National Institute for Health and Care Excellence

Final

Perioperative care in adults

[H] Evidence review for pre-operative fasting

NICE guideline NG180

Evidence reviews underpinning recommendations 1.4.1 and 1.4.2 and research recommendation in the NICE guideline

August 2020

Final

This evidence review was developed by the National Guideline Centre

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1 Preoperative fasting strategy

1.1 Review question: What is the most clinically and cost effective preoperative fasting strategy for adults?

1.2 Introduction

Patients are expect to be 'nil by mouth', or have a period of starvation, prior to undergoing a surgical procedure that requires a general anaesthetic. While some may not fully understand the mechanism of risk (aspiration of stomach contents), all are aware that eating and drinking prior to your operation can be very bad for you.

While we have consensus guidance from the royal colleges of Anaesthetists and Nursing promoting the liberal, or relaxed, fasting guidance we still see variance in our local practice. Unsurprisingly this causes confusion, not only for the patient, but also the clinical staff, who often opt for a 'better safe than sorry' strategy. This in turn leads to prolonged periods of starvation and the negative consequences being without fluid and sustenance.

Over the past 10 years we have seen perioperative care evolve. One such advancement is the use of high energy, carbohydrate rich, drinks to aid recovery. These are given before and after surgery with the assumption that they provide the patient with a metabolic boost to overcome the negative effects, and reduce the complications, of surgery. Again, as with fasting, the timing and impact of these drinks appears varied, with no clear guide on appropriate timing or dosing of these drinks.

This review will include an analysis of evidence to hopefully clarify these issues and provide clinicians the detail needed to develop standardised and safe fasting protocols.

1.3 PICO table

For full details see the review protocol in appendix A.

Table 1: PICO characteristics of review question

Population	• Adults 18 years and over having surgery.
Interventions/ Comparisons	• no food for <4 hours • no food for 4-6 hours • no food for >6 hours • no fluids for <2 hours • no fluids for 2-4 hours • no fluids for 4-6 hours • no fluids for >6 hours • maintaining clear fluids (non-milk, non-particulate drinks) before surgery • combinations of food and fluid restriction strategies
Outcomes	Critical outcomes: • health-related quality of life • mortality • patient, family and carer experience of care • adverse events and complications (Clavien-Dindo, postoperative morbidity score (POMS), aspiration – pulmonary complications, acute kidney injury) Important outcomes: • length of hospital stay • unplanned ICU admission

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	• thirst • headache • cancellation of surgery
Study design	Randomised controlled trials (RCTs), systematic reviews of RCTs. Observational studies if no relevant RCTs are identified.

1.4 Clinical evidence

1.4.1 Included studies

One Cochrane review including twenty seven RCTs and a further nineteen randomised controlled trials were included in the review;[3, 7, 17, 19, 20, 30 31, 37, 41, 43, 44, 58, 73, 84, 96-98, 102, 110, 115] these are summarised in Table 2 below. Evidence from these studies is summarised in the clinical evidence summary below (Table 3).

See also the study selection flow chart in appendix C, study evidence tables in appendix D, forest plots in appendix E and GRADE tables in appendix F.

1.4.2 Excluded studies

See the excluded studies list in appendix I.

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1.4.3 Summary of clinical studies included in the evidence review

Table 2: Summary of studies included in the evidence review

Study	Intervention and comparison	Population	Outcomes	Comments
Smith 2014[102]	Cochrane Reviews of twenty one randomized trials which have compared carbohydrate drinks to a placebo drink or traditional fasting. The population of patients were adults undergoing elective surgery. The intervention protocols for the two groups are summarized below: Clear fluids (carbohydrate): The intervention group included all participants who were given at least 45 g of carbohydrate by oral beverage or by the intravenous route. To be included, studies must have planned to administer the carbohydrates within four hours of surgery start time, or induction of anaesthesia. Co-intervention with other oral substances in the four hours before surgery was permitted so long as the dose of carbohydrate was at least 45g. Control: The intervention group was compared with a control group consisting of participants who received less than 45 g of carbohydrate in the four hours before anaesthesia. Control participants may have received a placebo drink containing less than 45 g of carbohydrate, clear liquids or nothing by mouth during this time. The control group may have received intravenous fluid therapy during the four hours before surgery start time, so long as the total combined dose of carbohydrates given by oral and intravenous routes remained less than 45g.		• Length of hospital stay • Postoperative complication rate • Aspiration • Fatigue • Nausea and vomiting • General wellbeing	Six studies from this Cochrane review were not included for analysis as they included populations or interventions not suitable for this review (cardiac surgery or a comparison with only water).
Ajuzieogu 2016[3]	Clear fluids (carbohydrate drink): 800 mL of oral carbohydrate solution containing 12.5% glucose, 50 kcal/100 mL	Patients ASA physical status I and II scheduled for abdominal myomectomy Age range:	• Patient satisfaction • Nausea and vomiting	

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Study	Intervention and comparison	Population	Outcomes	Comments
	(Nutricia preop®; Nutricia, Zoetermeer, The Netherlands) the night before surgery and an additional 400 mL 2 h before induction of anaesthesia (n=30) Control (fasting): Fasting from midnight until the surgery (n=30)	18-42 years Nigeria		
Asakura 2015[7]	Clear fluids (carbohydrate drink): Received 250ml of preoperative CHO (Arginaid Water™, 18% carbohydrates, Nestle Health Science, Tokyo, Japan) between 6.00–6:30 a.m. on the morning of surgery. This is because 250ml of Arginaid Water are approved as a meal (n=46) Control (fasting): Control group, did not receive any preoperative CHO and were fasted starting at midnight on the day of surgical procedure (N=45)	Patients ASA physical status 1 and 2 adults, age 20 to 79 years, who were scheduled to undergo a surgical procedure of body surface Mean age (SD): CHO: 63.4 ±13.6; Fasting: 64.5 ± 10.4;	• Patient reported quality of recovery • Length of stay	The QoR-40 is a global measure of quality of recovery. It incorporates five dimensions of health: patient support, comfort, emotions, physical independence, and pain; each item is graded on a five-point Likert scale. QoR-40 scores range from 40 (extremely poor quality of recovery) to 200 (excellent quality of recovery) is given as a median
Cakar 2017[17]	Clear fluids (carbohydrate drink): These patients were given an oral carbohydrate solution (PreOp-Nutricia-12.5% carbohydrate, 50 kcal 100 mL21, 290 mOsm kg21,pH:	Adult patients undergoing an elective thyroid operation and ASA physical status I or II. Mean age (SD):	• Thirst • Tiredness • Headache • Nausea • Vomiting	Results reported as an Incidence Rate Ratio

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Study	Intervention and comparison	Population	Outcomes	Comments
	5.0); 800 mL at 12:00 a.m. and 400 mL 2 hours before surgery (n=30) Control (fasting): The routine fasting procedure was implemented, in which patients were instructed not to take any fluid or food by mouth after midnight (12:00 a.m.) preoperatively and were not given an intravenous (IV) injection (n=33)	CHO: 48.17 (9.81) Glucose infusion: 55.53 (19.20) Fasting: 50.07 (9.95) Turkey		
Canbay 2014[19]	Clear fluids (carbohydrate drink): received 800 ml oral glucose solution containing 12.5 % glucose (Nutricia preop) at 24:00 h before surgery and 400 ml at 04:00 h, 2 h prior to the surgery (n=25) Control (fasting): oral intake was restricted starting from 24:00 h (n=25)	Adult patients who were in ASA I–II group and would undergo open radical retropubic prostatectomy surgery under elective conditions Mean age (SD): CHO: 60.00 ± 10.37 Fasting: 58.36 ± 11.19 Turkey	• Thirst	
Celiksular 2016[20]	Clear fluids (carbohydrate drink): The patients were given 800 mL and 400 mL (12.5%) of oral carbohydrate solution (PreopQ, Nutricia, Holland) 8 h and 2 h before their elective surgery, respectively (n=40)	Patients ASA I-II patients undergoing total hip replacement surgery due to coxarthrosis Mean age (SD): 52.9 (16.47)	• Nausea and vomiting (postoperative)	Patients in either group underwent surgery with general anaesthesia OR epidural

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Study	Intervention and comparison	Population	Outcomes	Comments
	Control (Fasting): This group of patients underwent surgery under general anaesthesia or epidural after an 8-h preoperative fasting period (n=40)	Turkey		
Doo 2018[30]	Clear fluids (carbohydrate): Subjects in the carbohydrate group also fasted, but received 400 ml of carbohydrate-rich drink (12.8% carbohydrates, 50 kcal/100 ml; Nucare NONPO®, Daesang Wellife, Korea) 2 hours before induction of anaesthesia. (n=25) Control (fasting): Subjects in the control group were requested to obey traditional preoperative fasting after midnight prior to the day of surgery. (n=25)	Patients aged 20–65 years with ASA I or II, who were scheduled to undergo open thyroidectomy under general anaesthesia Mean age (SD): CHO: 49.8 ± 7.1 Fasting: 51.0 ± 7.5 Korea	• Thirst • Fatigue • Nausea and vomiting • Anxiety • Patient satisfaction	All outcomes reported as a median from a 0-10 scale for thirst, fatigue, nausea, vomiting and anxiety, and a five point scale for patient satisfaction
Faria 2009[31]	Clear fluids (carbohydrate drink): Received 200 ml of a carbohydrate beverage containing 12.5% (25 g, 50 kcal per 100 ml and approximately 285 mOsm) of maltodextrine (Nidex, Nestle, Brazil) 2 h before operation (n = 12)	Adult women scheduled to undergo elective laparoscopic cholecystectomy Median age (range): CHO: 47 (19–65); Fasting: 48 (29–65) Brazil	• Vomiting	

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Study	Intervention and comparison	Population	Outcomes	Comments
	Control (fasting): conventional preoperative fasting of 8 h (n = 13)			
Gilbert 1995[37]	Clear fluids (water): Patients in group A (water) were asked to drink 500 ml- 1L of water over 2 h, before a 3 h pre-operative fast (n=46) Control (fasting): Group B (fasting) followed the standard regimen of fasting from midnight for the morning list or 'tea and toast' before 08.00 h for the afternoon session (n=49)	Patients scheduled for minor operations who were ASA I or II Water: 45.6 (15.6); Fasting: 48.3 (16.6) UK	• Thirst • Nausea • Vomiting • Drowsiness • Headache	
Hausel 2001[41]	Clear fluids (carbohydrate): During the evening before surgery, the CHO group consumed 800 mL of an iso-osmolar carbohydrate-rich drink (12.5% carbohydrates, 50 kcal/100 mL, 290 mOsm/kg, pH 5.0, Nutricia Preop®; Numico, Zoetermeer, the Netherlands). After midnight, nothing by mouth was allowed, except a single morning dose of 400 mL of the CHO drink (n=80) Control: patients were fasted from midnight (n=86)	Patients scheduled for elective laparoscopic cholecystectomy or elective major colorectal surgery Median age (IQR): Laparoscopic cholecystectomy – Fasted: 48 (37–59); Placebo: 52 (34–58); CHO: 49 (36–58); Colorectal surgery: Fasted 52 (34–66); Placebo 56 (46–69);	• Malaise • Nausea	

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Study	Intervention and comparison	Population	Outcomes	Comments
		CHO 56 (50–67) Sweden		
Helminen 2009[44]	Clear fluids (carbohydrate): Patients in the CHO group were given nothing after midnight and a 12.5% CHO (Nutricia Preop; Numici, The Netherlands), that is 400ml (=200 kcal), between 6 and 7 a.m. (n=80) Control: Patients in the fasting group were given nothing by mouth after midnight. (n=80)	Adult patients undergoing elective abdominal, anal, thyroid or parathyroid operations and ASA physical status I–III. Mean age (SD): Glucose: 61±16; CHO: 60±15; Fasting: 58±4 Finland	• Thirst • Anxiety • Tiredness (results preoperative)	
Helminen 2019[43]	Clear fluids (carbohydrate): 200ml of carbohydrate rick drink (Providextra; Fresineus Kabi Ab; Bad Homburg Vor der Hohe, Germany) containing 300kcal, 67g carbohydrate and 8g protein at home before leaving for the hospital or by 6am for surgery scheduled at 9am or 8pm at the latest for later surgery (n=57) Control (fasting): Patients were instructed to take nothing by mouth after midnight on the night before surgery (n=56)	Adults aged between 18 - 70 with ASA I to II scheduled for day case cholecystectomy. Mean age (SD): CHO: 47 (13); Fasting: 46 (11) Finland	• Thirst • Tiredness • Nausea	

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Study	Intervention and comparison	Population	Outcomes	Comments
Lee 2018[58]	Clear fluids (carbohydrate drink): Received 800ml of a clear carbohydrate beverage (12.8% carbohydrates, 50kcal/100ml, 290 mOsm/kg, Daesang WelLife Co, Korea). Patients were instructed to ingest 400ml of this beverage on the evening before surgery (400ml) 2h before any anaesthetic medication was administered (n=51) Control (fasting): Patients within this group were not allowed to drink any solution or fluid after midnight before surgery (n=51)	Patients ASA I – II adults who had a Karnofsky performance status scale greater than 70 undergoing laparoscopic cholecystectomy Mean age (SD): CHO: 50 (13) Fasting: 49 (12) Korea	• Postoperative global QoR-40 score	The QoR-40 is a global measure of quality of recovery. It incorporates five dimensions of health: patient support, comfort, emotions, physical independence, and pain; each item is graded on a five-point Likert scale. QoR-40 scores range from 40 (extremely poor quality of recovery) to 200 (excellent quality of recovery)
Melis 2006[73]	Clear fluids (carbohydrate drink A): Drink was poured out into a class 4 hours before surgery and had to be consumed 3 hours before surgery. Drink A was Nutricia preOp (Nutricia, Zoetermeer, the Netherlands), which contained 50.4g of the carbohydrates; consisting of 0.8g glucose, 5.2g polysaccharides and a small amount of organic acids and 200mg sodium, 488mg Potassium, 24mg chloride, 24mg calcium, 4mg of	Adult patients undergoing elective orthopaedic surgery Mean age (SD): Drink A: 59 (9) Drink B: 47 (17) Fasting: 56 (13) Netherlands	• Thirst • Nausea • Anxiety • Tiredness	Outcomes given are a difference n baseline and preoperative scores of well-being, expressed as a median increase or decrease and inter-quartile range in mm on a 100mm visual analogue scale.

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Study	Intervention and comparison	Population	Outcomes	Comments
	phosphor, and 4mg of Magnesium in a solution of 400ml with an osmolality of 260mOsm/kg (n=9) Clear fluids (carbohydrate drink B): Drink was poured out into a class 4 hours before surgery and had to be consumed 3 hours before surgery. Drink B was Roosvicee vruchtenmix (Heinz, Zeist, the Netherlands), a syrup of rosehip and other fruits, which was diluted in water (70ml syrup : 330ml water) and contained 48mg of carbohydrates, consisting of 6.2g fructose, 6.2g of glucose and furthermore carbohydrate with unidentified chemical structure of 0.2g fibre, 0.2g protein, 6.4mg sodium, 73mg potassium, 6.9mg calcium, 7.mg phosphor, 0.1mg iron and 41mg Vitamin C in a solution of 400ml with an osmolality of 574 mOsm/kg (n=10) Control (fasting): Fasted after midnight on the day of surgery (n=10)			
Onalan 2018[84]	Clear fluids (carbohydrate drink): the patients were given an oral	Patients aged >18 years but <65 years undergoing laparoscopic	• Thirst • Anxiety	High values from the general comfort scale are indicative of increased comfort.

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Study	Intervention and comparison	Population	Outcomes	Comments
	glucose solution (Nutricia preop) containing 12.5% glucose, first 800 mL at 12 a.m., and then 400 mL at 6 a.m., 2 hours before the surgery. The solution was ingested in 10 minutes. Nutricia preop, one of the OCSs containing maltodextrin and electrolytes, contains 12.5% glucose. It passes through the stomach in 90 minutes. Its osmolality is 285 mosm/kg/H2O and it has 50 kcal/100 mL. In addition, it contains 0.46 mg/mL sodium and 1.93 mg/mL potassium. (n=25) Control (fasting): Food and water were cut off in the control group as of 12 a.m. the night before surgery. (n=25)	cholecystectomy Median age (IQR): CHO: 53 (16) Fasting: 54 (14) Turkey		
Raksakietisak 2014[96]	Clear fluids (carbohydrate drink): Assigned to drink 400ml of 10% carbohydrate rich orange juice (Greenmate) between 18:00 and 24:00 and another 400ml at about 2 hour before anaesthesia (6:00 to 7:00am) (n=48) Control group (fasting): The control group had to starve	Patients aged 50 – 80 years with unilateral total knee replacement Mean age (SD): CHO: 69.8 (7.3) Fasting: 70.8 (8.5) Thailand	• Thirst • Anxiety • Nausea & vomiting	Preoperative thirst and anxiety measured on a 0-10 scale

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Study	Intervention and comparison	Population	Outcomes	Comments
	from midnight (n=50)			
Read 1991[97]	Clear fluids (water): Permitted to drink water up until 2 hours before the operation (n=25) Control (fasting): Abstain from eating and drinking from midnight (morning operation) or after a light breakfast at 6:30am (afternoon operation) (n=29)	Patients ASA I or II, between the ages of 18-60 and scheduled to have elective surgery normally requiring tracheal intubation Median age (range): Water: 30 (17-56) Fasting: 32 (18-50) Wales	• Nausea • Vomiting • Headache	
Sada 2014[98]	Clear fluids (carbohydrate): The study group received 800 mL (per os) of carbohydrate beverage in the evening before surgery (22:00) and an additional 400 mL 2 h before anaesthesia induction. (n=44) Control: The control group did not receive any of these drinks and were subject to the traditional preoperative fasting.(n=52)	Patients were older than 18 years, undergoing an operation of the colon and rectum for benign and malignant diseases, or open abdominal cholecystectomy for chronic cholecystitis Mean age (SD): CHO: 56.85 (12.8); Placebo: 55 (14.1); Fasting: 56.45 (14.28) Kosovo	• Thirst • Anxiety • Nausea	CHO vs Fasting All outcomes given as a median (range) at two different time points (0-24h & 36-48h)
Wang 2010 {Wang, 2010 #4285}	Clear fluids (carbohydrate): Patients in the CHO group consumed 400ml Nutricia PreOp (12.5% carbohydrate, 0.5kcal/ml, 240mOsm/kg, pH 4 - 9, Nutricia Zoetermeer, Netherlands) 3h before	Patients undergoing elective open colorectal cancer resection surgery Age – Median (range): CHO 66 (48 - 74);	• Anxiety • Tiredness • Nausea • Thirst	Some outcomes from this study have been included with Smith 2014 {Smith, 2014 #3480}. Outcomes not included in this systematic review have been extracted separately.

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Study	Intervention and comparison	Population	Outcomes	Comments
	induction of anesthesia completing CHO ingestion within 1h. Patients were nil by mouth after 2100 hours apart from single morning dose of 400ml carbohydrate drink. (n=18) Control (fasting): Patients were fasted from midnight before surgery (n=17)	Fasting 63 (37 - 74); China		
Yagmurdur 2011[110]	Clear fluids (carbohydrate): During the evening before surgery, patients in the CHO group ingested 800 mL of an iso-osmolar carbohydrate-rich drink [12.5% carbohydrates (glucose: 0.2 g, maltose: 0.7 g, polysaccharides: 10 g), 50 kcal/100 ml, 290 mOsm/kg, pH 5.0; Nutricia Preop ; Numico, Zoetermeer, The Netherlands]. Nothing per os was allowed from midnight except another 400 mL of CHO in the morning at least 90 minutes before spinal anesthesia in the CHO group. (n=22) Control: The patients in the control group underwent spinal anesthesia after the routine fast from midnight. (n=22)	Patients ASA classes I-II adult patients scheduled for elective inguinal hernia repair surgery under spinal anaesthesia Mean age (SD): CHO: 45 (7); Fasting: 43 (8) Turkey	• Thirst • Nausea • Anxiety	All results in median (interquartile range) form
Zhang 2019[115]	Clear fluids (carbohydrate	Patients aged 18 – 55, ASA I	• Thirst	Thirst and tiredness outcomes are

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Study	Intervention and comparison	Population	Outcomes	Comments
	drink): Patients in the CHO group consumed CHO (12.5g of carbohydrate per 100ml, 285 mOsm/kg; Nutricia Preop, Nutricia, Zoetermeer, The Netherlands) in doses of 800ml on the evening before surgery (between 8pm and 10pm) and 400ml 2h before their scheduled operation (n=29) Control (fasting): Patients in the fasting group were forbidden from eating anything after midnight before the induction of anaesthesia (n=29)	– II scheduled to undergo elective open gynaecological surgery Mean age (SD): CHO: 42.64 (5.26) Fasting: 43.57 (5.60) China	• Tiredness • Nausea • Headache	given as a median value (range) from a 100 point VAS scale

See appendix D for full evidence tables.

1.4.4 Quality assessment of clinical studies included in the evidence review

Table 3: Clinical evidence summary: Carbohydrate drinks versus fasting

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Fasting	Risk difference with CHO (95% CI)
Patient Satisfaction (0-10)	58 (1 study) 24 hours	⨁⨁⨁⊖ MODERATE1 due to risk of bias		The mean patient satisfaction (0-10) in the control groups was 6	The mean patient satisfaction (0-10) in the intervention groups was 2 higher (1.67 to 2.33 higher)
Postoperative global	95	⨁⨁⊖⊖		The mean postoperative global qor-	The mean postoperative global qor-

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Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Fasting	Risk difference with CHO (95% CI)
QoR-40 score	(1 study) 24 hours	LOW1,2 due to risk of bias, imprecision		40 score in the control groups was 194.5	40 score in the intervention groups was 7.8 lower (13.09 to 2.51 lower)
Length of hospital stay	673 (11 studies)	⊕⊕⊖⊖ LOW1,3 due to risk of bias, inconsistency		The mean length of hospital stay in the control groups was 5.962 days	The mean length of hospital stay in the intervention groups was 0.37 lower (0.68 lower to 0.06 higher)
Length of hospital stay - Major abdominal surgery	334 (6 studies)	⊕⊖⊖⊖ VERY LOW1,2,3 due to risk of bias, inconsistency, imprecision		The mean length of hospital stay - major abdominal surgery in the control groups was 10 days	The mean length of hospital stay - major abdominal surgery in the intervention groups was 1.43 lower (2.68 to 0.18 lower)
Length of hospital stay - Intermediate Abdominal Surgery	97 (1 study)	⊕⊕⊖⊖ LOW1,2 due to risk of bias, imprecision		The mean length of hospital stay - intermediate abdominal surgery in the control groups was 2.38 days	The mean length of hospital stay - intermediate abdominal surgery in the intervention groups was 0.21 higher (0.52 lower to 0.94 higher)
Length of hospital stay - Minor abdominal surgery	203 (3 studies)	⊕⊕⊕⊖ MODERATE1 due to risk of bias		The mean length of hospital stay - minor abdominal surgery in the control groups was 1.182 days	The mean length of hospital stay - minor abdominal surgery in the intervention groups was 0.07 lower (0.18 lower to 0.03 higher)
Length of hospital stay - Orthopaedic surgery	39 (1 study)	⊕⊕⊖⊖ LOW1,2 due to risk of bias, imprecision		The mean length of hospital stay - orthopaedic surgery in the control groups was 6 days	The mean length of hospital stay - orthopaedic surgery in the intervention groups was 1.00 lower (1.73 to 0.27 lower)
Thirst (0-10) (preoperative)	98 (1 study)	⊕⊕⊖⊖ LOW1,2 due to risk of bias,		The mean thirst (0-10) (preoperative) in the control groups was	The mean thirst (0-10) (preoperative) in the intervention groups was 0.2 higher

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Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Fasting	Risk difference with CHO (95% CI)
		imprecision		2.2	(0.71 lower to 1.11 higher)
Thirst (0-10) (postoperative)	50 (1 study)	⨁⨁⨁⨀ MODERATE1 due to risk of bias		The mean thirst (0-10) (postoperative) in the control groups was 7.8	The mean thirst (0-10) (postoperative) in the intervention groups was 7.16 lower (8.2 to 6.12 lower)
Thirst (mild)	50 (1 study)	⨁⨁⨀⨀ LOW1,2 due to risk of bias, imprecision	RR 0.46 (0.21 to 1.02)	Moderate	
				520 per 1000	281 fewer per 1000 (from 411 fewer to 10 more)
Thirst (moderate)	50 (1 study)	⨁⨁⨀⨀ LOW1,2 due to risk of bias, imprecision	RR 0.09 (0.01 to 1.56)	Moderate	
				200 per 1000	182 fewer per 1000 (from 198 fewer to 112 more)
Headache (postoperative)	58 (1 study)	⨁⨁⨀⨀ LOW1,2 due to risk of bias, imprecision	RR 0.33 (0.1 to 1.11)	Moderate	
				310 per 1000	208 fewer per 1000 (from 279 fewer to 34 more)
Complication rate	348 (5 studies)	⨁⨀⨀⨀ VERY LOW1,2 due to risk of bias, imprecision	RR 1.05 (0.59 to 1.87)	Moderate	
				148 per 1000	7 more per 1000 (from 61 fewer to 129 more)
Well-being (postoperative)	87 (2 studies)	⨁⨁⨁⨀ MODERATE1 due to risk of bias		The mean well-being (postoperative) in the control groups was 15.4	The mean well-being (postoperative) in the intervention groups was 0.04 standard deviations higher (0.4 lower to 0.47 higher)
Nausea & Vomiting 0-10 (postoperative)	58 (1 study)	⨁⨁⨀⨀ LOW1,2 due to risk of bias, imprecision		The mean nausea & vomiting 0-10 (postoperative) in the control groups was 6	The mean nausea & vomiting 0-10 (postoperative) in the intervention groups was 2.0 lower (2.58 to 1.42 lower)

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Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Fasting	Risk difference with CHO (95% CI)
Nausea & Vomiting - Nausea & Vomiting	138 (2 studies)	⨁⊖⊖⊖ VERY LOW1,2 due to risk of bias, imprecision	RR 0.77 (0.38 to 1.54)	Moderate 219 per 1000	50 fewer per 1000 (from 136 fewer to 118 more)
Nausea & Vomiting - Nausea	98 (1 study)	⨁⊖⊖⊖ VERY LOW1,2 due to risk of bias, imprecision	RR 0.94 (0.42 to 2.1)	Moderate 200 per 1000	12 fewer per 1000 (from 116 fewer to 220 more)
Nausea & Vomiting - Vomiting	232 (3 studies)	⨁⨁⊖⊖ LOW1,2 due to risk of bias, imprecision	RR 0.61 (0.34 to 1.1)	Moderate 240 per 1000	94 fewer per 1000 (from 158 fewer to 24 more)
Anxiety (0-10) (preoperative)	98 (1 study)	⨁⨁⨁⊖ MODERATE1 due to risk of bias		The mean anxiety (0-10) (preoperative) in the control groups was 3.3	The mean anxiety (0-10) (preoperative) in the intervention groups was 0.3 higher (1.05 lower to 1.65 higher)
Anxiety (0-10) (postoperative)	50 (1 study)	⨁⨁⨁⊖ MODERATE1 due to risk of bias		The mean anxiety (0-10) (postoperative) in the control groups was 5.12	The mean anxiety (0-10) (postoperative) in the intervention groups was 5 lower (6.1 to 3.9 lower)
Fatigue	108 (2 studies)	⨁⨁⨁⊖ MODERATE1 due to risk of bias		The mean fatigue in the control groups was 10.77	The mean fatigue in the intervention groups was 0.08 standard deviations lower (0.47 lower to 0.31 higher)

1 Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

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Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Fasting	Risk difference with CHO (95% CI)
2 Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs 3 Downgraded by 1 or 2 increments because: The point estimate varies widely across studies, unexplained by subgroup analysis. The confidence intervals across studies show minimal or no overlap, unexplained by subgroup analysis Heterogeneity, I2=50%, p=0.04, unexplained by subgroup analysis.					

