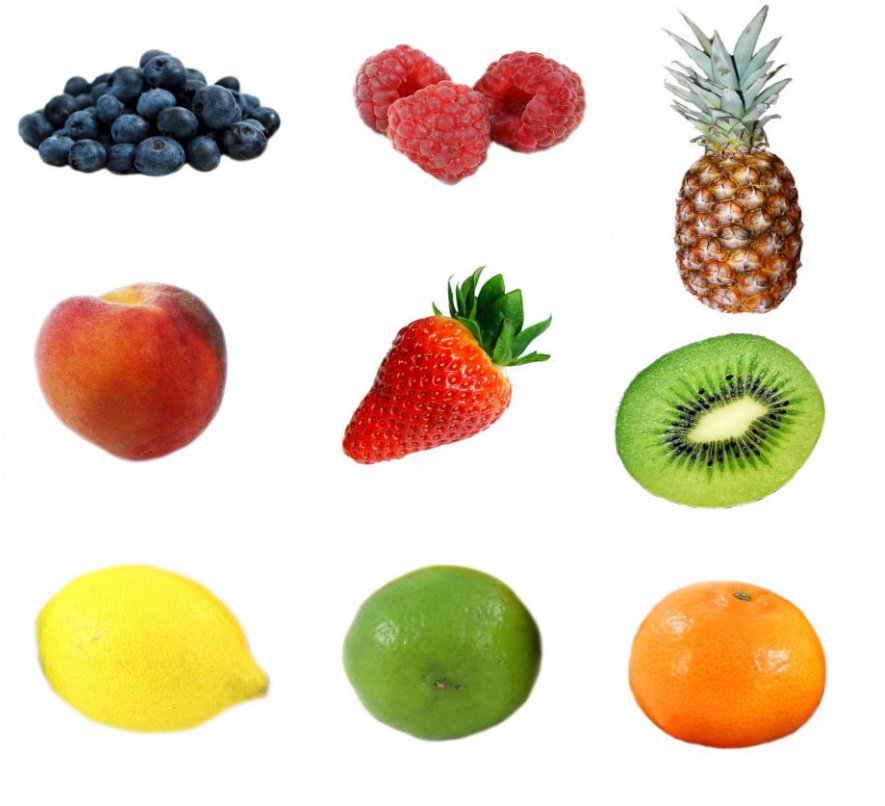
University Hospitals Bristol NHS
NHS Foundation Trust

Paediatric Nutrition

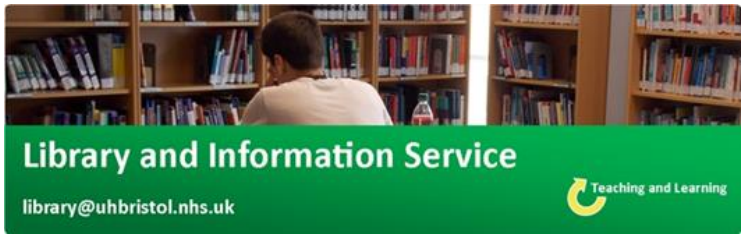
Current Awareness Newsletter



May 2017

(Quarterly)

Respecting everyone
Embracing change
Recognising success
Working together
Our hospitals.



Training Calendar 2017

All sessions are 1 hour

May	**(13.00)**
Mon 15th	**Literature Searching**
Fri 26th	**Interpreting Statistics**
Wed 31st	**Critical Appraisal**
June	**(12.00)**
Thurs 1st	**Literature Searching**
Thurs 8th	**Interpreting Statistics**
Tues 13th	**Critical Appraisal**
Thurs 29th	**Literature Searching**
July	**(13.00)**
Mon 3rd	**Interpreting Statistics**
Wed 12th	**Critical Appraisal**
Fri 21st	**Literature Searching**
Wed 26th	**Interpreting Statistics**

Your Outreach Librarian – Helen Pullen

Whatever your information needs, the library is here to help. Just email us at library@uhbristol.nhs.uk

Outreach: Your Outreach Librarian can help facilitate evidence-based practice for all in the team, as well as assisting with academic study and research. We also offer one-to-one or small group training in **literature searching, critical appraisal and medical statistics**. Get in touch: library@uhbristol.nhs.uk

Literature searching: We provide a literature searching service for any library member. For those embarking on their own research it is advisable to book some time with one of the librarians for a one-to-one session where we can guide you through the process of creating a well-focused literature research. Please email requests to library@uhbristol.nhs.uk

Contents

Librarians on demand!

Do you urgently need to find evidence to support your treatment of a patient? Would you like immediate information about a particular therapy, practice, condition, or other clinical need?

The Library can provide swift assistance with a range of our services, including literature searches and access to full text articles.

You can discuss your **urgent literature search** needs with a librarian immediately by calling extension 20105. A librarian can also be with you in your clinical area usually within 15 minutes.

For **speedy article requests** and other library services, email library@uhbristol.nhs.uk. If you specify your urgent need, we will prioritise this.

Journal Tables of Contents

Click on the **journal title (+ Ctrl)** for the most recent tables of contents.

If you would like any of the papers in full text then please email the library: library@uhbristol.nhs.uk

American Journal of Clinical Nutrition

May 1 2017, Volume 105, Issue 5

Journal of Human Nutrition & Dietetics

June 2017, Volume 30, Issue 3

Journal of the Academy of Nutrition and Dietetics

May 2017, Volume 117, Issue 5 (Formerly, Journal of American Dietetics Association)

Gut

May 2017, Volume 66, Issue 5

BMJ

Archive of 2017 online articles

Lancet

Archive of 2017 issues

UpToDate is the leading evidence-based clinical decision support system, designed for use at the point of care.

It contains more than 9,500 searchable topics across the following specialities:

- Adult and paediatric emergency medicine
- Allergy and immunology
- Cardiovascular medicine
- Dermatology
- Drug therapy
- Endocrinology and diabetes mellitus
- Family medicine
- Gastroenterology and hepatology
- General surgery
- Geriatrics
- Haematology
- Hospital Medicine
- Infectious diseases
- Nephrology and hypertension
- Neurology
- Obstetrics and gynaecology
- Oncology
- Paediatrics
- Primary care internal medicine
- Psychiatry
- Pulmonary, critical care and sleep medicine
- Rheumatology

How to access UpToDate

You can access UpToDate from any computer via www.uptodate.com. You will need your NHS Athens username/password (register through http://openathens.nice.org.uk/).

