CPD Tutorial Series

Mini-Tutorials in Nutrition Support

CN Magazine has joined forces with Stephen Taylor, Research Dietitian, Frenchay Hospital, Bristol – author of the book Nutrition Support and developer of FeedCalc – to bring you a special series of CNPD mini-tutorials around Nutrition Support.

The tutorials cover a range of topics around nutrition support in general with a particular focus on nutrition requirements. To facilitate the tutorials you will need to visit www.nutrition2me.com for full details, support information and links to the following free downloads:

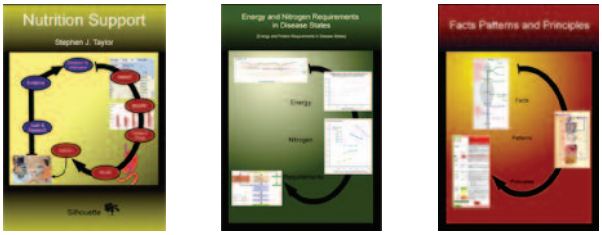
- **Nutrition Support eBook sample:** Nutrition Support is 2 books in 1 volume: 'Energy and nitrogen requirements in disease states' and 'Facts, patterns and principles'.
- **FeedCalc Trainer:** Enables the individualised care proposed to be attained within health service pressure. 'FeedCalc' automates estimation of nutritional requirements and feed prescription, checks for adequacy or toxicity and makes a patient record (clinical version only) for re-use.

The Mini-Tutorial series provides you with the opportunity to increase your knowledge in the area of nutrition support, assisting continuing professional development, along with providing a taster of both the Nutrition Support book and the FeedCalc software.
Each tutorial forms two parts:

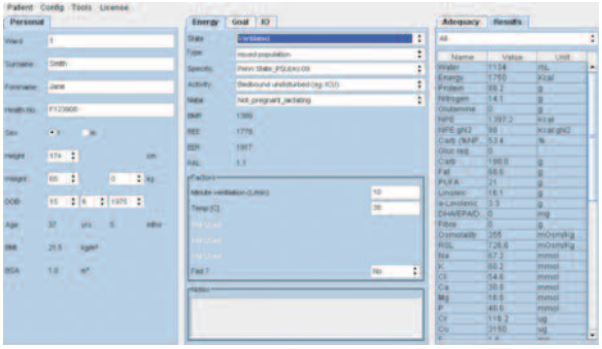
- Clinical state: A clinical state is introduced followed by technical questions and calculations facilitated through FeedCalc.
- Practice & prescribing: You simulate a prescribing scenario through FeedCalc to determine optimal prescription, adequacy and possible toxicity.

This first 'Mini-Tutorial' covers Septic Shock and future tutorials will include resting energy expenditure (REE), basal metabolic rate and stress factors, chronic disease, U-pattern REE during cancer treatment and REE in lung cancer.

Nutrition Support eBook sample



FeedCalc Trainer



'Nutrition Support' + 'FeedCalc Trainer' won the 2013 BDA Education (Elizabeth Washington) Award. 'Mini-Tutorials' are samples (± modification) from 'Nutrition Support'. The Mini-Tutorials are serialised in and downloadable from www.nutrition2me.com with full links to all require downloads. Full text/Tutorials are available from: www.nutritionsupport.info.

Tutorial 1
Septic Shock

Evidence suggests energy deficit, particularly in the first week of ICU admission, increases complications and mortality.[1] However, intervention studies often fail to show improved outcome when the aim is to feed up to energy expenditure (EE).[2,3,4] However, the studies used inaccurate estimates of EE and therefore meeting the 'goal' did not necessarily meet physiological need. In contrast, there is evidence of improved outcome when energy input is accurately titrated to expenditure.[5,6]

Since resting energy expenditure (REE) constitutes 90-95 per cent of total energy expenditure (TEE) in most ICU patients, accurately estimating REE is vital. We still require: a) Definitive proof of the optimal percentage of energy expenditure to deliver; and b) Further validation of methods to estimate REE. However, the principle of obtaining accurate measurements or estimates will remain important.