Evidence includes data from Smith M, McCall J, Plank L, Herbison G, Soop M, Nygren J. Preoperative carbohydrate treatment for enhancing recovery after elective surgery. Cochrane Database of Systematic Reviews 2014, Issue 8. Copyright Cochrane Collaboration, reproduced with permission.

Table 4: Clinical evidence summary: Carbohydrate drinks versus placebo drinks

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with placebo	Risk difference with CHO (95% CI)
Length of hospital stay	674 (10 studies)	⨁⨁⊖⊖ LOW1,2 due to risk of bias, inconsistency		The mean length of hospital stay in the control groups was 6.9 days	The mean length of hospital stay in the intervention groups was 0.04 lower (0.21 lower to 0.14 higher)
Length of hospital stay - Major abdominal surgery	441 (6 studies)	⨁⊖⊖⊖ VERY LOW1,2 due to risk of bias, inconsistency		The mean length of hospital stay - major abdominal surgery in the control groups was 9.4 days	The mean length of hospital stay - major abdominal surgery in the intervention groups was 0.59 lower (1.82 lower to 0.64 higher)
Length of hospital stay - Minor abdominal surgery	144 (2 studies)	⨁⨁⨁⊖ MODERATE1 due to risk of bias		The mean length of hospital stay - minor abdominal surgery in the control groups was 1.2 days	The mean length of hospital stay - minor abdominal surgery in the intervention groups was 0.06 lower (0.12 lower to 0.01 higher)

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Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with placebo	Risk difference with CHO (95% CI)
Length of hospital stay - Orthopaedic surgery	89 (3 studies)	⨁⨁⨁⨀ MODERATE1 due to risk of bias		The mean length of hospital stay - orthopaedic surgery in the control groups was 3.9 days	The mean length of hospital stay - orthopaedic surgery in the intervention groups was 0.1 higher (0.32 lower to 0.53 higher)
Complication rate	554 (8 studies)	⨁⨁⨀⨀ LOW1,3 due to risk of bias, imprecision	RR 0.92 (0.73 to 1.17)	Moderate	
				192 per 1000	15 fewer per 1000 (from 52 fewer to 33 more)
Fatigue (postoperative)	268 (3 studies)	⨁⨀⨀⨀ VERY LOW1,2 due to risk of bias, inconsistency		The mean fatigue (postoperative) in the control groups was 25.44	The mean fatigue (postoperative) in the intervention groups was 0.28 standard deviations higher (0.22 lower to 0.78 higher)
Well-being (postoperative)	205 (2 studies)	⨁⨁⨁⨀ MODERATE1 due to risk of bias		The mean well-being (postoperative) in the control groups was 61.2	The mean well-being (postoperative) in the intervention groups was 0 standard deviations higher (0.27 lower to 0.28 higher)
Nausea (24 h)	234 (2 studies)	⨁⨁⨁⨀ MODERATE1 due to risk of bias		The mean nausea (24 h) in the control groups was 13.1	The mean nausea (24 h) in the intervention groups was 1.71 lower (4.06 lower to 0.64 higher)
Vomiting (postoperative)	248 (3 studies)	⨁⨀⨀⨀ VERY LOW1,3 due to risk of bias, imprecision	RR 1.18 (0.65 to 2.12)	Moderate	
				85 per 1000	15 more per 1000 (from 30 fewer to 95 more)

1 Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
2 Downgraded by 1 or 2 increments because: The point estimate varies widely across studies, unexplained by subgroup analysis. The confidence intervals across studies show minimal or no overlap, unexplained by subgroup analysis Heterogeneity, I2=50%, p=0.04, unexplained by subgroup analysis.
3 Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs

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Evidence includes data from Smith M, McCall J, Plank L, Herbison G, Soop M, Nygren J. Preoperative carbohydrate treatment for enhancing recovery after elective surgery. Cochrane Database of Systematic Reviews 2014, Issue 8. Copyright Cochrane Collaboration, reproduced with permission.

Table 5: Clinical evidence summary: Clear fluids (water) versus fasting

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Fasting	Risk difference with Clear fluids (Water) (95% CI)
Nausea (POD1)	54 (1 study)	⨁⨁⨀⨀ LOW1,2 due to risk of bias, imprecision	RR 0.39 (0.16 to 0.91)	Moderate	
				517 per 1000	315 fewer per 1000 (from 47 fewer to 434 fewer)
Vomiting (POD1)	54 (1 study)	⨁⨁⨀⨀ LOW1,2 due to risk of bias, imprecision	RR 0.35 (0.11 to 1.13)	Moderate	
				345 per 1000	224 fewer per 1000 (from 307 fewer to 45 more)
Headache (POD1)	54 (1 study)	⨁⨀⨀⨀ VERY LOW1,2 due to risk of bias, imprecision	RR 0.58 (0.26 to 1.32)	Moderate	
				414 per 1000	174 fewer per 1000 (from 306 fewer to 132 more)

1 Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
2 Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs

Table 6: Evidence not suitable for GRADE analysis: CHO versus fasting

Outcome	Study (no. of participants)	Risk of bias	Comparison results	Intervention results	*P* value

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Outcome	Study (no. of participants)	Risk of bias	Comparison results	Intervention results	*P* value
Global QoR-40 score (Scale 40 – 200)	n=91 Asakura 2015[7]	High	Median (IQR) Fasting: 197 (189.5–200)	Median (IQR) CHO: 196 (191–198)	-
Length of stay (days)	n=91 Asakura 2015[7]	High	Median (IQR) Fasting: 3 (2–6)	Median (IQR) CHO: 3 (2–3)	-
	n=65 Yuill 2005 [113]	High	Median (IQR) Fasting: 8 (4)	Median (IQR) CHO: 10 (6)	
Patient Satisfaction (preoperative) Scale (1-5)	n=50 Doo 2018[30]	Very High	Median (IQR) Fasting: 4 (3-4)	Median (IQR) CHO: 4 (3-4)	1
Patient Satisfaction (postoperative) Scale (1-5)	n=50 Doo 2018[30]	Very High	Median (IQR) Fasting: 4 (3-4)	Median (IQR) CHO: 4 (3-4)	0.715
Thirst VAS (0-100)	n=60 Cakar 2014[17]	High	Incidence Rate Ratio (range): Fasting: 11.23 (9.41 to 3.40)	Incidence Rate Ratio: CHO: 1.0 (reference)	0
Thirst (preoperative) NRS (0-10)	n=50 Doo 2018[30]	High	Median (IQR) Fasting: 2 (1-2)	Median (IQR) CHO: 1 (0-2)	0.099
Thirst (postoperative) NRS (0-10)	n=50 Doo 2018[30]	High	Median (IQR) Fasting: 3 (1.5-4)	Median (IQR) CHO: 2 (1-3)	0.456
Thirst (difference in baseline and preoperative scores) VAS (0-100)	n=29 Melis 2006[73]	High	Median difference (IQR) Fasting: +34 (34) (increase)	Median difference (IQR) CHOA: -7 (39) (decrease); CHOB: 0 (18) (no difference)	-

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Outcome	Study (no. of participants)	Risk of bias	Comparison results	Intervention results	*P* value
Thirst (6 hours postoperative) VAS (0-100)	n=56 Zhang 2019[115]	High	Median (range) Fasting: 40 (20-55)	Median (range) CHO: 20 (10-30)	<0.001
Thirst (24 hours postoperative) VAS (0-100)	n=56 Zhang 2019[115]	High	Median (range) Fasting: 40 (20-50)	Median (range) CHO: 30 (25-40)	-
Thirst VAS (0-10) Preoperative	n=160 Helminen 2009[44]	High	Median (IQR) Fasting: 3 (0-5)	Median (IQR) CHO: 1 (0-4.5)	-
Thirst (0-10) 0-24 hours Postoperatively	n=96 Sada 2014[98]	High	Median (range) Colorectal patients: Fasting: 4 (1-7) Cholecystectomy patients: Fasting: 4 (1-7)	Median (range) Colorectal patients: CHO: 3 (1-5) Cholecystectomy patients: CHO: 3 (1-5)	P value > 0.05
Thirst (0-10) 36-48 hours Postoperatively	n=96 Sada 2014[98]	High	Median (range) Colorectal patients: Fasting: 2 (1-5) Cholecystectomy patients: Fasting: 2 (1-5)	Median (range) Colorectal patients: CHO: 2 (1-3) Cholecystectomy patients: CHO: 2 (1-3)	Colorectal <0.05 Cholecystectomy >0.05
Thirst (0-100) 90 minutes post CHO	n=44 Yagmurdur 2011[110]	High	Median (IQR) Fasting: 60 (56-64)	Median (IQR) CHO: 20 (16-24)	-
Thirst (0-100) 60 minutes post anesthesia	n=44 Yagmurdur 2011[110]	High	Median (IQR) Fasting: 64 (59-69)	Median (IQR) CHO: 18 (13-23)	-
Thirst (before induction)	n=113 Helminen 2019 [43]	High	Median (IQR): Fasting: 40 (8 - 63)	Median (IQR): CHO: 22 (6 - 50)	-

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Outcome	Study (no. of participants)	Risk of bias	Comparison results	Intervention results	*P* value
Thirst (2 hours post op)	n=113 Helminen 2019 [43]	High	Median (IQR): Fasting: 46 (24-70)	Median (IQR): CHO: 41 (20 - 61)	-
Thirst (4 hours post op)	n=113 Helminen 2019 [43]	High	Median (IQR): Fasting: 20(0-50)	Median (IQR): CHO: 28 (9-61)	-
Thirst (1hr preoperative)	n=35 Wang 2010 [107]	High	Median (range) Fasting: 24 (19-60)	Median (range) CHO: 20 (8-59)	
Nausea & Vomiting (preoperative) NRS (0-10)	n=50 Doo 2018[30]	High	Median (IQR) Fasting: 0 (0-0)	Median (IQR) CHO: 0 (0-1)	0.192
Nausea & Vomiting (postoperative) NRS (0-10)	n=50 Doo 2018[30]	High	Median (IQR) Fasting: 1 (1-2)	Median (IQR) CHO: 1 (0.5-2)	0.926
Nausea (difference in baseline and preoperative scores) VAS (0-100)	n=29 Melis 2006[73]	High	Median difference (IQR) Fasting: 0 (7) (no change)	Median difference (IQR) CHOA: 0 (6) (no differece); CHOB: +1 (6) (increase)	-
Nausea (0-10) 40 minutes post CHO drink	n=166 Hausel 2001[41]	High	Median (IQR) Fasting: 3 (2–10)	Median (IQR) CHO: 4 (2–6)	-
Nausea (0-10) 90 minutes post CHO drink	n=166 Hausel 2001[41]	High	Median (IQR) Fasting: 4 (2–12)	Median (IQR) CHO: 3 (2–7)	-
Nausea (before induction)	n=113 Helminen 2019 [43]	High	Median (IQR): Fasting: 0 (0-2)	Median (IQR): CHO: 0 (0-0)	-

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Outcome	Study (no. of participants)	Risk of bias	Comparison results	Intervention results	*P* value
Nausea (2 hours post op)	n=113 Helminen 2019 [43]	High	Median (IQR): Fasting: 0 (0-6)	Median (IQR): CHO: 0 (0-14)	-
Nausea (4 hours post op)	n=113 Helminen 2019 [43]	High	Median (IQR): Fasting: 0 (0-10)	Median (IQR): CHO: 0 (0-4)	-
Nausea (2 hours postoperative) VAS 0-100	n=95 Gilbert 1995 [37]	High	Median Water: 1.0	Median Fasting: 0	0.32
Nausea (0-10) 0-24 hours Postoperatively	n=96 Sada 2014[98]	High	Median (range) Colorectal patients: Fasting: 3 (1-6) Cholecystectomy patients: Fasting: 3 (1-6)	Median (range) Colorectal patients: CHO: 1 (1-5) Cholecystectomy patients: CHO: 1 (1-5)	>0.05
Nausea (0-10) 36-48 hours Postoperatively	n=96 Sada 2014[98]	High	Median (range) Colorectal patients: 2 (1-5) Cholecystectomy patients: Fasting: 2 (1-5)	Median (range) Colorectal patients: CHO: 1 (1-3) Cholecystectomy patients: CHO: 1 (1-3)	>0.05
Nausea (1hr preoperative)	n=35 Wang 2010 [107]	High	Median (range) Fasting: 8 (2-14)	Median (range) CHO: 8 (4-11)	
Nausea (0-100) 60 minutes post anesthesia	n=44 Yagmurdur 2011[110]	High	Median (IQR) Fasting: 9 (5-13)	Median (IQR) CHO: 8 (4-12)	-
Nausea (0-100) 90 minutes post CHO	n=44 Yagmurdur 2011[110]	High	Median (IQR) Fasting: 8 (4-12)	Median (IQR) CHO: 10 (7-13)	-
Anxiety (postoperative) NRS (0-10)	n=50 Doo 2018[30]	High	Median (IQR) Fasting: 0 (0-1)	Median (IQR) CHO: 0 (0-0)	0.50

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Outcome	Study (no. of participants)	Risk of bias	Comparison results	Intervention results	*P* value
Anxiety (difference in baseline and preoperative scores) VAS (0-100)	n=29 Melis 2006[73]	High	Median difference (IQR) Fasting: +3 (51) (increase)	Median difference (IQR) CHOA: -15 (49) (decrease); CHOB: 0 (15) (no difference)	-
Anxiety (preoperative) VAS (0-100)	n=56 Zhang 2019[115]	High	Median (range) Fasting: 60 (50-70)	Median (range) CHO: 30 (30-30)	-
Anxiety VAS (0-10) Preoperative	n=160 Helminen 2009[44]	High	Median (IQR) Fasting: 3 (1-5)	Median (IQR) CHO: 2 (1-5)	
Anxiety (0-10) 0-24 hours Postoperatively	n=96 Sada 2014[98]	High	Median (range) Colorectal patients: Fasting: 2 (1-6) Cholecystectomy patients: Fasting: 2 (1-6)	Median (range) Colorectal patients: CHO: 3 (1-3) Cholecystectomy patients: CHO: 2 (1-3)	>0.05
Anxiety (0-10) 36-48 hours Postoperatively	n=96 Sada 2014[98]	High	Median (range) Colorectal patients: Fasting: 1.5 (1-5) Cholecystectomy patients: Fasting: 1.5 (1-5)	Median (range) Colorectal patients: CHO: 1 (1-3) Cholecystectomy patients: CHO: 1 (1-3)	>0.05
Anxiety (0-100) 90 minutes post CHO	n=44 Yagmurdur 2011[110]	High	Median (IQR) Fasting: 48 (43-53)	Median (IQR) CHO: 20 (18-22)	-
Anxiety (0-100) 60 minutes post anesthesia	n=44 Yagmurdur 2011[110]	High	Median (IQR) Fasting: 46 (44-48)	Median (IQR) CHO: 43 (41-45)	-
Anxiety (1hr preoperative)	n=35 Wang 2010 [107]	High	Median (range) Fasting: 28 (16-61)	Median (range) CHO: 22 (11-47)	

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Outcome	Study (no. of participants)	Risk of bias	Comparison results	Intervention results	*P* value
Anxiety (preoperative) NRS (0-10)	n=50 Doo 2018[30]	High	Median (IQR) Fasting: 2 (1-2)	Median (IQR) CHO: 2 (1-3)	0.288
Headache VAS (0-100)	n=60 Cakar 2014[17]	High	Incidence Rate Ratio (range): Fasting: 2.70 (1.69 to 4.32)	Incidence Rate Ratio: CHO: 1.0 (reference)	0
Fatigue (preoperative) NRS (0-10)	n=50 Doo 2018[30]	High	Median (IQR) Fasting: 2 (1-2)	Median (IQR) CHO: 2 (0-2)	0.512
Fatigue (postoperative) NRS (0-10)	n=50 Doo 2018[30]	High	Median (IQR) Fasting: 1 (0-2)	Median (IQR) CHO: 1 (0.5-2)	0.630
Malaise (0-10) 40 minutes post CHO drink	n=166 Hausel 2001[41]	High	Median (IQR) Fasting: 12 (3–30)	Median (IQR) CHO: 8 (4–20)	-
Malaise (0-10) 90 minutes post CHO drink	n=166 Hausel 2001[41]	High	Median (IQR) Fasting: 10 (3–30)	Median (IQR) CHO: 7 (3–17)	-
Tiredness VAS (0-100)	n=60 Cakar 2014[17]	High	Incidence Rate Ratio (range): Fasting: 1.18 (0.64 to 2.17)	Incidence Rate Ratio: CHO: 1.0 (reference)	0.592
Tiredness (difference in baseline and preoperative scores) VAS (0-100)	n=29 Melis 2006[73]	High	Median difference (IQR) Fasting: -19 (27) (decrease)	Median difference (IQR) CHOA: 0 (20) (no difference); CHOB: -7 (29) (decrease)	-
Tiredness (6 hours postoperative) VAS (0-100)	n=56 Zhang 2019[115]	High	Median (range) Fasting: 30 (20-40)	Median (range) CHO: 30 (20-40)	-

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Outcome	Study (no. of participants)	Risk of bias	Comparison results	Intervention results	*P* value
Tiredness (24 hours postoperative) VAS (0-100)	n=56 Zhang 2019[115]	High	Median (range) Fasting: 30 (20-30)	Median (range) CHO: 40 (30-40)	-
Tiredness VAS (0-10) Preoperative	n=160 Helminen 2009[44]	High	Median (IQR) Fasting: 3 (0-5)	Median (IQR) CHO: 2 (0–5)	-
Tiredness (before induction)	n=113 Helminen 2019 [43]	High	Median (IQR): Fasting: 20 (5-46)	Median (IQR): CHO: 30 (10-54)	-
Tiredness (2 hours post op)	n=113 Helminen 2019 [43]	High	Median (IQR): Fasting: 53 (30-61)	Median (IQR): CHO: 49 (20-70)	-
Tiredness (4 hours post op)	n=113 Helminen 2019 [43]	High	Median (IQR): Fasting: 40 (10-50)	Median (IQR): CHO: 42 (8-70)	-
Tiredness (1hr preoperative)	n=35 Wang 2010 [107]	High	Median (range) Fasting: 23(10-53)	Median (range) CHO: 20 (11-60)	

Table 7: Evidence not suitable for GRADE analysis: Water versus fasting

Outcome	Study (no. of participants)	Risk of bias	Comparison results	Intervention results	*P* value
Thirst (2 hours postoperative) VAS 0-100	n=95 Gilbert 1995 [37]	High	Median Water: 5	Median Fasting: 21.0	0.0149
Vomiting (2 hours postoperative) VAS 0-100	n=95 Gilbert 1995 [37]	High	Median Water: 1.0	Median Fasting: 0	0.21

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Outcome	Study (no. of participants)	Risk of bias	Comparison results	Intervention results	*P* value
Drowsiness (2 hours postoperative) VAS 0-100	n=95 Gilbert 1995 [37]	High	Median Water: 13.0	Median Fasting: 7.0	0.42
Headache (2 hours postoperative) VAS 0-100	n=95 Gilbert 1995 [37]	High	Median Water: 2.5	Median Fasting: 2.0	0.99

See appendix F for full GRADE tables.

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1.5 Economic evidence

1.5.1 Included studies

No health economic studies were included.

1.5.2 Excluded studies

No relevant health economic studies were excluded due to assessment of limited applicability or methodological limitations.

See also the health economic study selection flow chart in Appendix G:.

1.5.3 Unit costs

Relevant unit costs of carbohydrate loading drinks are provided below to aid consideration of cost effectiveness.

Table 8: UK costs of carbohydrate loading drinks

Brand	Description	Cost per unit
Nutricia	Preop 0.5kcal/ml clear non- carbonated lemon flavoured iso-osmolar carbohydrate drink 200ml carton	£1.50
Polycal	Carbohydrate liquid ready to drink neutral 200ml 2.47kcal/ml plastic bottles	£1.44

Source: NHS Supply Chain 2018[77]

1.6 Evidence statements

1.6.1 Clinical evidence statements

No evidence was found for mortality; patient, family and carer experience of care; unplanned ICU admission and cancellation of surgery.

Carbohydrate drinks versus fasting

Quality of life

One study showed a clinically important benefit with carbohydrate drinks for postoperative patient satisfaction on a scale of 0 – 10 compared to fasting (1 study, n=58, moderate quality evidence)

One study showed a clinically important harm with carbohydrate drinks when measuring postoperative global QoR-40 score, a quality of life measure, compared to fasting (1 study, n=95, low quality of evidence)

Two studies found no clinically important difference between carbohydrate drinks and fasting in postoperative wellbeing (2 studies, n=87, moderate quality of evidence).

One study found no difference in between carbohydrate drinks and fasting in preoperative anxiety (1 study, n=98, moderate quality).

One study found a clinically important benefit with carbohydrate drinks for postoperative anxiety compared to fasting (1 study, n=50, moderate quality of evidence).

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Length of stay

Eleven studies looked at length of hospital stay, comparing carbohydrate drinks versus fasting. Overall, there was no clinically important difference between carbohydrate drinks versus fasting. (11 studies, n=673, low quality of evidence).

Broken down into the different types of surgery types, six studies showed a clinically important benefit for length of stay with carbohydrate drinks in major surgery compared to fasting (6 studies, n=334, very low quality of evidence).

One study showed a clinically important benefit with carbohydrate drinks for length of stay in orthopaedic surgery compared to fasting (1 study, n=39, low quality of evidence).

one study showed no clinically important difference between carbohydrate drinks and fasting for length of stay in intermediate abdominal surgery (1 study, n=97, low quality of evidence).

Three studies showed no clinically important difference between carbohydrate drinks and fasting for length of stay in minor abdominal surgery (3 studies, n=203, moderate quality of evidence).

Adverse events

Thirst was measured by several studies. One study measured preoperative thirst on a scale of 0-10 which found no clinically important difference between carbohydrate drinks and fasting (1 study, n=98, low quality of evidence).

Three studies found a clinically important benefit with carbohydrate drinks. for postoperative thirst on a scale of 0 – 10 (1 study, n=50, moderate quality), thirst mild (1 study, n=50, low quality) and thirst moderate (1 study, n=50, very low quality)

One study found a clinically important benefit with carbohydrate drinks for reducing postoperative headache compared to fasting (1 study, n=58, low quality).

Five studies showed no clinically important difference between carbohydrate drinks and fasting for complication rates (5 studies, n=348, very low quality).

One study showed a clinically important benefit with carbohydrate drinks when assessing postoperative nausea and vomiting measured on a VAS scale of 0 – 10 compared to fasting (1 study, n=58, low quality of evidence).

Two studies found no clinically important difference between carbohydrate drinks and fasting in nausea and vomiting overall (2 studies, n=138, very low quality evidence).

One study found no clinically important difference between carbohydrate drinks and fasting for nausea (1 study, n=98, very low quality)

Three studies found no clinically important difference for vomiting with carbohydrate drinks compared to fasting (n=232, low quality evidence)

One study found no clinically important difference between carbohydrate drinks and fasting in fatigue rates (1 study, n=108, moderate quality evidence)

Carbohydrate drinks versus placebo

Quality of life

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Two studies showed no clinically important difference between carbohydrate drinks and placebo drinks when measuring postoperative well-being (2 studies, n=205, moderate quality of evidence)

Length of stay

Six studies found no clinically important difference between carbohydrate drinks and placebo drinks for length of stay after major abdominal surgery (6 studies, n=441, very low quality of evidence).

Two studies found no found no clinically important difference between carbohydrate drinks and placebo drinks for length of stay after minor abdominal surgery (2 studies, n=144, moderate quality of evidence).

Three studies found no clinically important difference between carbohydrate drinks and placebo drinks for length of stay after orthopaedic surgery (3 studies, n=89, moderate quality of evidence).

Adverse events

Eight studies found no clinically important difference between carbohydrate drinks and placebo drinks when assessing complication rates (8 studies, n=554, low quality evidence).

Three studies found no clinically important difference between carbohydrate drinks and placebo drinks in rates of postoperative fatigue (3 studies, n=268, very low quality evidence).

