Medically assisted nutrition for palliative care in adult patients (Review)

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[Intervention Review]

Medically assisted nutrition for palliative care in adult patients

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ABSTRACT

Background

Many palliative care patients have a reduced oral intake during their illness. The management of this can include the provision of medically assisted nutrition with the aim of prolonging the length of life of a patient, improving their quality of life, or both.

Objectives

To determine the effect of medically assisted nutrition on the quality and length of life of palliative care patients.

Search methods

Studies were identified from searching *The Cochrane Library*, MEDLINE (1966 to 2008), EMBASE (1980 to 2008), CINAHL, CANCERLIT, Caresearch, Dissertation abstracts, SCIENCE CITATION INDEX and the reference lists of all eligible trials, key textbooks, and previous systematic reviews. The date of the latest search was July 2008.

Selection criteria

All relevant randomised controlled trials (RCTs) or prospective controlled trials (if no RCTs were found).

Data collection and analysis

There were no RCTs or prospectively controlled trials found that met the inclusion criteria.

Main results

There were four prospective non-controlled trials (including one qualitative study) that studied medically assisted nutrition in palliative care participants, and one Cochrane systematic review (on Motor Neurone disease), but no RCTs or prospective controlled studies.

Authors' conclusions

There are insufficient good quality trials to make any recommendations for practice with regards to the use of medically assisted nutrition in palliative care patients.

PLAIN LANGUAGE SUMMARY

Medically assisted nutrition to assist palliative care patients

It is common for palliative care patients to have reduced oral intake during their illness. Management of this condition includes discussion with the patient, family and staff involved and may include giving nutrition with medical assistance. This can be done either via a plastic tube inserted into a vein directly or into the stomach or other parts of the gastrointestinal tract. It is unknown whether this treatment helps people to feel better or live longer. A search of the international literature was only able to find a small number of studies looking at this issue. As a result, it is not possible to clearly define the benefits and harms of this treatment.

BACKGROUND

Many palliative care patients have a reduced oral intake during their illness. The cause of this varies, but may be part of a physical obstruction, anorexia/cachexia syndrome, generalised weakness, bowel obstruction, loss of desire to drink or no specific cause may be identified. The most common time for this decreased oral intake is during the terminal phase, when the patient becomes less conscious and therefore less able to receive nutrition orally (Morita 1998).

Management of this condition includes discussion with the patient, family and staff involved and either no medical intervention (but continued attention to treating any symptomatic problems, including good mouth care) or the provision of nutrition with medical assistance. The aim of this intervention can be to prolong the length of life of a participant, improve their quality of life, or both. These benefits may come via the reversal of the physiological factors associated with the patient's decline. Balanced against these potential benefits are adverse events that can be associated with any intervention (infection, bleeding, pain etc) (Bozzetti 1996). It is also essential to assess the psycho-spiritual impact of undergoing the treatment and what their expectations of medically assisted nutrition are.

Medically assisted nutrition can be performed via a tube inserted into any part of the gastrointestinal system (enteral) or via a tube inserted into the venous system (parenteral). There is some controversy and views vary on the ethics of medically assisted nutrition (Casarett 2005). The first ethical controversy centres around whether medically assisted nutrition is a medical intervention or a basic provision of comfort. Secondly there is controversy as to how and by whom should decisions be made with regards to medically assisted nutrition in patients who no longer have the capacity to make decisions for themselves. This review will concentrate on assessing the benefit of provision of nutrition with medical assistance versus the harm caused by such intervention in palliative care patients. It is only with this information that clinicians and patients can make informed decisions about whether this type of intervention is beneficial or harmful to an individual patient.

A separate Cochrane review has been conducted looking at the provision of medically assisted hydration for palliative care patients (Good 2008).

OBJECTIVES

The objectives of this review are to determine the effect of medically assisted nutrition in palliative care patients on their quality and length of life.

METHODS

Criteria for considering studies for this review

Types of studies

All relevant randomised controlled studies (RCTs) or prospective controlled studies (if no RCTs were found).

