Updated Recommendations

Canadian Clinical Practice Guidelines **May 28th, 2009**
Summary of Topics and Recommendations

Shaded areas denote the changes that have been made with the incorporation of new studies.

#	Topic	Question	2009 Recommendation	2007 Recommendation
1.	Enteral Nutrition vs. Parenteral Nutrition	Does enteral nutrition compared to parenteral nutrition result in better outcomes in the critically ill adult patient?	No change from 2007	Based on 1 level 1 study and 12 level 2 studies, when considering nutrition support for critically ill patients, we **strongly recommend** the use of enteral nutrition over parenteral nutrition.
2.	Early vs. delayed nutrient intake	Does early enteral nutrition compared to late enteral nutrition result in better outcomes in the critically ill adult patient?	Based on 14 level 2 studies, we **recommend** early enteral nutrition (within 24-48 hours following admission to ICU) in critically ill patients.	Based on 11 level 2 studies, we **recommend** early enteral nutrition (within 24-48 hours following admission to ICU) in critically ill patients.
3.1	Dose of EN: Use of indirect calorimetry vs. predictive equation for EN	Does the use of indirect calorimetry vs.a predictive equation for determining energy needs result in better outcomes in the critically ill adult patient?	No change from 2007	There are **insufficient data** to make a recommendation on the use of indirect calorimetry vs. predictive equations for determining energy needs for enteral nutrition in critically ill patients.
3.2	Dose of EN: Achieving target dose of EN *	Does achieving target dose of enteral nutrition result in better outcomes in the critically ill adult patient?	UPGRADED from 2007 Based on 2 level 2 studies and 2 cluster randomized controlled trials , when starting enteral nutrition in critically ill patients, strategies to optimize delivery of nutrients (starting at target rate, higher threshold of gastric residual volumes, use of prokinetics and small bowel feedings) **should be considered.**	Based on 1 level 2 study, when initiating enteral nutrition in head injured patients, strategies to optimize delivery of nutrients (starting at target rate, higher threshold of gastric residual volumes and use of small bowel feedings) **should be considered**. In other critically ill patients, there are **insufficient data** to make a recommendation.
4.1 (a)	Composition of EN: Immune Enhancing Diets: Diets supplemented with arginine and other select nutrients	Compared to standard enteral feeds, do diets supplemented with arginine and other select nutrients result in improved clinical outcomes in the critically ill adult patient?	Based on 4 level 1 studies and 18 level 2 studies, we recommend that diets supplemented with arginine and other select nutrients* not be used for critically ill patients.	Based on 4 level 1 studies and 17 level 2 studies, we **recommend** that diets supplemented with arginine and other select nutrients* not be used for critically ill patients.

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4.1 (b)	Composition of EN: Immune Enhancing Diets: Fish oils	Does the use of an enteral formula with fish oils, borage oils, and antioxidants result in improved clinical outcomes in the critically ill adult patient?	Based on 1 level 1 study and ~~4~~ level 2 studies, we **recommend** the use of an enteral formula with fish oils, borage oils and antioxidants in patients with Acute Lung Injury (ALI) and acute respiratory distress syndrome (ARDS).	Based on one level 1 study and 2 level 2 studies, we **recommend** the use of an enteral formula with fish oils, borage oils and antioxidants in patients with acute respiratory distress syndrome (ARDS).
4.1 (c)	Composition of EN: Immune Enhancing Diets: Glutamine	Compared to standard care, does glutamine-supplemented EN result in improved clinical outcomes in the critically ill adult patient?	Based on 2 level 1 and 7 level 2 studies, enteral glutamine **should be considered** in burn and trauma patients. There are **insufficient data** to support the routine use of enteral glutamine in other critically ill patients.	Based on 2 level 1 and 5 level 2 studies, enteral glutamine **should be considered** in burn and trauma patients. There are **insufficient data** to support the routine use of enteral glutamine in other critically ill patients.
4.1 (d)	Composition of EN: Ornithine Ketoglutarate (OKG)	Does supplementation of enteral nutrition with ornithine ketoglutarate (OKG) influence outcomes in the critically ill adult patient?	No change from 2007	There are **insufficient data** to make a recommendation regarding the use of ornithine ketoglutarate in burn patients and other critically ill patients.
4.2 (a)	Composition of EN: CHO/FAT: High fat, low CHO	Does a high fat/low carbohydrate enteral formula influence outcomes in the critically ill adult patient?	No change from 2007	There are **insufficient data** to recommend high fat/low CHO diets for critically ill patients.
4.2 (b)	Composition of EN: CHO/FAT: Low fat, high CHO	Does a low fat/high carbohydrate enteral formula influence outcomes in the critically ill adult patient?	No change from 2007	There are **insufficient data** to make a recommendation regarding the use of a low fat formula in critically ill patients.
4.2 (c)	Composition of EN: High Protein vs. Low Protein	Does the use of a higher protein enteral formula, compared to a lower protein enteral formula, result in better outcomes in the critically ill adult patient?	No change from 2007	There are **insufficient data** to make a recommendation regarding the use of high protein diets for head injured and other critically ill patients.
4.3	Composition of EN: Protein/peptides	Does the use of peptide based enteral formula, compared to a whole protein formula, result in better outcomes in the critically ill adult patient?	No change from 2007	Based on 4 level 2 studies, when initiating enteral feeds, we **recommend** the use of whole protein formulas (polymeric) in critically ill patients.
4.4	Composition of EN: pH	Do acidified feeds (low pH) compared to standard feeds result in better outcomes in the critically ill adult patient?	No change from 2007	There are **insufficient data** to make a recommendation regarding the use of low pH feeds in critically ill patients.