Updates

NICE National Institute for Health and Care Excellence

Effect of early supplemental parenteral nutrition in the paediatric ICU: a preplanned observational study of post-randomisation treatments in the PEPaNIC trial

15 May 2017 - Publisher: The Lancet Respiratory Medicine

Analysis of 1440 children randomised to early v late parenteral nutrition reports early administration of aminoacids is linked to increased risk of new infection and lower chance of weaning from mechanical ventilation whilst glucose during first 3days is

Cochrane Library

Oral calorie supplements for cystic fibrosis

Rosalind L Smyth, Oli Rayner

Online Publication Date: May 2017

Ultrasonography for confirmation of gastric tube placement

Hiraku Tsujimoto, Yasushi Tsujimoto, Yukihiko Nakata, Mai Akazawa, Yuki Kataoka

Online Publication Date: April 2017

UpToDate®

GASTROENTEROLOGY, HEPATOLOGY, AND NUTRITION

Psychological and behavioral symptoms in young children with celiac disease (May 2017)

Untreated celiac disease in children has been associated with subtle neurologic or behavioral symptoms, but previous studies may have been confounded by the parents' knowledge of the child's celiac disease diagnosis. A new study has found that three-year-old children with persistently positive tissue transglutaminase (tTG) antibodies and not on a gluten-free diet were more likely to manifest subtle behavioral symptoms (anxiety, depression, aggressive behavior, or sleep problems) compared with those with negative tTG antibodies [52]. The parents were unaware of the child's tTG status when they reported the behavioral symptoms. These findings lend further support to an

association between celiac disease and behavioral symptoms in young children. (See "Epidemiology, pathogenesis, and clinical manifestations of celiac disease in children", section on 'Neurologic disease and behavioral symptoms'.)

Other – NHS 'Behind the Headlines', Guidance etc

Concerns about alleged 'harmful' arsenic levels in baby rice cakes

Friday May 5 2017

"Almost half of baby rice food products contain illegal levels of inorganic arsenic despite new regulations set by the EU, according to researchers," ITV News reports…

Current Awareness Database Articles

Below is a selection of articles related to hand rehabilitation that were recently added to the healthcare databases. If you would like any of the following articles in full text, or if you would like a more focused search on your own topic, then get in touch: library@uhbristol.nhs.uk

1. The challenge of nutritional profiling of a protein-free feed module for children on low protein tube feeds with organic acidaemias.

Author(s): Daly, A; Evans, S; Ashmore, C; Chahal, S; Santra, S; MacDonald, A

Source: Journal of human nutrition and dietetics : the official journal of the British Dietetic Association; Jun 2017; vol. 30 (no. 3); p. 292-301

Publication Date: Jun 2017

Publication Type(s): Journal Article

Abstract:BACKGROUNDEnteral tube feeding for children with organic acidaemias (OA) is recommended. Protein restriction, providing minimum safe levels of protein intake, is advocated. Standard paediatric tube feeding formulae provide more than the minimum safe protein requirements and are unsuitable in OA without modification. Modified paediatric enteral feeds consist of several modular ingredients. The aim of this prospective longitudinal interventional study was to assess the efficacy of a premeasured novel protein-free module developed for children aged over 12 months compared to conventional practice.METHODSIn total, 15 children with OA (11.6-31 kg) needing enteral feeding were recruited. The protein-free module, from either a protein-free infant feed or modular ingredients, was replaced by the study feed. To ensure metabolic stability, energy and protein intake were unchanged. Dietary intake, anthropometry and nutritional biochemistry were recorded at baseline and week 26.RESULTSDietary intakes of magnesium (P = 0.02), sodium (P = 0.005), vitamin D (P = 0.04), docosahexaenoic acid (P = 0.01) and arachidonic acid (P = 0.001) significantly improved; plasma selenium (P = 0.002) and whole blood glutathione peroxidase (P = 0.02) significantly increased. Feed preparation accuracy as measured by composition analysis showed consistent errors both in pre- and study feeds.CONCLUSIONSA protein-free module improved nutritional intake and biochemistry, although feed preparation errors remained a common finding.

Database: Medline

2. Food-based anthocyanin intake and cognitive outcomes in human intervention trials: a systematic review.

Author(s): Kent, K; Charlton, K E; Netzel, M; Fanning, K

Source: Journal of human nutrition and dietetics : the official journal of the British Dietetic Association; Jun 2017; vol. 30 (no. 3); p. 260-274

Publication Date: Jun 2017

Publication Type(s): Journal Article Review

Abstract:BACKGROUNDPreclinical evidence suggests that the anthocyanins, which comprise a subclass of dietary flavonoids providing the purple and red pigmentation in plant-based foods, may

have a beneficial impact on cognitive outcomes.METHODSA systematic review was conducted to identify the published literature on food-based anthocyanin consumption and cognitive outcomes in human intervention trials. The literature search followed PRISMA guidelines and included six databases, as well as additional hand searching.RESULTSSeven studies were included in this review, comprising acute trials (n = 4) and longer-term (n = 3) interventions that assessed multiple cognitive outcomes in children, adults and older adults with cognitive impairment. Six of seven studies reported improvements in either a single, or multiple, cognitive outcomes, including verbal learning and memory, after anthocyanin-rich food consumption. As a result of methodological limitations and the large clinical and methodological diversity of the studies, the pooling of data for quantitative analysis was not feasible.CONCLUSIONSThe impact of food-based anthocyanin consumption on both acute and long-term cognition appears promising. However, adequately powered studies that include sensitive cognitive tasks are needed to confirm these findings and allow the translation of research into dietary messages.

Database: Medline

3. The effect of paternal methyl-group donor intake on offspring DNA methylation and birth weight.

Author(s): Pauwels, S; Truijen, I; Ghosh, M; Duca, R C; Langie, S A S; Bekaert, B; Freson, K; Huybrechts, I; Koppen, G; Devlieger, R; Godderis, L

Source: Journal of developmental origins of health and disease; Jun 2017; vol. 8 (no. 3); p. 311-321

Publication Date: Jun 2017

Publication Type(s): Journal Article

Abstract: Most nutritional studies on the development of children focus on mother-infant interactions. Maternal nutrition is critically involved in the growth and development of the fetus, but what about the father? The aim is to investigate the effects of paternal methyl-group donor intake (methionine, folate, betaine, choline) on paternal and offspring global DNA (hydroxy)methylation, offspring IGF2 DMR DNA methylation, and birth weight. Questionnaires, 7-day estimated dietary records, whole blood samples, and anthropometric measurements from 74 fathers were obtained. A total of 51 cord blood samples were collected and birth weight was obtained. DNA methylation status was measured using liquid chromatography-tandem mass spectrometry (global DNA (hydroxy)methylation) and pyrosequencing (IGF2 DMR methylation). Paternal betaine intake was positively associated with paternal global DNA hydroxymethylation (0.028% per 100 mg betaine increase, 95% CI: 0.003, 0.053, P=0.03) and cord blood global DNA methylation (0.679% per 100 mg betaine increase, 95% CI: 0.057, 1.302, P=0.03). Paternal methionine intake was positively associated with CpG1 (0.336% per 100 mg methionine increase, 95% CI: 0.103, 0.569, P=0.006), and mean CpG (0.201% per 100 mg methionine increase, 95% CI: 0.001, 0.402, P=0.049) methylation of the IGF2 DMR in cord blood. Further, a negative association between birth weight/birth weight-for-gestational age z-score and paternal betaine/methionine intake was found. In addition, a positive association between choline and birth weight/birth weight-for-gestational age z-score was also observed. Our data indicate a potential impact of paternal methyl-group donor intake on paternal global DNA hydroxymethylation, offspring global and IGF2 DMR DNA methylation, and prenatal growth.

