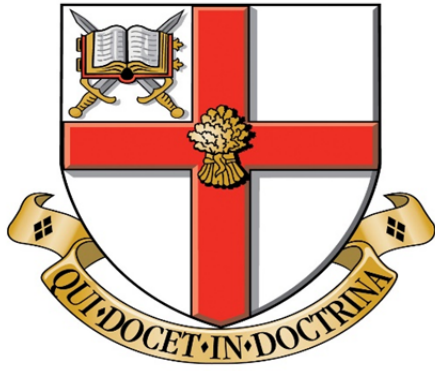


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Nutritional education for doctors and nurses: What is the impact?

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Nutritional education for doctors and nurses:

What is the impact?

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Vicky Johnson, July 2010

Abstract

The under-recognition and under-treatment of malnutrition in the UK, which costs the NHS an estimated £13 billion each year, has been linked to poor provision of nutritional education in medical and nursing academic programmes. The present study aimed to investigate whether the introduction of a mandatory nutritional education programme for doctors and nurses at a district general hospital would influence knowledge and attitudes related to the recognition and treatment of malnutrition and whether subsequent changes in clinical practice would be observed. It was hypothesised that knowledge, attitudes and clinical practice would all improve following training. A repeated measures design was used to assess knowledge and attitudes among junior doctors and registered nurses before and after an educational intervention using a quantitative questionnaire. A clinical audit of compliance with national clinical standards, in the form of the inpatient nutritional screening policy, was used to assess clinical practice and was a repeat of an audit conducted 12 months before. Both audits were compared for analysis. Baseline knowledge scores were below 55% for both doctors and nurses. Baseline attitude scores reflected an overall positive attitude towards nutritional screening for both groups. The results showed that both knowledge and attitudes improved significantly following training for both occupational groups. The audit identified that national clinical standards were not complied with. However, following training, statistically significant improvements *were* observed in compliance with the nutritional screening policy between 2008 and 2009. Specifically, the audit found that an additional 8.2% of patients were screened on admission to hospital and an additional 50.1% of patients were screened weekly during admission. Figures of prevalence of malnutrition also increased from 15.79% in 2008 to 19.21% in 2009 but were still lower than national statistics. It is recommended that all NHS Trusts implement mandatory nutritional education programmes for doctors and

nurses to support clinical governance. Limitations and considerations for future research are
discussed.

Declaration of Original Work

I hereby declare that work contained herewith is original and is entirely my own work (unless indicated otherwise). It has not been previously submitted in support of a degree, qualification or other course.

Signed:

Date: July 2010

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List of Abbreviations

BAPEN – British Association for Parenteral and Enteral Nutrition

BHH – Birmingham Heartlands Hospital

GP – General Practitioner

LREC – Liverpool Research Ethics Committee

MUST – Malnutrition Universal Screening Tool

NHS – National Health Service

NICE – National Institute for Clinical Evidence

NPSA – National Patient Safety Agency

NRS – Nutrition Risk Score

NST – Nutrition Screening Tool

ODGH – Ormskirk District General Hospital

SDGH – Southport District General Hospital

TRA – Theory of Reasoned Action

UK – United Kingdom

US – United States

1.0 Introduction

1.1 Background

The current financial climate in the UK has led to increased pressures in the National Health Service (NHS). As a result, NHS Trusts are encouraged to implement strategies that enable the provision of quality and excellence within changing economic constraints. This process requires identifying areas of financial burden within each Trust and exploring ways of reducing costs without compromising patient care. All departments are responsible for presenting ideas that aim to reduce their own annual expenditure, with creativity and innovation taking a leading role (Department of Health, 2010).

The National Institute for Clinical Excellence (NICE) has recommended cost-saving initiatives in the areas of healthcare that are considered to be under the greatest financial strain. Together with the British Association for Parenteral and Enteral Nutrition (BAPEN), NICE has described how the inadequate provision of nutritional care can have significant financial implications both locally and nationally (NICE, 2006). Nutritional care may be compromised if deviations from optimum nutritional status (e.g. malnutrition) are not recognised or treated effectively. Therefore, nutritional screening programmes have been recommended to alleviate these problems.

In order for nutritional screening to be effective, a robust infrastructure is required to support the key organisational priorities for the successful implementation of nutritional screening protocols (NICE, 2006). Such priorities include the requirement for all healthcare professionals directly involved in the nutritional care of patients to receive education regarding the provision of nutritional support.

It has been acknowledged in much of the literature that nutritional education for doctors and registered nurses is poor (Jackson, 2001; Audit Commission, 2002; Magnusson, 2008; NPSA, 2009). Studies have demonstrated how the implementation of training programmes for these professional groups can improve knowledge and attitudes towards nutritional care (Mowe et al, 2006; Lindorff-Larsen et al, 2007) but have not yet been able to demonstrate how this may result in improvements in clinical practice.

The need to provide nutritional education for doctors and nurses has long been recognised and could provide a realistic and achievable way of reducing expenditure in the NHS (NICE, 2006). For this to be an acceptable approach to ease the economic burden of malnutrition in the UK, evidence is required that demonstrates how education can directly influence clinical practice. If change could be achieved, training programmes would not only be cost-effective for NHS departments but would also improve quality of care for patients.

All NHS Trusts must adopt a strategic plan to provide quality nutritional care for their patients. Clinical governance directs this approach, maintaining clinical effectiveness with the use of research, education and training, clinical audit and risk management (Department of Health, 1999). In order for nutritional screening to successfully identify malnutrition, it is important to explore the processes involved so that quality initiatives are conversant with current issues.

The present study has been designed to explore the impact of nutritional education for doctors and registered nurses in relation to improving the identification and treatment of malnutrition in the UK and supporting economic strategies.

1.2 Literature Review

1.2.1 Defining Malnutrition

Malnutrition is an ongoing clinical and public health problem. A recent report by the British Association for Parenteral and Enteral Nutrition (BAPEN) suggests that up to three million people are living at high risk of malnutrition in the UK (Elia and Russell, 2009). According to Elia (2003), malnutrition refers to both under- and over-nutrition and has been defined as:

“..a state of nutrition in which a deficiency, excess or imbalance of energy, protein and other nutrients causes measurable adverse effects on tissue/body form (body shape, size and composition) and function and clinical outcome” *Elia (2003) pp 8*

Although Elia has presented a definition that is qualitative in the nature of its terminology, there is no universal agreement as to how malnutrition should be interpreted into quantitative parameters (Green, 1999). The emphasis on ‘measurable adverse effects’ has caused problems in selecting appropriate anthropometric, biochemical and clinical indices and subsequent cut-off values that can be used to identify differences between normal and abnormal nutrition (Stratton, Green and Elia, 2003).

Although the term ‘malnutrition’ can be applied to both the deficiency and excess of nutrients, it is more commonly associated with under-nutrition and the two terms have been used interchangeably within much of the literature (Stratton, Green and Elia, 2003). The problems with defining malnutrition have percolated through the research making it difficult to generalise and identify relationships between findings, as well as to obtain an accurate prevalence rate (Green, 1999).

These issues highlight the need for the introduction of a universal system that both defines and identifies malnutrition consistently across all healthcare settings (Elia, 2003). In recent years, steps have been taken towards achieving this goal with the introduction of mandatory nutritional screening programmes for both acute and community NHS Trusts in the UK (NICE, 2006). Additionally, national guidelines have been produced which aim to standardise the implementation of these programmes within the clinical governance framework. As the majority of the research has used the term ‘malnutrition’ to refer to under-nutrition the rest of this report will continue within this context.

1.2.2 Prevalence of Malnutrition

The prevalence rate of malnutrition has ranged from 11-59% among a variety of healthcare settings and patient groups (McWhirter & Pennington, 1994; Corish et al, 2000; Margetts et al, 2003; Thomas et al, 2007; Russell & Elia, 2009). Undoubtedly, the disparity of figures regarding prevalence is multi-factorial and involves problems with defining malnutrition as well as population differences between the samples used in these studies. It is perhaps most difficult to record the prevalence among free-living individuals in the community as opportunities to assess malnutrition risk are more limited. Institutional settings however lend themselves to opportunities for nutritional screening and assessment.

Previously, it had been determined that 40% of those admitted to a Dundee Teaching hospital were malnourished, according to anthropometric indices (McWhirter & Pennington, 1994). More recently, a study looking at prevalence among 130 hospitals in the UK, as recorded using the ‘Malnutrition Universal Screening Tool’ (MUST), found that 28% of those admitted to hospital were at high risk of malnutrition (Russell & Elia, 2009). The variance between these results could be due to the population demographics (e.g. age, gender, region,

socio-economic status) or may even suggest that the range of anthropometric indices used in the Dundee study were more sensitive to the detection of malnutrition than the screening tool.

Though the prevalence of malnutrition has been shown to be high on admission to hospital, studies have demonstrated how 'at risk' patients can deteriorate further during their hospital stay. Up to 78% of those identified as 'at risk' of malnutrition have shown a significant decline in their nutritional status during admission (McWhirter & Pennington, 1994; Corish et al, 2000). Though several government initiatives have been launched since these studies were published, such as those forming part of the Better Hospital Food Programme (Department of Health, 2001), malnutrition is still under-recognised and under-treated in hospitals (Department of Health, 2007; BAPEN, 2009).

Relationships have been found between incidence of malnutrition and variables such as age and socio-economic status. For instance, up to 14% of older people aged 65 years and over in the UK are malnourished (Stratton & Elia, 2000; Age Concern, 2006) and patients over the age of 80 years have a five times higher prevalence of malnutrition than those under the age of fifty (Elia, 2003; Age Concern, 2006). Additionally, it has been well documented that the disproportionate prevalence of malnutrition in deprived areas exacerbates health inequalities (Stratton, 2007; Russell & Elia, 2009).

1.2.3 Causes and Consequences of Malnutrition

Malnutrition can be viewed as both a cause and a consequence of disease (Elia, 2003). A 10% intentional weight loss in obese subjects is associated with as much as a 50% reduction in health risks (Elia, 2003) but the same amount of *unintentional* weight loss in both over- and under-weight individuals can be associated with increased risk of clinical complications (NICE, 2006).

The development of malnutrition is multi-factorial. It can arise at any age and from a wide range of acute and chronic diseases. Additionally, psychosocial factors such as social isolation, poverty and bereavement have been implicated (Green, 1999). The severity of malnutrition experienced during or following an illness can be directly proportional to the severity and progression of the underlying condition and is associated with morbidity and mortality (NICE, 2006).

