

CADTH RAPID RESPONSE REPORT: SUMMARY OF ABSTRACTS

Peripheral Parenteral Nutrition for Adult Patients in Hospital Settings: Clinical Effectiveness and Cost- Effectiveness

Service Line: Rapid Response Service
Version: 1.0
Publication Date: November 1, 2019
Report Length: 8 Pages

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Cite As: Peripheral parenteral nutrition for adult patients in hospital settings: clinical effectiveness and cost-effectiveness. Ottawa: CADTH; 2019 Nov. (CADTH rapid response report: summary of abstracts).

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Funding: CADTH receives funding from Canada's federal, provincial, and territorial governments, with the exception of Quebec.

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Research Questions

1. What is the clinical effectiveness of peripheral parenteral nutrition for adult patients who are not meeting their nutritional needs through enteral feeding in hospital settings?
2. What is the cost-effectiveness of peripheral parenteral nutrition for adult patients who are not meeting their nutritional needs through enteral feeding in hospital settings?

Key Findings

Three randomized controlled trials (including one pilot study) and one non-randomized study were identified regarding the clinical effectiveness of peripheral parenteral nutrition for adult patients who are not meeting their nutritional needs through enteral feeding in hospital settings. However, no economic evaluations were identified regarding the cost-effectiveness of peripheral parenteral nutrition for adult patients who are not meeting their nutritional needs through enteral feeding in hospital settings.

Methods

A limited literature search was conducted by an information specialist on key resources including MEDLINE All (1946–) via Ovid, Cumulative Index to Nursing and Allied Health Literature (CINAHL), the Cochrane Library, the University of York Centre for Reviews and Dissemination (CRD) databases, the websites of Canadian and major international health technology agencies, as well as a focused Internet search. The search strategy was comprised of both controlled vocabulary, such as the National Library of Medicine’s MeSH (Medical Subject Headings), and keywords. The main search concepts were peripheral parenteral nutrition. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 01, 2014 and October 25, 2019. Internet links were provided, where available.

Selection Criteria

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

Population	Adults in hospital who are not meeting their nutritional needs through enteral feeding (i.e., intake of food via the gastrointestinal tract, nutrition taken through the mouth or through an enteral feeding tube)
Intervention	Peripheral parenteral nutrition (nutrition provided through vein access in a limb)
Comparators	Central parenteral nutrition (nutrition provided through a central vein), usual care (no parenteral nutrition, partial oral intake, no alternative nutritional support)
Outcomes	Q1: Clinical effectiveness (e.g., benefits, harms, nutritional adequacy, length of stay, infection, phlebitis [inflammation of the vein], blood clots in the vein [venous thrombosis]) Q2: Cost-effectiveness (e.g., incremental cost per quality-adjusted life year or health benefit gained)
Study Designs	Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, economic evaluations

Results

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, and economic evaluations.

Three randomized controlled trials¹⁻³ (including one pilot study³) and one non-randomized study⁴ were identified regarding the clinical effectiveness of peripheral parenteral nutrition for adult patients who are not meeting their nutritional needs through enteral feeding in hospital settings. However, no economic evaluations were identified regarding the cost-effectiveness of peripheral parenteral nutrition for adult patients who are not meeting their nutritional needs through enteral feeding in hospital settings. Furthermore, no relevant health technology assessments, systematic reviews or meta-analyses were identified.

Additional references of potential interest are provided in the appendix.

Overall Summary of Findings

Three randomized controlled trials¹⁻³ (including one pilot study³) and one non-randomized study⁴ were identified regarding the clinical effectiveness of peripheral parenteral nutrition for adult patients who are not meeting their nutritional needs through enteral feeding in hospital settings.

Jin et al.¹ compared peripheral parenteral nutrition to an isotonic electrolyte solution in a randomized controlled trial of post-surgery gastric cancer patients. The results of the trial, which included 80 patients, suggested that peripheral parenteral nutrition for 4-8 days post gastric cancer surgery may significantly improve nutritional and psychological status as well as quality of life and immune function in patients when compared to a control.

