DEVELOPING NUTRITIONAL PLANS FOR HOSPITALISED PATIENTS

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Eukanuba ROYAL CANIN

Dr. Nick Cave

Massey University

BVSc, MVSc, PhD, MANZS, DipACVN

Accredited CPD

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0.5 Points CVE *(LIVE EVENT)*

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WEBINAR SERIES 2021

Nutrition plans for seriously ill hospitalised patients

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BVSc MVSc PhD DipACVN

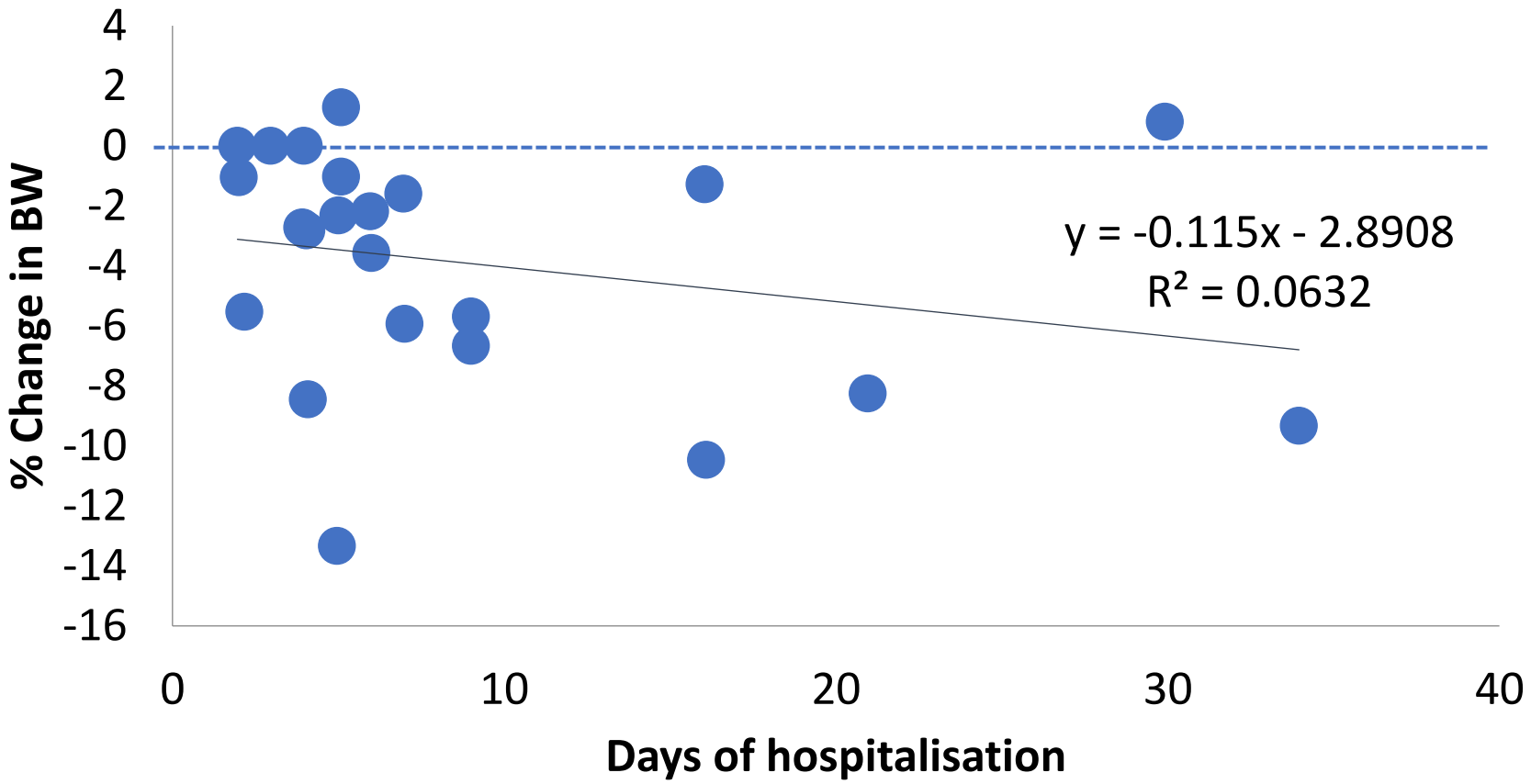
Te Kunenga ki Pūrehuroa

MASSEY UNIVERSITY

“Nutritional support”

- Often neglected
  - paradoxically, neglect is more likely in critically ill patients