Clinical complications that can arise in the malnourished patient include anxiety, depression, apathy, poor wound healing, impaired immunity, increased risk of infection and impaired organ function (Todorovic et al, 2003). Furthermore, malnourished surgical patients have three times more post-operative complications and four times greater risk of death than well-nourished patients (NICE, 2006). These adverse effects have also been associated with an increased length of hospital stay, which contributes significantly to the reported £13 billion cost of malnutrition in the UK each year (BAPEN, 2009).

1.2.4 The Need for Nutritional Screening

Early detection of nutritional depletion is vital to improve clinical outcomes of patients admitted to hospital. Complications associated with malnutrition can be dramatically reduced by nutritional interventions (Green, 1999). There continues to be much discussion regarding the lack of any formal programme that links effective recognition of malnutrition to effective treatment. As previously mentioned, there remains great need for an integrated and overarching approach to tackling this under-recognised public health problem in the UK.

Like other features of a patient's primary disease (e.g. blood pressure, temperature, fluid balance), nutritional status should be considered for routine assessment (Kondrup et al, 2002). It has been advocated by a wide range of health professionals and organisations and is

a fundamental aspect of care (Department of Health, 2001; Council of Europe, 2002). The extensive range of nutritional screening tools available has previously caused problems in selecting a tool that is both reliable and valid. To overcome this, guidelines have been produced which specify the basic principles that a tool should incorporate (Kondrup et al, 2002; Green & Watson, 2006).

A nutritional screening programme involves the application of a screening tool in a group of patients in order to establish a level of risk and to identify malnourished patients who may have otherwise been missed (NICE, 2006). Though screening has been promoted as a simple and general procedure, there is controversy regarding which screening tool is most suitable for detecting malnutrition. For instance, several screening tools have been developed with no reference to specific methodological criteria (Arrowsmith, 1999; Jones, 2002).

Despite this, there are also nutritional screening tools which have been validated by research, such as the Nutrition Risk Score (NRS; Reilly et al, 1995) and the Malnutrition Universal Screening Tool 'MUST' (Elia, 2003). These tools are currently considered to be the most widely used in the UK (Corish et al, 2004; NICE, 2006) and their utilisation within the acute setting varies according to local Trust policies.

Though NICE (2006) promotes the use of the MUST, flexibility is granted for use of a tool that has been equally validated. However, Elia (2003) notes that such flexibility can cause problems for patients moving from one healthcare setting to another and subsequently compromises continuity of care. Additionally, the use of a single tool across all healthcare settings and geographical regions would facilitate the attainment of more accurate figures of prevalence. One study compared the use of the NRS with the MUST and concluded that the MUST, but not the NRS, correlated with mortality and therefore has more predictive validity for a patient population aged 65 years and older (Henderson et al, 2008).

In spite of these observations, at the local level each screening tool appears to serve its purpose of detecting patients at risk of malnutrition and allowing referral to appropriate services for more detailed nutritional assessment. In some hospitals, audits of nutritional screening are used to support clinical governance which allows NHS Trusts to not only improve patient care but also to obtain figures of in-house prevalence (Audit Commission, 2002).

In 2007 BAPEN launched their 'nutritional screening week', which was repeated in 2008 in 130 hospitals in the UK (Russell & Elia, 2009). The aim of the project was not only to try and establish a current figure of prevalence across the UK but also to highlight how screening programmes were implemented within the hospitals taking part. It was found that only 56% of the hospitals screened 76-100% of patients on admission compared with the 100% target recommended by NICE (2006).

Current recommendations are that all patients should be nutritionally screened on admission to hospital and weekly thereafter during their stay (NICE, 2006). In terms of how these recommendations translate into clinical practice, the BAPEN study highlights how as many as 44% of hospitals may not be meeting these standards. The results suggest that many patients at risk of malnutrition could still go undetected if they missed the opportunity to undergo screening. It is important for all acute Trusts to implement policies for nutritional screening to enable the delivery of adequate nutritional care.

It has previously been noted that malnutrition costs the UK up to £13 billion each year (BAPEN, 2009). Prospective studies which assess the potential economic advantages following the implementation of screening programmes are lacking. However, one study has demonstrated how financial pressures could be reduced by the application of a nutritional care plan following early detection of malnutrition using a screening tool (Kruizenga et al,

2005). Costs of training and quality assurance for screening have been reported as low. Additionally, cost-effectiveness modelling has shown that with an acute background mortality of 1.5%, the prevalence of malnutrition would need to be just 3% to make screening cost-effective (NICE, 2006).

1.2.5 The Need for Nutritional Education

In order for nutritional screening and appropriate treatment to become part of routine clinical practice, it is necessary to address any barriers to the implementation of this process. Such barriers exist within the healthcare system and may involve Government departments, commissioners, planners and providers (Elia, 2003). The NICE guideline for nutrition support in adults (NICE, 2006) also highlights these organisational issues and makes recommendations as to how local and national policies for nutritional screening programmes can be effectively employed.

The aim of the NICE guideline (NICE, 2006) is to improve the practice of nutritional care so that malnutrition is recognised and treated appropriately. As well as highlighting the pathway from recognition to treatment (i.e. screening, prescription and monitoring), the guideline also identifies key organisational priorities and barriers that underpin this process (time, resources, funding etc). Additionally, it states the need for all healthcare professionals directly involved in patient care to receive education and training regarding the importance of providing adequate nutrition.

The lack of education and training in the field of nutrition amongst healthcare professionals has been a longstanding problem that has been highlighted in numerous publications. A report by the Audit Commission in 2002 stated that a significant number of healthcare staff do not have their training needs identified or recorded. Moreover, there is evidence to

suggest that some professional groups tend to select educational programmes that are more suited to their current knowledge rather than selecting those which may address novel and challenging concepts (Sibley et al, 1982).

The need for a more formal approach to the teaching of nutrition was emphasised by the British Nutrition Foundation in 1983 however nutritional education for doctors, medical students and other healthcare professionals has still been reported as inadequate (Brett, Godden & Keenan, 1986; Department of Health, 1994; National Patient Safety Agency, 2009).

Studies conducted in the United States (US) and Canada have shown that only a quarter of medical schools have a mandatory nutrition course as part of their programme (Feldman, 1995). Of those students attending a school which did not have a nutrition course, 80% felt that nutrition coverage was inadequate (Hark & Morrison, 2000). In the UK, 74% of General Practitioners reported to have had no undergraduate training in nutrition (Elia, 2003) and a survey of more than 600 Primary Care nurses found that 86% lacked basic training in this area (Magnusson, 2008).

A survey assessing knowledge of malnutrition among healthcare professionals in a teaching hospital found that understanding and awareness of nutritional care was poor (Nightingale & Reeves, 1999). As expected, it was found that dietitians were most knowledgeable about under-nutrition compared to other healthcare professionals. However, upon close inspection of the methodology for this study it could be argued that participants were not assessed on their knowledge of malnutrition per se. The questionnaire used consisted of questions that were based on general principles of nutrition rather than specific aspects of malnutrition and nutritional screening. Nevertheless, further studies involving professional populations have also confirmed poor knowledge and differing attitudes towards malnutrition, upon which,

education and training is likely to have a positive influence (Mowe et al, 2006; Lindorff-Larsen et al, 2007).

One study demonstrated improvements in nutritional knowledge and confidence among practice nurses following intervention of a training session delivered by a dietitian (Cadman, 1998). Before training, baseline data showed that the mean score for knowledge was 7.8 and only 27% of the practice nurses reported having good or excellent confidence when giving dietary advice. Following training, the mean knowledge score increased to 15.4 and good or excellent confidence levels were reported by 88% of participants.

Other studies have also shown how training and education can improve knowledge and practice among healthcare professionals for other aspects of nutritional care (Ockene et al, 1996; Penny et al, 2005; Ke, Chui, Hu & Lo, 2008).

The skills for conducting a nutritional assessment are generally not taught to medical students and house staff in the United States and Canada which is associated with a deficit in clinical practice (Singh et al, 2006). Historically, this was also the case in the UK. Since 1994, several organisations have developed core curriculums for nutrition for both undergraduate and postgraduate programmes for healthcare professionals (Jackson, 2001). The curriculums were set out as the first steps towards developing national standards for the provision of adequate nutritional education for doctors, nurses and other healthcare professionals in the UK. This has subsequently encouraged local authorities to implement their own training initiatives. The important question then follows; will the additional training improve clinical practice?

It has been noted above that knowledge can improve following training. An early study by Byrd-Bredbenner and Shear (1982) demonstrated positive correlations between nutritional knowledge, attitudes and behaviours. This suggests that increased knowledge may lead to

positive attitudes and behaviour change. This is crucial given the current diffuseness of responsibility among healthcare staff. Less than 50% of nurses in one general hospital considered themselves responsible for the nutritional care of their patients (Burnham, 1996).

If lack of knowledge and education among healthcare staff is a significant factor in the under-recognition of malnutrition, the expectation would be improved detection rates following the implementation of training initiatives.

A recent study has examined how the introduction of a mandatory training programme for nurses and healthcare assistants in an acute hospital NHS Trust may improve adherence to the local nutritional screening policy.

Cundy and Weekes (2008) compared the results of audits which showed completion rates of the Nutrition Screening Tool (NST) before and after the implementation of a mandatory training programme for nursing staff. The audits were conducted in May 2000, February 2003 and June 2007 with the training for nutritional screening becoming mandatory in October 2005. It was expected that completion rates would be significantly higher in the 2007 audit following the implementation of training. However, their findings were quite different. There was actually a downwards trend in completion rates of the screening tool, with the lowest rates recorded in the 2007 audit (32%). The researchers concluded that training alone is insufficient to improve NST completion rates.

This study failed to demonstrate an improvement in clinical practice following training. However, closer scrutiny over the content of the training programme is needed before the potential benefits are dismissed. Additionally, the study also noted that there were organisational and departmental restructures within the Trust between the first, second and third audits which may have influenced the results. It may be the case that the particular

training programme, though described as ‘relevant’, may not have been tailored to meet the needs necessary to implement screening.

1.2.6 Attitudes Towards Nutritional Screening

A strong infrastructure is required for nutritional screening to be successful. This involves multi-disciplinary communication and co-ordination, with each discipline clearly defining and accepting its role within the process. Though much of the literature has highlighted the importance of sharing knowledge, this alone may not be sufficient to positively change clinical practice.