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4.5	Composition of EN: Fibre	Do enteral feeds with fibre, compared to standard feeds result in better outcomes in the critically ill adult patient?	No change from 2007	There are **insufficient data** to support the routine use of fibre (pectin or soy polysaccharides) in enteral feeding formulas in critically ill patients.
5.1	Strategies to optimize delivery and minimize risks of EN: Feeding Protocols*	Does the use of a feeding protocol result in better outcomes in the critically ill adult patient?	UPGRADED from 2007 Based on 1 level 2 study and 2 cluster randomized controlled trials, an evidence based feeding protocol that incorporates prokinetics at initiation and a higher gastric residual volume (250 mls) and the use of post pyloric feeding tubes, **should be considered** as a strategy to optimize delivery of enteral nutrition in critically ill adult patients.	There are **insufficient data** from randomized trials to recommend the use of a feeding protocol in critically ill patients. If a feeding protocol is to be used, based on 1 level 2 study, a protocol that incorporates prokinetics (metaclopromide) at initiation and tolerates a higher gastric residual volume (250 mls) **should be considered** as a strategy to optimize delivery of enteral nutrition in critically ill adult patients.
5.2	Strategies to optimize delivery and minimize risks of EN: Motility agents *	Compared to standard practice (placebo), does the routine use of motility agents result in better clinical outcomes in the critically ill adult patient?	UPGRADED from 2007 Based on 1 level 1 study and 5 level 2 studies, in critically ill patients who experience feed intolerance (high gastric residuals, emesis), we **recommend** the use of a promotility agent. Given the safety concerns associated with erythromycin, the recommendation is made for metoclopramide. There are **insufficient data** to make a recommendation about the use of combined use of metoclopramide and erythromycin.	Based on a systematic review and 2 level 2 studies, in critically ill patients who experience feed intolerance (high gastric residuals, emesis), the use of metoclopramide as a motility agent **should be considered**.
5.3	Strategies to optimize delivery and minimize risks of EN: Small Bowel feeding	Does enteral feeding via the small bowel compared to gastric feeding result in better outcomes in the critically ill adult patient?	No change from 2007	Based on 11 level 2 studies, small bowel feeding compared to gastric feeding maybe associated with a reduction in pneumonia in critically ill patients. In units where obtaining small bowel access is feasible, we **recommend** the routine use of small bowel feedings. In units where obtaining access involves more