Types of participants

Participants included:

- palliative care participants who received medically assisted nutrition;
- those that were receiving palliative care (WHO 2005);
- (but not be limited to) incurable cancer, dementia, neurodegenerative diseases (e.g. Motor Neuron Disease), Human Immunodeficiency Virus, Chronic Airways Limitation and Chronic Heart Failure whose prognosis was limited and the focus of care was quality of life (Doyle 2004;

- adult participants aged 18 years and above were included, both male and female and in any setting such as home, hospice or hospital.

Included participants were not limited to those in the terminal phase of their illness. Participants who were having medically assisted nutrition as part of a perioperative, chemotherapy or radiotherapy regime, or because of chemotherapy or radiotherapy adverse effects will be excluded.

Types of interventions

Medically assisted administration of nutrition:

- parenteral nutrition - administration of nutritional liquid via a central or peripheral venous catheter, that does not directly enter the gastrointestinal system;
- enteral nutrition - administration of nutritional liquid through a tube via the gastrointestinal system (nasogastric tube, jejunostomy, gastrostomy).

Comparisons:

- placebo,
- no intervention,
- usual treatment or supportive care.

Types of outcome measures

Primary outcomes

1. Quality of life on any measure (including symptom assessment scales)

Secondary outcomes

1. Survival
2. Adverse Events

Search methods for identification of studies

A. Electronic Databases

The following electronic databases were searched using a search strategy developed for MEDLINE, but modified appropriately for each database:

- *The Cochrane Library:* Cochrane Controlled Trials Register, Cochrane Database of Systematic Reviews, Cochrane Database of Reviews of Effectiveness.
- MEDLINE (1966 to present).
- EMBASE (1980 to present).
- CINAHL.
- CANCERLIT.
- Caresearch - database listing conference proceedings and grey literature.
- Dissertation abstracts.
- SCIENCE CITATION INDEX.

Date of most recent search: July 2008

B. Reference Lists

The reference lists of all eligible trials, key textbooks, and previous systematic reviews were searched for additional studies.

C. Language

The search attempted to identify all relevant studies irrespective of language. There were no non-English papers identified.
The subject search used a combination of controlled vocabulary and free text terms based on the search strategy for searching MEDLINE. Please see Appendix 1.
This search strategy was adapted for other databases searched.

Data collection and analysis

Studies identified by the search strategy had the title and abstract (where possible) assessed by the lead review author (PG) to identify potentially relevant articles.
The results of studies identified from the different databases were as follows:
The Cochrane Library - 1136 (476 from clinical trials)
MEDLINE - 6655
EMBASE - 4548
CINAHL - 56
CANCERLIT - 2480
Caresearch - 172
Dissertation abstracts - 54
SCIENCE CITATION INDEX - 4601
After review of the title and abstracts, 22 references were retrieved in full. Unfortunately none of these met the inclusion criteria. However, there were four prospective non-controlled trials (including one qualitative study), and a Cochrane systematic review. These studies will be described in the discussion section.

Quality

All studies were to have their methodological quality assessed. There was to be two scales used.

1. RCTs would be assessed via the Oxford Quality Scale devised by Jadad *et al* (Jadad 1996).
2. The quality of non RCTs would be assessed using a scale devised by Rinck *et al* (Rinck 1997).

Data extraction

The following information was planned to be obtained for each study:

- study methods (study design, allocation, blinding, setting, inclusion criteria);
- participants (sample size, exclusions/inclusions, number, disease, duration of trial, withdrawals and dropouts, site - e.g. hospital, hospice, home);
- intervention (type, route of delivery, control used);
- outcome (quality of life, symptom measures, survival, time from death intervention was initiated);
- adverse effects.

The extraction was to occur independently by two review authors.

Data analysis

The overall effectiveness of medically assisted nutrition in palliative care participants was to be assessed and also specific sub-group analysis (where possible) was to be undertaken by:

- study design:

data from RCTs and prospective controlled studies were to be evaluated separately

- participants:
    - cancer,
    - non-cancer,
    - dementia,
    - neurodegenerative diseases.
- intervention:
    - medically assisted nutrition - parenteral, enteral nutrition.
- study quality
- timing of intervention (in relation to death)
- site

Statistical analysis

No studies were suitable for evaluation.