Two studies showed no clinically important difference between carbohydrate drinks and placebo drink in postoperative nausea rates (2 studies, n=234, moderate quality evidence)

Three studies showed no clinically important difference between carbohydrate drinks and placebo drinks in postoperative vomiting (3 studies, n=248, very low quality evidence)

Water versus fasting

Adverse events

One study found a clinically important benefit with water in postoperative nausea, vomiting and headache, compared to fasting (1 study, n=54, very low quality evidence)

Evidence not suitable for GRADE

Carbohydrate drinks versus fasting

One study showed no notable difference between carbohydrate drinks and fasting for quality of life via the global QoR-40 score (1 study, n=91, high risk of bias)

Two studies found no notable difference between carbohydrate drink and fasting when assessing length of stay (2 studies, n=156, high risk of bias)

One study showed no notable difference between carbohydrate drinks and fasting in preoperative or postoperative patient satisfaction rates on a scale of one to five (1 study, n=50, very high risk of bias)

Seven studies found no notable difference between carbohydrate drinks and fasting in preoperative anxiety (7 studies, n=418, high risk of bias)

Three studies found no clinically important difference between carbohydrate drinks and fasting for postoperative anxiety (3 studies, n=242, high risk of bias)

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One study showed no notable difference between carbohydrate drinks and fasting in preoperative and postoperative fatigue (1 study, n=50, high risk of bias)

One study found no notable difference between carbohydrate drinks and fasting for rates of headache (1 study, n=60, high risk of bias)

One study showed no notable difference between carbohydrate drinks and fasting in preoperative malaise (1 study, n=166, high risk of bias)

One study found no notable difference between carbohydrate drinks and fasting in levels of preoperative or postoperative nausea and vomiting (combined) (1 study, n=50, high risk of bias)

Two studies showed no notable difference between carbohydrate drinks and fasting in preoperative nausea (2 studies, n=204, high risk of bias)

Five studies showed no notable difference between carbohydrate drinks and fasting in postoperative nausea (5 studies, n= 317, high risk of bias)

One study showed a trend to benefit with carbohydrate drinks in overall thirst rates compared to fasting (1 study, n=60, high risk of bias)

Four studies showed no notable difference between carbohydrate drinks and fasting in preoperative thirst (4 studies, n=315, high risk of bias)

Five studies showed no notable difference between carbohydrate drinks and fasting for postoperative thirst (5 studies, n=431, high risk of bias)

One study showed no notable difference between carbohydrate drinks and fasting with overall levels of tiredness (1 study, n=60, high risk of bias)

Four studies showed no notable difference between carbohydrate drinks and fasting in preoperative tiredness (4 studies, n=337, high risk of bias)

Two studies showed no clinically important difference in postoperative tiredness with carbohydrate drinks compared to fasting (n=169, high risk of bias)

Water versus fasting

One study showed no statistically significant difference between water and fasting for drowsiness, vomiting or headache (1 study, n=95, high risk of bias)

One study showed a statistically significant benefit with water for postoperative compared to fasting (1 study, n=95, high risk of bias)

1.6.2 Health economic evidence statements

- No relevant economic evaluations were identified.

1.7 The committee's discussion of the evidence

Please see recommendations 1.4.1 – 1.4.2 in the guideline.

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1.7.1 Interpreting the evidence

1.7.1.1 The outcomes that matter most

The committee considered that the focus of this evidence review was to better understand the optimal time and duration of fasting for people undergoing surgery, to improve patient experience while minimising the risk of adverse events from surgery. Subsequently, the committee agreed critical outcomes for decision making to be health related quality of life, mortality, patient, family and carer experience of care and adverse events and complications. The committee also considered length of hospital stay, unplanned ICU admission, thirst, headache and cancellation of surgery to be important outcomes.

No evidence was found for mortality, unplanned ICU admission and cancellation of surgery.

1.7.1.2 The quality of the evidence

The quality of evidence that was suitable for GRADE analysis ranged from very low to moderate. The majority of the evidence was graded at low quality. This was mostly due to imprecision of data, reducing the certainty with which the committee could make conclusions from the evidence. The committee felt that the quality of the evidence limited the strength with which they could make any recommendations, particularly given that any recommendation for the use of carbohydrate drinks would have a significant resource impact.

1.7.1.3 Benefits and harms

The committee reviewed the body of evidence comparing preoperative carbohydrate drinks to fasting, carbohydrate drinks to placebo drinks and water to fasting.

Carbohydrate drinks versus fasting:

Two studies reporting patient satisfaction postoperatively. One study reported patient satisfaction using a 0 - 10 Likert scale which showed better patient satisfaction. The second study using the QoR-40 score showed a reduction in patient satisfaction with a carbohydrate drink. The committee considered the variation may be due to the taste of the carbohydrate drinks given.

Six studies of patients undergoing major abdominal surgery and one study of patients undergoing orthopaedic surgery, showed a reduction in the length of hospital stay when preoperatively given a carbohydrate drink. However, one study looking at intermediate abdominal surgery and three studies reviewing minor abdominal surgery showed no clinically important difference when participants were given carbohydrate drinks.

When patients were given carbohydrate drinks, the outcome of preoperative thirst showed no clinical difference. However, one study which assessed postoperative thirst and another study which grouped thirst into mild or moderate postoperative thirst showed a clinically important benefit by reducing the number of patients who experienced thirst.

There was a clinically important benefit with carbohydrate drinks in the reduction of postoperative headache shown by one study. Evidence from five studies showed no difference in complication rate for participants who were given a carbohydrate drink.

Nausea and vomiting grouped together in one study showed a clinically important benefit with carbohydrate drinks. As individual outcomes from six studies, there was no clinically important difference with the use of carbohydrate drinks. When assessing postoperative well-being, one study showed clinically important benefit with carbohydrate drinks in reducing postoperative anxiety. But one study looking at preoperative anxiety and another study assessing fatigue showed no clinically important benefit with carbohydrate drinks. Two studies assessed wellbeing overall, which showed no clinically important benefit.

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The committee agreed that on the balance of evidence carbohydrate drinks preoperatively may have a benefit in the context of major abdominal surgery both for patient comfort with reduced thirst and improved satisfaction and for operative outcomes with a shorter length of stay, The committee noted that there were no observed harms of carbohydrate drinks.

Carbohydrate drinks versus placebo drinks:

Evidence from eleven studies showed no difference in length of hospital stay and evidence from eighteen studies showed no difference in complication rate, nausea, vomiting or postoperative well-being.

Water versus fasting:

One study showed evidence of clinically important benefit through the reduction of nausea, vomiting and headache postoperatively when given water preoperatively.

No evidence was found for mortality, unplanned ICU admission and cancellation of surgery for either of the three comparison groups

The committee considered that on the balance of all the evidence and considering the increased cost of carbohydrate drinks compared to clear fluids, people should be told that can take clear fluids two hours before surgery and to consider carbohydrate drinks before complex abdominal surgery.

1.7.2 Cost effectiveness and resource use

No economic evaluations were identified for this review; therefore, unit costs were presented to aid committee consideration of cost effectiveness.

There are different types of carbohydrate loading drinks in the NHS but the cost per carton is approximately £1.50. The committee highlighted that these costs can vary across trusts as prices are usually negotiable. Although this is a low cost, if all adults having surgery are prescribed carbohydrate drinks, this affects a large population and therefore the overall costs would be very high.

The clinical evidence showed that both carbohydrate loading and water were associated with some improvements in comparison to fasting, for example, less people had headaches and felt nauseous. This can temporarily improve the adult's quality of life post-surgery. However, there was no evidence of complications being reduced. For major abdominal surgery, five studies showed a reduction in hospital length of stay of 1.26 days which could have significant cost-savings.

The committee highlighted that current practice varies but that in recent years more hospitals have been prescribing carbohydrate drinks to adults undergoing surgery.

As water showed similar effectiveness to carbohydrate drinks when compared to fasting, the committee made a recommendation to offer water to people undergoing surgery. The committee highlighted this may lead to cost-savings as some hospitals routinely offer carbohydrate drinks to people. A recommendation was also made to consider carbohydrate drinks in adults having abdominal surgery, as there was an indication that postoperative length of stay could be reduced. Also, the committee highlighted that adults are usually unable to eat after major abdominal surgery, therefore carbohydrate drinks may have some clinical benefits in this population.

1.7.3 Other factors the committee took into account

The committee agreed that the recommendation to offer clear fluids before surgery is consistent with current practice. Clear fluids can include water, fruit juice without pulp, coffee or tea without milk, and ice lollies/popsicles. Clear fluids do not include carbonated drinks,

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milk, or yoghurt. The committee highlighted the importance of preoperative fasting in preventing intraoperative and postoperative complications. Historically, patients have been asked to fast from midnight or up to six hours prior to surgery to prevent such complications. Therefore, the committee suggested that telling patients they can drink water until up to two hours prior to surgery as well as the benefits of doing so will need to be clearly explained. The committee also noted that in some units and ahead of certain types of surgery, people are allowed to drink clear fluids less than two hours before surgery. The committee noted that the amount of clear fluid that can be drunk before surgery is not limited but that is should not be excessive.

The committee noted that the recommendations are applicable to all people undergoing surgery and not just those requiring a general anaesthetic. It also applies to people undergoing dental surgery.

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Appendices

Appendix A: Review protocols

Table 9: Review protocol: Preoperative fasting strategy

ID	Field	Content
0.	PROSPERO registration number	Not registered on PROSPERO
1.	Review title	What is the most clinically and cost effective preoperative fasting strategy for adults?
2.	Review question	What is the most clinically and cost effective preoperative fasting strategy for adults?
3.	Objective	To determine the most clinically and cost effective preoperative fasting strategy.
4.	Searches	• Cochrane Central Register of Controlled Trials (CENTRAL) • Cochrane Database of Systematic Reviews (CDSR) • Embase • MEDLINE • Epistemonikos The searches may be re-run 6 weeks before the final committee meeting and further studies retrieved for inclusion if relevant. The full search strategies will be published in the final review.
5.	Condition or domain being studied	Perioperative care
6.	Population	Inclusion: Adults 18 years and over having surgery. Exclusion: • children and young people aged 17 years and younger • surgery for burns, traumatic brain injury or neurosurgery • cardiac surgery • parenteral feeding • emergency surgery • pregnant women • gastroparesis
7.	Intervention/Exposure/Test	• no food for <4 hours • no food for 4-6 hours • no food for >6 hours • no fluids for <2 hours

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		• no fluids for 2-4 hours • no fluids for 4-6 hours • no fluids for >6 hours • maintaining clear fluids (non-milk, non-particulate drinks) before surgery • combinations of food and fluid restriction strategies
8.	Comparator/Reference standard/Confounding factors	• each other
9.	Types of study to be included	Randomised controlled trials (RCTs), systematic reviews of RCTs. Observational studies if no RCT evidence is identified.
10.	Other exclusion criteria	Exclusions: • non-English language studies • studies published before 2000
11.	Context	An extended fasting period can be unpleasant for the person undergoing surgery. This review aims to determine the most clinically and cost effective fasting strategy.
12.	Primary outcomes (critical outcomes)	• health-related quality of life • mortality • patient, family and carer experience of care • adverse events and complications (Clavien-Dindo, postoperative morbidity score (POMS), aspiration – pulmonary complications, acute kidney injury) The committee did not agree to on any established minimal clinically important differences, therefore the default MIDs will be used and any difference in mortality will be considered clinically important.
13.	Secondary outcomes (important outcomes)	• length of hospital stay • unplanned ICU admission • thirst • headache • cancellation of surgery The committee did not agree to on any established minimal clinically important differences, therefore the default MIDs will be used and any difference in mortality will be considered clinically important.
14.	Data extraction (selection and coding)	EndNote will be used for reference management, sifting, citations and bibliographies. All references identified by the searches and from other sources will be screened for inclusion. 10% of the abstracts will be reviewed by two reviewers, with any disagreements resolved by discussion or, if necessary, a third independent reviewer. The full text of potentially eligible studies will be

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		retrieved and will be assessed in line with the criteria outlined above. Data extractions performed using EviBase, a platform designed and maintained by the National Guideline Centre (NGC)
15.	Risk of bias (quality) assessment	Risk of bias will be assessed using the appropriate checklist as described in Developing NICE guidelines: the manual. • Systematic reviews: Risk of Bias in Systematic Reviews (ROBIS) • Randomised Controlled Trial: Cochrane RoB (2.0) • Non randomised study, including cohort studies: Cochrane ROBINS-I • Case control study: CASP case control checklist • Controlled before-and-after study or Interrupted time series: Effective Practice and Organisation of Care (EPOC) RoB Tool • Cross sectional study: JBI checklist for cross sectional study • Case series: Institute of Health Economics (IHE) checklist for case series 10% of all evidence reviews are quality assured by a senior research fellow. This includes checking: • papers were included /excluded appropriately • a sample of the data extractions • correct methods are used to synthesise data • a sample of the risk of bias assessments Disagreements between the review authors over the risk of bias in particular studies will be resolved by discussion, with involvement of a third review author where necessary.
16.	Strategy for data synthesis	Pairwise meta-analyses will be performed using Cochrane Review Manager (RevMan5). GRADEpro will be used to assess the quality of evidence for each outcome, taking into account individual study quality and the meta-analysis results. The 4 main quality elements (risk of bias, indirectness, inconsistency and imprecision) will be appraised for each outcome. Publication bias is tested for when there are more than 5 studies for an outcome. The risk of bias across all available evidence was evaluated for each outcome using an adaptation of the 'Grading of Recommendations Assessment, Development and Evaluation (GRADE) toolbox' developed by the international GRADE working group

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		http://www.gradeworkinggroup.org/ • Where meta-analysis is not possible, data will be presented and quality assessed individually per outcome. • CERQual will be used to synthesise data from qualitative studies. • WinBUGS will be used for network meta-analysis, if possible given the data identified. • List any other software planned to be used. Heterogeneity between the studies in effect measures will be assessed using the I^2 statistic and visually inspected. An I^2 value greater than 50% will be considered indicative of substantial heterogeneity. Sensitivity analyses will be conducted based on pre-specified subgroups using stratified meta-analysis to explore the heterogeneity in effect estimates. If this does not explain the heterogeneity, the results will be presented pooled using random-effects.		
17.	Analysis of sub-groups	Subgroups: • older adults (over 60 years) • people with diabetes		
18.	Type and method of review	☒	Intervention	
		☐	Diagnostic	
		☐	Prognostic	
		☐	Qualitative	
		☐	Epidemiologic	
		☐	Service Delivery	
		☐	Other (please specify)	
19.	Language	English		
20.	Country	England		
21.	Anticipated or actual start date	[To be added.]		
22.	Anticipated completion date	[To be added.]		
23.	Stage of review at time of this submission	Review stage	Started	Completed
		Preliminary searches	☐	☐
		Piloting of the study selection process	☐	☐
		Formal screening of search results against eligibility criteria	☐	☐
		Data extraction	☐	☐

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		Risk of bias (quality) assessment	☐	☐
		Data analysis	☐	☐
24.	Named contact	5a. Named contact National Guideline Centre 5b Named contact e-mail perioperativecare@nice.org.uk 5e Organisational affiliation of the review National Institute for Health and Care Excellence (NICE) and the National Guideline Centre		
25.	Review team members	From the National Guideline Centre: Ms Kate Ashmore Ms Kate Kelley Ms Sharon Swain Mr Ben Mayer Ms Maria Smyth Mr Vimal Bedia Mr Audrius Stonkus Ms Madelaine Zucker Ms Margaret Constanti Ms Annabelle Davis Ms Lina Gulhane		
26.	Funding sources/sponsor	This systematic review is being completed by the National Guideline Centre which receives funding from NICE.		
27.	Conflicts of interest	All guideline committee members and anyone who has direct input into NICE guidelines (including the evidence review team and expert witnesses) must declare any potential conflicts of interest in line with NICE's code of practice for declaring and dealing with conflicts of interest. Any relevant interests, or changes to interests, will also be declared publicly at the start of each guideline committee meeting. Before each meeting, any potential conflicts of interest will be considered by the guideline committee Chair and a senior member of the development team. Any decisions to exclude a person from all or part of a meeting will be documented. Any changes to a member's declaration of interests will be recorded in the minutes of the meeting. Declarations of		

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		interests will be published with the final guideline.	
28.	Collaborators	Development of this systematic review will be overseen by an advisory committee who will use the review to inform the development of evidence-based recommendations in line with section 3 of Developing NICE guidelines: the manual. Members of the guideline committee are available on the NICE website.	
29.	Other registration details	n/a	
30.	Reference/URL for published protocol	n/a	
31.	Dissemination plans	NICE may use a range of different methods to raise awareness of the guideline. These include standard approaches such as: • notifying registered stakeholders of publication • publicising the guideline through NICE's newsletter and alerts • issuing a press release or briefing as appropriate, posting news articles on the NICE website, using social media channels, and publicising the guideline within NICE.	
32.	Keywords	Perioperative care, preoperative, fasting	
33.	Details of existing review of same topic by same authors	n/a	
34.	Current review status	☐	Ongoing
		☐	Completed but not published
		☐	Completed and published
		☐	Completed, published and being updated
		☐	Discontinued
35..	Additional information	n/a	
36.	Details of final publication	www.nice.org.uk	

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Table 10: Health economic review protocol

Review question	All questions – health economic evidence
Objectives	To identify health economic studies relevant to any of the review questions.
Search criteria	• Populations, interventions and comparators must be as specified in the clinical review protocol above. • Studies must be of a relevant health economic study design (cost–utility analysis, cost-effectiveness analysis, cost–benefit analysis, cost–consequences analysis, comparative cost analysis). • Studies must not be a letter, editorial or commentary, or a review of health economic evaluations. (Recent reviews will be ordered although not reviewed. The bibliographies will be checked for relevant studies, which will then be ordered.) • Unpublished reports will not be considered unless submitted as part of a call for evidence. • Studies must be in English.
Search strategy	A health economic study search will be undertaken using population-specific terms and a health economic study filter – see appendix B below.
Review strategy	Studies not meeting any of the search criteria above will be excluded. Studies published before 2003, abstract-only studies and studies from non-OECD countries or the USA will also be excluded. Each remaining study will be assessed for applicability and methodological limitations using the NICE economic evaluation checklist which can be found in appendix H of Developing NICE guidelines: the manual (2014).[76] **Inclusion and exclusion criteria** • If a study is rated as both 'Directly applicable' and with 'Minor limitations' then it will be included in the guideline. A health economic evidence table will be completed and it will be included in the health economic evidence profile. • If a study is rated as either 'Not applicable' or with 'Very serious limitations' then it will usually be excluded from the guideline. If it is excluded then a health economic evidence table will not be completed and it will not be included in the health economic evidence profile. • If a study is rated as 'Partially applicable', with 'Potentially serious limitations' or both then there is discretion over whether it should be included. **Where there is discretion** The health economist will make a decision based on the relative applicability and quality of the available evidence for that question, in discussion with the guideline committee if required. The ultimate aim is to include health economic studies that are helpful for decision-making in the context of the guideline and the current NHS setting. If several studies are considered of sufficiently high applicability and methodological quality that they could all be included, then the health economist, in discussion with the committee if required, may decide to include only the most applicable studies and to selectively exclude the remaining studies. All studies excluded on the basis of applicability or methodological limitations will be listed with explanation in the excluded health economic studies appendix below. The health economist will be guided by the following hierarchies. *Setting:* • UK NHS (most applicable). • OECD countries with predominantly public health insurance systems (for example, France, Germany, Sweden). • OECD countries with predominantly private health insurance systems (for example, Switzerland).

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	• Studies set in non-OECD countries or in the USA will be excluded before being assessed for applicability and methodological limitations. *Health economic study type:* • Cost–utility analysis (most applicable). • Other type of full economic evaluation (cost–benefit analysis, cost-effectiveness analysis, cost–consequences analysis). • Comparative cost analysis. • Non-comparative cost analyses including cost-of-illness studies will be excluded before being assessed for applicability and methodological limitations. *Year of analysis:* • The more recent the study, the more applicable it will be. • Studies published in 2003 or later but that depend on unit costs and resource data entirely or predominantly from before 2003 will be rated as 'Not applicable'. • Studies published before 2003 will be excluded before being assessed for applicability and methodological limitations. *Quality and relevance of effectiveness data used in the health economic analysis:* • The more closely the clinical effectiveness data used in the health economic analysis match with the outcomes of the studies included in the clinical review the more useful the analysis will be for decision-making in the guideline. For example, economic evaluations based on observational studies will be excluded, when the clinical review is only looking for RCTs,

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Appendix B: Literature search strategies

The literature searches for this review are detailed below and complied with the methodology outlined in Developing NICE guidelines: the manual 2014, updated 2018.[76]

For more detailed information, please see the Methodology Review.

B.1 Clinical search literature search strategy

Searches were constructed using a PICO framework where population (P) terms were combined with Intervention (I) and in some cases Comparison (C) terms. Outcomes (O) are rarely used in search strategies for interventions as these concepts may not be well described in title, abstract or indexes and therefore difficult to retrieve. Search filters were applied to the search where appropriate.

Table 11: Database date parameters and filters used

Database	Dates searched	Search filter used
Medline (OVID)	1946 – 31 May 2019	Exclusions Randomised controlled trials Systematic review studies
Embase (OVID)	1974 – 31 May 2019	Exclusions Randomised controlled trials Systematic review studies
The Cochrane Library (Wiley)	Cochrane Reviews to 2019 Issue 5 of 12 CENTRAL to 2019 Issue 5 of 12 DARE, and NHSEED to 2015 Issue 2 of 4 HTA to 2016 Issue 4 of 4	None
Epistemonikos (Epistemonikos Foundation)	Inception - 19 February 2019	Systematic review studies

Medline (Ovid) search terms

1.	exp Preoperative Care/ or Preoperative Period/
2.	(pre-operat* or preoperat* or pre-surg* or presurg*).ti,ab.
3.	((before or prior or advance or pre or prepar*) adj3 (surg* or operat* or anaesthes* or anesthes*)).ti,ab.
4.	or/1-3
5.	limit 4 to English language
6.	(exp child/ or exp pediatrics/ or exp infant/) not (exp adolescent/ or exp adult/ or exp middle age/ or exp aged/)
7.	5 not 6
8.	letter/
9.	editorial/
10.	news/
11.	exp historical article/
12.	Anecdotes as Topic/
13.	comment/
14.	case report/
15.	(letter or comment*).ti.

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16.	or/8-15
17.	randomized controlled trial/ or random*.ti,ab.
18.	16 not 17
19.	animals/ not humans/
20.	exp Animals, Laboratory/
21.	exp Animal Experimentation/
22.	exp Models, Animal/
23.	exp Rodentia/
24.	(rat or rats or mouse or mice).ti.
25.	or/18-24
26.	7 not 25
27.	Fasting/ or Food deprivation/
28.	Water deprivation/
29.	hunger/ or thirst/
30.	(meal* or solid or solids or drink* or water or liquid* or milk or beverage* or hydrat* or eat* or ate or food* or feed* or carbohyrate* or fasting or fasted or starv* or hung* or thirst*).ti,ab.
31.	((fluid* or oral* or consume or consumption) adj4 (restrict* or limit* or stop* or abstinence or abstain* or deprive* or deprivation or lack* or fast* or starve* or hung* or thirst* or intake or intaking or ingest*)).ti,ab.
32.	("nil by mouth" or "nothing by mouth" or NBM or "nil per os" or "nihil per os" or "nulla per os" or "non per os" or NPO).ti,ab.
33.	or/27-32
34.	26 and 33
35.	randomized controlled trial.pt.
36.	controlled clinical trial.pt.
37.	randomi#ed.ab.
38.	placebo.ab.
39.	randomly.ab.
40.	clinical trials as topic.sh.
41.	trial.ti.
42.	or/35-41
43.	Meta-Analysis/
44.	Meta-Analysis as Topic/
45.	(meta analy* or metanaly* or metaanaly* or meta regression).ti,ab.
46.	((systematic* or evidence*) adj3 (review* or overview*)).ti,ab.
47.	(reference list* or bibliograph* or hand search* or manual search* or relevant journals).ab.
48.	(search strategy or search criteria or systematic search or study selection or data extraction).ab.
49.	(search* adj4 literature).ab.
50.	(medline or pubmed or cochrane or embase or psychlit or psyclit or psychinfo or psycinfo or cinahl or science citation index or bids or cancerlit).ab.
51.	cochrane.jw.
52.	((multiple treatment* or indirect or mixed) adj2 comparison*).ti,ab.
53.	or/43-52
54.	34 and (42 or 53)

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Embase (Ovid) search terms

1.	*preoperative care/ or *preoperative period/
2.	(pre-operat* or preoperat* or pre-surg* or presurg*).ti,ab.
3.	((before or prior or advance or pre or prepar*) adj3 (surg* or operat* or anaesthes* or anesthes*)).ti,ab.
4.	or/1-3
5.	limit 4 to English language
6.	(exp child/ or exp pediatrics/ or exp infant/) not (exp adolescent/ or exp adult/ or exp middle age/ or exp aged/)
7.	5 not 6
8.	letter.pt. or letter/
9.	note.pt.
10.	editorial.pt.
11.	case report/ or case study/
12.	(letter or comment*).ti.
13.	or/8-12
14.	randomized controlled trial/ or random*.ti,ab.
15.	13 not 14
16.	animal/ not human/
17.	nonhuman/
18.	exp Animal Experiment/
19.	exp Experimental Animal/
20.	animal model/
21.	exp Rodent/
22.	(rat or rats or mouse or mice).ti.
23.	or/15-22
24.	7 not 23
25.	*diet restriction/ or food deprivation/
26.	water deprivation/
27.	*hunger/ or thirst/
28.	(meal* or solid or solids or drink* or water or liquid* or milk or beverage* or hydrat* or eat* or ate or food* or feed* or carbohyrate* or fasting or fasted or starv* or hung* or thirst*).ti,ab.
29.	((fluid* or oral* or consume or consumption) adj4 (restrict* or limit* or stop* or abstinence or abstain* or deprive* or deprivation or lack* or fast* or starve* or hung* or thirst* or intake or intaking or ingest*)).ti,ab.
30.	("nil by mouth" or "nothing by mouth" or NBM or "nil per os" or "nihil per os" or "nulla per os" or "non per os" or NPO).ti,ab.
31.	or/25-30
32.	24 and 31
33.	random*.ti,ab.
34.	factorial*.ti,ab.
35.	(crossover* or cross over*).ti,ab.
36.	((doubl* or singl*) adj blind*).ti,ab.
37.	(assign* or allocat* or volunteer* or placebo*).ti,ab.
38.	crossover procedure/
39.	single blind procedure/

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40.	randomized controlled trial/
41.	double blind procedure/
42.	or/33-41
43.	systematic review/
44.	Meta-Analysis/
45.	(meta analy* or metanaly* or metaanaly* or meta regression).ti,ab.
46.	((systematic* or evidence*) adj3 (review* or overview*)).ti,ab.
47.	(reference list* or bibliograph* or hand search* or manual search* or relevant journals).ab.
48.	(search strategy or search criteria or systematic search or study selection or data extraction).ab.
49.	(search* adj4 literature).ab.
50.	(medline or pubmed or cochrane or embase or psychlit or psyclit or psychinfo or psycinfo or cinahl or science citation index or bids or cancerlit).ab.
51.	cochrane.jw.
52.	((multiple treatment* or indirect or mixed) adj2 comparison*).ti,ab.
53.	or/43-52
54.	32 and (42 or 53)

Cochrane Library (Wiley) search terms

#1.	MeSH descriptor: [Preoperative Care] this term only
#2.	MeSH descriptor: [Preoperative Period] this term only
#3.	MeSH descriptor: [Perioperative Nursing] this term only
#4.	(pre-operative* or preoperative* or preop* or pre-op* or pre-surg* or presurg*):ti,ab
#5.	(before or prior or advance) near/3 (surg* or operat* or anaesthes* or anesthes*):ti,ab
#6.	(or #1-#5)
#7.	MeSH descriptor: [Fasting] this term only
#8.	MeSH descriptor: [Food Deprivation] this term only
#9.	MeSH descriptor: [Water Deprivation] this term only
#10.	MeSH descriptor: [Hunger] this term only
#11.	MeSH descriptor: [Thirst] this term only
#12.	(meal* or solid or solids or drink* or water or liquid* or milk or beverage* or hydrat* or eat* or ate or food* or feed* or carbohyrate* or fasting or fasted or starv* or hung* or thirst*):ti,ab
#13.	((fluid* or oral* or consume or consumption) near/4 (restrict* or limit* or stop* or abstinence or abstain* or deprive* or deprivation or lack* or fast* or starve* or hung* or thirst* or intake or intaking or ingest*)):ti,ab
#14.	("nil by mouth" or "nothing by mouth" or NBM or "nil per os" or "nihil per os" or "nulla per os" or "non per os" or NPO):ti,ab
#15.	(or #7-#14)
#16.	#6 and #15

Epistemonikos (Epistemonikos Foundation) search terms

1.	(pre-operative* OR preoperative* OR preop* OR pre-op* OR pre-surg* OR presurg*) AND (fasting OR fasted OR starv* OR hung* OR thirst* OR "nil by mouth" OR "nothing by mouth" OR NBM OR "nil per os" OR "nihil per os" OR "nulla per os" OR "non per os" OR NPO) [Filters: protocol=no, classification=systematic-review]

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B.2 Health Economics literature search strategy

Health economic evidence was identified by conducting a broad search relating to the perioperative care population in NHS Economic Evaluation Database (NHS EED – this ceased to be updated after March 2015) and the Health Technology Assessment database (HTA) with no date restrictions. NHS EED and HTA databases are hosted by the Centre for Research and Dissemination (CRD). Additional health economics searches were run on Medline and Embase.