Owners rarely need convincing



24 long-stay patients, Becca Leung, PhD Candidate

Te Kunenga ki Pūrehuroa

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Absence of nutritional support

= starvation in hospital

- Muscle wasting
- Weakness
- Intestinal ileus and atrophy
- Impaired healing
- Decreased immunity
- Increased morbidity and mortality

Malnutrition causes poor outcomes

- Higher surgical complication rates
  - Decreased immunity
  - Delayed wound healing
  - Sepsis
- Longer hospital stays
  - Resources
  - $$
- Increased hospital readmission rate
- Greater risk of mortality

1. Agarwal E (et al). *Clinical Nutrition.* 32, 737–745, 2013
2. Remillard RL (et al). *Vet Therapeutics.* 2, 301–310, 2001
3. Andersen HK (et al). *Cochrane database Syst. Rev.* , CD004080, 2006
4. Thompson C and Fuhrman MP. *Nutr. Clin. Pract.* 20, 331–347, 2005
5. Hiesmayr M (et al). *Clin. Nutr.* 28, 484–491, 2009

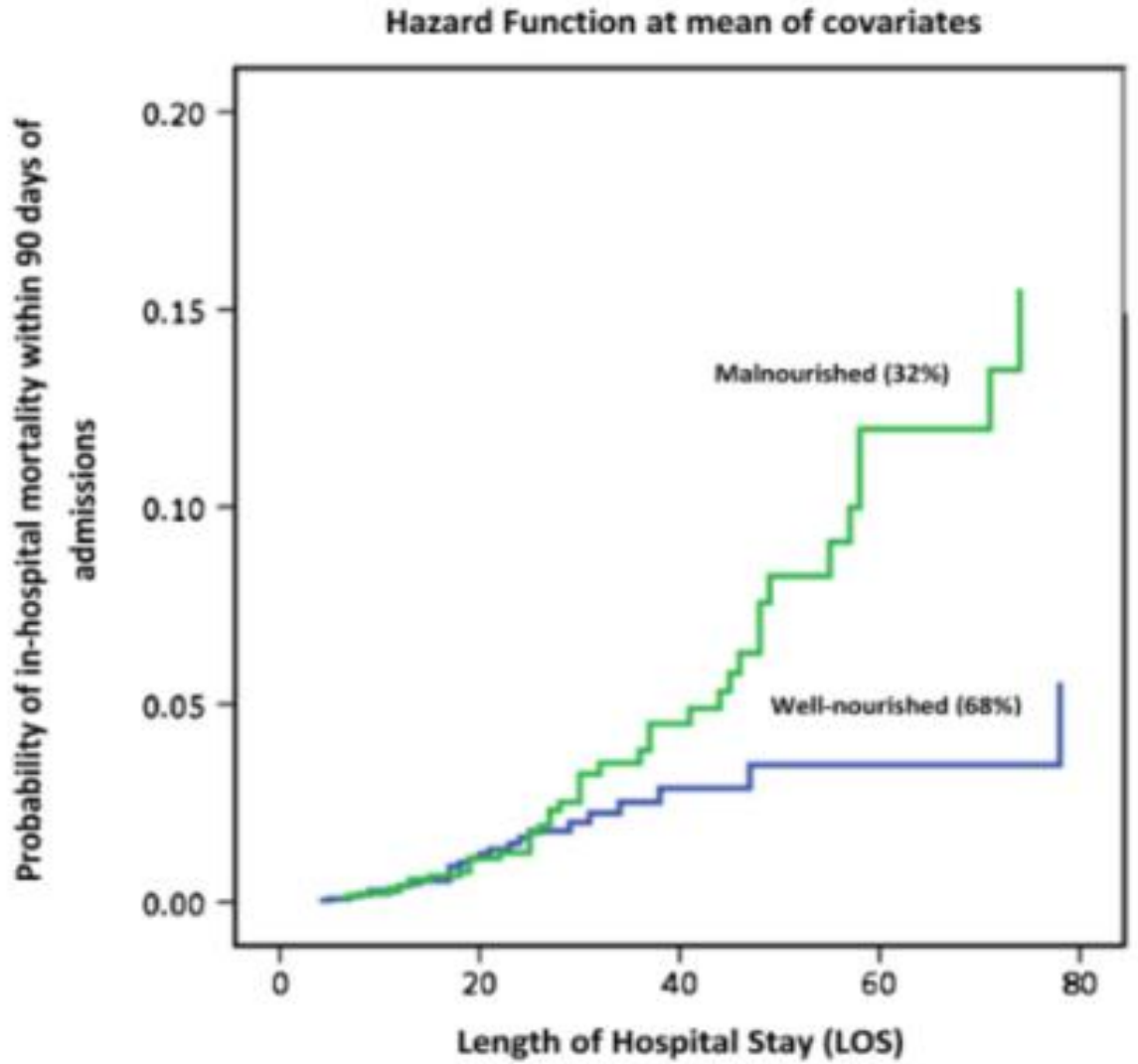
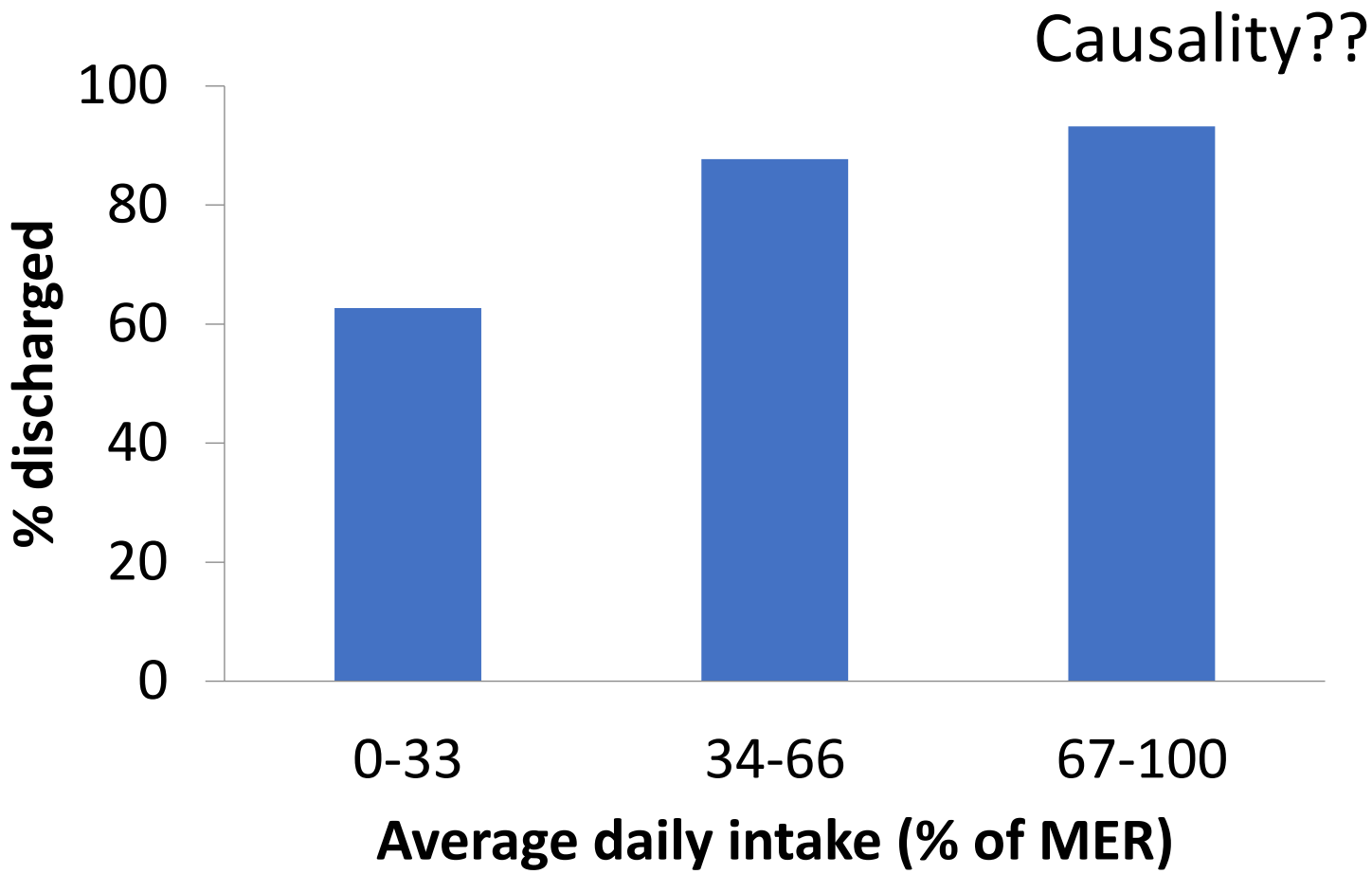


Fig. 1. Cumulative incidence of 90-day in-hospital mortality in well-nourished and malnourished patients ($N = 3017$).



n = 522 feline and canine patients

Brunetto M (et al). Journal of Vet Emergency and Critical Care, 20, 2, 224-342, 2010

Risks of overfeeding?

