

South African Society for Parenteral and Enteral Nutrition (SASPEN) statement on Nutritional management of patients with SARS-CoV-2 Infection



The COVID-19 pandemic has brought a unique challenge to the healthcare system worldwide. While supportive care remains the cornerstone in the management of these patients the need to provide nutrition remains an integral part of these supportive measures.

While there is no evidence relating to COVID-19 per se to guide nutritional intervention it seems that patients with the highest mortality and worst outcome are patients with compromised immunity such as elderly patients, patients with polymorbid conditions and malnourished patients. South Africa is faced with a unique challenge. Although we have a younger population in South Africa the incidence of malnutrition, poverty, HIV and TB is high. The current international guidelines for the management of COVID-19 patients are based largely on existing guidelines for polymorbid conditions, geriatric care and general critical care patients.

This guideline is based on the recommendations put forward by the American Society for Parenteral and Enteral Nutrition (ASPEN) as well as the European Society for clinical nutrition and metabolism (ESPEN), which is endorsed by the South African Society for Parenteral and Enteral Nutrition (SASPEN) for use in the South African context.

1. Nutritional Assessment:

It is recommended that healthcare practitioners involved in the care of COVID-19 patients follow personal protective equipment (PPE) standards as recommended by their institution and which is in line with recommendations from the National Institute for Communicable Diseases (NICD) and World Health Organization (WHO). SASPEN however supports the notion that patient contact be kept to a minimum and recommends that dietitians do not enter rooms of patients with COVID-19 but perform nutrition assessment based on the information provided by other healthcare workers in direct contact with the patient. **Addendum A** has an example of a form that can be used for this purpose. Dietitians are also encouraged to engage with the patient's family telephonically to gain further information for the nutritional assessment. This recommendation is also in line with the Health Professions Council of South Africa's guideline for telemedicine for COVID-19 patients.

Patients should be assessed for malnutrition by using the GLIM (Global Leadership Initiative on Malnutrition) criteria. GLIM comprises a two-step approach where individuals are firstly screened to identify those at risk of malnutrition, the NRS-2002 screening tool for hospitalized patients are recommended, and secondly assessed

for diagnosis and grading of malnutrition. Patients need one phenotypic and one etiologic criterion to be diagnosed as malnourished. (See Addendum B)

2. Requirements, route and timing of nutrition delivery

2.1. Ward patients infected with COVID-19

2.1.1. Requirements:

Macronutrient requirements:

The current guidelines from ESPEN and ASPEN both refer to polymorbid and older patients seeing that these are the patient populations where complications of the disease and possible hospitalization is expected. It is impossible to provide COVID-19 specific nutritional guidelines at present. SASPEN recommends using current, non-COVID-19 recommendations for patients coupled with close monitoring of the patient’s nutritional status and adjustment of the nutrition prescription if needed.

	>65 years of age	Severely underweight	Protein	Fat:CHO
Polymorbid patients	27kCal/kg/day TE	30kCal/kg/day TE	>1g/kg/day	
Older patients	30kCal/kg/day TE		1g/kg/day	
No respiratory deficiency				30:70

**Patients at risk of refeeding syndrome should be treated with gradual increase to full requirements and necessary monitoring under dietetic guidance

Micronutrient requirements:

Provision of at least the daily allowance for vitamins and trace-elements should be ensured.

There is no evidence that routine use of high dose micronutrient or trace-elements will prevent or improve the clinical outcomes of COVID-19 infected patients. However, if the daily allowance is not provided in the diet or with oral nutrition supplements (ONS) additional supplementation can be considered on a case by case basis.

2.1.2. Route and timing:

The oral route is always preferred. Nutritional intervention should be started early during the hospitalization of patients. Especially in older and polymorbid patients whose nutrition may already be compromised. ONS should be considered whenever patients are unable to meet nutritional goals through diet alone. ONS should provide at least 400kCal/day including 30g or more of protein. Nutritional treatment should continue after hospital discharge.

In patients with reasonable prognosis where nutritional goals cannot be met orally enteral nutrition (EN) should be administered if oral intake is expected to be impossible for more than 3 days or if oral intake is expected to be below 50% of calculated requirements for more than one week.

Parenteral nutrition (PN) should only be considered if patients are unable to meet full requirements through the enteral route.

