

**Baxter**

## Helping Empower Recovery

### The Online Series (Heros)

Part 2:  
Restructuring Nutrition Support Services  
to Facilitate Care for Covid-19 Patients

April 16, 2020

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## Program Disclosure

- Support for this program is provided by Baxter International Inc.
- This program is not an accredited continuing education (CE) program
- Today's presentation slides and on-demand viewing of this program will be available by 23-April at:
  - [https://www.baxterglobal.com/nutrition\\_hero\\_series](https://www.baxterglobal.com/nutrition_hero_series)

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## Faculty



### **Ella Terblanche, RD**

Critical Care Dietitian  
at St Georges University Hospitals  
NHS Foundation Trust, London  
Chair of BDA Critical Care Specialist Group  
London, UK

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## Disclosures



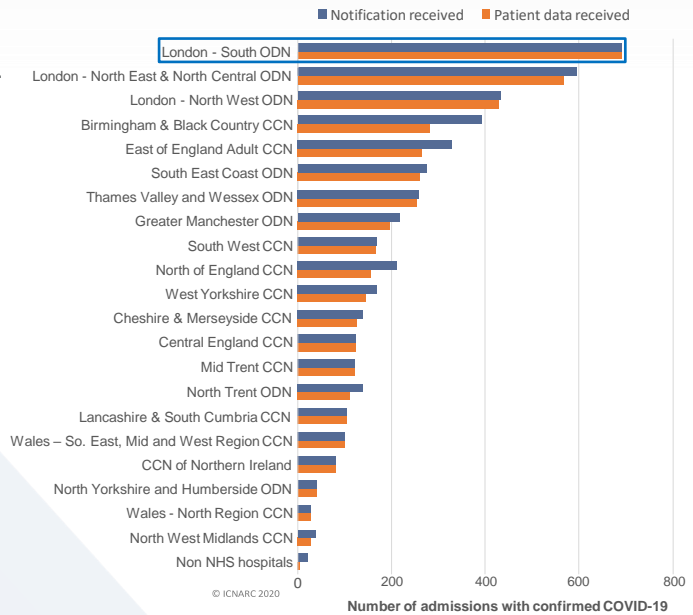
### **Ella Terblanche, RD**

**Baxter:** Consultancy & Education

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## About Ella Terblanche

- I work at St George's Hospital in South London, UK.
- I'm a Critical Care Dietitian and the Chair of the BDA Critical Care Specialist Group (380 members)
- We are the largest healthcare provider in Southwest London, and one of the country's principal teaching hospitals
- Normally have 3 big ICUs
- One of the country's main centres for COVID ICU patients, with a COVID retrieval team
- Now have 7 ICU areas and increasing every day
- Seen 200+ ICU patients with COVID



ODN=Organisational Delivery Network; CCN=Critical Care Network.  
Source: ICNARC Case Mix Programme Database. 10 April 2020

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## About Ella Terblanche

- Increased from 2 full-time ICU dietitians to being supported by a team of 18 non ICU dietitians
- On-going upskilling and supporting these non-ICU dietitians to provide nutritional care to ICU patients
- Local plans for
  - Criteria for prioritisation of patients for dietetic input
  - Additional pumps & feed
  - Remote working
  - COVID starter regimens with high protein EN
  - Guidelines for bolus feeding
  - Guidelines for Proning

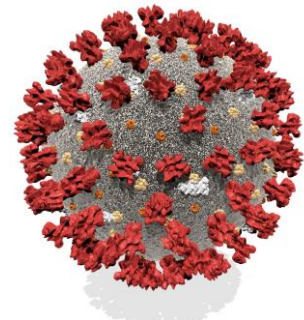


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## Objectives

- To discuss the practical challenges of delivering nutrition support in the COVID-19 pandemic
- To understand the nutritional requirements and contribution of IV medications and renal replacement therapy
- To discuss the role of supplemental parenteral nutrition when enteral is not possible



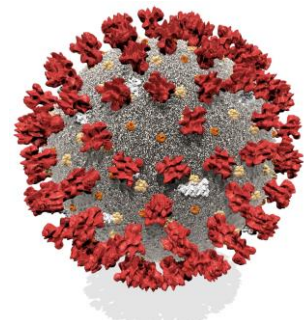
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## Critical Care Medical Management of COVID 19



