

How to monitor nutrition in the ICU?

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What is important in monitoring nutrition in ICU patients?



Important

- **Set target to identify subjects at nutritional risk**
- **Avoid nutrition-related complications**
- **Avoid undernutrition that may lead to an enhanced loss of lean body mass**
- **Hypercaloric feeding should be avoided in critically ill: Glucose, propofol and citrate provide non-nutritional calories: Feeding intake should be corrected in response to prevent overfeeding**
- **Protein intake is essential: When feeding intake is reduced protein intake is compromised**
- **Non-nutritional calories may be non-relevant in some patients, but in patients treated with both propofol and citrate they may account for 1/3 of total energy intake**
- **Protein & micronutrients targets then can only be achieved by adding protein & micronutrient supplements**

Algemeen

Patiënt

Allergieën

Handleidingen

Storing/noodprocedure

Hyperlink

Overzicht

Respiratie

Circulatie

Cerebraal

Gastro Intestinaal

Vocht IN

Vocht UIT

Vochtbalans

CVVH Dialyse

Verzorging

Opdrachten

Infectie

Laboratorium

1 Uur

9-3-15

1300

1400

1500

1600

1700

1800

1900

2000

2100

2200

2300

10-3-15

000

IC/MC

000

Voeding

Tube Feed

32

42

38

Enteral Protein Suppl.

100

100

100

100

Sondevoe...

4 medic...

Voedings...

Per Os

Intake

Sondevoeding & TPV

Dagtotaal/doel eiwitten

30/56

41/60

43/64

45/68

56/72

59/76

61/80

63/84

75/88

77/92

88/96

Dagtotaal/doel energie

830/1.040

920/1.110

980/1.190

1.050/1.260

1.150/1.340

1.220/1.410

1.290/1.480

1.360/1.560

1.470/1.630

1.540/1.700

1.650/1.780

Energie_citraat

230

250

270

290

300

320

340

360

380

400

420

Energie_glucose

0

0

0

0

0

0

0

0

0

0

0

Energie_propofol

90

90

90

90

90

90

90

90

90

90

90

Energie_voeding

500

580

620

670

760

810

860

910

1000

1050

1140

Dagtotaal Koolhydraten

58

62

67

73

80

86

92

98

105

111

117

Dagtotaal Vetten

24

25

26

28

29

31

33

34

36

38

40

Opnametotaal/doel eiwit...

320/460

331/464

332/468

335/472

346/476

348/480

351/484

353/488

364/492

367/496

378/500

Opnametotaal/doel ener...

6.780/8.530

6.870/8.600

6.930/8.680

7.000/8.750

7.110/8.820

7.180/8.900

7.250/8.970

7.320/9.050

7.420/9.120

7.490/9.190

7.600/9.270

Opnametotaal Koolhydr...

487

492

497

503

509

515

522

528

534

541

547

Opnametotaal Vetten

256

257

258

260

262

263

265

267

268

270

272

Gastro-Intestinaal

Retineren/braken

Maagretentie (>500 ml)

0

Maagretentie teruggesp...

10

Defaecatie

Flexiseal/Def prod totaal

250

400

400

400

400

400

400

400

400

400

400

Def hoeveelheid

Normaal

Def hoeveelheid in ml

150

Def. typering vlgs Bristol

6-(Zeer) za→

Def kleur

Bruin (licht)

Def methode

Incontinent

Pro

NMS

Nasaal

0 d/22 h/52 m

Info

Voedingsformulier

Orale intake


NEX

Def. classificatie vlgs Bristol

FlexiSeal selectie criteria

FlexiSeal handleiding

Snapshot ICU PDMS Gelderse Vallei Hospital Ede The Netherlands

Intake	<input type="checkbox"/> Sondevoeding & TPV 	13:00 h
	Dagtotaal/doel eiwitten	30/56
	Dagtotaal/doel energie	830/1.040
	Energie_citraat	230
	Energie_glucose	0
	Energie_propofol	90
	Energie_voeding	500
	Dagtotaal Koolhydraten	58
	Dagtotaal Vetten	24
	Opnametotaal/doel eiwit...	320/460
	Opnametotaal/doel ener...	6.780/8.530
	Opnametotaal Koolhydr...	487
	Opnametotaal Vetten	256