The second randomized controlled trial by Kruger et al.² compared peripheral parenteral nutrition to control in 100 patients being worked-up for suspected biliopancreatic tumors. The authors of the study concluded that patients with suspected biliopancreatic tumors were able to stabilize their body weight with peripheral parenteral nutrition during the fasting periods of the work-up.

The third randomized controlled trial by Saito et al.³ compared the administration of total parenteral nutrition through a central catheter to a peripheral line in perioperative esophageal cancer patients undergoing esophagectomy. This pilot study, which included 40 patients, suggested that perioperative management of patients with peripheral parenteral nutrition is suitable as there was no significant difference in calories administered, albumin and red blood cell levels as well as morbidity of early postoperative complications.

Finally, Hsieh et al.⁴ conducted a non-randomized retrospective study comparing the administration of peripheral parenteral nutrition to no treatment in the recovery of right lobe liver donors. This study, which included 84 donors, suggested that peripheral parenteral nutrition significantly decreased the incidence of postoperative atelectasis, pleural effusion and total complications compared to control (those who did not receive postoperative peripheral parenteral nutrition).

References Summarized

Health Technology Assessments

No literature identified.

Systematic Reviews and Meta-analyses

No literature identified.

Randomized Controlled Trials

1. Jin Y, Yong C, Ren K, Li D, Yuan H. Effects of post-surgical parenteral nutrition on patients with gastric cancer. *Cell Physiol Biochem*. 2018;49(4):1320-1328.
[PubMed: PM30205371](#)
2. Kruger J, Meffert PJ, Vogt LJ, et al. Early parenteral nutrition in patients with biliopancreatic mass lesions, a prospective, randomized intervention trial. *PLoS ONE*. 2016;11(11):e0166513.
[PubMed: PM27861546](#)
3. Saito K, Nakajima Y, Kawada K, Tokairin Y, Kawano T. Is a central venous catheter necessary for the perioperative management of esophagectomy? A prospective randomized pilot study comparing two different perioperative regimens. *Dig Surg*. 2016;33(6):478-487.
[PubMed: PM27250846](#)

Non-Randomized Studies

4. Hsieh CE, Lin KH, Lin CC, et al. Comparative factor analysis of the effect of postoperative peripheral parenteral nutrition on recovery of right lobe liver donors. *Exp Clin Transplant*. 2015 Apr;13(2):157-162.
[PubMed: PM25871368](#)

Economic Evaluations

No literature identified.

Appendix — Further Information

Previous CADTH Reports

5. Lipid formulations for patients requiring parenteral nutrition: a review of clinical effectiveness, cost-effectiveness, and guidelines – an update. (*CADTH rapid response report: summary with critical appraisal*). Ottawa (ON): CADTH; 2019: <https://www.cadth.ca/sites/default/files/pdf/htis/2019/RC1164%20Lipid%20Formulations%20for%20PN%20Final.pdf>. Accessed 2019 Oct 31.

Systematic Reviews and Meta-analyses

Unclear Access Route

6. Burden S, Billson HA, Lal S, Owen KA, Muneer A. Perioperative nutrition for the treatment of bladder cancer by radical cystectomy. *Cochrane Database Syst Rev*. 2019;5:CD010127.
[PubMed: PM 31107970](#)
7. Lewis SR, Schofield-Robinson OJ, Alderson P, Smith AF. Enteral versus parenteral nutrition and enteral versus a combination of enteral and parenteral nutrition for adults in the intensive care unit. *Cochrane Database Syst Rev*. 2018;6:CD012276.
[PubMed: PM29883514](#)
8. Feinberg J, Nielsen EE, Korang SK, et al. Nutrition support in hospitalised adults at nutritional risk. *Cochrane Database Syst Rev*. 2017;5:CD011598.
[PubMed: PM28524930](#)

Mixed Population

9. Ward EJ, Henry LM, Friend AJ, Wilkins S, Phillips RS. Nutritional support in children and young people with cancer undergoing chemotherapy. *Cochrane Database Syst Rev*. 2015 Aug 24(8):CD003298.
[PubMed: PM26301790](#)

Ongoing Reviews

10. Lee S, Lee Y, Tywonek K, Serrano P. Parenteral versus enteral nutrition in the conservative treatment of postoperative pancreatic fistulae: a systematic review and meta-analysis (CRD42019137522). *PROSPERO: International prospective register of systematic reviews*. York (GB): University of York Centre for Reviews and Dissemination; 2019: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42019137522. Accessed 2019 Oct 31.