- Critically ill patients
  - Deranged metabolism
  - Hyperglycaemia
  - Hypertriglyceridaemia
- Other problems
  - Osmotic diarrhoea, vomiting, aspiration, abdominal pain
- “Re-feeding syndrome”

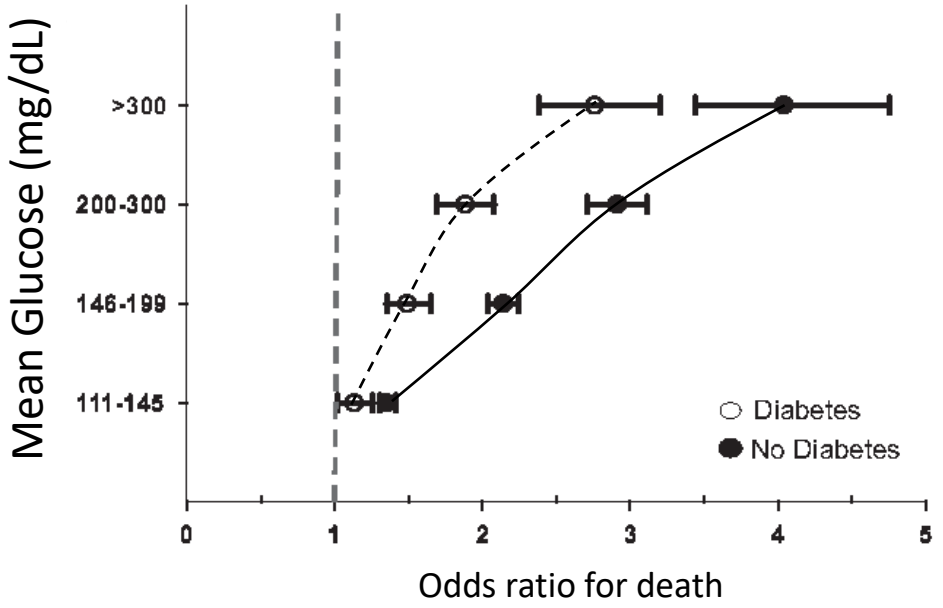
The New England
Journal of Medicine

VOLUME 345 NOVEMBER 8, 2001 NUMBER 19

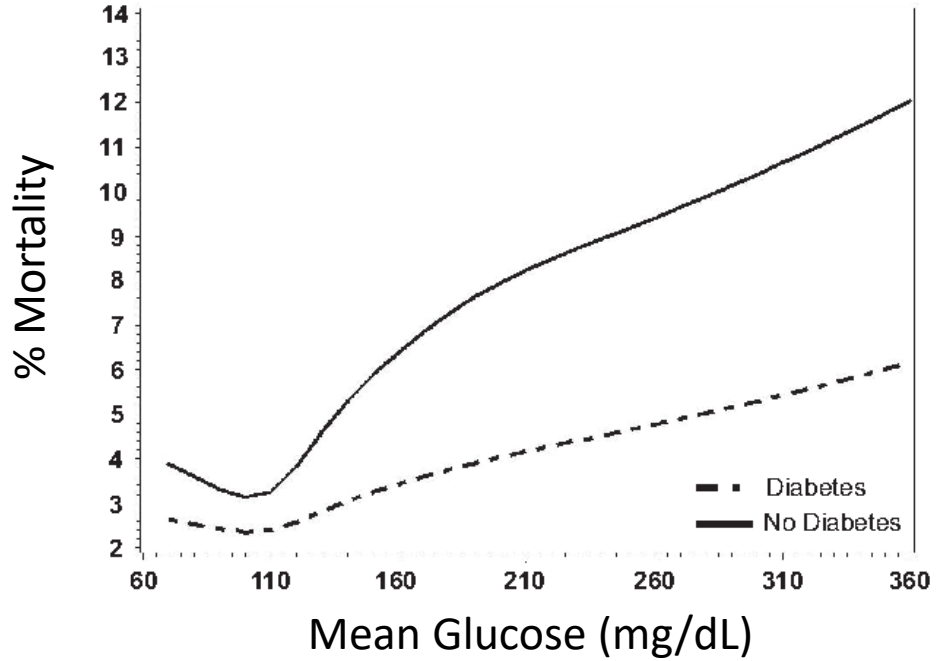
INTENSIVE INSULIN THERAPY IN CRITICALLY ILL PATIENTS

GREET VAN DEN BERGHE, M.D., PH.D., PIETER WOUTERS, M.SC., FRANK WEEKERS, M.D., CHARLES VERWAEST, M.D., FRANS BRUYNINCKX, M.D., MIET SCHETZ, M.D., PH.D., DIRK VLASSELAERS, M.D., PATRICK FERDINANDE, M.D., PH.D., PETER LAUWERS, M.D., AND ROGER BOUILLON, M.D., PH.D.

