer, if it would mean improved food provision. However, caterers are reluctant to agree as they feel that this would make the patient even more critical. There is also concern as to the practicalities of such a scheme.

Medical and catering managers mentioned that kitchen staff recruitment is an issue. The job is perceived as unskilled and therefore pay and conditions reflect this, staff turnover can be as high as 50% annually,

'...they [catering department] don't get the quality of staff because of shortage of pay, that's an issue with the kitchen staff. So I appreciate they have problems but

sometimes the food was good to start with and then it just goes lousy, with bad cooking, it causes a problem at ward level' – ward manager

'...its difficult to get staff on the amount that we can pay them – they would rather work in Burger-King' – catering manager

5.3.5 Food Service Staff

The catering manager was enthusiastic in the potential for dedicated food service staff who could be trained to,

'sell the product' 'reduce wastage' and *'tempt jaded palates'*

Nurses can be quite damaging when serving food if they are disparaging and make critical comments. This will affect patients' expectations and enjoyment of their meal.

The caterers use wastage (ERIC – Estates Return Information Collection, 2001) (NHS Estates, 2001) as a measure of consumer satisfaction, and wards where there are hostesses, demonstrate less waste and greater patient satisfaction. Ward hostesses work a similar shift each day and remain with a particular ward whereas nursing staff '*tend to come and go'*. A relationship can be developed between patient and hostess,

'...I get spoken to a lot by the elderly, especially old boys who live on their own, they confide in me and tell me all their secrets' - hostess

Hostesses see their role as carers and feel their allegiance is towards the ward, whereas paradoxically, the catering manager felt their role was 60% food service and 40% carer. Dietitians see the role as a link between the two,

'...the whole idea is to get them to liaise and be a co-ordinator for the meals between nursing and catering' - dietitian

It was highlighted by the ward hostesses that customer care and service was a fundamental part of their job. It would have been beneficial for patients to have the catering system explained on arrival; 'meet and greet' is a useful marketing tool in any customer based operation. One hostess suggested a 'welcome pack' for patients to introduce the catering facilities; however, this had never been actioned. Therefore, patients were not aware that condiments were available on the ward nor that biscuits could be requested to supplement meals if required,

'...felt a bit peckish, didn't like to tell nurse and so have just eaten a sandwich that the wife has brought in' - patient

5.3.6 Interpretation

Several issues related to hospital food service have been explored through focus groups and interviews with the main stakeholders. Many of these were associated with varying perceptions of responsibilities for aspects of meal provision and the lack of communication evident between disciplines. However, ultimately it is the patient and the patients' needs which should be the main focus and priority for all concerned,

'...what we need is basic care, the food that we want, it should be hot, it should be well presented and well cooked. If we don't eat we will be in hospital for longer and all we want to do is go home' – patient

5.4 Summary

Food service in hospitals is multidimensional and the challenge is to focus on patient needs, especially as budgets, bed numbers and targets seem to be the driving force currently for the NHS. No one chooses to eat food in hospital; the consumers are arguably 'captive' and cannot vote with their feet.

From this research it is evident that there is potential for malnutrition in this environment. Nutritional intake was below that recommended, the temperature of food was less than satisfactory and food wastage was confirmed to be higher than desired. Expectations of patients towards hospital food were neutral; however, satisfaction was shown to increase when the trolley system of delivery was used. Furthermore, patient satisfaction was demonstrated to be dependent on the food quality attributes of temperature and texture. Operational analysis revealed that the busiest time on the ward was breakfast, when patients were constantly interrupted whilst consuming their food. The 'protection' of meal periods would certainly enable patients to enjoy their food in peace. Hospital food service can be viewed as two discrete areas, that of patient care and meal management. The amalgamation occurs at meal time with communication being identified as the driving force for improvement.

A holistic approach to hospital food service will therefore be taken within the discussion in Chapter Six where pertinent issues will be explored in more depth. The research hypothesis will be answered in Chapter Seven.

CHAPTER SIX

DISCUSSION

6.0 INTRODUCTION

The purpose of this chapter is to draw together both the primary and secondary research and to synthesise current issues relevant to the aim of this dissertation. Themes are explored and a holistic appreciation of hospital food service will be provided. A theoretical model is developed and justified, providing a framework for conclusions and recommendations given in Chapter Seven.

6.1 Model of Patient Experience and Satisfaction with Hospital Food Service

If factors impinging on hospital food service are considered holistically, there is a cyclical relationship, in that responsibility for nutritional status commences and concludes in the community with the Primary Health Care team. Admission to hospital is a temporary occurrence and a bridge between the two, and as such it is important that complete nutrition is maintained. A simple screening tool together with regular monitoring would ensure that patient nutrition did not deteriorate. Towards this aim, a manager is required to orchestrate the process within the hospital environment and oversee the whole operation if channels of open communication are to be achieved.

Patient satisfaction and, therefore, morale is crucial in the healing process and, as has been shown in this research, the texture and temperature of food are important factors impinging on satisfaction together with the style of service. Other issues raised by patients during discussions are the welcoming of protected periods and branded products.

Feedback is a perceived problem, not just from a patient's perspective but from other stakeholders too. Communication needs to be more transparent and regular meetings held with representatives at an operational level. With more informed and better hospital food service, the incidence of malnutrition could be decreased, the patient experience would improve and subsequently hospital stays would be reduced. A well

managed patient would be discharged into the community 'medically fit' leading to a reduction in cost to the NHS.

The solution could be as easy in the first instance of ensuring the provision of well cooked, hot food.

A conceptual model of hospital food service (Figure 13, Chapter 4) was devised to provide the framework for research methodology. This model has subsequently been developed and refined, reflecting data gathered during the case study, its interpretation and synthesis of the issues raised. The revised theoretical model is presented at Figure 19 and discussion ensues relating primary and secondary research.

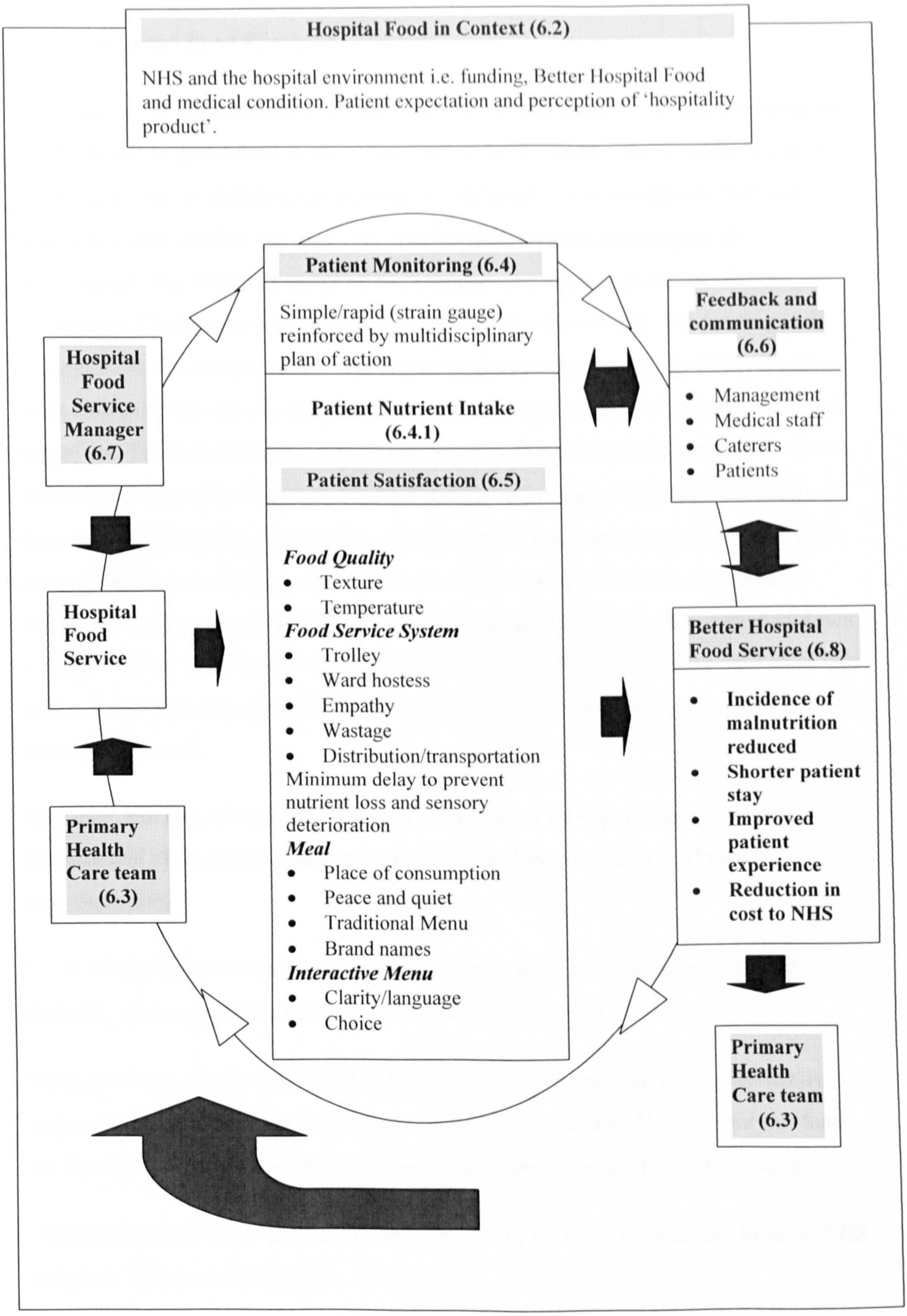

Figure 19 A theoretical model of patient experience and satisfaction with hospital food service

(Note: numbers in shaded area refer to paragraphs in the text)

6.2 Hospital Food Service in Context

Historical evidence provides a background and climate to any discussion relating to the NHS and hospital food service. Founded in 1948, health care previously was a luxury and only available to the privileged. Although it was recognised that free health care was needed, the goal was unachievable without the support of government. The NHS is funded by the taxpayer and as such is accountable to Parliament. Challenges present at its inception still remain today, the funding and management of an organisation, the largest in Europe (www.nhs.uk, 2003) together with balancing the often conflicting demands and expectations of patients, staff and taxpayers. Tension has arisen between increasing demand and the realism of finite resources. Budgets are 'squeezed' on an annual basis and performance indicators have become the norm. Historically, dietary care has not been regarded as part of patient treatment or therapy. It is viewed as a 'hotel service' and an area where efficiency savings can be made. It has been suggested that menus are designed down to a price rather than up to a standard (Girling, 2002). Patients' concur, and from this study, it has been shown that with a plate system of delivery perception does not match expectation.

However, the aim of the NHS as laid down in the white paper 'The New NHS. Modern and Dependable (Department of Health, 1997) is still one of public accountability,

'*...to rebuild public confidence in the NHS as a public service, accountable to patients, open to public scrutiny and shaped by their views'.*

Food service is clearly embedded in the hospital experience, all be it peripherally, and to date has resisted any attempts to make it self-funding. The Secretary of State for Health has made a definite statement, that in the lifetime of this Parliament

'*The Government have no plans to introduce 'hotel' charges, including food, in NHS hospitals'* (House of Commons, 2002).

Patients have made it quite clear, though, in this research that they would be prepared to contribute to facility charges. Unfortunately, a service whose masters are politicians is often manipulated and managed for political reasons rather than for the

general good. Charging for hospital food service would compromise the Government strategy of health equality (Department of Health, 1998).

The Better Hospital Food programme launched in 2001 as part of the NHS Plan (Department of Health, 2000) is a long-term initiative aimed at improving the quality and availability of food in hospitals. Although admirable, in reality it manifests itself currently at ward level in this hospital as dishes on the menu (approximately two) being described as 'chefs hats' (leading chef dishes) and other hospitals having the benefit of 'matrons'. The cynical would suggest that the impetus for concern regarding hospital food was political rather than philanthropical (Channel 4 Dispatches -13 May 2004). Notwithstanding, the profile of hospital food and service has been raised, with management at Trust Board level and stakeholders in general, but particularly in this hospital, aware of the need for a nutritional policy framework. Future proposals include a national franchise for hospital meals, unannounced inspections and greater emphasis on the service aspects such as improving the environment in which food is served and eaten (www.nhs.uk, 2004).

Patients are consumers and as such have expectations and aspirations which may or may not always be met. With hospitality becoming more sophisticated and eating out more customary, hospital food service needs to modernise and improve on the image of tasteless, poorly presented, lukewarm dishes. Sick people with fragile appetites want tasty, hot food presented attractively in an inviting congenial environment (Patient Experience Survey, 2002).

The literature would suggest that patient's attitudes towards hospital food reflect institutional stereotyping (Cardello *et al*, 1996) and that the media do very little to dispel this view. It is therefore important to make the meal occasion as near as possible resemble the situation at home. A reduction in the standardisation of menus (Khan, 1981) and a more intimate environment (Cardello, 1982) would be initiatives that could achieve these aims removing the hospital context away from the negative image. There would result a synchronous increase in patient satisfaction.

Primary Health Care Team

The monitoring of nutritional status should commence within the community with the Primary Health Care Team, to ensure 'medically fit' patients on admission for 'routine', elective surgery. Research shows that in some cases, 40% of patients can

be malnourished on admission (McWhirter and Pennington, 1994). Arguably, with a proactive and engaged Primary Health Care Team, this incidence could be reduced. Conversely, it is also crucial that patients are discharged nutritionally robust and that this state is maintained within the community. Organised contact between hospital and community needs to be established and communication needs to be such, that the 'patient journey' is considered as a totality. Both the literature review and results from this study would suggest that communication is fragmentary. A recommendation made within The Council of Europe Resolution (Council of Europe, 2003) identifies this concern and has advised that regular contact between the hospital and primary health care sector should be established.

6.4 Patient Monitoring

It is a fundamental right and expectation from both patients and their relatives that care will be monitored. This includes food intake and clinical status on a regular basis. Time commitments and paper work burden are poor excuses for absolving duty which has been reinforced by the United Kingdom Central Council for Nursing (1997). Although, it has been proposed that the caring component of nursing, should be devolved to health care assistants thereby enable registered nurses to concentrate on treatment and technical nursing (Templeton, 2004). Notwithstanding, responsibilities should be clearly assigned.

While in hospital, observations of the meal service should be made on a routine basis and become part of the patient information record stored in the case file. There is a need for an evidence-based screening tool which is easy to apply and easy to interpret. There needs to be a balance between a simple method which is less accurate but uncomplicated to use and therefore probably will be used, and a more accurate, but more complex method which might not be used (Council of Europe, 2001).

Weight for height, (BMI) is not a definite measurement of undernutrition, but it is a useful indicator, and measurement over time provides an indication of patient status (Vlaming *et al*, 1999). However, it is often extremely difficult to weigh patients particularly when they are infirm, unable to stand or bed-bound. The solution could be as simple as incorporating a 'strain gauge'[16] into a hospital bed. Sensitivity and

[16] strain-gauge - a device whose electrical resistance varies in proportion to the amount of strain or weight

resolution could be set to ± 0.5kg and when attached to a circuit, the device could continuously measure the weight of a patient whilst supine. This would be an efficient and non-invasive method of patient monitoring without impinging on staff time and resources. Changes in weight would be automatically recorded and patients would not be required to get out of bed (essential in the orthopaedic ward).

Food intake should also be recorded in case notes of those patients who are considered vulnerable. For accurate information, the whole process needs to be supervised by one person from food delivery to plate collection. The suggestion from a ward hostess of being part of patient hand-over appears to be a logical, convenient and relatively simple way of ensuring good communication and it is unfortunate that the role of hostess is perceived as unskilled and lowly.

Patient monitoring has been highlighted in the literature as a crucial step in the detection of malnutrition and in the maintenance of patient status (Schwartz and Gudzin, 2000). The task is not arduous and it has been recommended that standards of practice for assessing and monitoring nutritional risk should be developed at a national and European level (Council of Europe, 2003). One such initiative in the U.K. is the 'Malnutrition Universal Screening Tool' (MUST) (Elia, 2004) for use in hospitals and the community. The availability of such a tool, however, does not necessarily guarantee that it will be used and any recommendation needs to be backed up by a clearly defined policy.

6.4.1 Patient Nutrient Intake

Patients were not nutritionally compromised and in this case study energy intake appeared to be satisfactory with both systems of delivery. This is contrary to published research conducted in acute hospitals. However, it is acknowledged that there is much discrepancy in the reported incidence of malnutrition due to the different criteria which are used to benchmark the condition (Elia and Stratton, 2000). With a usual length of stay ranging from 5-10 days, other nutrients although below recommendations, would not potentially be a cause for concern as long as nutritional status was adequate on admission. Therefore the crucial aspect for elective surgery hospitals may be patient satisfaction.

Satisfaction with the food service provision was shown to improve with the trolley system of delivery however, nutritional intake did not increase. The prediction of

food consumption in 'real life' situations is extremely difficult. Although, satisfaction used as a dependent variable is a better predictor than most, individuals bring their own idiosyncratic, sensory expectations and experience to a meal situation (Cardello *et al*, 2000). There is a complex relationship between acceptability of food (liking) and intake. The first does not necessarily guarantee the second. When people are in an uncongenial environment, the effect of liking is diminished (Meiselman, 2004).

Even if satisfaction does increase, a complimentary increase in food intake is not necessarily observed within a hospital setting. There is obviously a very complicated relationship between the two and it could be that in hospital, there is a threshold of consumption, 'complete nutrition', whereby the barrier to food intake is hospitalisation itself. Lack of appetite due to a medical problem is probably the main reason for hospital undernutrition, however, this does not mean that those involved should be complacent and that improvements cannot be made. Strategies for motivating food consumption, highlighted in the literature such as appropriate meal temperature and texture, ward ambience and dining areas together with attention by staff are fundamental in any hospitality situation.

6.5 Patient Satisfaction

The consideration of patient's expectations and perceptions should have particular significance in shaping the objectives of any food service operation. Expectations were matched by the trolley service of delivery and hence a corresponding level of satisfaction was achieved. Results obtained from the consumer opinion card show that the bulk trolley method of food distribution enables all foods to have a better texture, and for some foods (potato, poached fish and minced beef) temperature, and for other foods (broccoli, carrots, and poached fish) flavour than the plate system of delivery, where flavour is associated with bad opinion or dissatisfaction.

Food Quality

Unfortunately hospital food service has an image problem, before even tasting it patients generally expect poor quality (Beck *et al.,* 2001); this has been described as 'institutionalised stereotyping' (Cardello *et al.*, 1996). Food quality attributes have been demonstrated in this case study to have a critical effect on patient satisfaction. While confirming previous results (DeLuco and Cremer, 1990; Dubé *et al.*, 1994;

O'Hara *et al.*, 1997; Lau and Gregoire, 1998; Hwang *et al.*, 2003), attributes of significance (temperature and texture) have been established by comparing two systems of delivery. Strong preferences have been shown for the appropriate temperature of food and this can influence acceptance (Ryynanen *et al.*, 2001). Texture is a sensory characteristic which has also been shown to influence satisfaction (Rosenthal, 1999) and is susceptible in institutional food (Royal Commission on the National Health Service, 1978). Sensory characteristics have been identified in the literature as being important to hospital patients when judging food quality (Cardello, 1982; Clark, 1998).

Although service features were not a high priority from a patient perspective, it has been suggested that staff attitude can be as crucial as food temperatures (Jackson, 1997). Results from this case study agree with other research showing that the service predisposition of NHS staff are such that the food service experience is mostly satisfactory (Lee-Ross, 1999; Hwang *et al.*, 2003), and therefore food quality is the driving factor for satisfaction.