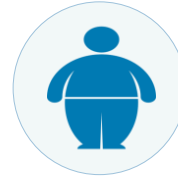
Conservative Fluid Strategy<sup>1,2</sup>



Ventilatory Strategy Requiring Increased Doses of Sedation and Neuromuscular Blockade<sup>1</sup>



Use of Prone Position<sup>1,2</sup>



Higher proportion of Obese patients<sup>3</sup>



Up to 30% of ICU Patients May Need CRRT<sup>1</sup>

1. Clinical management of persons admitted to hospital with suspected COVID-19 infection (<https://www.England.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/clinical-management-of-persons-admitted-to-hospital-v1-10-march-2020.pdf>, accessed March 2020); 2. ARDS Guideline ([https://www.ficm.ad.uk/sites/default/files/ficm\\_ics\\_guideline\\_-\\_July\\_2018.pdf](https://www.ficm.ad.uk/sites/default/files/ficm_ics_guideline_-_July_2018.pdf), accessed March 2020); 3. ICNARC Case Mix Programme Database. 10 April 2020

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## Logistical Challenges Experienced in the Pandemic



- Shortages of EN pumps, giving sets, NGTs
- Practicalities of using bolus feeding instead
- Avoiding NGT/NJT insertion as it's an aerosol generating procedure
- Unable to do regular GRV checks
  - Lack of nursing time to perform task
  - Concerns over transmission to nurse from the GRV liquid
- Delays in getting NGTs inserted and position confirmed
- Losing NGTs on getting in and out of prone position
- Is EN safe when in the prone position?
- Uncertainties about using EN when on NIV

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## Nutritional Considerations Specific to COVID-19

- Gastrointestinal intolerances
- Proning
- Glycaemic control
- Fluid restrictions
- Raised electrolytes
- NIV
- Obesity
- Non nutritional calories

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## Case Study

**63yo female patient on CTICU with T1RF COVID19 +**

### Past Medical History (PMH):-

- HTN, T2DM, Obesity, Asthma

### Anthropometry

- Weight: 117kg
- Height: 161cm
- BMI: 45
- Ideal Body Weight:- 64kg (BMI 25)
- Adjusted Body Weight:- 77kg

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## Clinical Update

### Patient day 10

- Respiratory Status: Fio2 60%, intubated & ventilated, proned twice
- Cardiologic Status: supported with Norad & vasopressin
- Renal: FB- ve 194mls – on renal replacement therapy
- Temperature: 38C
- Gastric residuals volume (GRVs): Not documented - reports of 'not absorbing' in medical notes. Now vomiting
- Bowels: BNO yet 10 days
- Blood glucose:- 10.2mmol on insulin 2units/hr
- Medications: Propofol ~25ml/hr (600kcal), Fentanyl, Clonidine, Docusate, Lactulose, Senna, Erythromycin, Metoclopramide, Lansoprazole
- Nutrition :- EN rate halved due to poor GI tolerance

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## Signs and Symptoms of GI Intolerance

- Delayed gastric emptying measured by GRVs
- Cut-offs from 250-500 mls (or not used at all)
- BNO
- Diarrhoea
- Abdominal distention
- Vomiting
- Dilated loops of bowel (air/fluid)



Deane A, et al. *Nutrition in Clinical Practice*. 2019;34(1):23-36.

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## Gastrointestinal Dysfunction Is Multifactorial and Complex

### The following factors can lead to delayed gastric emptying and intestinal dysmotility

- Gut is first to be affected by shock & last to be resuscitated
- If haemodynamically unstable requiring high dose vasopressors, gut perfusion can be compromised
- Systemic inflammation
- Dysregulated intestinal microbiota
- High use of sedation & paralysis
- Severe constipation
- Age
- Hyperglycaemia
- Electrolyte abnormalities (K<sup>+</sup>, Mg)
- COVID 19 with GI involvement

Deane A, et al. *Nutrition in Clinical Practice*. 2019;34(1):23-36.  
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## Nutrition Whilst in the Prone Position