Results At 12 months, with a total of 1548 patients enrolled, intensive insulin therapy reduced mortality during intensive care from 8.0 percent with conventional treatment to 4.6 percent ($P<0.04$, with adjustment for sequential analyses).



n=259,040
ICU patients



Critical care medicine 2009 Hyperglycemia-related mortality in critically ill patients varies with admission diagnosis. Falciglia et al

There’s a Goldilocks zone

When to force feed?

- Anorexia for ≥ 3 days
- Anorexia predicted > 3 days
- BCS ≤ 3/9 with reduced appetite
- Hypoalbuminaemia with reduced appetite
- Recent weight loss ≥ 5% per week (not due to dehydration)
- Known malnutrition
- Specific conditions

Specific conditions for forced feeding

- Anorexia!
- Cat with hepatic lipidosis
- Canine parvovirus
- Pancreatitis
- Peritonitis

⇒ We need a plan

What is a nutrition plan?

- What
- How much
- How often
- How

How?

Nutritional support = **Forced feeding**

- Hand feeding
- Syringe feeding
- Tube feeding
- Parenteral nutrition

Syringe feeding

- The patient **doesn’t want to eat!**
- May be adequate for short term, under-feeding
- Risk of aspiration, stress, injury

Feeding tubes

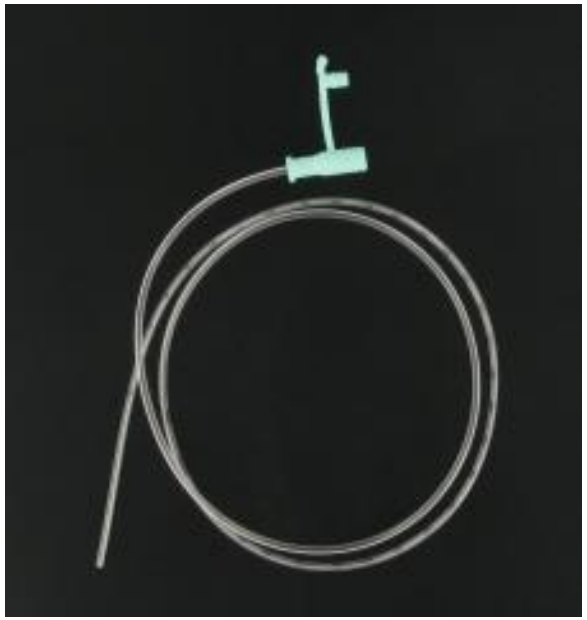
Tube sizes

Nasoesophageal tubes:		Oesophageal tubes:
Cat 5-6 Fr		5 - 12 Fr
Dog 6-10 Fr		6 - 14 Fr

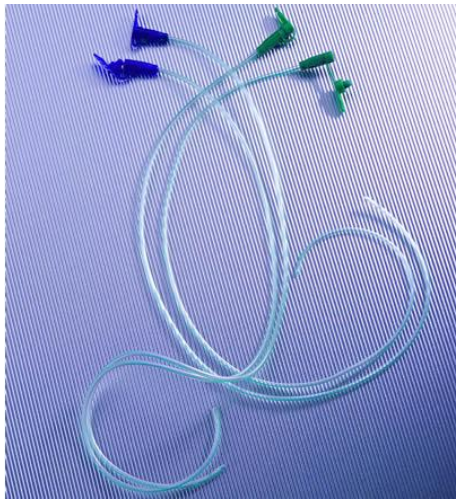
- Liquid diets
  - No benefit to > 8 Fr
  - Smaller tubes are better tolerated

Tube materials

- Standard tube: Polyurethane or silicone



- PVC and red rubber
  - Hard, irritant



Nasoesophageal and Oesophageal tubes

Nasoesophageal tubes

- Easy
- Cheap
- Short term (<14 days)
- Disadvantages
  - Displacement, tolerance, liquid diets, rhinitis,
  - Not when oesophageal disease present (can place nasogastric)

Nasoesophageal tube placement

- Cats are anatomically easy, but behaviourally difficult
- Dogs are behaviourally easy, but anatomically difficult

atdove.org:

https://www.youtube.com/watch?v=0h0xL3ItC2I

https://www.youtube.com/watch?v=sg5SQfbjjvw

Confirm correct placement

- Sedated / moribund patients at greatest risk of airway intubation
- Direct observation if sedated enough

1. Apply suction – negative pressure
2. Instil air and auscultate for borborygmus
3. Instil sterile saline – observe cough vs. swallow/nothing
4. Blow air - observe cough vs. swallow/nothing
5. Radiograph

Malnutrition + sepsis

Parvoviral enteritis

Cholangiohepatitis

Septic peritonitis

Naso – oesophageal vs. gastric?