Database: Medline

4. Development, prevention, and treatment of feeding tube dependency.

Author(s): Krom, Hilde; de Winter, J Peter; Kindermann, Angelika

Source: European journal of pediatrics; Jun 2017; vol. 176 (no. 6); p. 683-688

Publication Date: Jun 2017

Publication Type(s): Journal Article Review

Abstract: Enteral nutrition is effective in ensuring nutritional requirements and growth. However, when tube feeding lasts for a longer period, it can lead to tube dependency in the absence of medical reasons for continuation of tube feeding. Tube-dependent children are unable or refuse to start oral activities and they lack oral skills. Tube dependency has health-, psychosocial-, and economy-related consequences. Therefore, the transition to oral feeding is of great importance. However, this transition can be very difficult and needs a multidisciplinary approach. Most studies for treatment of tube dependency are based on behavioral interventions, such as family therapy, individual behavior therapy, neuro-linguistic programming, and parental anxiety reduction. Furthermore, oral motor therapy and nutritional adjustments can be helpful in tube weaning. The use of medication has been described in the literature. Although mostly chosen as the last resort, hunger-inducing methods, such as the Graz-model and the Dutch clinical hunger provocation program, are also successful in weaning children off tube feeding.CONCLUSIONThe transition from tube to oral feeding is important in tube-dependent children but can be difficult. We present an overview for the prevention and treatment of tube dependency. What is known: • Longer periods of tube feeding can lead to tube dependency. • Tube weaning can be very difficult. What is new: • Weaning as soon as possible and therefore referral to a multidisciplinary team are recommended. • An overview of treatment options for tube dependency is presented in this article.

Database: Medline

5. Pediatric intestinal failure-associated liver disease.

Author(s): Courtney, Cathleen M; Warner, Brad W

Source: Current opinion in pediatrics; Jun 2017; vol. 29 (no. 3); p. 363-370

Publication Date: Jun 2017

Publication Type(s): Journal Article

Abstract:PURPOSE OF REVIEWThe goal of this review is to provide updates on the definition, pathophysiology, treatment, and prevention of intestinal failure-associated liver disease (IFALD) that are relevant to care of pediatric patients.RECENT FINDINGSCurrent literature emphasizes the multifactorial nature of IFALD. The pathogenesis is still largely unknown; however, molecular pathways have been identified. Key to these pathways are proinflammatory cytokines involved in hepatic inflammation and bile acids synthesis such as Toll-like receptor 4 and farnesoid X receptor, respectively. Research for prevention and treatment is aimed at alleviating risk factors associated with IFALD, principally those associated with parental nutrition. Multiple nutrients and amino acids are relevant to the development of IFALD, but lipid composition has been the primary focus. Lipid emulsions with a lower ratio of omega-6-to-omega-3 polyunsaturated fatty acids (FAs) appear to improve bile flow and decrease intrahepatic inflammation. Long-term consequences of these alternative lipid emulsions are yet to be determined.SUMMARYIFALD remains the greatest contributor of mortality in patients with intestinal failure. Many factors contribute to its development, namely, alterations in the gut microbiome, sepsis, and lack of enteral intake. Novel combinations of lipid formulations are promising alternatives to purely soy-based formulas to reduce cholestasis.

Database: Medline

6. 24-Hour protein, arginine and citrulline metabolism in fed critically ill children - A stable isotope tracer study.

Author(s): de Betue, Carlijn T I; Garcia Casal, Xiomara C; van Waardenburg, Dick A; Schexnayder, Stephen M; Joosten, Koen F M; Deutz, Nicolaas E P; Engelen, Marielle P K J

Source: Clinical nutrition (Edinburgh, Scotland); Jun 2017; vol. 36 (no. 3); p. 876-887

Publication Date: Jun 2017

Publication Type(s): Journal Article

Abstract:BACKGROUND & AIMSThe reference method to study protein and arginine metabolism in critically ill children is measuring plasma amino acid appearances with stable isotopes during a short (4-8 h) time period and extrapolate results to 24-h. However, 24-h measurements may be variable due to critical illness related factors and a circadian rhythm could be present. Since only short duration stable isotope studies in critically ill children have been conducted before, the aim of this study was to investigate 24-h appearance of specific amino acids representing protein and arginine metabolism, with stable isotope techniques in continuously fed critically ill children.METHODSIn eight critically ill children, admitted to the pediatric (n = 4) or cardiovascular (n = 4) intensive care unit, aged 0-10 years, receiving continuous (par)enteral nutrition with protein intake 1.0-3.7 g/kg/day, a 24-h stable isotope tracer protocol was carried out. L-[ring-2H5]-phenylalanine, L-[3,3-2H2]-tyrosine, L-[5,5,5-2H3]-leucine, L-[guanido-15N2]-arginine and L-[5-13C-3,3,4,4-2H4]-citrulline were infused intravenously and L-[15N]-phenylalanine and L-[1-13C]leucine enterally. Arterial blood was sampled every hour.RESULTSCoefficients of variation, representing intra-individual variability, of the amino acid appearances of phenylalanine, tyrosine, leucine, arginine and citrulline were high, on average 14-19% for intravenous tracers and 23-26% for enteral tracers. No evident circadian rhythm was present. The pattern and overall 24-h level of whole body protein balance differed per individual.CONCLUSIONSIn continuously fed stable critically ill children, the amino acid appearances of phenylalanine, tyrosine, leucine, arginine and citrulline show high variability. This should be kept in mind when performing stable isotope studies in this population. There was no apparent circadian rhythm.CLINICAL TRIAL REGISTERNCT01511354 on clinicaltrials.gov.

Database: Medline

7. Markers of enteral adaptation in pediatric cases with short bowel syndrome.

Author(s): Chiba, Masahiro; Sanada, Yutaka; Toki, Akira

Source: Pediatrics international : official journal of the Japan Pediatric Society; May 2017

Publication Date: May 2017

Publication Type(s): Journal Article

Abstract:BACKGROUNDThis study aimed to ascertain if prospective determinations of specific gut hormones and growth factors could predict bowel adaptation in children with short bowel syndrome (SBS).METHODSWe studied parenteral nutrition (PN) independency as the short-term result and discontinuation of enteral nutrition (EN) as the long-term result from a retrospective chart review of 7 patients with SBS, who were managed in the absence of growth retardation. The correlation between increased numbers of enteral feedings or enteral nutrients and fasting levels of serum gastrin, glucagon-like peptide 2 (GLP-2), citrulline, and diamine oxidase (DAO) activity was analyzed. Five patients were weaned from PN, and 2 from EN.RESULTSFasting serum gastrin levels were significantly higher and the serum GLP-2 levels were lower in the PN-dependent patients than in the patients weaned from EN. The upper limit of fasting serum gastrin for PN independence and for EN independence was 300 and 200 pg/mL, respectively. The lower limit of fasting serum citrulline for PN independence was 15 μmol/L. However, the relationship between the serum citrulline and DAO levels and the course of bowel adaptation were poor.CONCLUSIONSSerum citrulline levels are

predictors of PN independence in children with SBS. Fasting serum gastrin and GLP-2 levels are indicators for monitoring the adaptation of the residual intestine. However, this is a small study and further larger prospective trials are required to confirm these results.