RESULTS

Description of studies

See: Characteristics of excluded studies.
No studies met the inclusion criteria.

Excluded studies

Please see Table 1 in 'Additional tables' and the Characteristics of excluded studies table.

Risk of bias in included studies

No studies were evaluated for methodological quality.

Effects of interventions

There were no RCT nor prospectively controlled trials found that met the inclusion criteria.

DISCUSSION

The objective of this systematic review was to determine the effectiveness of medically assisted nutrition in palliative care patients (of all ages) on their quality and length of life. Extensive searching of the literature produced no RCTs nor prospective controlled trials that fulfilled the inclusion criteria. The discussion will focus only on prospective trials that were retrieved, as this represents the next highest study quality design. However, the studies are all of a low quality because of their design, and therefore caution is needed in interpreting any of the results.

This search identified four prospective non-controlled trials (including one qualitative study) that studied medically assisted nutrition in palliative care participants (Bozzetti 2002; Meier 2001; Orrevall 2005; Pironi 1997), and one Cochrane systematic review (Langmore 2006). One study (Meier 2001) included participants with advanced dementia. The other three studies (Bozzetti 2002; Orrevall 2005; Pironi 1997) included only participants with advanced cancer. In two studies (Bozzetti 2002; Orrevall 2005) participants received only parenteral nutrition, whilst in another two studies (Langmore 2006; Meier 2001) the included participants had enteral nutrition. In one study (Pironi 1997) included participants had either enteral or parenteral nutrition. The Cochrane review (Langmore 2006) assessed participants with motor neuron disease.

Survival was measured in three studies (Bozzetti 2002; Meier 2001; Pironi 1997) and evaluated in the systematic review (Langmore 2006). Quality of Life (QOL) was used as an outcome measure in three of the studies (Bozzetti 2002; Langmore 2006; Orrevall 2005). Two studies look at the effect of the intervention on Karnofsky Performance Scale (KPS) (Bozzetti 2002; Pironi 1997). Only one study recorded adverse events of the interventions (Pironi

1997). The qualitative study analysed the positive and negative features according to the themes derived from the data (Orrevall 2005).

In a prospective, cohort study of participants with advanced dementia there was no significant difference, in survival, between those participants with PEG inserted (median 195 days, range 21 to 1405 days), and those without PEG insertion (median 189 days, range four to 1502) (P = 0.9) (Meier 2001). The Cochrane review had conflicting results, in that three studies found a longer survival in participants who had a PEG, whilst the other four studies found no difference. Bozzetti 2002 found that participants on home parenteral nutrition (HPN) had a median survival of four months. The mean survival was used when Pironi 1997 looked at participants on HPN (12.2 weeks) and those on home enteral nutrition (17.2 weeks). QOL did not improve after PEG insertion for participants with motor neuron disease (Langmore 2006), nor at one month in those with advanced cancer (Bozzetti 2002), but there was a perceived benefit in this area in the qualitative study (Orrevall 2005). In one study (Bozzetti 2002) the KPS was stable until a progressive decline at three months prior to death, whilst another study (Pironi 1997) found that at one month after intervention the KPS was increased in 13 participants, decreased in 19 participants, and was unchanged in 132 participants. The qualitative study of advanced cancer participants in Sweden (Orrevall 2005) found that HPN produced positive features including assurance that nutrition was being met, and this led to a perceived benefit on energy, strength and activity. It was also seen as decreasing the feeling of "pressure to eat" and more acceptance of whatever was able to be eaten orally.

Pironi 1997 found that with HEN, there was NG tube blockage/dislodgment in 0.26 per year of HEN and PEG site infection in one participant and hub replacement in two participants, whilst the complications of treatment with HPN (per year of treatment were catheter sepsis (0.67), DVT (0.16) and metabolic instability (0.50). This study also attempted to look at the burden of medically assisted nutrition for participants and their families. However, this was only done as a judgement by nutrition staff, and was therefore open to a large element of bias. They found that medically assisted nutrition was well accepted in 124 cases (19 HPN), with annoyance in 30 cases (seven HPN), and scarcely tolerated in ten cases (three HPN). The qualitative study (Orrevall 2005) found that the negative features of HPN were related to physical symptoms of nausea, vomiting, drowsiness and headache, as well as HPN placing a restriction on their family life and social involvement.