In commercial hospitality operations, priority of attention is given to 'service scapes' for example the standard of crockery, background music, design of space and furnishings etc. For example, research in an institutional setting has demonstrated that when music is played there was a significant ($p<0.01$) correlation between food served and food consumed (Ragneskog *et al.*, 1996). However, these factors did not feature in this case study, patients and staff agreed that the first concern should be the quality of the food.

Food Service System

There are mixed opinions amongst hospital catering managers regarding the relative merits of plate and bulk trolley service. Some consider that a trolley service increases the quality of food, the inter-personal aspects of the food service and patients' satisfaction (Hwang *et al.*, 1999), although, a challenge to food service staff with regard to portion size (Mibey and Williams, 2002). Alternatively, others feel, that plated meal service ensures quality presentation and best service (Hwang *et al.*, 1999; Mibey and Williams, 2002).

From this research it can be confirmed that patients were more satisfied with the trolley style of delivery and certainly there is more opportunity for patient/staff interaction and nurture. However, one instance was observed where in a 'close to

discharge bay', and the presence of nursing staff is infrequent, a nurse performed a medical procedure at the same time as serving food. The potential for cross-contamination is evident adding weight to the argument of employing dedicated food service employees. The benefit of ward hostesses has also been demonstrated from factors of reduced wastage and use of sip feeds (Waite *et al.*, 2000) together with patient satisfaction (Gledhill, 2000; NHS Estates, 2003a).

Anecdotal evidence, observation and pilot studies suggest that a bulk trolley bedside service is the preferred and most successful meal distribution method as it allows the patient to control portion size according to appetite (Wilson, 2000). The task force who developed The Nutrition Guidelines for Hospital Catering (Department of Health, 1995a) concurred, recognising that orthopaedic patients have increased nutritional requirements but may have variable appetites.

This case study research confirms patient satisfaction is enhanced by choice at the point of consumption; however, portion size was not the controlling dimension. Temperature and texture were the most important attributes which measure patient satisfaction with food.

It can be seen that keeping food hot in hospital is still a challenge even with trolleys that can be plugged in to a power supply as required. Food temperature, although improved with the trolley system of delivery, was still not satisfactory. The problem was not with the hardware, the trolleys were more than capable of ensuring heat integrity, but with the operators. All the food was displayed on the ward as soon as it arrived, unfortunately however, the time taken for each patient to be served could be as long as forty five minutes. Time taken for distribution should be kept to a minimum to avoid nutrient loss and sensory deterioration.

In any food service programme, perceptions of freshness can greatly affect how patients rate the overall meal (Doucette, 1999). If patients can choose their food just before they eat it, this greatly enhances their perception of the item's freshness and influences satisfaction. Perceived control and patient empowerment have also been shown to strongly influence patient satisfaction with food services (Bélanger and Dubé, 1996; Faulkner, 2001). This research confirmed that where patients have increased involvement with the process of food service such as in the trolley system of delivery, satisfaction is increased.

Trolley wastage was not within guidelines (Department of Health, 1996) and certainly initiatives to reduce waste are urgently required. Dedicated food service staff, together with a confirmation of ward numbers, would aid in the estimation of meals required. The saving to the hospital could be substantial.

Meal

The main problem as observed in this study is the lack of structure and priority given to food service both pre and post operative; clinical considerations take precedence. In some hospitals such as acute, prioritising clinical care might be appropriate. However, for rehabilitation and elective surgery, food should gain higher priority and become embedded in the concept of an integral part of treatment. Meal times need to be protected so that meals can be enjoyed, free from interruption as one would expect in any hospitality situation. Patients from the Women's Health and Orthopaedic wards are seldom physically ill but rather immobilised by their injuries. Their greatest 'enemy' is boredom and therefore meal times are important. A social, congenial atmosphere, where meals can be taken if desired in the company of others, whether they are patients or visitors, would improve the meal experience and hence encourage recovery. Recommendations from the Council of Europe (Council of Europe, 2003) endorse this sentiment and are fully supported by the Health Caterers Association and The Better Hospital Food project.

Much was made by the patients regarding food that was easily recognisable and traditional. When in hospital, there is a need for familiar meals that remind of home, complicated, sophisticated dishes are not well received.

There is an argument that hospital food intake (Cardello *et al.,* 1996) and therefore service is comparable to in-flight food service where the challenges of advanced preparation and extended holding times are similar. Airlines are aware of their reputation for serving less than satisfactory food and one solution has been to improve the quality of the food served, by using creative input from chefs and brand-name items (Frank, 2000). The former initiative encompasses strategy from the Better Hospital Food project and the latter i.e. brand names, is being considered in the hospital at present. Product branding has been identified in the literature of one way of enhancing perceived quality (Vranešević and Stančec, 2003).

Interactive Menu

One of the challenges identified in the research and maybe limited to this hospital, was with the plated system, it took three days for the menu to 'catch up' with a new patient. Additionally, the main course did not come with vegetables or potatoes, and the latter had to be ordered separately. Patients' orders were not always checked prior to being sent to the kitchen and meals therefore, could be sent to the ward with only the meat component. It was observed that 'extra' servings were not usually obtainable and larger portions not always provided, even when ordered. Menus are an important tool for the catering manager as they are the first point of contact with the patient and can be used both for communication and marketing purposes. However, if not easy to read or interpret, a negative message can be portrayed. In the trolley system, no prior information was given to the patients regarding the menus and sometimes this was a problem as it was difficult to identify the dish purely by sight. It could be said that there would be increased feelings of anticipation without prior information, conversely the alternative could be true. Feelings of frustration could ensue if a dish had been ordered which subsequently did not arrive.

In the trolley system, where the food is visible, there is more opportunity for communication and clarification of any dishes that are not instantly recognisable.

Further menu development will ensue with the emergence of more sophisticated computer software. This is already being observed in America, with hospitals able to provide meals on demand (Stein, 2000; McLymount *et al.*, 2003) and the pioneering of interactive voice recognition technology (Jamison *et al.*, 1996). A touch screen facility with a direct link to the catering facilities is being considered at the case study hospital, as all patients have access to bedside televisions. This will enable patients to preview dishes available and then select as required. Delivery will be at set times and by the trolley method as previously experienced.

6.6 Feedback and Communication

Hospital food service requires a policy, framework, manager and representation at Trust Board level. There needs to be a continuum from kitchen to consumption, with emphasis on hospitality and quality. Feedback and communication in this hospital is fragmentary at best and not actioned at worst. There is a dependence on informal dissemination without structure, reflecting the multi-disciplinary nature of the service and stakeholders. Ultimately, it is the patients who are disadvantaged; whose health

ironically, is the focus of attention. Poor communication and relationship conflict has been identified in the literature as a cause for concern (Riddiford *et al.*, 2000) and it has been suggested that organisational research should be conducted within hospital food service to assess and improve the communication between different staff disciplines (Council of Europe, 2003).

6.7 Hospital Food Service Manager

A lack of clearly defined responsibilities has been identified in the management of nutritional care together with fragmented cooperation between different staff groups (Council of Europe, 2001). There is insufficient description of responsibilities and as a consequence there is reliance on the task being achieved without a strategy in place for achievement. The uniqueness of hospital food service is that the primary objective is to provide direct, individualised, total nutritional care and as such it needs to be controlled and orchestrated. A failure at any point negates the system. Collaboration and co-operation needs a central co-ordinator, a hospital food service manager who has remit for the entire process from kitchen to consumption, and a position at board level. Greater emphasis has been given to the role of food in clinical outcomes and as such, needs to be reflected in the organisation of hospital management (Council of Europe, 2003).

Food service departments are usually seen as part of facilities rather than as an integral part of patient treatment and the trend is towards contracting out. This emphasises the requirement for a competent purchaser who can verbalise and describe what is required. Guidelines and standards need to be developed with sufficient detail in contracts to encompass the requirements of all patients (Council of Europe, 2003). The hospital management should acknowledge responsibility for food service and give priority to a food policy.

6.8 Better Hospital Food Service

From the literature review it was identified that better hospital food service would result in a decreased incidence of malnutrition, shorter patient stay and improved patient experience. This would subsequently prevent 'bed blocking' and therefore lead to a reduction in cost to the NHS. Good nutrition is a prerequisite for optimal treatment.

Management, both clinical and facilities are in agreement with this philosophy and certainly patients would welcome an experience which enhanced morale and therefore speeded up recovery time. It is recognised by all stakeholders that improvement would be able to be measured in clinical advantage.

The first step to better hospital food is quality, particularly aspects of texture and temperature. Food served of appropriate sensory properties would tempt jaded appetites and encourage self recovery.

'*emphasis should be placed on the quality of ingredients, the suitability of recipes, cooking methods, taste, colour, smell and the presentation of food, as all these have a part to play in people's enjoyment of food' - Albert Roux* (Department of Health, 1995a).

6.9 Summary

Current issues pertinent to stakeholders and a holistic appreciation of hospital food service have been provided in this chapter. A theoretical model of patient experience and satisfaction is presented integrating both primary and secondary research. In Chapter Seven, conclusions, limitations and recommendations for further study will be given.

CHAPTER SEVEN: CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS FOR FURTHER STUDY

7.0 INTRODUCTION

This Chapter draws the research together and enables conclusions to be formulated with respect to hospital food service. Recommendations will be made to facilitate an improved patient experience.

7.1 Conclusions

Researching factors that impinge on patient satisfaction with hospital food service allows an understanding and appreciation to be gained of the interconnected, ordered set of relationships underlying a positive experience.

Results from this research concur with the body of literature that indicates food quality is the driving factor for patient satisfaction with food service in hospitals. However, this position is contradictory to the theory that hospital food cannot be improved and that there must be other factors contributing to being 'hungry in hospital'. In reality, there is no easy answer but this research shows and there is evidence to support that the two dimensions, temperature and texture are of the utmost importance to patients, therefore defining the focus for hospital food service managers. The environment and situation do have a role to play but until the food is acceptable their importance is peripheral.

Historically, the more 'captive' the customer, the more hospitality focused on subsistence rather than on enjoyment. Certainly patients do not concur with this view and their demands and expectations towards the hospitality operation within a hospital framework are increasing. A fundamental change is required within the NHS and although the Better Hospital Food project goes some way to indicating commitment there are still issues that require addressing.

The results from the empirical research have confirmed part of the hypothesis set out in Chapter One that food service is an important element of the patient's hospital experience and that choice at the point of consumption is the preferred style of delivery. However, in contrast, being able to see and smell the food on offer, patients

did not feel more encouraged to eat and this investigation could not confirm that increased patient/server interaction would influence satisfaction.

The theory which is purported is that in hospital there is a threshold of consumption and supports the assertion that when food is freely available individuals will only take what they want. Further research is required to fully comprehend the complicated relationship between satisfaction and intake in a hospital setting..

The following conclusions can therefore be made from this dissertation.

Firstly, food service in hospitals is a complex and difficult hospitality operation, the most challenging in the industry aggravated by the number of stakeholders. The food provision to patients involves a multi-disciplinary work force which makes communication disjointed and the process dysfunctional. The appointment of a hospital food service manager to oversee production from kitchen to consumption would ensure continuity of operation. This would also alleviate the reliance on informal dissemination of information as there would be one channel of communication and command.

Secondly, the monitoring of nutritional status is currently fragmentary with no clear protocol: there is a need therefore for organised established contact between hospital and Primary Health Care team.

Thirdly, neither the plated system nor trolley food service system was advantageous to nutrient provision and both provided nutrients below the recommendations. Paradoxically, the energy intake of patients appeared to be satisfactory as monitored by Body Mass Index and this therefore questions either the suitability of current dietary recommendations for a hospital population and/or the contribution of 'snacks' to patient intake.

Fourthly, satisfaction with the food service provision was enhanced with the trolley system of delivery, particularly from the aspect of texture. Temperature and texture are the two most significant factors in the evaluation of patient satisfaction with hospital food service. Evidence shows staff within the NHS exhibit a caring and empathetic nature and therefore service predisposition demonstrates little significance with patient satisfaction towards the overall meal experience.

In relation to meal times, these should be made special and protected from interruption as one would expect in any hospitality situation. The preferred menus are traditional and inclusion of brand names would improve perceived food quality.

Lastly, with reference to wastage, there is concern and certainly initiatives to reduce waste are urgently required. Confirmation of patient numbers would aid in the estimation of meals required.

The following recommendations are therefore made:

7.2 Recommendations for Hospital Food Service

- Monitoring of patient care, which includes food intake, should be automatic and ownership accepted by the Primary Health Care team as well as hospital.

- Optimised feeding of patients should be part of a hospital food service policy framework

- A food service manager is essential to orchestrate the entire operation from kitchen to consumption

- Consideration should be given to the use of branded products to enhance patient trust in food quality

- Regular monitoring and documentation of food temperature and texture at ward level, with corrective action if not satisfactory

- Confirmation of meal numbers on the same day as service

- Trolley style of delivery as the preferred system

7.3 Limitations

The main limitation of case study research is the restricted external validity and the challenge of making recommendations beyond the case being studied. Although depth of information is gathered, extrapolating to different situations could be problematic. Two wards were used in the hospital with no account made for the seriousness of illness.

A number of limitations also arise when using standard food tables and population nutritional recommendations. Although rigor was ensured by weighing food intake, interpretation is reliant on accurate information being provided for analysis and comparison. Within food tables, the majority of values assume that food is served almost immediately after preparation and cooking. Hospital food service, as observed, is a slow and ponderous operation with the potential to cause deterioration in the nutritional profile of the food as served. In addition account was not taken of snack intake as the focus for this research was on the food service system. Therefore caution should be exercised with literal interpretation of nutritional data; the purpose of this research was to show trends and a comparison between systems.

Analysis of satisfaction questionnaires has historically caused debate amongst social science statisticians. By definition this type of data cannot be considered normally distributed and therefore tests should not be performed that rely on normality. Non-parametric tests that compare ranks are more parsimonious and were used in this research and therefore the data analysis by definition is conservative.

In spite of the limitations, the results contribute to the theoretical understanding of hospital food service and provide an academic framework for further study.

7.4 Recommendations for Further Study

The investigation concentrated on two wards, Women's Health and Orthopaedic, a natural progression would therefore be to extend the research to the rest of the hospital.

There has been a question raised in this research with regard to food service and a hierarchy of hospitals, hence recommendations for further research would be to compare patient satisfaction with food service in acute, elective surgery and rehabilitation hospitals.

Further research could develop the questionnaire in order to establish links between attribute importance and satisfaction. Identifying the gaps in meeting customer expectations will support better prioritisation by the organisation in developing future service improvements.

APPENDICES

APPENDIX 1

COUNCIL OF EUROPE- COMMITTEE OF MINISTERS

Resolution ResAP (2003)3 on food and nutritional care in hospitals

(Adopted by the Committee of Ministers on 12 November 2003 at the 860th meeting of the Ministers' Deputies)

1. The Committee of Ministers, in its composition restricted to the Representatives of Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Slovenia, Spain, Sweden, Switzerland and the United Kingdom, member states of the Partial Agreement in the Social and Public Health Field;

2. Recalling Resolution (59) 23 of 16 November 1959 on the extension of the activities of the Council of Europe in the social and cultural fields;

3. Having regard to Resolution (96) 35 of 2 October 1996, whereby it revised the structures of the Partial Agreement and resolved to continue, on the basis of revised rules replacing those set out in Resolution (59) 23, the activities hitherto carried out and developed by virtue of that resolution; these being particularly aimed at:

a. raising the level of health protection of consumers in its widest sense, including a constant contribution to harmonising – in the field of products having a direct or indirect impact on the human food chain as well as in the field of pesticides, pharmaceuticals and cosmetics – legislation, regulations and practice governing, on the one hand, quality, efficiency and safety controls for products and, on the other hand, the safe use of toxic or noxious products;

b. integrating people with disabilities into the community: defining and contributing to the implementation at European level of a model of coherent policy for people with disabilities taking into account the principles of full citizenship and of independent living; contributing to the elimination of all barriers to integration, whether psychological, educational, family-related, cultural, social, professional, financial or architectural;

4. Considering that the aim of the Council of Europe is to achieve a greater unity between its members for the purpose of facilitating their economic and social progress;

5. Considering that access to a safe and healthy variety of food is a fundamental human right;

6. Bearing in mind the beneficial effects of proper food service and nutritional care in hospitals on the recovery of patients and their quality of life;

7. Bearing in mind the unacceptable number of undernourished hospital patients in Europe;

8. Bearing in mind the fact that undernutrition among hospital patients leads to extended hospital stays, prolonged rehabilitation, diminished quality of life and unnecessary costs to health care;

9. Bearing in mind the Parliamentary Assembly Recommendation 1244 (1994) on food and health;

10. Having regard to the First Action Plan for Food and Nutrition Policy of the WHO European Region (2000 – 2005),

11. Recommends that the governments of the member states of the Partial Agreement in the Social and Public Health Field, having due regard to their specific constitutional structures, national, regional or local circumstances, as well as economic, social and technical conditions:

a. draw up and implement national recommendations on food and nutritional care in hospitals based on the principles and measures set out in the appendix to this resolution;

b. promote the implementation and take steps towards the application of the principles and measures contained in the appendix, in fields where these are not the direct responsibility of governments but where public authorities have a certain power or play a role;

c. ensure the widest possible dissemination of this resolution among all parties concerned, particularly public authorities, hospital staff, primary health care sector, patients, researchers and non-governmental organisations active in this field.

Appendix to Resolution ResAP(2003)3

1. Nutritional assessment and treatment in hospitals

1.1 Nutritional risk screening

i. The assessment of nutritional risk should take into account nutritional status and the severity of disease.
ii. The nutritional risk screening method should be evidence based, in order to secure the identification of patients who may benefit from nutritional support.
iii. The nutritional risk screening method should be easy to use and simple to understand.
iv. The influence of age, growth and sex should be taken into consideration when the nutritional risk of the patient is determined.
v. The nutritional risk of all patients should be routinely assessed either prior to or at admission.
This assessment should be repeated regularly (intervals depending on the level of nutritional risk) during hospital stay.
vi. Studies should be undertaken to develop and validate simple screening methods, aimed for use in hospitals and primary health care sector.
vii. Identification of a patient at nutritional risk should be followed by a thorough nutritional assessment, a treatment plan including dietary goals, monitoring of food intake and body weight, and adjustment of treatment plan.
viii. Standards of practice for assessing and monitoring nutritional risk/status should be developed at a national and European level.

1.2 Identification and prevention of causes of undernutrition

i. The multiple causes of disease-related undernutrition should always be considered for every patient.

ii. The use of medications and combinations with side effects of anorexia, nausea and other gastrointestinal symptoms, drug-nutrient interactions or alterations of taste and smell should be well grounded and avoided as much as possible while physicians and nurses should be aware of these side effects.

iii. "Nil-by-mouth" regimes, overnight fasting and bowel-cleansing protocols with dietary restrictions should not be used routinely; the literature should be reviewed in order to assess which procedures may require such regimes and for those investigations/procedures requiring dietary restriction the exact period of restriction should be determined.

iv. The definition of disease-related undernutrition should be universally accepted and used as a clinical diagnosis and hence treated as such.