Note: There should not be a limitation to the use of EN or PN in terms of patient age or diagnosis if there is expected benefit to improve nutritional status.

2.2. Patients admitted to critical care units with COVID-19

2.2.1. Pre-intubation period:

Follow treatment plan for ward patients.

**If there are limitations to the enteral route, e.g. due to non-invasive ventilation, early PN should be considered to meet nutritional requirements. PN can be provided as total parenteral nutrition or supplemental parenteral nutrition.

2.2.2. Ventilated patients:

2.2.2.1. Requirements:

Macronutrients:

Energy delivery should be started incrementally in the first 3 days of ICU admission (not exceeding 70% of the calculated requirements) with the aim to meet full requirements after day 3 of admission. Energy requirements can be estimated using predictive equations or simple weight-based equations e.g. 25 – 30kCal/kg. Caution should be applied with the use of predictive equations to prevent overfeeding in the first week of ICU admission.

Protein should be delivered at a minimum of 1.3g/kg (range 1.2 – 2g/kg). For obese patients 1.3g/kg adjusted body weight is recommended by ESPEN. (Adjusted body weight = ideal body weight + [(actual body weight – ideal body weight) x 0.33])

Fat: CHO NPE ratio of 50:50.

In patients at risk of refeeding syndrome, start with approximately 25% of requirements, with either EN or PN, and increase slowly while monitoring potassium, phosphate and magnesium levels regularly.

Note: Nutritional requirements should take into consideration the use of Propofol and dextrose containing intra-venous fluids.

Micronutrients:

Provision of at least the daily allowance for vitamins and trace-elements should be ensured.

There is no evidence that routine use of high dose micronutrient or trace-elements will prevent or improve the clinical outcomes of COVID-19 infected patients. However, if unable to meet full requirements from the nutritional formula provided, additional supplementation can be considered on a case by case basis.

Fluid:

Patients presenting with acute respiratory failure, may require restrictive fluid strategies. Therefore consideration should be given to enteral and parenteral formulations where nutritional requirements can be met with minimal fluid administration.

2.2.2.2. Route and timing:

Enteral nutrition should be initiated within 24 – 36 hours of admission to ICU or within 12hours of placing a patient on mechanical ventilation through the nasogastric route.

Delay enteral nutrition support in:

- Patients with uncontrolled shock and unmet hemodynamic and tissue perfusion goals.
- Patients with life-threatening hypoxemia, hypercapnoea or acidosis.

The use of continuous enteral feed administration rather than bolus feeding is recommended. Continuous feeding is better tolerated and limits the interactions with healthcare workers. With increasing numbers of hospital admissions there is however a high probability that nutrition resources such as enteral feeding pumps might be in short supply. In these instances it is advised that critically ill patients be prioritized for enteral feeding pumps while gravity feeding, if available, or bolus feeding can be used in stable patients or in the ward setting. Refer to **Addendum C** for standard operating procedures with gravity feeding.

In patients not tolerating gastric feeding pro-kinetic agents should be started prior to consideration of a post-pyloric feeding tube. Bedside placement with methods that do not require use of endoscopic or fluoroscopic guidance to minimize exposure of healthcare providers through moving patients out of isolation units or performing aerosol generating procedures. This might limit the availability of post-pyloric feeding tubes significantly in the South African context.

The prone position per se does not represent a limitation or contra-indication for enteral nutrition. ASPEN recommends keeping the head of the bed elevated to at least 10 – 25 degrees to decrease the risk of aspiration. Stop enteral feed when turning patient to- and from the prone position, commence feed immediately thereafter. When patients are fed in the prone position regular aspiration of gastric residual volumes (GRV) should be done and the threshold for GRV's should be lowered to 300ml.

Patients who do not tolerate full enteral nutrition during the first week of ICU admission should be considered for parenteral nutrition on a case-by-case basis. All strategies to optimize enteral tolerance should be explored prior to initiation of parenteral nutrition.

In a subset of COVID-19 patient presenting with gastro-intestinal disturbances, early enteral nutrition might not be achievable. In these patients presenting with diarrhea, nausea, vomiting, abdominal discomfort and, in some cases, gastro-intestinal bleeding the use of early total- or supplemental parenteral nutrition should be considered with transitioning to enteral nutrition as gastro-intestinal symptoms resolve.