If knowledge is required to influence behaviours of target populations, it is recommended that the attitudes these populations have about the subject under discussion should also be explored (Byrd-Bredbenner and Shear, 1982; Mowe et al, 2006; Lindorff-Larsen et al, 2007). By doing this, it is possible to assess whether a specific training programme for nutritional screening will meet the criteria necessary to change clinical practice.

Little research exists regarding the attitudes towards nutritional screening among healthcare professionals. It has been suggested that positive attitudes towards nutritional nursing care may prevent the development of malnutrition (Bachrach-Lindstrom et al, 2007). This has been explored further with regards to how attitudes correlate with improvements in knowledge and clinical practice. The Scandinavian Nutrition Group has conducted several studies related to guidelines and standards for improving the recognition and treatment of malnutrition within the acute hospital setting, with a focus on knowledge and attitudes among healthcare workers.

One particular study showed differences between performance and attitudes within the area of nutritional screening following the implementation of initiatives aimed to improve

adherence to European guidelines (Lindorff-Larsen et al, 2007). Questionnaires assessing clinical practice and attitudes towards screening were sent to doctors and nurses working at large hospitals in Denmark in 1997 (survey 1). The questionnaires were then redistributed in 2004 (survey 2) following the introduction of several initiatives (e.g. quality improvement programme, local practice guidelines) to assess the impact of these measures.

The findings showed a significant improvement in attitudes, knowledge and clinical practice between 1997 and 2004. Though several biases have been identified, such as differences between responders for each of the 2 surveys, the results demonstrate positive changes regarding the recognition and treatment of malnourished patients admitted to hospital.

It may be concluded that the best approach to tackling the under-recognised and under-treated problem of malnutrition is to identify it as early as possible and target attitude change. This involves providing education and training for healthcare professionals regarding the importance of nutritional care and how adherence to local nutritional screening policies is imperative to detect suboptimal nutritional status.

In support of this, the NICE guideline for nutritional support in adults (NICE, 2006) was designed to provide healthcare professionals with national standards, against which their clinical practice could be measured. Knowledge of these guidelines, gained through education, is essential if the standards are to be complied with and met 100% of the time. By meeting such standards, NICE proposes that malnutrition will not only be detected but also treated effectively.

1.3 Research Aim

The present project has been designed to assess the knowledge of the NICE guideline for nutritional support and attitudes towards nutritional screening among healthcare professionals (doctors and registered nurses) working at a district general hospital. The project aims to investigate whether training not only influences these parameters but also influences clinical practice. The following objectives will be used to achieve this aim:

1.4 Study objectives:

- To investigate how training may influence knowledge of clinical standards among healthcare professionals as identified by NICE (2006).
- To investigate how training may influence attitudes towards nutritional screening among healthcare professionals.
- To measure compliance with the local nutritional screening policy against NICE clinical standards.

The study objectives will be achieved by use of quantitative questionnaires and a clinical audit regarding the use of a nutritional screening tool in the acute setting.

1.5 Study Hypotheses

Primary Hypothesis

- Training will improve knowledge of clinical standards among healthcare professionals.

- Overall use of a nutritional screening tool complies with clinical standards as identified by NICE (2006).

Secondary Hypothesis

- Training will improve attitudes towards nutritional screening among healthcare professionals.
- 100% of patients admitted to hospital are nutritionally screened on admission.
- 100% of patients are nutritionally screened on a weekly basis during admission.

2.0 Methods

2.1 Educational Intervention

2.1.1 Study Design

The first part of the project involved a repeated measures design with an educational intervention. Data collection was conducted using a quantitative questionnaire issued before training and again following training. The training sessions formed part of a mandatory training programme for healthcare professionals which ran over seven months and were thus utilised in the present study. The independent variable was the delivery of the training session. The dependent variables were knowledge score and attitude score.

2.1.2 Population and Sample

The population under investigation consisted of all junior house officers (foundation year one) and registered nurses currently employed by Southport and Omskirk NHS Trust who were based at Southport District General Hospital (SDGH). The population was selected based on selection criteria used in previous research of a similar nature (Lindorff-Larsen et al, 2007). The total population consisted of 25 junior house officers and 166 registered nurses (statistics obtained from the Human Resources Department, SDGH).

The study sample included 19 (76% of total population) junior house officers and 38 (22% of total population) registered nurses. Though the aim was to include the total population in the study (as training sessions were mandatory), this was not possible as some staff were unable to attend the training sessions due to shift patterns, work rotations, staff sickness and holiday leave.

Participants were automatically selected on their attendance to the training sessions, which were already mandatory for the target populations prior to the study. Staff who attended were verbally asked to complete the questionnaires which were to be used for departmental audit purposes and the present study. Subsequent completion of the questionnaires was deemed implied consent. All staff who attended the training sessions took part. No randomisation procedures were necessary for the study.

Ethical approval was sought from the Liverpool Research Ethics Committee (LREC) and the Research and Development Department at SDGH (see Appendix 1.0).

2.1.3 Materials

Questionnaire Design

The questionnaire was produced by the Chief Researcher in accordance with guidelines for designing and developing questionnaires for research (Coolican, 1999; Boynton & Greenhalgh, 2004), and also utilised formats used in previous research (Nightingale & Reeves, 1999; Lindorff-Larsen et al, 2007). The questionnaire was an amalgamation of the two assessment methods; the knowledge test and the attitude scale.

Other than occupation, no personal or identifiable data were collected using the questionnaire. A copy of the questionnaire used in the study can be found in Appendix 2.0.

Two questionnaires were given to each participant (one copy to complete before training and one copy to complete after training). Each copy was marked with questionnaire number 1 (before training) and questionnaire number 2 (after training), with both copies having a matching identification number (e.g. 001). This method ensured adherence to the repeated measures design but maintaining confidentiality by using only an identification number.

Knowledge Test

There was no pre-existing questionnaire available that could be utilised to assess knowledge of the NICE clinical standards and therefore the knowledge test was produced by the Chief Researcher. The knowledge test consisted of 12 multiple choice questions that were all related to the clinical standards as identified in the NICE guideline for nutritional support in adults (2006). The questions were developed in such a way that a correct answer could be viewed as evidence of knowledge of that particular standard. Each multiple choice question had four possible answers provided with a tick box next to each one. The knowledge test was piloted before use to enhance reliability and validity.

Attitude Scale

There was no pre-existing scale available that could be utilised to assess attitudes towards nutritional screening and therefore it had to be developed by the Chief Researcher. The attitude scale originally included seven statements about nutritional screening which were based on recommendations from the NICE guideline for nutritional support in adults (2006). A likert scale was used for participants to rate whether they ‘strongly agree’, ‘agree’, are ‘undecided’, ‘disagree’ or ‘strongly disagree’ with the statements. A mixture of positive and negative statements was used in an attempt to reduce bias as recommended by Coolican (1999). The attitude scale was also piloted before use.

Training Session Design

The training session consisted of an interactive lecture delivered by a registered dietitian with the assistance of a computerised presentation (using Microsoft Powerpoint 2007). The lecture lasted approximately 1 hour and covered the clinical standards as identified in the NICE clinical guideline (2006). The quick reference version of the guideline was used to

structure the lecture to ensure delivery of all the standards identified. A copy of the presentation can be found in Appendix 3.0.

Other Materials and Apparatus

Pens were issued to participants in order to complete the questionnaires. The training session was delivered with use of a computer and projector to enable the use of Microsoft Powerpoint 2007.

2.1.4 Procedures

Piloting the Questionnaire

The questionnaire was piloted among 10 registered nurses working at Ormskirk District General Hospital (ODGH). The nurses were recruited opportunistically in the Outpatients department at ODGH where they were approached by the Chief Researcher and asked if they would like to take part in a pilot study. Those in agreement were asked to read and sign a consent form which detailed the procedure and how the data would be used (Appendix 4.0). Feedback forms were provided with each questionnaire upon which participants could make comments regarding the quality of the content (Appendix 5.0). Participants were instructed to take 15 minutes to complete the questionnaire. The completed questionnaires, along with the feedback forms, were then collected by the Chief Researcher.

All questionnaires and feedback forms were completed within the allocated time of 15 minutes. The items for the knowledge test and attitude scale were adjusted in accordance with comments made on the feedback forms.

Additionally, the questionnaires were then reviewed by 12 registered dietitians who provided feedback on all items for both assessment methods to improve reproducibility and quality.

Feedback included possible weaknesses in the wording and readability of the items, the adequacy of the content and the clarity of the instructions. These were discussed as a group with the Chief Researcher until a consensus was reached. The final questionnaire was then deemed suitable for use in the present study.

The Training Session and Completion of Questionnaires

Mandatory nutrition training sessions are already established for junior house officers at SDGH as part of the Trust graduate training programme. Subsequently, mandatory training sessions for nursing staff were arranged and piloted in 2009. A total of 8 training sessions (which both professional groups could attend) were delivered over a 7 month period, from January 2009 to July 2009. All junior house officers and registered nurses were required to attend the sessions. All training sessions were delivered by the same registered dietitian using the same computerised presentation.

The sessions had been arranged during the autumn of 2008 by the Department of Nutrition and Dietetics, in collaboration with the University of Liverpool and the clinical skills coordinator as per Trust policy. The training sessions were not arranged for the purpose of the present study. All training sessions were conducted in the Clinical Education Centre at SDGH.

Upon arrival to the lecture room, those attending the training sessions were verbally informed that a questionnaire would be issued as part of the training session, the results of which would be used for departmental audit purposes and also form part of a research project.

Participants were given 2 copies of the same questionnaire, which had been issued with identification numbers as outlined in the materials section above. Participants were given 15 minutes to complete the questionnaire, with the pens provided, prior to the commencement of

the lecture. For the knowledge test, participants had to tick *one* of the 4 multiple choice answers they felt was correct for each question. For the attitude scale, participants had to circle either 'strongly agree', 'agree', 'undecided', 'disagree' or 'strongly disagree' for each statement. All questionnaires were collected by the Chief Researcher prior to the delivery of the lecture.

Following each training session, the participants were given a further 15 minutes to complete the second copy of the questionnaire just as they had done beforehand. After 15 minutes the questionnaires were collected by the Chief Researcher.

2.1.5 Statistical Analysis

The data from the pilot study for the attitude scale was analysed using PASW Statistics 17 for Windows to obtain a Cronbach's Alpha coefficient.

Data from the completed questionnaires in the main study were pooled for statistical analysis using the same data analysis software as in the pilot study. The data were summarised using measures of central tendency (mean and median) and measures of variability (standard deviation).