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				logistical difficulties, small bowel feedings **should be considered** for patients at high risk for intolerance to EN (on inotropes, continuous infusion of sedatives, or paralytic agents, or patients with high nasogastric drainage) or at high risk for regurgitation and aspiration (nursed in supine position). Finally, in units where obtaining small bowel access is not feasible (no access to fluoroscopy or endoscopy and blind techniques not reliable), small bowel feedings **should be considered** for those select patients who repeatedly demonstrate high gastric residual volumes and are not tolerating adequate amounts of EN delivered into the stomach.
5.4	Strategies to optimize delivery and minimize risks of EN: Body position	Do alterations in body position result in better outcomes in the critically ill adult patient?	No change from 2007	Based on 1 level 1 and 1 level 2 study, we **recommend** that critically ill patients receiving enteral nutrition have the head of the bed elevated to 45 degrees. Where this is not possible, attempts to raise the head of the bed as much as possible **should be considered.**
6.1	EN Other: Closed vs. open system	Does the use of a closed system for enteral feeding result in better outcomes when compared to an open system in the critically ill adult patient?	No change from 2007	There are **insufficient data** to make a recommendation on the administration of EN via a closed vs. open system in critically ill patients.
6.2	EN Other: Prebiotics/Probiotics/Synbiotics†	Does the addition of Prebiotics/Probiotocs/Synbiotics to enteral nutrition result in better outcomes in the critically ill adult patient?	No change from 2007	There are **insufficient data** to make a recommendation on the use of Prebiotics/Probiotics/Synbiotics in critically ill patients.
6.3	EN Other: Continuous vs. other methods of administration	Does continuous administration of enteral nutrition compared to other methods of administration result in better outcomes in the critically ill adult patient?	No change from 2007	There are **insufficient data** to make a recommendation on enteral feeds given continuously vs. other methods of administration in critically ill patients.

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6.4	EN (Other): Gastrostomy vs. Nasogastric feeding	Does enteral feeding via a gastrostomy compared to nasogastric feeding result in better outcomes in the critically ill adult patient?	No change from 2007	There are **insufficient data** to make a recommendation on gastrostomy feeding vs. nasogastric feeding in the critically ill.
7.	EN in combination with PN	Does the use of parenteral nutrition in combination with enteral nutrition result in better outcomes in the critically ill adult patient?	No change from 2007	Based on 5 level 2 studies, for critically ill patients starting on enteral nutrition, we **recommend** that parenteral nutrition **not be** started at the same time as enteral nutrition. In the patient who is not tolerating adequate enteral nutrition, there are **insufficient data** to put forward a recommendation about when parenteral nutrition should be initiated. Practitioners will have to weigh the safety and benefits of initiating PN in patients not tolerating EN on an individual case-by-case basis. We **recommend** that PN **not be** started in critically ill patients until all strategies to maximize EN delivery (such as small bowel feeding tubes, motility agents) have been attempted.
8.	PN: PN vs. standard care	Compared to standard care (IV fluids, oral diet, etc.), does parenteral nutrition result in better outcomes in critically ill patients who have an intact GI tract?	No change from 2007	Based on 5 level 2 studies, in critically ill patients with an intact gastrointestinal tract, we **recommend** that parenteral nutrition **not be used** routinely.
9.1	Composition of PN: Branched Chain Amino acids (BCAA)	Does the addition of BCAA to parenteral nutrition influence outcomes in the critically ill adult patient?	No change from 2007	In critically ill patients who are receiving parenteral nutrition, there are **insufficient data** to make a recommendation regarding the use of branched chain amino acids.