REE is highly variable in critical illness because it is often a syndrome of pathophysiological states (e.g. trauma and secondary infection) and treatments (e.g. mechanical ventilation, inotropes, opiates) that may have differing and opposing effects depending upon the combination, timing and genotype. This is epitomised by 'septic shock' where systemic infection can cause very different phyiological changes in different individuals, or the same individual at different time-points. However, EE is still measurable from its relationship to gas exchange. Certain physiological parameters are thought to parallel gas exchange: minute ventilation (or tidal volume and respiratory rate), and body temperature.[7,8,9]

Two types of REE equations have been developed from regression analysis for mechanically ventilated patients:

1. Multiple 'static' parameters that assume the same degree of EE depending upon the presence or absence of specific conditions. Example: 1784 – 11*age(y) + 5*Kg + 244*1(sex=male) + 239*1(trauma) + 804*1(burn).[10] Note that male ± trauma ± burn parameters are dropped if absent.

2. Incorporating physiological parameters; these vary with physiological state. Example: PSU(m) equation:[9,11]

- >60y & BMI >30: Mifflin*0.71+Tmax*85+Vm*64-3085;
- other patients: Mifflin*0.96+Tmax*140+Vm*31-6212 where;
- Mifflin. *et al.* (1990) is:[12]
  - Men: 10*Kg+6.25*cm-5*Age+5;
  - Women: 10*Kg+6.25*cm-5*Age-161.

Now visit **www.nutrition2me.com**, and access the 'Mini-Tutorials' section in the Resource Centre – here you will find all the information you need and will be able to complete the CNPD questions linked to this issue's 'Mini-Tutorial' on Septic Shock.

References **1.** Alberda C, et al (2009). The relationship between nutritional intake and clinical outcomes in critically ill paients: results of an international multicenter observational study. Intensive Care Medicine; 35: 1728-37.**2.** Arabi YM, et al (2011). Permissive underfeeding and intensive insulin therapy in critically ill patients: a randomized controlled trial. American Journal of Clinical Nutrition; 93: 569-77.**3.** Rice TW, et al (2011). Randomized trial of initial trophic versus full-energy enteral nutrition in mechanically ventilated patients with acute respiratory failure. Critical Care Medicine; 39: 967-73. **4.** Rice TW, et al (2012). Initial trophic vs Full enteral feeding in patients with acute lung injury. The EDEN randomized trial. Journal of the American Medical Association; 307: 795-803. **5.** Heidegger CP, et al (2013). Optimisation of energy provision with supplemental parenteral nutrition in critically ill patients: a randomised controlled clinical trial. Lancet.; 381: 1716-7.**6.** Singer P, et al (2011). The tight calorie control study (TICACOS): a prospective, randomized, controlled pilot study of nutritional support in critically ill patients. Intensive Care Medicine.; 37: 601-609. **7.** Bruder N, et al (1998). Influence of body temperature, with or without sedation, on energy expenditure in severe head-injured patients. Critical Care Medicine.; 26: 568-72. **8.** Faisy C, et al (2003). J. Assessment of resting energy expenditure in mechanically ventilated patients. The American Journal of Clinical Nutrition; 78: 241-9. **9.** Frankenfield DC, Coleman A, Alam S (2009). Analysis of estimation methods for resting metabolic rate in critically ill adults. Journal of Parenteral and Enteral Nutrition; 33: 27-36. **10.** Ireton-Jones C, Jones J (2002). Improved equations for predicting energy expenditure in patients: The Ireton-Jones equations. Nutrition in Clinical Practice; 17: 29-31. **11.** Frankenfield D (2011). Validation of an equation for resting metabolic rate in older obese, critically ill patients. Journal of Parenteral and Enteral Nutrition; 35: 264-269. **12.** Mifflin M, et al (1990). A new predictive equation for resting energy expenditure in healthy individuals. The American Journal of Clinical Nutrition; 51: 241-7.