Database: Medline

8. Refractory cytopenias secondary to copper deficiency in children receiving exclusive jejunal nutrition.

Author(s): Jacobson, Amanda E; Kahwash, Samir B; Chawla, Anjulika

Source: Pediatric blood & cancer; May 2017

Publication Date: May 2017

Publication Type(s): Journal Article

Abstract: Copper deficiency is a known cause of anemia and neutropenia that is easily remedied with copper supplementation. Copper is primarily absorbed in the stomach and proximal duodenum, so patients receiving enteral nutrition via methods that bypass this critical region may be at increased risk for copper deficiency. In pediatrics, postpyloric enteral feeding is increasingly utilized to overcome problems related to aspiration, severe reflux, poor gastric motility, and gastric outlet obstruction. However, little is known about the prevalence of copper deficiency in this population. We describe three pediatric patients receiving exclusive jejunal feeds who developed cytopenias secondary to copper deficiency.

Database: Medline

9. Increased Fat Absorption from Enteral Formula Through an In-Line Digestive Cartridge in Patients with Cystic Fibrosis.

Author(s): Freedman, Steven; Orenstein, David; Black, Phillip; Brown, Perry; McCoy, Karen; Stevens, John; Grujic, Danica; Clayton, Russell

Source: Journal of pediatric gastroenterology and nutrition; May 2017

Publication Date: May 2017

Publication Type(s): Journal Article

Abstract:OBJECTIVESSupplemental enteral nutrition (EN) is used by approximately 12% of people with cystic fibrosis (CF). The objective of this study was to evaluate the safety, tolerability, and fat absorption of a new in-line digestive cartridge (Relizorb) that hydrolyzes fat in enteral formula provided to patients with CF.METHODSPatients with CF receiving EN participated in a multicenter, randomized, double-blind, crossover trial with an open-label safety evaluation period. Plasma omega-3 fatty acid (FA) concentrations were measured and used as markers of fat absorption. Gastrointestinal (GI) symptoms were recorded to evaluate safety and tolerability. Information regarding the effect of EN on appetite and breakfast consumption was also collected.RESULTSPrior to study entry, participants had received EN for a mean of 6.6 years at a mean volume of approximately 800 mL, yet had a mean body mass index of only 17.5 kg/m and omega-3 FA plasma concentrations were only 60% of levels found in normal healthy subjects. Compared with placebo, cartridge use resulted in a statistically significant 2.8-fold increase in plasma omega-3 FA concentrations. There were no adverse experiences associated with cartridge use, and a decrease in the frequency and severity of most symptoms of malabsorption was observed with cartridge use. Participants reported increased preservation of appetite and breakfast consumption with cartridge use compared with their pre-study regimen.CONCLUSIONSUse of this in-line digestive cartridge was safe and well tolerated, and resulted in significantly increased levels of plasma omega-3 FA used

with enteral formula, suggesting an overall increased fat absorption.This is an open access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal. http://creativecommons.org/licenses/by-nc-nd/4.0.

Database: Medline

10. The differential effects of changes in individual macronutrient intake on changes in lipid concentrations during childhood: From the Ewha Birth & Growth Cohort.

Author(s): Lee, Hye Ah; Hwang, Hyo Jeong; Oh, Se Young; Park, Eun Ae; Cho, Su Jin; Kim, Hae Soon; Park, Hyesook

Source: Clinical nutrition (Edinburgh, Scotland); May 2017

Publication Date: May 2017

Publication Type(s): Journal Article

Abstract:BACKGROUND & AIMSHigh carbohydrate or fat intake is responsible for abnormal lipid concentrations in adults, but few studies of children have been reported. Using data from a Korean children's cohort study, we assessed the association between macronutrient intake and lipid profile with a longitudinal association during a 4-year follow-up.METHODSUsing 2 days of 24-h dietary data obtained at 3 (n = 323) and 7 (n = 292) years old from the Ewha Birth & Growth Cohort, we calculated changes (n = 103) in macronutrient intake in terms of energy-adjusted intake and percent total energy for nutrients. Changes in lipid profiles (TC: total cholesterol, TG: triglyceride, HDL-c: high-density lipoprotein cholesterol, LDL-c: low-density lipoprotein cholesterol) are the primary outcomes in this study. The effects of individual changes in macronutrient intake on changes in lipid profiles over time were assessed using multiple regression analyses.RESULTSThe percentages of total energy from carbohydrates and fat were 59.1% and 27.4% at baseline, respectively. Those in the highest tertile of carbohydrate intake showed the highest mean TG and lowest mean TC and HDL-c levels, regardless of observation time. By contrast, those with the highest fat intake indicated the lowest mean TG and highest mean TC and HDL-c at 7 years old. In addition, increased intake of carbohydrates had an unfavorable effect on TG, while increased intake of fat, especially animal-based fat, increased LDL-c levels over time.CONCLUSIONSOur study showed that a relatively high intake of carbohydrate or fat among children had an unfavorable effect on lipid concentrations based on a longitudinal approach.

Database: Medline

11. Whole-Grain Intake, Reflected by Dietary Records and Biomarkers, Is Inversely Associated with Circulating Insulin and Other Cardiometabolic Markers in 8- to 11-Year-Old Children.

Author(s): Damsgaard, Camilla T; Biltoft-Jensen, Anja; Tetens, Inge; Michaelsen, Kim F; Lind, Mads V; Astrup, Arne; Landberg, Rikard

Source: The Journal of nutrition; May 2017; vol. 147 (no. 5); p. 816-824

Publication Date: May 2017

Publication Type(s): Journal Article

Available in full text at Journal of Nutrition - from EBSCOhost

Abstract: Background: Whole-grain consumption seems to be cardioprotective in adults, but evidence in children is limited.Objective: We investigated whether intakes of total whole grain and dietary fiber as well as specific whole grains were associated with fat mass and cardiometabolic risk

profile in children.Methods: We collected cross-sectional data on parental education, puberty, diet by 7-d records, and physical activity by accelerometry and measured anthropometry, fat mass index by dual-energy X-ray absorptiometry, and blood pressure in 713 Danish children aged 8-11 y. Fasting blood samples were obtained and analyzed for alkylresorcinols, biomarkers of whole-grain wheat and rye intake, HDL and LDL cholesterol, triacylglycerols, insulin, and glucose. Linear mixed models included puberty, parental education, physical activity, and intakes of energy, fruit and vegetables, saturated fat, and n-3 (ω-3) polyunsaturated fatty acids.Results: Median (IQR) whole-grain and dietary fiber intakes were 52 g/d (35-72 g/d) and 17 g/d (14-22 g/d), respectively. Fourteen percent of children were overweight or obese and most had low-risk cardiometabolic profiles. Dietary whole-grain and fiber intakes were not associated with fat mass index but were inversely associated with serum insulin [both $P < 0.01$; e.g., with 0.68 pmol/L (95% CI: 0.26, 1.10 pmol/L) lower insulin · g whole grain-1 · MJ-1]. Whole-grain oat intake was inversely associated with fat mass index, systolic blood pressure, and LDL cholesterol (all $P < 0.05$) as well as insulin ($P = 0.003$), which also tended to be inversely associated with whole-grain rye intake ($P = 0.11$). Adjustment for fat mass index did not change the associations. The C17-to-C21 alkylresorcinol ratio, reflecting whole-grain rye to wheat intake, was inversely associated with insulin ($P < 0.001$).Conclusions: Higher whole-grain intake was associated with lower serum insulin independently of fat mass in 8- to 11-y-old Danish children. Whole-grain oat intake was linked to an overall protective cardiometabolic profile, and whole-grain rye intake was marginally associated with lower serum insulin. This supports whole grains as healthy dietary components in childhood. This trial was registered at clinicaltrials.gov as NCT01577277.