Table 12: Database date parameters and filters used

Database	Dates searched	Search filter used
Medline	2014 – 30 May 2019	Exclusions Health economics studies
Embase	2014 – 30 May 2019	Exclusions Health economics studies
Centre for Research and Dissemination (CRD)	HTA - Inception – 02 May 2019 NHSEED - Inception to 02 May 2019	None

Medline (Ovid) search terms

1.	exp Preoperative Care/ or exp Perioperative Care/ or exp Perioperative Period/ or exp Perioperative Nursing/
2.	((pre-operative* or preoperative* or preop* or pre-op* or pre-surg* or presurg*) adj3 (care* or caring or treat* or nurs* or monitor* or recover* or medicine)).ti,ab.
3.	((perioperative* or peri-operative* or intraoperative* or intra-operative* or intrasurg* or intra-surg* or peroperat* or per-operat*) adj3 (care* or caring or treat* or nurs* or monitor* or recover* or medicine)).ti,ab.
4.	((postoperative* or postop* or post-op* or post-surg* or postsurg*) adj3 (care* or caring or treat* or nurs* or monitor* or recover* or medicine)).ti,ab.
5.	((care* or caring or treat* or nurs* or recover* or monitor*) adj3 (before or prior or advance or during or after) adj3 (surg* or operat* or anaesthes* or anesthes*)).ti,ab.
6.	1 or 2 or 3 or 4 or 5
7.	(intraoperative* or intra-operative* or intrasurg* or intra-surg* or peroperat* or per-operat* or perioperat* or peri-operat*).ti,ab.
8.	((during or duration) adj3 (surg* or operat* or anaesthes* or anesthes*)).ti,ab.
9.	7 or 8
10.	postoperative care/ or exp Postoperative Period/ or exp Perioperative nursing/
11.	(postop* or post-op* or post-surg* or postsurg* or perioperat* or peri-operat*).ti,ab.
12.	(after adj3 (surg* or operat* or anaesthes* or anesthes*)).ti,ab.
13.	(post adj3 (operat* or anaesthes* or anesthes*)).ti,ab.
14.	10 or 11 or 12 or 13
15.	exp Preoperative Care/ or Preoperative Period/
16.	(pre-operat* or preoperat* or pre-surg* or presurg*).ti,ab.
17.	((before or prior or advance or pre or prepar*) adj3 (surg* or operat* or anaesthes* or anesthes*)).ti,ab.
18.	15 or 16 or 17
19.	6 or 9 or 14 or 18
20.	letter/
21.	editorial/

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22.	news/
23.	exp historical article/
24.	Anecdotes as Topic/
25.	comment/
26.	case report/
27.	(letter or comment*).ti.
28.	or/20-27
29.	randomized controlled trial/ or random*.ti,ab.
30.	28 not 29
31.	animals/ not humans/
32.	exp Animals, Laboratory/
33.	exp Animal Experimentation/
34.	exp Models, Animal/
35.	exp Rodentia/
36.	(rat or rats or mouse or mice).ti.
37.	or/30-36
38.	19 not 37
39.	limit 38 to English language
40.	(exp child/ or exp pediatrics/ or exp infant/) not (exp adolescent/ or exp adult/ or exp middle age/ or exp aged/)
41.	39 not 40
42.	economics/
43.	value of life/
44.	exp "costs and cost analysis"/
45.	exp Economics, Hospital/
46.	exp Economics, medical/
47.	Economics, nursing/
48.	economics, pharmaceutical/
49.	exp "Fees and Charges"/
50.	exp budgets/
51.	budget*.ti,ab.
52.	cost*.ti.
53.	(economic* or pharmaco?economic*).ti.
54.	(price* or pricing*).ti,ab.
55.	(cost* adj2 (effectiv* or utilit* or benefit* or minimi* or unit* or estimat* or variable*)).ab.
56.	(financ* or fee or fees).ti,ab.
57.	(value adj2 (money or monetary)).ti,ab.
58.	or/42-57
59.	41 and 58

Embase (Ovid) search terms

1.	*preoperative period/ or *intraoperative period/ or *postoperative period/ or *perioperative nursing/ or *surgical patient/
2.	((pre-operative* or preoperative* or preop* or pre-op* or pre-surg* or presurg*) adj3 (care* or caring or treat* or nurs* or monitor* or recover* or medicine)).ti,ab.
3.	((perioperative* or peri-operative* or intraoperative* or intra-operative* or intrasurg* or intra-surg* or peroperat* or per-operat*) adj3 (care* or caring or treat* or nurs* or

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	monitor* or recover* or medicine)).ti,ab.
4.	((care* or caring or treat* or nurs* or recover* or monitor*) adj3 (before or prior or advance or during or after) adj3 (surg* or operat* or anaesthes* or anesthes*)).ti,ab.
5.	1 or 2 or 3 or 4
6.	peroperative care/ or exp peroperative care/ or exp perioperative nursing/
7.	(intraoperative* or intra-operative* or intrasurg* or intra-surg* or peroperat* or per-operat* or perioperat* or peri-operat*).ti,ab.
8.	((during or duration) adj3 (surg* or operat* or anaesthes* or anesthes*)).ti,ab.
9.	6 or 7 or 8
10.	postoperative care/ or exp postoperative period/ or perioperative nursing/
11.	(postop* or post-op* or post-surg* or postsurg* or perioperat* or peri-operat*).ti,ab.
12.	(after adj3 (surg* or operat* or anaesthes* or anesthes*)).ti,ab.
13.	(post adj3 (operat* or anaesthes* or anesthes*)).ti,ab.
14.	10 or 11 or 12 or 13
15.	exp preoperative care/ or preoperative period/
16.	(pre-operat* or preoperat* or pre-surg* or presurg*).ti,ab.
17.	((before or prior or advance or pre or prepar*) adj3 (surg* or operat* or anaesthes* or anesthes*)).ti,ab.
18.	15 or 16 or 17
19.	5 or 9 or 14 or 18
20.	letter.pt. or letter/
21.	note.pt.
22.	editorial.pt.
23.	case report/ or case study/
24.	(letter or comment*).ti.
25.	or/20-24
26.	randomized controlled trial/ or random*.ti,ab.
27.	25 not 26
28.	animal/ not human/
29.	nonhuman/
30.	exp Animal Experiment/
31.	exp Experimental Animal/
32.	animal model/
33.	exp Rodent/
34.	(rat or rats or mouse or mice).ti.
35.	or/27-34
36.	19 not 35
37.	limit 36 to English language
38.	(exp child/ or exp pediatrics/) not (exp adult/ or exp adolescent/)
39.	37 not 38
40.	health economics/
41.	exp economic evaluation/

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42.	exp health care cost/
43.	exp fee/
44.	budget/
45.	funding/
46.	budget*.ti,ab.
47.	cost*.ti.
48.	(economic* or pharmaco?economic*).ti.
49.	(price* or pricing*).ti,ab.
50.	(cost* adj2 (effectiv* or utilit* or benefit* or minimi* or unit* or estimat* or variable*)).ab.
51.	(financ* or fee or fees).ti,ab.
52.	(value adj2 (money or monetary)).ti,ab.
53.	or/40-52
54.	39 and 53

NHS EED and HTA (CRD) search terms

#1.	MeSH DESCRIPTOR Preoperative Care EXPLODE ALL TREES
#2.	MeSH DESCRIPTOR Perioperative Care EXPLODE ALL TREES
#3.	MeSH DESCRIPTOR Perioperative Period EXPLODE ALL TREES
#4.	MeSH DESCRIPTOR Perioperative Nursing EXPLODE ALL TREES
#5.	(((perioperative* or peri-operative* or intraoperative* or intra-operative* or intrasurg* or intra-surg* or peroperat* or per-operat*) adj3 (care* or caring or treat* or nurs* or monitor* or recover* or medicine)))
#6.	(((care* or caring or treat* or nurs* or recover* or monitor*) adj3 (before or prior or advance or during or after) adj3 (surg* or operat* or anaesthes* or anesthes*)))
#7.	(((pre-operative* or preoperative* or preop* or pre-op* or pre-surg* or presurg*) adj3 (care* or caring or treat* or nurs* or monitor* or recover* or medicine)))
#8.	(((postoperative* or postop* or post-op* or post-surg* or postsurg*) adj3 (care* or caring or treat* or nurs* or monitor* or recover* or medicine)))
#9.	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8
#10.	(* IN HTA)
#11.	(* IN NHSEED)
#12.	#9 AND #10
#13.	#9 AND #11
#14.	MeSH DESCRIPTOR Intraoperative Care EXPLODE ALL TREES
#15.	#1 OR #2 OR #3 OR #4 OR #14
#16.	((intraoperative* or intra-operative* or intrasurg* or intra-surg* or peroperat* or per-operat* or perioperat* or peri-operat*))
#17.	(((during or duration) adj3 (surg* or operat* or anaesthes* or anesthes*)))
#18.	((postop* or post-op* or post-surg* or postsurg* or perioperat* or peri-operat*))
#19.	((after adj3 (surg* or operat* or anaesthes* or anesthes*)))
#20.	((post adj3 (operat* or anaesthes* or anesthes*)))
#21.	((pre-operat* or preoperat* or pre-surg* or presurg*))
#22.	(((before or prior or advance or pre or prepar*) adj3 (surg* or operat* or anaesthes* or anesthes*)))
#23.	#15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22
#24.	#10 AND #23

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#25.	#11 AND #23
#26.	#12 OR #13 OR #24 OR #25

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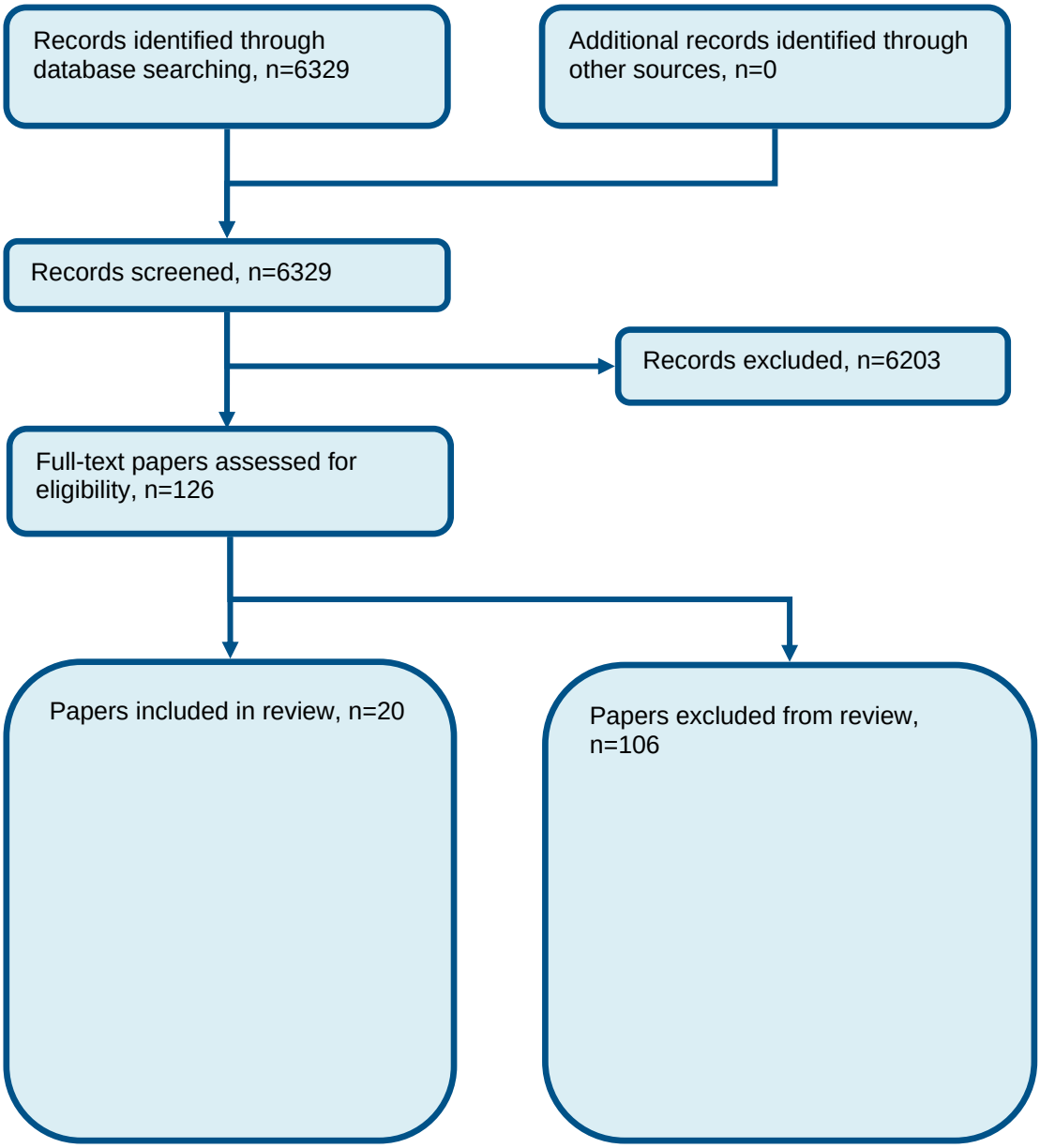
Appendix C: Clinical evidence selection

Figure 1: Flow chart of clinical study selection for the review of preoperative fasting



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Appendix D: Clinical evidence tables

Study	Ajuzieogu 2016[3]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=90)
Countries and setting	Conducted in Nigeria; Setting: Hospital
Line of therapy	Unclear
Duration of study	Intervention + follow up: 24 hours
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: People scheduled for abdominal myomectomy
Stratum	Overall
Subgroup analysis within study	Stratified then randomised
Inclusion criteria	Ninety American Society of Anesthesiologists (ASA) physical status I and II patients aged 18–42 years scheduled for abdominal myomectomy were studied after obtaining a written informed consent from them.
Exclusion criteria	Patients with a history of any gastrointestinal disorder, receiving antacids, or H2 receptor blockers, or those who refused general anesthesia were excluded. Other exclusion criteria were a history of diabetes mellitus, body mass index >30 kg/m2 and pregnancy.
Age, gender and ethnicity	Age - Range: 18-42 years of age. Gender (M:F): Not specified.
Further population details	1. Age: <60 years 2. People with diabetes: Non-diabetic
Indirectness of population	No indirectness
Interventions	(n=30) Intervention 1: Combination of food and fluid restrictions - To be reported. Fasting from midnight until the surgery. . Duration 24 hours. Concurrent medication/care: Not stated. Indirectness: No indirectness (n=30) Intervention 2: Maintaining clear fluids before surgery - Non-milk, non-particulate drinks. 800 mL of oral carbohydrate solution containing 12.5% glucose, 50 kcal/100 mL (Nutricia preop®; Nutricia, Zoetermeer, The Netherlands) the night before surgery and an additional 400 mL 2 h before induction of anesthesia.. Duration 24 hours. Concurrent medication/care: Not stated. Indirectness: No indirectness
Funding	No funding

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RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: FASTING versus CARBOHYDRATE DRINK

Protocol outcome 1: Adverse events and complications
- Actual outcome: Postoperative nausea and vomiting-VAS at 24 hours; Group 1: mean 6 (SD 1.25); n=29, Group 2: mean 4 (SD 1); n=29; VAS 1-10 Top=High is poor outcome; Comments: 2 People dropped out in the overall population due to faulty aspiration techniques, however which groups had these drop-outs is not mentioned. 1 per group has therefore been assumed.
Risk of bias: All domain - Low, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Comments - 2 People dropped out in the overall population due to faulty aspiration techniques, however which groups had these drop-outs is not mentioned. 1 per group has therefore been assumed. ; Indirectness of outcome: No indirectness ;
- Actual outcome: Postoperative nausea and vomiting-VAS at Postoperative score; Group 1: mean 7 (SD 1); n=29, Group 2: mean 7.5 (SD 0.75); n=29; VAS 1-10 Top=High is poor outcome; Comments: 2 People dropped out in the overall population due to faulty aspiration techniques, however which groups had these drop-outs is not mentioned. 1 per group has therefore been assumed.
Risk of bias: All domain - Low, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Comments - 2 People dropped out in the overall population due to faulty aspiration techniques, however which groups had these drop-outs is not mentioned. 1 per group has therefore been assumed. ; Indirectness of outcome: No indirectness ;

Protocol outcome 2: Patient, family and carer experience of care
- Actual outcome: Patient satisfaction at 24 hours; Group 1: mean 6 (SD 0.5); n=29, Group 2: mean 8 (SD 0.75); n=29; VAS 1-10 Top=High is good outcome; Comments: 2 People dropped out in the overall population due to faulty aspiration techniques, however which groups had these drop-outs is not mentioned. 1 per group has therefore been assumed.
Risk of bias: All domain - Low, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Comments - 2 People dropped out in the overall population due to faulty aspiration techniques, however which groups had these drop-outs is not mentioned. 1 per group has therefore been assumed. ; Indirectness of outcome: No indirectness ;

Protocol outcomes not reported by the study	Quality of life ; Mortality ; Unplanned ICU admission ; Thirst ; Headache ; Cancellation of surgery

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Study	Asakura 2015[7]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=134)
Countries and setting	Conducted in Hong Kong (China); Setting: Yokohama City University Hospital in Yokohama, Japan
Line of therapy	Unclear
Duration of study	Intervention + follow up:
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients ASA physical status 1 and 2 adults, age 20 to 79 years, who were scheduled to undergo a surgical procedure of body surface
Exclusion criteria	Patients with impaired gastrointestinal motility, poor comprehension of Japanese, or with psychiatric disorders were excluded from enrolment
Recruitment/selection of patients	scheduled to undergo a surgical procedure of body surface
Age, gender and ethnicity	Age - Mean (SD): CHO:63.4 ±13.6; Fasting: 64.5 ± 10.4. Gender (M:F): 33/28.
Further population details	1. Age: >60 years (CHO:63.4 ±13.6; Fasting: 64.5 ± 10.4). 2. People with diabetes: Not stated / Unclear
Indirectness of population	No indirectness
Interventions	(n=46) Intervention 1: Combination of food and fluid restrictions - To be reported. received 250ml of preoperative CHO (Arginaid Water™, 18% carbohydrates, Nestle Health Science, Tokyo, Japan) between 6.00–6:30 a.m. on the morning of surgery. This is because 250ml of Arginaid Water are approved as a meal. Duration preoperative. Concurrent medication/care: na. Indirectness: No indirectness (n=45) Intervention 2: Combination of food and fluid restrictions - To be reported. Control group, did not receive any preoperative CHO, and were fasted starting at midnight on the day of surgical procedure. Duration preoperative. Concurrent medication/care: na. Indirectness: No indirectness
Funding	No funding
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: CHO versus FASTING Protocol outcome 1: Quality of life	

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- Actual outcome: Global QoR-40 score at 24 hours postoperative; Median (IQR): CHO: 196 (191–198); Fasting: 197 (189.5–200)); Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 4, Reason: lost to follow up; Group 2 Number missing: 5, Reason: lost to follow up Protocol outcome 2: Adverse events and complications - Actual outcome: Length of stay at postoperative; median (IQR):: CHO: 3 (2–3); Fasting: 3 (2–6) days); Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 4, Reason: lost to follow up; Group 2 Number missing: 5, Reason: lost to follow up	
Protocol outcomes not reported by the study	Mortality ; Patient, family and carer experience of care ; Unplanned ICU admission ; Thirst ; Headache ; Cancellation of surgery

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Study	Cakar 2017[17]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=95)
Countries and setting	Conducted in Turkey; Setting: Medical university hospital, Turkey
Line of therapy	Unclear
Duration of study	Intervention + follow up:
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	adult patients undergoing an elective thyroid operation and American Society of Anesthesiologists (ASA) physical status I or II.
Exclusion criteria	The exclusion criteria were aged below 18 or above 80 years, pregnancy, history of delayed gastric emptying, gastrointestinal obstruction, liver cirrhosis, diabetes mellitus, hypertension, severe hepatic or renal failure, or any endocrine disorder that might influence the metabolic parameters and patients requiring urgent or emergent surgery.
Recruitment/selection of patients	undergoing an elective thyroid operation
Age, gender and ethnicity	Age - Mean (SD): CHO: 48.17 ± 9.81; Fasting: 50.07 ± 9.95. Gender (M:F): 28/32.
Further population details	1. Age: <60 years (CHO: 48.17 ± 9.81; Fasting: 50.07 ± 9.95). 2. People with diabetes: Non-diabetic
Indirectness of population	No indirectness
Interventions	(n=30) Intervention 1: Combination of food and fluid restrictions - To be reported. These patients were given an oral carbohydrate solution (PreOp-Nutricia-12.5% carbohydrate, 50 kcal 100 mL21, 290 mOsm kg21,pH: 5.0); 800 mL at 12:00 a.m. and 400 mL 2 hours before surgery . Duration preoperative. Concurrent medication/care: na. Indirectness: No indirectness (n=33) Intervention 2: Combination of food and fluid restrictions - To be reported. The routine fasting procedure was implemented, in which patients were instructed not to take any fluid or food by mouth after midnight (12:00 a.m.) preoperatively and were not given an intravenous (IV) injection. Duration preoperative. Concurrent medication/care: NA. Indirectness: No indirectness

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Funding	Funding not stated
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: CHO versus FASTING Protocol outcome 1: Adverse events and complications - Actual outcome: Tiredness at 6am POD 1; Incidence Rate Ratio (range):: CHO: 1.0 (reference); Fasting: 1.18 (0.64 to 2.17) VAS 0-100 Top=High is poor outcome, Comments: p value 0.592; Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 0; Group 2 Number missing: 3, Reason: lost to follow up Protocol outcome 2: Thirst - Actual outcome: Thirst at 6am POD 1; Incidence rate ratio (range): CHO: 1.0 (reference); Fasting: 11.23 (9.41 to 3.40) VAS 0-100 Top=High is poor outcome, Comments: p value 0.0; Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 0; Group 2 Number missing: 3, Reason: lost to follow up Protocol outcome 3: Headache - Actual outcome: Headache at 6am POD 1; Incidence Rate Ratio (range):: CHo: 1.0 (reference): Fasting: 2.70 (1.69 to 4.32) VAS 0-100 Top=High is poor outcome, Comments: p value 0.0; Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness; Group 1 Number missing: 0; Group 2 Number missing: 3, Reason: lost to follow up	
Protocol outcomes not reported by the study	Quality of life ; Mortality ; Patient, family and carer experience of care ; Unplanned ICU admission ; Cancellation of surgery

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Study	Canbay 2014[19]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=50)
Countries and setting	Conducted in Turkey; Setting: Department of Anesthesiology, Faculty of Medicine, Hacettepe University, Turkey
Line of therapy	Unclear
Duration of study	Intervention + follow up:
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	ASA I–II group and would undergo open radical retropubic prosta- tectomy surgery under elective conditions.
Exclusion criteria	Patients with metabolic, endocrine, or hepatic disease, fever, and infection were excluded.
Recruitment/selection of patients	Undergoing open radical retropubic prostatectomy surgery
Age, gender and ethnicity	Age - Mean (SD): CHO: 60.00 ± 10.37; Fasting: 58.36 ± 11.19. Gender (M:F): all male.
Further population details	1. Age: >60 years (CHO: 60.00 ± 10.37; Fasting: 58.36 ± 11.19). 2. People with diabetes: Non-diabetic
Indirectness of population	No indirectness
Interventions	(n=25) Intervention 1: Combination of food and fluid restrictions - To be reported. Received 800 ml oral glucose solution containing 12.5 % glucose (Nutricia preop) at 24:00 h before surgery and 400 ml at 04:00 h, 2 h prior to the surgery . Duration preoperative. Concurrent medication/care: NA (n=25) Intervention 2: Combination of food and fluid restrictions - To be reported. oral intake was restricted starting from 24:00h . Duration preoperative. Concurrent medication/care: NA
Funding	Funding not stated

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: CHO versus FASTING

Protocol outcome 1: Thirst
- Actual outcome: Thirst (Mild) at Unclear; Group 1: 6/25, Group 2: 13/25; Comments: 4 point Likert scale (0 = no sense, 1: mild, 2: moderate, 3: severe)

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Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness; - Actual outcome: Thirst (Moderate) at Unclear; Group 1: 0/25, Group 2: 5/25; Comments: 4-point likert scale (0 = no sense, 1: mild, 2: moderate, 3: severe) Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ;	
Protocol outcomes not reported by the study	Quality of life ; Mortality ; Adverse events and complications ; Patient, family and carer experience of care ; Unplanned ICU admission ; Headache ; Cancellation of surgery

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Study	Celiksular 2016[20]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=80)
Countries and setting	Conducted in Turkey; Setting:
Line of therapy	Not applicable
Duration of study	Intervention + follow up:
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	ASA I-II patients undergoing total hip replacement surgery due to coxarthrosis
Exclusion criteria	The exclusion criteria consisted of patients using steroids and/or beta-ad-renergic blockers and those with rheumatologic, endocrine, metabolic, renal and liver disease; tumours; obesity; fever and infection.
Recruitment/selection of patients	undergoing total hip replacement surgery due to coxarthrosis
Age, gender and ethnicity	Age - Mean (SD): CHO: 53 (14.96); Fasting: 52.8 (17.86). Gender (M:F): 23/57.
Further population details	1. Age: <60 years (CHO: 53 (14.96); Fasting: 52.8 (17.86)). 2. People with diabetes: Non-diabetic
Indirectness of population	--
Interventions	(n=40) Intervention 1: Combination of food and fluid restrictions - To be reported. The patients were given 800 mL and 400 mL (12.5%) of oral carbohydrate solution (PreopQ, Nutricia, Holland) 8h and two hours before their elective surgery . Duration preoperative. Concurrent medication/care: General anesthesia or epidural anesthesia. Indirectness: No indirectness (n=40) Intervention 2: Combination of food and fluid restrictions - To be reported. This group of patients underwent surgery under general anaesthesia or epidural after an 8-h preoperative fasting period . Duration preoperative. Concurrent medication/care: general anesthesia or epidural. Indirectness: No indirectness
Funding	Funding not stated

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: CHO versus FASTING

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Protocol outcome 1: Adverse events and complications - Actual outcome: Nausea & Vomiting at Unclear; Group 1: 2/40, Group 2: 1/40 Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness;	
Protocol outcomes not reported by the study	Quality of life ; Mortality ; Patient, family and carer experience of care ; Unplanned ICU admission ; Thirst ; Headache ; Cancellation of surgery

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Study	Doo 2018[30]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=50)
Countries and setting	
Line of therapy	Unclear
Duration of study	Intervention + follow up:
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients aged 20–65 years with American Society of Anesthesiologists physical status I or II, who were scheduled to undergo open thyroidectomy under general anaesthesia
Exclusion criteria	mellitus, gastric emptying disorders including gastroesophageal reflux disease, contraindications for ketorolac or nefopam, or emergency surgery were excluded. Patients with fasting blood glucose ≥ 126 mg/dl or glycosylated hemoglobin ≥ 6.5% on pre-operative laboratory test, suggestive of hidden diabetes mellitus, were also excluded.
Recruitment/selection of patients	scheduled to undergo open thyroidectomy under general anaesthesia
Age, gender and ethnicity	Age - Mean (SD): CHO:49.8 ± 7.1 ; Fasting: 51.0 ± 7.5. Gender (M:F): 11/39.
Further population details	1. Age: <60 years (CHO:49.8 ± 7.1 ; Fasting: 51.0 ± 7.5). 2. People with diabetes: Non-diabetic
Indirectness of population	--
Interventions	(n=25) Intervention 1: Combination of food and fluid restrictions - To be reported. Subjects in the carbohydrate group fasted, but received 400 ml of carbohydrate-rich drink (12.8% carbohydrates, 50 kcal/100 ml; Nucare NONPO® , Daesang Wellife, Korea) 2 hours before induction of anesthesia.. Duration preoperative. Concurrent medication/care: General anesthesia with postoperative PCA (n=25) Intervention 2: Combination of food and fluid restrictions - To be reported. Subjects in the control group were requested to obey traditional preoperative fasting after midnight prior to the day of surgery..