AUTHORS' CONCLUSIONS

Implications for practice

There are insufficient good quality studies to make any recommendations for practice with regards to the use of medically assisted nutrition in palliative care patients. Clinicians will need to make a decision based on the perceived benefits and harms of medically assisted nutrition in individual patient circumstances, without the benefit of high quality evidence to guide them. The uncontrolled prospective studies described would suggest that patients with a good performance status and medium to long term prognosis (months to years) may benefit from medically assisted nutrition. However, the evidence base to support this at the moment is weak and any intention to use this treatment should be monitored carefully and ideally fed in to further research.

Implications for research

Trial design

There are very few quality studies that have looked at the question of medically assisted nutrition in palliative care patients. It may be difficult to ever do a RCT in this area. The logistics of recruiting participants to any palliative care trial are well known (Rinck 1997) but are especially so with regards to medically assisted nutrition. There are two distinct palliative care populations, in which further trials of the effect of medically assisted nutrition would be useful. The first is those patients who develop the anorexia/cachexia syndrome. The second is in those patients who are unable to swallow, but whose prognosis (from their cancer) would seem to be longer than their prognosis from the aphagia. The difficulty in this situation is the reliance on the physicians ability to provide a prognosis, and this is not always accurate (Glare 2003).

As well as looking at the possibility of RCTs in this area, the evidence base will be improved with at least some prospective controlled trials, and even with more prospective uncontrolled trials. This may need to be done with innovative designs such as comparisons between different centres that have different nutrition practices or by following up cohorts of participants who are offered medically assisted nutrition, in whom some proceed and some do not (as long as the two groups are similar).

Patient groups

The studies in this review did not have well defined patient populations. Palliative care is performed in hospital, in-patient palliative care units and the community. Trials need to be performed in all these areas to allow external validity (able to be applied to a similar patients as those seen in a trial) to different palliative care populations. It would also be helpful to define at what stage of their illness participants are being given medically assisted nutrition. The reasons and aims of nutrition in the last few days/weeks of life may be very different to those participants with a longer prognosis. The prospective prediction of prognosis is difficult, and it may be better to stratify participants according to performance status.

Interventions

Medically administered nutrition can be given by many different routes. Further trials are needed to determine the optimum route and dose.

Outcomes

It is important that clinically relevant outcomes are clearly defined and are the most clinically useful to this situation. In this patient population this includes energy levels, functional status and overall quality of life. As well as these, the effect of this intervention on overall survival needs to be reported. Also important is that adverse events are well defined so that the risk of treatment can be balanced against any benefits.

REFERENCES

References to studies excluded from this review

Bozzetti 2002 *{published data only}*
Bozzetti F, Cozzaglio L, Biganzoli E, Chiavenna G, De Cicco M, Donati D, et al.Quality of life and length of survival in advanced cancer patients on home parenteral nutrition. *Clinical Nutrition* 2002;**21**(4):281–8.

Langmore 2006 *{published data only}*
Langmore SE, Kasarskis EJ, Manca ML, Olney RK. Enteral tube feeding for amyotrophic lateral sclerosis/motor neuron disease. *Cochrane Database of Systematic Reviews* 2006, Issue 4. [DOI: 10.1002/14651858.CD004030.pub2]

Meier 2001 *{published data only}*
Meier DE, Ahronheim JC, Morris J, Baskin-Lyons S, Morrison RS. High short-term mortality in hospitalized patients with advanced dementia: Lack of benefit of tube feeding. *Archives of Internal Medicine* 2001;**161**(4):594–9. [: 0003–9926]

Orrevall 2005 *{published data only}*
Orrevall Y, Tishelman C, Permert J. Home parenteral nutrition: a qualitative interview study of the experiences of advanced cancer patients and their families. *Clinical Nutrition* 2005;**24**(6):961–70.