Database: Medline

12. Early, rapidly progressive enteral nutrition promotes growth of very low birth weight (VLBW) infants.

Author(s): Flidel-Rimon, Orna; Raz, Moriya; Balla, Uri; Hofi, Lilach; Juster-Reicher, Ada; Shinwell, Eric S

Source: The journal of maternal-fetal & neonatal medicine : the official journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstetricians; May 2017; vol. 30 (no. 10); p. 1227-1231

Publication Date: May 2017

Publication Type(s): Journal Article

Abstract:AIMThis study describes the effects of a quality improvement program to promote improved postnatal nutrition on the growth of very low birth weight (VLBW) infants.METHODSDaily data regarding nutrition and growth were collected from the medical record of VLBW infants born during 1995-2010. The infants were grouped by year of birth in order to compare infants from before, during and after the policy change. Evaluation of growth included age in days at a return to birth weight and the proportion of infants with weight below the 10th percentile at discharge.RESULTSThe caloric and protein intake improved significantly. The age at a return to birth weight fell ($p < 0.01$) from 14.6 ± 5 d to 11 ± 8 d after the change. The proportion of infants with a discharge weight below the 10th percentile for corrected age fell ($p < 0.01$) from 72.1% to 42.1%. Data on enteral feeding showed that increased rate of enteral feeds (EF) was associated with better growth ($p < 0.001$).CONCLUSIONIncreasing awareness led to increase in caloric and protein intake in VLBW infants. Aggressive EF was associated with more rapid weight gain. However, the provision of protein and calories during the first 2 weeks of life still falls short of the latest European Society of Pediatric Gastroenterology, Hepatology and Nutrition recommendations.

Database: Medline

13. Can Vco2-Based Estimates of Resting Energy Expenditure Replace the Need for Indirect Calorimetry in Critically Ill Children?

Author(s): Mouzaki, Marialena; Schwartz, Steven M; Mtaweh, Haifa; La Rotta, Gustavo; Mah, Kandice; Herridge, Joann; Van Arsdell, Glen; Parshuram, Christopher S; Floh, Alejandro A

Source: JPEN. Journal of parenteral and enteral nutrition; May 2017; vol. 41 (no. 4); p. 619-624

Publication Date: May 2017

Publication Type(s): Journal Article

Abstract:BACKGROUNDOptimal energy provision, guided by measured resting energy expenditure (REE), is fundamental in the care of critically ill children. REE should be determined by indirect calorimetry (IC), which has limited availability. Recently, a novel equation was developed for estimating REE derived from carbon dioxide production (Vco2). The aim of this study was to validate the accuracy of this equation in a population of critically ill children following cardiopulmonary bypass (CPB).METHODSThis is an ancillary study to a larger trial of children undergoing CPB. Respiratory mass spectrometry was used measure oxygen consumption (Vo2) and Vco2. REE was then calculated according to the established Weir equation (REEW) and the modified, Vco2-based equation (REECO2). The agreement between the 2 measurements was assessed using Bland-Altman plots and mixed-model regressions accounting for repeated measures.RESULTSData from 104 patients, which included 575 paired measurements, were included. The agreement between REEW and REECO2 was biased during the 72-hour observation period post CPB, with a mean percentage error between measurements of 11% (±7%). The most important determinant of the bias with the Vco2-based equation was the respiratory quotient (RQ). The percentage error between REEW and REECO2 dropped to 4.4% (±2.4%) in those with an RQ between 0.8 and 1. The within-subject variability for RQ in this cohort was wide (11%).CONCLUSIONSIC remains the most accurate method to determine the REE of critically ill patients. Widespread availability of Vco2 data renders Vco2-based approaches to measurement of REE attractive; however, further research is needed to ensure that REE is estimated accurately.

Database: Medline

14. Parenteral Nutrition Is One of the Most Significant Risk Factors for Nosocomial Infections in a Pediatric Cardiac Intensive Care Unit.

Author(s): Netto, Roberta; Mondini, Matteo; Pezzella, Chiara; Romani, Lorenza; Lucignano, Barbara; Pansani, Laura; D'argenio, Patrizia; Cogo, Paola

Source: JPEN. Journal of parenteral and enteral nutrition; May 2017; vol. 41 (no. 4); p. 612-618

Publication Date: May 2017

Publication Type(s): Journal Article

Abstract:BACKGROUNDNosocomial infections (NIs) are associated with significant morbidity and mortality and increased healthcare costs. We aimed to assess the NI epidemiology and associated risk factors in a pediatric cardiac intensive care unit (PCICU).MATERIALS AND METHODSProspective observational study on 1106 patients admitted to a PCICU from January 1, 2012, to October 31, 2013. NIs were defined and recorded weekly by a multidisciplinary team. Independent risk factors for NIs were assessed by logistic regression analysis in the overall cohort, in cardiac surgical patients, and in those who had cardiopulmonary bypass (CPB).RESULTSNinety-two patients (8.3%) had NIs. Overall mortality was 2% but 8.3% in children with NIs (P < .001). The most frequent NIs were pneumonia (19.6%), bacteremia of unknown origin (16.3%), and catheter-associated bloodstream infection (14.1%) caused mainly by Staphylococcus aureus and Pseudomonas aeruginosa. In the overall cohort, independent risk factors for NIs were number of days of parenteral nutrition (PN), days of invasive and noninvasive ventilation, ward before PCICU admission, and days of PCICU stay;

in the cardiac surgical patients, the risk factors were days of PN and days of invasive and noninvasive ventilation; in children who had undergone CPB, the risk factors for NIs were days of PN, delayed sternal closure, reintervention, length of CPB, younger age, and days of invasive ventilation.CONCLUSIONMortality was significantly higher in patients with NIs. The use of PN was one of the most significant predictors for NIs in the overall cohort of PCICU patients, cardiac surgical patients, and those who required CPB.

Database: Medline

15. Enteral Feeding Therapy for Maintaining Remission in Crohn's Disease: A Systematic Review.

Author(s): El-Matary, Wael; Otley, Anthony; Critch, Jeff; Abou-Setta, Ahmed M

Source: JPEN. Journal of parenteral and enteral nutrition; May 2017; vol. 41 (no. 4); p. 550-561

Publication Date: May 2017

Publication Type(s): Journal Article

Abstract:BACKGROUNDThe efficacy of enteral nutrition (EN) for maintaining remission in patients with inactive Crohn's disease (CD) is unclear. The aim of this article was to systematically identify, review, and critically appraise the evidence on efficacy of EN in maintaining medically induced remission in CD.MATERIALS AND METHODSSeveral databases were searched from inception to April 2015 for relevant citations of published randomized controlled trials and nonrandomized cohort studies. Two reviewers independently selected studies for inclusion and assessed study quality and risk of bias. The primary outcome was relapse rate in patients with inactive CD who have been in medically induced remission and subsequently started or maintained on EN.RESULTSTwelve studies (1169 patients, including 95 children) fulfilled the inclusion criteria. As the included studies were significantly heterogeneous, a meta-analysis was not performed. Eleven studies showed that EN was either better than, or as effective as, the comparator in maintaining remission in patients with inactive CD. No major EN-related adverse events were reported. Only 1 adult randomized controlled trial (n = 51), with low risk of bias, compared EN with regular diet and found a relapse rate of 34% in the EN group versus 64% in the control group (P < .01) after a mean follow-up of 11.9 months.CONCLUSIONSEN is more effective than regular diet and as effective as some medications in maintaining remission for patients with inactive CD. Large, properly designed randomized controlled studies of sufficient duration are required to confirm this conclusion for EN versus individual medications.