3. Formula selection:

3.1. Enteral Nutrition:

ASPEN recommends the use of a standard, polymeric, high protein (>20% protein) formula in the early acute phase of critical illness. As the patient condition improves and vasopressor requirements decrease additional fibre can be considered, unless there is significant gastro-intestinal dysfunction.

Fish-oil containing enteral formulas can be considered.

From a practical point of view patients requiring fluid restriction and especially patients managed in the prone position, will benefit from a high calorie and protein, low volume enteral formulation which will restrict the volume to be delivered significantly.

3.2. Parenteral Nutrition:

ASPEN recommends that the use of pure soybean lipid emulsions be limited during the acute phase of COVID-19. Strategies to limit the use of pure soybean include the use of PN formulations with mixed lipid emulsions.

Langlois et al. 2019 showed in a systematic review and meta-analysis (12 RCTs and 1280 patients were included) of Omega-3 fatty acid supplementation in critically ill patients with ARDS a trend in patients receiving omega-3 fatty acids toward reduced ICU LOS and duration of mechanical ventilation.

Fish oil containing PN is associated with statistically and clinically significant positive effects on clinical outcomes e.g. infection rates, sepsis rate, length of ICU and hospital stay. (Pradelli JPEN 2020)

Regarding specific nutrients only parenteral lipid emulsions with EPA and DHA from fish oil are recommended by the ESPEN guideline on *Clinical nutrition in the intensive care unit and Consensus Statements from the International Summit "Lipids in Parenteral Nutrition."* (Singer 2019, Calder JPEN 2020, Mayer JPEN 2020).

International guidelines promote the notion of cluster care to prevent unnecessary exposure of healthcare workers. With this in mind PN formulations containing both micro- and macronutrients should be considered for use in these patients to limit patient contact. In facilities where this is not possible it should be ensured that patients receive all prescribed elements of PN support which should include macro- and micronutrients.

4. Monitoring

Patients should be monitored on a daily basis for evidence of feed intolerance in order to make early changes to optimize nutrition delivery.

Monitoring should at least include:

	Potential indicators	Tools	Possible actions
GI Tolerance	Gastric residuals, vomiting, abdominal distention, stools	Use institutional gastric residual cut offs (consider a lower volume in patients in prone position), clinical impression of the abdomen	Consider changing the enteral formulation, Consider pro-kinetics, Placement of a Naso-jejunal tube (if this can be done without screening or endoscopy), start parenteral nutrition
Blood glucose control	Episodes of hyper- or hypoglycemia	Institutional protocol on blood glucose monitoring and control	Review nutritional script for overfeeding, consider adjusting enteral formula
Biochemistry	Derangement of biochemistry results e.g. Refeeding syndrome, hypernatremia, renal dysfunction, parenteral nutrition associated liver disease	Laboratory normal values	Consider adjusting nutrition plan according to specific derangement
Nutritional delivery	Assess the percentage energy and protein delivered in the last 24hours to avoid over- and underfeeding	Intake and output charts, volume delivered via feeding pump	Consider adjusting feed rates, enteral formula etc to meet requirements.
Nutritional status	Muscle wasting, weakness etc.	Body weight, body composition assessment if available, clinical examination (rely on information provided by other healthcare professionals to avoid direct patient contact)	Adjust nutrition plan accordingly.
Changes in medical management that will influence nutrition delivery or prescription e.g. Initiation/discontinuation of Propofol, Prone position, initiation/discontinuation of renal replacement therapy, fluid strategy, mobilization of the patient etc.			