1.3 Nutritional support

i. Nutritional support as part of the treatment of patients should be considered systematically.

ii. The nutritional treatment plan should be reviewed and adjusted if appropriate on at least a weekly basis, by means of information about the patient's nutritional intake, weight change and other relevant nutritional and clinical variables.

iii. Nutritional support should be properly targeted to the individual patient.
The volume of artificial nutrition infused and any discarded should be carefully documented.

iv. No patient should receive artificial nutritional support without proper evaluation of indications, risks and benefits, informed consent of the patient as well as close supervision of side effects.

v. Specific immune-modulating formulas should be limited to those patients who may benefit from them in the light of available randomised trials.

vi. Patients in need of nutritional support should receive such treatment before admission (where possible), at the earliest opportunity during hospital stay and after discharge.

vii. Medical and nursing admission, discharge and outpatient records should contain information about each patient's nutritional status, and physical and mental condition in relation to food intake.

viii. Randomised trials and systematic reviews by specialists in clinical nutrition should be performed to evaluate the effect of nutritional support on nutritional status, clinical outcome, and physical and mental condition.

ix. Randomised trials evaluating the effect of ordinary food on clinical outcome should be given high priority.

x. Standards of practice for the assessment and dietary management of patients with dysphagia should be developed at national levels as appropriate.
National descriptors for texture modification should be developed.

1.4 Ordinary food

i. Ordinary food by the oral route should be the first choice to correct or prevent undernutrition in patients.

ii. Good practice to ensure the intake of ordinary food by the patients should be studied and documented. The practice of documenting and assessing intake of ordinary food by the patients identified as at nutritional risk is essential.

iii. Sip feedings should not be used as a substitute for the adequate provision of ordinary food, and should only be used where there are clear clinical indications.

iv. Artificial nutritional support should only be started when the use of ordinary food fails or is inappropriate.

1.5 Artificial nutritional support

i. Standards of practice established and implemented for initiation, safe delivery, aseptic handling techniques, line care, monitoring and termination of all artificial nutritional support should be developed at national and European level.

ii. Standards of practice should be developed for the initiation, preparation, education, equipment provision, and safe delivery and monitoring of patients discharged on home nutritional support.

2. Nutritional care providers

2.1 Distribution of responsibilities for nutritional care in hospitals

i. The Department of Health, Regional Authorities and each Hospital management should acknowledge their responsibility with regard to nutritional care and support, and food service systems.

ii. Hospital management, physicians, pharmacists, nurses, dieticians and food service staff should work together in providing nutritional care, while the hospital management should give due attention to such co-operation.

iii. The responsibility of different staff categories with respect to nutritional care and support, and food service should be clearly assigned.

iv. Hospitals should develop appropriate structures to set standards for nutritional care and support especially in relation to costs, contract specifications, nutritional risk screening and audits, and to implement these standards through the control, supervision and audit of nutritional care and support.

v. Nutritional risk screening, assessment and monitoring should be included in the accreditation standards for hospitals.

2.2 Communication

i. Organisational research should be conducted to assess and improve the cooperation between different staff groups.

ii. Food service personnel, ward staff and patients should develop, test and implement forms for menu ordering.

iii. Regular contacts between ward and food service personnel should be established.

iv. One or more representatives in each ward and at the kitchen should be designated to have primary responsibility for communication and information in nutrition-related issues.

v. Regular contacts between the hospital and the primary health care sector should be established.

2.3 Education and nutritional knowledge at all levels

i. A continuous education programme on general nutrition and techniques of nutritional support for all staff involved in the feeding of patients should be implemented.

ii. Clinical nutrition should be included in under- and post-graduate education of physicians.

iii. Chairs in clinical nutrition should be established.

iv. Clinical nutrition for both adults and children should be recognised as a specialised discipline by medical schools. The teaching should cover preventive as well as therapeutic aspects of nutritional care and support.

v. The education of nurses in clinical nutrition, with special emphasis on nutritional risk assessment, monitoring, and feeding techniques, should be improved.
vi. The education of clinical and general dieticians at national levels should be set at the highest undergraduate level to enable all European dieticians to assume a more central role in nutritional care and support.
vii. The education of administrative dieticians should be upgraded, especially in the field of management.
viii. The education and training of hospital food service managers/supervisors should differ from hotel management by preparing them to cater for sick people
ix. Special focus should be placed on the nutritional training of non-clinical staff members, e.g. part-time care assistants and ward housekeepers and the definitions of their area of responsibility.
x. Special emphasis should be given to educating and informing the public (including patients) regarding the importance of good nutrition.
xi. European initiatives on clinical nutrition education should be encouraged.
xii. Co-operation between clinical nutrition societies in different countries should be expanded.

3. Food service practices

3.1 Organisation of hospital food service

i. The responsibilities and accountabilities for hospital nutrition among health care professionals and hospital management should be clearly assigned.
ii. A food service policy should be adopted and implemented at hospital or regional level.
iii. Hospital managers should give proper attention to food service policy and nutritional support.
iv. All hospital staff – clinical and non-clinical – should acknowledge food service as an important part of the treatment and care of patients.

3.2 Contract food service

i. Guidelines and standards for out-sourcing hospital food service should be developed.
ii. Contracts should be sufficiently detailed and they should cover special diets on medical and personal indications, energy and protein dense menus and provision of snacks and/or meals at ward or near-ward level. They should also cover texture-modified menus for the management of dysphagia.
iii. The cost for adequate contract monitoring should be built into the contract.
iv. The Clinical Nutrition Service/Department, the Nutritional Steering Committee, the Nutritional Support Team or an adequately qualified person should be given the responsibility for ensuring that the contract reflects nutritional standards.

3.3 Meal service and eating environment

i. The serving system should be adjusted to the patients' needs taking into consideration their physical and mental condition. This often requires different serving systems.
ii. All patients should have the possibility to choose their eating environment.
iii. All patients should have the possibility to sit at a table when eating their main meals.
iv. The hospital-eating environment should be improved with a focus on surroundings and the presence of personnel and free from unpleasant smell/odours.

v. Adequately trained personnel should be available to assist patients with mental/physical feeding difficulties and suitable modified equipment should be available when required to aid/facilitate independent feeding.

3.4 Food temperature and hygiene

i. All patients should receive hospital food, which has been stored, prepared and transported in such a way as to ensure the hygiene, safety, palatability, gastronomy, and nutrient content of the food at a high level.
ii. All hot meals should be served at temperatures around 60-70° C.
iii. The Nutritional Steering Committee, the Nutritional Support Team or an adequately qualified person should be responsible for the hygienic aspects of food service.
iv. The kitchen and ward staff should receive proper education in food hygiene while the hygienic control of hospital food production should be used to engage hospital management in the wider concept of hospital nutrition.

3.5 Specific improvements in food service practices to prevent undernutrition

i. Standards for food service systems, based on patient needs rather than hospital needs, should be developed.
ii. Regardless of which serving system is used, close collaboration between the patient, relatives and the nursing, dietetic and food service staff is required to get the patient to eat.
iii. The provision of meals should be flexible and individualised. All patients should have the possibility to order food and extra food at any time and be informed of this possibility.
iv. Menus should be specifically targeted to different patient categories.
v. Proper feeding-aid should be provided.
vi. Successful measures to prevent undernutrition should be given publicity.

4. Hospital food

4.1 Hospital menus and diets on medical indications

i. Good practice should be established through the development of national guidelines and standards for food provision in hospitals to meet the needs of all categories of patients including diets on medical indications, and vegetarian, texture modified and energy and protein dense menus.
ii. Studies should be undertaken to evaluate the effect of energy and protein dense menus on food intake and patient outcome.
iii. A range of dishes enriched in energy and protein should be available in every hospital aimed at patients with disease-related undernutrition.
iv. The physician should always be aware of the nutritional status of patients and only prescribe diets with scientifically documented effects.
v. The health care personnel should be aware of the patient's use of "alternative diets" and the influence these might have on the nutritional status.
vi. Immediate feedback from the patients to the kitchen and ward staff in relation to liking or disliking of the food served should be encouraged.
vii. The nutrient content, the portion size of the food and food wastage should be audited annually.
viii. The nutrient sufficiency of a menu should be documented already at the planning stage. The Clinical Nutrition Service/Department, the Nutritional

Steering Committee, or the Nutritional Support Team or an adequately qualified person, should be given the responsibility for ensuring that the menu reflects nutritional standards.
ix. A database on nutrient content of meals/menus and portion sizes should be established in each food service department to be made available for the purpose of assessing nutritional adequacy of menus and monitoring of patients' food intake.
x. Research should be conducted to generate more reliable data on nutrient losses with different food service systems.

4.2 Meal pattern
i. Serving hours should be reviewed to ensure that there is sufficient time between each meal to allow for in-between snacks in the morning, afternoon and late evening.
ii. Mealtimes should be spread out to cover most of the hours spent awake.
iii. Interruption of patients' meal times by ward rounds, teaching and diagnostic procedures should be minimised.
iv. Snacks and nourishing drinks between meals should be offered when appropriate and be available on every ward.
v. The involvement of relatives in serving meals to patients should be encouraged, when appropriate.
vi. The use of sip feedings should be properly targeted and a protocol for the distribution and supervision of sip feeds should be developed and implemented.

4.3 Monitoring of food intake
i. The personnel on the wards should be trained in how to monitor food intake.
ii. The food intake of patients should be noted by means of a semiquantitative system.
iii. Tray collection should be supervised closely to enable monitoring of patients' food intake.
iv. The level of food intake should be used to assess the patients' need for nutritional support.
v. The food intake of patients at nutritional risk and receiving nutritional support should be registered by means of dietary records.
vi. Information from the kitchen and the menu nutrient database regarding portion size and energy content of hospital food should be available to aid ward personnel in the monitoring of patients' food intake.
vii. The information about patients' food intake should be used to develop appropriate, target group specific menus.
viii. Studies should be undertaken to develop and validate simple food recording methods.

4.4 Informing and involving the patient
i. The positive role of nutrition as treatment should be made known to the public to engender general awareness and support.
ii. On admission or before admission patients should be informed about the importance of good nutrition for their successful treatment.
iii. Adequate information in written and oral form should be given to patients regarding available dishes and foods.
iv. Dishes should be described accurately so that patients have a reasonable idea of what to expect.
v. Patients should receive information regarding the nutrient composition of different foods and drinks.
vi. Patients should receive help and guidance in ordering food by the ward staff.

vii. Patients should be involved in planning their meals and have some control over food selection.
viii. Patients should be able to receive a menu, which is in accordance with their age, religious, ethnic or cultural background.
ix. Methods to assess patient satisfaction should be developed and implemented.

5. Health Economics

5.1 Cost-effectiveness and cost-benefit considerations

i. Calculations of cost-benefit and cost-effectiveness of nutritional support should also be made at hospital level.
ii. Calculations of cost-benefit and cost-effectiveness of nutritional support should involve experts in health economics.
iii. When estimating the cost-benefit and cost-effectiveness the choice of nutritional support should be considered.
iv. When estimating the cost-benefit and cost-effectiveness of nutritional support, outcomes should include functional capability and life satisfaction of patients.

5.2 Food service and food wastage costs

i. The influence of food service practice on food wastage should be examined.
ii. Flexibility with regard to the patient's menu choice and serving size should be ensured.
iii. When assessing the cost of different food preparation systems, the patient's satisfaction with the food served should be considered.
iv. The food budget should be valued as part of the budget spending on clinical support and treatment services.
v. Hospital managers should take into account the potential cost of complications and prolonged hospital stay due to undernutrition when assessing the cost of nutritional care and support.
vi. Steps should be taken to reduce documented wastage of food, sip feedings and artificial nutrition products.

6. Definitions

Artificial nutritional support
Administration of specially formulated liquid nutrients through a tube directly into the gut (enteral nutrition) or into a vein (parenteral nutrition).
Diets on medical indications
A prescribed allowance of food or nutrients provided via the oral route and used in the treatment of specific diseases, e.g. lipid lowering diet, diabetic diet, and energy reduced diet.
Disease-related undernutrition
A state of insufficient intake, utilisation or absorption of energy and nutrients due to individual or systemic factors, which results in recent or rapid weight loss and change in organ function, and is likely to be associated with a worse outcome from the disease or the treatment. Undernourished patients can be overweight or obese according to their body mass index (BMI).
Energy and protein dense menu
A menu with a high nutrient density, due to use of food products with a high fat and protein content.
Food service
A system in which meals are produced and served for hospital patients, in a

APPENDIX 2

Nutrition Guidelines for Hospital Catering (Department of Health, 1995)
Recommendations for minimum nutrition content.

PROTEIN	18 grams per main meal
ENERGY	1200-2500 kcal range on menus a minimum of 300kcal for each main meal a minimum of 500kcal for an energy dense choice
FAT	Lower fat options on the menu to contain:- a maximum of 15g total fat for a main course a maximum of 5g total fat for a pudding
SUGAR	No specific recommendation
SALT	No specific recommendation
VITAMIN C	40mg per day
IRON	8.7mg per day for men aged 19 and above 14.8mg per day for women aged 19-50 years 8.7mg per day for women aged above 50
FOLIC ACID	200µg per day for men and women aged 19 years and upwards.
DIETARY FIBRE – NON-STARCH POLYSACCARIDES (NSP)	12g per day

APPENDIX 3

Nutritional Risk Screening Tool as recommended by ESPEN (European Society of Parenteral and Enteral Nutrition).

Nutritional Risk Screening (NRS 2002)

Table 1 Initial screening

		Yes	No
1	Is BMI <20.5?		
2	Has the patient lost weight within the last 3 months?		
3	Has the patient had a reduced dietary intake in the last week?		
4	Is the patient severely ill ? (e.g. in intensive therapy)		

Yes: If the answer is 'Yes' to any question, the screening in Table 2 is performed.
No: If the answer is 'No' to all questions, the patient is re-screened at weekly intervals. If the patient e.g. is scheduled for a major operation, a preventive nutritional care plan is considered to avoid the associated risk status.

Table 2 Final screening

Impaired nutritional status		Severity of disease (≈ increase in requirements)	
Absent Score 0	Normal nutritional status	Absent Score 0	Normal nutritional requirements
Mild Score 1	Wt loss >5% in 3 mths or Food intake below 50–75% of normal requirement in preceding week	Mild Score 1	Hip fracture* Chronic patients, in particular with acute complications: cirrhosis*, COPD*. *Chronic hemodialysis, diabetes, oncology*
Moderate Score 2	Wt loss >5% in 2 mths or BMI 18.5 – 20.5 + impaired general condition or Food intake 25–60% of normal requirement in preceding week	Moderate Score 2	Major abdominal surgery* Stroke* *Severe pneumonia, hematologic malignancy*
Severe Score 3	Wt loss >5% in 1 mth (>15% in 3 mths) or BMI <18.5 + impaired general condition or Food intake 0-25% of normal requirement in preceding week in preceding week.	Severe Score 3	Head injury* Bone marrow transplantation* *Intensive care patients (APACHE>10).*
Score:	+	Score:	=Total score
Age	if ≥70 years: add 1 to total score above	=age-adjusted total score	

Score ≥3: the patient is nutritionally at-risk and a nutritional care plan is initiated
Score <3: weekly rescreening of the patient. If the patient e.g. is scheduled for a major operation, a preventive nutritional care plan is considered to avoid the associated risk status.

NRS-2002 is based on an interpre-tation of available randomized clinical trials.
*indicates that a trial directly supports the categorization of patients with that diagnosis.
Diagnoses shown in *italics* are based on the prototypes given below.

Nutritional risk is defined by the present nutritional status and risk of impairment of present status, due to increased requirements caused by stress metabolism of the clinical condition.

A nutritional care plan is indicated in all patients who are

(1) severely undernourished (score=3), or (2) severely ill (score=3), or (3) moderately undernourished + mildly ill (score 2 +1), or (4) mildly undernourished + moderately ill (score 1 + 2).

Prototypes for severity of disease
Score=1: a patient with chronic disease, admitted to hospital due to complications. The patient is weak but out of bed regularly. Protein requirement is increased, but can be covered by oral diet or supplements in most cases.

Score=2: a patient confined to bed due to illness, e.g. following major abdominal surgery. Protein requirement is substantially increased, but can be covered, although artificial feeding is required in many cases.

Score=3: a patient in intensive care with assisted ventilation etc. Protein requirement is increased and cannot be covered even by artificial feeding. Protein breakdown and nitrogen loss can be significantly attenuated.

(Kondrup *et al*, 2003)

APPENDIX 4 **Patient Research Information Sheet**

Patient satisfaction with Hospital Food Service

INFORMATION SHEET

A study by Bournemouth University into hospital food service.

You are being invited to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with friends and relatives.

WHAT IS THE PURPOSE OF THE STUDY?

The aim of this study is to critically evaluate patient satisfaction and experience with hospital food service.

WHY HAVE I BEEN CHOSEN?

We are investigating patients admitted to Women's Health and the Orthopaedic Wards.

DO I HAVE TO TAKE PART?

It is up to you decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason. This will not affect the standard of care you receive.

WHAT WILL HAPPEN TO ME IF I TAKE PART?

A researcher may ask your opinion about the meal given to you in hospital. This is because we would like to know how the hospital food service measures up to your expectations and what part of it you would like to see improved. Some of the conversation may be taped so that it can be transcribed at a later date.

WHAT ARE THE POSSIBLE DISADVANTAGES AND RISKS OF TAKING PART?

There are no disadvantages or risk in taking part in this study. It does not affect the care you will receive when in hospital.

WHAT ARE THE POSSIBLE BENEFITS OF TAKING PART?

You will be helping in a study that will give the patient's opinion about hospital food.

WHAT HAPPENS WHEN THE RESEARCH STUDY STOPS?

The research will be written up as part of a degree.

WILL MY TAKING PART IN THIS BE KEPT CONFIDENTIAL?

All information which is collected about you during the course of the research will be kept strictly confidential. The tapes are anonymous, and will not have any personal details on them

WHAT WILL HAPPEN TO THE RESULTS OF THE RESEARCH STUDY?

The results will be written up as part of a PhD degree and maybe published at a later date.

WHO IS ORGANISING AND FUNDING THE RESEARCH?

This research is funded by The Worshipful Company of Cooks Research Centre, *Bournemouth University.*

WHO HAS REVIEWED THE STUDY?

The research project has been reviewed and approved by the East Dorset Local Research Ethics Committee.

CONTACT FOR FURTHER INFORMATION

If you have any queries please don't hesitate to contact me:- Heather Hartwell, Bournemouth University. Tel: 01202 595585

Many thanks for your help in this project, please keep a copy of the information sheet and signed consent form.

APPENDIX 5 **Patient Consent Form**

CONSENT FORM

Patient satisfaction with hospital food service

NAME OF RESEARCHER : Heather Hartwell

1. I confirm that I have read and understood the information sheet for the above study and have had the opportunity to ask questions. ☐

2 I agree to take part in the above study. ☐

3 I understand that I can withdraw at any time and without giving a reason. (This will not affect the standard of care you receive.) ☐

Name of Participant	Date	Signature

Heather Hartwell

Name of Person taking consent	Date	Signature

APPENDIX 6 A Sample Menu from the Case Study Hospital

Royal Bournemouth Hospital
In partnership with Bateman Catering

MONDAY Day Code 2

Name _____

Ward _____

Please put a tick ☑ in the box opposite your choice. If you would like a large portion put a cross ☒ in the box.