What lab tests in monitoring nutrition in ICU patients



Lab tests

- glucose
- triglycerides
- Na
- K
- phosphate
- magnesium
- ASAT, ALAT, bilirubin
- ammonia
- (urea in urine)

Monitoring Nutrition in the ICU

Procedure	Aimed impact
Screening for nutritional risk and malnutrition using Nutritional Risk score (NRS-2002) using a cutoff of 5 points [Less efficient: subjective global assessment (SGA) or mini-nutrition assessment short form (MNA-SF)]	Detect the patients who are in need of special metabolic and nutritional attention Detect patients at risk of refeeding syndrome to initiate a progressive feeding strategy and intensify P, K and Mg determinations ^{33, 101, 102}
Placement of nasogastric tubes	Assure correct position of the tube before initiating EN (gold standard is X-Ray ¹²)
Feeding protocol for enteral and parenteral nutrition	Standardized nutritional therapy
Energy target determination and reevaluation	Individualized adaptation of energy delivery
Protein target determination	Particular attention to protein needs to cover 1.2 to 1.3 g/kg/day (NB: kcal from proteins is included in total energy count)
Blood electrolyte protocol: phosphate and potassium sampling 2 times/day during first 48 hours of feeding and Na, Cl, Mg, once daily	Detect electrolyte abnormalities associated with poor outcome
Refeeding syndrome management	Achieve optimal management of electrolytes (phosphate and potassium) and vitamins when disturbances are detected. Consider slow build-up of caloric and protein provision
Prevention of aspiration:	
Bed head tilt up 30-45° ⁶	Prevent bronchoaspiration during EN
Assessment of gastric filling by ultrasound ¹⁰³ , or measurement of GRV in patients during initiation of enteral feeding, particularly with unprotected airway	Prevent bronchoaspiration due to gastric overfilling
Enteral access protocol: Consideration of postpyloric feeding with persistent large GRV on gastric feeding Consideration of percutaneous access with prolonged feeding	Improve feeding efficiency
Bowel management protocol	Prevent both constipation and diarrhea
Blood glucose control and insulin infusion protocol	Prevent hypo- and hyper-glycemia
Daily assessment of feed volume delivery	Prevent underfeeding
Patient weighing	Follow-up of fluid mediated weight gain and weight loss

Variable	Frequency	Relative cost index
Glucose	First 24 hr of ICU admission /feeding : every 4-6 hrs Later: at least 2 times daily	0.6 ‰
Phosphate	Within first 6-12 hr of admission Later: once a day	0.8 ‰
Potassium	First 24 hr of ICU admission /feeding : every 6 hr with blood gases	0.7 ‰
Sodium, Chloride, Magnesium	Once daily	0.6 and 2.1 ‰
Liver tests: AST, ALT	Twice weekly	2 ‰
Triglycerides ⁶⁶	Twice weekly	0.7 ‰
Prealbumin	Once weekly	5 ‰
Glutamine	In selected cases (renal replacement therapy, burns, PN without glutamine)	3 ‰
Trace elements: Cu, Se, Zn	In selected cases (such as e.g. burns, addressed in the text)	11, 26 and 17 ‰
Urea – blood	3 times weekly	0.6 ‰
Urea – urine	6-hr urine collection once weekly in absence of renal failure	0.7 ‰
Ammonium	In case of unexplained worsening of consciousness state ⁴⁴	10 ‰
Carnitine	Considering the limited availability and cost, to be done only in presence of unexplained rapid muscle catabolism and hyperlactatemia ⁸⁰ with adequate protein supply	51 ‰

How to monitor nutrition performance in all ICU patients?



ICU Nutrition indicators

- **EN started in 24/48 hours**
- **SPN patients**
- **PN patients**
- **total energy deficit**
- **total protein deficit**
- **Nutric scores**
- **Outcome**
- **Refeeding syndrome?**