**BDA Critical Care Specialist Group  
COVID-19 Best Practice  
Guidance: Enteral  
Feeding in Prone Position**

<b>Before Proning</b>	<ul style="list-style-type: none"> <li>• Cease feed ideally 1 hour before proning. Ensure insulin infusion ceased simultaneously.</li> <li>• Aspirate NGT directly before proning and discard contents</li> </ul>
<b>Before Restarting Feeds</b>	<ul style="list-style-type: none"> <li>• Place the bed in the reverse Trendelenberg position (30 degrees head up) unless contra-indicated.</li> <li>• Recheck position of enteral feeding tube as per local guidelines (ie, cm marking at nare/lip). If safe to do so reconnect and resume enteral feeding at last tolerated rate if GRVs in range. If not yet at target rate, continue to increase as per usual local practice.</li> </ul>
<b>Feeding in the Prone Position</b>	<ul style="list-style-type: none"> <li>• Do not exceed a maximum feed rate of 60-85 ml/hr as agreed with the dietitian</li> <li>• Measure GRVs every 4 hours using a threshold of 300 ml or below</li> <li>• Low threshold to consider aperients if bowels not active or suspected faecal loading</li> </ul>
<b>Managing Feed Intolerance</b>	<ul style="list-style-type: none"> <li>• Low threshold to consider prokinetics if any signs of delayed gastric emptying</li> <li>• Consider bedside NJT placement (if available) or alternatively PN after 72 hours if ongoing tolerance issues despite prokinetics</li> </ul>
<b>Before Deproning</b>	<ul style="list-style-type: none"> <li>• Cease feed ideally 1 hour before deproning. Ensure insulin infusion ceased simultaneously</li> <li>• Aspirate NGT directly before deproning and discard contents</li> </ul>
<b>Once Deproned</b>	<ul style="list-style-type: none"> <li>• Recheck positioning of enteral feeding tube as per local guidelines (ie, cm marking at nare/lip). If safe to do so resume enteral feeding.</li> <li>• Restart at last tolerated rate, if below target rate increase towards target rate as tolerated as per usual local practice</li> </ul>

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## Glycaemic Control

- High prevalence of patients with T2DM
- Stress response exacerbating erratic glycaemic control
- Pyrexia seems to play a role
- Very high doses of insulin required
- Avoid overfeeding calories and carbohydrate in first 5 days
- Watch for hypoglycaemia if EN/PN is stopped e.g, proning, bolus feeding
- Gut dysfunction



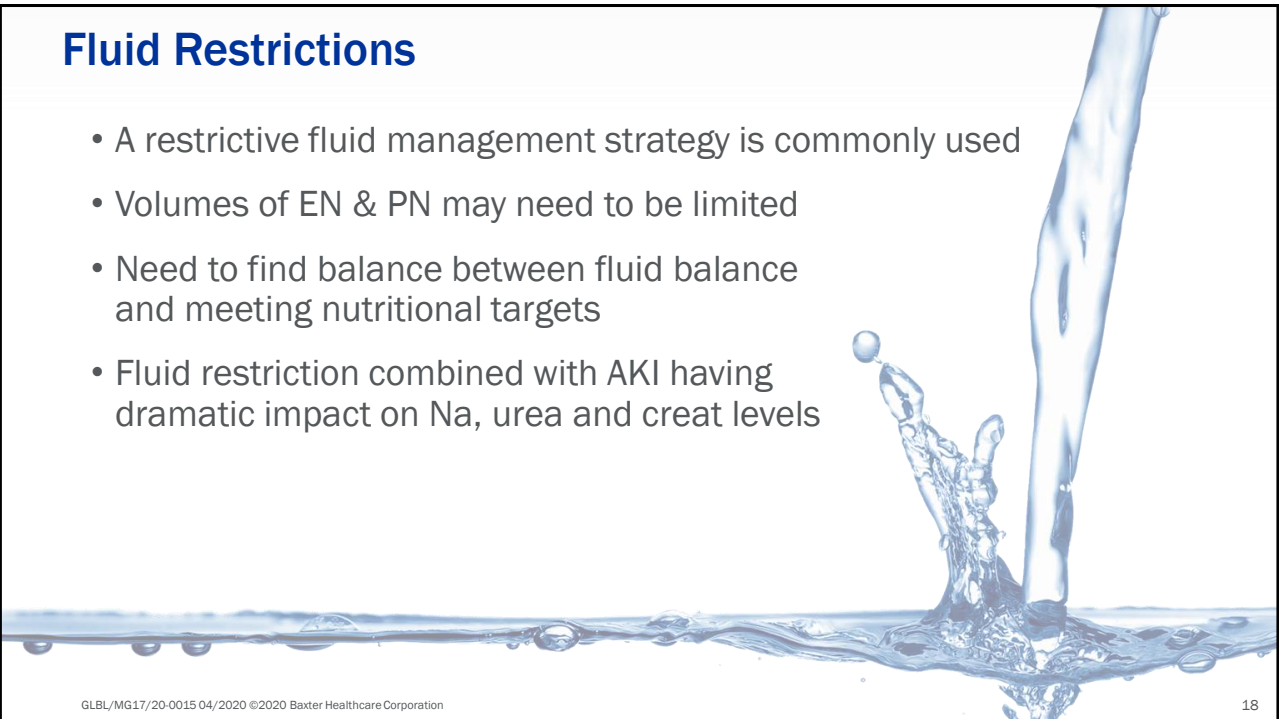
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## Fluid Restrictions

