

**SPECIAL SUPPLEMENT**  
Sedation in Critically-Ill  
COVID-19 Patients

# 20 Lessons from 2020

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# Nutrition Management of COVID-19 Patients in the ICU and Post-ICU

This article is a summary of a webinar series where three nutritional experts discussed a practical approach on how to feed and how to provide high-quality nutritional therapy to critically ill patients during hospitalisation. Prof Elisabeth De Waele, Dr Arthur Van Zanten and Prof Paul Wischmeyer in the webinar series discuss nutrition support for COVID-19 ICU patients and strategies for the nutrition management of COVID-19 patients post-ICU.

stress disorder, also called the Post-Intensive Care Syndrome. All these factors do not help nutritional intake during the recovery phase. That is why it is essential to have prolonged nutrition therapy combined with exercise rehabilitation throughout every phase of critical illness and recovery.

Optimising nutrition therapy in COVID-19 patients both in the ICU and post-ICU is extremely important. It is known that in general, patients often do not receive their full nutritional requirements whilst in the ICU (Bendavid 2019). Evidence shows that patients are consistently underfed at ward level often not exceeding more than 50% of their needs, particularly those only on oral intake (Peterson et al. 2010; Chapple et al. 2010; Wittholz et al. 2020; Ridley et al. 2019). COVID-19 patients can also be obese, suffer from hypertension, diabetes, COPD and other premorbid diseases. While acute illness can be severe and requires admission to the ICU, that is not where this journey ends. Clinicians have to manage the nutritional care needs of the patient both in the ICU and during the recovery phase even beyond hospital discharge ensuring this coordinated care is continued and carried out.

## Practical Tips for Nutrition Therapy in Critically Ill COVID-19 Patients

Here are some practical questions and tips on how to manage nutrition issues when provid-

ing care to COVID-19 patients in the ICU:

- *When to start enteral nutrition in patients with vasopressors?* Enteral nutrition can begin when haemodynamic stability is achieved. There is no need to wait until vasopressors have been stopped. When mean arterial pressure is stable, and when ScvO<sub>2</sub> and lactate levels are acceptable, early enteral nutrition can begin (Reignier et al. 2018).
- *There was initial concern at the start of the pandemic about feeding prone ventilated patients with enteral nutrition. Is this justified?* Most COVID-19 patients are able to tolerate enteral feeding with nasogastric tube placement whilst in prone position. Clinical evidence does not support withholding enteral nutrition in this state (Reintam et al. 2018). Therefore, healthcare providers can successfully feed COVID-19 ICU patients with enteral nutrition even in prone position.
- *What to do in cases with persistently high Gastric Residual Volumes (GRV)?* Some units don't measure GRVs at all as it is an aerosol generating procedure. However in those that do, use of prokinetics is recommended, although if you choose to use hydroxychloroquine it is important to monitor for QTc prolongation. If high GRVs persist, the next step, would be to introduce jejunal feeding if this is currently

Patients with coronavirus disease may suffer from pneumosepsis. It is a dysregulated host response to pneumonia. There is often also the accompanying complication of multiple organ dysfunction syndrome (failure of the cardiovascular system, the hepatic system, the renal system, the neurological system, the respiratory system, and the haematological system). The GI tract and nutrition are also issues that must be considered to prevent further loss of lean mass and declining immune function.

Many COVID-19 patients survive ICU stay. But many of these survivors are debilitated and may have to learn how to walk again. Swallowing is very difficult after prolonged intubation, as patients have progressive loss of body weight and even more loss of lean body mass. They suffer from concentration disturbances, decline of cognitive functions and anxiety, depression and post-traumatic

carried out in the hospital or unit or consider parenteral nutrition (PN)

- **Permissive underfeeding, and how long?** Early enteral nutrition is important to preserve gut function. Permissive underfeeding is not superior in sepsis patients compared to full feeding. Heyland et al. (2010) also showed that no feeding is inferior to trophic feeding. Guidelines suggest that there is a slow build of enteral feeding in the first 1-3 days and that the aim is to get to nutritional targets by day 4 (de Koning et al. 2019).
- **What about energy target?** In critically ill mechanically ventilated patients, energy expenditure (EE) should be determined by using indirect calorimetry. If indirect calorimetry is used, isocaloric nutrition rather than hypocaloric nutrition can be progressively implemented after the early phase of acute illness (after Day 1-3). Hypocaloric nutrition should be administered in the early phase of acute illness (<70% of requirements). Caloric delivery should be increased up to 80-100% after day 3. If predictive equations are used to estimate the energy need, hypocaloric nutrition should be preferred over isocaloric nutrition for the first week of ICU stay (Singer et al. 2019).
- **Very high protein products, and why?** Many COVID-19 patients are obese, and this requires a high protein, low-calorie strategy to prevent overfeeding. In a general ICU population, to prevent overfeeding calories, which studies show can be detrimental, the volume provided does not often meet protein needs on a per kg bodyweight basis unless higher protein feeds are given. To meet the guideline recommendation of 1.3 g/kg/day of proteins, high protein feeds are recommended for use and enteral protein supplements can also be used when this is not sufficient (Zanten et al. 2018). Many clinicians report finding it difficult to achieve protein requirements without the use of high protein enteral feeds.