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	Duration preoperative. Concurrent medication/care: general anesthesia with postoperative PCA. Indirectness: No indirectness
Funding	Equipment / drugs provided by industry (This research received carbohydrate beverages (Nucare NONPO® ORCID)

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: CHO versus FASTING

Protocol outcome 1: Adverse events and complications
- Actual outcome: Nausea & Vomiting at preoperative; Median (IQR): : CHO: 0 (0-1); Fasting: 0 (0-0) NRS 0-10 Top=High is poor outcome, Comments: p value 0.192;
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ;
- Actual outcome: Nausea & Vomiting at postoperative; Median (IQR):: CHO: 1 (0.5-2) ; Fasting: 1 (1-2) NRS 0-10 Top=High is poor outcome, Comments: p value 0.926;
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ;
- Actual outcome: Fatigue at preoperative; Median (IQR): CHO: 2 (0-2); Fasting: 2 (1-2) NRS 0-10 Top=High is poor outcome, Comments: p value 0.512;
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ;
- Actual outcome: Fatigue at postoperative; Median (IQR):: CHO: 1 (0.5-2); Fasting: 1 (0-2) NRS 0-10 Top=High is poor outcome, Comments: p value 0.630;
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ;
- Actual outcome: Anxiety at preoperative; Median (IQR): CHO: 2 (1-3); Fasting: 2 (1-2) NRS 0-10 Top=High is poor outcome, Comments: p value 0.288;
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ;
- Actual outcome: Anxiety at postoperative; median (IQR):: CHo: 0 (0-0); Fasting: 0 (0-1) NRS 0-10 Top=High is poor outcome, Comments: p value 0.50;
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ;

Protocol outcome 2: Patient, family and carer experience of care
- Actual outcome: Patient Satisfaction at preoperative; Mean; (Median (IQR):: CHO: 4 (3-4); Fasting: 4 (3-4)) 5-point scale 0-5 Top=High is good outcome, Comments: p value 1
(5: very satisfied, 4: somewhat satisfied, 3: neutral, 2: somewhat dissatisfied, 1: very dissatisfied);
Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness ;
- Actual outcome: Patient Satisfaction at postoperative; Median (IQR) : CHO: 4 (3-4); Fasting: 4 (3-4) 5 point scale 1-5 Top=High is good outcome,

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Comments: p value 0.715 5-point scale (5: very satisfied, 4: somewhat satisfied, 3: neutral, 2: somewhat dissatisfied, 1: very dissatisfied); Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness; Protocol outcome 3: Thirst - Actual outcome: Thirst at preoperative; Median (IQR): CHO: 1 (0-2); Fasting: 2 (1-2) NRS 0-10 Top=High is poor outcome, Comments: p value 0.099; Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; - Actual outcome: Thirst at postoperative; Median (IQR) : CHO: 2 (1-3); Fasting: 3 (1.5-4) NRS 0-10 Top=High is poor outcome, Comments: p value 0.456; Risk of bias: All domain - ; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Quality of life ; Mortality ; Unplanned ICU admission ; Headache ; Cancellation of surgery

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Study	Faria 2009[31]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=21)
Countries and setting	Conducted in Brazil; Setting: Medical centre, Brazil
Line of therapy	Not applicable
Duration of study	Intervention + follow up:
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Adult women scheduled to undergo elective laparoscopic cholecystectomy
Exclusion criteria	ASA score above II, diabetes mellitus, age below 18 or above 65 years old, renal failure, gastroesophageal reflux, acute cholecystitis, use of corticosteroids up to 6 months previously, and any noncompliance or violation on the assigned protocol of preoperative fasting.
Recruitment/selection of patients	scheduled to undergo elective laparoscopic cholecystectomy
Age, gender and ethnicity	Age - Median (range): CHO: 47 (19–65); Fasting: 48 (29–65). Gender (M:F): all female.
Further population details	1. Age: <60 years (CHO: 47 (19–65); Fasting: 48 (29–65)). 2. People with diabetes: Non-diabetic
Indirectness of population	No indirectness
Interventions	(n=11) Intervention 1: Combination of food and fluid restrictions - To be reported. receive 200 ml of a carbohydrate beverage containing 12.5% (25 g, 50 kcal per 100 ml and approximately 285 mOsm) of maltodextrine (Nidex, Nestle, Brazil) 2 h before operation. Duration preoperative. Concurrent medication/care: All patients were submitted to general anesthesia without epidural blockage. They received a single dose of 1 g of intravenous cefazolin. A routine prescription of 1,000–1,500 ml of intravenous saline was administered to all patients postoperatively. Postoperative fasting was prescribed until 5:00 p.m., 12 h after the patients had or had not received the carbohydrate drink. After that, all patients received a liquid diet unless they had nausea or vomiting, in which case an antiemetic was prescribed. Postoperative analgesia was provided with both 50 mg of subcutaneous tramadol cloridrate and 500 mg of intravenous dipyrone every 6h.. Indirectness: No indirectness (n=12) Intervention 2: Combination of food and fluid restrictions - To be reported. conventional preoperative fasting of 8 h. Duration preoperative. Concurrent medication/care: All patients were submitted to general

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	anesthesia without epidural blockage. They received a single dose of 1 g of intravenous cefazolin. A routine prescription of 1,000–1,500 ml of intravenous saline was administered to all patients postoperatively. Postoperative fasting was prescribed until 5:00 p.m., 12 h after the patients had or had not received the carbohydrate drink. After that, all patients received a liquid diet unless they had nausea or vomiting, in which case an antiemetic was prescribed. Postoperative analgesia was provided with both 50 mg of subcutaneous tramadol cloridrate and 500 mg of intravenous dipyrone every 6h.. Indirectness: No indirectness
Funding	-- (CNPq (Conselho Nacional de Desenvolvimento Cientifico e Tecnologico) funding the study (grant 401943/2005-4))
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: CHO versus FASTING Protocol outcome 1: Adverse events and complications - Actual outcome: Vomiting at Postoperative; Group 1: 3/11, Group 2: 7/10 Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - High, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness; Group 1 Number missing: 0; Group 2 Number missing: 2	
Protocol outcomes not reported by the study	Quality of life ; Mortality ; Patient, family and carer experience of care ; Unplanned ICU admission ; Thirst ; Headache ; Cancellation of surgery

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Study	Gilbert 1995[37]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=95)
Countries and setting	Conducted in United Kingdom; Setting: The Vale of Leven Hospital, Alexandria, Dunbartonshire
Line of therapy	Unclear
Duration of study	Intervention + follow up:
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients scheduled for minor operations who were ASA I or II
Exclusion criteria	Patients with gastrointestinal disease, undergoing emergency procedures, pregnant women, children and patients with mental handicap were not studied.
Recruitment/selection of patients	Patients scheduled for minor operations who were ASA I or II
Age, gender and ethnicity	Age - Mean (SD): Water: 45.6 (15.6); Fasting: 48.3 (16.6). Gender (M:F): 35/60.
Further population details	1. Age: <60 years (Water: 45.6 (15.6); Fasting: 48.3 (16.6)). 2. People with diabetes: Not stated / Unclear
Indirectness of population	--
Interventions	(n=46) Intervention 1: Combination of food and fluid restrictions - To be reported. Patients in group A (water) were asked to drink 500 ml- 1L of water over 2 h, before a 3 h pre-operative fast.. Duration preoperative. Concurrent medication/care: All patients received premedication with temazepam 20mg and ranitidine 150 mg by mouth, 2 h before the scheduled time of operation. (n=49) Intervention 2: Combination of food and fluid restrictions - To be reported. Group B (fasting) followed the standard regimen of fasting from midnight for the morning list or 'tea and toast' before 08.00 h for the afternoon session.. Duration preoperative. Concurrent medication/care: All patients received premedication with temazepam 20mg and ranitidine 150 mg by mouth, 2 h before the scheduled time of operation.. Indirectness: No indirectness
Funding	Funding not stated

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: WATER versus FASTING

Protocol outcome 1: Adverse events and complications

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- Actual outcome: Nausea at 2 hours post operative; Median: Water: 1.0; FAsting: 0 0-100 Top=High is poor outcome, Comments: p value 0.32; Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low, Comments - Only median value given; Indirectness of outcome: No indirectness ; Group 1 Number missing: 5, Reason: not enough water taken or given IV fluids; Group 2 Number missing: 1, Reason: given IV fluids - Actual outcome: Vomiting at 2 hours post operative; Median : Water: 1.0; Fasting: 0 0-100 Top=High is poor outcome, Comments: p value 0.21; Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low, Comments - Only median value given; Indirectness of outcome: No indirectness ; Group 1 Number missing: 5, Reason: not enough water taken or given IV fluids; Group 2 Number missing: 1, Reason: given IV fluids - Actual outcome: Drowsiness at 2 hours post operative; Mean; ; Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low, Comments - Only median value given; Indirectness of outcome: No indirectness; Group 1 Number missing: 5, Reason: not enough water taken or given IV fluids; Group 2 Number missing: 1, Reason: given IV fluids Protocol outcome 2: Thirst - Actual outcome: Thirst at 2 hours post operative; Median: Water: 5.0; Fasting: 21.0 VAS 0-100 Top=High is poor outcome, Comments: P value 0.0149; Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low, Comments - Only median value given; Indirectness of outcome: No indirectness ; Group 1 Number missing: 5, Reason: not enough water taken or given IV fluids; Group 2 Number missing: 1, Reason: given IV fluids Protocol outcome 3: Headache - Actual outcome: Headache at 2 hours post operative; Median : Water: 2.5; Fasting: 2.0 0-100 Top=High is poor outcome, Comments: p value 0.99; Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low, Comments - Only median value given; Indirectness of outcome: No indirectness ; Group 1 Number missing: 5, Reason: not enough water taken or given IV fluids; Group 2 Number missing: 1, Reason: given IV fluids	
Protocol outcomes not reported by the study	Quality of life ; Mortality ; Patient, family and carer experience of care ; Unplanned ICU admission ; Cancellation of surgery

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Study	Hausel 2001[41]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=252)
Countries and setting	Conducted in Sweden; Setting: Three hospitals in the Stockholm area took part in the study.
Line of therapy	Not applicable
Duration of study	Intervention time:
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients who were eligible for intake of preoperative clear fluids, according to the guidelines from the Swedish Association of Anaesthetists (1), were considered for inclusion. These guidelines are similar to the present recommendations given by the American Society of Anesthesiologists (ASA)
Exclusion criteria	conditions (including pharmacologic treatments) that might impair gastrointestinal motility, gastroesophageal reflux, pregnancy, and the potential for difficult airway management. In addition, patients with diabetes mellitus and patients in ASA physical status classes ≥III were excluded.
Recruitment/selection of patients	patients scheduled for elective laparoscopic cholecystectomy or elective major colorectal surgery
Age, gender and ethnicity	Age - Median (IQR): Laparoscopic cholecystectomy - Fasted: 48 (37–59); CHO: 49 (36–58); Colorectal surgery: Fasted 52 (34–66); CHO 56 (50–67). Gender (M:F): 84/168.
Further population details	1. Age: <60 years (Laparoscopic cholecystectomy - Fasted: 48 (37–59); CHO: 49 (36–58); Colorectal surgery: Fasted 52 (34–66); CHO 56 (50–67)). 2. People with diabetes: Non-diabetic
Indirectness of population	No indirectness
Interventions	(n=80) Intervention 1: Combination of food and fluid restrictions - To be reported. During the evening before surgery, the CHO group consumed 800 mL of an iso-osmolar carbohydrate-rich drink (12.5% carbohydrates, 50 kcal/100 mL, 290 mOsm/kg, pH 5.0, Nutricia Preop®; Numico, Zoetermeer, the Netherlands). After midnight, nothing by mouth was allowed, except a single morning dose of 400 mL of the CHO drink. Duration preoperative. Concurrent medication/care: Premedication was standardized to morphine 10 mg IM or ketobemidone 5 mg IM. Epidural analgesia was initiated before general anesthesia (GA) by using bupivacaine with epinephrine. GA was induced IV with fentanyl and thiopental after the administration of glycopyrrolate.

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	(n=86) Intervention 2: Combination of food and fluid restrictions - To be reported. patients were fasted from midnight. Duration preoperative. Concurrent medication/care: Premedication was standardized to morphine 10 mg IM or ketobemidone 5 mg IM. Epidural analgesia was initiated before general anesthesia (GA) by using bupivacaine with epinephrine. GA was induced IV with fentanyl and thiopental after the administration of glycopyrrolate. . Indirectness: No indirectness
Funding	Funding not stated
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: CHO versus FASTING Protocol outcome 1: Adverse events and complications - Actual outcome: Malaise at 40 minutes post morning drink; Median (IQR): Fasted: 12 (3–30); CHO: 8 (4–20) visual analogue scale 0-100 Top=High is poor outcome; Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; - Actual outcome: Malaise at 90 minutes post morning drink; Median (IQR): Fasted: 10 (3–30); CHO: 7 (3–17) visual analogue scale 0-100 Top=High is poor outcome; Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; - Actual outcome: Nausea at 40 minutes post morning drink; Median (IQR): Fasting: 3 (2–10); CHO: 4 (2–6) visual analogue scale 0-100 Top=High is poor outcome; Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; - Actual outcome: Nausea at 90 minutes post morning drink; Median (IQR): Fasting: 4 (2–12); CHO:3 (2–7) visual analogue scale 0-100 Top=High is poor outcome; Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ;	
Protocol outcomes not reported by the study	Quality of life ; Mortality ; Patient, family and carer experience of care ; Unplanned ICU admission ; Thirst ; Headache ; Cancellation of surgery

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Study	Helminen 2009[44]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=240)
Countries and setting	Conducted in Finland; Setting: Department of Surgery and bDepartment of Anaesthesia, Seinajoki Central Hospital, Finland
Line of therapy	Not applicable
Duration of study	Intervention + follow up:
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	adult patients undergoing elective abdominal, anal, thyroid or parathyroid operations and ASA physical status I–III.
Exclusion criteria	Patients who were pregnant or who had dementia, impairment of gastrointestinal motility or diabetes mellitus were excluded from the study.
Recruitment/selection of patients	patients undergoing elective abdominal, anal, thyroid or parathyroid operations
Age, gender and ethnicity	Age - Mean (SD): CHO: 60±15; Fasting: 58±4. Gender (M:F): 68/137.
Further population details	1. Age: >60 years (CHO: 60±15; Fasting: 58±4). 2. People with diabetes: Not stated / Unclear
Indirectness of population	--
Interventions	(n=80) Intervention 1: Combination of food and fluid restrictions - To be reported. Patients in the CHO group were given nothing after midnight and a 12.5%CHD(Nutricia Preop; Numici, The Netherlands), that is 400ml (=200 kcal), between 6 and 7 a.m.. Duration preoperative. Concurrent medication/care: Patients were premedicated and anaesthetized according to the normal practice of our hospital. Oral premedication of hydroxyzine hydrochloride (Atarax; UCB, Belgium) 25–50mg with a small amount of water was given at 7 a.m. in the morning.. Indirectness: No indirectness (n=80) Intervention 2: Combination of food and fluid restrictions - To be reported. Patients in the fasting group were given nothing by mouth after midnight.. Duration preoperative. Concurrent medication/care: Patients were premedicated and anaesthetized according to the normal practice of our hospital. Oral premedication of hydroxyzine hydrochloride (Atarax; UCB, Belgium) 25–50mg with a small amount of water was given at 7 a.m. in the morning.. Indirectness: No indirectness
Funding	Funding not stated

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RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: CHO versus FASTING

Protocol outcome 1: Thirst
- Actual outcome: Thirst at Before anesthesia; Median (IQR): CHO: 1 (0-4.5); Fasting: 3 (0-5) visual analogue scale 0-10 Top=High is poor outcome; Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 10; Group 2 Number missing: 7
- Actual outcome: Tiredness at Before anesthesia; median (IQR): CHO: 2 (0–5); Fasting: 3 (0-5) visual analogue scale 0-10 Top=High is poor outcome; Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 10; Group 2 Number missing: 7
- Actual outcome: Anxiety at Before anesthesia; median (IQR): CHO: 2 (1-5); Fasting: 3 (1-5) visual analogue scale 0-10 Top=High is poor outcome; Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness; Group 1 Number missing: 10; Group 2 Number missing: 7

Protocol outcomes not reported by the study	Quality of life ; Mortality ; Adverse events and complications ; Patient, family and carer experience of care ; Unplanned ICU admission ; Headache ; Cancellation of surgery

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Study	Helminen 2019[43]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=113)
Countries and setting	Conducted in Finland; Setting: Seinajoki Central hospital, Oulu University hospital, Finland
Line of therapy	Not applicable
Duration of study	Intervention + follow up:
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Adults aged between 18 - 70 with ASA I to II scheduled for day case cholecystectomy.
Exclusion criteria	bleeding or coagulation disorders, BMI > 40kg/m², insulin dependent diabetes, dementia, migraine or menieres disease or with a history of alcohol or drug abuse
Recruitment/selection of patients	scheduled for day case cholecystectomy.
Age, gender and ethnicity	Age - Mean (SD): CHO: 47 (13); Fasting: 46 (11). Gender (M:F): Define.
Further population details	1. Age: <60 years (CHO: 47 (13); Fasting: 46 (11)). 2. People with diabetes: Diabetic patients (non insulin dependent diabetes patients were included. 5 in each group.).
Indirectness of population	No indirectness
Interventions	(n=57) Intervention 1: Combination of food and fluid restrictions - To be reported. 200ml of carbohydrate rick drink (Providextra; Fresineus Kabi Ab; Bad Homburg Vor der Hohe, Germany) containing 300kcal, 67g carbohydrate and 8g protein at home before leaving for the hospital or by 6am for surgery scheduled at 9am or 8pm at the latest for later surgery. . Duration preoperative. Concurrent medication/care: NA (n=56) Intervention 2: Combination of food and fluid restrictions - To be reported. Patients were instructed to take nothing by mouth after midnight on the night before surgery.. Duration preoperative. Concurrent medication/care: NA. Indirectness: No indirectness
Funding	No funding

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: CHO versus FASTING

Protocol outcome 1: Quality of life
- Actual outcome: Tiredness at before induction; Median (IQR): CHO: 30 (10-54); Fasting: 20 (5-46) VAS 0-100 Top=High is poor outcome;

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Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 4, Reason: questionnaire not completed; Group 2 Number missing: 1, Reason: questionnaire not completed - Actual outcome: Tiredness at 2 hours postoperative; Mean; (Median (IQR): CHO: 49 (20-70); Fasting: 53 (30-61)) VAS 0-100 Top=High is poor outcome; Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 4, Reason: questionnaire not completed; Group 2 Number missing: 1, Reason: questionnaire not completed - Actual outcome: Tiredness at 4 hours postoperative; Median (IQR) : CHO: 42 (8-70); Fasting: 40 (10-50) VAS 0-100 Top=High is poor outcome; Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 4, Reason: questionnaire not completed; Group 2 Number missing: 1, Reason: questionnaire not completed Protocol outcome 2: Adverse events and complications - Actual outcome: Nausea at before induction; Median (IQR): CHO: 0 (0-0); Fasting: 0 (0-2) VAS 0-100 Top=High is poor outcome; Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 4, Reason: questionnaire not completed; Group 2 Number missing: 1, Reason: questionnaire not completed - Actual outcome: Nausea at 2 hours postoperative; Median (IQR): CHO: 0 (0-14); Fasting: 0 (0-6) VAS 0-100 Top=High is poor outcome; Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 4, Reason: questionnaire not completed; Group 2 Number missing: 1, Reason: questionnaire not completed - Actual outcome: Nausea at 4 hours postoperative; Median (IQR) : CHO: 0 (0-4); Fasting: 0 (0-10) VAS 0-100 Top=High is poor outcome; Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 4, Reason: questionnaire not completed; Group 2 Number missing: 1, Reason: questionnaire not completed Protocol outcome 3: Thirst - Actual outcome: Thirst at before induction; Median (IQR): CHO: 22 (6 - 50); Fasting: 40 (8 - 63)); Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 4, Reason: questionnaire not completed; Group 2 Number missing: 1, Reason: questionnaire not completed - Actual outcome: Thirst at 2 hours postoperative; Median (IQR): : CHO: 41 (20 - 61); Fasting: 46 (24-70)); Risk of bias: All domain - ; Indirectness of outcome: No indirectness - Actual outcome: Thirst at 4 hours postoperative; Median (IQR) : CHO: 28 (9-61); Fasting: 20(0-50)); Risk of bias: All domain - ; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the	Mortality ; Patient, family and carer experience of care ; Unplanned ICU admission ; Headache ;

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study	Cancellation of surgery

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Study	Lee 2018[58]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=153)
Countries and setting	
Line of therapy	Not applicable
Duration of study	Intervention + follow up:
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients ASA I – II adults who had a Karnofsky performance status scale greater than 70 undergoing laparoscopic cholecystectomy
Exclusion criteria	fasting glucose level greater than 120 mg/dL, type I or II diabetes, gastroesophageal reflux disease, history of previous Gi surgery or ASA IV/V
Recruitment/selection of patients	undergoing laparoscopic cholecystectomy
Age, gender and ethnicity	Age - Mean (SD): CHO: 50 (13); Fasting: 49 (12). Gender (M:F): 49/48.
Further population details	1. Age: <60 years (CHO: 50 (13); Fasting: 49 (12)). 2. People with diabetes: Non-diabetic
Indirectness of population	No indirectness
Interventions	(n=51) Intervention 1: Combination of food and fluid restrictions - To be reported. Received 800ml of a clear carbohydrate beverage (12.8% carbohydrates, 50kcal/100ml, 290 mOsm/kg, Daesang WelLife Co, Korea). Patients were instructed to ingest 400ml of this beverage on the evening before surgery (400ml) 2h before any anesthetic medication was administered. Duration preoperative. Concurrent medication/care: General anesthesia with IV postoperative pain relief (n=51) Intervention 2: Combination of food and fluid restrictions - To be reported. Patients within this group were not allowed to drink any solution or fluid after midnight before surgery. Duration preoperative. Concurrent medication/care: General anesthesia with IV postoperative pain relief
Funding	Equipment / drugs provided by industry (Nos-NPO were provided by the Daesang Corporation, Korea)
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: CHO versus FASTING Protocol outcome 1: Quality of life	

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- Actual outcome: Postoperative QoR-40 score at POD 1; Group 1: mean 187.7 (SD 17.5); n=46, Group 2: mean 194.5 (SD 5.6); n=51; QoR-40 40-200 Top=High is good outcome Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness; Group 1 Number missing: 5, Reason: prolonged fasting time; Group 2 Number missing: 2, Reason: refusal to complete postoperative data Protocol outcome 2: Adverse events and complications - Actual outcome: Length of stay (days) at postoperative; Group 1: mean 2.59 days (SD 1.61); n=46, Group 2: mean 2.38 days (SD 2.05); n=51 Risk of bias: All domain - Low, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 5, Reason: prolonged fasting time; Group 2 Number missing: 2, Reason: refusal to complete postoperative data	
Protocol outcomes not reported by the study	Mortality ; Patient, family and carer experience of care ; Unplanned ICU admission ; Thirst ; Headache ; Cancellation of surgery