- A restrictive fluid management strategy is commonly used
- Volumes of EN & PN may need to be limited
- Need to find balance between fluid balance and meeting nutritional targets
- Fluid restriction combined with AKI having dramatic impact on Na, urea and creat levels



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## Raised Electrolytes

- Shortage of Renal Replacement Therapy (RRT) machines seen
- Stricter than normal RRT criteria
- Many patient have very high K levels (6-7mmol)
- Will need to low electrolyte EN or electrolyte free PN



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## NIV (Non-invasive ventilation) and Nutrition Provision

- NGT may cause air leakage, compromising NIV effectiveness
- Stomach can get very distended, effecting diaphragmatic function
- Reluctance to use EN
- Oral intake is often insufficient
- Can lead to undernutrition/starvation
- Try methods to optimize EN delivery & tolerance before proceeding to PN
  - Use a fine bore 8Fr feeding tube if possible
  - Use of regular prokinetics
  - Aspirating the stomach every 4-6 hours



NIV=Noninvasive ventilation; NGT=Nasogastric Tube

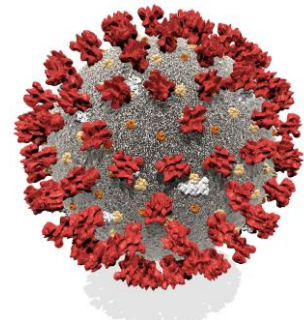
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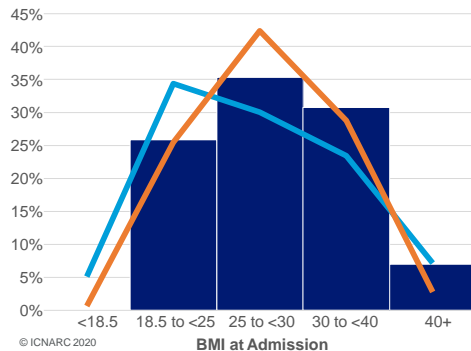
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## Obesity

**Figure 7: BMI distribution of patients critically ill with confirmed COVID-19**

- Patients critically ill with confirmed COVID-19
- Patients critically ill with viral pneumonia (non-COVID-19), 2017-19
- Age- and sex-matched general population



© ICNARC 2020

ICNARC Case Mix Programme Database. 10 April 2020; Singer 2019; McClave 2016

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- In the UK, 74% of COVID patients in ICU have BMI >25 & 38% with BMI >30
- Energy & protein needs are poorly defined
- ESPEN: 20-25 kcal/kg Adjusted BW & protein 1.3 g/kg Adj BW
- ASPEN: 11-14 kcal/kg Actual BW & protein 2-2.5 g/kg IBW
- Caution needed to avoid overfeeding & underfeeding

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## Energy and Protein Requirements

- Indirect calorimetry not recommended due to exposure risk
- Start cautiously over the first 3-5 days (~20 kcal/kg)
- Aim for 25 kcal/kg by day 5
- Increase to 28-30 kcal/kg after 7 days
- Protein: 1.2-1.3 g/kg (1.5 g/kg if on CRRT)
- Use IBW/Adjusted body weight for BMI >30
- Aim for ~30 kcals/kg in extubated/NIV patients