Database: Medline

16. Persistence of hepatic fibrosis in pediatric intestinal failure patients treated with intravenous fish oil lipid emulsion.

Author(s): Belza, Christina; Thompson, Rory; Somers, Gino R; de Silva, Nicole; Fitzgerald, Kevin; Steinberg, Karen; Courtney-Martin, Glenda; Wales, Paul W; Avitzur, Yaron

Source: Journal of pediatric surgery; May 2017; vol. 52 (no. 5); p. 795-801

Publication Date: May 2017

Publication Type(s): Journal Article

Abstract:BACKGROUNDPediatric intestinal failure (PIF) is a life-altering chronic condition with significant morbidity and mortality. Omegaven® therapy has been used to treat children with advanced intestinal failure associated liver disease. Our objective was to determine the evolution of hepatic fibrosis in PIF patients who received Omegaven® and describe their clinical outcome.METHODSA retrospective review in PIF patients who received Omegaven® was performed. Patients were included if they had liver biopsies completed before Omegaven® therapy and after

resolution of hyperbilirubinemia. Biopsy results were evaluated to determine the degree of fibrosis, inflammation, and cholestasis. Clinical and biochemical data was collected.RESULTSSix patients were identified. Assessment of fibrosis at last follow-up demonstrated improvement in 2 patients and progression or stable fibrosis in 4/6. All patients demonstrated reduction in cholestasis and inflammation. One patient received a liver/intestine transplant and a second is listed, both of them with progressive fibrosis. One patient achieved full enteral nutrition, while the rest remain partially parenteral nutrition dependent.CONCLUSIONUse of Omegaven® is associated with reduced cholestasis and inflammation, but with persistence or worsening of fibrosis in some patients. A subset of patients with progressive fibrosis may develop portal hypertension and progressive liver disease.

Database: Medline

17. Predicting time to full enteral nutrition in children after significant bowel resection.

Author(s): Gonzalez-Hernandez, Jessica; Prajapati, Purvi; Ogola, Gerald; Channabasappa, Nandini; Drews, Barbara; Piper, Hannah G

Source: Journal of pediatric surgery; May 2017; vol. 52 (no. 5); p. 764-767

Publication Date: May 2017

Publication Type(s): Journal Article

Abstract:PURPOSEParenteral nutrition (PN) contributes to considerable morbidity in children after significant bowel resection. This study evaluates the utility of clinical variables in predicting time to independence from PN.METHODSAfter IRB approval, a retrospective review (1999-2012) of 71 children who were on PN for >6weeks after intestinal resection and successfully weaned was performed. Clinical characteristics were evaluated to determine the relationship to time to full enteral nutrition. P-values<0.05 were significant.RESULTSMost children had necrotizing enterocolitis (56%), intestinal atresia (20%), or gastroschisis (11%) with a median small bowel length of 55cm (IQR, 35-92cm). The duration of PN was independent of the etiology of intestinal loss, presence of the ileocecal valve or colon, or location of anastomosis, but was strongly associated with small bowel length (<0.01) and percent of expected small bowel based on gestational age (GA) (median 50%, <0.01). In general, children who had 25-50% of their small bowel were dependent on PN for at least 2years compared to approximately 1year for those with 51-75%.CONCLUSIONThe duration of PN dependence in children after major bowel resection is best predicted by remaining small bowel length and can be estimated using a linear regression model.LEVEL OF EVIDENCE2b.

Database: Medline

18. Gastrojejunostomy tube complications - A single center experience and systematic review.

Author(s): Morse, James; Baird, Robert; Muchantef, Karl; Levesque, Dominique; Morinville, Veronique; Puligandla, Pramod S

Source: Journal of pediatric surgery; May 2017; vol. 52 (no. 5); p. 726-733

Publication Date: May 2017

Publication Type(s): Journal Article

Abstract:PURPOSEGastrojejunostomy tubes (GJTs) enable enteral nutrition in infants/children with feeding intolerance. However, complications may be increased in small infants. We evaluated our single-institution GJT complication rate and systematically reviewed existing literature.METHODSWith REB approval, a retrospective single-institution analysis of GJT placements between 2009 and 2015 was performed. For the systematic review, MOOSE guidelines were followed.RESULTSAt our institution, 48 children underwent 154/159 successful insertions primarily

for gastroesophageal reflux (n=27; 55%) and aspiration (n=11; 23%). Median age at first GJT insertion was 2.2years (0.2-18). Thirty-five (73%) had an index insertion when ≤10kg. GJTs caused 2 perforations and 1 death. The systematic review assessed 48 articles representing 2726 procedures. Overall perforation rate was estimated as 2.1% (n=36 studies, 23/1092, 95% CI: 1.0-3.2). Perforation rates in children <10kg versus ≥10kg were estimated as 3.1%/procedure (95% CI: 1.1%-5.0%) and 0.1%/procedure (95% CI: 0%-0.3%), respectively. The relative risk of perforation was 9.4 (95% CI: 2.8-31.3). Overall mortality was estimated as 0.9%/patient (n=39 studies; 95% CI: 0.2-1.6%). Most perforations (19/23; 83%) occurred ≤30days of attempted tube placement.CONCLUSIONGastrojejunostomy tubes are associated with significant complications and frequently require revision/replacement. Insertion in patients <10kg is associated with increased perforation risk. Caution is warranted in this subgroup.LEVEL OF EVIDENCELevel II.

Database: Medline

19. Effect of Differential Enteral Protein on Growth and Neurodevelopment in Infants <1500 g: A Randomized Controlled Trial.

Author(s): Dogra, Shivani; Thakur, Anup; Garg, Pankaj; Kler, Neelam

Source: Journal of pediatric gastroenterology and nutrition; May 2017; vol. 64 (no. 5); p. e126

Publication Date: May 2017

Publication Type(s): Journal Article

Abstract:OBJECTIVEThe aim of the study was to determine whether higher enteral protein intake leads to improved head growth at 40 weeks postmenstrual age (PMA) in preterm infants <32 weeks or 1500 g.METHODSRandomized controlled trial in which 120 infants were assigned to either group A with higher enteral protein intake achieved by fortification with higher protein containing fortifier (1 g/100 mL expressed breast milk) or to group B with lower enteral protein intake where fortification was done with standard available protein fortifier (0.4 g /100 mL expressed breast milk).RESULTSThe mean (standard deviation) protein intake was higher in group A as compared to group B; 4.2 (0.47) compared with 3.6 (0.37) g·kg·day, P<0.001. At 40 weeks PMA, the mean (standard deviation) weekly occipitofrontal circumference gain was significantly higher in group A as compared to group B; 0.66 (0.16) compared with 0.60 (0.15) cm/week (mean difference 0.064, 95% confidence interval [0.004-0.123], [P=0.04]). Weight growth velocity in group A was 11.95 (2.2) g·kg·day as compared to 10.78 (2.6) g·kg·day in group B (mean difference 1.10, 95% confidence interval [0.25-2.07], [P=0.01]). No difference was observed in the length between the 2 groups. There was no difference in growth indices and neurodevelopmental outcomes at 12 to 18 months corrected age in the 2 groups.CONCLUSIONSFortification of expressed human milk with fortifier containing higher protein results in better head growth and weight gain at 40 weeks PMA in preterm infants <32 weeks or 1500 g without any benefits on long-term growth and neurodevelopment at 12 to 18 months corrected age (CTRI/2014/06/004661).