Luncheon

(Please choose one from the following)

1 ☐ Chilled Orange Juice . . . . . D.HE
2 ☐ Home Made Cream of Celery Soup . . . . . D.HP.S

— MAIN COURSE —

(Please choose one from the following)

3 ☐ Chicken Casserole . . . . . D.HP.S
4 ☐ Potato and Cheese Bake. . . . . D.HE.S
5 ☐ Smoked Mackerel & Salad . . . . . D.HE
6 ☐ White Egg Mayonnaise Roll . . . . . D.HP.S
7 ☐ Brown Egg Mayonnaise Roll . . . . . D.HP.S

8 ☐ Boiled Rice. . . . . D.HP
9 ☐ Creamed Potatoes . . . . . D.HE.S

10 ☐ Sweetcorn Kernals . . . . . D.HE.S
11 ☐ Garden Peas . . . . . D.HE.S
12 ☐ Mixed Salad . . . . . D.HE

— DESSERTS —

13 ☐ Sultana Sponge & Custard . . . . . D.HP
14 ☐ Semolina Pudding . . . . . (D)HP.S
15 ☐ Vanilla Ice Cream . . . . . D.HP.S
16 ☐ Fresh Orange . . . . . D.HE.HP.S

HE = *Healthy Eating*, HP = *High Protein & High Energy*, D = *Diabetic*, S = *Soft*, ( ) *Brackets around coded menu indicates products have been made suitable for diets.*

Light and Soft menus available on wards. Please ask sister. Condiments on ward.

Royal Bournemouth Hospital
In partnership with Bateman Catering

MONDAY Day Code 2

Name _____

Ward _____

Please put a tick ☑ in the box opposite your choice. If you would like a large portion put a cross ☒ in the box.

Evening Meal

(Please choose one from the following)

1 ☐ Chilled Apple Juice . . . . . D.HE.(HP)
2 ☐ Minestrone Soup . . . . . D.HE.(HP)

— MAIN COURSE —

(Please choose one from the following)

3 ☐ Ham & Mushroom Vol Au Vent . . . . . D.HP.S
4 ☐ Corned Beef & Salad . . . . . D.HE
5 ☐ Qourn Casserole . . . . . D.HP.S
6 ☐ White Cream Cheese, Lettuce & Chive Sandwich . . . . . D.HP.HE.S
7 ☐ Brown Cream Cheese, Lettuce & Chive Sandwich . . . . . D.HP.HE.S

8 ☐ Creamed Potatoes . . . . . D.HE.S
9 ☐ Chipped Potatoes . . . . . D.HF

10 ☐ Broad Beans. . . . . D.HE
11 ☐ Sliced Leeks. . . . . D.HE.S

— DESSERTS —

12 ☐ Rhubarb Fool . . . . . (D)(HE)(HP)S
13 ☐ Vanilla Ice Cream . . . . . D.HP.S
14 ☐ Cheddar Cheese and Biscuits . . . . . D.HF
15 ☐ Fresh Banana . . . . . D.HE.HP.S

HE = *Healthy Eating*, HP = *High Protein & High Energy*, D = *Diabetic*, S = *Soft*, ( ) *Brackets around coded ment indicates products have been made suitable for diets*

Light and Soft menus available on wards. Please ask sister Condiments on ward.

APPENDIX 7

Meal Satisfaction Questionnaire (pre-meal)

Breakfast ***Lunch*** ***Supper***

As part of a review of meal service at The Royal Bournemouth Hospital by Bournemouth University we would be most grateful if you could complete this questionnaire.

Thank you.

Please circle the phrase which is most appropriate.

1. How do you rate your hunger now at this moment on a scale of (1) to (7)?

(1)	(2)	(3)	(4)	(5)	(6)	(7)
not hungry at all			neither/ nor			very hungry

Comments

2. How much are you looking forward to your meal?

very much	quite a lot	fairly	neither	not really	not a lot	not at all

Comments

3. How appealing do you think that the meal will be?

very appealing	quite appealing	fairly appealing	neither	fairly unappealing	quite unappealing	very unappealing

Comments

Thank you for your time.

4. How tasty do you think the food will be?

very tasty	quite tasty	fairly tasty	neither	fairly tasteless	quite tasteless	very tasteless

Comments

5. How satisfied do you expect to be with your meal?

very satisfied	quite satisfied	fairly satisfied	neither	fairly dissatisfied	quite dissatisfied	very dissatisfied

Comments

6. Have you been admitted or visited anyone in hospital before?

Yes No

Now, to help us classify your answers would you mind answering the following questions?

Male/female ***Age----------*** ***Date of Admission----------***

Thank you for your time.

Meal Satisfaction Questionnaire (post-meal)

Breakfast ***Lunch*** ***Supper***

As part of a review of meal service at The Royal Bournemouth Hospital by Bournemouth University we would be most grateful if you could complete this questionnaire

Please circle the phrase which is most appropriate.

1. How do you rate your hunger now at this moment on a scale of (1) to (7)?

(1)	(2)	(3)	(4)	(5)	(6)	(7)
very hungry			neither/ nor			not hungry at all

Comments

2. How well did the portion size match expectation?

very well	quite well	fairly well	neither	fairly poorly	quite poorly	very poorly

Comments

3. How would you rate the presentation of your meal?

very good	quite good	fairly good	neither	fairly poor	quite poor	very poor

Comments

Thank you for your time.

4. How appealing was the meal?

very appealing	quite appealing	fairly appealing	neither	fairly unappealing	quite unappealing	very unappealing

Comments

5. Were the food items served at the correct temperature?

Yes No **If 'No' were cold items too warm or hot items too cold? Please comment.**

Comments

6. How tasty was your food?

very tasty	quite tasty	fairly tasty	neither	fairly tasteless	quite tasteless	very tasteless

Comments

7. How satisfied were you with your meal?

very satisfied	quite satisfied	fairly satisfied	neither	fairly dissatisfied	quite dissatisfied	very dissatisfied

Comments

8. How would you rate the overall standard of catering in this hospital?

Excellent	very good	quite good	fairly good	neither	fairly poor	quite poor	very poor	extremely poor

Comments

Thank you for your time.

APPENDIX 8 ***Consumer Opinion Card***

FOOD ITEM:----------

After you have eaten this item, please rate it on the following characteristics. Select ONE phrase that best describes your opinion of each and cross the number beside it.

Temperature		**Flavour**		**Portion Size**		**Texture**	
Much Too Hot	7	Very Good Flavour	7	Much Too Big	7	Very Bad Texture	7
Too Hot	6	Good Flavour	6	Too Big	6	Bad Texture	6
Slightly Too Hot	5	Slightly Good Flavour	5	Slightly Too Big	5	Slightly Bad Texture	5
Just Right	4	Neutral Flavour	4	Just Right	4	Neutral Texture	4
Slightly Too Cold	3	Slightly Bad Flavour	3	Slightly Too Small	3	Slightly Good Texture	3
Too Cold	2	Bad Flavour	2	Too Small	2	Good Texture	2
Much Too Cold	1	Very Bad Flavour	1	Much Too Small	1	Very Good Texture	1

What is your OVERALL OPINION of this item?

7	6	5	4	3	2	1
Very Good	Good	Slightly Good	Neutral	Slightly Bad	Bad	Very Bad

COMMENTS:

Now to help us classify your answers would you mind answering the following questions about yourself?

Male/Female *Age----------* *Date of Admission----------*

Thank you for your time.

APPENDIX 9 The Protocol for Operational Analysis

Patient: **Meal Episode:**	**Length of Meal Episode:**
Number of interruptions	
Number of times staff empathise with patients (smile, chat, aid eating, open packets)	
Number of times patient interacts with other patients/visitors (social facilitation)	
Time taken to eat meal	
Percentage time taken in social facilitation	
Percentage time taken with medical concerns during meal episode	
Notes:	

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CLINICAL NUTRITION AND METABOLISM GROUP OF THE NUTRITION SOCIETY

AND

THE BRITISH ASSOCIATION FOR PARENTERAL AND ENTERAL NUTRITION

The Harrogate International Centre (HIC)
Harrogate
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Abstracts of Original Communications

Comparison of mean energy intake between eating situations in a NHS hospital – a pilot study. By H.J. HARTWELL and J.S.A. EDWARDS, *The Worshipful Company of Cooks Centre for Culinary Research, Bournemouth University, Talbot Campus, Poole, Dorset, BH12 5BB*

Malnutrition has long been recognised in hospitals with the resultant consequences. The eating environment was acknowledged in the BAPEN report (Allison 1999) as a factor affecting food consumption and that eating is a social activity, which may be enhanced if patients sit together. Food served in conducive surroundings and in the company of others stimulates appetites and increases the enjoyment of the meal occasion. Past studies have shown that subjects will eat more sitting around a table in a social situation than when isolated (Edelman *et al* 1986). As stated by Rozin (1996) 'a social presence, in both animals and humans, seems to increase food intake'. This has been demonstrated by DeCastro (1990) where it was reported that the number of people present at a mealtime was positively correlated with energy content of the meal consumed.

The aim of this study was to ascertain if the eating environment within a hospital influenced food intake. Dietary data were collected for three consecutive 24 hour periods from a Women's Health Unit (n=13) in a NHS hospital. Patients were all post-operative, ambulant and consumed their meal in different locations. Furthermore every individual chosen felt reassured and was well convalesced. No attempt was made to manipulate the situation.

- Group 1: Around a table
- Group 2: Sitting by their bed
- Group 3: Sitting in bed

Menu items were weighed before and after consumption, trays were collected and waste calculated. Nutritional analysis was undertaken using the Microdiet software program.

Results show a significant increase ($p<0.05$) in mean daily energy intake for the group sitting around the table.

	Group 1 Patients at a table (n = 4)	S.D.	Group 2 Patients by the bed (n = 5)	S.D.	Group 3 Patients in bed (n = 4)	S.D.
Age range	36-62yrs	-	60-86yrs	-	49-89yrs	-
Mean daily intake (kcal)	1632	314	1348	336	1363	287
Maximum (kcal)	2045	-	1858	-	1847	-
Minimum (kcal)	1104	-	758	-	955	-

There were no significant differences in 'avoidable' waste for all groups. Intakes of carbohydrate, fat and protein were greater at the lunch time meal for patients in Group 1. The increase in carbohydrate intake of Group 1 was significant ($p<0.05$) compared to Group 2.

Primary indications from this research show that consuming meals in a social situation could increase energy/macro nutrient intake. These results support other research in this field (DeCastro 1989) and suggest that eating in company appears a promising technique with which to encourage patients to use food as treatment. Social facilitation could be promoted during meal times by the creation of ambient dining areas away from the noise and smells at ward level where patients can consume their meals. Even if space is limited, patients should be encouraged to eat their meals around a table in a social context.

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A preliminary assessment of two hospital food service systems using parameters of food safety and consumer opinion

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Key words

Consumer opinion; food safety; hospital food service; hostess cafeteria trolley delivery; plated delivery

Abstract

The goal of any hospital caterer should be to provide food that meets nutritional requirements, satisfies the patient, improves morale and is microbiologically safe. Food distribution to hospital wards plays a critical role.

The aim of this study was to compare two hospital food service systems using parameters of food safety and consumer opinion.

An NHS hospital was selected where food delivery was due to change from a plated system to a cafeteria trolley system.

Samples (50g) of dishes (n=27) considered to be high-risk were collected for three consecutive days from breakfast, lunch and supper meals. The samples were taken from a pre-ordered tray (similar to that of a patient) in the plated system and from the trolley on the ward in the cafeteria system of meal delivery (approximately six months after its introduction). Consumer opinions cards (n=180) were distributed and interviews also conducted.

Microbiologically, the quality of food items delivered by both systems was satisfactory. However, concern was raised with the plated system, not for hot foods cooling down but for chilled foods warming up and being sustained in ambient conditions. Overall consumer satisfaction and experience was enhanced with the trolley system. Food was hotter and generally perceived to be of a better quality. Satisfaction with cold desserts was not dependent on the delivery system.

Introduction

Food is essential for life and the minimum any consumer should expect is that it is safe to eat. Infirm people, old people and children are particularly vulnerable to the effects of food poisoning; hence food safety is paramount in hospitals, schools and residential homes. Good food hygiene is the use of policies, practices and procedures designed to protect food from contamination, prevent multiplication of bacteria or ensure the destruction of disease-producing micro-organisms (Barrie, 1996). This can be achieved by correct storage, hygienic preparation, thorough cooking and ensuring that high-risk foods are not kept in ambient conditions. High-risk foods are defined as those most likely to be microbiologically contaminated and/or are intended for consumption without further treatment. The hospital food service system is considered to be the most complicated production process within the hospitality sector (Wilson *et al*, 2000), lending itself to the potential for numerous hygiene violations. Food hygiene is therefore of growing concern in hospitals (Council of Europe, 2001).

In August 1984, 355 hospital patients and 106 staff were involved in an outbreak of food poisoning resulting in 19 deaths. The inquiry which followed identified cross-contamination between raw and cooked foods, poor food preparation and storage facilities which in turn led to a complete failure by staff to follow the basic rules of food hygiene practice (DHSS, 1986). Mismanagement was also identified as a contributory factor. Partly as a result of this outbreak, fuelled by media attention, Crown Immunity was removed from Government properties in February 1987 and hospitals are now inspected by environmental health officers (EHOs), as are all other catering establishments (Lomas, 1988).

Some food premises are considered to be more at risk due to the very nature of the population group that they serve. Hospitals are classified as 'Inspection Rating Category A' and as such are inspected with greater frequency, every six months compared to every five years for premises that pose the least risk (Gillespie *et al*, 2000). EHOs also consider the number of customers likely to be put at risk if there is a failure in food hygiene and award a 'consumer at risk' score accordingly (Gillespie *et al*, 2000). Scores range from zero (very few at risk) to 15 (a substantial number at risk). An additional score of 20 exists for premises serving vulnerable groups (old

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Introduction

Food is essential for life and the minimum any consumer should expect is that it is safe to eat. Infirm people, old people and children are particularly vulnerable to the effects of food poisoning; hence food safety is paramount in hospitals, schools and residential homes. Good food hygiene is the use of policies, practices and procedures designed to protect food from contamination, prevent multiplication of bacteria or ensure the destruction of disease-producing micro-organisms (Barrie, 1996). This can be achieved by correct storage, hygienic preparation, thorough cooking and ensuring that high-risk foods are not kept in ambient conditions. High-risk foods are defined as those most likely to be microbiologically contaminated and/or are intended for consumption without further treatment. The hospital food service system is considered to be the most complicated production process within the hospitality sector (Wilson *et al*, 2000), lending itself to the potential for numerous hygiene violations. Food hygiene is therefore of growing concern in hospitals (Council of Europe, 2001).

In August 1984, 355 hospital patients and 106 staff were involved in an outbreak of food poisoning resulting in 19 deaths. The inquiry which followed identified cross-contamination between raw and cooked foods, poor food preparation and storage facilities which in turn led to a complete failure by staff to follow the basic rules of food hygiene practice (DHSS, 1986). Mismanagement was also identified as a contributory factor. Partly as a result of this outbreak, fuelled by media attention, Crown Immunity was removed from Government properties in February 1987 and hospitals are now inspected by environmental health officers (EHOs), as are all other catering establishments (Lomas, 1988).

Some food premises are considered to be more at risk due to the very nature of the population group that they serve. Hospitals are classified as 'Inspection Rating Category A' and as such are inspected with greater frequency, every six months compared to every five years for premises that pose the least risk (Gillespie *et al*, 2000). EHOs also consider the number of customers likely to be put at risk if there is a failure in food hygiene and award a 'consumer at risk' score accordingly (Gillespie *et al*, 2000). Scores range from zero (very few at risk) to 15 (a substantial number at risk). An additional score of 20 exists for premises serving vulnerable groups (old

people, sick people and young children).

Patients' right to have confidence in hospital catering is endorsed by the National Health Service, *"Food served in hospitals should be enjoyed by patients, provide good nutritional value and be safe to eat"* (NHS, 1994). This is highlighted as the majority of patients (90%) rely on hospital food for their nutritional intake (Elia *et al*, 1998). The hospital caterer therefore has a duty to produce palatable, attractive, nutritious food, free from contamination (Barrie, 1996). However, they are often thwarted in this goal by antiquated production equipment and strict food costings (Kipps and Middleton, 1990).

The budget for hospital food varies between Trusts but ranges from £1.60 to £2.40 per person per day (Allison, 1999). The siting of hospital wards at considerable distances from the kitchen establishes the possibility of delays between production, delivery, service and consumption (Kipps and Middleton, 1990). This stretched, continuous and staggered food cycle can have negative effects on the quality of food, securing the need for a strict and systematic method of monitoring potential food hazards (Wilson *et al*, 1997).

All food in the UK must comply with the Food Safety Act 1990. This Act applies to food from plough to plate and is supported by regulations, codes of practice and Industry Guides. The Food Safety (Temperature Control) Regulations 1995 place stringent requirements on temperature control during receipt, storage, processing and distribution of food. High-risk foods should be kept at 63°C and above or 8°C and below [Food Safety (Temperature Control) Regulations 1995]. Although this might be strictly adhered to within the kitchen environment, food in transit, and often as served to the patient, falls below this requirement (Allison, 1999; Kelly, 1999).

Temperature of hot food is an area of patient dissatisfaction and a regular cause for complaint (ACHCEW, 1997; O'Hara *et al*, 1997; Rush and Moloney, 1998). In the USA where the plated meal system is used, approximately 28% of all patients are dissatisfied with the temperature of hot food items and approximately 25% are dissatisfied with the temperature of cold food items (Gregoire, 1994).

Food that should be hot is sometimes too cold and congealed by the time it is served, and conversely cold food such as ice-cream may have melted. This raises the question of food safety being compromised, particularly when the client base is a vulnerable group. In hospitals, the arrangements for food preparation, distribution and service should deliver safe food of defined standards in terms of nutritional quality, balance, palatability and temperature (Davis and Bristow, 1999).

There is strong statistical evidence that the incidence of food poisoning caused by caterers is greater than in any other food sector, accounting for 70% of all bacterial food poisoning outbreaks (Wilson *et al*, 1997). Seventy per cent of these food poisoning outbreaks are due to the inadequate time and temperature control of food, while the remaining 30% are the result of cross-contamination. However, cross-contamination is greater in the kitchens of cafes, restaurants and hotels than those of schools, hospitals and staff canteens (Tebbut, 1984).

In the UK, between 1993 and 1998, 2% of all foodborne disease outbreaks occurred in hospitals. This compares to the rest of Europe where figures range from 4.9% in Germany to 0.8% in Spain (WHO, 2001). Although these statistics are low in comparison with caterers as a whole, there must still be an element of concern. The topic is of particular significance in the UK since the Food Standards Agency announced a benchmark for food poisoning reduction and has indicated a target of a 20% cut in the number of cases of food-borne illness by 2006 (Food Standards Agency, 2001a).

In 2000, there were 86,616 statutory notifications of food poisoning. However, this is probably only the tip of the iceberg as so many cases go unreported; the true figure is probably 4.5 million (Food Standards Agency, 2001b). Food poisoning is preventable and costs millions of pounds each year in avoidable healthcare. Food safety enforcement statistics in the UK have revealed that half of inspected catering premises violated food hygiene regulations, and as such is high on the Government's agenda (Food Standards Agency, 2001c).

The service and consumption of food and beverages breaks the monotony of a long, unexciting day and could be an important component in the improvement of patient morale. Reilly *et al* (1987) suggest that the 'meal experience' is an essential element within the scope of patient recovery and can reflect the length of stay in hospital. In a survey conducted of 192 acute care trusts regarding methods of food production, delivery and service of meals (Hwang Li-Jen *et al*, 1999), hospital caterers seem to have split opinions with respect to bulk and plated service methods.

Several thought that bulk service could increase the quality of food, the inter-personal aspects of the food service and patients' satisfaction. However, others felt, alternatively, that plated meal service could ensure quality presentation and best service.

There appears to be a divergence of opinion regarding hospital food service with very little systematic evaluation of the main catering systems (Wilson *et al*, 2000).

The aim of this research was to critically compare two hospital food service systems using parameters of food safety and consumer opinion.