5. Closing comments

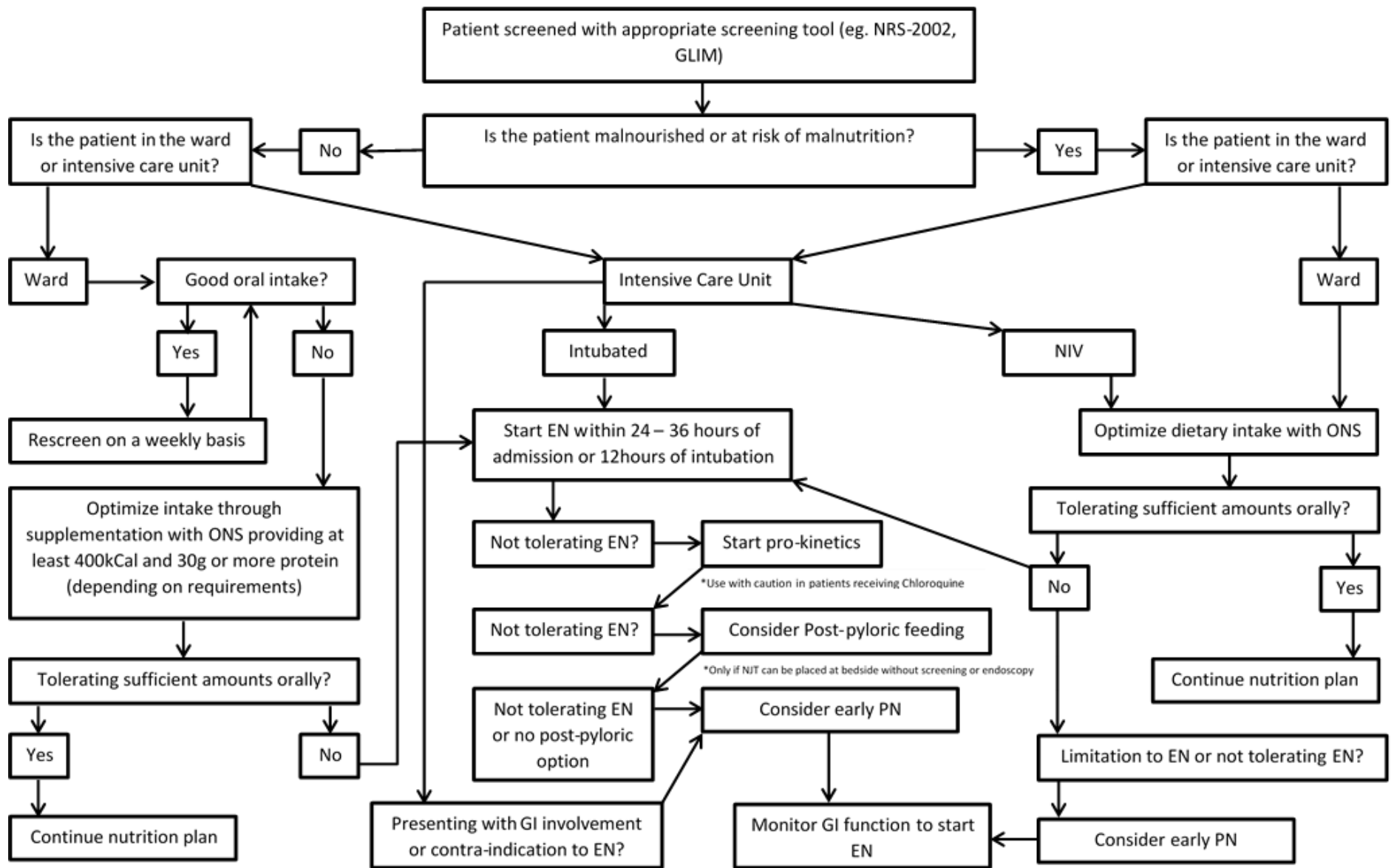
Nutrition support of patients with COVID-19 forms an integral part of management, irrespective of whether the patient is managed in the ward or intensive care setting. Nutrition evaluation and intervention should be prioritized early to ensure optimization of these vulnerable patients and improve patient outcomes. Nutrition care and the availability of nutrition resources should be considered as essential by all role-players involved in the healthcare system.

6. References to ESPEN and ASPEN documents:

Barazzoni R, Bischoff SC, Krznaric Z, Pilrich M, Singer P, endorsed by the ESPEN council, *ESPEN expert statements and practical guidance of nutritional management of individuals with sars-cov-2 infection*, Clinical Nutrition, <https://doi.org/10.1016/j.clnu.2020.03.022>.

