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Original article

Multi-modal intervention improved oral intake in hospitalized patients. A one year follow-up study

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SUMMARY

Background: Good nutritional practice (GNP) includes screening, nutrition plan and monitoring, and is mandatory for targeted treatment of malnourished patients in hospital.
Aims: To optimize energy- and protein-intake in patients at nutritional risk and to improve GNP in a hospital setting.
Methods: A 12-months observational multi-modal intervention study was done, using the top-down and bottom-up principle. All hospitalized patients (>3 days) were included. *Setting*: A university hospital with 758 beds and all specialities. *Measurements*: Record audit of GNP, energy- and protein-intake by 24-h recall, patient interviews and staff questionnaire before and after the intervention. *Interventions*: Based on pre-measurements, nutrition support teams in each department made targeted action plans, supervised by an expert team. Education, diagnose-specific nutrition plans, improved menus and eating environment, and awareness were initiated. *Statistics*: Mann–Whitney and Kruskal–Wallis test was used for ordinal data, and Pearson Chi square test for nominative data.
Results: Overall 545 patients participated (287 before/258 after) from 26/22 departments. There were no significant differences regarding sex, age, BMI or previous weight loss before and after the intervention. *Result-indicators*: Energy intake improved from 52% to 68% ($p < 0.007$), and protein intake from 33% to 52% ($p < 0.001$) (>75% of requirements). Intake of less than 50% of requirements decreased with 50%. *Process-indicators*: Screening improved from 56% to 77% ($p < 0.001$), nutrition plans from 21% to 56% ($p < 0.0001$), and monitoring food intake from 29% to 58% ($p < 0.0001$).
Conclusions: Intake of energy and protein as well as GNP improved using a multi-modal top-down and bottom-up approach.

1. Background

Undernutrition is common in hospitalized patients, ranging from 20 to 60%, depending on setting, speciality and screening tool. Undernutrition is significantly associated with increased morbidity and mortality [1–4]. Nutritional risk in this study is defined as patients who score 3–7 points by screening with NRS-2002, and therefore are found to benefit clinically from nutritional support [5,6]. Socioeconomic consequences include increased treatment costs, prolonged hospital stay and convalescence, as well as increased dependency on care after discharge. For the individual patient, there is an increased risk of social isolation, dependency on others and depression [4]. Optimising individual protein and energy intake in patients at nutritional risk can improve clinical outcome and reduce costs [7–13]. An intake of at least 75% of energy- and protein-requirements has been shown to reduce complications and adverse outcomes in hospitalized patients [7]. Based on this evidence, the Danish Healthcare Quality Programme (www.IKAS.dk) has incorporated nutrition screening, planning and monitoring, as recommended by the ESPEN guidelines, into mandatory quality standards and indicators in hospitals in Denmark. Good Nutrition Practise (GNP) is seen as screening all patients for nutritional risk within 24 h after admission, making a

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nutrition plan for patients at nutrition risk and monitoring nutrition intake to see and eventually adjust the nutrition plan [1]. In spite of guidelines and quality accreditation incentives, local audits of nutritional practice in our institution were not uniformly satisfactory. Although audits of clinical nutrition had only been undertaken in a few especially interested departments, they indicated a need for improvement. Improving patients' energy and especially protein intake by oral nutrition is difficult to achieve due to a multitude of factors [4,7,14]. Interest, knowledge and priority among doctors and nurses, organisation and structure, communication and documentation of nutritional care are important factors as well as the quality and serving of hospital food [4,15–18]. Logically no single intervention can address such a complex clinical problem. This gave rise to the idea of a multi-modal "bottom-up and top-down" strategic interventional approach, which has been used to improve clinical nutrition practice [19].

2. Aims

The aims of this study were to increase the result-indicators: energy- and protein-intake in patients at nutritional risk and furthermore, generally, to improve the process-indicators: GNP (screening, plan and monitoring as well as communication) as described in the ESPEN guidelines, the Danish National Guidelines and the Danish Healthcare Quality Programme.