Measures of central tendency were determined by the different statistical tests that were applied to the data from the knowledge test and the attitude scale. Mean knowledge scores were calculated and reported as percentages. A paired samples t-test was applied to the data to compare mean knowledge scores for both occupation groups before and after training. A Wilcoxon signed-rank test was applied to the data to compare median attitude scores for both occupation groups (junior house officers and registered nurses) before and after training. The level of significance (the alpha level) for both tests was set to <0.05 .

2.2 Nutritional Screening Audit

2.2.1 Audit Design

The second part of the project involved an evaluation of clinical practice in the form of a clinical audit. The audit investigated compliance with the local nutritional screening policy and was conducted prospectively in August 2009. The audit was a repeat of an audit conducted in August 2008, with which the results were compared to assess for changes in clinical practice. Both audits took place at SDGH. The outcome variable was the completion rate of the nutritional screening tool used on the acute wards at SDGH. The standards to be met were: 100% of patients admitted to SDGH were nutritionally screened on admission and 100% of patients were re-screened on a weekly basis for the duration of their hospital stay. The standards were taken from the NICE guideline for nutritional support in adults (2006).

2.2.2 Population and Sample

The population included all patients admitted to the acute wards of SDGH. The hospital is a receiving hospital, providing acute services to the adult population (i.e. age 16 and over) of the towns of Southport, Omskirk and surrounding areas. No paediatric services are currently provided at SDGH.

The first audit was conducted between the 10th and the 14th August 2008. The sample included all adult patients (aged 16 and over) who were currently residing on the wards at SDGH during this time. New admissions (i.e. those patients admitted after the 9th August 2008) were excluded. A total of 304 inpatients across all specialities were included in the 2008 audit.

For the prospective audit the sample included all adult patients currently residing on the acute wards at SDGH between the 3rd and the 7th August 2009. Again, new admissions (i.e. those patients admitted after the 2nd August 2009) were excluded. A total of 302 inpatients across all specialities were included in the 2009 audit.

2.2.3 Materials

The Nutritional Screening Pathway

The nutritional screening tool used at SDGH at the time of the audits was the SDGH Nutritional Screening Pathway (Appendix 6.0). The screening tool is based on a previously validated tool known as the Nutrition Risk Score (NRS; Reilly et al, 1995). This tool was developed at the Birmingham Heartlands Hospital (BHH) as part of their new nutritional screening programme which commenced in 1993. Details of the tool's validation are beyond the scope of this project but can be found in Reilly et al (1995) and Reilly (1996).

The benefits of this tool include its ease of use, application to all patient categories and ages and its reliance on subjective as well as objective criteria. The outcome of the tool is a nutrition risk score which is used to direct further care plans. Though previous completion rates at BHH have not been promising, with an average completion rate of just 33%, the recognition of patients in need of nutritional interventions was predicted to increase considerably once the tool was launched (Reilly, 1996).

An adaptation of the NRS has been used at SDGH for several years. According to the SDGH nutritional screening policy, all patients admitted to hospital should have a copy of the nutritional screening pathway present within their nursing documentation. All patients should also be nutritionally screened on admission and, where applicable, re-screened weekly for the duration of their hospital stay. The policy also states that any patient who receives a

score of 6 or above is considered to be either malnourished or at risk of malnutrition and should be referred to the dietitian.

2.2.4 Procedures

The audit was registered and approved by the Clinical Audit Department at SDGH for each year prior to the commencement of data collection. The data were collected using an audit tool designed by the Department of Nutrition and Dietetics which had previously been agreed with the Clinical Audit Department at SDGH. For both audits, the data were collected by dietetic assistants working for the Department of Nutrition and Dietetics.

The audit tool included the following data: whether the Nutritional Screening Pathway was present, whether the screening score was recorded, what the screening score was and whether the patients were re-screened weekly for the duration of their stay. The latter was only applicable for patients whose admission had been greater than seven days.

Data collection involved the dietetic assistants visiting all acute wards in the hospital during the selected 5 day period for that year (either 2008 or 2009). The data were obtained from the Nutritional Screening Pathways contained within the nursing notes for each patient. The dietetic assistants used the audit tool to gather the information for all patients who were currently residing on each ward, who were admitted before the first day of the 5 day data collection period.

2.2.5 Statistical Analysis

Once all of the wards had been visited by the dietetic assistants, the audit was complete and the data were pooled for statistical analysis using Microsoft Office Excel 2007 for Windows.

The data from both audits were analysed using a one sample Z-test for proportions. The test was used to indicate whether the clinical standards had been met.

3.0 Results

3.1 Knowledge Test

One point was given to each item correctly answered in the knowledge test. A zero was given for each incorrect answer. Any questions unanswered or left blank were also scored zero. A total score out of 12 was given for each participant and this score was converted to and reported as a percentage.

Table 3.1: Table showing mean knowledge test scores and standard deviations for both professional groups before and after training

		Knowledge Score (%) Test 1	Knowledge Score (%) Test 2
Junior House Officers (N=19)	Mean	51.75	80.69
	Standard Deviation	16.79	13.62
Registered Nurses (N=38)	Mean	39.68	90.56
	Standard Deviation	18.01	13.59

Table 3.1 shows the mean knowledge scores and standard deviations for the 2 occupation groups (junior house officers and registered nurses) both before and after the training sessions. Observations of the mean scores for both groups before and after training reflect the predicted differences.

For junior house officers, there was a difference of 28.9% between baseline and post-training scores. For registered nurses, this difference was 50.9%. Registered nurses showed a greater improvement following training than junior house officers. Additionally, the spread of scores from the mean for both groups reduced post-training as indicated by the standard deviations (95% CI \pm 10.5%). The mean scores and standard errors are represented pictorially in the graph below.

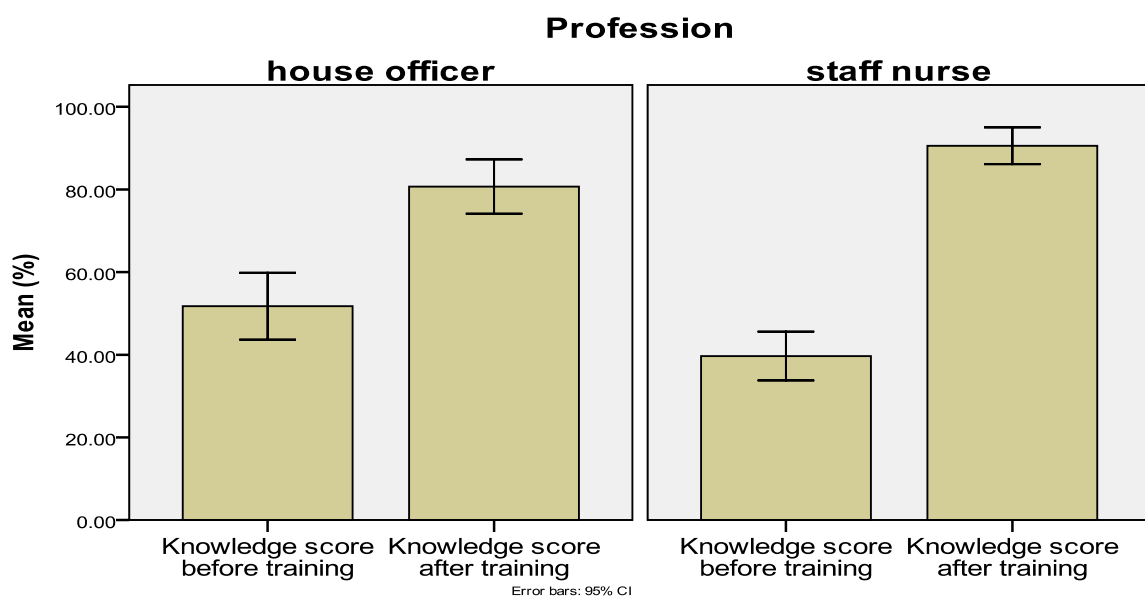


Figure 3.1: Bar graph showing mean scores (%) \pm standard errors of the mean for the knowledge test before and after training for junior house officers and registered nurses

To confirm these observations, a paired samples t-test was conducted on these data for both groups.

The t-test revealed a significant main effect of training for junior house officers showing, on average, that scores were higher following training compared with before training, $t(18) = -5.79$, $p = <0.01$, $r = 0.81$. The effect size (r) indicates that the difference in knowledge following training was a substantial effect.

A significant main effect was also revealed for registered nurses showing that, on average, scores were higher following training compared with before training, $t(37) = -15.73$, $p < 0.01$, $r = 0.93$. The effect size (r) indicates that the difference in knowledge following training was also a substantial effect.

3.2 Attitude Scale

The pilot study for the attitude scale ($n = 10$) produced a Cronbach's Alpha coefficient of 0.79 for the 6 items. The attitude scale was a likert scale with item scores ranging from 1-5 depending upon responses. For instance, 'strongly disagree' scored 1 point and 'strongly agree' scored 5 points. It must be pointed out that scores for items 1, 4 and 5 were reversed due to the fact that the statements were negative. This means that for these items 'strongly disagree' scored 5 points and 'strongly agree' scored 1 point. Items where no score was circled were marked as a score of 1 by default to allow subsequent categorisation of total scores.

The total scores for all 6 items were added together to give an overall attitude score for each participant in both conditions. These scores were collated and a median attitude score was calculated for each occupation group.

A range was calculated between the minimum possible attitude score (6) and the maximum possible attitude score (30). This range of 24 was divided equally into 3 to represent 3 attitude dimensions (negative, ambivalent or positive). Scores between 6 and 12 points were considered to reflect an overall negative attitude, scores between 12 and 18 reflected ambivalence and scores above 18 were considered to reflect an overall positive attitude towards nutritional screening.

Table 3.2: Table showing median attitude scores for both professional groups before and after training

	Baseline	After Training
Junior House Officers (N = 19)	20.00	24.00
Registered Nurses (N = 38)	22.00	28.00

Table 3.2 shows the median attitude scores for the 2 occupation groups (junior house officers and registered nurses) both before and after the training sessions. Observations of the median attitude scores for both groups before and after training reflect the predicted differences. The median attitude score for both groups after training was higher than the attitude score before training. It can also be seen that, despite the median attitude scores being lower for both groups before training, these results suggest an overall positive attitude towards nutritional screening at baseline for junior house officers and registered nurses. These observations are also represented pictorially in the graph below.

