NEMO

Estimating energy, protein & fluid requirements for adult clinical conditions

Wherever possible, energy requirements of individuals should be measured using indirect calorimetry or other objective measures. Where measuring energy expenditure is not possible, prediction equations can be used, however, there is a lack of strong and consistent evidence supporting standardised predictive equations. As a result, when estimating requirements for protein and energy, the following should be considered:

Starting point only	Predictive equations are not considered accurate for individuals in the clinical setting. Although these provide a useful starting point, the emphasis should be on reviewing and reassessment, considering changes to treatment goals, clinical conditions, biochemical and anthropometric parameters, and patient activity levels.
Ease of use	Consider using predictive methods that are easy to apply, do not need calculators, and do not require multiple clinical measurements. At the bedside, these are just as likely to provide adequate estimates of requirements as those that take more time and effort.
Using a data range	Single figure estimates imply accuracy. This can be misleading and result in poor follow-up.
Rounding data / units of Measure	Consider rounding protein requirements in units of 5, and round kilojoules to the nearest 100kJ. Simple maths avoids the need for calculators.
Clinical measurements	Consider the following: Is the patient's weight / height an estimate or an accurate measure? Are they fluid overloaded or do they have ascites? What is your assessment of body composition? Should an adjusted body weight be used?
Consider the evidence base	Are the original data sets relevant to the current patient population? Is the methodology applicable at an individual patient level?
Be flexible	Remember that other professionals may use different data ranges and that these also may be justifiable. Remember: ensuring review and reassessment is the key to patient focused care.

Weight to be used for calculations.

Within Healthy Weight Range (BMI 18.5 - 25kg/m^2)*	Use actual weight
Underweight	Use actual weight
Overweight/Obese^	Consider use of adjusted body weight IBW + [(actual weight – IBW) x 25%] ***IBW = weight at BMI 25***
* BMI reference ranges can vary according to clinical condition, for example in elderly people. See *NEMO Using Body Mass Index* guide for further information. ^ The use of an adjusted body weight is highly debated in the literature. Consider your patient's body composition when adjusting their body weight. For example, no adjustment may be required for an overweight individual with high lean body mass or an adjustment factor of 50% may be used where it is suspected that the patient has a higher muscle mass contributing to higher BMI. There is no data available to recommend level of adjustment of body weight for BMI >60.	

This is a consensus document from Dietitian/ Nutritionists from the Nutrition Education Materials Online, "NEMO", team.

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Queensland Government

Estimating energy, protein & fluid requirements

The following 'ratio method' equations for estimating energy, protein and fluid requirements have been collated from the available evidence-based guidelines and literature (see reference list). Please note that **many of these equations are based on 'expert opinion' or have limited supporting evidence** in the available guidelines. The Queensland Health NEMO Nutrition Support Group recommends these equations **be used only as a starting point** for establishing nutrition support, and that clinicians have a thorough understanding of their context within respective evidenced-based guidelines or literature. Regular ongoing monitoring and assessment to determine individual patient requirements is essential.

Patient category	Energy		Protein
	kJ/kg	kcal/kg	g/kg
Not hypermetabolic			
Includes: CVA[1,2], ulcerative colitis/Crohn's[3] (remission)	100-125	25-30	0.8-1
Ulcerative colitis/Crohn's[3] (active)	100-125	25-30	1.2-1.5
Acute elderly patients[4,5]	100-125	25-30	1-1.5
Adults[6] (not severely ill or injured, nor at risk of refeeding syndrome)	100-145	25-35	0.8-1.5
AKI (non-catabolic; not on dialysis)[7]	100-145	25-35	0.8-1
Moderately hypermetabolic			
HIV/AIDS[8] asymptomatic	110-135	26-32	0.8-1
HIV/AIDS[8] symptomatic	120-160	28-38	0.8-1
Post-operative (~14days)[9,10], repletion, infection[11], temp >38°[11], head injury[12-14], multi-trauma[15], BMT[16], peritonitis, burns (10-20% FTB/DPT), exacerbation COPD[17,18]	125-145	30-35	1.2-1.5
XRT or chemoXRT[9,19]	≥125	≥30	≥1.2
Pancreatitis[20,21]	105-145	25-35	1.0-1.5
Pressure Injury[22]	125-146	30-35	1.2-1.5
Cancer cachexia[23]	≥120	≥30	≥1.4
Liver disease[24] (non-hospitalised, stable, BMI<30kg/m^2)	125-145	30-35	1.2-1.5
Liver cirrhosis[24] (non-hospitalised, stable BMI 30-40kg/m^2) using ABW	105-145	25-35	1.2-1.5
Liver cirrhosis[24] (non-hospitalised, stable BMI >40kg/m^2) using ABW	84-105	20-25	1.2-1.5
Hypermetabolic			
Burns (>20% FTB/DPT)[26]	145-160	35-40	1.5-2.0
Liver disease[24,25](decompensated cirrhosis, acute alcoholic hepatitis/liver failure, acute phase post-transplantation)	145-160	35-40	1.2-1.5
Cystic Fibrosis[27] Energy: 110-200% of general population energy target Protein: 15-20% of energy intake			
Refeeding risk [6,28] Oral nutrition – commence at goal energy and protein targets Enteral/parenteral – Commence at 50% energy and protein targets *This is a starting point only. Increase gradually[28], monitoring relevant parameters for refeeding syndrome and overfeeding.*			
Eating Disorders[29] Energy: 120kJ/kg x 1.4 (activity factor) x 1.5 (repletion factor). Note: 12MJ is the standard energy meal plan goal for patients with an eating disorder			

Chronic Kidney Disease [30-34] (ONLY applicable when NOT acutely unwell; use oedema free ABW if BMI>25**)** Stage 1-2 Stage 3-5 (not on dialysis) Stage 5 (HD+PD; need to account for bag glucose in kJ for PD) *Energy based on age, gender, physical activity, weight goals, body composition, CKD stage, concurrent illness/inflammation **Protein – lower end with close monitoring if uraemic symptoms/conservative care; mid range for BGL control, higher end if stable CKD Stage 3	 105-145* 105-145* 105-145*	 25-35 25-35 25-35	 0.75-1 0.55-0.8** 1-1.2
Critically ill [35-37] Early phase critical illness Critical illness *Nutrition intake providing 70-100% of resting energy expenditure (REE) is considered target.[351] If predictive equations are used to estimate the energy need, nutrition below 70% estimated needs should be preferred over isocaloric nutrition for the first week of ICU stay.[35, 37] Consider early and progressive nutrition delivery in the high nutrition risk or malnourished patient. [35]* plus AKI (no dialysis)[7] plus AKI (with dialysis)[7]	 84-105 105-125	 20-25 25-30	 1.2-2.0 1.2-2.0 1-1.3 1.3-1.7

Adjusted weight	**Fluid per day**	**OR** 30-35mL/kg[7] with allowances for extra losses via drains etc.
40 – 60kg	1.5-2L	
60 – 80kg	2-2.5L	**Note:** some caution should be used with elderly patients who may have reduced cardiac/renal function (20-25mL/kg[38] suggested starting point for IV fluids) **AI** 2.1-2.6L of fluid per day for adults[39]
>80kg	2.5 -3L	

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