Randomized Controlled Trials

Unclear Access Route

11. Berger MM, Pantet O, Jacquelin-Ravel N, et al. Supplemental parenteral nutrition improves immunity with unchanged carbohydrate and protein metabolism in critically ill patients: the SPN2 randomized tracer study. *Clin Nutr*. 2019 Oct;38(5):2408-2416.
[PubMed: PM30448193](#)

12. Luo Z, Wang J, Zhang Z, et al. Efficacy of early enteral immunonutrition on immune function and clinical outcome for postoperative patients with gastrointestinal cancer. *JPEN J Parenter Enteral Nutr.* 2018 05;42(4):758-765.
[PubMed: PM28666095](#)

13. Harvey SE, Parrott F, Harrison DA, et al. A multicentre, randomised controlled trial comparing the clinical effectiveness and cost-effectiveness of early nutritional support via the parenteral versus the enteral route in critically ill patients (CALORIES). *Health Technol Assess.* 2016 Apr;20(28):1-144.
[PubMed: PM27089843](#)

Alternative Intervention

14. Azagury DE, Ris F, Pichard C, Volonte F, Karsegard L, Huber O. Does perioperative nutrition and oral carbohydrate load sustainably preserve muscle mass after bariatric surgery? A randomized control trial. *Surg Obes Relat Dis.* 2015 Jul-Aug;11(4):920-926.
[PubMed: PM25851776](#)

Alternative Comparator - Subcutaneous Parenteral Nutrition

15. Zaloga GP, Pontes-Arruda A, Dardaine-Giraud V, Constans T, Clinimix Subcutaneous Study Group. Safety and efficacy of subcutaneous parenteral nutrition in older patients: a prospective randomized multicenter clinical trial. *JPEN J Parenter Enteral Nutr.* 2017 09;41(7):1222-1227.
[PubMed: PM26888874](#)

Alternative Outcomes

16. Iresjo BM, Engstrom C, Lundholm K. Preoperative overnight parenteral nutrition (TPN) improves skeletal muscle protein metabolism indicated by microarray algorithm analyses in a randomized trial. *Physiol Rep.* 2016 Jun;4(11).
[PubMed: PM27273879](#)

Non-Randomized Studies

Unclear Access Route

17. Pagliari D, Rinninella E, Cianci R, et al. Early oral vs parenteral nutrition in acute pancreatitis: a retrospective analysis of clinical outcomes and hospital costs from a tertiary care referral center. *Intern Emerg Med.* 2019 Oct 16;16:16.
[PubMed: PM31620978](#)

18. Yang S, Guo J, Ni Q, et al. Enteral nutrition improves clinical outcome and reduces costs of acute mesenteric ischaemia after recanalisation in the intensive care unit. *Clin Nutr.* 2019 02;38(1):398-406.
[PubMed: PM29290518](#)

19. Yamada SM. Too early initiation of enteral nutrition is not nutritionally advantageous for comatose acute stroke patients. *J Nippon Med Sch.* 2015;82(4):186-192.
[PubMed: PM26328795](#)

No Comparator

20. Yu YD, Han JH, Jung SW, Kim DS. Safety and efficacy of peripheral nutrition fluid (MG-TNA) in patients undergoing surgery for hepatobiliary and pancreatic disease: results of a phase 4 trial. *Ann Hepatobiliary Pancreat Surg.* 2019 May;23(2):133-137. [PubMed: PM31225414](#)

Economic Evaluations

Unclear Access Route

21. Pradelli L, Graf S, Pichard C, Berger MM. Supplemental parenteral nutrition in intensive care patients: a cost saving strategy. *Clin Nutr.* 2018 04;37(2):573-579. [PubMed: PM28169021](#)