Pironi 1997 *{published data only}*
Pironi L, Ruggeri E, Tanneberger S, Giordani S, Pannuti F, Miglioli M. Home artificial nutrition in advanced cancer. *Journal of the Royal Society of Medicine* 1997;**90**(11): 597–603.

Additional references

Bozzetti 1996
Bozzetti F, Amadori D, Bruera E, Cozzaglio L, Corli O, Filiberti A, et al.Guidelines on artificial nutrition versus hydration in terminal cancer patients. European Association for Palliative Care. *Nutrition* 1996;**12**(3):163–7.

Casarett 2005
Casarett D, Kapo J, Caplan A. Appropriate use of artificial nutrition and hydration - fundamental principles and recommendations. *New England Journal of Medicine* 2005; **353**(24):2607–12.

Doyle 2004
Doyle D, Hanks G, Cherny NI, Calman K. *Oxford Textbook of Palliative Medicine*. 3rd Edition. Oxford: Oxford University Press, 2004.

Glare 2003
Glare P, Virik K, Jones M, Hudson M, Eychmuller S, Simes J, et al.A systematic review of physicians' survival predictions in terminally ill cancer patients. *BMJ* 2003;**327** (7408):195–8. [: 1468–5833 (Electronic)]

Good 2008
Good P, Cavenagh J, Mather M, Ravenscroft P. Medically assisted hydration for palliative care patients. *Cochrane Database of Systematic Reviews* 2008, Issue 2. [DOI: 10.1002/14651858.CD006273.pub2]

Jadad 1996
Jadad AR, Moore RA, Carroll D, Jenkinson C, Reynolds DJ, Gavaghan DJ, et al.Assessing the quality of reports of randomized clinical trials: is blinding necessary?. *Controlled Clinical Trials* 1996;**17**(1):1–12.

Morita 1998
Morita T, Ichiki T, Tsunoda J, Inoue S, Chihara S. A prospective study on the dying process in terminally ill cancer patients. *American Journal of Hospital Palliative Care* 1998;**15**(4):217–22. [: 1049–9091 (Print)]

Rinck 1997
Rinck GC, van den Bos GA, Kleijnen J, de Haes HJ, Schade E, Veenhof CH. Methodologic issues in effectiveness research on palliative cancer care: a systematic review. *Journal of Clinical Oncology* 1997;**15**(4):1697–707.

WHO 2005

WHO. WHO Definition of Palliative Care. http://www.who.int/cancer/palliative/definition/en/ accessed 5 December 2005.

* *Indicates the major publication for the study*

CHARACTERISTICS OF STUDIES

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Bozzetti 2002	Prospective non-controlled trial.
Langmore 2006	Retrospective case control studies, and prospective cohort studies
Meier 2001	Prospective non-controlled trial.
Orrevall 2005	Prospective non-controlled trial.
Pironi 1997	Prospective non-controlled trial.

DATA AND ANALYSES

This review has no analyses.

ADDITIONAL TABLES

Table 1. Data on excluded studies

Study ID	Methods	Participants	Interventions	Outcomes	Notes
Bozzetti 2002	Prospective, observational study	69 adult cancer participants Six centres in Italy Indications for Home Parenteral Nutrition (HPN) were intestinal obstruction (58), malnutrition (7), not specified (4)	HPN External tunnelled catheters (51 participants) and porta cath (18 participants)	Median survival was four months, after participants began HPN At one month there was no significant change from baseline with regards to Quality of Life (using Rotterdam symptom checklist) with 40% improved, 50% deteriorated and 10% no change) . The Karnofsky Performance Status (KPS) was stable until progressive decline at three months prior to death	
Langmore 2006	Cochrane systematic review	Motor neuron disease	Medically Assisted Nutrition (via enteral tube feeding)	There were no RCTs found. The review discussed seven studies. Five of these studies were retrospective case controlled. Two were prospective cohort studies (Chio 2002 and Mazzini 1995). All seven studies tested for survival advantage of intervention. Three found a longer survival in participants who had a PEG, whilst the other four found no difference.	