- **Hydrolysed vs. Polymeric feeds:** Both the ASPEN guidelines and the Canadian Critical Care Nutrition Practice Guidelines do not recommend the use of hydrolysed protein feeds. This is because there is no evidence to support use of hydrolysed feeds for routine use in ICU patients. Whole protein enteral feeds are recommended in all the nutritional guidelines.
- **Monitoring for refeeding hypophosphataemia:** Lower caloric intake is associated with better 6-month survival in refeeding syndrome but not in patients without RFS. As per ESPEN guidelines, in patients with refeeding hypophosphataemia, electrolytes should be measured 2-3 times a day and supplemented if needed, and energy supply should be restricted for 48 hours and then gradually increased (Singer et al. 2019).
- **Ramping up proteins & calories:** In critically ill COVID-19 patients, during the phase of critical illness, a minimum of 1.3g/kg protein equivalents should be delivered per day progressively as per ESPEN guidelines (Singer et al. 2019).
- **When to use parenteral nutrition (PN)?** As per ESPEN guidelines (Singer et al. 2019), in patients who do not tolerate full dose EN during the first week in the ICU, the safety and benefits of initiating PN should be weighed on a case by case basis, and PN should not be started until all strategies to maximise EN tolerance have been attempted.
- **What to do in renal failure patients and during continuous veno-venous haemofiltration (CVVH)?** Use normal protein dose, and start CVVH on normal renal criteria. Increase protein dose to compensate for the loss of amino acids into the ultrafiltrate. Only when dialysis is resource-limited, consider lowering the protein dose, but preferably not below 1.0g/kg bodyweight (Zhu et al. 2018).
- **Glucose control:** ESPEN Guidelines (Singer et al. 2019) recommend that blood glucose should be measured initially after ICU admission or after commence-

- ment of artificial nutrition support and at least every 4 hours for the first two days. Insulin should be administered when glucose levels exceed 10 mmol/L.
- **Special feeds (immunonutrition, fish oil):** Special feeds are not recommended for use in COVID-19 patients.
- **Extubation phase:** Consider interrupting gastric feeding before extubation a few hours before or empty the stomach (GRV). Many COVID-19 patients demonstrate post-extubation stridor and need to be re-intubated. Give prophylactic steroids. Keep in mind that extubation is not the end of medical nutrition therapy. Many patients remain dysphagic and are unable to meet targets. It is important that patients are able to demonstrate they can eat sufficiently before the feeding tube is removed.

### Nutritional Considerations in COVID-19 Patients During the Post-ICU Phase

It is becoming evident that general ICU patients on discharge to ward level are still being underfed (Peterson et al. 2010; Ridley et al. 2019, Wittholz et al. 2020). The Nutrition Day data shows that it takes, on average, nearly two weeks for patients on ICU to meet their full nutritional needs (Bendavid 2017). It is often at the point of ICU discharge that nasogastric tubes are routinely removed. A few studies have shown that patients do not improve their nutritional intake beyond 50% of their needs with oral intake alone and that this persists in the post-ICU phase (Peterson et al. 2010; Wittholz et al. 2020; Ridley et al. 2019). At a point where critically ill patients may best be able to utilise the nutritional substrates for anabolic processes, is also the phase where continued underfeeding appears to persist. Growing evidence shows that post-ICU patients are not meeting their nutritional requirements.

What does the future look like for an ICU COVID-19 survivor? We don't know because we don't have the data. This is a

new disease. Healthcare practitioners need to learn from this experience to be able to tailor their approach to this new patient population. However, we do know that patients who suffer from acute respiratory distress syndrome are still not back at baseline even after five years (Herridge et al. 2003). We see the same issues with COVID-19 patients. They have longer than average length of ICU stays and ventilation, and they also appear to lose lean body mass. It is important to invest in nutrition in post-ICU patients. Clinical evidence clearly shows that higher daily protein delivery during hospitalisation is associated with decreased mortality following hospital discharge (Weijs et al. 2019). COVID-19 patients have muscle weakness, debility and loss of function. They are still in need of calories, proteins, vitamins and trace elements (Wittholz et al. 2019). It's not that they don't want to eat, but they may face multiple issues and complications that prevent them from being able to meet their nutritional needs. This is something that needs to change because recovery for these patients is long and slow. They do

not appear to resume a normal oral intake whilst in hospital, and become even more vulnerable during the post-ICU phase (Moisey et al. 2020).

Here are some practical recommendations for post-ICU nutrition:

- Use ESPEN guidelines for the nutritional management of individuals with SARS-CoV-2 infection (Wischmeyer et al. 2017; Arends et al. 2017; Weimann et al. 2017; Vokert et al. 2019; NICE guidelines 2017). Avoid premature removal of feeding tubes until patients have demonstrated ability to meet most of their requirements. If a patient is eating <50% of needs for >3 days, enteral nutrition should be commenced.
- Focus on practical issues. If they cannot eat enough, proactively provide oral nutritional supplements. To rebuild muscle mass and function, patients will need ongoing nutrition support, likely oral nutritional supplements and those with leucine and Vitamin D.
- Utilise a crisis situation to learn and apply new protocols, improve decision-making, use telemedicine etc.

- Follow-up on survivors and monitor their nutritional information, including their intake, body weight and muscle mass.
- Provide patients relevant and practical nutritional related information at discharge. This is to ensure patients and carers are aware of what is required and why, and especially to support compliance to eating sufficiently at meals or additional nutrition support measures such as oral nutritional supplements or enteral nutrition.
- Use home enteral nutrition programmes. Only when proactive feeding strategies are used (longer EN, overnight EN or oral nutritional supplements), are patients likely to meet their nutritional needs (van Zanten et al. 2019). ■

This article is based on two-part COVID-19 Webinar Series hosted by Nutricia. To watch the complete webinars please visit: <https://nutricia.wavecast.io/critical-care-and-tube-feeding>

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