CRD summary
This review assessed the effectiveness of interventions to minimise undernutrition in elderly in-patients. The authors concluded that the use of oral supplements is supported. However, the strength of this conclusion might be limited as it is based on only a minority of the outcomes of interest from studies of poor quality. The authors’ recommendation for further research appears justified.

Authors’ objectives
To assess the effectiveness of interventions to minimise undernutrition in elderly in-patients.

Searching
MEDLINE, PREMEDLINE, CINAHL, AUSTROM, ASThealth, EMBASE and the Science Citation Index were searched from 1980 onwards for English language studies; the search terms were reported. Unpublished studies were sought using Dissertation Abstracts International, and the Australian Journal of Nutrition and Dietetics was handsearched. The reference lists of relevant articles were screened to identify further studies.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs), non-RCTs, longitudinal studies, cohort studies, case-control studies and time series were eligible for inclusion.

Specific interventions included in the review
Studies of interventions aimed at minimising undernutrition were eligible. The included studies focused on: supplying oral supplements (providing, where reported, an additional 150 to 1,000 kcal/day); enteral nutrition therapy (providing, where reported, an additional 1,000 to 2,800 kcal/day); changes to the foods provided to participants; services of additional staff; or implementation of evidence-based guidelines. The interventions in the included studies ranged in duration from 3 days to 6 months, or ran from admission to discharge.

Participants included in the review
Studies including older in-patients in acute and sub-acute hospitals, where the period from admission to discharge exceeded 3 days, were eligible for inclusion. Participants had to be aged 65 or older; however, studies conducted within a ‘geriatric’ ward were also included. Studies including day-only and short-stay admissions, or those set in residential care, were excluded. The participants in the primary studies included women with fractured neck of the femur, patients with acute critical illness or dementia, rehabilitation patients, malnourished patients, psychiatric patients and long-term geriatric patients.

Outcomes assessed in the review
The inclusion criteria were not defined in terms of outcomes and the primary outcomes were not highlighted. The outcomes of interest were dietary intake measures, anthropometry and body composition measures, biochemical indicators, clinical outcomes (including length of hospital stay, mortality and prevalence or incidence of malnutrition) and functional indicators.

How were decisions on the relevance of primary studies made?
Two reviewers assessed studies for inclusion.

Assessment of study quality
Two independent reviewers assessed study quality, referring any disagreements to a third reviewer. The tool used was Database of Abstracts of Reviews of Effects (DARE)
the Joanna Briggs Institute experimental critical appraisal form, which scores studies on 10 criteria assessing randomisation, outcome measurement, group comparability, allocation concealment, blinding of the participants and outcome assessors, appropriate statistical analysis, reliable outcome measurement and adequate follow-up of participants.

Data extraction
Two independent reviewers performed the data extraction, referring any disagreements to a third reviewer. For each study, results for the treatment groups were extracted (with control group data extracted where present) together with the statistical significance of the results (where possible).

Methods of synthesis
How were the studies combined?
All results were presented in a narrative synthesis, grouping studies by intervention type and discussing each outcome measure in turn. Where appropriate (i.e. at least 2 RCTs were judged to be sufficiently comparable), the results of the RCTs were pooled using meta-analysis to calculate the weighted mean difference (WMD), standardised mean difference (SMD) or relative risk (RR) with 95% confidence intervals (CIs). If significant statistical heterogeneity was detected ($p<0.10$) a random-effects model was used for the meta-analysis, otherwise a fixed-effect model was employed.

How were differences between studies investigated?
Differences between the studies were discussed in the text of the review. For RCTs used in the meta-analysis, heterogeneity was assessed using the chi-squared test and through visual interpretation of graphs.

Results of the review
Twenty-nine studies, involving 4,021 participants in total, were included. These comprised 18 RCTs (2,886 participants), 2 before-and-after studies (47 participants), 3 time series (100 participants), 3 crossover trials (84 participants) and 3 non-RCTs (904 participants).

The overall quality of the studies was poor. No studies met all of the quality criteria; 3 of the 29 studies fulfilled 8 of the 10 criteria. Few studies clearly blinded the outcome assessors and/or concealed treatment allocation. Eighteen studies had greater than 80% participant follow-up.