- Overall: complication rates the same

- Tubes traversing the LES cause reflux oesophagitis
  - Larger the tube – greater the risk
  - Oesophagitis greatest when rigid tubes used

⇒ Place nasoesophageal tubes

⇒ Use nasogastric of oesophageal function compromised

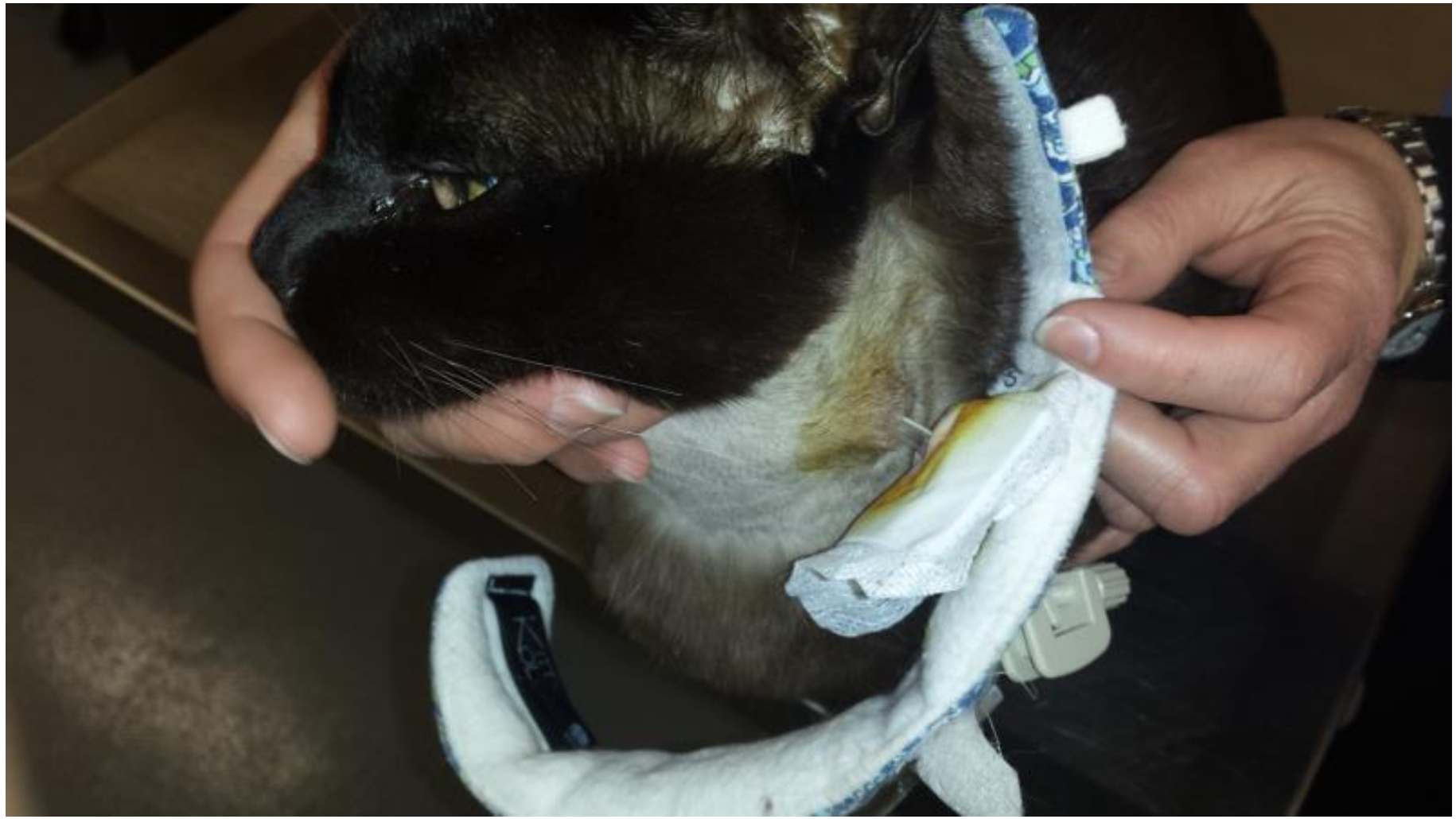
Balkany TJ,et al. Cervical Esophagostomy in Dogs: Endoscopic, Radiographic, and Histopathologic Evaluation of Esophagitis Induced by Feeding Tubes. *Annals of Otology, Rhinology & Laryngology*. 1977;86(5):588-593