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Study	Melis 2006[73]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=29)
Countries and setting	Conducted in Netherlands; Setting: VU University Medical Centre, Netherlands
Line of therapy	Not applicable
Duration of study	Intervention + follow up:
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Adult patients undergoing elective orthopaedic surgery
Exclusion criteria	inability to give informed consent, decreased consciousness, and circumstancex increasing the chance of a full stomach at the moment of induction (diabetes, sliding hernia of the stomach, rolling diaphragmatic hernia, obstruction of GI tract, pregnancy, increased intracranial pressure, obesity and use of medication affecting gastric emptying)
Recruitment/selection of patients	Adult patients undergoing elective orthopaedic surgery
Age, gender and ethnicity	Age - Mean (SD): Drink A: 59 (9); Drink B: 47 (17); Fasting: 56 (13). Gender (M:F): 15/14.
Further population details	1. Age: <60 years (Drink A: 59 (9); Drink B: 47 (17); Fasting: 56 (13)). 2. People with diabetes: Non-diabetic
Indirectness of population	No indirectness
Interventions	(n=19) Intervention 1: Combination of food and fluid restrictions - To be reported. CHO Drink A: Drink was poured out into a class 4 hours before surgery and had to be consumed 3 hours before surgery. Drink A was Nutricia preOp (Nutricia, Zoetermeer, the Netherlands), which contained 50.4g of the carbohydrates; consisting of 0.8g glucose, 5.2g polysaccharides and a small amount of organic acids and 200mg sodium, 488mg Potassium, 24mg chloride, 24mg calcium, 4mg of phosphor, and 4mg of Magnesium in a solution of 400ml with an osmolality of 260mOsm/kg CHO drink B: Drink was poured out into a class 4 hours before surgery and had to be consumed 3 hours before surgery. Drink B was Roosvicee vruchtenmix (Heinz, Zeist, the Netherlands), a syrup of rosehip and

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	other fruits, which was diluted in water (70ml syrup : 330ml water) and contained 48mg of carbohydrates, consisting of 6.2g fructose, 6.2g of glucose and furthermore carbohydrate with unidentified chemical structure of 0.2g fiber, 0.2g protein, 6.4mg sodium, 73mg potassium, 6.9mg calcium, 7.mg phosphor, 0.1mg iron and 41mg Vitamin C in a solution of 400ml with an osmolality of 574 mOsm/kg . Duration preoperative. Concurrent medication/care: NA. Indirectness: No indirectness (n=10) Intervention 2: Combination of food and fluid restrictions - To be reported. Fasted after midnight on the day of surgery. Duration preoperative. Concurrent medication/care: NA. Indirectness: No indirectness
Funding	Funding not stated

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: CHO DRINK A / CHO DRINK B versus FASTING

Protocol outcome 1: Quality of life
- Actual outcome: Anxiety at day before surgery up to preoperative; Median increase/decrease (IQR): CHOA: -15 (49); CHOB: 0 (15) ; Fasting: +3 (51) VAS 0-100 Top=High is poor outcome;
Risk of bias: All domain - High, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness;

Protocol outcome 2: Adverse events and complications
- Actual outcome: Nausea at day before surgery up to preoperative; Median increase / decrease (IQR): CHOA: 0 (6); CHOB: +1 (6); Fasting: 0 (7) VAS 0-100 Top=High is poor outcome;
Risk of bias: All domain - High, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ;
- Actual outcome: Tiredness at day before surgery up to preoperative; Mean; (median increase/decrease (IQR): CHOA: 0 (20); CHOB: -7 (29); Fasting: -19 (27)) VAS 0-100 Top=High is poor outcome;
Risk of bias: All domain - High, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ;

Protocol outcome 3: Thirst
- Actual outcome: Feeling of thirst at day before surgery up to preoperative; Median Increase/Decrease (IQR): CHOA: -7 (39); CHOB: 0 (18); Fasting: +34 (34) VAS 0-100 Top=High is poor outcome;
Risk of bias: All domain - High, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ;

Protocol outcomes not reported by the	Mortality ; Patient, family and carer experience of care ; Unplanned ICU admission ; Headache ;

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study	Cancellation of surgery

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Study	Onalan 2018[84]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=53)
Countries and setting	Conducted in Turkey; Setting: Karabuk University Health Sciences Institute, Karabuk, Turkey;
Line of therapy	Unclear
Duration of study	Intervention + follow up:
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Scheduled for LC, Age more than 18 years and less than 65 years. Agreeing to participate in the study and signing the informed consent form.
Exclusion criteria	Those with a history of diabetes (type 1 and 2). Those who have ahistory of gestational diabetes. Body mass index (BMI)of 40 kg/m2 or more (BMI 5 body weight/height2). ASA group III or IV. Those who were administered intravenous fluid before surgery. Those with liver and kidney failure. Drug users whose blood glucose levels will be impacted. Those who have previously undergone abdominal surgery. Those with a history of acute cholecystitis or acute pancreatitis. Patients for whom CO2 insufflation is inconvenient in terms of anesthesia (heart failure, chronic obstructive pulmonary disease, and so forth). Those who have bleeding diathesis. Those receiving immuno suppressive treatment. Patients with any infectious disease.
Recruitment/selection of patients	elective laparoscopic cholecystectomy (LC)
Age, gender and ethnicity	Age - Median (IQR): CHO: 53 (16); Fasting: 54 (14). Gender (M:F): 13/37.
Further population details	1. Age: <60 years (CHO: 53 (16); Fasting: 54 (14)). 2. People with diabetes: Non-diabetic
Indirectness of population	No indirectness
Interventions	(n=26) Intervention 1: Combination of food and fluid restrictions - To be reported. the patients were given an oral glucose solution (Nutricia preop) containing 12.5% glucose, first 800 mL at 12 a.m., and then 400 mL at 6 a.m., 2 hours before the surgery. The solution was ingested in 10 minutes. Nutricia preop, one of the

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	OCSs containing maltodextrin and electrolytes, contains 12.5% glucose. It passes through the stomach in 90 minutes. Its osmolality is 285 mosm/kg/H2O and it has 50 kcal/100 mL. In addition, it contains 0.46 mg/mL sodium and 1.93 mg/mL potassium. . Duration preoperative . Concurrent medication/care: To provide the standardization of treatment after surgery, both groups were treated with 2,000 mL 5% dextrose plus 1,500 mL saline solution, cefazolin sodium (according to our country's infection control committee suggestion) 1 g 2 x 1, tenoxicam 20 mg 2 x 1, ranitidine 50 mg 3 x 1, and metocloramide HCL.. Indirectness: No indirectness (n=27) Intervention 2: Combination of food and fluid restrictions - To be reported. Food and water were cut off in the control group as of 12 a.m. the night before surgery. Duration Preoperative. Concurrent medication/care: To provide the standardization of treatment after surgery, both groups were treated with 2,000 mL 5% dextrose plus 1,500 mL saline solution, cefazolin sodium (according to our country's infection control committee suggestion) 1 g 2 x 1, tenoxicam 20 mg 2 x 1, ranitidine 50 mg 3 x 1, and metocloramide HCL.. Indirectness: No indirectness
Funding	Academic or government funding (This study was carried out as the Scientific Research Project of Karabuk University)

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: CHO versus FASTING

Protocol outcome 1: Thirst
- Actual outcome: Thirst at 3 hours postoperative; Group 1: mean 0.64 (SD 0.91); n=25, Group 2: mean 7.8 (SD 2.5); n=25; VAS 0-10 Top=High is poor outcome; Comments: P value <0.001
Low values from the visual analog scale are indicative
of recovery.
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness; Group 1 Number missing: 1, Reason: prolonged procedure; Group 2 Number missing: 2, Reason: prolonged procedure / change of surgery
- Actual outcome: Anxiety at 3 hours postoperative; Group 1: mean 0.12 (SD 0.44); n=25, Group 2: mean 5.12 (SD 2.77); n=25; VAS 0-10 Top=High is poor outcome; Comments: P value <0.001
Low values from the visual analog scale are indicative of recovery.
Risk of bias: All domain - ; Indirectness of outcome: No indirectness

Protocol outcomes not reported by the	Quality of life ; Mortality ; Adverse events and complications ; Patient, family and carer experience of care

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study	; Unplanned ICU admission ; Headache ; Cancellation of surgery

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Study	Raksakietisak 2014[96]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=100)
Countries and setting	Conducted in Thailand; Setting: Faculty of Medicine Siriraj Hospital, Mahidol Unviersity, Thailand
Line of therapy	Unclear
Duration of study	Intervention + follow up:
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients aged 50 – 80 years with unilateral total knee replacement
Exclusion criteria	Revision TKR or bilateral TKR, BMI > 30kg/m2, Gi diseases or Gi affecting drugs, diabetes, CKD, and CHF
Recruitment/selection of patients	unilateral total knee replacement
Age, gender and ethnicity	Age - Mean (SD): CHO: 69.8 (7.3); Fasting: 70.8 (8.5). Gender (M:F): 10/88.
Further population details	1. Age: >60 years (CHO: 69.8 (7.3); Fasting: 70.8 (8.5)). 2. People with diabetes: Non-diabetic
Indirectness of population	No indirectness
Interventions	(n=48) Intervention 1: Combination of food and fluid restrictions - To be reported. Assigned to drink 400ml of 10% carbohydrate rich orange juice (Greenmate) between 18:00 and 24:00 and another 400ml at about 2 hour before anaesthesia (6:00 to 7:00am) . Duration preoperative. Concurrent medication/care: Single shot spinal anesthesia (n=50) Intervention 2: Combination of food and fluid restrictions - To be reported. The control group had to starve from midnight. Duration preoperative. Concurrent medication/care: Single shot spinal anesthesia. Indirectness: No indirectness
Funding	-- (Siriraj research development fund)

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: CHO versus FASTING

Protocol outcome 1: Adverse events and complications

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- Actual outcome: Nausea at postoperative; Group 1: 9/48, Group 2: 10/50 Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 2, Reason: inadequate spinal block; Group 2 Number missing: 0 - Actual outcome: Vomiting at postoperative; Group 1: 8/48, Group 2: 12/50 Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low, Comments - ; Indirectness of outcome: No indirectness; Group 1 Number missing: 2, Reason: inadequate spinal block; Group 2 Number missing: 0 Protocol outcome 2: Patient, family and carer experience of care - Actual outcome: Anxiety at Preoperative; Group 1: mean 3.6 (SD 3); n=48, Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 2, Reason: inadequate spinal block; Group 2 Number missing: 0 Protocol outcome 3: Thirst - Actual outcome: Thirst at Preoperative; Group 1: mean 2.4 (SD 2.2); n=48, Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 2, Reason: inadequate spinal block; Group 2 Number missing: 0	
Protocol outcomes not reported by the study	Quality of life ; Mortality ; Unplanned ICU admission ; Headache ; Cancellation of surgery

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Study	Read 1991[97]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=54)
Countries and setting	Conducted in United Kingdom; Setting: University Hospital of Wales
Line of therapy	Not applicable
Duration of study	Intervention + follow up:
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients ASA I or II, between the ages of 18-60 and scheduled to have elective surgery normally requiring tracheal intubation
Exclusion criteria	Pregnant, GI abnormality, or any medications known to affect gastric emptying
Recruitment/selection of patients	scheduled to have elective surgery normally requiring tracheal intubation
Age, gender and ethnicity	Age - Median (range): Water: 30 (17-56); Fasting: 32 (18-50). Gender (M:F): 18/36.
Further population details	1. Age: <60 years (Water: 30 (17-56); Fasting: 32 (18-50)). 2. People with diabetes: Not stated / Unclear
Indirectness of population	No indirectness
Interventions	(n=25) Intervention 1: Preoperative food restriction for - 4-6 hours. Permitted to drink water up until 2 hours before the operation. Duration preoperative. Concurrent medication/care: Premedication of oral temazepam 20mg given 2h preoperatively. Indirectness: No indirectness (n=29) Intervention 2: Combination of food and fluid restrictions - To be reported. Abstain from eating and drinking from midnight (morning operation) or after a light breakfast at 6:30am (afternoon operation) . Duration preoperative. Concurrent medication/care: Premedication of oral temazepam 20mg given 2h preoperatively. Indirectness: No indirectness
Funding	Funding not stated
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: WATER versus FASTING	

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Protocol outcome 1: Adverse events and complications - Actual outcome: Nausea at POD1; Group 1: 5/25, Group 2: 15/29 Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; - Actual outcome: Vomiting at POD1; Group 1: 3/25, Group 2: 10/29 Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness; Protocol outcome 2: Headache - Actual outcome: Headache at POD1; Group 1: 6/25, Group 2: 12/29 Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ;	
Protocol outcomes not reported by the study	Quality of life ; Mortality ; Patient, family and carer experience of care ; Unplanned ICU admission ; Thirst ; Cancellation of surgery

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Study	Sada 2014[98]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=142)
Countries and setting	
Line of therapy	Not applicable
Duration of study	Intervention + follow up: 48 hours postoperative
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	patients were older than 18 years, undergoing an operation of the colon and rectum for benign and malignant diseases, or open abdominal cholecystectomy for chronic cholecystitis
Exclusion criteria	type 1 or 2 diabetes mellitus, stomach emptying disorders or documented gastric esophageal reflex disease, emergency surgery interventions, or refusal of the patient to participate in the trial
Recruitment/selection of patients	undergoing an operation of the colon and rectum
Age, gender and ethnicity	Age - Mean (SD): CHO: 56.85 (12.8); Fasting: 56.45 (14.28). Gender (M:F): 53/89.
Further population details	1. Age: <60 years (CHO: 56.85 (12.8); Fasting: 56.45 (14.28)). 2. People with diabetes: Non-diabetic (Type 1 and 2 diabetes an exclusion criterion).
Indirectness of population	No indirectness
Interventions	(n=44) Intervention 1: Combination of food and fluid restrictions - To be reported. The study group received 800 mL (per os) of carbohydrate beverage in the evening before surgery (22:00) and an additional 400 mL 2 h before anesthesia induction.. Duration preoperative. Concurrent medication/care: General anesthesia for surgery. Indirectness: No indirectness (n=52) Intervention 2: Combination of food and fluid restrictions - To be reported. The control group did not receive any of these drinks and were subject to the traditional preoperative fasting.. Duration preoperative. Concurrent medication/care: General anesthesia for surgery. Indirectness: No indirectness
Funding	Funding not stated
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: CARBOHYDRATE DRINK versus FASTING	

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Protocol outcome 1: Adverse events and complications
- Actual outcome: Thirst at 0-24h postoperatively; Mean; (Median (range): see below) visual analogue scale 0-10 Top=High is poor outcome, Comments:
Colorectal patients: CHO: 3 (1-5): Fasting: 4 (1-7) p value >0.05
Cholecystectomy patients: CHO: 3 (1-5): Fasting: 4 (1-7) p value >0.05;
Risk of bias: All domain - High, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - High, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 1, Reason: excluded from analysis/lost to follow up; Group 2 Number missing: 2, Reason: excluded from analysis/lost to follow up
- Actual outcome: Anxiety at 0-24h postoperatively; median (range): see below visual analogue scale 0-10 Top=High is poor outcome, Comments:
Colorectal patients: CHO: 3 (1-3): Fasting: 2 (1-6) p value >0.05
Cholecystectomy patients: CHO: 2 (1-3): Fasting: 2 (1-6) p value >0.05;
Risk of bias: All domain - High, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - High, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 1, Reason: excluded from analysis/lost to follow up; Group 2 Number missing: 2, Reason: excluded from analysis/lost to follow up
- Actual outcome: Nausea at 0-24h postoperatively; median (range): see below visual analogue scale 0-10 Top=High is poor outcome, Comments:
Colorectal patients: CHO: 1 (1-5): Fasting: 3 (1-6) p value >0.05
Cholecystectomy patients: CHO: 1 (1-5): Fasting: 3 (1-6) p value >0.05;
Risk of bias: All domain - High, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - High, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 1, Reason: excluded from analysis/lost to follow up; Group 2 Number missing: 2, Reason: excluded from analysis/lost to follow up

Protocol outcome 2: Thirst
- Actual outcome: Thirst at 36-48h postoperatively; median (range): see below visual analogue scale 0-10 Top=High is poor outcome, Comments:
Colorectal patients: CHO: 2 (1-3): Fasting: 2 (1-5) p value <0.05
Cholecystectomy patients: CHO: 2 (1-3): Fasting: 2 (1-5) p value >0.05;
Risk of bias: All domain - High, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - High, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 1, Reason: excluded from analysis/lost to follow up; Group 2 Number missing: 2, Reason: excluded from analysis/lost to follow up
- Actual outcome: Anxiety at 36-48h postoperatively; median (range): see below visual analogue scale 0-10 Top=High is poor outcome, Comments:
Colorectal patients: CHO: 1 (1-3): Fasting: 1.5 (1-5) p value >0.05
Cholecystectomy patients: CHO: 1 (1-3): Fasting: 1.5 (1-5) p value >0.05;
Risk of bias: All domain - High, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - High, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness; Group 1 Number missing: 1, Reason: excluded from analysis/lost to follow up; Group 2 Number missing: 2, Reason: excluded from analysis/lost to follow up
- Actual outcome: Nausea at 36-48h postoperatively; median (range): see below visual analogue scale 0-10 Top=High is poor outcome, Comments:
Colorectal patients: CHO: 1 (1-3): Fasting: 2 (1-5) p value >0.05
Cholecystectomy patients: CHO: 1 (1-3): Fasting: 2 (1-5) p value >0.05;
Risk of bias: All domain - High, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - High, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness; Group 1 Number missing: 1, Reason: excluded from analysis/lost to follow up; Group 2

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Number missing: 2, Reason: excluded from analysis/lost to follow up	
Protocol outcomes not reported by the study	Quality of life ; Mortality ; Patient, family and carer experience of care ; Unplanned ICU admission ; Headache ; Cancellation of surgery

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Study	Smith 2014[102]
Study type	Cochrane Review
Number of studies (number of participants)	27 (n=1976)
Line of therapy	preoperative carbohydrate supplementation
Method of assessment of guideline condition	Adequate method of assessment/diagnosis. Cochrane review of randomised controlled trials (RCTs) that compared the effects on postoperative recovery and well-being when preoperative carbohydrate treatment was used versus placebo or preoperative fasting in adults (18 years of age or older)
Stratum	Overall
Selection of studies	Assessed RCTs evaluating the effects of preoperative carbohydrate treatment was used versus placebo or preoperative fasting, and included: a clearly defined clinical question details of inclusion and exclusion criteria details of databases searched and relevant search strategies length of hospital stay, complication rate, patient reported well-being scores and adverse events summary results for at least one desired outcome
Inclusion criteria	Included adult patients (18 years of age or older) undergoing any type of elective surgical procedure while under general, spinal or epidural anaesthesia. We included patients who underwent spinal or epidural blockade in addition to general anaesthesia.
Exclusion criteria	Excluded patients who required urgent or emergency surgery (cases in which surgery is required within 24 hours after the first physician contact for a potentially life-threatening condition).
Indirectness of population	No indirectness
Interventions	Intervention 1: The intervention group included all participants who were given at least 45 g of carbohydrate by oral beverage or by the intravenous route. To be included, studies must have planned to administer the carbohydrates within four hours of surgery start time, or induction of anaesthesia. Co-intervention with other oral substances in the four hours before surgery was permitted so long as the dose of carbohydrate was at least 45 g (n=935) Intervention 2: The intervention group was compared with a control group consisting of participants who received less than 45 g of carbohydrate in the four hours before anaesthesia. Control participants may have received a placebo drink containing less than 45 g of carbohydrate, clear liquids or nothing by mouth during this time. The control group may have received intravenous fluid therapy during the four hours before surgery start time, so long as the total combined dose of carbohydrates given by oral and intravenous routes remained less than 45 g (n=1041)

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Outcomes reported	Length of hospital stay: measured in days. Postoperative complication rate Fatigue: measured by such instruments as ordinal or visual analogue scales. General well-being: measured by such instruments as ordinal, visual analogue or composite scales. Nausea 24 hours postoperatively: measured by such instruments as ordinal, visual analogue or composite scales. Vomiting within 24 hours postoperatively: measured as an incidence rate.
Evidence included for 21 studies: An 2008; Bisgaard 2004; Braga 2012; Harsten 2012; Hausel 2005; Henriksen 2003; Kaska 2010; Lidder 2013; Ljunggren 2012; Ljunggvist 1994; Mathur 2010; Noblett 2006; Ozdemir 2011; Pexe-Machado 2013; Soop 2001; Soop 2004; Wang 2010; Yang 2012; Yildiz 2013; Yuill 2005; Zelic 2012 Six studies from this Cochrane review were not included for analysis as they included populations or interventions not suitable for this review : Breuer 2006 – cardiac surgery Jarvela 2008 – cardiac surgery Lauwick 2009 – comparison with water only Perrone 2011 – comparison with water only Rapp-Kasek 2007 – cardiac surgery Tran 2013 – cardiac surgery	
Risk of bias assessment	Overall risk of bias – low risk of bias, Study eligibility criteria – low concern, Identification and selection of studies – low concern, Data collection and study appraisal – low concern, Synthesis and findings – low concern

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Study	Wang 2010[107]
Study type	RCT (Patient randomised; Parallel) – Included in Smith 2014[102]
Number of studies (number of participants)	(n=48)
Countries and setting	Conducted in China; Setting: Departments of general surgery at Medical University Hospitals in China
Line of therapy	Unclear
Duration of study	Intervention + follow up:
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients undergoing elective open colorectal cancer resection surgery
Exclusion criteria	Diabetes Mellitus or impaired glucose tolerance, medication affecting insulin sensitivity, weight loss greater than 10 per cent during the previous 6 months, presence of distant metastasis on CT, renal insufficiency, hepatic insufficiency, GORD, gastrointestinal obstruction or conditions known to affect gastric emptying rate and age more than 75 or less than 25 years
Recruitment/selection of patients	Patients undergoing elective open colorectal cancer resection surgery
Age, gender and ethnicity	Age - Median (range): CHO 66 (48 - 74); Fasting 63 (37 - 74);. Gender (M:F): 28/20.
Further population details	1. Age: >60 years (CHO 66 (48 - 74); Fasting 63 (37 - 74);). 2. People with diabetes: Non-diabetic
Indirectness of population	--
Interventions	(n=18) Intervention 1: Combination of food and fluid restrictions - To be reported. Patients in the CHO group consumed 400ml Nutricia PreOp (12.5% carbohydrate, 0.5kcal/ml, 240mOsm/kg, pH 4 - 9, Nutricia Zoetermeer, Netherlands) 3h before induction of anesthesia completing CHO ingestion within 1h. Patients were nil by mouth after 2100 hours apart from single morning dose of 400ml carbohydrate drink. . Duration perioperative. Concurrent medication/care: Oral bowel preparation with polyethylene glycol electrolyte solution administered to all patients. All patients received a low residue liquid diet freely before 2100 hours on the day before surgery. (n=17) Intervention 2: Combination of food and fluid restrictions - To be reported. Patients were fasted from midnight before surgery. Duration perioperative. Concurrent medication/care: Oral bowel preparation with polyethylene glycol electrolyte solution administered to all patients. All patients received a low residue liquid diet freely before 2100 hours on the day before surgery.
Funding	Funding not stated

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RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: CHO versus FASTING

Protocol outcome 1: Quality of life
- Actual outcome: Anxiety at 1 hour preoperative; Median (range): CHO: 22 (11-47); Fasting: 28 (16-61) VAS 0-100 Top=High is poor outcome;
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 2, Reason: complications found during surgery; Group 2 Number missing: 1, Reason: complications found during surgery

Protocol outcome 2: Adverse events and complications
- Actual outcome: Nausea at 1 hour preoperative; Median (range): CHO: 8 (4-11); Fasting: 8 (2-14) VAS 0-100 Top=High is poor outcome;
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness; Group 1 Number missing: 2, Reason: complications found during surgery; Group 2 Number missing: 1, Reason: complications found during surgery
- Actual outcome: Tiredness at 1 hour preoperative; Median (range): CHO: 20 (11-60); Fasting: 23(10-53) VAs 0-100 Top=High is poor outcome;
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 2, Reason: complications found during surgery; Group 2 Number missing: 1, Reason: complications found during surgery

Protocol outcome 3: Thirst
- Actual outcome: Thirst at 1 hour preoperative; Median (range) : CHO: 20 (8-59); Fasting: 24 (19-60) VAS 0-100 Top=High is poor outcome;
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 2, Reason: complications found during surgery; Group 2 Number missing: 1, Reason: complications found during surgery

Protocol outcomes not reported by the study	Mortality ; Patient, family and carer experience of care ; Unplanned ICU admission ; Headache ; Cancellation of surgery

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Study	Yagmurdur 2011[110]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=44)
Countries and setting	Conducted in Turkey; Setting: The Ministry of Health Ankara Research and Training Hospital, Ankara, Turkey.
Line of therapy	Not applicable
Duration of study	Intervention + follow up:
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients ASA classes I-II adult patients scheduled for elective inguinal hernia repair surgery under spinal anesthesia
Exclusion criteria	not specified
Recruitment/selection of patients	scheduled for elective inguinal hernia repair surgery under spinal anesthesia
Age, gender and ethnicity	Age - Mean (SD): CHO: 45 (7); Fasting: 43 (8). Gender (M:F): 26/18.
Further population details	1. Age: <60 years (CHO: 45 (7); Fasting: 43 (8)). 2. People with diabetes: Not stated / Unclear
Indirectness of population	--
Interventions	(n=22) Intervention 1: Combination of food and fluid restrictions - To be reported. During the evening before surgery, patients in the CHO group ingested 800 mL of an iso-osmolar carbohydrate-rich drink [12.5% carbohydrates (glucose: 0.2 g, maltose: 0.7 g, polysaccharides: 10 g), 50 kcal/100 ml, 290 mOsm/kg, pH 5.0; Nutricia Preop ; Numico, Zoetermeer, The Netherlands]. Nothing per os was allowed from midnight except another 400 mL of CHO in the morning at least 90 minutes before spinal anesthesia in the CHO group.. Duration preoperative. Concurrent medication/care: spinal anesthesia (n=22) Intervention 2: Combination of food and fluid restrictions - To be reported. The patients in the control group underwent spinal anesthesia after the routine fast from midnight. . Duration preoperative. Concurrent medication/care: spinal anesthesia
Funding	Funding not stated
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: CHO DRINK versus FASTING	