Based on recommendations from the following COVID-19 guidelines; CCSG, AuSPEN, ESPEN, ASPEN / SCCM  
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## Non-nutritional Calories

- Propofol infusions 1.1 kcal/ml
  - 20-40 ml/hr (500-1000)/day
  - Needs to taken into consideration to avoid harmful effects of overfeeding
  - But decrease in 800 kcals in EN will result in decrease in 50 g protein/day
- Citrate anticoagulation
  - Calorific gain depends on solutions used
  - Anticoagulant Citrate Dextrose Solution (ACD-A) can contribute around 400-500 kcal/day
- Peritoneal dialysis being used in some units
  - ~500 kcal/day depending on solution used

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## Case study

### Estimated Energy and protein needs

- Energy: 25kcal/77kg (Adj BW) = 1931kcal
- Protein: 1.3g/77kg (Adj BW)= 100g protein
- Or -
- Energy:11-14/117kg = 1287-1638kcal
- Protein: 2-2.5g/IBW 64kg =128-160g

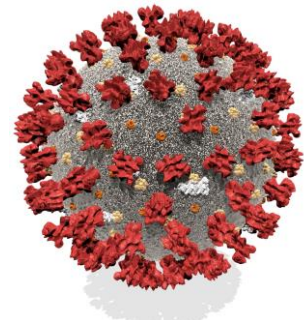
***Compromise: 1800kcal & 100g protein***

## Case study: Plan

- To continue to treat bowels aggressively as impacting on nutrition delivery
- To continue with enteral feeding if tolerated, using per plans below based on propofol dose
- **Propofol 20-30ml/hr – High protein EN @ 40ml/hr x 24 hours (960ml, 1200kcal, 60g protein)**
  - **(+protein supplements x 3 providing an additional 33g protein)**
- Review GI tolerance on next review to see if change of EN type is indicated or PN is needed
- Revisit energy and protein needs on next review

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## What If I Need to Use PN?

- Am I putting my patient at risk?
- The threshold and criteria for switching to PN in a patient with COVID-19 during the pandemic may be different than what is in current critical care nutrition guidelines
- Assess on an individual patient basis



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## EN vs PN

- The use of EN compared to PN has no effect on mortality in critically ill patients
- The use of EN compared to PN is associated with a reduction in the number of infectious complications in critically ill patients, in trials where patients in the PN group received more calories than in the EN group
- The use of EN compared to PN maybe associated with a reduction in ICU LOS & MV days but had no effect on hospital LOS
- The use of EN compared to PN may not be associated with an improvement in calories due to underfeeding in both groups
- The use of EN may be associated with increased episodes of vomiting
- There is no difference between EN and PN in terms of patient reported outcomes

LOS=length of stay; MV=mechanical ventilation  
 Critical Care Nutrition: Systematic Reviews [www.criticalcarenutrition.com](http://www.criticalcarenutrition.com) December 2018  
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## Using PN Safely

- Try all methods of optimizing EN delivery first
- Aim for PN via a CVC
- Use 'off the shelf' multi-chamber bags opposed to scratch bags, if excessive demands
- Careful consideration to energy dose, matched to metabolic phase
- Consider SPN if sub-optimal EN delivery after 5-7 days



CVC=Central venous catheter; SPN=Supplemental parenteral nutrition  
 Based on recommendations from the following COVID-19 guidelines; CCSG, AuSPEN, ESPEN, ASPEN / SCCM  
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## Summary