Table 1. Data on excluded studies (*Continued*)

				Only three studies looked at nutritional outcomes and these suggested a positive advantage for those participants with PEGs. Only two studies looked at QOL, and both failed to show improvement in QOL after PEG insertion	
Meier 2001	Prospective, cohort study. This was part of a study looking at increased consultation versus usual care in the management of participants with advanced dementia	182 eligible participants - 99 consented to inclusion in study The ninety three participants were excluded because of: - no available surrogate decision maker (40), - surrogate decision maker unable to understand and participate in informed consent (19), - surrogate decision maker refused informed consent (five), - subject imminently dying or medically unstable (eight), - language barrier (three), family conflict (three), and - transferred/discharged/died (five). The participants had been admitted to a New York hospital with an acute illness (Pneumonia or Urinary Tract Infection (61), dehydration or metabolic abnormality (12), Other (26))	Of the 99 study participants, 82 had no feeding tube on admission (two admitted for insertion of feeding tube) . Of these 82 participants, 51 had a PEG inserted during the index admission	The median survival was not significantly different between those participants with PEG inserted (median 195 days, range 21 to 1405 days) , and those without PEG insertion (median 189 days, range four to 1502) (P = 0. 9)	

Table 1. Data on excluded studies (*Continued*)

Orrevall 2005	Qualitative study	13 participants were interviewed and 11 family members, during 2000 to 2001, in Sweden. These were recruited via advanced home care teams (AHCTs) nurses being asked to contact participants with advanced cancer. Participants contacted were asked to provide names of relatives who were also willing to participate	Nine participants received partial HPN and oral intake, two were on total HPN and two were actually weaned from HPN. The intervention consisted of HPN for at least two weeks (and at least three times per week), with an AHCT nurse connecting and disconnecting the infusion each time. Ten of the participants died within six months of the interview, but eleven lived greater than three months	The positive features (according to participants and relatives) included assurance that nutrition was being met, and this led to a perceived benefit on Quality of life, energy, strength and activity. It was also seen as decreasing the feeling of "pressure to eat" and more acceptance of whatever was able to be eaten orally. The benefits of HPN were very much related to the close involvement and frequent visits of the AHCT nurses. The negative features of HPN were related to physical symptoms of nausea, vomiting, drowsiness and headache. As well HPN placed a restriction on the family life and social involvement	The selection protocol used lends itself to be a large source of bias
Pironi 1997	Prospective survey	Italian advanced cancer patients. Participants were described as having advanced cancer when receiving only palliative care. Participants were included if they had hypophagia (oral calorie intake absent or <50% of basal energy expenditure (Harris-Benedict formula), life expectancy greater	The method of intervention for 135 participants with HEN was using a nasogastric tube (50%), percutaneous endoscopic gastrostomy (18%), jejunostomy (27%), and surgical gastrostomy (5%). The infusion method was pump (83%) and via gravity (17%). In the 29 partici-	Mean survival was 17.2 weeks for participants on HEN and 12. 2 weeks for participants on HPN. This included 47 participants (29%) who survived less than six weeks. This was most common in groups with the primary tumour outside gastrointestinal tract and head-neck	

Table 1. Data on excluded studies (*Continued*)

		than six weeks, suitable participant and family circumstances (controlled or absent pain, no severe vital organ failure, emotional stability, willingness and ability to cope with HAN-related activities and suitable hygienic conditions) , and able to give verbal consent. 6838 participants on a hospital-at-home program - 587 of these referred for assessment of HAN. Of these 587, 164 were eligible and received HAN - 135 enteral (HEN), 29 parenteral (HPN). The reasons for exclusion of the 423 participants included absence of hypophagia (264), estimated life expectancy < 6 weeks, lack of suitable home/family conditions (30) and lack of consent (21). 50 participants (30%) aware of their diagnosis.	pants with HPN the methods used were non tunnelled percutaneous catheters (79%), tunnelled percutaneous catheters (14%) and totally implanted ports (7%)	region, and in the group with a Karnofsky Performance Score (KPS) of less than or equal to 40. During the first month of HAN the KPS increased in 13 participants, decreased in 19 participants, and was unchanged in 132 participants. Twelve participants on HEN became able to go out and look after themselves unaided, whilst two became housebound. Body weight increased in 43 participants, decreased in 21 participants and there was no change in 80 participants, with 20 participants confined to bed) and unable to be weighed. Of the 108 participants excluded because their estimated survival was less than six weeks, 31 (29%) lived greater than or equal to six weeks. During treatment there were 95 participants (61%) who underwent 155 hospital readmissions. This included three admissions for HPN complications and seven for jejunostomy po-	