Hospital food service systems

There are a number of food production systems available for use in catering operations, including cook and serve, cook-freeze and sous vide (cook-chill).. In this study a traditional cook and serve system is employed with ingredients being bought in, stored, prepared and cooked on site. Distribution of meals can use either a plated meal or cafeteria meal system.

Plated meal system

In this system (Figure 1) food is ordered by patients up to 24 hours in advance. Meals are then assembled just prior to being required. This is achieved using a conveyor belt with caterers standing either side serving the appropriate portions onto plates and tray in accordance with the patient's order. These trays are then stacked into pre-heated cabinets, with cold dishes being placed into a separate ambient compartment, before delivery to the hospital ward.

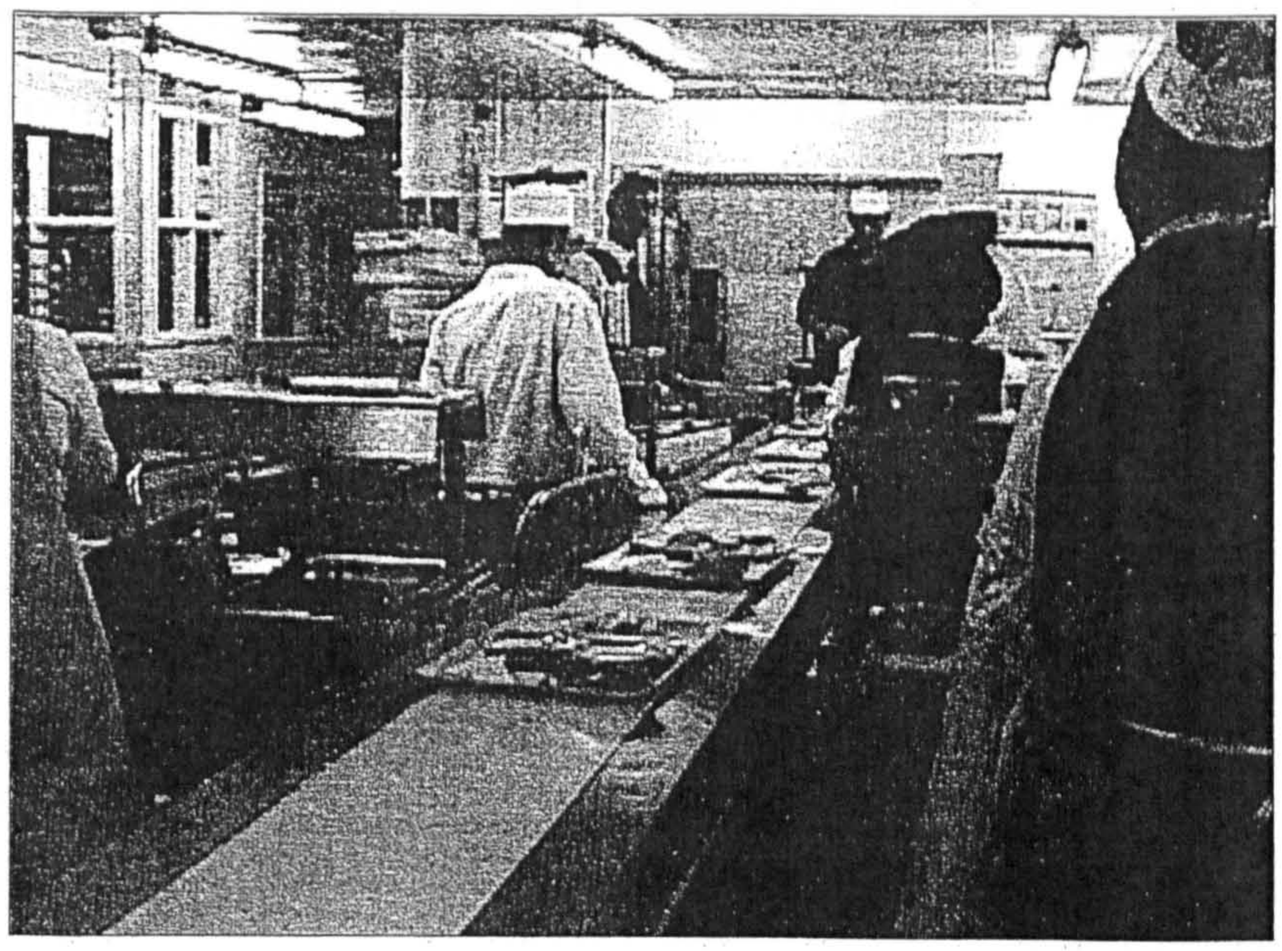
When the meals are required, hot and cold dishes are reassembled and the tray, now containing the soup, main course and cold dessert, if ordered, is served to the patient by health care assistants or nursing staff.

Cafeteria trolley system

This is a more flexible style of food service as meal selection is made at the point of consumption. Dishes are loaded, in bulk,

Figure 1

Plated system of food delivery



into a preheated trolley. There is also a chilled compartment for the storage of salads, desserts and other cold items (Figure 2).

The trolleys are transported to the ward where they are again plugged into an electrical socket.

When required for service, they can be wheeled near to the patient and overhead gantry lights turned on to improve presentation and ensure that food on display is kept hot. Patients order their meal at the point of service with portion sizes being varied in accordance with the patient's appetite.

Methodology and data collection

An NHS hospital was selected where the food distribution was through a plated service but was due to change subsequently to a hostess cafeteria trolley system. The rationale behind this latter decision was for economic reasons as the plated cabinets were ten years old and in need of replacement. Ethical approval from the appropriate Trust was sought and gained for this study.

Data were collected from two wards - Women's Health and Orthopaedic - chosen partly because food was last to be assembled and delivered and therefore provided a worst case scenario, and partly because patients were capable of independent critical judgement and are highly censorious (evidenced by past surveys conducted by the caterers). The study included only those patients consuming a 'normal' diet provided by the kitchen and did not include those on high-energy, high-protein or therapeutic diets.

Food samples

Samples (50g) from dishes (n=27) considered to be high-risk were collected from breakfast, lunch and supper meals. High-risk dishes were defined as those of high protein content and therefore most likely to be microbiologically contaminated. These were taken from a pre-ordered tray (similar to that of a patient) in the plated system and then from the trolley on the ward in the cafeteria system of meal delivery (approximately six months after its introduction) for a period of three consecutive days in each case. Temperatures of food were recorded at the final stage of preparation and immediately prior to consumption. The time taken for the food to reach the patient was also recorded.

Once taken, samples were immediately placed in a refrigerated container containing a Kane-May temperature probe (KM22, accuracy $\pm$ 0.2°C) and kept at chilled temperatures, 5°C for approximately 30 minutes, until transferred to the laboratory for testing. Samples of 20g were used for food analysis with the remainder stored under refrigerated conditions in case results needed to be replicated.

Food microbiology was based on enumeration methods (i.e. colony counts) using plates of nutrient agar (aerobic and anaerobic) incubated at 37°C $\pm$ 1°C for 24 hours and 48 hours, together with Chromocult coliform agar (for ease of identification of *Escherichia coli* and accuracy of coliform count) incubated at 37°C $\pm$ 1°C for 24

Figure 2

Trolley system of food delivery

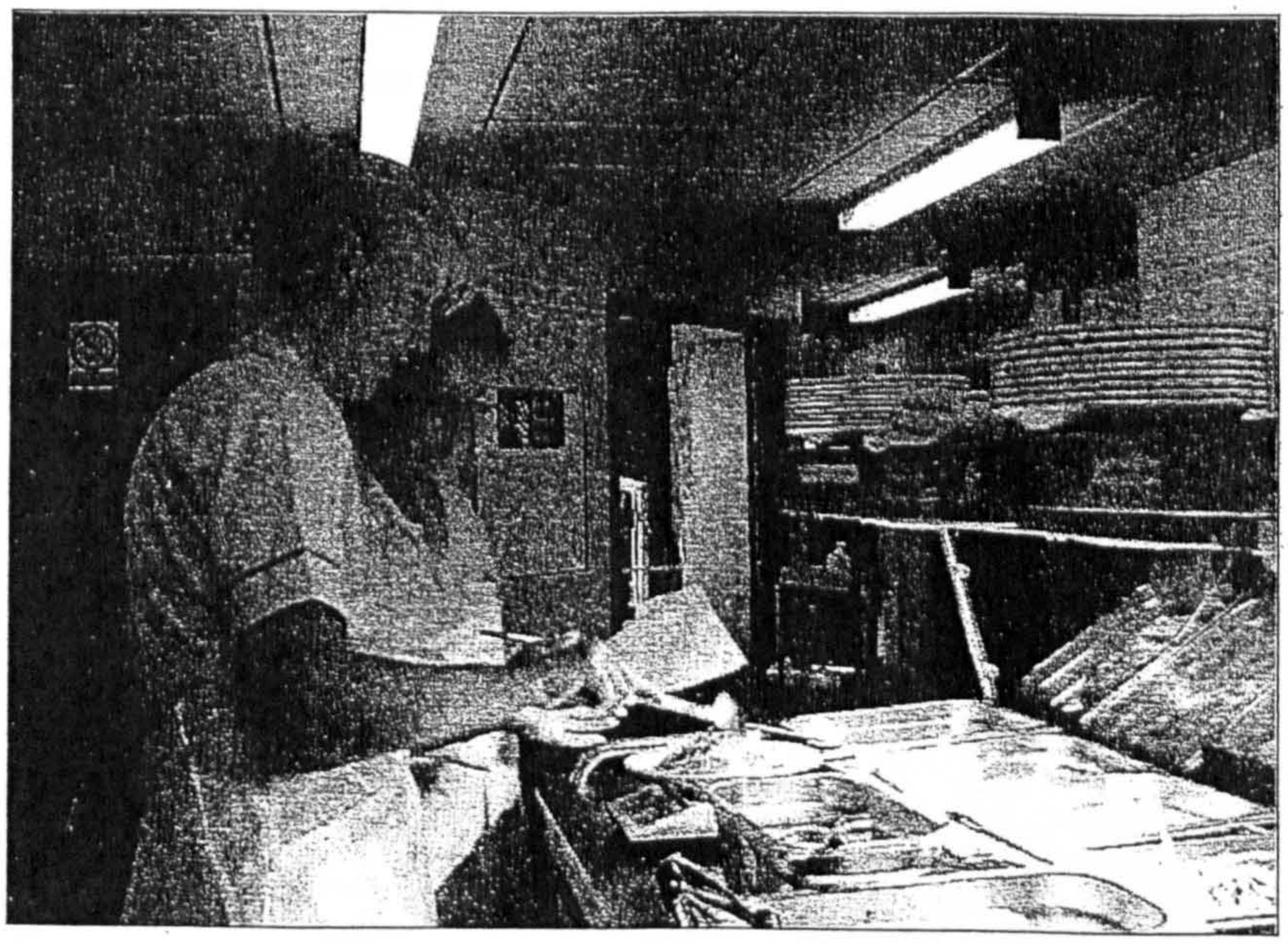


Table 1

Mean core temperature of high-risk foods served at supper for three days by the plated system of food delivery

Food	Temperature on the belt (°C)	Temperature on plate as served (°C)	Temperature difference (°C)
Chicken soup	82.0	51.3	-30.7
Beef lasagne	86.0	52.0	-34.0
Tuna/sweetcorn (cold)	Not tested	25.1	n/a
Ham (gammon)	87.0	38.8	-48.2
Cauliflower cheese	80.0	60.3	-19.7
Fruit trifle	Not tested	16.8	n/a
Shepherd's pie	78.8	58.0	-20.8
Cold boiled egg (on plate)	17.8	18.9	+1.1

hours. Samples of high-risk food were weighed aseptically into a sterile Stomacher bag and diluent (0.1% peptone water) added to give a 10^{-1} dilution. Samples were then homogenised for 60 seconds using a Stomacher 4000, and 1 ml of the resultant liquor poured onto the test plates. Duplicate plates were prepared using a Spiral System (Spiral Systems, Spiral Plater, model D). After incubation, colonies appeared along the lines of the spiral. The bacterial density was determined by counting the colonies on a countable portion of the plate and dividing this number by the volume of the sample contained within the area counted. Plate counts for total aerobic and anaerobic organisms were performed after 24 and 48 hours together with total coliform plate count after 24 hours.

Consumer opinion

In order to determine patients' satisfaction with the temperature and quality of food served, consumer opinion cards (Cardello *et al*, 1984) were distributed (n=180) and interviews conducted which concentrated on the quality indicators of core foods (temperature, flavour, portion size, texture and overall opinion). Core foods selected were carrots, broccoli, minced beef dish, poached fish dish, creamed potato and trifle. These items were chosen as they appeared on both the plate and trolley menu; some were high-risk. Patients were asked to complete the opinion cards once they had received their trays while consuming their meal. Anonymity of responses was guaranteed to all respondents in order to ensure valid judgements and candid comments.

Table 2

Mean core temperature of high-risk foods served at supper for three days by the trolley system of food delivery

Food	Temperature at trolley start (°C)	Temperature at trolley finish (°C)	Temperature difference (°C)
Minced beef	69.0	66.0	-3.0
Jacket potato	68.0	66.1	-1.9
Macaroni cheese	65.0	62.0	-3.0
Sausage	63.0	58.2	-4.8
Carrots	76.0	50.0	-26.0
Pork cutlet	64.0	59.7	-4.3
Rice pudding	73.0	63.2	-9.8
Minestrone soup	73.2	58.0	-15.2
Fish fingers	68.5	60.8	-7.7
Ice-cream	-3.2	-3.2	0
Chilled mousse	-4.1	-4.1	0

Data analysis.

Standard statistical tests were applied to the data using appropriate procedures in SPSS. Frequencies, one-way ANOVA and then subsequent paired t-tests were conducted between matched core food items to determine significant differences between the means. Statistical significance (p=0.05) was used for all tests.

Results

Plated meal system

The temperatures of hot food items on the conveyor belt were within the Food Safety (Temperature Control) Regulations 1995. Table 1 gives the temperatures on the belt and on the plate as served for high-risk foods served at supper. All hot foods including high-risk were between 70°C and 80°C. However, although the hot food items were at an acceptable temperature while being plated, they were not hot enough when actually served to the patients.

Microbiologically, no cooked items had total viable counts greater than $1x10^2$ cfu g^{-1} after aerobic and anaerobic incubation at 37°C for 48 hours. Similarly the coliform count gave no grounds for concern (PHLS, 2000). However, higher counts were noted on the chilled foods. The fruit trifle had an aerobic colony count of $6.8x10^2$ cfu g^{-1} and an anaerobic colony count of $3.4x10^2$ cfu g^{-1}. Salmon sandwiches also showed the same trend in plate numbers, whilst the egg in an egg salad showed a reading of $2.0x10^2$ cfu g^{-1} total coliforms after 24 hours incubation. However, no *E. coli* (an indicator for faecal contamination) was observed.

Cafeteria trolley system

With the advantage of the overhead heating facility dishes are kept hot even when opened and remain so as the nurses progress around the ward; therefore foods are generally hotter as summarised in Table 2. However, some dissipation of heat was found from foods such as soups with a large surface area, and most dishes were registering a temperature of below 63°C by the time service was completed.

Microbiologically, all foods, both hot and chilled, had negligible amounts of growth <20 cfu g^{-1} for aerobic, anaerobic and coliforms organisms. No *E. coli* was observed.

Consumer opinion

Analysis of variance showed an overall sig-

Table 3

Comparison of core foods by food service system

	Carrots		Broccoli		Beef dish		Fish		Mashed potato		Trifle	
Attributes	F	Sig	F	Sig	F	Sig	F	Sig	F	Sig	F	Sig
Temperature	3.6	0.06	1.6	0.21	18	0.00*	12	0.00*	0.42	0.52	0.01	0.92
Flavour	20	0.00*	5.2	0.03*	2.1	0.15	16	0.00*	3.1	0.08	0.00	0.97
Portion size	0.00	1.0	40	0.00*	2.6	0.11	0.00	0.97	5.0	0.03*	0.01	0.92
Texture	14	0.00*	14	0.00*	13	0.00*	14	0.00*	7.2	0.01*	0.01	0.91
Opinion	3.2	0.08	1.4	0.24	7.5	0.01*	18	0.00*	6.9	0.01*	0.02	0.89

* denotes significance p=0.05

This table illustrates significant differences of the two food service systems, between core foods and their attributes

nificant effect of temperature for the beef and fish dish. Further investigation revealed that these dishes were significantly hotter served by the trolley system, as summarised in Table 3.

However, it was observed that the vegetables were spread out in the gastronome pan on the trolley, dissipating heat, mirroring the situation found on a plate.

Texture was significantly enhanced by the trolley system of food delivery. Overall opinion of the patients revealed that the mashed potato, beef and fish dish benefited by choice at the point of consumption. There was no conclusive evidence regarding portion size or flavour, and satisfaction with cold desserts such as trifles was found not to be dependent on the delivery system.

Discussion

Plated meal system

Microbiologically, the quality of food items with both systems was satisfactory. However, it was noted that with the plated system of food delivery, there was cause for concern, not for the hot foods cooling down, but for the chilled foods warming up and this ambient temperature being sustained.

Cold desserts and salads, where they were left in the kitchen for the duration of the belt run in the plated service system (approximately one hour), reached temperatures in excess of the recommendations. A boiled egg for an egg salad was noted to be 17.8°C. This was also because once a ward food order had been 'plated' the trays were stored in a preheated cabinet with the chilled foods in an ambient compartment, awaiting a kitchen porter for delivery. In some instances chilled food was at room temperature in excess of two hours.

Within the Food Safety (Temperature Control) Regulations, 1995, there is some flexibility (tolerances) where food normally requiring temperature control may be kept above 8°C for a single period of up to four hours. However, when dealing with a vulnerable group, extreme care should be taken. Desserts containing cream and other high-risk ingredients, such as the fruit trifle, are potentially risky and account for 11% of food poisoning cases noted in the UK (Food Standards Agency, 2001d). In other European countries this figure can be higher; for example, in Germany, there are 29.3% of foodborne disease outbreaks attributable to cakes, puddings and ice-cream (WHO, 2001).

There was also an unsatisfactory coliform result identified on the hard-boiled egg in a salad delivered by the plated system. Although plate counts were within food safety guidelines (PHLS, 2000) and the foods passed as acceptable microbiological quality, there is some cause for concern, particularly when dealing with hospital patients.

The contamination could only have come from either poor personal hygiene of the food handler or cross-contamination from food preparation surfaces, indicating a general lack of hygiene. Growth would have then been encouraged by holding the food at ambient temperatures for an excessive length of time.

The temperature of the preheated hot cabinet for the plated system reached 118°C. However, due to the antiquated nature of the hardware and the time taken to arrive on the wards, heat was dissipated quite quickly. Cabinets were registering temperatures of 88°C after a journey which in some instances took up to 30 minutes. Spot checks on the food were not made inside the cabinet but temperatures of dishes on the belt were within Food Hygiene Regulations; however, as delivered to the patient temperatures were as low as 39°C.

On the ward, nurses or health care assistants, when free, would deliver the trays to the patients. Quite often meal times were delayed due to ward rounds and medical emergencies. Therefore the temperature of food delivered to the patient was less than satisfactory. Seventy-nine per cent of patients stated that food items were not served at the correct temperature by the plated system of delivery. The recurring theme from respondents was that the vegetables were too cold and the ice-cream 'mushy'. Other comments included:

"Every time it (the food) comes it's cold and I don't like the look of it on the plate."

"Anything cold is at room temperature; I wish that the ice-cream could be solid."

"Having the pudding with the main meal means that if it is hot, the pudding is then cold by the time you eat it."