Martindale R, Patel JJ, Taylor B, Warren M, McClave SA, *Nutrition Therapy in the Patient with COVID-19 disease requiring ICU care*, Updated 1 April 2020

Algorithm for nutritional care of COVID-19 patients:



ONS = Oral nutrition supplement, PN = Parenteral nutrition, EN = Enteral Nutrition, NJT = Nasojejunal tube, NIV = Non-invasive ventilation

Addendum A

Nutrition communication form for COVID-19 positive patients

Nutrition management form for patients with COVID-19

Please complete this form daily for all patients in the unit and send a photo to the covering dietitian

Ward: _____

Date: _____

Please attach patient sticker				Wt: (kg)		Nutrition: Please indicate specific nutrition concerns, fluid restrictions, etc here	
				Ht: (m)			
Diagnosis and co-morbidities							
Ventilated	Yes	No	Biochemistry	Na:	Cr:	K:	
Prone position	Yes	No		Mg:	Ur:	PO:	
Dialysis	Yes Mode:	No					
Inotropes		Dose:					
Propofol		Rate:	Current nutrition: Indicate current feed rates, volume received in past 24hrs etc.				
IV fluids (indicate type)		Rate:					
NGD (mL/past 24 hrs)		Comments:					
Stool (Yes / No)							
BG: (minimum and maximum)		Insulin (U/hr)					

Addendum B

NRS-2002 screening tool and GLIM criteria for diagnosis of malnutrition

Nutrition Risk Screening 2002 Tool

Table 1: Initial screening		Yes	No
1	Is BMI <20?		
2	Has the patient lost weight within the last 3 months?		
3	Has the patient had a reduced dietary intake in the last week?		
4	Is the patient severely ill? (e.g. In ICU)		

Yes: If the answer is 'Yes' to any question, the screening in Table 2 is performed.
No: If the answer is 'No' to all questions, the patient is re-screening at weekly intervals. If the patient e.g. is scheduled for a major operation, a preventive nutritional care plan is considered to avoid the associated risk status.

Table 2: Final Screening			
Impaired Nutritional Status		Severity of disease	
Absent Score 0	Normal nutritional status	Absent Score 0	Normal nutritional requirements
Mild Score 1	Wt loss >5% in 3 mths or Food intake below 50-75% of normal re- quirement in preceding week.	Mild Score 1	Hip fracture* Chronic patients, in particular with acute complications: cirrhosis*, COPD*. <i>Chronic hemodialysis, diabetes, oncology.</i>
Moderate Score 2	Wt loss >5% in 2 mths or BMI 18.5 - 20.5 + impaired general con- dition or Food intake 25-50% of normal requirement in preceding week	Moderate Score 2	Major abdominal surgery* Stroke* <i>Severe pneumonia, hematologic malignancy.</i>
Severe Score 3	Wt loss >5% in 1 mth (>15% in 3 mths) or BMI <18.5 + impaired general condition or Food intake 0-25% of normal requirement in preceding week in preceding week.	Severe Score 3	Head injury* Bone marrow transplantation* <i>Intensive care patients (APACHE>10).</i>

Impaired nutritional status score _____ + Severity of disease score _____ =
 If ≥ 70 years add 1 to the score above
Total age-adjusted score:
Score ≥ 3 : the patient is nutritionally at-risk and a nutritional care plan is initiated
Score < 3: weekly rescreening of the patient. If the patient e.g. is scheduled for a major operation, a preventive nutritional care plan is considered to avoid the associated risk status.

<p>NRS-2002 is based on an interpretation of available randomized clinical trials. * indicates that a trial directly supports the categorization of patients with that diagnosis. Diagnoses shown in <i>italics</i> are based on the prototypes given below. Nutritional risk is defined by the present nutritional status and risk of impairment of present status, due to increased requirements caused by stress metabolism of the clinical condition.</p>	<p>A nutritional care plan is indicated in all patients who are 1) Severely undernourished (score =3), 2) Severely ill (score = 3), 3) Moderately undernourished + mildly ill (score 2 +1), or 4) Mildly undernourished + moderately ill (score 1 + 2). Prototypes for severity of disease: Score = 1: a patient with chronic disease, admitted to hospital due to complications. The patient is weak but out of bed regularly. Protein requirement is increased, but can be covered by oral diet or supplements in most cases.</p>	<p>Score = 2: a patient confined to bed due to illness, e.g. following major abdominal surgery. Protein requirement is substantially increased, but can be covered, although artificial feeding is required in many cases. Score = 3: a patient in intensive care with assisted ventilation etc. Protein requirement is increased and cannot be covered even by artificial feeding. Protein breakdown and nitrogen loss can be significantly attenuated.</p>
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GLIM Criteria for malnutrition