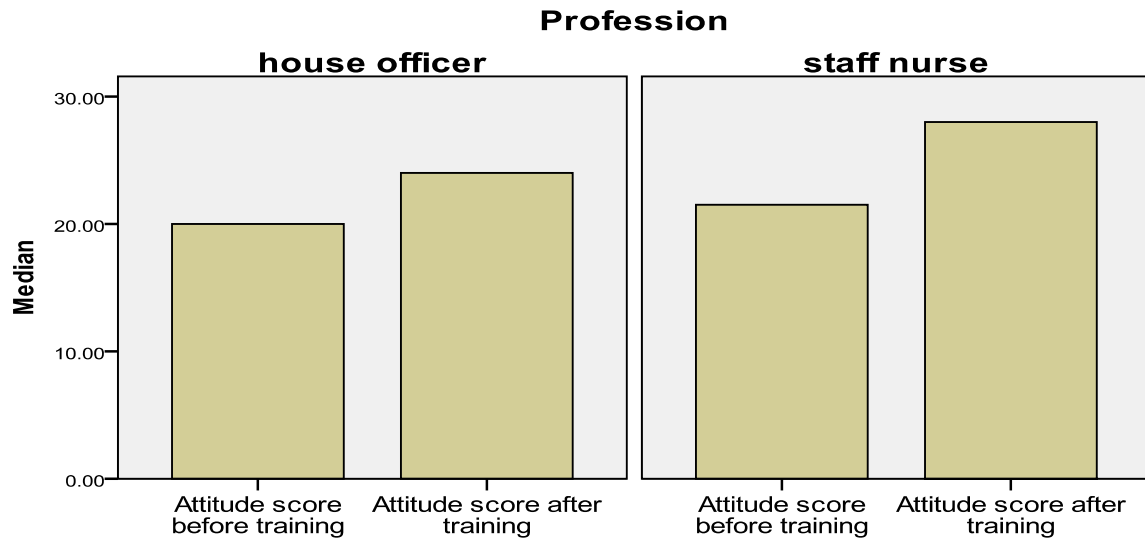


Figure 3.2: Bar graph showing median attitude scores for nutritional screening before and after training for junior house officers and registered nurses

To confirm these observations, a Wilcoxon signed rank test was performed on the data for both groups.

The results of the Wilcoxon signed rank test for junior house officers shows that attitude scores following training were significantly higher than attitude scores before training, $T = 7.00$, $p = <0.05$, $Z = -3.43$, $r = -0.55$. The effect size (r) shows that the difference in attitude scores following training was substantive.

For registered nurses, the same test produced a similar result where attitude scores following training were significantly higher than attitude scores before training, $T = 12.00$, $p = <0.05$, $Z = -5.21$, $r = -0.60$. The effect size (r) indicates that the difference in attitude scores following training was also a substantial effect.

3.3 The Clinical Audit

The total number of patients included in the audit samples for both years (2008; 2009) was 304 and 302 respectively. Table 3.0 shows the number of patients in each speciality included in both audits (2008 and 2009). It may be seen that the numbers of patients in each speciality for both audits was comparable.

Table 3.3: Table showing the number of patients by speciality for both nutritional screening audits

Audit 2008		Audit 2009	
Speciality	Number of Patients	Speciality	Number of Patients
High Dependency	4	High Dependency	3
Intensive Care	5	Intensive Care	5
Coronary Care	5	Coronary Care	2
Spinal Injuries	42	Spinal Injuries	38
General Medicine	123	General Medicine	127
Orthopaedics	30	Orthopaedics	24
Gastroenterology	28	Gastroenterology	27
Surgical	37	Surgical	48
Respiratory	30	Respiratory	28
Total	304	Total	302

Prevalence of Malnutrition

To determine levels of prevalence at SDGH, patients who were screened and had a score of 6 or above on the nutritional screening pathway were considered to be malnourished (or at risk of malnutrition). The figures of prevalence are given in the graphs below as a percentage of the total population for each year.

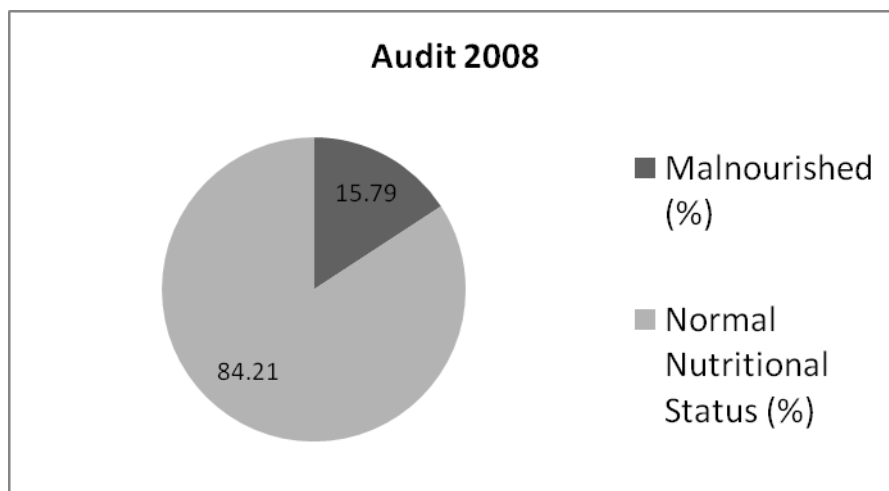


Figure 3.3: Pie chart showing the percentage of patients identified as malnourished in 2008

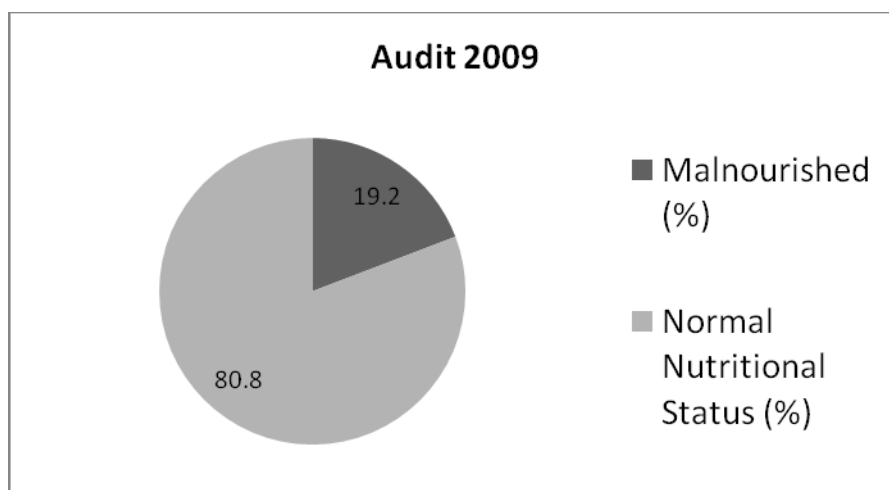


Figure 3.4: Pie chart showing the percentage of patients identified as malnourished in 2009

The number of patients in the total population for each year was comparable ($n = 304$ in 2008 and $n = 302$ in 2009). More patients were identified as malnourished according to the nutritional screening pathway in 2009.

The Clinical Standards

The graph below shows the percentage of patients who were nutritionally screened on admission to hospital and those who were screened weekly for the duration of their stay in both 2008 and 2009.

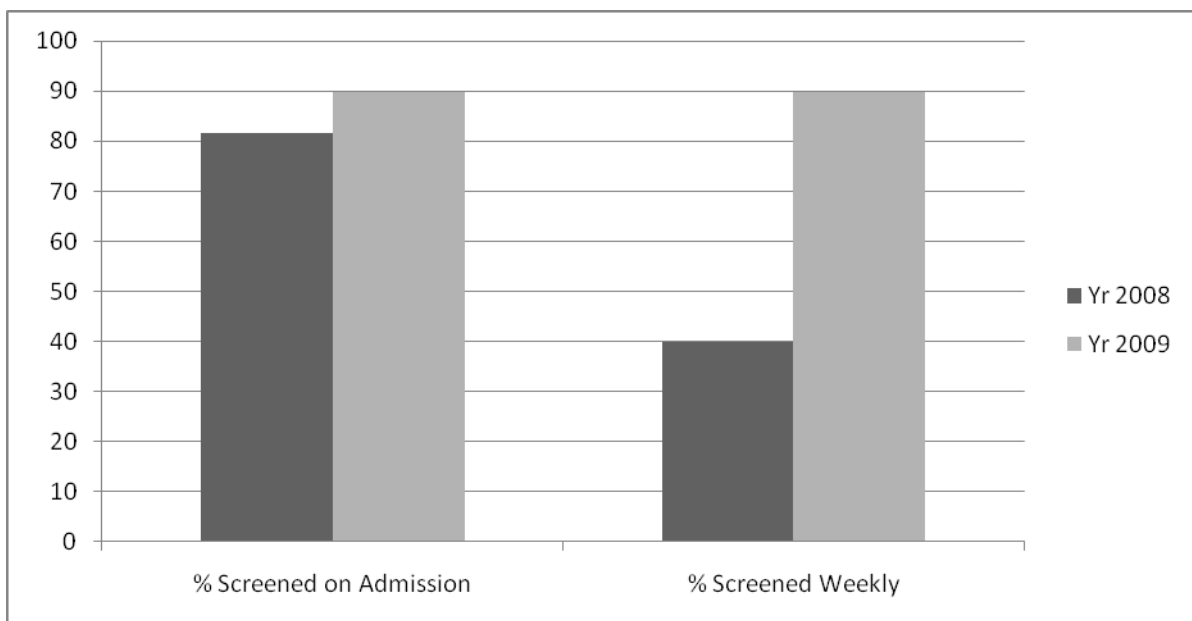


Figure 3.5: Bar graph showing the percentage of patients screened on admission and weekly during their hospital admission in 2008 and 2009

Initial observations show that an additional 8.16% of patients were screened on admission in 2009. In 2008, 248 out of 304 patients were screened on admission compared with 271 out of 302 patients in 2009. For patients who required nutritional screening to be repeated on a weekly basis during their hospital stay, this observed effect was even more pronounced (an

additional 50.13% of patients were re-screened weekly). In 2008, 78 out of 196 patients were re-screened weekly compared with 116 out of 129 patients in 2009.

In order to confirm whether the observed improvements in clinical practice are enough to meet the clinical standards set out by NICE (2006), a one sample Z-test for proportions was applied to the data.