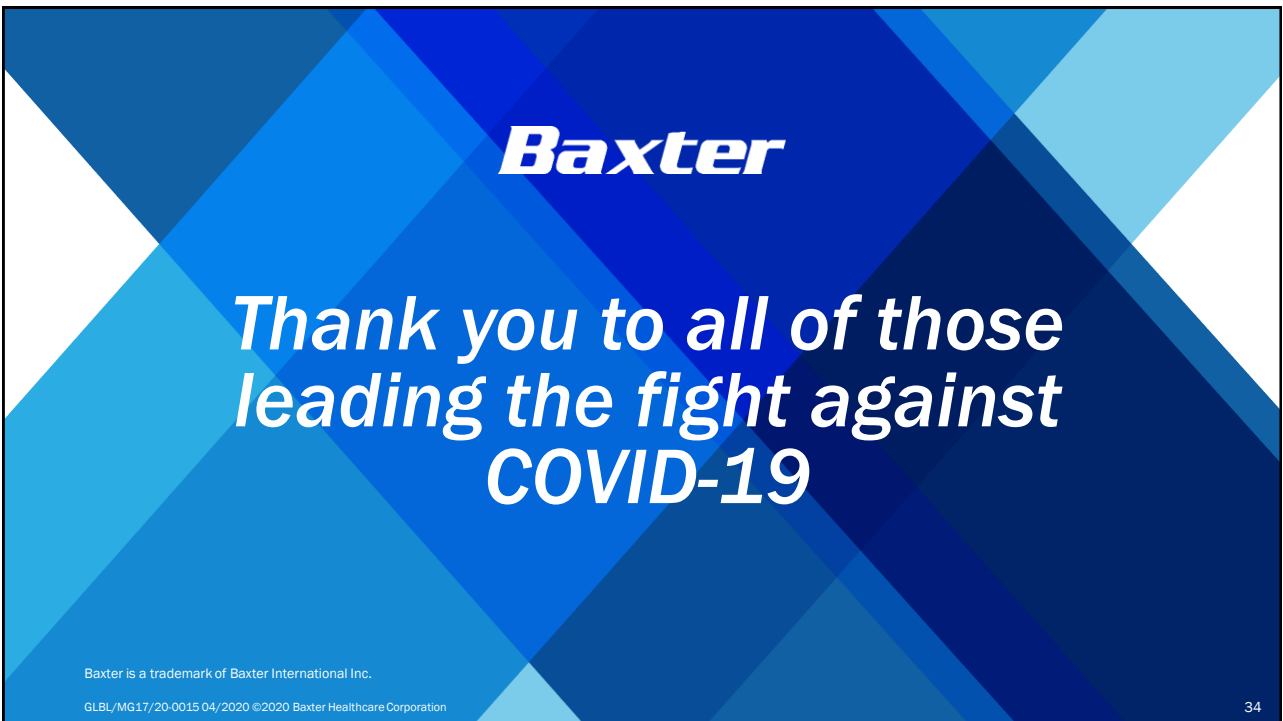
- Unique group of patients; obesity, glyceamic control, very high doses of propofol, fluid balance, electrolytes, GI dysfunction, proning
- Challenges due to numbers of patients seen, availability of equipment & critical care nutrition knowledge of those caring for these patients
- Be respectful of nursing time for nutrition support tasks
- EN should be first line
- But if not possible, PN is a safe alternative (if sensible calorie dose) and appropriate line care

## References

- BDA CCSG (March 2020) Guidance on management of nutrition and dietetic services during the COVID 19 pandemic
- BDA CCSG (April 2020) Best Practice Guidance: Enteral Feeding in the Prone Position
- SCCM/ASPEN (April 2020) Nutrition Therapy in the Patient with COVID-19 Disease Requiring ICU Care
- ESPEN (March 2020) Expert statement and practical guidance for nutritional management of individuals with sars-cov-2 infection
- AuSPEN (April 2020) Nutrition Management for Critically and Acutely Unwell Hospitalised Patients with COVID-19 in Australia and New Zealand



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**PART 3: EARLY NUTRITIONAL SUPPLEMENTATION IN NON-ICU HOSPITALIZED COVID-19 PATIENTS**

**Thursday, April 23, 2020**

**at 08:00 PST/11:00 EST/16:00 BST/17:00 CEST**

**OBJECTIVES**

- Address the nutritional requirements of COVID-19 patients
- Discuss the role of delivery and monitoring of nutrition support in the COVID-19 ICU patient
- Review of best practices experienced in treating COVID-19 patients

**FEATURING SPEAKERS:**



**Alessandro Laviano, MD**  
Associate Professor of Internal Medicine  
Department of Clinical Medicine  
Sapienza University  
Rome, Italy



**Riccardo Caccialanza, MD**  
Director of UOC Dietetics and Clinical  
Nutrition Fondazione IRCCS Policlinico  
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