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Protocol outcome 1: Thirst - Actual outcome: Thirst at 90 minutes post ingestion of CHO drink; median (IQR): CHO: 20 (16-24); Fasting: 60 (56-64) visual analogue scale 0-100 Top=High is poor outcome; Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; - Actual outcome: Thirst at 60 minutes post anesthesia; median (IQR): CHO: 18 (13-23): Fasting: 64 (59-69) visual analogue scale 0-100 Top=High is poor outcome; Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; - Actual outcome: Nausea at 90 minutes post ingestion of CHO drink; Median (IQR) : CHO: 10 (7-13); Fasting: 8 (4-12) visual analogue scale 0-100 Top=High is poor outcome; Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; - Actual outcome: Nausea at 60 minutes post anesthesia; Median (IQR): CHO: 8 (4-12); Fasting: 9 (5-13) visual analogue scale 0-100 Top=High is poor outcome; Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; - Actual outcome: Anxiety at 90 minutes post ingestion of CHO drink; Median (IQR): CHO: 20 (18-22); Fasting: 48 (43-53) visual analgoue scale 0-100 Top=High is poor outcome; Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; - Actual outcome: Anxiety at 60 minutes post anesthesia; Median (IQR): CHO: 43 (41-45); Fasting: 46 (44-48) visual analogue scale 0-100 Top=High is poor outcome; Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ;	
Protocol outcomes not reported by the study	Quality of life ; Mortality ; Adverse events and complications ; Patient, family and carer experience of care ; Unplanned ICU admission ; Headache ; Cancellation of surgery

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Study	Yuill 2005[113]
Study type	RCT (Patient randomised; Parallel) – Included in Smith 2014[102]
Number of studies (number of participants)	(n=35)
Countries and setting	Conducted in Netherlands; Setting: Royal infirmary of Edinburgh
Line of therapy	Unclear
Duration of study	Intervention + follow up:
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients undergoing elective abdominal surgery
Exclusion criteria	Existing impaired renal function, liver cirrhosis, diabetes, metabolic abnormalities, or gastric stasis / obstruction were excluded as were all patients undergoing emergency or laparoscopic procedures
Recruitment/selection of patients	Patients undergoing elective abdominal surgery
Age, gender and ethnicity	Age - Mean (SD): CHO: 52.1 (2.4); Fasting: 52.8 (2.5). Gender (M:F): 39/26.
Further population details	1. Age: <60 years (CHO: 52.1 (2.4); Fasting: 52.8 (2.5)). 2. People with diabetes: Non-diabetic
Indirectness of population	--
Interventions	(n=34) Intervention 1: Combination of food and fluid restrictions - To be reported. Placebo drink (fluid and electrolytes; potassium; sodium; chloride; calcium; magnesium) of 800ml on the evening prior to surgery approximately 12 hours before anesthesia and a further 400ml 2 - 3 hours before the induction of anesthesia. It was stipulated that the 400ml drink on the morning of surgery should be consumed over 20 minutes. . Duration preoperative. Concurrent medication/care: NA (n=31) Intervention 2: Combination of food and fluid restrictions - To be reported. Carbohydrate drink (containing 12.6g carbohydrates 100ml with electrolytes, potassium, sodium, chloride, calcium and magnesium) of 800ml on the evening prior to surgery approximately 12 hours before anesthesia and a further 400ml 2 - 3 hours before the induction of anesthesia. It was stipulated that the 400ml drink on the morning of surgery should be consumed over 20 minutes. . Duration preoperative. Concurrent medication/care: NA
Funding	Study funded by industry (Study supported by Numico research, Wageningen, Netherlands)
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: PLACEBO versus CHO	

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Protocol outcome 1: Adverse events and complications - Actual outcome: Length of stay at Perioperative period; Median (IQR) : CHO: 10 (6); Fasting: 8 (4) days); Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness;	
Protocol outcomes not reported by the study	Quality of life ; Mortality ; Patient, family and carer experience of care ; Unplanned ICU admission ; Thirst ; Headache ; Cancellation of surgery

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Study	Zhang 2019[115]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=58)
Countries and setting	Conducted in China; Setting: First affiliated Hospital of Nanchang University, China
Line of therapy	Not applicable
Duration of study	Intervention + follow up:
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients aged 18 – 55, ASA I – II scheduled to undergo elective open gynaecological surgery
Exclusion criteria	Not specified
Recruitment/selection of patients	scheduled to undergo elective open gynaecological surgery
Age, gender and ethnicity	Age - Mean (SD): CHO: 42.64 (5.26); Fasting: 43.57 (5.60). Gender (M:F): all female.
Further population details	1. Age: <60 years (CHO: 42.64 (5.26); Fasting: 43.57 (5.60)). 2. People with diabetes: Not stated / Unclear
Indirectness of population	No indirectness
Interventions	(n=29) Intervention 1: Combination of food and fluid restrictions - To be reported. Patients in the CHO group consumed CHO (12.5g of carbohydrate per 100ml, 285 mOsm/kg; Nutricia Preop, Nutricia, Zoetermeer, The Netherlands) in doses of 800ml on the evening before surgery (between 8pm and 10pm) and 400ml 2h before their scheduled operation. Duration preoperative . Concurrent medication/care: combined spinal epidural anesthesia for the procedure (n=29) Intervention 2: Combination of food and fluid restrictions - To be reported. Patients in the fasting group were forbidden from eating anything after midnight before the induction of anaesthesia. Duration preoperative. Concurrent medication/care: combined spinal epidural anesthesia for the procedure. Indirectness: No indirectness
Funding	Funding not stated
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: CHO versus FASTING	

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Protocol outcome 1: Adverse events and complications
- Actual outcome: Nausea & vomiting at Postoperative; Group 1: 8/29, Group 2: 12/29; Comments: p value 0.2646
Risk of bias: All domain - High, Selection - High, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ;
- Actual outcome: Tiredness at 6h postoperative; median (range): CHO: 30 (20-40); Fasting: 30 (20-40) VAS 0-100 Top=High is poor outcome;
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ;
- Actual outcome: Tiredness at 24h postoperative; median (range): CHO: 40 (30-40); Fasting: 30 (20-30) VAS 0-100 Top=High is poor outcome;
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ;
- Actual outcome: Anxiety at Preoperative; median (range): CHO: 30 (30-30); Fasting: 60 (50-70) VAS 0-100 Top=High is poor outcome, Comments: p value <0.001;
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ;

Protocol outcome 2: Patient, family and carer experience of care
- Actual outcome: Length of hospital stay at Postoperative; Group 1: mean 3.82 days (SD 0.67); n=29, Group 2: mean 4.36 days (SD 0.78); n=29; Comments: 0.0079
Risk of bias: All domain - High, Selection - High, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ;

Protocol outcome 3: Thirst
- Actual outcome: Thirst at 6h postoperative; Median (range):: CHO: 20 (10-30); Fasting: 40 (20-55) VAS 0-100 Top=High is poor outcome, Comments: p value < 0.001;
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ;
- Actual outcome: Thirst at 24h postoperative; median (range): CHO: 30 (25-40); Fasting: 40 (20-50) VAS 0-100 Top=High is poor outcome;
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness;

Protocol outcome 4: Headache
- Actual outcome: Headache at Postoperative; Group 1: 3/29, Group 2: 9/29; Comments: P value 0.0507
Risk of bias: All domain - High, Selection - High, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ;

Protocol outcomes not reported by the study	Quality of life ; Mortality ; Unplanned ICU admission ; Cancellation of surgery

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Table 13: Risk of bias summary from Cochrane review

Study: Smith 2014[102]	
Domain	Outcome
Study eligibility criteria	Low concern
Identification and selection of studies	Low concern
Data collection and study appraisal	Low concern
Synthesis and findings	Low concern
Overall risk of bias	Low risk of bias

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Appendix E: Forest plots

E.1 Carbohydrate drinks versus Fasting

Figure 2: Patient Satisfaction (0-10) (24 hours postoperative)

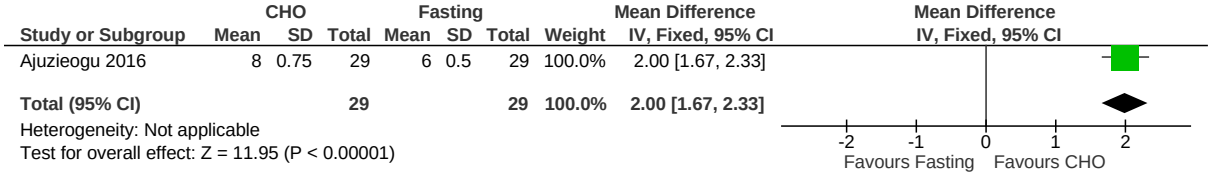

Figure 3: Postoperative global QoR-40 score

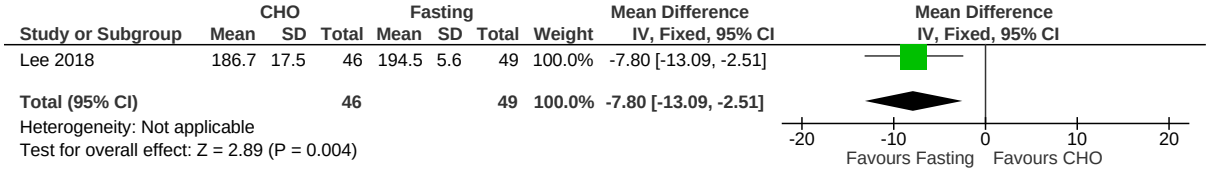

Figure 4: Length of hospital stay (days)

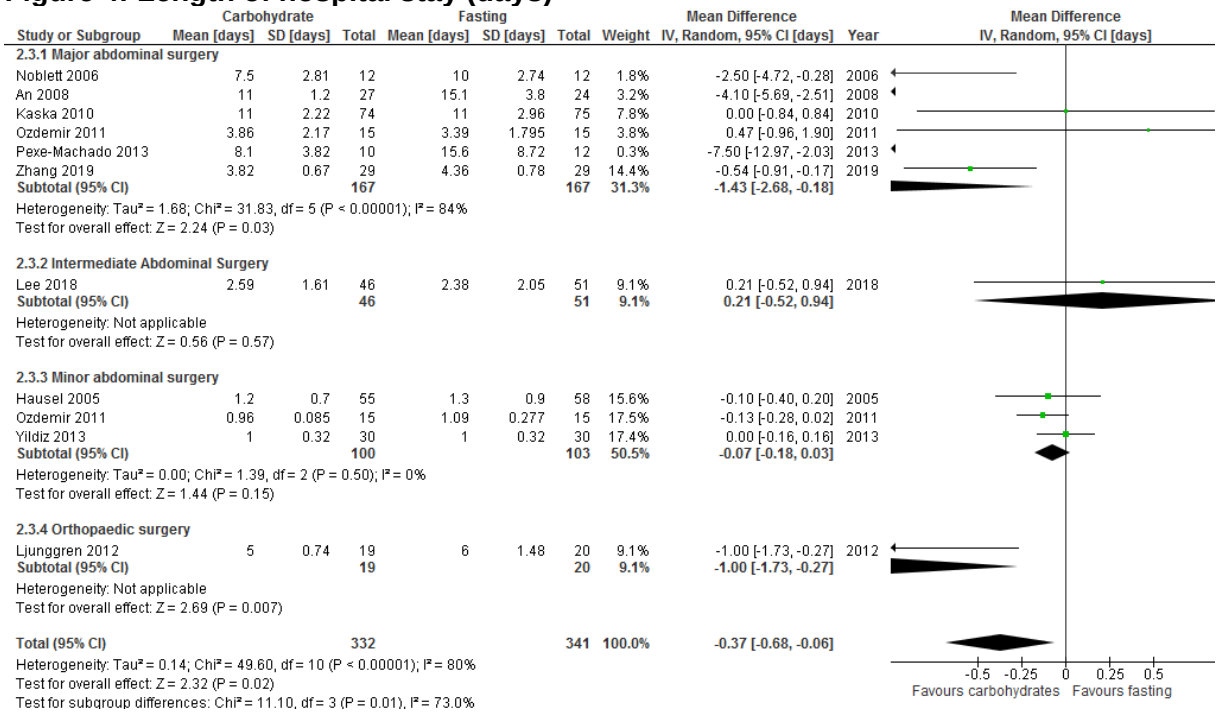

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Figure 5: Thirst (0-10) (preoperative)

Study or Subgroup	CHO Mean	CHO SD	CHO Total	Fasting Mean	Fasting SD	Fasting Total	Weight	Mean Difference IV, Fixed, 95% CI
Raksakietisak 2014	2.4	2.4	48	2.2	2.2	50	100.0%	0.20 [-0.71, 1.11]
Total (95% CI)			**48**			**50**	**100.0%**	**0.20 [-0.71, 1.11]**

Heterogeneity: Not applicable
Test for overall effect: Z = 0.43 (P = 0.67)

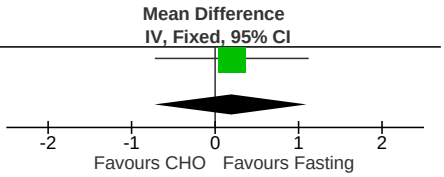

Figure 6: Thirst (0-10) (postoperative)

Study or Subgroup	CHO Mean	CHO SD	CHO Total	Fasting Mean	Fasting SD	Fasting Total	Weight	Mean Difference IV, Fixed, 95% CI
Onalan 2018	0.64	0.91	25	7.8	2.5	25	100.0%	-7.16 [-8.20, -6.12]
Total (95% CI)			**25**			**25**	**100.0%**	**-7.16 [-8.20, -6.12]**

Heterogeneity: Not applicable
Test for overall effect: Z = 13.46 (P < 0.00001)

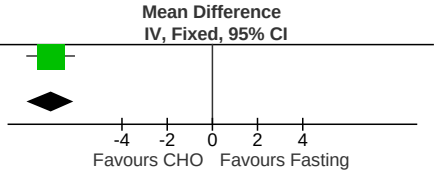

Figure 7: Thirst (mild)

Study or Subgroup	CHO Events	CHO Total	Fasting Events	Fasting Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Canbay 2014	6	25	13	25	100.0%	0.46 [0.21, 1.02]
Total (95% CI)		**25**		**25**	**100.0%**	**0.46 [0.21, 1.02]**
Total events	6		13			

Heterogeneity: Not applicable
Test for overall effect: Z = 1.91 (P = 0.06)

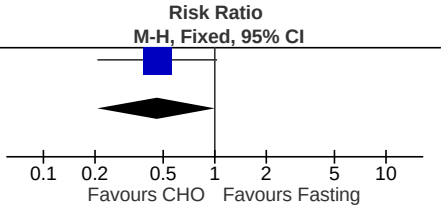

Figure 8: Thirst (moderate)

Study or Subgroup	CHO Events	CHO Total	Fasting Events	Fasting Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Canbay 2014	0	25	5	25	100.0%	0.09 [0.01, 1.56]
Total (95% CI)		**25**		**25**	**100.0%**	**0.09 [0.01, 1.56]**
Total events	0		5			

Heterogeneity: Not applicable
Test for overall effect: Z = 1.65 (P = 0.10)

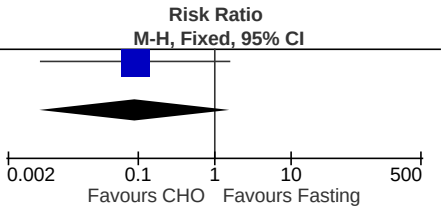

Figure 9: Headache (postoperative)

Study or Subgroup	CHO Events	CHO Total	Fasting Events	Fasting Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Zhang 2019	3	29	9	29	100.0%	0.33 [0.10, 1.11]
Total (95% CI)		**29**		**29**	**100.0%**	**0.33 [0.10, 1.11]**
Total events	3		9			

Heterogeneity: Not applicable
Test for overall effect: Z = 1.79 (P = 0.07)

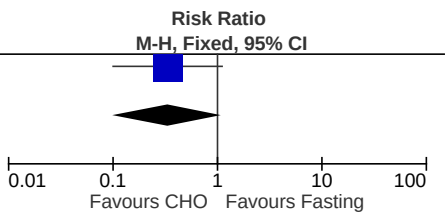

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Figure 10: Complication rate

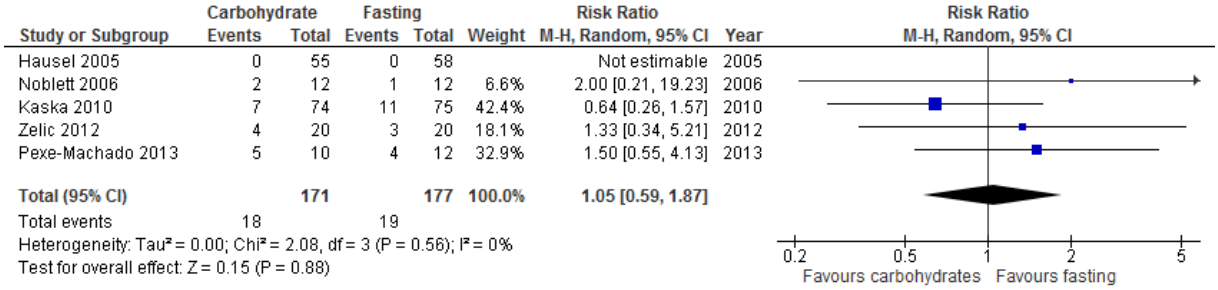


Figure 11: Well-being (postoperative)

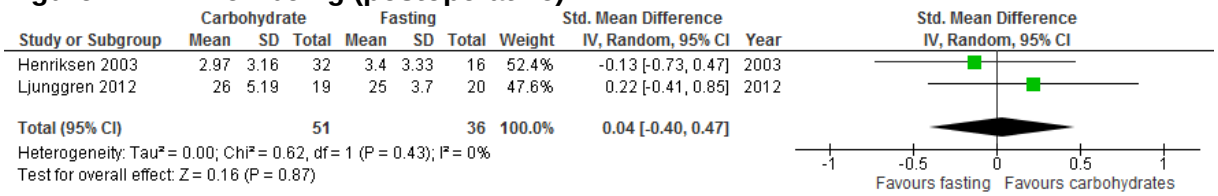


Figure 12: Nausea & Vomiting (0-10) (postoperative)

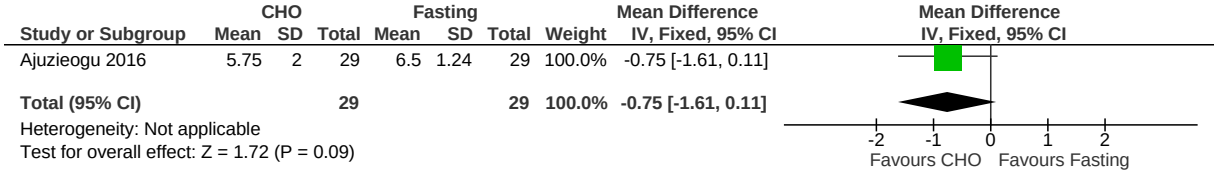
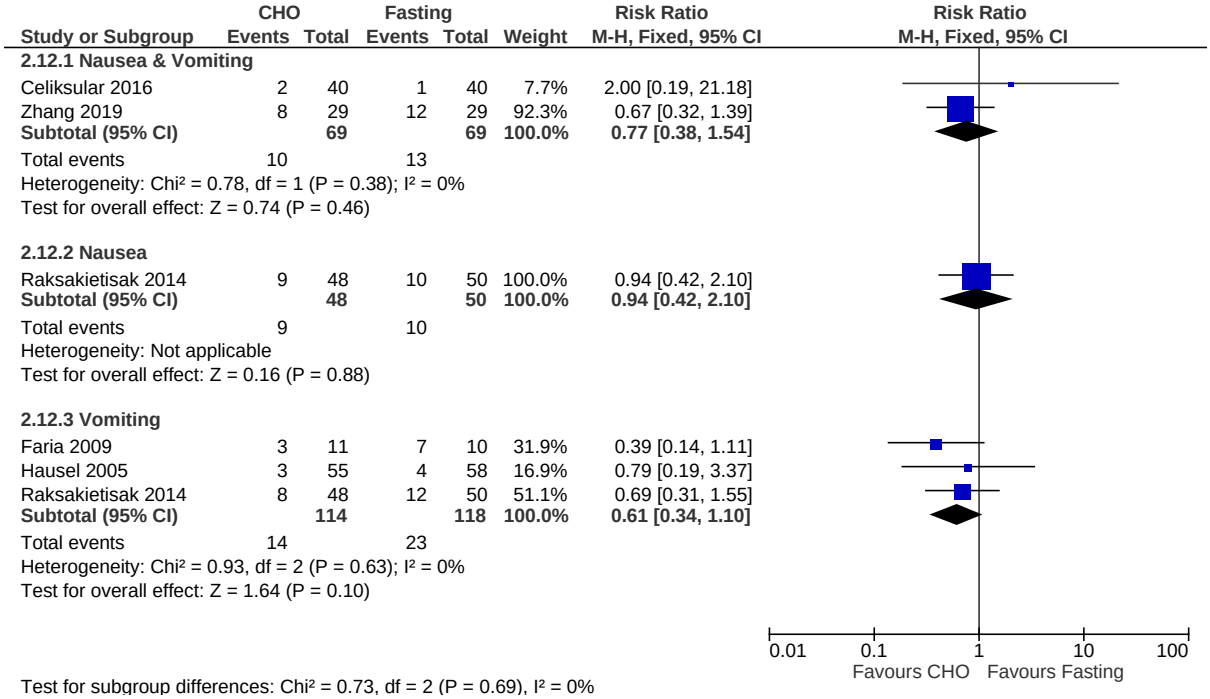


Figure 13: Nausea & Vomiting



Test for subgroup differences: Chi² = 0.73, df = 2 (P = 0.69), I² = 0%

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Figure 14: Anxiety (0-10) (preoperative)

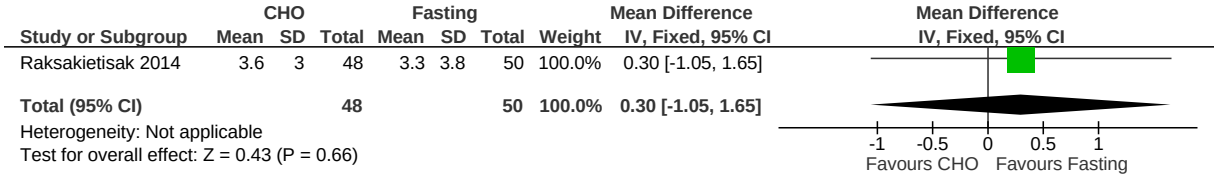


Figure 15: Anxiety (0-10) (postoperative)

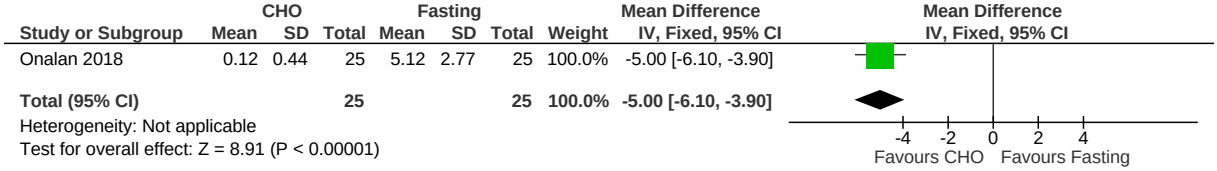
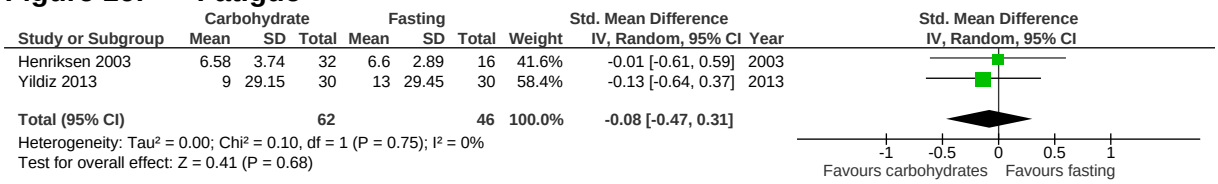


Figure 16: Fatigue



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E.2 Carbohydrate drinks versus placebo drinks

Figure 17: Length of hospital stay (days)

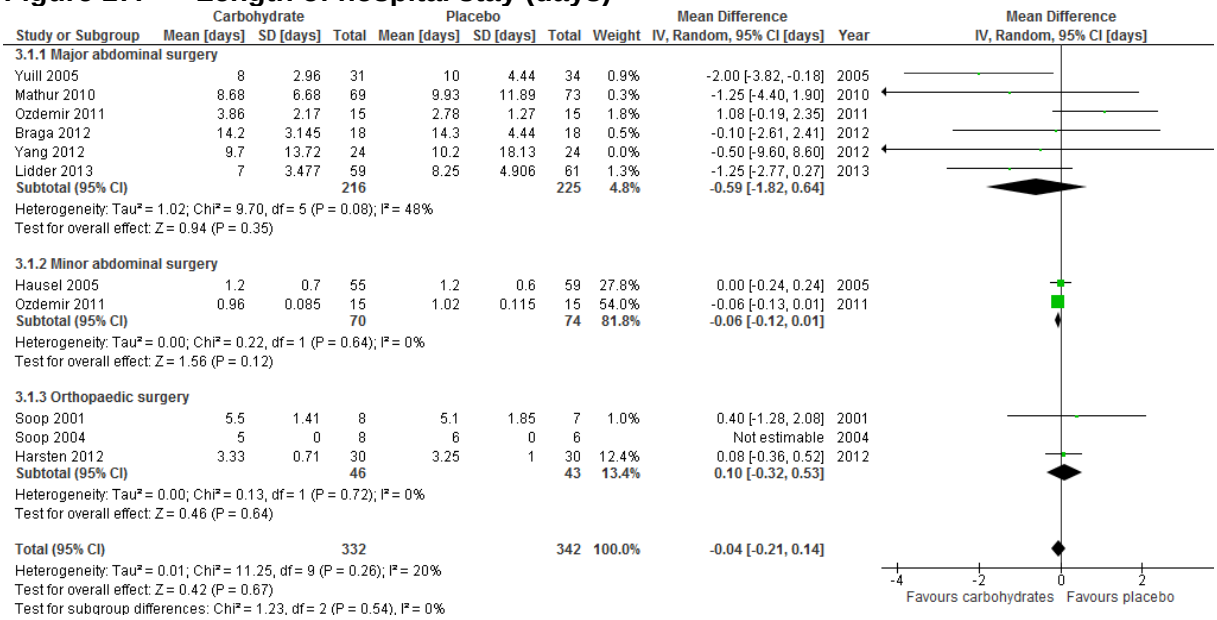

Figure 18: Complication rate

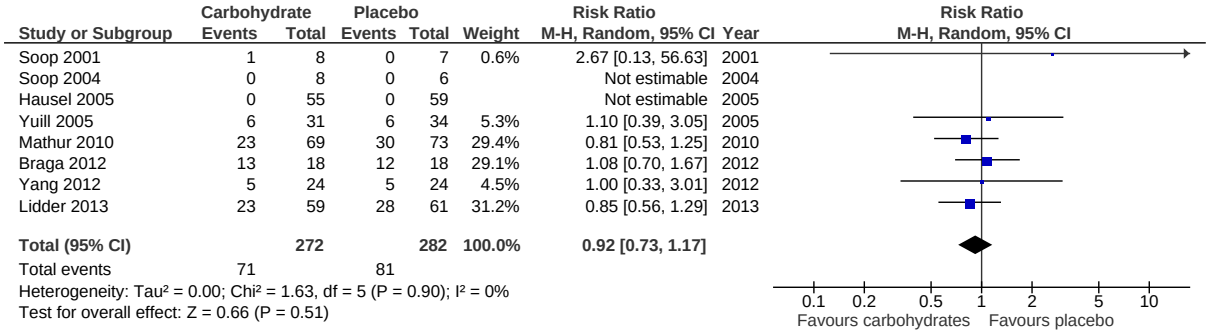

Figure 19: Fatigue (postoperative)