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9.2	Composition of PN: Type of lipids	Does the type of lipids in parenteral nutrition influence outcomes in the critically ill adult patient?	No change from 2007	There are **insufficient data** to make a recommendation on the type of lipids to be used in critically ill patients who are receiving parenteral nutrition.
9.3	Composition of PN: Zinc†	Does zinc supplementation (via IV/PN) given either alone or in combination with other nutrients result in better outcomes in the critically ill patient?	No change from 2007	There are **insufficient data** to make a recommendation regarding IV/PN zinc supplementation in critically ill patients
9.4	Composition of PN: Glutamine* †	Does glutamine supplementation of parenteral nutrition influence outcomes in the critically ill adult patient?	UPGRADED from 2007 Based on 4 level 1 studies and 13 level 2 studies, when parenteral nutrition is prescribed to critically ill patients, parenteral supplementation with glutamine, where available, is **strongly recommended.** There are **insufficient data** to generate recommendations for intravenous glutamine in critically ill patients receiving enteral nutrition.	Based on 4 level 1 studies and 5 level 2 studies, when parenteral nutrition is prescribed to critically ill patients, parenteral supplementation with glutamine, where available, i**s recommended.** There are **insufficient data** to generate recommendations for intravenous glutamine in critically ill patients who are receiving enteral nutrition.
10.1	Strategies to optimize benefits and minimize risks of PN: Dose of PN	Does the dose parenteral nutrition influence outcomes in the critically ill adult patient?	No change from 2007	Based on 4 level 2 studies, in critically ill patients who are not malnourished, are tolerating some EN, or when parenteral nutrition is indicated for short term use (< 10 days), low dose parenteral nutrition **should be considered**. There are **insufficient data** to make recommendations about the use of low dose parenteral nutrition in the following patients: those requiring PN for long term (> 10 days), obese critically ill patients, and malnourished critically ill patients. Practitioners

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				will have to weigh the safety and benefits of low dose PN on an individual case-by-case basis in these latter patient populations.
10.2	Use of Lipids	Does the presence of lipids in parenteral nutrition affect outcomes in the critically ill adult patient?	No change from 2007	Based on 2 level 2 studies, in critically ill patients who are not malnourished, are tolerating some EN, or when parenteral nutrition is indicated for short term use (< 10 days), withholding lipids high in soybean oil should be considered. There are **insufficient data** to make a recommendation about withholding lipids high in soybean oil in critically ill patients who are malnourished or those requiring PN for long term (> 10 days). Practitioners will have to weigh the safety and benefits of withholding lipids high in soybean oil on an individual case-by-case basis in these latter patient populations.
10.3	Strategies to optimize benefits and minimize risks of PN: Mode of lipid delivery	Does the mode of delivery of lipids influence outcomes in the critically ill adult patient?	No change from 2007	There are **insufficient data** to make a recommendation on mode of lipid delivery in critically ill patients who are receiving parenteral nutrition.
10.4	Strategies to optimize benefits and minimize risks of PN: intensive insulin therapy†	Does tight blood sugar control result in better outcomes in the critically ill adult patient?	We **recommend** that hyperglycemia (blood sugars > 10 mmol/L) be avoided in all critically ill patients. Based on the NICE-SUGAR study and a recent meta-analysis, **we recommend** a blood glucose target of around 8.0 mmol/L (or 7-9 mmol/L), rather than a more stringent target range (4.4 to 6.1 mmol/L) or a more liberal target range (10 to 11.1 mmol/L).	Based on 3 level 2 studies, in surgical critically ill patients receiving nutrition support, intensive insulin therapy to tightly control blood sugars between 4.4-6.6 mmol/L **should be considered**. In all critically ill patients, we **recommend** avoiding hyperglycemia (blood glucose > 10 mmol/L) by minimizing intravenous dextrose and using insulin administration when necessary.
11.1	Supplemental antioxidant nutrients: combined vitamins and trace elements	Does the addition of supplemental antioxidant combined vitamins and trace elements result in better outcomes in the critically ill patient?	Based on **3 level 1 and 13 level 2** studies, the use of supplemental combined vitamins and trace elements **should be considered** in critically ill patients.	Based on 3 level 1 and 10 level 2 studies, the use of supplemental combined vitamins and trace elements and **should be considered** in critically ill patients.

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11.2	Supplemental antioxidant nutrients: parenteral selenium **	Does parenteral selenium supplementation (alone or in combination with other antioxidants) result in better outcomes in the critically ill patient?	DOWNGRADED from 2007 There are insufficient data to make a recommendation regarding IV/PN selenium supplementation alone, or in combination with other antioxidants, in critically ill patients.	Based on 1 level 1 and 7 level 2 studies, the use of IV/PN selenium supplementation alone or in combination with other antioxidants should be considered in critically ill patients.

* The recommendations for these sections were upgraded with the incorporation of new evidence and values.
** The recommendation for this section was downgraded with the incorporation of new evidence and values.
† Sections updated in May 2009

For a list of the new studies added to the various topics of the Canadian CPGs, refer to the individual sections on www.criticalcarenutrition.com