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# Cost savings of an adult hospital nutrition support team

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**Abstract**

**Objectives:** A hospital-based nutrition support team (NST) may need to demonstrate cost savings and quality benefits. The primary aim of this study was to determine whether an NST could show tangible cost savings (equipment, investigations, and medication costs) from managing patients considered for parenteral nutrition (PN). Secondary aims related to the quality issues of placement of PN catheters, catheter-related sepsis (CRS), duration of parenteral nutrition, and mortality.

**Methods:** An NST was formed in 1999 and worked in all adult areas of a university hospital (Leicester Royal Infirmary). Comparative data about all patients given PN were collected for 2 consecutive years (a retrospective pre-NST year and a prospective NST year).

**Results:** In the pre-NST year there were 82 PN episodes (54 patients), 665 PN days, and a CRS rate of 71% (seven infections/100 PN days). In the NST year, there were 133 referrals for PN but only 78 PN episodes (75 patients, 59% of referrals), 752 PN days, and a decreased overall CRS rate of 29% (three infections/100 PN days, $P < 0.05$) but a rate of 7% (0.6 infection/100 PN days) in the final 3 mo of the NST year. Tangible cost savings for the NST year were derived from 55 avoided PN episodes (£42 741) and 35 avoided CRS episodes (£7974). Thirty-nine percent of PN catheters were inserted by the NST with no insertion-related complications. Competency-based training of ward nursing staff decreased the CRS rate. Mean duration of PN increased from 8 to 10 d ($P$ not significant). In-hospital mortality for patients who had PN was 23 of 54 (43%) in the pre-NST year compared with 18 of 75 (24%) in the NST year ($P < 0.05$).

**Conclusions:** Although the number of PN days increased with an NST, tangible cost savings of £50 715 were demonstrated within the NST year by avoided PN episodes and a decreased incidence of CRS. These savings justify the salaries of a nutrition nurse specialist and a senior dietitian. 

*Keywords:* Nutrition support team; Parenteral nutrition; Enteral nutrition; Cost savings

## Introduction

The incidence of undernutrition (protein-energy malnutrition or marasmus) on admission to the hospital is 11% to 40% [1–6], the point prevalence on 1 d for medical inpatients is 40% to 44% [7,8], and 70% to 82% of patients who are at risk of or have undernutrition are not recognized (based on referral to dietitians for nutritional support) [3,4,7]. Weight loss occurs in 63% to 75% of patients in the hospital [1,4].

Undernourished patients have a dysfunction in all physiologic systems and this is most apparent clinically as muscular weakness, impaired immunity (with high infection rate), and decreased wound healing [9]. Undernourished patients require more intensive nursing than normally nourished patients who have similar underlying clinical problems and have a longer hospital stay with more complications, a higher readmission rate, and higher morbidity and mortality [10–14]. Although randomized, prospective, controlled trials of nutritional support in medical and surgical patients have reported various improvements (usually in nutritional status or in markers of disease activity), they do not consistently show decreases in length of hospital stay, complications, and mortality [15].

Patients who are undernourished or who are at risk of becoming undernourished are often poorly managed due to inadequate nutritional assessment [4,7,16] and poor medical and nursing knowledge and practice [17–19], with pub-

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lished catheter-related sepsis (CRS) rates of 21% to 33% before and 0% to 5% after a nutrition support team (NST) had been formed [20,21]. Many hospitals (41% in the United Kingdom) do not have a specialist NST [22,23]. An NST core membership consists of a clinician, nutrition nurse specialist (NNS), dietitian, and pharmacist [24,25], although other specialists may be involved (e.g., a chemical pathologist or microbiologist). It has been recommended that all hospitals in the United Kingdom have an NST [25,26]. An NST may improve the quality of patient care by improving nutritional assessment and appropriate nutrient delivery and decreasing mechanical, infective, and metabolic complications [27–36]; however, there are few randomized, prospective, controlled trials [36]. In the United States some retrospective or prospective observational studies have shown an NST to result in cost savings [37–40]; most of these savings are accounted for by decreased bed occupancy and staff time. Those responsible for managing or financing a hospital in the United Kingdom National Health Service may not perceive an NST as essential and they may regard bed occupancy and staff time as costs that are incurred regardless of a patient's presence in a bed (intangible costs). Thus an NST may need to prove its benefits in terms of tangible costs (includes equipment, investigation, and medication costs) and/or quality of care.

The primary aim of this study was to determine whether tangible cost savings could be demonstrated in the first year after the formation of a hospital-based adult NST. The secondary aims related to quality-of-care issues and included changes in the place where a parenteral nutrition (PN) catheter was inserted, CRS rate, duration of PN, and mortality. An additional secondary aim was to estimate the full cost savings when the intangible costs were included. Although an NST may manage many patients who receive enteral nutrition, this report deals with cost issues concerning PN.

## Materials and methods

Data for the pre-NST and NST years are based on patient PN episodes. A patient PN episode is taken from the start of the first PN infusion to its being stopped (e.g., due to infection, mechanical problem, or no longer being required). One patient may have more than one PN episode.

### *Pre-NST year*

There was no formal process for selecting patients for PN; the medical/surgical team looking after the patient requested PN, and then the ward dietitian and pharmacist chose a PN regimen. There was a nursing document relating to the management of PN catheters (including setting up/taking down PN bags) but adherence to this was not mandatory. The subsequent management of the PN was by the entire ward team. The expertise to insert nasojejunal tubes endoscopically was available but not often used.

One observer (J.F.K.) retrospectively collected data from the case notes of all patients receiving PN at Leicester Royal Infirmary (LRI) for this pre-NST year (September 1998 to August 1999). The patients were identified from the pharmacy records of all patients to whom PN was dispensed. Data about diagnosis, reasons for PN, complications (especially CRS), and days of feeding were noted from medical, nursing, dietetic, and pharmacy records, fluid and observation charts, and microbiology reports.

### *NST year*

The work of the NST at the LRI began with the appointment of an NNS (J.F.K.) on September 27, 1999. The NST agreed on aims, objectives, and terms of reference (Appendix 1) and began daily ward rounds on November 1, 1999. Careful records of all patients seen in the first year of the NST (November 1, 1999 to October 31, 2000) were made. These included information about diagnoses, reasons for PN, route of feeding, place where PN line was inserted, complications, and days of PN feeding (Tables 2 and 3). The staff caring for the patient or the pharmacy department notified the NST of all patients in whom PN was considered.

### *Teaching*

Education was aimed at trained and untrained nursing staff. Trained staff ($n = 75$) underwent a competency-based training and assessment in PN (Table 1). This included identification of those who were undernourished and those who were at risk of becoming undernourished, choice of feeding route, PN administration, complications, and monitoring. One-to-one sessions with the NNS supported staff experiences.

University-based student nurse training in groups of up to 165 per session involved lectures and interactive methods to develop an understanding of undernutrition and the methods used for its detection, prevention, and treatment.

Weekly education meetings for medical staff were held. In addition, sessions entitled "helping patients to eat" assisted untrained nursing staff to identify patients at risk of undernutrition and the importance of nutritional support.

### *Tangible costs*

Tangible costs included equipment and medication costs but excluded nursing, medical and laboratory time, and bed occupancy costs. The hospital managers had argued that tangible costs were the relevant costs because staff time and bed occupancy would be incurred due to the presence of a patient in a hospital bed, regardless of a patient's requirements for nutritional support.