Clinical standard number 1 (100% of patients admitted to hospital are nutritionally screened on admission), was not met in both years. In 2008 the observed sample proportion was 0.816 (95% CI 0.999 – 1.001, $p = 0.05$, $z = -306.5$) meaning that only 81.6% of patients were screened. In 2009 the observed sample proportion was 0.897 (95% CI 0.999 – 1.001, $p = 0.05$, $z = -171.5$) meaning that only 89.7% of patients were screened.

Clinical standard number 2 (100% of patients are nutritionally screened on a weekly basis during admission), was also not met in both years. In 2008 the observed sample proportion was 0.398 (95% CI 0.999 – 1.001, $p = 0.05$, $z = -859.8$). In 2009 the observed sample proportion was 0.899 (95% CI 0.998 – 1.002, $p = 0.05$, $z = -112.1$).

Though the clinical standards for both cases were not met, there was an improvement to move closer towards the standards in 2009.

4.0 Discussion

4.1 Summary of Findings

It has been acknowledged that there is a profound lack of education and training for healthcare professionals regarding the importance of providing adequate nutrition for hospitalised patients in the United Kingdom (British Nutrition Foundation, 1983; Jackson, 2001; Elia, 2003; Magnusson, 2008; National Patient Safety Agency, 2009). The Guideline for Nutritional Support in Adults (NICE, 2006) identified education and training to be a key organisational priority in the fight against malnutrition, which is a growing public health problem nationwide. The guideline proposed that such interventions will facilitate adherence to local nutritional screening policies which will subsequently improve detection rates and access to appropriate services for treatment.

The present study aimed to explore the potential benefits of providing nutritional education for junior house officers and registered nurses working at SDGH. Several parameters were assessed including knowledge of the NICE guideline for nutritional support in adults (baseline and post-training) and attitudes towards nutritional screening (baseline and post-training). In addition to investigating improvements in these parameters, the study also aimed to demonstrate how such interventions may lead to a change in clinical practice.

Consistent with previous research (Ockene et al, 1996; Cadman, 1998; Penny et al, 2005; Mowe et al, 2006; Lindorff-Larsen et al, 2007; Ke, Chiu, Hu & Lo, 2008), the main findings show significant improvements in knowledge and attitudes among junior doctors and registered nurses following education and training.

The mean knowledge scores increased from 51.75% at baseline to 80.69% post-training for junior house officers. The knowledge scores also increased among registered nurses from

39.68% to 90.56%. The median attitude scores significantly increased from baseline to post-training for both junior house officers and registered nurses (20 to 24 and 22 to 28 respectively).

The results of the clinical audits show that, whilst statistically the standards were not met, improvements were made with regards to compliance with the nutritional screening policy. Following the training sessions, an additional 8.16% of patients were nutritionally screened on admission to hospital and an additional 50.13% of patients were re-screened weekly during their hospital stay. Though these results were not statistically significant they may be interpreted as an overall improvement in clinical practice.

4.2 Knowledge of Nutritional Support

The National Institute for Clinical Excellence (NICE) is an independent organisation that is dedicated to providing guidance and setting quality standards to improve health and prevent and treat ill-health. All healthcare professionals are encouraged to implement the guidance to support clinical governance, by ensuring healthcare is provided in line with the most robust clinical evidence available and that staff utilise appropriate resources to maintain cost effective care. Similar to the guidance for medical treatments and devices, the NICE guideline for nutritional support in adults (NICE, 2006) is an example of how these goals can be achieved within the field of nutrition and dietetics.

Numerous studies have highlighted how healthcare professionals generally consider nutritional assessment to be a routine part of patient care (Brett, Godden & Keenan, 1986; Mowe et al, 2006; Vetter et al, 2008) Despite this, knowledge of how to conduct nutritional assessments, interpret these indices and select appropriate interventions has been reported as poor among these professional populations (Department of Health, 1994; Guagnano, Merlitti,

Pace-Palitti, Manigrasso & Sensi, 2001; Vetter et al, 2008; National Patient Safety Agency, 2009; Awad, Herrod, Forbes & Lobo, 2009). The findings from the present study support these claims, with both junior doctors and registered nurses on average scoring less than 55% at baseline in the knowledge test for nutritional support.

The implications associated with poor nutritional knowledge among healthcare professionals cannot be underestimated. One study has highlighted how general practitioners regard their lack of knowledge, skills and experience in certain areas to be reasons for not practising evidence based medicine (Tomlin, Humphrey & Rogers, 1999). With this in mind, it may be postulated that inadequate knowledge regarding the importance of nutrition opposes the concept of clinical governance.

Quality initiatives for NHS Trusts are often based on national standards, such as those recommended by NICE (2006). However, if such initiatives are to be acted upon, the healthcare providers should have knowledge not only of the recommendations themselves but also of the most appropriate ways to deliver them. This emphasises the importance of communication, a final and crucial step in the process of achieving clinical effectiveness.

Theoretically, if healthcare professionals who are directly involved in the nutritional care of patients do not have sufficient knowledge of nutritional care practices then this puts those patients at considerable nutritional risk. It has already been documented that nutritional risk, as identified by a nutritional screening tool, can be associated with significant complications (Todorovic et al, 2003; NICE, 2006). Such consequences may be avoided if the 'at risk', malnourished patient is identified and treated appropriately.

The results of the present study indicate that baseline knowledge of the NICE guideline for nutritional support was inadequate for both professional groups. This suggests that there could be a significant gap in undergraduate and post-registration tuition among both medical

and nursing disciplines. The need for education and training for doctors and nurses regarding the importance of recognising and treating malnutrition is clearly identified and it is important to consider how this need may best be fulfilled.

Unfortunately, the present study did not investigate whether the participants had received any previous training in the field of nutrition. Such information would have been beneficial in order to make recommendations for future educational interventions. The fact that, on average, registered nurses had a lower knowledge score than junior house officers may indicate a greater lack of pre-registration nutritional training for nursing professionals. Or it could even suggest that junior house officers have a greater interest in nutrition and therefore undertake more self-directed learning in this area. However, these remain very weak assumptions without the necessary data being available to enrich the claims.

Improvements in knowledge test scores among junior house officers and registered nurses post-training were statistically significant. However, it is important to note that, even immediately after training, both groups failed to obtain a mean score of 100%. This could suggest that a single training session alone may be insufficient to achieve this success rate. This may be a contributing factor as to why educational interventions do not always guarantee improvements in clinical practice (Cundy & Weekes, 2008; Weekes et al, 2009).

The knowledge transfer process involves complex interactions of several stages, namely generation, adaptation, dissemination, reception, adoption and utilisation (Becheikh, Ziam, Idrissi, Castonguay & Landry (2010). The present study concerns the last four stages of this process which refer to the communication of knowledge and how it will be utilised.

Successful transfer requires the linkage agent (in this case the training programme and facilitator) to deliver the knowledge in a way that is easy to understand, that is applicable to the educational context, that is easily accessible and that is relevant (Becheikh et al, 2010).

The training session was designed with reference to these attributes. The NICE guideline (NICE, 2006) has been produced in two formats; a quick reference guide and the full document which provides a detailed appraisal of the evidence. In order to communicate all of the key standards, the quick reference guide was used to structure the presentation, whilst a combination of extracts from both documents was incorporated. As the documents are both intended to be accessible to all healthcare professionals it was assumed that its content would be suitable for the specified audience.

Such knowledge dissemination should be the prime focus of quality initiatives aimed at tackling malnutrition in the acute setting. All Trusts need to ensure that their healthcare staff are equipped with the nutritional knowledge required to deliver high standards of care. In this regard, the core content of all education and training programmes needs to be standardised nationwide. NICE offers a structure that fulfils this requirement.

As previously mentioned, though the selection and distribution of knowledge is fundamental, there are no guarantees that it will be adopted and utilised by the target audience and result in a change in clinical practice. It is important to assess other aspects (e.g. attitudes, learning environment etc) that may be involved so that recommendations for quality initiatives can be made.

4.3 Attitudes Towards Nutritional Screening

The study used a self-report scale to assess attitudes towards nutritional screening before and after a training session conducted by a dietitian. Based on previous research of a similar nature (Lindorff-Larsen et al, 2007), it was hypothesised that attitudes would improve following training. The results supported this prediction in that the median attitude score for

both professional groups (junior house officers and registered nurses) was significantly higher post-training than at baseline.

Though these results lend evidentiary support to the claim that training can significantly improve attitudes towards nutritional screening, they must be interpreted with consideration of the methods by which they were produced. More importantly, the rationale for assessing these attitudes must also be clear if the findings are to be used to inform clinical practice.

The measurement and assessment of attitudes has long been a source of fascination and controversy within social research (Hogg & Vaughan, 1995). The source of this controversy is the proposed 'inability' to obtain a definitive and accurate measure of such a hypothetical construct. Despite this, the likert scale has been widely accepted as a statistically reliable tool for measuring attitudes (Coolican, 1999) and was thus used in the present study.

Some studies have demonstrated an improvement in attitudes following training for other aspects of health care (Borrelli, Lee & Novak, 2008; Vadlamudi et al, 2008). Though one study has investigated this in relation to nutritional screening (Lindorff-Larsen et al, 2007), the scale used in this study did not specifically reflect the recommendations made in the NICE guideline for nutritional support in adults (NICE, 2006). For this reason, the scale used to measure attitudes in the present study had to be created by the Chief Researcher and piloted before use.

The tool not only detected improvements in attitudes following training but also categorised these into negative (score 6-12), ambivalent (score 12-18) or positive (score 18 or above). A promising finding was that for both groups, the median attitude score reflected a positive attitude towards nutritional screening even at baseline, suggesting that overall junior house officers and registered nurses already considered nutritional screening to be an important part of patient care. Other research has also reported similar findings. For example, a study by

Vetter, Herring, Soon, Shah and Kalet (2008) found that 77% of medical interns thought that nutritional assessment should be a routine aspect of primary care appointments. However, in consideration of the data obtained in the nutritional screening audits, this finding also suggests that a positive attitude alone is insufficient to determine behaviour. Positive attitude scores both pre- and post-training for both occupational groups did not reflect the behaviour recorded in both nutritional screening audits (2008 and 2009), as clinical standards were not met.

With this in mind, we can deduce that training can improve attitudes within the same dimension (i.e. make positive attitudes more positive). However, it is not clear whether the same assumption can be applied when attempting to change attitudes from one dimension to another (i.e. changing a negative attitude to a positive attitude etc.). Studies in other areas that have demonstrated improvements in attitudes following an educational intervention did not categorise baseline attitudes into specific dimensions (Munro, Watson & McFadyen, 2000; Sejr & Osler, 2002). These findings, along with the results obtained in the present study make it difficult to determine whether a similar effect would have been observed if the baseline median attitude scores for both groups had been negative.