Table 1. Data on excluded studies (*Continued*)

				sitioning. An attempt was made to record the burden to the participant and families. This was judged by the nutrition staff, and was dependent on the level of complaints of the participant and families. They found that HAN was well accepted in 124 cases (19 HPN), with annoyance in 30 cases (seven HPN), and scarcely tolerated in ten cases (three HPN). In terms of complications with HEN, there was NG tube blockage/ dislodgment in 0.26 per year of HEN and PEG site infection in one participant and hub replacement in two participants. The complications of treatment with HPN (per year of treatment were catheter sepsis (0.67) , DVT (0.16) and metabolic instability (0.50)	

APPENDICES

Appendix 1. Search strategy

#1 MeSH descriptor PALLIATIVE CARE explode all trees
#2 palliat* in All Text
#3 MeSH descriptor TERMINALLY ILL this term only
#4 MeSH descriptor TERMINAL CARE explode all trees
#5 (terminal* in All Text near/6 care* in All Text)
#6 ((terminal* in All Text near/6 ill* in All Text) or terminal-stage* in All Text or dying in All Text or (close in All Text near/6 death in All Text))
#7 (terminal* in All Text near/6 diseas* in All Text)
#8 (end in All Text near/3 life in All Text)
#9 hospice* in All Text
#10 (end-stage next disease* in All Text or end next stage next disease* in All Text or end-stage next illness in All Text or end next stage next illness in All Text or end-stage next care in All Text or end next stage next care in All Text)
#11 incurable next illness* in All Text
#12 incurable next disease* in All Text
#13 (advanced next directive* in All Text or living next will* in All Text or do-not-resuscitate next order* in All Text)
#14 (end-stage next disease* in All Text or end next stage next disease* in All Text or end-stage next illness in All Text or end next stage next illness in All Text or end-stage next care in All Text or end next stage next care in All Text)
#15 (advanced in All Text near/6 disease* in All Text)
#16 (#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15)
#17 MeSH descriptor NUTRITION explode all trees
#18 MeSH descriptor NUTRITION ASSESSMENT explode all trees
#19 MeSH descriptor NUTRITION THERAPY explode all trees
#20 MeSH descriptor FEEDING METHODS explode all trees
#21 (feed in All Text or feeding in All Text or fed* in All Text or food* in All Text)
#22 MeSH descriptor FOOD explode all trees
#23 diet* in All Text
#24 nutrition* in Record Title
#25 nutrition* in Abstract
#26 (#17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25)
#27 (#16 and #26)

WHAT'S NEW

Last assessed as up-to-date: 17 July 2008.

Date	Event	Description
11 May 2011	Amended	Contact details updated.

HISTORY

Protocol first published: Issue 4, 2006

Review first published: Issue 4, 2008

Date	Event	Description
6 October 2010	Amended	Contact details updated.
30 October 2008	Amended	Minor edits made to text using new RevMan 5 software

CONTRIBUTIONS OF AUTHORS

Phillip Good: formulate question, write protocol, search for studies, review abstracts, retrieve articles, assess article quality, write review, write update.

John Cavenagh: formulate question, critical revision of review.

Peter Ravenscroft: formulate question, critical revision of review.

Mark Mather: formulate question, critical revision of review.

DECLARATIONS OF INTEREST

None known

INDEX TERMS

Medical Subject Headings (MeSH)

*Enteral Nutrition [adverse effects; methods]; *Parenteral Nutrition [adverse effects; methods]; Longevity; Palliative Care [*methods]; Quality of Life

MeSH check words

Adult; Humans