Oral supplement interventions (15 studies, 2,021 participants; 12 outcomes assessed): 9 studies looked at different measures of dietary intake; the results were mixed although most reported significant increases in energy and/or protein intake with oral supplements. For intervention groups compared with control, there were greater increases in weight (5 RCTs; SMD 0.74, 95% CI: 0.01, 1.46, $p=0.05$; statistically significant heterogeneity was found, $p<0.0001$) and in arm muscle circumference (6 RCTs; SMD 0.23, 95% CI: 0.04, 0.42, $p=0.02$), but no significant differences in change in midarm circumference (2 RCTs; SMD -0.21, 95% CI: -2.01, 1.59, $p=0.82$) or tricep skinfold thickness (5 RCTs; SMD 0.22, 95% CI: -0.37, 0.82, $p=0.46$) and no consensus for body mass index (2 RCTs) and handgrip strength (3 studies). There was no consistent difference between treatment and control groups in serum albumin (3 RCTs; WMD -1.40, 95% CI: -5.23, 2.44, $p=0.47$) and pre-albumin (4 studies). There was no significant effect of oral supplementation on length of stay (4 RCTs; WMD -0.49, 95% CI: -2.52, 1.53, $p=0.63$). There was also no significant reduction in mortality (4 RCTs; RR 0.81, 95% CI: 0.53, 1.24, $p=0.34$) and 2 RCTs looking at malnutrition outcomes gave conflicting results.

Enteral nutrition interventions (6 studies, 406 participants; 10 outcomes assessed): there was no significant effect on mortality between treatment and control groups (4 RCTs; RR 1.07, 95% CI: 0.29, 3.96). There was no significant difference between treatment and control groups in change in albumin levels (3 RCTs; WMD -1.48, 95% CI: -1.49, 0.33, $p=0.46$) and no consensus among a further 3 studies. Five studies reported on dietary intake; those reporting on total energy intake reported increases in intervention groups compared with control. The results for oral intake varied. Further outcomes were reported from 3 or fewer studies.

Guideline implementation interventions (3 studies, 904 participants; 6 outcomes assessed): 3 non-RCT studies assessed length of hospital stay; 2 studies found no difference between treatment and control groups on this measure and 1 study...
reported reduced length of stay for the treatment group. One study reported an increase in weight in the intervention group compared with control; another study found no significant difference. Further outcomes were reported from 1 study each.

Additional staff support interventions (1 study, 592 participants): this study reported no significant change in any of the 9 outcomes (including weight and other body composition measures, handgrip strength and mortality) when an additional health care assistant assisted on elderly hospital wards.

Changes to hospital diet (4 studies, 98 participants; 2 outcomes assessed): 4 studies reported increases (significant in 3 studies) in energy intake in intervention groups. One study assessed weight and found this to increase significantly in the treatment group over the 6-week intervention.

Authors’ conclusions
The evidence supports the use of oral supplements to minimise undernutrition in elderly in-patients, but there is a need for further research in this area, particularly for interventions involving changes to the hospital diet and staff support at the ward level.

CRD commentary
The review question and inclusion criteria were clear. However, the review assessed several outcomes and did not highlight any primary outcomes, thus raising the potential for selective reporting of results and finding statistical significance by chance. Several sources were searched for primary studies, and the eligibility of unpublished studies reduced the risk of publication bias. Two independent reviewers performed the quality assessment and data extraction, thus minimising the likelihood of bias and errors being introduced during these processes. The quality of the included studies was assessed and results were presented, along with full details of all included studies. The review included a wide range of study designs and participants, and the interventions also varied considerably. Given this heterogeneity, it was appropriate that meta-analyses were only performed with sufficiently comparable RCTs, otherwise a narrative synthesis was used. However, for many of the outcomes there were few studies, and many of the meta-analyses involved a small number of statistically heterogeneous studies, making it difficult to draw strong conclusions.

The authors’ conclusion regarding the effectiveness of oral supplements is based on positive pooled results for only 2 of the 12 outcomes of interest, possibly limiting the strength of this conclusion. In addition, the results for one of these positive outcomes (weight) showed statistical heterogeneity and the authors stated that the study quality was generally poor; this, too, limited the strength of the evidence. However, the recommendation for further research appears justified given the small number of studies available for those intervention types.

Implications of the review for practice and research
Practice: The authors recommended the use of oral supplements for elderly hospital in-patients to promote weight gain and increase lean body mass. Clinicians should try to identify biochemical indicators (other than albumin and pre-albumin) that can effectively monitor nutritional status in hospital in-patients; they should also ensure that prescribed interventions are actually implemented.

Research: The authors stated that further high-quality research is needed to assess the effectiveness of interventions to minimise undernutrition, particularly those involving alteration to the standard hospital diet and the addition of staff support at the ward level. Studies should assess ‘more useful’ outcomes such as changes in lean body mass and functional status, and should report to what extent the prescribed intervention was actually implemented.

Funding
Central Coast Health Research Committee.

Bibliographic details

**Indexing Status**
Subject indexing assigned by CRD

**MeSH**
Aged; Aged, 80 and over; Aging; Frail Elderly; Hospitalization; Malnutrition /prevention & control; Nutrition Assessment; Nutrition Disorders /prevention & control; Nutrition Policy; Nutritional Requirements; Nutritional Status; Nutritional Support /methods /nursing; Risk Factors

**Accession Number**
12007008173

**Date bibliographic record published**
31/01/2008

**Date abstract record published**
31/01/2008

**Record Status**
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.