It may also be argued that the tool used to assess attitudes towards nutritional screening was not validated sufficiently in order to draw concrete conclusions however certain processes were utilised to minimise this effect. Reliability testing using Cronbach's Alpha (Coolican, 1999) was statistically significant and the peer review demonstrated a strong consensus among registered dietitians regarding the validity of the statements used in the scale. Given the absence of an alternative tool, the scale used in the present study was deemed suitable for use.

The results from the attitude scales reflect the observed improvements in knowledge and in compliance with the nutritional screening policy. This supports other research which has shown positive correlations between nutritional knowledge, attitudes and behaviour change (Byrd-Bredbenner & Shear, 1982). Research within the field of social psychology has led to the development of theories regarding how attitudes relate to behaviour. It is important to consider these if we are to understand how the findings from the present study can be utilised to inform future clinical practice guidelines for nutritional assessment.

In order to achieve a change in behaviour, its determinants must be known and influenced accordingly. Reasoned behaviour is under the control of attitudes and subjective norms and, according to the theory of reasoned action (TRA, Ajzen & Fishbein, 1970; Fishbein & Ajzen, 1975), a change in such behaviour is a product of the manipulation of the knowledge, beliefs and motivations that are intrinsically linked to attitude formation. The process of nutritional screening may be viewed as a reasoned behaviour, as opposed to an emotional or habitual behaviour, which is best influenced by the transfer of objective knowledge (Goldenbeld, Levelt & Heidstra, 2000). Therefore, it may be assumed that if attitudes can be changed through knowledge, it is possible to change the target behaviour.

In terms of knowledge transfer, the key stages in this process that could be assumed to have the greatest impact on the recognition and treatment of malnutrition are adoption and utilisation. This is due to the fact that whilst it is important to deliver the relevant information, the crucial step is to encourage the receiving audience to adopt (i.e. be agreeable to) and utilise it. Training programmes previously employed to improve compliance with nutritional screening protocols (Cundy & Weekes, 2008) may not have incorporated sufficient methods that addressed these issues.

It is beyond the scope of this report to discuss the many factors (e.g. cognition, motivation, function and environment) that influence the adoption stage of the transfer process.

However, it is important to briefly acknowledge that this stage requires the receiving individual to assimilate all of the information that is immediately available. Such information encompasses not only the core content that is to be delivered but also information about the way the content is delivered, by whom, in what environment etc. Additionally, receiver characteristics such as personal interests, beliefs, values, previous knowledge and experience will undoubtedly have great impact on how agreeable they are with the core content (Byrd-Bredbenner & Shear, 1982). Attitudes represent some of these characteristics and their assessment should help to inform how agreeable the receiver is to the new knowledge and if they are likely to utilise it in future clinical practice.

The fact that the median attitude scores for both groups were positive post-training leads to the suggestion that the participants were happy to adopt the new knowledge. Yet the reasons behind this transfer process remain unclear. Would attitudes have been as positive if, for example, the training session had been delivered by a different dietitian or even by a facilitator with no prior training in the field? Or would the results have been dramatically different if the session had been conducted without the assistance of a visual computerised presentation?

It is essential to recognise that attitudes and behaviour are not under the influence of knowledge alone, but by the interplay of many extraneous factors (Byrd-Bredbenner & Shear, 1982). The theory that the mere delivery of knowledge will influence its adoption and utilisation cannot offer a suitable explanation of how training can improve clinical practice until it can be reproduced in various settings, with different participants and with different educational facilitators.

NHS Trusts wishing to incorporate nutritional education and training programmes for their staff should take time to consider the methods available for the delivery of this knowledge. For training sessions where an educational facilitator is required, learner attitudes are more positive when the facilitator has a strong, background knowledge of the subject area (Guskey, 2002; Dills & Placone, 2008). This authentication may be strengthened if the facilitator themselves has positive attitudes towards the content that is to be delivered (Guskey, 2002).

Based on these claims, it will be in the interest of the Trust to select a facilitator who meets these requirements. Not surprisingly, previous research has demonstrated that dietitians have greater knowledge and more positive attitudes towards nutritional care of patients than doctors and nurses (Nightingale & Reeves, 1999; Awad, Herrod, Forbes & Lobo, 2009). Dietitians should therefore play a central role in raising awareness of national standards for nutritional care, providing leadership for nutritional screening policies that are aimed to recognise and treat malnutrition. The facilitator in the present study was a dietitian which may have contributed to the positive results following training.

In view of the confounding effect that facilitator characteristics may have on learning, it may be more beneficial to exchange a human-led training session for a computer-based program. 'E-learning' is considered to represent the future for all learning opportunities and is advocated in post-graduate medical education (Brigdon, 2003). It is easy to administer and cost-effective. The use of this form of linkage agent may eradicate facilitator characteristics from the training session and it may help to standardise nutritional education for healthcare professionals. That said, perhaps learning is most effective if learners are able to interact with a facilitator in order to enrich their knowledge of the core content (Guskey, 2002). The potential benefits of a standardised e-learning program for the importance of nutritional care

should not be dismissed, however future research should establish whether such methods are more advantageous than traditional methods of teaching.

4.4 Measuring Clinical Practice

The nutritional screening audits used to form the second part of the present study were based on the clinical standards outlined in the NICE guideline for nutritional support in adults (NICE, 2006). Their inclusion was aimed to not only obtain a figure of prevalence but also to demonstrate how the perceived improvements in knowledge and attitudes following the educational intervention may subsequently lead to improved clinical practice on the wards at SDGH.

Malnutrition risk was defined by a score of 6 or above on the nutritional screening pathway. The results showed that in 2008 the observed figure of prevalence was 15.8% and in 2009 this figure increased to 19.2%. This increased incidence may be due to several factors. For instance, an obvious reason would be that as more patients were exposed to the process of nutritional screening on admission in 2009, more 'at risk' individuals would be identified. Additionally, it could be argued that more 'at risk' patients happened to be on the wards at SDGH in 2009 than in 2008. Further, it could be that the staff members who were responsible for nutritional screening were more familiar with the tool a year later as a result of practice effects.

It is difficult to isolate these ideas from the potential impact that the educational intervention may have had on the detection rate of 'at risk' individuals. However, even at its highest, the recorded figure of prevalence of malnutrition at SDGH was considerably lower than other studies have reported (McWhirter & Pennington, 1994; Corish et al, 2000; Margetts et al,

2003; Thomas et al, 2007; Russell & Elia, 2009). Given the fact that the local area has a high aging population, and with reference to previous research, it would be expected that the prevalence would be closer to national statistics of 28-40% (Elia, 2003; Age Concern, 2006; Russell & Elia, 2008).

There may be several explanations for this. Firstly, a true figure of prevalence must be derived from data which represents the entire patient population at any one time. This was not achieved in the present study as not all patients were screened either on admission or weekly during their stay. Secondly, the nutritional screening pathway, though validated, may not be as reliable at detecting malnutrition as other nutritional assessment methods and may therefore not be comparable to the indices used in other studies. Thirdly, ease of use has been advocated as a necessary component of any screening tool (Kondrup et al, 2002). Therefore, compliance may be higher with tools that are more simple and quick to use than others. It may be advantageous to compare the detection rates with an alternative and more widely used nutritional screening tool (i.e. MUST) in future audits to enable direct comparisons to be made with other research.

The clinical standards under investigation recommend that 100% of patients admitted to hospital are nutritionally screened on admission and that 100% of patients are nutritionally screened on a weekly basis during their admission (NICE, 2006). Unfortunately, statistical analysis demonstrated that these standards were not met in both the 2008 audit (pre-training) and the 2009 audit (post-training). However, observations indicate that there were clear improvements made with regards to compliance with the nutritional screening policy.

The number of patients screened on admission increased from 81.6% to 89.7%. This means that an additional 8.2% of patients admitted to SDGH in 2009 were given the opportunity to undergo nutritional screening. More dramatically, for the patients who were admitted to

SDGH for longer than one week ($n = 196$ in 2008; $n = 129$ in 2009), the percentage nutritionally screened on a weekly basis for the duration of their stay increased from 39.8% to 89.9% (a difference of 50.1%). This finding is particularly important when considering previous research, which has found that up to 78% of patients who are at risk of malnutrition show a decline in their nutritional status during admission (McWhirter & Pennington, 1994; Corish et al, 2000). If such deterioration is not detected then it has the potential to lead to significant clinical and financial consequences (Todorovic et al, 2003; NICE, 2006).

The data regarding screening on admission was promising. Even in 2008, which was prior to the educational intervention, the number of patients nutritionally screened on admission to SDGH was comparable with 56% of the hospitals included in the BAPEN nutritional screening week (Russell & Elia, 2009). These hospitals screened 76-100% of their patients on admission.

Though recency effects may have had some influence on the significant improvements in knowledge and attitudes immediately post-training, the clinical audit in 2009 was conducted nine months after the first training session and one month after the last. If the increases in screening rates in 2009 were related to the implementation of the training sessions this suggests that knowledge and attitudes must have been retained for up to nine months post-training. For this to be determined, it would have been beneficial to issue a repeat questionnaire at the time of the audit.

Overall, the results of the screening audits showed promising improvements. Whether or not such observations are considered to be a direct result of the training programme remains to be determined. However, given that a lack of nutritional education for doctors and nurses has been identified in numerous publications as a contributory factor to the under-recognition of

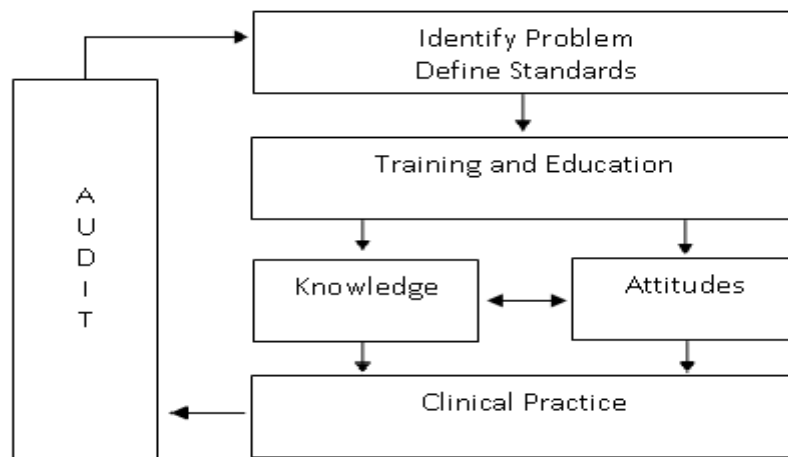
malnutrition in UK hospitals (Department of Health, 1994; Elia, 2003; NICE, 2006; NPSA, 2009), it is likely to have made a positive impact.