"Cold carrots and broccoli - ugh!"

Steps had been taken by the caterers to rectify this situation by, for example, putting the ice-cream in insulated beakers. Unfortunately, due to the length of delivery time from belt to patient, the ice-cream still melted.

The food is only kept hot with varying degrees of success and for a relatively short time as it is not possible for the cabinets to be plugged into an electrical point when on

the ward. Temperatures therefore are very much dependent on the integrity of the 'hot' cabinets.

Cafeteria trolley system

In the cafeteria trolley system, the hostess trolley is plugged in before being loaded in the kitchen, and remains so until collected by a porter for delivery to the ward. The temperature integrity of the food is therefore easier to maintain particularly as the trolley, arriving on the ward, is again plugged in.

Eighty-six per cent of patients served by the trolley method of service delivery thought the food items were of the correct temperature compared to 21% served by the plate system. Comments from patients also reflected this greater satisfaction:

"I consider the quality of meals to be very good considering the conditions in which it has to be served and the numbers dealt with. One important factor I find in enjoying the meal is being able to see the selection before making a choice."

"It is much nicer to be able to see the food available before choosing."

"I find it a pleasure to not know what I am getting and smell the food on arrival."

"I always look forward with a certain amount of anticipation: the choice is varied and quantity adequate."

"There was sufficient choice and more than enough. I have been both pleased and satisfied."

However, it was also observed that there could be a disadvantage with this system unless strict guidelines are issued, as on several occasions during trolley delivery, nurses were asked by patients to empty bedpans or perform other medical duties whilst serving food. They would roll up the green apron covering their uniform, complete the medical task and then continue with the food service operation; however, they did always wash their hands.

Consumer opinion

It is clear from this research that overall consumer satisfaction and experience was much enhanced when there was choice at the point of consumption. The food was hotter and generally perceived to be better quality. People have strong preferences for the temperature of food which influences acceptance. Overall pleasantness of a food item has been found to correlate strongly with the appropriateness of temperature. Foods served at unfamiliar temperatures may be rejected (Cardello and Maller, 1982; Ryynanen *et al*, 2001).

Conclusion

Consumers are concerned with food safety and less than half of the population are confident about current food safety measures (Food Standards Agency, 2001e).

The NHS is a significant provider of catering services and some Trusts have a policy of keeping 50 g of all high-risk foods for 72 hours so that they are available for culture in the event of a complaint or illness (Barrie, 1996). For quality benchmarking purposes, other Trusts send 'ghost meals' to the wards and check for sensory satisfaction. Whilst hospital outbreaks are most commonly due to agents transmitted from person to person, a proportion are foodborne and as such should be preventable. (Advisory Committee on the Microbiological Safety of Food, 2000).

Generally caterers are positive about food safety issues. However, doubts have been raised about the ability of caterers to transfer positive attitudes into action (Coleman and Griffith, 2001).

In the hospital under study, a pro-forma hazard analysis was in place, and all catering staff had undergone some level of food hygiene training with management holding advanced certificates. Food temperatures during production and on the belt were routinely monitored. However, once food leaves the confines of the kitchen, food safety is out of the control of the caterers. A number of personnel are involved and effective coordination needs to be in place to ensure that food is appropriately controlled and monitored throughout the distribution chain (Aston, 2000). Therefore, a delivery system that can guarantee the temperature integrity of the product, hot or chilled, must be an advantage.

Responsibility for serving food on the wards remains with the registered nurse, although this task can be delegated (United Kingdom Central Council for Nursing, Midwifery and Health Visiting, 1997). Accordingly, food hygiene training should also be a crucial element in all course structures designed for nurses or health care assistants. This is of particular significance for any defence of due diligence. In the hospital studied, nurses and health care assistants had received some instruction regarding operating the trolley and maintaining temperature control; however, to date they have not received any formal food hygiene training - a situation that is soon to be rectified.

There is little published literature regarding food safety and food service systems but evidence from this research suggests that the cafeteria trolley system of delivery has the potential for being safer. Moreover, it is the system favoured by patients. Satisfaction is likely to lead to improved morale and a speedier recovery.

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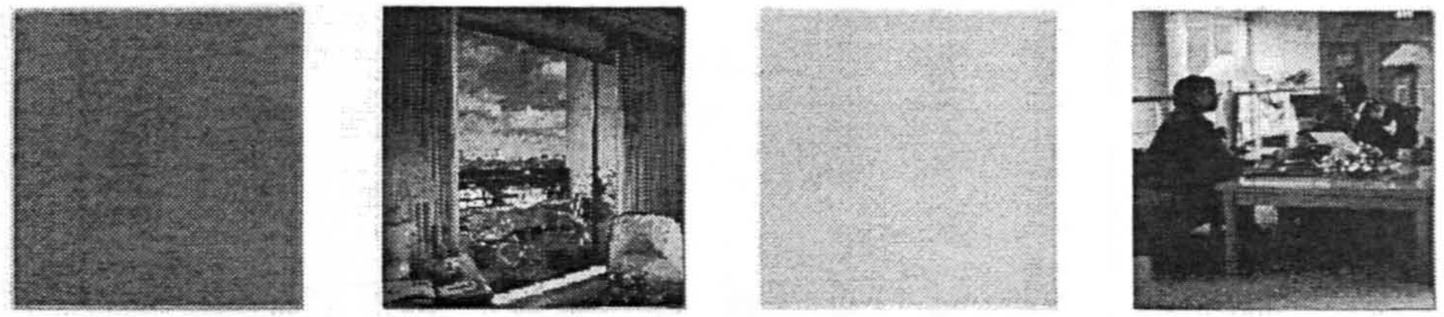

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NOTATIONAL ANALYSIS IN HOSPITAL FOOD SERVICE

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Permission was sought and granted by the NHS Trust Research Ethics Committee to conduct this research.

ABSTRACT

Notational analysis is a tool used to describe a sequential history of coded events and was used in this research to critically evaluate a food service operation within a NHS hospital.

The research methodology involved collecting observational data during mealtimes in an orthopaedic ward. The sample consisted of male (n=14) and female (n=16) patients age range 65-84 years. Data were collected two days post operation and consisted of structured observation for breakfast, midday and evening meal episodes.

Social facilitation significantly peaked at the evening meal ($p \leq 0.05$) mainly due to the number of visitors present. There was also a significant difference between male and female patients. Furthermore a positive correlation was evident between length of mealtime and both social facilitation and medical interruptions.

Empathy function was constant between meal episodes and between both male and female patients.

1. INTRODUCTION

Historically, the use of notation in recording patterns of movement can be traced back thousands of years to when the Egyptians developed a crude form of dance notation (Hughes and Franks, 1997). Notational analysis has since been traditionally used for coaching diagnosis in a variety of sporting events including the British Women's Curling team who won gold at the Winter Olympics 2002. It's emergence in the field of sport was supported by evidence suggesting that subjective observations of athletes were unreliable and inaccurate (Hughes and Franks, 1997), detail was either missed, forgotten or misinterpreted. Research by Franks and Miller (1986) identified that international-level soccer coaches could only recollect 42% of the key factors during one match. Moreover,

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studies into eyewitness recall further endorse the limitations of human memory either by failure at the acquisition stage or by failure at the retrieval stage (Loftus, 1979).

Notational analysis is a tool used to describe a sequential history of coded events and was used in this research to critically evaluate a food service operation within a NHS hospital. An objective assessment allows managers to identify those occurrences that stand out as distinctive features and enables a quantifiable comparison between situations. The concept of systematic observation has been used extensively by educators to gather data on the performance of teachers within a training environment (Hughes and Franks, 1997). It allows a researcher to use a protocol to observe, record and analyse fundamental elements within an episode that are deemed important in determining effectiveness, with the assumption that other observers using the same instrument would agree with the recorded data (Hughes and Franks, 1997).

Food service in hospitals is an essential part of patient care and a fundamental factor in aiding recovery. However hospital food service is considered the most complicated and fragmented process within the hospitality sector with many interrelated factors impinging on the whole (Wilson, 1997). A schematic representation is given in Figure 1.

Figure 1.

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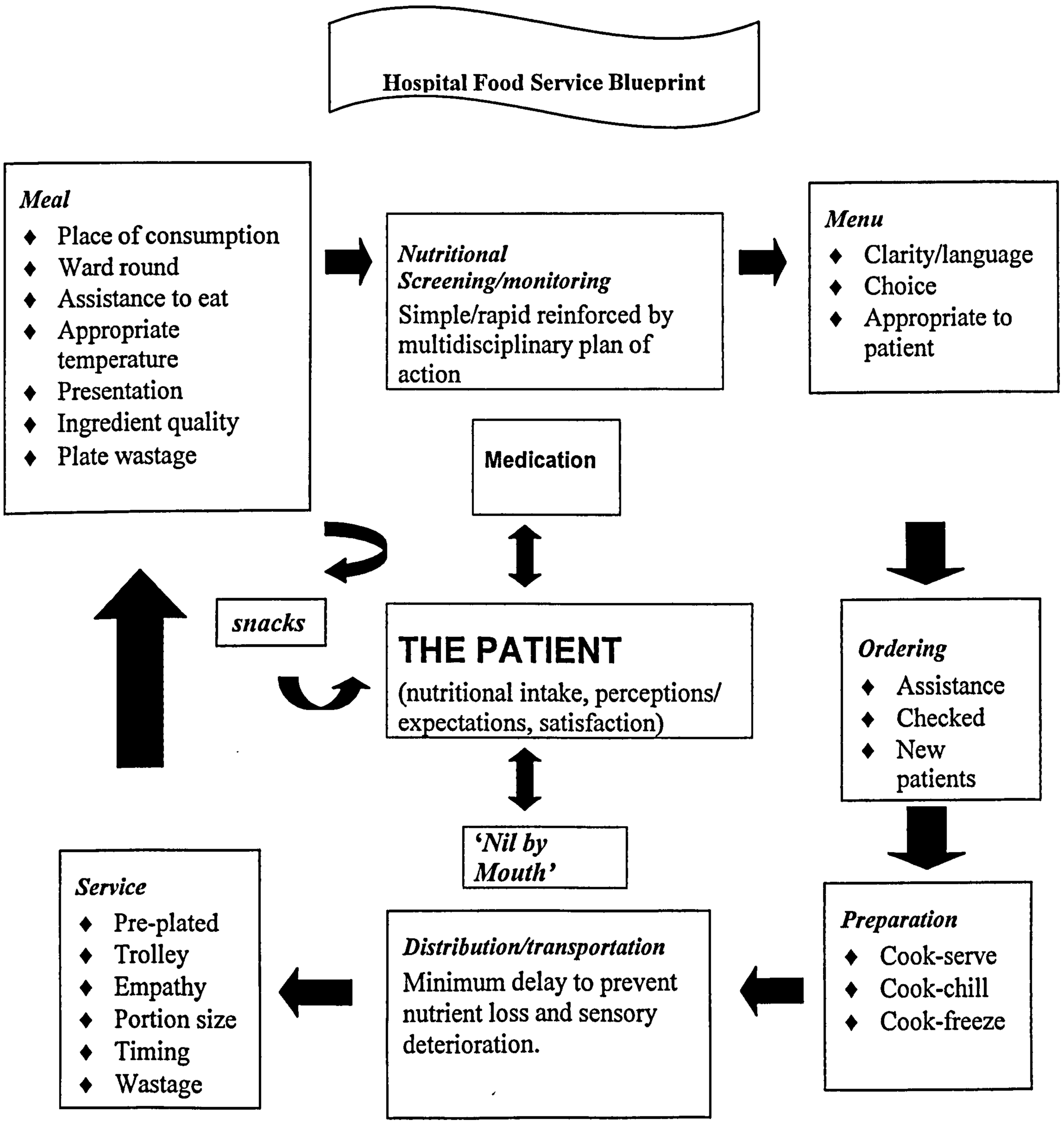

Resource: adapted from Edwards *et al.*, 2000

Recently, there has been increasing concern over the high prevalence of malnutrition among hospital patients and a growing interest in the role of food to improve clinical outcomes (Allison, 1999, Royal College of Physicians, 2002). One of the major causes of undernutrition in institutions is not the failure to provide food but to deliver it in a manner appropriate to the particular patient (Allison, 1999). An important aspect of food service is the 'situation' (atmosphere, style of operation, time and staff attributes etc.) (Meiselman, 1996). These aspects distinguish what would

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be merely a refuelling exercise and make food intake a 'meal occasion'.

Food and meals in hospital are an essential ingredient of patient life and break the monotony of what could be a long and uneventful day, therefore as most patients are confined within the boundaries of the ward, mealtimes can take on an inflated significance (Tomes and Chee Peng, 1995).

Hospitalisation can be a socially isolating event and therefore person to person interaction is important, as opposed to simply having a meal 'dropped off' (Lavecchia, 1998; Oyarzun, 2000; Folio 2002). Moreover, positive attitudes expressed by staff can influence intake through persuasive action or communication (Rozin and Tuorila, 1993).

Previous research has suggested that social facilitation (Hartwell and Edwards, 2000) and server/patient empathy (de Raeve, 1994) could be crucial factors in the patient meal experience. It has also been suggested that interruptions by medical staff and housekeeping personnel could negatively effect food consumed as the best condition during mealtime is that of peace and quiet (Deutekom, 1991).

The research design constitutes part of a wider study to evaluate food service and was chosen to reflect the distinctive features of social facilitation, empathy and the number of interruptions experienced by patients during meal times in hospital. These interruptions were identified as critical elements of food service performance pertinent within the analysis. Observation was used as a supportive technique complementing data acquired by other methodologies including patient questionnaires and interviews.

2. METHODOLOGY

The research methodology involved collecting observational data during meal times in an orthopaedic ward in a NHS hospital. This ward was chosen as the patients had undergone elective surgery, either hip or knee replacement, and therefore, post-operation could eat as normal and none required assistance. The sample consisted of male (n=14) and female (n=16) patients in the age range of 65-84 years. Data were collected two days post operation and consisted of structured observation for breakfast, midday and evening meal episodes. Patients were situated in bays of six and an unobtrusive method of observation was possible, as in this hospital there are glass panels between the nursing station and patient. The researcher standing in the nursing station could therefore monitor distinctive features such as interruptions, activities and their timings, (using a stopwatch[1]), notating onto a pre-designed form (Figure 2). Staff and patients were familiar with

[1] Philip-Harris ± 1.0000sec

researchers, there was no interaction with informants and therefore observer effects were minimal.

Figure 2. Protocol for Notational Analysis

Patient: **Meal Episode:**	**Length of Meal Episode:**
Number of interruptions	
Number of times staff empathise with patients (smile, chat, aid eating, open packets)	
Number of times patient interacts with other patients/visitors (social facilitation)	
Time taken to eat meal	
Percentage time taken in social facilitation	
Percentage time taken with medical concerns during meal episode	
Notes:	

For this study, a meal episode was defined as starting at the time the meal tray arrived to when it was collected, and the meal time calculated when the patient started to eat until the cutlery was put down to signify that the patient had finished. An interruption was defined as a medical interruption such as visits by consultants, laboratory personnel or medical professionals who disturbed the patient while consuming their meal.

Social facilitation was characterised by social intercourse either with other patients, visitors or the ward hostess. Lastly, empathy was interpreted as the number of times medical and other staff smiled, chatted, helped to open packets and generally nurtured the patient.

2.1 Data Analysis

Results were tabulated (Tables 1and 2) and analysed applying standard statistical tests to the data using appropriate procedures in SPSS(Norusis M.J. and SPSS® Inc 1993). Paired T-tests were conducted to determine differences with significance ($p \leq 0.05$) being applied for all tests.

3. RESULTS

Results are summarised in Tables 1 and 2.

Table 1. Results of notational analysis for Male patients

Male	Age range 65-84 years					
meal	Mean meal episode length∂ (minutes)	Mean time taken to eat meal (minutes)	Number of interruptions	Number of times staff empathise with patient	% of mealtime taken in social facilitation	% of mealtime taken in medical interruptions
Breakfast (n=6)	30	23	2.0	2.0	0.0	10.9*
Lunch (n=4)	45	22	1.0	2.0	2.0	2.0
Evening Meal (n=4)	90	31	0.0	3.0	10.8*	0.0

∂ meal episode = time from when food was delivered to bed and tray removed
* denotes significant difference ($p \leq 0.05$)

From the results it can be seen that domestic staff were quite quick to clear the trays at breakfast time. However, due to the change over of staff at the evening meal, used trays were left in front of patients for longer than was required. There was no social facilitation evident in either male or female patients at breakfast time; however, this was the period when the majority of ward rounds took place and therefore a significant percentage of time was taken up with medical interruptions. Social facilitation significantly peaked at the evening meal ($p \leq 0.05$) mainly due to the number of visitors present. There was also a significant

difference between male and female patients. Furthermore a positive correlation was evident between length of mealtime and both social facilitation and medical interruptions.

Empathy was constant between meal episodes and between both male and female patients.

Table 2. Results of notational analysis for Female patients

Female	Age range 66-84 years					
meal	Mean meal episode length∂ (minutes)	Mean time taken to eat meal (minutes)	Number of interruptions	Number of times staff empathise with patient	% of mealtime taken in social facilitation	% of mealtime taken in medical interruptions
Breakfast (n=5)	34	27	1.0	1.0	0.0	5.5*
Lunch (n=6)	40	30	0.0	3.0	11.3*	0.0
Evening Meal (n=5)	60	38	0.0	2.0	19.8*	0.0

∂ meal episode = time from when food was delivered to bed and tray removed
* denotes significant difference ($p \leq 0.05$)

4. DISCUSSION

Most patients (90%) depend on basic hospital food to optimise their recovery (Elia, 1998) and therefore hospital food service is a crucial link in the chain of treatment. However, constraints at ward level have been identified as factors contributing to nutritional decline (Toraman, 2002). The public's perception of healthcare food service is typically less than favourable and for many people, patient fare falls just below that found at motorway service stations (Hartwell and Edwards, 2003). Health care is a service industry, and patients are becoming more discriminating about service quality (DeLuco and Cremer, 1990). Based on the SERVQUAL paradigm, Tomes and Chee Peng, (1995) identified a total of eight dimensions of importance to patients, six relating to the intangibles of hospital care and two covering the tangible aspects. These were namely empathy/understanding, relationship between patients and health care staff, communications, reliability, courtesy, dignity, food and physical environment.

A need to focus on the patient as the customer requires a fundamental change in NHS culture (Carr, 1992; Bolton, 2002) and a move towards a

more patient-oriented rather than task-oriented attitudes by medical employees. Ward staff often find it difficult to balance medical and meal requirements, and meals can 'interfere' with domestic medical routine and take second place (Edwards and Nash, 1999).

It has been suggested that nutritional decline may be accelerated by hospitalisation itself (Holmes, 1999). Patients can miss between 11 and 27 percent of their meals due to the timing of clinical investigations, effects of illness or poor food quality (Holmes, 1998). Meal interruptions for medical reasons should therefore be kept to a minimum, and measures taken to minimise disturbances. Patients wish to have a quiet and undisturbed meal (Deutekom, 1991).

The eating environment has been acknowledged as a factor affecting food consumption (Royal College of Physicians, 2002), food served in conducive surroundings by friendly approachable staff increases the enjoyment of the meal occasion. Patients have also intimated they would like to feel that hospital staff are attentive to their needs (Department of Health, 2000).

Nourishment or empathy may be offered in different ways, however past research has identified the importance of nurses' company at mealtimes (Littlewood and Saeidi, 1994). Patients perceive and benefit from the emotional support they receive from staff; moreover they transfer this 'added value' to their satisfaction judgments (Bélanger and Dubé, 1996).