Phenotypic and etiologic criteria for diagnosis of malnutrition

Phenotypic Criteria			Etiologic Criteria	
Weight Loss (%)	Low body mass index (kg/m ²)	Reduced muscle mass	Reduced food intake and assimilation	Inflammation
>5% within the past 6 months, or > 10% beyond 6 months	<20 if <70 years <22 if >70 years	Reduced by validated body composition measuring techniques	≤50% of ER >1 week or Any reduction for > 2 weeks or Any chronic GI condition that adversely impacts food assimilation or absorption	Acute disease/injury or chronic disease related

Patient requires at least 1 phenotypic criterion and 1 etiologic criterion for diagnosis of malnutrition

Thresholds for severity grading of malnutrition into stage 1 (moderate) and stage 2 (severe) malnutrition

	Phenotypic criteria		
	Weight loss (%)	Low body mass index (kg/m ²)	Reduced muscle mass
Stage 1/ moderate malnutrition	5 – 10 % within the past 6 months or 10 – 20% beyond 6 months	<20 if < 70 yr <22 if ≥ 70 yr	Mild to moderate deficit (per validated assessment method)
Stage 2/ severe malnutrition	>10% within the past 6 months or >20% beyond 6 months	<18.5 if < 70 yr < 20 if ≥ 70 yr	Severe deficit (per validated assessment method)

Addendum C

Standard operating procedure for gravity enteral feeding

STANDARD OPERATING PROCEDURE:

Guideline for administration of enteral nutrition with gravity set

South African Society
for Parenteral and
Enteral Nutrition



1. PURPOSE

The purpose of this standard operating procedure is to share guidelines for gravity feeding when there is a lack of enteral feeding pumps at an institution.

Please note that the South African Society of Parenteral and Enteral Nutrition (SASPEN) recommends where pumps are available that feeding pumps be used before utilizing gravity feeding.

2. TERMINOLOGY

Drip rate: The number of drops per allocated time

Drip factor: number of drops per milliliter (mL) of solution calibrated for an administration set (usually found on the package of the administration set). For EN usually set at 20 drops = 1 mL (or 20 ggt/ml)

Rate: number of milliliters (ml) of formula to be delivered over the course of one hour (mL/hr)

3. CALCULATING DRIP RATE

The following formula can be used to calculate the drip rate:

Step 1: Number of drops per minute

$$\text{Drip rate (ggt/min)} = \frac{\text{total volume (milliliters)} \times \text{drip factor (ggt/ml)}}{\text{total time (minutes)}}$$

Step 2: Number of drops per minute / 60 seconds per minute = Number of drops per second

Step 3: Number of drops per second x 15 = Number of drops per 15 seconds

Example: Calculating drip rate of feed to run at 80mL/hr:

Step 1: Calculation: $80\text{mL}/60\text{min} \times 20\text{ggt/mL} = 26.6 = 27$ drops per minute.

Step 2: Drops per second: $27 \text{ drop per minute}/60\text{seconds} = 0.45$ drops per second

Step 3: drops per 15 seconds: $0.45 \times 15 = 6.75 = 7$ drops per 15 seconds

4. Table with calculated drip rate

Please see the table for easy reference to the drip rates:

rate (ml/hr)	drip rate (min)	drip rate (15sec)
10	3	1
15	5	1
20	7	2
25	8	2
30	10	3
35	12	3
40	13	3
45	15	4
50	17	4
55	18	5
60	20	5
65	22	5
70	23	6
75	25	6
80	27	7
85	28	7
90	30	8
95	32	8
100	33	8
105	35	9
110	37	9
115	38	10
120	40	10

Reminder: It is important to check this drip rate regularly to ensure the feed is still running at the required rate.

5. REFERENCES

https://journals.lww.com/nursingmadeincrediblyeasy/Citation/2004/07000/How_fast_should_the_drops_drip_.12.aspx

<http://www.shieldhealthcare.com/community/nutrition/2019/04/16/gravity-feeding-how-to-determine-and-set-appropriate-flow-rate/?fbclid=IwAR2rEm9D1ImPHufsigUmCjmskmPBeRImHaVlb7BqKh9sojGy2k1jscAJzGk>