3. Methods

An observational multi-modal intervention study, including baseline measurements, was followed by a 12 months intervention period, completed by follow-up measurements. The methodology for the intervention sought the "bottom-up and top-down" principle, which both made an available strategic framework and had the intention of motivating participants [19]. This aimed at motivating the involved departments to improve practice, by acknowledging and acting upon own results from the baseline investigation with interventions that were especially pertinent to local conditions, specific patient categories and fields of interest. The study was organised by a multi professional specialist team from the hospital Nutrition Steering Committee. The organisation of the study is seen in Fig. 1a.

All hospitalized patients (>3 days after admittance) were included after informed consent. Patients, who suffered from dementia, were terminally ill or age >18 were excluded. The follow-up measurements took place one year after the baseline measurements. Both baseline and follow-up measurements took place at all included departments at the hospital on the same week and weekday with one year in between.

3.1. Organisation of the baseline and post intervention cross-sectional measurements

The NST in each department was involved during the study period. On the two days of the cross-sectional measurements studies, all the NST members were assigned only to participate with the study measurements.

The involved NST members doing the nutritional audits, were distributed in-between the departments. One member of the NST remained in their own department, and the other 2–4 nurse- and doctor-members of the team were assigned to a department to which they had no affiliation. The dieticians were all assigned to do the 24-h recall interviews.

An illustration of the study methods is seen in Fig. 1b.

3.2. Setting

The setting was Aalborg University Hospital with 758 beds, including all specialities. The hospital was organized with a hospital nutrition committee, and nutrition support teams in 26 clinical departments, including, surgery, internal medicine, geriatrics, oncology and cardiology. The hospital nutrition committee was chaired by the hospital director, and the study was initiated from this committee. The establishment of multi professional nutrition support teams within each department was a priority from the hospital management, to fulfil new national accreditation criteria. The directors financial advisor participated in the committee meetings, in order to ensure that decisions were financially realistic. The committee was composed of staff from the clinical departments, leader representatives from the clinics, the head of the hospital kitchen, and a development consultant from the kitchen. Centre for Nutrition and Bowel disease, was represented by the head of department, head of clinical dieticians and head of the clinical nutrition research unit.

The nutrition support teams (NST) included at a minimum a physician, a nurse, and a leading person (most often the associate head nurse). In the hospital, 9 dieticians were employed in "Centre for Nutrition and Bowel Disease". The dieticians were each predominantly associated with a specific department. For that reason, not all departments had equal access to dieticians, and not all departments had a dietician associated to their NST. Many departments had more participants in their NST – most often 4–6 members. In daily practice, the NST were assigned to take part in the implementation of nutrition guidelines in their own departments, to spread their knowledge about clinical nutrition to colleagues, and to supervise colleagues in specific patient related nutritional problems. Team members were however mostly assigned to general clinical procedures in their departments. As educational basis for their nutrition team-membership, the NST members had a two day nutrition workshop, arranged by the hospital nutrition committee. Many team members had participated in several lectures regarding clinical nutrition.

3.3. Measurements

Before and after the intervention period, the following *measurements* were made:

- Basic demographic data
- Process-indicators including GNP (screening according to NRS 2002) [5] nutrition plan and monitoring
- Structured patient interviews
- Result-indicators including *energy*- and protein-intake by *24-h dietary recall interviews* [20]
- *Staff questionnaires*

3.4. Basic demographic data

Basic demographic data were obtained from patient records. These included age, gender, weight, BMI, weight loss <3 months. Fof co-morbidities, diabetes, COPD and stroke were registered.

3.5. Process-indicators including GNP

Process-indicators included nutrition screening on admission, nutrition plan and nutrition monitoring. These data were obtained from the patient records. The audit team performed the patient record audit in a pre-defined room in the department, and performed the structured patient interview at bedside. The NST

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