The application of notational analysis as a diagnostic tool to analyse and quantify hospital meal service is unique. However, as an instrument for analysis, it can be used wherever there is a sequential history of distinctive features. If a 'performance' time frame can be split into subsequent parts and coded events, this type of quantitative evaluation can be employed. The advantage of using such an objective process is that it is not open to operator bias. Emotions and personal biases are factors, which affect storage and retrieval of memory, and often observers tend to remember highlights without the detail and minutiae (Hughes and Franks, 1997). Furthermore, it can be non-invasive, all of which helps to eliminate any errors or bias that might be introduced.

Notational analysis in this research has been applied in its basic form, by hand and in 'real' time. For sporting performances there has been increasing use of video and slow motion to give extensive and comprehensive feedback to athletes. However, in a hospital setting or other food service situation, it is imperative that the observer is discrete and unobtrusive and does not become a disturbing activity by itself.

5. CONCLUSION

Feedback is of vital importance in any service situation not just for management issues but also crucial in identifying training needs. As long

as enough data have been collected to define the performance profile fully, meaningful interpretation can be made and measures taken to improve practice.

There is a divergence of opinion regarding hospital food service and there are a myriad of problems, however none are insurmountable. The quality of hospital food is improving and there have been many initiatives to raise the profile and perception of this food sector. One such latest Government plan is the use of celebrity chefs to design new menus and the introduction of patient-focused benchmarking (Department of Health, 2001).

However, perhaps hospital food service would benefit from changing to a more customer focused operation rather than product focused. A food service system that reflects and delivers the needs of the individual rather than one that is shaped by the constraints of the distribution style. Mealtimes provide a welcome break and all efforts to make them special will produce benefits in the quality of patient experience.

Notational analysis as an analytical tool does have a place in hospitality and could be used by management to improve performance

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A comparative analysis of 'plated' and 'bulk trolley' hospital food service systems*

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Keywords:
bulk trolley, hospital food service, nutritional intake, patient satisfaction, plated delivery

Abstract

It has been recognized that hospital food service could be improved with malnutrition a target concern. The hypothesis of this study is that a food service system that enables patients to see and smell the food on offer and interact with the staff serving the meals will result in better patient nutritional intake and increased meal satisfaction. Data were collected from two wards, Women's Health and Orthopaedic (patients $n = 31$ in each study), over two 3-day consecutive periods. First, for a pre-ordered, plated meal service; and second, 9 months later, for a trolley service offering choice at the point of consumption. Food was weighed before and after the meal experience. Questionnaires were also administered and interviews were conducted with the patients ($n = 614$) to evaluate patients' acceptability of both catering systems. Results show that nutritional intake was not dependent on the catering systems and that possibly in hospital, unlike other 'eating out' situations, there are barriers to 'complete nutrition'. However, patient satisfaction was improved with the trolley system, where 93% of patients were satisfied compared to 76% with the plate system. This research indicates that nutritionally, the method of meal delivery is immaterial but patients do prefer choice at the point of consumption.

Introduction

Food service in hospitals is an essential part of patient care and a fundamental factor in aiding recovery (Allison 1999; Jonkers *et al.* 2001). Food preparation, distribution and service should therefore deliver safe food of defined standards in terms of nutritional quality, balance, palatability and temperature (Davis & Bristow 1999).

However, food is not served in isolation and an evaluation of the patient meal experience is one of the crucial criteria to judge success of a service operation. The National Health Service (NHS) serves approximately 220 million meals annually, 71% of which are produced by in-house catering departments (Audit Commission 2001). In terms of expenditure, the NHS is the third largest purchaser of catering services in the UK and is only exceeded by business and industry, and local authority education catering (National Health Service 1994).

The financial constraints and close economic boundaries of hospital catering, do not always permit the provision of food or service that matches the expectations of patients. The budget for hospital food (excluding ancillary costs) varies between NHS Trusts (a Trust may be a single large hospital but generally incorporates a group of hospitals in a geographical area) but ranges from £1.50 to £4.00 per person per day. However, patient satisfaction shows no relationship to the cost of providing such a service (Audit Commission 2001).

Hospital food service can present especially complex features compared with those met in most other large establishments. This is because of the nature of the patient and the requirement to coordinate different disciplines, with many interrelated factors impinging on the whole (Wilson *et al.* 1997). These aspects include the remoteness of kitchens from some wards, the need

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for hospitals to stay within tight cost limits and the fact that the main impetus of this type of institution is in healing not hospitality. The chief concern of medical staff is for A, B, C (airway, breathing and circulation) with D for digestion down the list of priorities.

Recently, there has been increasing concern over the high prevalence of malnutrition among hospital patients and a growing interest in the role of food to improve clinical outcomes (Allison 1999; Royal College of Physicians 2002). The problem is not just confined to the UK but is a phenomenon encountered throughout hospitals in the Western world (Council of Europe 2001).

Patients who are malnourished have lower resistance to infections, delayed wound healing, generalized weakness and reduced functional capacity. Any of these impairments can impede recovery and cause serious complications (Bankhead 1995). Malnutrition also has psychological effects including apathy and depression that in turn lead to a loss of morale and the will to recover (Beese 1997). Malnutrition therefore prolongs recovery and increases the need for high-dependency nursing care and ultimately promotes a reduced quality of life for patients (Council of Europe 2001).

Production and meal distribution

There are three broad categories of catering system utilized within the NHS, cook-serve, cook-chill or cook-freeze, however, linked to this is the meal distribution system, which is equally important in the food chain. To maintain nutrient content, temperature and palatability, food should be distributed and served as quickly as possible (Allison 1999).

Serving systems can be categorized firstly as a plated meal service, where meals are ordered in advance, and secondly as a ward bulk trolley system where meals may be ordered in advance or chosen at the point of service.

Food wastage

Hospital food, school meals and other institutional catering share a reputation for 'predictable awfulness' and high food wastage (Bender 1984). Partly as a result of this, the estimated cost of food wastage to the NHS in the UK is £144 million annually (Allison 1999) or 10% of the food cost for each patient each day (Audit Commission 2001). Food wastage can vary between 17% and 67% depending on the service system but where wastage is high, patients are less likely to meet their nutritional requirements (Edwards & Nash 1999; Heffernan & Moloney 2000). Food waste can be seen as an inverse measure of consumer acceptability and hence a potential measure of food quality (Cardello 1982; Hong & Kirk 1995).

Patient satisfaction

An important aspect of food service is the 'situation' (atmosphere, style of operation, time and staff attributes) (Meiselman 1996). These aspects distinguish what would be merely a refuelling exercise and make food intake a 'meal occasion'. Food is an essential ingredient of patient life and breaks the monotony of what could be a long and uneventful day. Therefore, as most patients are confined within the boundaries of the ward, mealtimes can take on an inflated significance (Tomes & Chee Peng 1995). Dependent people, as patients are, can be sensitive to any experience of neglect (de Raeve 1994) and hence the concepts of empathy and nurture are important. Hospitalization can be a socially isolating event and therefore person to person interaction is important as opposed to simply having a meal 'dropped off' (Lavecchia 1998; Folio *et al.* 2002). Patient satisfaction with meal service has been shown to be dependent on who delivers it. There are higher ratings for food quality when dietary employees deliver, conversely when nursing staff deliver, care and concern receive a higher score (Gregoire 1995).

The hypothesis of this study is that a food service system that enables patients to see and smell the food on offer and interact with the staff serving the meals will result in better patient nutritional intake and increased meal satisfaction. This will be reflected in a resultant decrease in plate waste and, moreover, encourage enhanced nutritional intake.

An NHS hospital was identified in the south of England where the plate system of food delivery was in place but where the bulk trolley system was soon to be introduced. The hospital serves approximately 800 meals at each main meal using a 4-week menu cycle and allowed £1.98 per patient per day (July 1999) for food.

Methodology

The research methodology involved collecting patient food consumption data from the 'plated system' and then from the 'bulk trolley system' of meal delivery (approximately 6 months after introduction) for a period of 3 consecutive days in each case at the same time of year. Data were collected from two types of wards, Women's Health ($n = 20$) and Orthopaedic ($n = 42$) (total $n = 62$; age range 34–89 years).

These wards were chosen as the patients are capable of independent critical judgement and are highly criti-

cal (evidenced by past surveys conducted by the caterers), results then would have implications for the rest of the hospital. Nutritional value of snacks was not included in this research as the hospital food service should be capable of providing for the nutritional needs of all the patients. Only patients who had ordered and had the opportunity to consume meals over a period of 3 days were included, to give the accuracy required.

At breakfast there was a choice of white or brown bread, the option of fruit juice, porridge and cereal. For lunch, the first course was characterized by 'home-made' soup or fruit juice. Main courses comprised sandwiches, meats and vegetarian meals with starches on the side. There were five choices and at least some form of potato appeared every day with creamed potato the most frequent option. Milky puddings were offered at lunchtime and ice cream if required. For the evening meal, fruit juice or soup were again offered, however, this time, dried soup powder was used. There were five choices of main course, including a vegetarian option, followed by dessert, which could be a trifle/mousse/ice cream or cheese and biscuits. A specimen menu can be found in Appendix I.

Permission was sought and granted by the NHS Trust Research Ethics Committee to conduct this research.

Data confidentiality

Although subjects were identified by gender, ward, bay and bed number, this was done purely as a means of identifying patients in order to eliminate the likelihood of data being transposed. A unique number was used for data analysis.

Data collection: plated meal system

Patients, nurses or ward clerks complete menu cards at ward level the day prior to consumption. When meals were assembled, a balance (Hanson Digital Scales accuracy ±4%) was placed on the patient's tray under the plate on the conveyor belt, tared and each food weighed as it was served onto the plate, a method that is unlikely to influence the portion size served. Similar portion sizes were used for both male and female patients. Completed trays were then loaded into pre-heated trolleys, with cold items positioned in the ambient section. The trolleys were transported to the ward where trays were taken to the patient's bedside by health care assistants. Once the meal, or all that was required had been consumed, trays were collected and any remaining food weighed out of sight of the patients.

Data collection: bulk trolley system

Food loaded onto the trolley was weighed, and once service was complete the food remaining was also weighed. Patients did not order in advance but chose freely the food and amount from the trolley (the menu being consistent with the plate service). The weights of individual food components served to the patients were measured by placing a balance under the plate and recording the weight of each food item. This had no effect on the style or speed of service. Once patients had finished their meals, any food remaining on the plates and trays was weighed, again out of sight of the patients.

Data collection: patient satisfaction

Questionnaires/interviews delivered orally by the researcher were used to collect the perceptions and expectations of patients on the quality of food served by both plate and trolley system of delivery. An attitude-based approach using a Likert Scale was developed to determine what was important to the hospital patient. A seven-point scale (7 = very good, 6 = quite good, 5 = fairly good, 4 = neither, 3 = fairly poor, 2 = quite poor, 1 = very poor) was used for nine variables (choice, hunger, anticipation, portion size, presentation, appeal, temperature of food, taste, satisfaction) and a nine-point scale used for the opinion of overall standard of catering. The questionnaire was designed to be used as the basis for a structured interview, with the opportunity for comments if required. This was administered before and after the meal in both plate and trolley systems for a larger sample(n = 614). The format and questions for the interviews were designed to identify both strengths and weaknesses in the food service systems. Anonymity of responses was guaranteed to all respondents in order to ensure valid judgements and candid comments.

The rigor of the methodology was ensured as the wards chosen were for elective surgery. This means that the patient profile generally remains static and the medical conditions are of a similar nature. Caterers and menu choice were the same for both plate and trolley systems of delivery and therefore any change observed would be because of the factor of foodservice system.

Data analysis

Nutritional analysis

Microdiet computer software was used to calculate the nutritional content of the meals consumed by the patients. This is a computer programme (Salford Uni-

versity) that manipulates McCance and Widdowson's *The Composition of Foods* (Holland *et al.* 1991) and the current supplements. Some of the recommendations made within the Nutritional Guidelines for Hospital Catering (Department of Health 1995), are per meal, for example, fat, protein and energy, while the remaining recommendations are per day. Therefore for consistency, these nutrients have been calculated per day and then compared against Committee on Medical Aspects of Food Policy (COMA) dietary reference values (Department of Health 1991) using a physical activity level (PAL) of 1.4. Elmstahl *et al.* (1997) took PAL 1.33 for a study with geriatric patients and discussed that this might be too low. As the patients sampled were ambulatory it was not considered necessary to go below PAL 1.4.

Nutrient analysis was confined to those nutrients recommended for minimum nutrient content in the Nutritional Guidelines for Hospital Catering (Department of Health 1995).

Patient satisfaction

While the primary focus of the questionnaire was to establish the parameters affecting overall perceived food quality, it also allowed a direct comparison of the attitude of an individual to the overall standard of catering within the hospital and a comparison of the two systems of delivery. Significance between the responses to both food service systems was calculated using two-sided paired *t*-tests. Statistical significance at $P = 0.05$ was used for all tests.

Results

Demographic details of patients are summarized in Table 1.

Table 1 The demographic characteristics of patients ($n = 614$) included in the questionnaire survey*

	Characteristic percentage	
	Plate system of delivery	Trolley system of delivery
Gender		
Female	59	59
Male	41	41
Age		
20–29	3.6	3.6
30–39	4.6	2.6
40–49	4.3	5.9
50–59	10.9	16.5
60–69	22.8	26.1
70–79	39.7	30.4
80–89	13.9	14.9
Length of stay		
1 day	10.3	16.2
1–3 days	17.9	15.2
1 week	23.3	9.2
More than 1 week	47.8	59.4

*There were no significant differences between the sample groups.

Nutrition

Nutritional intake for both systems is summarized in Table 2 and is similar for male and female patients.

Provision of energy, protein, iron, vitamin D and folate were all below recommendations however, vitamin C was more than adequate and inline with the guideline of 40 mg/day. There were no statistically significant differences between the nutrient content of the food intakes from meals served with the two food service systems.

Wastage

Historically, the bulk trolley food service has produced more total wastage than a plate served system (Steele & Delaney 1983) and results from this current research confirm these findings (Table 3). Notwithstanding, plate waste was significantly less with the bulk trolley service.

Patient satisfaction

The results of the patient satisfaction questionnaire are summarized in Table 4.

The expectations of patients did not vary significantly between the two food service systems and with both systems of delivery, the patients were more satisfied than overall they expected to be. However, patients had feelings of higher anticipation with the trolley system of delivery (Table 4, question 1) with more significant differences in post consumption questions. Evidence suggests that there is no significant difference in the predicted appeal (Table 4, question 2) of the meal from the two service systems. However, although diminished by plate delivery, actual appeal was significantly enhanced by the trolley. Results indicate that presentation, temperature, flavour and satisfaction were all rated significantly higher with the trolley system of food service. This was also reflected in the evaluation of the overall standard of catering that was significantly enhanced in the patients' opinion by choice at the point of consumption (trolley service). Ninety three percent of patients scored the overall standard of catering with a rating of five or higher with the trolley food service system compared to 76% with the plate system.

Table 2 Nutritional intake: comparison of plate and trolley systems of food service delivery

	Male age range 54–86 years			Female age range 34–89 years		
Nutrient	Recommended/ day	Plate system ($n = 8$)	Trolley system ($n = 9$)	Recommended/ day	Plate system ($n = 23$)	Trolley system ($n = 22$)
Energy (kcal)*	50–59 years: 2550† 60–64 years: 2380† 65–74 years: 2330† 75+ years: 2100†	1308 ± 299	1184 ± 331	19–49 years: 1940† 50–74 years: 1900† 75+ years: 1810†	1309 ± 399	1134 ± 252
Energy (MJ)*	50–59 years 10.60† 60–64 years 9.93† 65–74 years 9.70† 75+ year 8.77†	5.5 ± 1.2	5.0 ± 1.4	19–49 years 8.10† 50–74 years 7.96† 75+ years: 7.61†	5.5 ± 1.7	4.8 ± 1.0
Protein (g)*	53.3‡	51 ± 15	50.3 ± 13.5	46.5‡	48.3 ± 13	45.1 ± 13
Fat (% energy)*	35	37	34	35	38	37
CHO (% energy)*	50	48	49	50	48	47
Vitamin C (mg)**	40	78 ± 42	64 ± 29	40	94 ± 68	75 ± 23
Vitamin D (μg)*	65+ years: 10	1.4 ± 0.4	2.0 ± 0.6	65+ years: 10	1.8 ± 1.0	1.7 ± 0.7
Iron (mg)**	8.7	7.0 ± 2.0	7.3 ± 2.5	19–50 years: 14.8 50+ years: 8.7	7.0 ± 2.1	7.4 ± 2.4
Folate (μg)**	200	139 ± 45	144 ± 67	200	153 ± 49	145 ± 47

*Recommendations from dietary reference values (Department of Health 1991).
**Recommendations from The Nutritional Guidelines for Hospital Catering (Department of Health 1995).
†Estimated average requirement (EAR) with PAL = 1.4.
‡Reference nutrient intake (RNI).

Table 3 Food wastage according to meal service system (food served but not eaten – avoidable waste)

Plate system of delivery waste	
Plate	11.6%
Belt	None (any food remaining goes into staff restaurant)
Trolley system of delivery waste	
Trolley	5.9%
Plate	20.5%

Discussion

It has been suggested that a 7-day weighed dietary intake is necessary to accurately assess an individual's nutrient intake in the community (Bingham 1987). In the environment of a busy general hospital this period of time is unrealistic. Pearson *et al.* 1982) recommend a period of 3 days for energy and 4 days for vitamin C assessment. Other studies have used periods of 48 h (Mitchell 1999) and 3 days (Browne & Moloney 1998).

There has also been discussion regarding the inclusion of a weekend day (McGlone *et al.* 1997). However, unlike other scenarios, the hospital menu works on a cycle and therefore is unlikely to vary at the weekend. It is possible to estimate the amount of food eaten using standard portions, however, this methodology is open to criticism and lacks accuracy (Davies 1993). McGlone (1997) states that a period of 3 to 4 days will give results sufficiently accurate for a nutritional assessment of potential clinical value. It was therefore decided to give the accuracy required in this research that weighed intake for 3 days would be used.

There are mixed opinions among hospital catering managers regarding the relative merits of plate or bulk trolley service. Some think that trolley service increases the quality of food, the interpersonal aspects of the food service and patients' satisfaction. Others feel that plated meal service ensures quality presentation and best service (Hwang Li-Jen *et al.* 1999; Mibey & Williams 2002).

A plated meal system does offer an efficient means of food service at ward level, unfortunately although the main weakness of this type of food distribution is that patients often have to make their selection 24 h before consumption and without the sensory advantage of sight of the food. Menu selection a long time in advance can cause missed, duplicate and wasted trays (Bukowski 1998). In one study in the US an average error rate of 12.9% was calculated from the 6553 trays studied, with error rates of 12.5%, 10.9% and 15.1% for breakfast, lunch and dinner, respectively (Dowling & Cotner 1988).

There was much criticism identified in this research from patients regarding menu ordering with the plate system.