Database: Medline

20. Nutritional status, metabolic state and nutrient intake in children with bronchiolitis.

Author(s): De Cosmi, V; Mehta, N M; Boccazzi, A; Milani, G P; Esposito, S; Bedogni, G; Agostoni, C

Source: International journal of food sciences and nutrition; May 2017; vol. 68 (no. 3); p. 378-383

Publication Date: May 2017

Publication Type(s): Journal Article

Abstract: Nutrition has a coadjuvant role in the management of children with acute diseases. We aimed to examine nutritional status, macronutrient requirements and actual macronutrient delivery

in bronchiolitis. The nutritional status was classified according to WHO criteria and resting energy expenditure (MREE) was measured using an indirect calorimeter. Bland-Altman analysis was used to examine the agreement between MREE and estimated energy expenditure (EEE) with standard equations. Based on the ratio MREE/EEE in relation to Schofield equation on admission, we defined the subjects' metabolic status. A total of 35 patients were enrolled and 46% were malnourished on admission, and 25.8% were hypermetabolic, 37.1% hypometabolic and 37.1% normometabolic. We performed a 24-h recall in 10 children and 80% were overfed (AEI: MREE >120%). Mean bias (limits of agreement) with MREE was 8.9 (-73.9 to 91.8%) for Schofield; 61.0 (-41 to 163%) for Harris-Benedict; and 9.9 (-74.4 to 94.2%) for FAO-WHO equation. Metabolism of infants with bronchiolitis is not accurately estimated by equations.

Database: Medline

21. Nutrition and High-Flow Nasal Cannula Respiratory Support in Children With Bronchiolitis.

Author(s): Slain, Katherine N; Martinez-Schlurmann, Natalia; Shein, Steven L; Stormorken, Anne

Source: Hospital pediatrics; May 2017; vol. 7 (no. 5); p. 256-262

Publication Date: May 2017

Publication Type(s): Journal Article

Available in full text at Hospital Pediatrics - from Highwire Press

Abstract:OBJECTIVESNo guidelines are available regarding initiation of enteral nutrition in children with bronchiolitis on high-flow nasal cannula (HFNC) support. We hypothesized that the incidence of feeding-related adverse events (AEs) would not be associated with HFNC support.METHODSThis retrospective study included children ≤24 months old with bronchiolitis receiving HFNC in a PICU from September 2013 through April 2014. Data included demographics, respiratory support during feeding, and feeding-related AEs. Feeding-related AEs were extracted from nursing documentation and defined as respiratory distress or emesis. Feed route and maximum HFNC delivery were recorded in 8-hour shifts (6 am-2 pm, 2 pm-10 pm, and 10 pm-6 am).RESULTS70 children were included, with a median age of 5 (interquartile range [IQR] 2-10) months. HFNC delivery at feed initiation varied widely, and AEs related to feeding occurred rarely. Children were fed in 501 of 794 (63%) of nursing shifts, with AEs documented in only 29 of 501 (5.8%) of those shifts. The incidence of AEs at varying levels of respiratory support did not differ (P = .092). Children in the "early feeding" (fed within first 2 shifts) group (n = 22) had a shorter PICU length of stay (2.2 days [IQR 1.4-3.9] vs 3.2 [IQR 2.5-5.3], P = .006) and shorter duration of HFNC use (26.0 hours [IQR 15.8-57.0] vs 53.5 [IQR 37.0-84.8], P = .002), compared with children in the "late feeding" group (n = 48).CONCLUSIONSIn this small, single-institution patient cohort, feeding-related AEs were rare and not related to the delivered level of respiratory support.

Database: Medline

22. Oral Nutrition in Children With Bronchiolitis on High-Flow Nasal Cannula Is Well Tolerated.

Author(s): Sochet, Anthony Alexander; McGee, Jessica Ann; October, Tessie Wazeerah

Source: Hospital pediatrics; May 2017; vol. 7 (no. 5); p. 249-255

Publication Date: May 2017

Publication Type(s): Journal Article

Available in full text at Hospital Pediatrics - from Highwire Press

Abstract:OBJECTIVESTo determine the incidence of aspiration-related respiratory failure and nutrition interruptions in children with bronchiolitis on high-flow nasal cannula (HFNC) receiving

enteral nutrition.METHODSWe performed a single-center, prospective, observational cohort study within a 313-bed tertiary medical center from January through December 2015. We included term children 1 month to 2 years of age without comorbid bacterial pneumonia or chronic medical conditions who were diagnosed with bronchiolitis while receiving HFNC and enteral nutrition. Primary outcomes were incidence of aspiration-related respiratory failure and nutrition interruptions. Secondary outcomes were duration of HFNC therapy, length of stay, and nutrition characteristics.RESULTSOf the 344 children admitted with bronchiolitis, 132 met the inclusion criteria. Ninety-seven percent received enteral nutrition by mouth and 3% by nasogastric tube. HFNC flow rates at the time of nutrition initiation ranged between 4 and 13 L per minute (0.3-1.9 L/kg per minute) and respiratory rates from 18 to 69 breaths per minute. One (0.8%) subject had aspiration-related respiratory failure and 12 (9.1%) experienced nutrition interruptions. Children with interruptions in nutrition had a longer length of stay by 2.5 days ($P < .01$) and received an additional day of HFNC therapy ($P < .01$). By discharge, 55 (42%) children achieved all nutritional goals: caloric, volume, and protein. Children admitted overnight had an increased incidence of delay to nutrition initiation (30% vs 11%; $P < .01$).CONCLUSIONSWe observed a low incidence of aspiration-related respiratory failure in term children with bronchiolitis on HFNC receiving enteral nutrition. Oral nutrition was tolerated across a range of HFNC flow and respiratory rates, suggesting the practice of withholding nutrition in this population is unsupported.

Database: Medline

23. Timing of the initiation of parenteral nutrition in critically ill children.

Author(s): Jimenez, Lissette; Mehta, Nilesh M; Duggan, Christopher P

Source: Current opinion in clinical nutrition and metabolic care; May 2017; vol. 20 (no. 3); p. 227-231

Publication Date: May 2017

Publication Type(s): Journal Article

Abstract:PURPOSE OF REVIEWTo review the current literature evaluating clinical outcomes of early and delayed parenteral nutrition initiation among critically ill children.RECENT FINDINGSNutritional management remains an important aspect of care among the critically ill, with enteral nutrition generally preferred. However, inability to advance enteral feeds to caloric goals and contraindications to enteral nutrition often leads to reliance on parenteral nutrition. The timing of parenteral nutrition initiation is varied among critically ill children, and derives from an assessment of nutritional status, energy requirements, and physiologic differences between adults and children, including higher nutrient needs and lower body reserves. A recent randomized control study among critically ill children suggests improved clinical outcomes with avoiding initiation of parenteral nutrition on day 1 of admission to the pediatric ICU.SUMMARYAlthough there is no consensus on the optimal timing of parenteral nutrition initiation among critically ill children, recent literature does not support the immediate initiation of parenteral nutrition on pediatric ICU admission. A common theme in the reviewed literature highlights the importance of accurate assessment of nutritional status and energy expenditure in deciding when to initiate parenteral nutrition. As with all medical interventions, the initiation of parenteral nutrition should be considered in light of the known benefits of judiciously provided nutritional support with the known risks of artificial, parenteral feeding.

