The effect of interventions to prevent and treat malnutrition in patients admitted for rehabilitation: a systematic review with meta-analysis

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CRD summary
This review concluded that oral nutritional supplements and energy dense meals improved energy and protein intake and may be effective strategies for addressing malnutrition in rehabilitation. These conclusions reflect the evidence but limitations of the review and the paucity of the evidence base suggest that the conclusions may not be reliable.

Authors’ objectives
To evaluate the effect of oral nutritional interventions in adult patients admitted for rehabilitation.

Searching
MEDLINE, PsycINFO, EMBASE, CINAHL and Cochrane Central Register of Controlled Trials (CENTRAL) were searched from inception to March 2013 for publications in English. The search strategy was reported in an online supplement. Reference lists of included studies and relevant review articles were handsearched to locate further studies.

Study selection
Eligible studies had a level of evidence of I, II, III-1, III-2, III-3 or IV and evaluated oral nutritional interventions in adult in-patients in rehabilitation, geriatric evaluation medicine wards or similar. Eligible control conditions included alternate interventions or standard/usual care. Primary outcomes included dietary intake, anthropometry, nutrition-related biochemistry or structured nutritional assessment scores/classifications. Secondary outcomes included functional measures (such as need for assistance, physical capacity, strength) and length of stay. Outcomes had to have been measured during the rehabilitation in-patient stay. Exclusion criteria were stated in the paper.

Mean age of patients ranged from 65 to 83 years. Patients had nonspecific and specific clinical conditions and most were frail, malnourished or at risk of malnutrition. Interventions administered included oral nutritional supplements (alone or in combination with a modified nutrient content or delivery schedule), food service interventions and clinical care processes. Mean duration of stay in rehabilitation ranged from three days to eight weeks.

Two reviewers independently selected studies for inclusion in the review; any discrepancies were resolved through consensus.

Assessment of study quality
Two reviewers independently used a published tool to assess inclusion/exclusion, bias, generalisability, data collection and analysis in individual studies. Studies were assigned overall quality ratings of negative (weak quality), neutral (neither exceptionally strong or weak quality) or positive (strong quality). Further details were provided in the paper.

Data extraction
Data on outcomes were extracted to calculate mean differences and 95% confidence intervals. Units were converted (where necessary) to a consistent format. Data were sometimes obtained from graphs or through contact with primary study authors.

The authors did not state how many reviewers extracted data.

Methods of synthesis
Where possible, weighted mean differences (WMD) and 95% confidence intervals were pooled using random-effects meta-analysis. The $I^2$ statistic was used to assess between-study heterogeneity as low ($I^2 < 25\%$), medium ($I^2 < 50\%$) or high ($I^2 > 75\%$). Where data could not be meta-analysed it was synthesised in a narrative, with greater emphasis placed on results from studies with high-quality ratings.
Results of the review
Eleven studies were included in the review (1,012 patients, range 12 to 345 per study). These included four randomised controlled trials (RCTs), three case series, two non-randomised controlled studies, one quasi-experimental study and one historical control study. Study quality ratings were positive (five studies, including three RCTs) or neutral (six studies).

Compared with standard meals, energy dense meals were associated with statistically significantly greater intakes of energy (WMD 324 kcal/day, 95% CI 212 to 436) and protein (WMD 9.1 grams/day, 95% CI 0.2 to 17.9). These findings came from one case series, one crossover RCT and one non-RCT; heterogeneity was low for energy intake (I²=39%) and high for protein intake (I²=89%).

In evaluations of oral nutritional supplements (plus meals) (two RCTs, one case series), energy intake, protein intake, weight and albumin levels increased in all intervention groups. Statistically significant differences between intervention groups and control groups (usual meals only) were only consistently shown for energy intake and protein intake (no meta-analyses performed). Results were mixed for changes in mid arm circumference and triceps skin fold. In comparisons of specialty versus standard oral nutritional supplements (plus meals) (two RCTs, one non-RCT), increases in energy intake and weight were greater with the use of specialty oral nutritional supplement but these between-group differences were not statistically significant. Mixed results were shown for protein intake, and changes in albumin and pre-albumin levels.

Further results (including results for secondary outcomes and/or results only reported by singular studies) were reported in the review paper.

Authors’ conclusions
The provision of oral nutrition supplements and energy dense meals improved energy and protein intake; they may be effective strategies for preventing or treating malnutrition in rehabilitation settings.

CRD commentary
The review question and inclusion criteria were clearly defined. Suitable databases were searched although the restriction to publications in English meant that relevant studies may have been missed. Only study selection and quality assessment were reported as having been performed in duplicate, thus the possibility of reviewer error and/or bias cannot be ruled out. The quality assessment criteria employed seemed appropriate; results demonstrated low overall risks of bias or uncertainty regarding risk of bias (due to insufficient reporting). The largely narrative method of synthesis was appropriate given the paucity of the evidence and the differences across the studies. The use of meta-analysis with data from food service interventions may not have been appropriate due to differences between the studies (such as in study design). The authors acknowledged that the clinical significance of the pooled findings was unclear.

Overall the authors’ cautious conclusions reflect the evidence although limitations of the review methods and the paucity of the evidence base suggest that they may not be reliable.

Implications of the review for practice and research
Practice: The authors stated that oral nutrition supplements or energy dense meals are potential solutions for improving energy and protein intake among patients in rehabilitation.

Research: The authors stated that future studies evaluating oral nutritional interventions should include robust clinical, functional and cost outcomes. Research was also needed to evaluate new and innovative nutrition strategies in the rehabilitation setting and to investigate the translational capacity of findings of nutritional interventions across the continuum of healthcare.

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