Table 4 Patient satisfaction rating by food service system†

Items	Plate system ($n = 312$) Mean	SD	Trolley system ($n = 302$) Mean	SD	*P*-value
Before meal experience					
1. How much are you looking forward to your meal?	4.51	1.62	4.91	1.51	0.002*
2. How appealing do you think that the meal will be?	4.81	1.18	4.77	1.33	0.660
3. How tasty do you think the food will be?	4.8	1.28	4.87	1.28	0.517
4. How satisfied do you expect to be with your meal?	5.01	1.26	5.11	1.25	0.330
After meal experience					
5. How well did the portion size match expectation?	5.54	1.18	5.85	1.03	0.001*
6. How would you rate the presentation of your meal?	5.14	1.36	5.58	1.02	0.000*
7. How appealing was the meal?	4.58	2.29	5.27	1.18	0.000*
8. Were the food items served at the correct temperature?	1.21	0.41	1.86	0.35	0.000*
9. How tasty was your food?	5.05	1.56	5.6	1.09	0.000*
10. How satisfied were you with your meal?	5.10	1.52	5.72	1.08	0.000*
11. How happy were you with the choice available?	5.14	1.20	5.03	1.55	0.325
12. How would you rate the overall standard of catering in this hospital?	5.85	1.98	6.75	1.35	0.000*

*Denotes significant difference ($P < 0.05$).
†Scoring system: questions 1–11, seven-point scale where 7 = very good, 6 = quite good, 5 = fairly good, 4 = neither, 3 = fairly poor, 2 = quite poor, 1 = very poor; question 12, nine-point scale where 9 = excellent, 8 = very good, 7 = quite good, 6 = fairly good, 5 = neither, 4 = fairly poor, 3 = quite poor, 2 = very poor, 1 = extremely poor.

This is not what I ordered.
The menu card was taken away too quickly.
I'm a new patient and haven't ordered.

Fifty percent of the patients on one ward during the study did not have the opportunity to order their own evening meal and 58% could not remember what they had ordered. The former was because of a variety of reasons such as the ward clerk had ordered for them, they were a new patient or they had been absent when the menu cards were collected. One of the problems identified in the research, and maybe limited to this hospital, was that it took 3 days for the menu system to 'catch up' with a new patient.

With the plated system, the main course did not come with vegetables or potatoes, the latter had to be ordered separately. Patients' orders were not always checked prior to being sent to the kitchen and meals, therefore, could be sent to the ward with only the meat component.

Dishes also need to be described accurately, be unambiguous and descriptive (Cardello 1982). There were comments regarding language difficulty and interpretation of the printed menu.

Description on the menu does not fit reality.
I don't understand what a B.L.T. sandwich is.

In the trolley system, where the food is visible, there is more opportunity for communication and clarification of any dishes that are not instantly recognizable.

Positive attitudes expressed by staff can influence intake either positively or negatively through persuasive action or communication (Rozin & Tuorila 1993). Bélanger & Dubé (1996) found that patients perceive and benefit from the emotional support they receive from staff. Moreover, they transfer this 'added value' to their satisfaction judgements as demonstrated in this research.

With the plate system food can arrive less than attractively presented on the plate with congealed gravy or dry, 'curled up' meat portions. Other disadvantages of this method include impersonal patient service and increased plate wastage (Edwards & Nash 1999). Moreover, for a new patient faced with a meal pre-ordered by a different patient, no alternative may be available. It was observed that 'additional' servings are not usually obtainable and larger portions are not always provided, even when ordered.

Plating food before arrival on the ward reduces the likelihood of the nurses' involvement in any aspect of the patients' mealtimes and often signals a lunch break for the staff. Furthermore, with a pre-plated delivery system in which the main courses and desserts are served together, nursing staff do not need to return to patients to serve a second course and thus there are no ready-made opportunities for them to observe any difficulties the patient may have while feeding or the amount of food that has been eaten (Carr & Mitchell 1991). Partly as a result, a bulk trolley bedside service is the meal distribution method recommended by Brit-

ish Association for Parenteral and Enteral Nutrition (BAPEN), in that it allows the patient to control portion size according to appetite and has proved highly successful in pilot studies in the UK (Allison 1999).

Perceptions of freshness can greatly affect how a patient's meal is rated overall (Doucette 1999). If patients can choose their food just before they eat it, this greatly enhances their perception of the item's freshness and influences satisfaction. Perceived control and patient empowerment have been shown to strongly influence patient satisfaction with food services (Bélanger & Dubé 1996; Faulkner 2001). It was therefore predicted and confirmed that where patients have increased involvement with the process of food service, satisfaction is increased. One way to increase perceived control is to give as much responsibility as possible to every patient in making choices, that is, choosing a menu compatible with their food preferences at the time required. In the trolley system of delivery with choice at the point of service this is possible. Patients did not feel disadvantaged by not ordering in advance and for 92% of patients portion size matched expectation.

> One important factor I find in enjoying the meal is being able to see the choice before making a selection.
>
> There is usually sufficient choice. I much prefer this method of distribution to the menu system because you cannot foresee how hungry you will be.

Nutrition

With both systems, daily energy intake particularly was below that recommended by the dietary reference values (Department of Health 1991) and confirms suggestions of being 'hungry in hospital' (Association of Community Health Councils 1997). These findings differ from those in research conducted by Wilson *et al.* (2000) that found that energy, protein, fat and carbohydrate intakes were significantly higher with the trolley method of delivery.

It was suggested that the main reason for the observed differences was the higher total food intake of the main course from the trolley, this phenomenon was not observed in the present study.

However, if the nutritional value of snack intake is considered, this would certainly contribute to the overall daily nutrient intake and could provide as much as 22% of daily energy intake (Dupertius *et al.* 2003). To be consistent, as not all patients have visitors, particularly the elderly who often rely solely on the food provided by the institution and do not make up any deficit (Frost *et al.* 1991), snacks were not included.

The nutritional data from such a study as this needs to take into consideration deterioration in water-soluble and heat labile nutrients, which occur during cooking, and distribution of food. The time lapse between food being cooked and actual consumption is important. Potatoes kept hot for 1 to 2 h will have lost most of their vitamin C and green vegetables will have lost three-quarters of this vitamin (McGlone 1997). Folic acid is particularly heat labile and losses during cooking and hot-holding may therefore be considerable.

Caterers took an hour to assemble trays on the belt system with the two wards selected as sample at the end of the 'run'. Delivery then took another 30 min by 'train'. Food was therefore kept hot for between 1 and 2 h. The trolley service was swifter with the trolleys being loaded just prior to distribution.

Wastage

Wastage from the plate system of food delivery was comparable to figures achieved by other meal sectors such as schools (Osner 1982). It has been well documented that the plate service generates more waste on the tray, but with the trolley service more is left on the trolley (Edwards & Nash 1997; Hackes *et al.* 1997). Plate waste for both these food service systems was within guidelines of 10–15%, suggested by Wilson (2000) at the 21st European Society of Parenteral and Enteral Nutrition Congress. However, the waste left on the trolley was high at 20.5%. Although inevitable if a wide choice is to be provided, this could be a consequence of poor ordering and will need to be addressed by the hospital. One of the initiatives that is being piloted is to telephone wards 2 h before service for final meal numbers. Preliminary results suggest that this could reduce total wastage by 30%.

Patient opinion

Patient's expectations of hospital food were not high.

> . . . having heard so much criticism of hospital food in general, I was not expecting too much and therefore was pleasantly surprised.
>
> Can anyone look forward to meals in hospitals?

The trolley system of food delivery appears to more than match patient expectation, enhance meal experience and therefore consumer satisfaction levels are subsequently greater.

There is a divergence of opinion regarding hospital food service and there are a myriad of problems, however, none are insurmountable. The quality of hospital food is improving and there have been many initiatives to raise the profile and perception of this food sector.

Once such latest government plan is the use of celebrity chefs to design new menus and the introduction of patient-focused benchmarking (Department of Health 2001).

Conclusions and recommendations for further research

This study has demonstrated that nutritional intake is not influenced by style of the food service system and despite anecdotal evidence suggesting the more satisfied the consumer the more they will eat, this may not be true in a hospital setting. There may be barriers present that prevent 'complete nutrition' (the provision of a healthy nutritionally balanced diet that meets and satisfies both physiological and psychological requirements) and that a 'threshold of consumption' exists.

However, perhaps hospital food service would benefit from changing to a more customer-focused operation rather than product-focused. A food service system that reflects and meets the needs of the individual rather than one that is shaped by the constraints of the distribution style. Mealtimes provide a welcome break and all efforts to make them special will produce benefits in the quality of patient experience. It has been shown that patients eating in company increases macro nutrient intake (Hartwell & Edwards 2000) and further research could concentrate on the enhancement of mealtimes such as the effects of music or the use of china service ware and the service predisposition of staff. For shorter stay patients a low level of satisfaction with hospital food may be a temporary annoyance, however, for longer stay patients the consequences could be more serious.

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Appendix I: A sample menu

Royal Bournemouth Hospital
In partnership with Bateman Catering

MONDAY **Day Code 2**

Name _____

Ward _____

Please put a tick ☑ in the box opposite your choice. If you would like a large portion put a cross ☒ in the box.

Luncheon

(Please choose one from the following)

1 ☐ Chilled Orange Juice . . . . . D.HE
2 ☐ Home Made Cream of Celery Soup . . . . . D.HP.S

— MAIN COURSE —

(Please choose one from the following)

3 ☐ Chicken Casserole . . . . . D.HP.S
4 ☐ Potato and Cheese Bake . . . . . D.HE.S
5 ☐ Smoked Mackerel & Salad . . . . . D.HE
6 ☐ White Egg Mayonnaise Roll . . . . . D.HP.S
7 ☐ Brown Egg Mayonnaise Roll . . . . . D.HP.S

8 ☐ Boiled Rice . . . . . D.HP
9 ☐ Creamed Potatoes . . . . . D.HE.S

10 ☐ Sweetcorn Kernals . . . . . D.HE.S
11 ☐ Garden Peas . . . . . D.HE.S
12 ☐ Mixed Salad . . . . . D.HE

— DESSERTS —

13 ☐ Sultana Sponge & Custard . . . . . D.HP
14 ☐ Semolina Pudding . . . . . (D)HP.S
15 ☐ Vanilla Ice Cream . . . . . D.HP.S
16 ☐ Fresh Orange . . . . . D.HE.HP.S

HE = *Healthy Eating*, HP = *High Protein & High Energy*, D = *Diabetic*, S = *Soft*, ( ) *Brackets around coded menu indicates products have been made suitable for diets.*
Light and Soft menus available on wards. Please ask sister. Condiments on ward.

Royal Bournemouth Hospital
In partnership with Bateman Catering

MONDAY **Day Code 2**

Name _____

Ward _____

Please put a tick ☑ in the box opposite your choice. If you would like a large portion put a cross ☒ in the box.

Evening Meal

(Please choose one from the following)

1 ☐ Chilled Apple Juice . . . . . D.HE.(HP)
2 ☐ Minestrone Soup . . . . . D.HE.(HP)

— MAIN COURSE —

(Please choose one from the following)

3 ☐ Ham & Mushroom Vol Au Vent . . . . . D.HP.S
4 ☐ Corned Beef & Salad . . . . . D.HE
5 ☐ Quorn Casserole . . . . . D.HP.S
6 ☐ White Cream Cheese, Lettuce & Chive Sandwich . . . . . D.HP.HE.S
7 ☐ Brown Cream Cheese, Lettuce & Chive Sandwich . . . . . D.HP.HE.S

8 ☐ Creamed Potatoes . . . . . D.HE.S
9 ☐ Chipped Potatoes . . . . . D.HP

10 ☐ Broad Beans . . . . . D.HE
11 ☐ Sliced Leeks . . . . . D.HE.S

— DESSERTS —

12 ☐ Rhubarb Fool . . . . . (D)(HE)(HP)S
13 ☐ Vanilla Ice Cream . . . . . D.HP.S
14 ☐ Cheddar Cheese and Biscuits . . . . . D.HP
15 ☐ Fresh Banana . . . . . D.HE.HP.S

HE = *Healthy Eating*, HP = *High Protein & High Energy*, D = *Diabetic*, S = *Soft*, ( ) *Brackets around coded menu indicates products have been made suitable for diets.*
Light and Soft menus available on wards. Please ask sister. Condiments on ward.

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Brief Communication

A comparison of energy intake between eating positions in a NHS hospital—a pilot study

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Abstract

Malnutrition and the under-consumption of food in hospitals is prevalent and in UK hospitals, the consumption of meals is mainly a solitude event, despite evidence to show that eating in the presence of others can actually increase food intake.

Dietary data were collected for three consecutive 24 h periods ($n=13$) from patients who consumed their meals either in bed, at the side of the bed or in the presence of others. Results show a significant increase ($p<0.05$) in the mean daily energy intake for those sitting around a table in the presence of others.

Although a small pilot study, the results confirm the value of social facilitation in improving the under-consumption of food when in hospital.

Keywords: Social facilitation; Eating location; Hospital food service; Food/energy intake

Introduction

Malnutrition in hospital patients in both the USA and UK has long been reported (Bollett & Owens, 1973; Moy, Smallman, & Booth, 1995; Prevost & Butterworth, 1974; Yates, Lopez, & Jackson, 1977) and in most European hospitals it is estimated as being between 20 and 30% (Beck et al., 2001). Malnutrition is not confined to adults but also includes children and in one hospital, 26% of children were malnourished on admission (McCarthy & McIvor, 2001).

Additional nutritional support has demonstrated clinical benefits in both the short and long-terms (Barton, Beigg, Macdonald, & Allison, 2000; Bozzetti, 2001; Brosnan, Margetts, Munro, Passey, & Rivers, 2001; Lauque et al., 2000; Robertson, 1990) and it has been suggested that improved provision would result in a five-day reduction in hospital stay for approximately 10% of patients. The consequent annual saving is estimated to be £266 million (Lennard-Jones, 1992).

A number of strategies, for example, supplementation, to address hospital malnutrition have been proposed although there is no firm evidence to support their success leading to the suggestion that there are no substitutes for the adequate provision of 'normal' food with supplementation only being used where there are clear clinical indications (Allison, 1999; Hankey, Summerbell, & Wynne, 1993). However, in many instances where 'normal' food is supplied, food intake is low and wastage is high (Edwards & Nash, 1999).

Eating is often a social activity and a number of studies have shown how food intake is affected when consumed with others. Social facilitation, as it is often referred to, is the influence of person on person, or more precisely, how and why the behaviour of one individual affects the behaviour of others (Zajonc, 1965). Why social facilitation should be so important is far from clear but eating in the presence of others could increase levels of arousal and drive, or provide cues as to appropriate or inappropriate behaviour (Zajonc). It could also be that when meals are eaten together, more food is provided, individuals might be more hungry in the presence of others, the atmosphere might be more social, the food might taste better, or simply that the meal might last longer (Feunekes, Graaf, & Staveren, 1995).

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Table 1
Energy intake

	Patients at a table ($n=4$)	SD	Patients by the bed ($n=5$)	SD	Patients in bed ($n=4$)	SD
Age range	36–62 yrs	–	60–86 yrs	–	49–89 yrs	–
Mean age	49		75		63	
Evening (kcal)	525	129	553	230	516	250
Midday (kcal)	588	158	395	137	418	139
Breakfast (kcal)	523	103	412	132	493	200
Mean daily intake (kcal)	1632	314	1348	336	1363	287
Maximum (kcal)	2045	–	1858	–	1847	–
Minimum (kcal)	1104	–	758	–	955	–

Mean intake of patients at a table are different ($p<0.05$) from the other two groups.

Research has shown, for example, that energy intake is higher and satiety levels lower when food is consumed in groups (de Castro & deCastro, 1989); the speed of consumption is increased (Rosenthal & McSweeney, 1979), and the bigger the group size, the larger the meal (de Castro & Brewer, 1991). These findings are not confined to complete meals and can be seen across a range of meals served (de Castro, Brewer, Elmore, & Orozco, 1990), in both normal and overweight individuals (Edelman, Engell, Bronstein, & Hirsch, 1986). Group make-up can also be important and in a fast food restaurant, mixed sex groups consumed significantly more than single sex groups (Klesges, Bartsch, Norwood, Kautzman, & Haugrud, 1984). Furthermore, when a group of individuals who normally consumed their meals alone were 'instructed' to eat with others, meal size and intake increased (Redd & de Castro, 1992).

Notwithstanding these criteria, and the prevalence of malnutrition, many hospitals in the United Kingdom have closed their 'dayrooms' and patients can no longer socialise and consume their meals in the company of others. The aim of this pilot study, therefore, was to ascertain how food intake might be affected by allowing hospital patients to eat in the company of others.

Methods

Dietary data were collected for three consecutive 24 h periods from a Women's Health Unit ($n=13$) in a National Health Service (NHS) hospital. Patients were hospitalised for a variety of surgical procedures in the age range 36–89 years of age (see Table 1). All were post-operative, ambulant and every subject selected felt reassured, was well convalesced within two days of discharge.

Meals were consumed by patients in one of three positions which were chosen by the individuals themselves

- *Group 1.* Around a table
- *Group 2.* Sitting by their bed
- *Group 3.* Sitting in bed

As pre-ordered meals were plated in the kitchen, food items were weighed using Hanson Digital Scales accuracy $\pm 4\%$ and placed onto patient trays. Completed trays were then transported to hospital wards and served to patients for consumption as usual. Once meals were finished, trays were collected, and out of sight of the patients, any food remaining was again weighed. Nutritional analysis was undertaken using the Microdiet[1] software program.

Statistical analysis

Data were imported into and analysed using SPSS. The normality of distribution was tested by the Kolmogorov–Smirnov statistic and subsequently means and standard deviations were calculated and results compared using a one-way Analysis of Variance. Statistical significance at $p \leq 0.05$ was used for all tests.

Results

Results (Table 1) show a significant increase ($p<0.05$) in mean daily energy intake for the group sitting around the table (Group 1) over the other two groups. Mean daily intakes of carbohydrate, fat and protein were greater at the midday meal for patients in Group 1 with the carbohydrate intake of Group 1 being significant ($p<0.05$) compared to Groups 2 and 3.

When individual meals are compared, there were no significant differences in the groups for the evening meal; at the midday meal, Group 1 was significantly different from both Groups 2 and 3; and at breakfast the only significant difference was between Groups 1 and 2.

There were no significant differences in 'avoidable' waste for all groups.

Discussion

Although a small cohort, initial indications from this research indicate that consuming meals in a social situation *significantly* increases energy and carbohydrate intake although it is unclear from this study why this should be

the case. It is interesting to note that most of the significant difference in macronutrient intake occurred at the mid-day meal which has additional implications for the service of meals to older people who might prefer their meal then.

The Nutritional Guidelines for Hospital Catering (Department of Health, 1995) recommend that throughout the day, the menu should be capable of providing a minimum of 1200 kcal and as much as 2500 kcal. From these results is can be seen that patient intake was within this range; however, below the Dietary Reference Values of 1964 kcal (Department of Health, 1991).

In these 'live' settings, where individuals have a free choice, it is problematic ensuring that groups are similar, although as far as could be ascertained in this study, patients were in a similar physical condition, post recovery, and had a free choice as to what food they could eat and where they could sit. It could be, therefore, that those who chose to sit with others were more motivated, hence ready to consume larger meals. No attempt was made to manipulate the situation, hence it could be argued that those patients who were more social would prefer to eat with others. Therefore, they might have been more motivated and predisposed towards the consumption of more food.

Further work is warranted to ascertain the extent to which patients choosing their own eating positions influenced the outcome of the study. Notwithstanding, it is suggested that social facilitation has the potential to address hospital malnutrition and the under-consumption of food. It should, therefore, be promoted and used at meal times with the creation of ambient dining areas, away from the noise, smells and other distractions associated with hospital wards, and where patients could consume their meals in the company of others. Even if space is limited, patients should be encouraged to eat their meals around a table in a social context and where appropriate, 'encouraged' or 'instructed' to do so. Increasing the intake of 'normal' food, and in doing so, reduce or eliminate the costs of other feeding regimens, whilst improving total food and nutritional intake should be the primary aim.

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