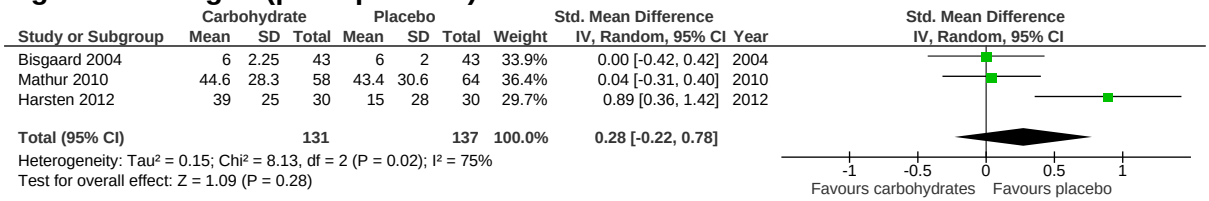

Figure 20: Well-being (postoperative)

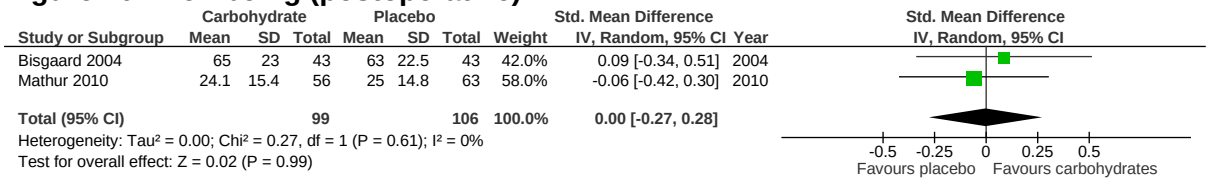

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Figure 21: Nausea (mm) (postoperative)

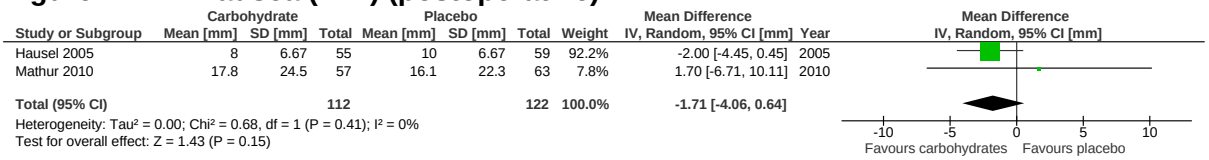
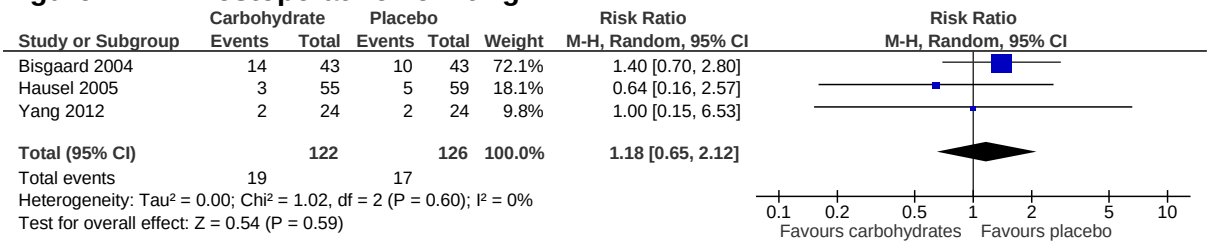


Figure 22: Postoperative vomiting



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E.3 Water versus Fasting

Figure 23: Nausea POD 1

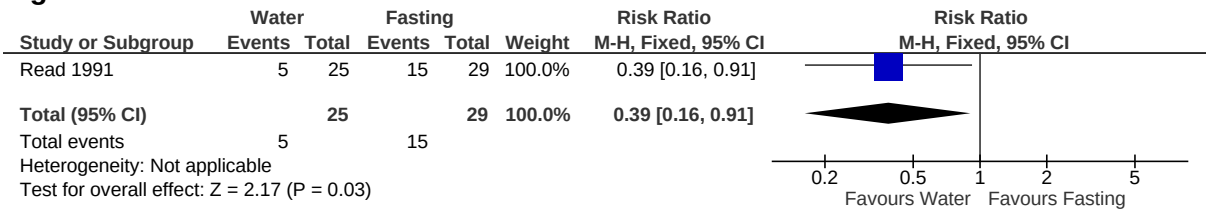

Figure 24: Vomiting POD 1

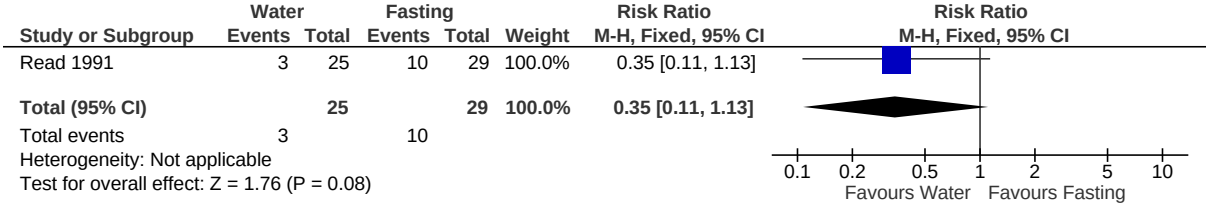

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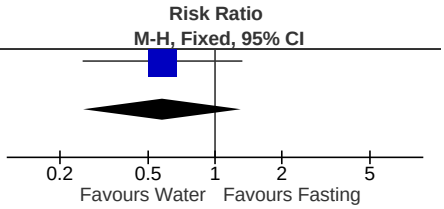
Figure 25: Headache POD 1

Study or Subgroup	Water Events	Water Total	Fasting Events	Fasting Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Read 1991	6	25	12	29	100.0%	0.58 [0.26, 1.32]
Total (95% CI)		**25**		**29**	**100.0%**	**0.58 [0.26, 1.32]**
Total events	6		12			

Heterogeneity: Not applicable
Test for overall effect: Z = 1.30 (P = 0.19)



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Appendix F: GRADE tables

Table 14: Clinical evidence profile: Carbohydrate drinks versus fasting

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	CHO versus fasting	Control	Relative (95% CI)	Absolute		
Patient Satisfaction (0-10) (follow-up 24 hours; Better indicated by higher values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	29	29	-	MD 2 higher (1.67 to 2.33 higher)	⊕⊕⊕O MODERATE	CRITICAL
Postoperative global QoR-40 score (follow-up 24 hours; Better indicated by higher values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	46	49	-	MD 7.8 lower (13.09 to 2.51 lower)	⊕⊕OO LOW	CRITICAL
Length of hospital stay (Better indicated by lower values)												
11	randomised trials	serious[1]	serious[3]	no serious indirectness	no serious imprecision	none	332	341	-	MD 0.37 lower (0.68 lower to 0.06 higher)	⊕⊕OO LOW	CRITICAL
Length of hospital stay - Major abdominal surgery (Better indicated by lower values)												
6	randomised trials	serious[1]	very serious[3]	no serious indirectness	serious[2]	none	167	167	-	MD 1.43 lower (2.68 to 0.18 lower)	⊕OOO VERY LOW	CRITICAL

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Length of hospital stay - Intermediate Abdominal Surgery (Better indicated by lower values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	46	51	-	MD 0.21 higher (0.52 lower to 0.94 higher)	⊕⊕OO LOW	CRITICAL
Length of hospital stay - Minor abdominal surgery (Better indicated by lower values)												
3	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	100	103	-	MD 0.07 lower (0.18 lower to 0.03 higher)	⊕⊕⊕O MODERATE	CRITICAL
Length of hospital stay - Orthopaedic surgery (Better indicated by lower values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	19	20	-	MD 1.00 lower (1.73 to 0.27 lower)	⊕⊕OO LOW	CRITICAL
Thirst (0-10) (preoperative) (Better indicated by lower values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	48	50	-	MD 0.2 higher (0.71 lower to 1.11 higher)	⊕⊕OO LOW	IMPORTANT
Thirst (0-10) (postoperative) (Better indicated by lower values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	25	25	-	MD 7.16 lower (8.2 to 6.12 lower)	⊕⊕⊕O MODERATE	IMPORTANT
Thirst (mild)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	6/25 (24%)	52%	RR 0.46 (0.21 to 1.02)	281 fewer per 1000 (from 411 fewer to 10 more)	⊕⊕OO LOW	IMPORTANT

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Thirst (moderate)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	0/25 (0%)	20%	RR 0.09 (0.01 to 1.56)	182 fewer per 1000 (from 198 fewer to 112 more)	⊕⊕OO LOW	IMPORTANT
Headache (postoperative)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	3/29 (10.3%)	31%	RR 0.33 (0.1 to 1.11)	208 fewer per 1000 (from 279 fewer to 34 more)	⊕⊕OO LOW	IMPORTANT
Complication rate												
5	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	18/171 (10.5%)	14.8%	RR 1.05 (0.59 to 1.87)	7 more per 1000 (from 61 fewer to 129 more)	⊕OOO VERY LOW	IMPORTANT
Well-being (postoperative) (Better indicated by lower values)												
2	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	51	36	-	SMD 0.04 higher (0.4 lower to 0.47 higher)	⊕⊕⊕O MODERATE	IMPORTANT
Nausea & Vomiting 0-10 (postoperative) (Better indicated by lower values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	29	29	-	MD 2.0 lower (2.58 to 1.42 lower)	⊕⊕OO LOW	IMPORTANT
Nausea & Vomiting												

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Nausea & Vomiting - Nausea & Vomiting												
2	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	10/69 (14.5%)	21.9%	RR 0.77 (0.38 to 1.54)	50 fewer per 1000 (from 136 fewer to 118 more)	⊕OOO VERY LOW	IMPORTANT
Nausea & Vomiting - Nausea												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	9/48 (18.8%)	20%	RR 0.94 (0.42 to 2.1)	12 fewer per 1000 (from 116 fewer to 220 more)	⊕OOO VERY LOW	IMPORTANT
Nausea & Vomiting - Vomiting												
3	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	14/114 (12.3%)	24%	RR 0.61 (0.34 to 1.1)	94 fewer per 1000 (from 158 fewer to 24 more)	⊕⊕OO LOW	IMPORTANT
Anxiety (0-10) (preoperative) (Better indicated by lower values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	48	50	-	MD 0.3 higher (1.05 lower to 1.65 higher)	⊕⊕⊕O MODERATE	CRITICAL
Anxiety (0-10) (postoperative) (Better indicated by lower values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	25	25	-	MD 5 lower (6.1 to 3.9 lower)	⊕⊕⊕O MODERATE	CRITICAL
Fatigue (Better indicated by lower values)												
2	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	62	46	-	SMD 0.08 lower (0.47 lower to 0.31 higher)	⊕⊕⊕O MODERATE	IMPORTANT

[1] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
[2] Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs

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[3] Downgraded by 1 or 2 increments because: The point estimate varies widely across studies, unexplained by subgroup analysis. The confidence intervals across studies show minimal or no overlap, unexplained by subgroup analysis Heterogeneity, I2=50%, p=0.04, unexplained by subgroup analysis.

Table 15: Clinical evidence profile: Carbohydrate drinks versus Placebo

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	CHO versus placebo	Control	Relative (95% CI)	Absolute		
Length of hospital stay (Better indicated by lower values)												
10	randomised trials	serious[1]	serious[2]	no serious indirectness	no serious imprecision	none	332	342	-	MD 0.04 lower (0.21 lower to 0.14 higher)	⊕⊕OO LOW	CRITICAL
Length of hospital stay - Major abdominal surgery (Better indicated by lower values)												
6	randomised trials	serious[1]	very serious[2]	no serious indirectness	no serious imprecision	none	216	225	-	MD 0.59 lower (1.82 lower to 0.64 higher)	⊕OOO VERY LOW	CRITICAL
Length of hospital stay - Minor abdominal surgery (Better indicated by lower values)												
2	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	70	74	-	MD 0.06 lower (0.12 lower to 0.01 higher)	⊕⊕⊕O MODERATE	CRITICAL
Length of hospital stay - Orthopaedic surgery (Better indicated by lower values)												
3	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	46	43	-	MD 0.1 higher (0.32 lower to 0.53 higher)	⊕⊕⊕O MODERATE	CRITICAL
Complication rate												

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8	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[3]	none	71/272 (26.1%)	19.2%	RR 0.92 (0.73 to 1.17)	15 fewer per 1000 (from 52 fewer to 33 more)	⊕⊕OO LOW	IMPORTANT
Fatigue (postoperative) (Better indicated by lower values)												
3	randomised trials	serious[1]	very serious[2]	no serious indirectness	no serious imprecision	none	131	137	-	SMD 0.28 higher (0.22 lower to 0.78 higher)	⊕OOO VERY LOW	IMPORTANT
Well-being (postoperative) (Better indicated by lower values)												
2	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	99	106	-	SMD 0 higher (0.27 lower to 0.28 higher)	⊕⊕⊕O MODERATE	CRITICAL
Nausea (24 h) (Better indicated by lower values)												
2	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	112	122	-	MD 1.71 lower (4.06 lower to 0.64 higher)	⊕⊕⊕O MODERATE	IMPORTANT
Vomiting (postoperative)												
3	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	very serious[3]	none	19/122 (15.6%)	8.5%	RR 1.18 (0.65 to 2.12)	15 more per 1000 (from 30 fewer to 95 more)	⊕OOO VERY LOW	IMPORTANT

[1] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
[2] Downgraded by 1 or 2 increments because: The point estimate varies widely across studies, unexplained by subgroup analysis. The confidence intervals across studies show minimal or no overlap, unexplained by subgroup analysis Heterogeneity, I2=50%, p=0.04, unexplained by subgroup analysis.
[3] Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs

Table 16: Clinical evidence profile: Clear fluids (water) versus fasting

Quality assessment						No of patients	Effect		Quality	Importance

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No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Clear fluids (Water)	Fasting	Relative (95% CI)	Absolute		
Nausea (POD1)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	5/25 (20%)	51.7%	RR 0.39 (0.16 to 0.91)	315 fewer per 1000 (from 47 fewer to 434 fewer)	⊕⊕OO LOW	IMPORTANT
Vomiting (POD1)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	3/25 (12%)	34.5%	RR 0.35 (0.11 to 1.13)	224 fewer per 1000 (from 307 fewer to 45 more)	⊕⊕OO LOW	IMPORTANT
Headache (POD1)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	6/25 (24%)	41.4%	RR 0.58 (0.26 to 1.32)	174 fewer per 1000 (from 306 fewer to 132 more)	⊕OOO VERY LOW	IMPORTANT

[1] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
[2] Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs

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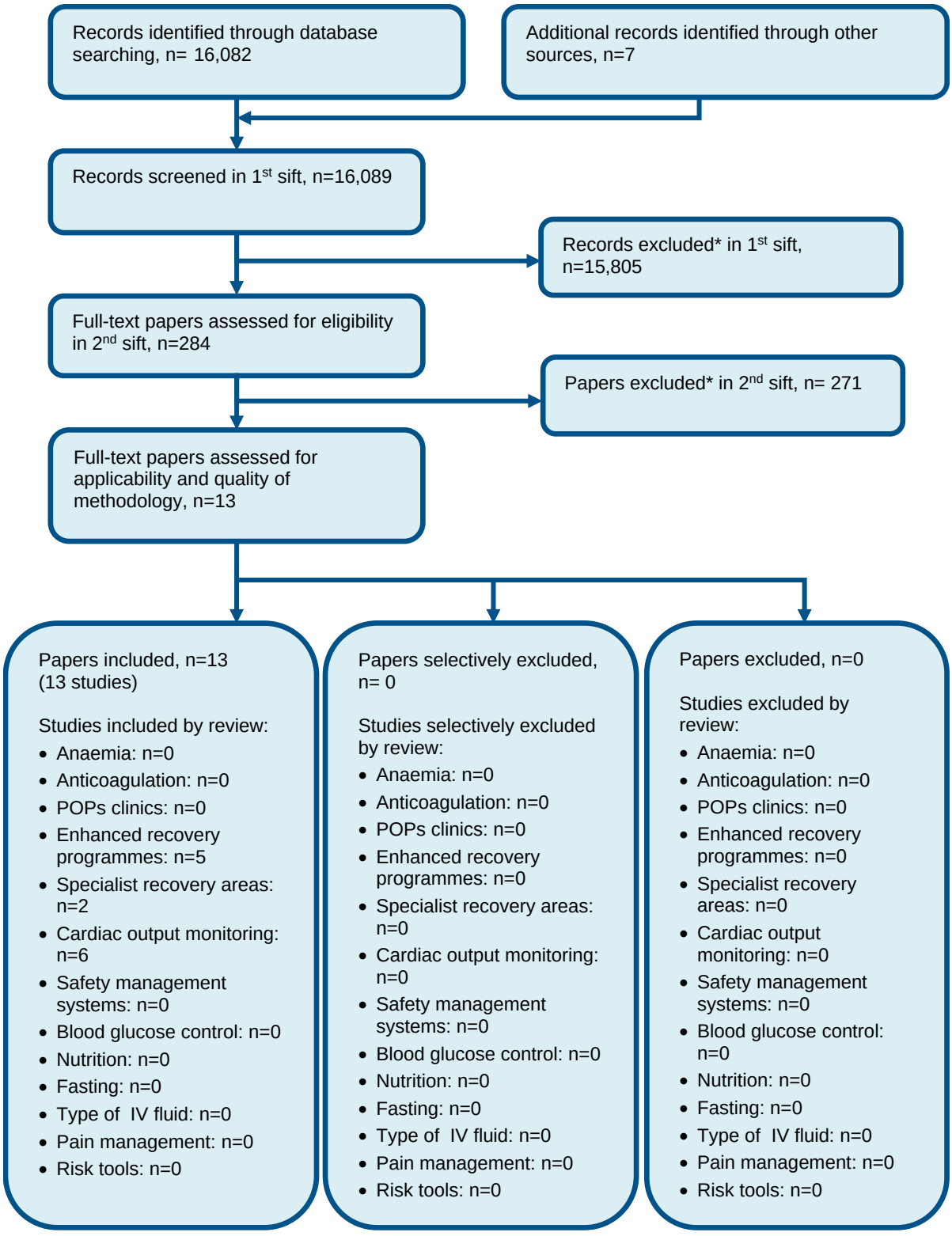
Appendix G: Health economic evidence selection

Figure 26: Flow chart of health economic study selection for the guideline



* Non-relevant population, intervention, comparison, design or setting; non-English language

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Appendix H: Health economic evidence tables

None.

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Appendix I: Excluded studies

I.1 Excluded clinical studies

Table 17: Studies excluded from the clinical review

Reference	Reason for exclusion
Adamova 2017[1]	Incorrect study design
Agarwal 1989[2]	Unclear outcomes – how outcomes measured unclear and not specified
Aguilar-Nascimento 2009[26]	Not in English
Amer 2017[4]	Systematic Review : references screened
American Society of Anesthesiologists 2011[94]	Incorrect study design
Anonymous 2018[5]	Not available
Anonymous 2017[29]	Incorrect comparison
Aronsson 2009[6]	Incorrect comparison
Awad 2013[8]	Systematic Review : references screened
Azagury 2015[9]	Not available
Bhaskaran 2018[10]	Incorrect comparison
Bilku 2014[11]	Systematic Review : references screened
Bisgaard 2004[12]	Incorrect comparison
Bopp 2011[13]	No relevant outcomes
Borges Dock-Nascimento 2011[14]	No relevant outcomes
Brady 2003[15]	Systematic Review : references screened
Breuer 2006[16]	Incorrect population
Campos 2018[18]	Incorrect study design
Chen 2014[21]	Not in English
Chen 2015[22]	Not in English
ChiCtr 2018[23]	Citation only
de Aguilar-Nascimento 2010[25]	Incorrect study design
de Aguilar-Nascimento 2014[24]	No relevant outcomes
Dilmen 2017[27]	No relevant outcomes
Dock-Nascimento 2012[28]	No relevant outcomes
Feguri 2017[32]	Incorrect population
Feng 1995[33]	Not in English
Gava 2016[34]	No relevant outcomes
Ghorashi 2014[35]	Incorrect population
Gianotti 2018[36]	Incorrect comparison
Gonik 2016[38]	Incorrect population
Goodwin 1991[39]	Incorrect population
Harsten 2012[40]	Data included within Systematic review included
Hausel 2005[42]	Data included within Systematic review included
Henriksen 2003[45]	Data included within Systematic review included

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Reference	Reason for exclusion
Hosny 2018[46]	Incorrect population
Hutchinson 1988[47]	Incorrect comparison
Itou 2012[48]	Incorrect comparison
Jones 2011[49]	Incorrect study design
Karlsson 2016[50]	No relevant outcomes
Kaska 2006[51]	Not in English
Kaska 2010[52]	Data included within Systematic review included
Kwon 1994[53]	Not in English
Lagerkranser 1997[54]	Abstract only
Lam 1993[55]	Incorrect study design – non randomized
Lambert 2016[56]	Systematic Review : references screened
Lauwick 2009[57]	Incorrect comparison
Li 2012[59]	Systematic Review : references screened
Li 2015[60]	Not in English
Lidder 2013[61]	Data included within Systematic review included
Liu 2018[62]	Incorrect population
Ljunggren 2014[63]	No relevant outcomes
Ljungqvist 1998[64]	Abstract only
Ljungqvist 2001[65]	Incorrect study design
Ludwig 2013[66]	Incorrect study design
Maltby 1986[68]	Incorrect population
Maltby 2006[67]	Incorrect study design
Manchikanti 2011[69]	Incorrect study design
Mathur 2010[70]	Data included within Systematic review included
McKenna 2008[71]	Incorrect study design
Meisner 2008[72]	Not in English
Miller 1983[74]	No relevant outcomes
Morimoto 2019[75]	No relevant outcomes
Noba 2019[78]	Incorrect comparisons
Noblett 2006[79]	Incorrect comparison
Nygren 1996[81]	Abstract only
Nygren 1999[80]	No relevant outcomes
Nygren 2007[82]	Incorrect study design
Nygren 2015[83]	Incorrect study design
Orbey 2009[85]	Incorrect comparison
Ozdemir 2011[86]	Not in English
Ozkan 2000[87]	Not in English
Perrone 2011[88]	Incorrect comparison
Pexe-Machado 2013[89]	Data included within Systematic review included
Pimenta 2014[90]	Incorrect study design
Popovic 2019[91]	Systematic Review : references screened
Pousman 2009[92]	Incorrect study design & population
Power 2012[93]	Incorrect study design
Pu 2005[95]	Not in English
Savluk 2017[99]	Incorrect population

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Reference	Reason for exclusion
Singh 2015[100]	No relevant outcomes
Smith 2012[101]	Systematic review: incorrect population
Soop 1998[103]	Not in English
Soreide 1996[104]	Incorrect study design
Tran 2013[105]	Incorrect population
van Ginhoven 2011[106]	Incorrect intervention
Xu 2017[108]	Systematic Review : references screened
Yagci 2008[109]	No relevant outcomes
Yildiz 2013[111]	Systematic Review : references screened
Yilmaz 2013[112]	No relevant outcomes
Zhan 2018[114]	Incorrect population

I.2 Excluded health economic studies

Published health economic studies that met the inclusion criteria (relevant population, comparators, economic study design, published 2003 or later and not from non-OECD country or USA) but that were excluded following appraisal of applicability and methodological quality are listed below. See the health economic protocol for more details

Table 18: Studies excluded from the health economic review

Reference	Reason for exclusion
None.	

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Appendix J: Research recommendation

Research question

What is the optimal timing of administration of carbohydrate drinks as part of a preoperative fasting strategy?

Why this is important

Patients are expect to be 'nil by mouth', or have a period of starvation, prior to undergoing a surgical procedure that requires a general anaesthetic. While some may not fully understand the mechanism of risk (aspiration of stomach contents), all are aware that eating and drinking prior to your operation can be very bad for you.

While we have consensus guidance from the royal colleges of Anaesthetists and Nursing promoting the liberal, or relaxed, fasting guidance we still see variance in our local practice. Unsurprisingly this causes confusion, not only for the patient, but also the clinical staff, who often opt for a 'better safe than sorry' strategy. This in turn leads to prolonged periods of starvation and the negative consequences being without fluid and sustenance.

Over the past 10 years we have seen perioperative care evolve. One such advancement is the use of high energy, carbohydrate rich, drinks to aid recovery. These are given before and after surgery with the assumption that they provide the patient with a metabolic boost to overcome the negative effects, and reduce the complications, of surgery. Again, as with fasting, the timing and impact of these drinks appears varied, with no clear guide on appropriate timing or dosing of these drinks.

This research question will explore the optimal timing of carbohydrate drunks to hopefully clarify these issues and provide clinicians the detail needed to develop standardised and safe fasting protocols.

PICO question	Population: Adults 18 years and over who require major surgery Intervention(s) and comparison: • no food for <4 hours • no food for 4-6 hours • no food for >6 hours Outcome(s): Health-related quality of life, mortality, patient, family and carer experience of care, adverse events and complications (Clavien-Dindo, postoperative morbidity score (POMS), aspiration – pulmonary complications, acute kidney injury), length of hospital stay, unplanned ICU admission, thirst, headache and cancellation of surgery

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