Database: Medline

24. Causes of interruptions in postoperative enteral nutrition in children with congenital heart disease.

Author(s): Qi, Jirong; Li, Zhuo; Cun, Yueshuang; Li, Xiaonan

Source: Asia Pacific journal of clinical nutrition; May 2017; vol. 26 (no. 3); p. 402-405

Publication Date: May 2017

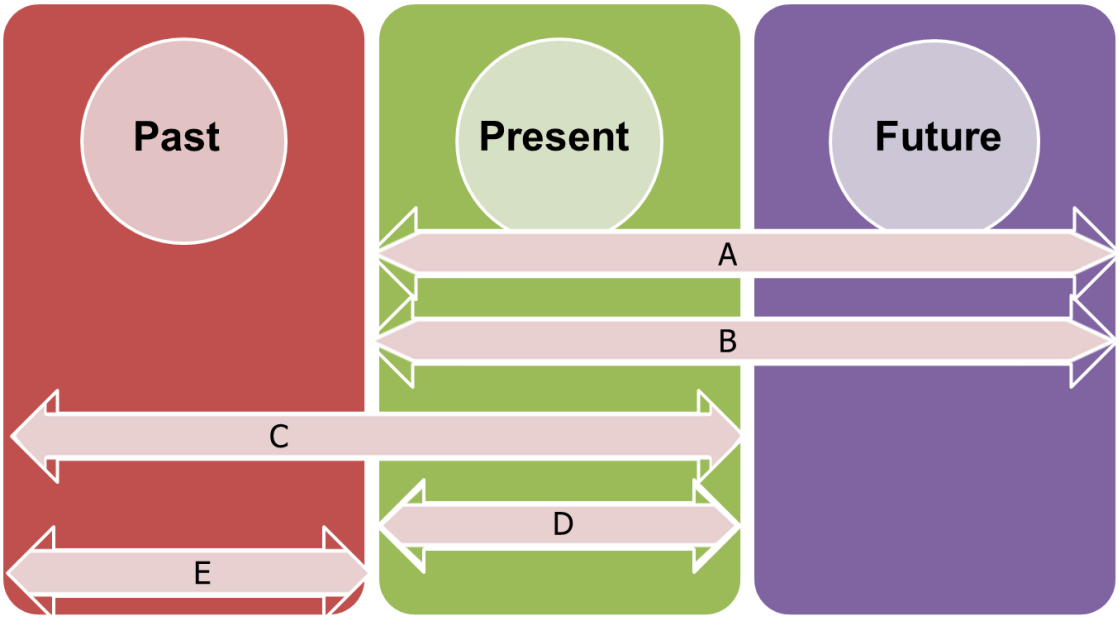
Publication Type(s): Journal Article

Abstract:BACKGROUND AND OBJECTIVESPerioperative nutritional support has become a hot topic in the clinical management of congenital heart disease (CHD). Postoperative enteral nutrition (EN) offers many benefits, such as protection of the intestinal mucosa, reduced risk of infection, and low clinical costs. Interruptions in EN frequently influence nutritional support and clinical outcomes. We, therefore, aimed to determine the causes of interruptions in postoperative EN in CHD patients and discuss clinical counter measures.METHODS AND STUDY DESIGNWe analyzed the data of 360 CHD patients to determine the causes of interruptions in postoperative EN and develop possible clinical strategies to prevent such interruptions.RESULTSOf the 360 patients (aged from 1 month to 6 years), 198 patients had at least one EN interruption. The total number of interruptions was 498 (average, 2.52 interruptions/ patient). Non-gastrointestinal factors (airway management, fluid overload, invasive procedure, increased intracranial pressure, feeding tube block, and clinical deterioration) accounted for 67.8% (338/498) of all interruptions and gastrointestinal factors (vomiting, gastrointestinal bleeding, diarrhea, constipation, and large gastric residual volume) accounted for 32.2% (160/498). The total number of interruptions and the number of interruptions due to gastrointestinal factors were significantly higher in younger patients (aged from 1-12 months) than in older patients (aged from 1-6 years).CONCLUSIONSNon-gastrointestinal factors were the main causes of interruptions in postoperative EN in CHD patients. Younger patients had a greater number of interruptions as a whole, and more interruptions caused by gastrointestinal factors. Gastrointestinal factors can be reduced by tube feeding and use of gastrointestinal motility drugs.

Database: Medline

Exercise: Study Design Timeframes

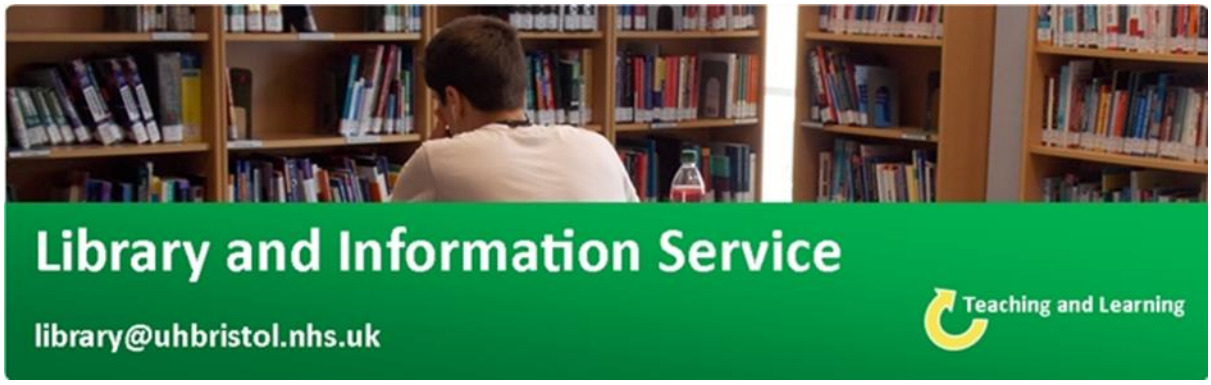
Match the study design with the timeframe it covers.



1. **Randomised Controlled Trial**
2. **Cross-Sectional Study**
3. **Case-control Study**
4. **Cohort Study**
5. **Case Report**

Find out more about study designs in one of our training sessions.
For more details, email library@uhbristol.nhs.uk.

Answers: 1A/B; 2D; 3C; 4A/B; 5E



Library Opening Times

Staffed hours: 8am-5pm, Monday to Friday

Swipe-card access: 7am-11pm, seven days a week

Level 5, Education and Research Centre

University Hospitals Bristol

Contact your Outreach Librarian:

Helen Pullen

library@uhbristol.nhs.uk