4.5 The Impact of Nutritional Education

The present study has demonstrated improvements in knowledge and attitudes among junior house officers and registered nurses following the delivery of a training session at SDGH. Additionally, improved compliance with the nutritional screening policy was also observed from the results of the clinical audits. Though these findings show a positive effect at the local level, what do they mean for NHS Trusts nationwide?

All NHS organisations in the UK must continually strive to improve the quality of their services. Clinical governance represents the systematic approach to safeguarding high standards of care and it is the duty of all NHS Trusts to operate within this framework. Several key elements have been identified that are used to achieve quality improvements including clinical audit, continuing healthcare needs assessments and continuing education (Department of Health, 1999). With this in mind, it is important to consider how nutritional education and the use of nutritional screening audits may easily sit within this structure.

The following model has been proposed by the author to demonstrate why training programmes must be viewed as an integral part of the audit process.



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Figure 4.1: Model showing the role of training and education within the clinical governance framework

The model represents the clinical audit cycle. In terms of the present study, the problem was identified as the under-recognition and under-treatment of malnutrition in the UK. The standards were defined by NICE (2006) as the need for nutritional screening to be conducted on admission to hospital and weekly during admission. A training programme was produced and delivered to communicate the standards to the target groups and, by demonstrating improvements in knowledge of malnutrition and attitudes towards nutritional screening, the study went on to measure and assess clinical practice.

The findings of the present study show how each component is necessary for quality improvement. The fact that more patients were nutritionally screened and identified as malnourished in 2009 suggests that the inclusion of a training programme, in addition to subsequent improvements in knowledge and attitudes, could be associated with improved

clinical practice. When these steps were absent in 2008, poorer compliance with the nutritional screening policy was observed.

Though the precise mechanisms underpinning the relationships between knowledge, attitudes and behaviour remain elusive, the findings offer an explanation as to how nutritional education is received by doctors and nurses and the way the information is processed to inform clinical practice.

Until now, publications which advocate the introduction of mandatory training programmes for nutrition among doctors and nurses (British Nutrition Foundation, 1983; Audit Commission, 2002; Lindorff-Larsen et al, 2007) do not illustrate their functional value in terms of outcome measures. The present study clearly demonstrates this and offers a framework for a standardised training session which could be utilised by any NHS Trust in the UK.

In terms of cost-effectiveness, the provision of such training sessions could have very positive outcomes. The training sessions in the present study were produced and presented by a registered dietitian and lasted for one hour at a time. Materials were minimal and included pens, copies of the presentation, copies of the questionnaires used for data collection and access to a computer and projector. If the training sessions were ongoing and spread evenly throughout the year, the amount of allocated time would make little impact as a whole time equivalent.

With this in mind, costs to conduct annual mandatory training sessions in each NHS Trust would be low and, given the potential savings that could be made, presents itself as a realistic solution to improving recognition and treatment of malnutrition in hospitals. It has been shown that up to 78% of patients who are at risk of malnutrition can decline during admission (McWhirter & Pennington, 1994; Corish et al, 2000). As such decline is associated with

increased length of stay and clinical complications it would make a significant difference to expenditure if these individuals were identified and treated promptly. The present study provides evidence that the provision of nutritional education for doctors and nurses could be associated with a large increase in weekly nutritional screening during admission to hospital thus improving recognition and treatment of malnutrition.

4.6 Limitations

As previously mentioned in this chapter, the findings of the present study must be interpreted with reference to the methods by which they were produced. It must be acknowledged that though improvements in knowledge and attitudes were observed following the training session, these measures may not be truly representative and may not necessarily be directly responsible for the observed improvements in clinical practice.

The repeated measures design was used to try and limit between-subjects differences but did not minimise practice effects of completing the questionnaire. However, such effects may be viewed as another method of learning which would have supported the aim of the training session.

Though the training session was mandatory it was not possible to include the total population in the study sample. This may be related to several reasons such as staff shift patterns, annual leave, sickness and the fact that there were only 8 training sessions conducted over a 7 month period. If the training sessions had been conducted more frequently and at varying times (i.e. in the evening) over a 12 month period then more staff would have been able to attend and therefore results that were more representative would have been obtained.

Whilst the present study aimed to assess how the training session may improve knowledge of nutritional support it did not explore the educational background of each participant. On

reflection, such additional information would have been beneficial in order to establish whether previous nutritional education differs between junior house officers and registered nurses. Furthermore, by including senior house officers, registrars and consultants in the study sample such differences may be more profound.

It has been acknowledged that the measurement and assessment of attitudes will always be challenging (Hogg & Vaughan, 1995). The present study used a likert scale to assess the attitudes towards several items, forming a total attitude score. This score represented each participant's overall attitude towards nutritional screening but did not reflect how attitudes may have differed among individual items. For instance, whilst a participant may agree that all patients should be nutritionally screened on admission to hospital, they may at the same time agree that nutritional screening is not cost-effective. Recognition of such differences would enrich the study data and help to define specific areas of focus for future educational interventions.

Clinical practice was reflected by completion rates of the nutritional screening tool used at SDGH. Though the tool has been validated elsewhere (Reilly et al 1995; Reilly 1996) other research has questioned its validity against the use of a more widely advocated tool, the MUST (Henderson et al, 2008). The benefits of standardising the application of a single screening tool nationwide have already been discussed (Elia, 2003) and had the MUST been used in the present study more representative data may have been obtained.

5.0 Conclusions

The present study used a repeated measures design to investigate the influence that an educational intervention would have on knowledge and attitudes among doctors and nurses working at SDGH. The study findings supported the hypotheses that training would improve knowledge of nutritional screening and improve attitudes towards nutritional screening.

Though the methods by which training sessions would best be delivered are under review, it is recommended that all NHS Trusts in the UK should consider the immediate implementation of mandatory dietitian-led nutritional education programmes for doctors and registered nurses. As there are several barriers to staff accessing training programmes, such as shift patterns, annual leave and sickness, the role of an e-learning program should be investigated which may support or even replace conventional teaching methods.

The study also assessed what impact the training sessions may have on clinical practice. Though clinical standards for the screening audit were not met, improvements in compliance with the nutritional screening policy were observed. With reference to the clinical governance framework, all NHS Trusts should have a nutritional screening policy and conduct annual audits assessing compliance. Additionally, nutritional screening should be standardised with the use of one single tool across the whole of the UK.

Training for healthcare staff should be considered an integral part of the audit process. Education programmes should be mandatory for communicating all national clinical standards to staff as they are introduced into the healthcare system. By following the model showing education and training within the clinical governance framework it is possible for all NHS Trusts to successfully monitor the delivery and utilisation of national recommendations to improve the quality of their services.

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Appendix 1.0

Letter Confirming Ethical Approval

Appendix 2.0
Study Questionnaire

What is your occupation? Please circle:

Doctor (F1)

Registered Nurse

Please state how much you agree or disagree with the following statements by circling an appropriate number:

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Nutritional screening is not an essential part of initial assessment in the acutely ill patient.	1	2	3	4	5
It is cost-effective to nutritionally screen all patients attending the outpatient department.	1	2	3	4	5
All patients should be nutritionally screened on admission to hospital.	1	2	3	4	5
Nutritional screening should only take place when there is clinical concern.	1	2	3	4	5
It is too time consuming to nutritionally screen all patients admitted to hospital.	1	2	3	4	5
Nutritional screening is necessary for patients admitted for elective surgery.	1	2	3	4	5

Please tick ONE answer per question for the following

1) How often should hospitalised patients be nutritionally screened?

- a) monthly b) weekly c) twice per week d) every other day

2) What is the normal healthy range for body mass index (BMI)?

- a) 12-17 b) 19-25 c) 24-30 d) 29-35

3) The prevalence of malnutrition among patients admitted to hospital has been reported as..?

- a) 5-10% b) 30-40% c) 60-70% d) 90%

4) What is the minimum percentage weight loss (in last 3 months) that is indicative of malnutrition?

- a) 2% b) 5% c) 15% d) 20%

5) What treatment should be used for a patient who is malnourished, has unsafe/inadequate oral intake and a functioning gastrointestinal tract?

- a) parenteral nutrition b) elemental diet
 c) enteral nutrition d) oral nutritional supplements

6) What treatment should be used for a patient who is malnourished, has unsafe/inadequate oral intake and a non-functioning gastrointestinal tract?

- a) enteral bolus feeding
- b) parenteral nutrition
- c) oral nutritional supplements
- d) continuous enteral feeding

7) Which of the following classifies a patient at risk of refeeding syndrome?

- a) low potassium, magnesium and sodium AND >10% weight loss in the last 3-6 months
- b) high potassium, magnesium and phosphate AND >5% weight loss in the last 3-6 months
- c) low potassium, magnesium and phosphate AND >10% weight loss in the last 3-6 months
- d) high potassium, sodium and urea AND >10% weight loss in the last 3-6 months

8) Which vitamin should be supplemented in the event of the risk of refeeding syndrome?

- a) pyridoxine
- b) vitamin c
- c) niacin
- d) thiamine

9) Before commencing enteral and parenteral nutrition support, it is essential to assess which of the following?

- a) vitamin D status
- b) serum proteins
- c) nutritional requirements
- d) all of the above

10) Which of the following is not indicated as a marker for assessing malnutrition risk?

- a) body mass index (BMI)
- b) % weight loss in last 3-6 months
- c) serum albumin
- d) history of oral intake

11) Which of the following *must* be assessed before commencing oral nutrition support?

- a) zinc status
- b) swallow function
- c) clotting factors
- d) all of the above

12) In order for nutritional screening to be cost-effective, the prevalence of malnutrition in any one department has been estimated as having to be....?

- a) 76%
- b) 3%
- c) 18%
- d) 45%

Thank you for taking the time to complete this questionnaire

Appendix 3.0
Training Session Presentation

Appendix 4.0

Consent Form for Pilot Study

Appendix 5.0

Feedback Form for Pilot Study

Appendix 6.0

Nutritional Screening Pathway used at SDGH