Oesophagostomy tubes

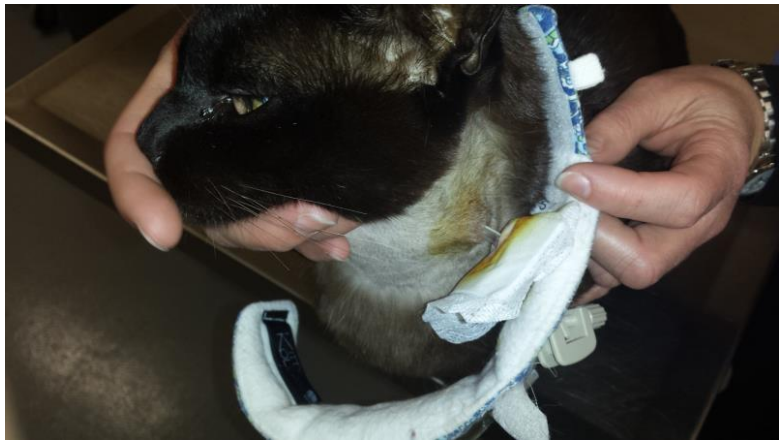
- Easy
- Requires GA
- Moderate to long term (days to weeks)
- Discharge with client feeding
- Can feed blended canned food
- Requires neck dressing and careful tube care

atdove.org:

https://www.atdove.org/video/esophagostomy-tube-placement

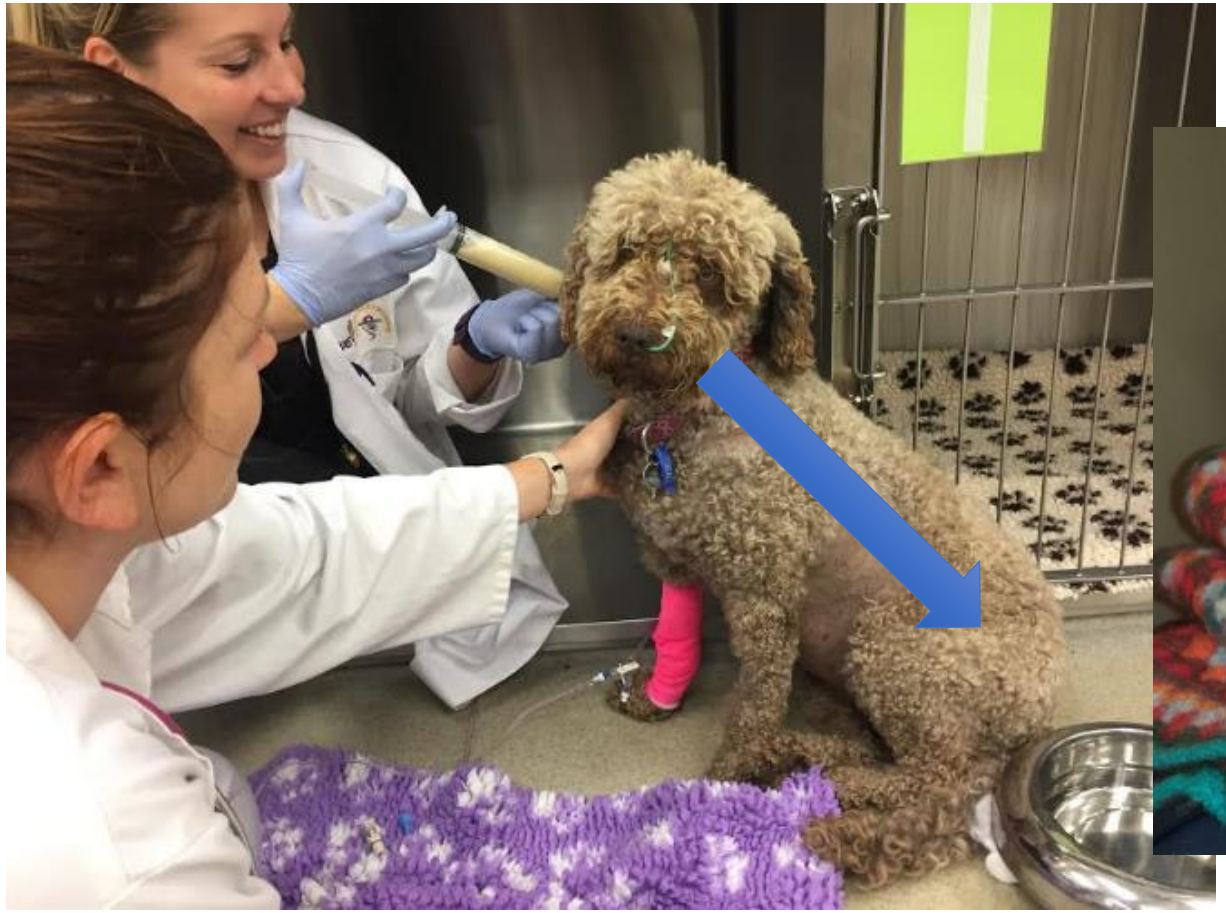


Care of tube site



- Clean site twice daily initially
- Remove all visible exudate
- Fresh dressing + betadine or similar
- Once site is dry and healed (7-10d) – may not require much attention

Thoracic oesophagus sloping down



Get gravity on your side

Feeding tubes – bonus

- Maintenance of fluid balance
  - Easy to meet (and exceed) H_2O requirements
  - Exceeding requirements will lead to diuresis
  - Aim for USG 1.020-1.030

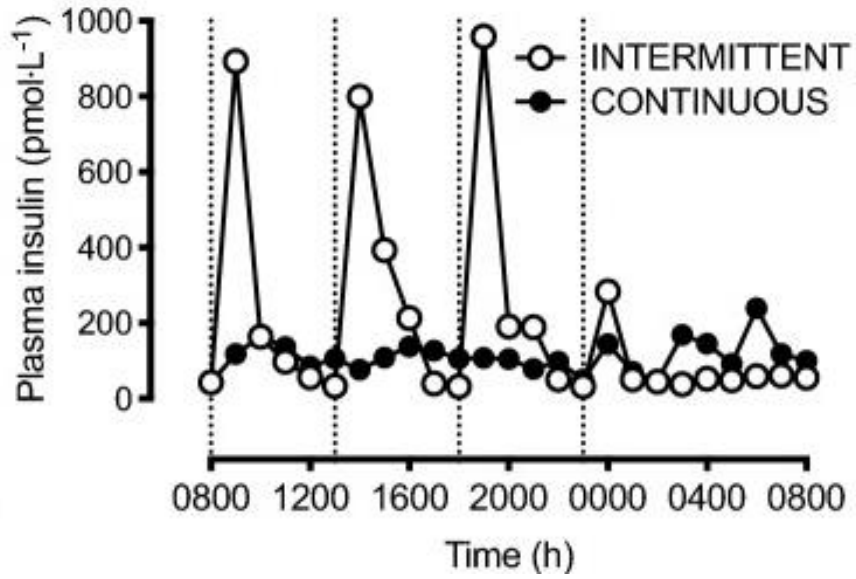
- Medication
  - Convenience
  - Most common cause of tube blockage: pre-mix, or use liquid forms
- Long term use at home
  - Chronic kidney disease

How often?

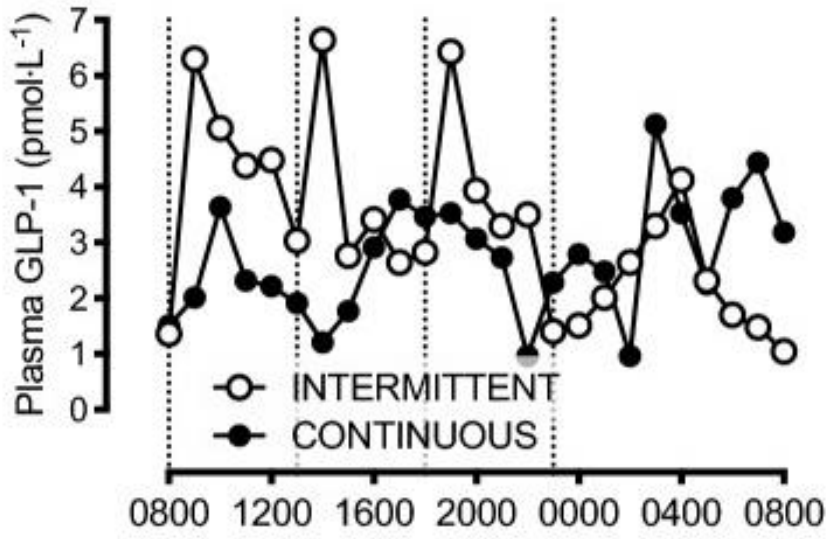
CRI vs intermittent bolus?

An individual's response to intermittent vs. continuous feeding

Insulin



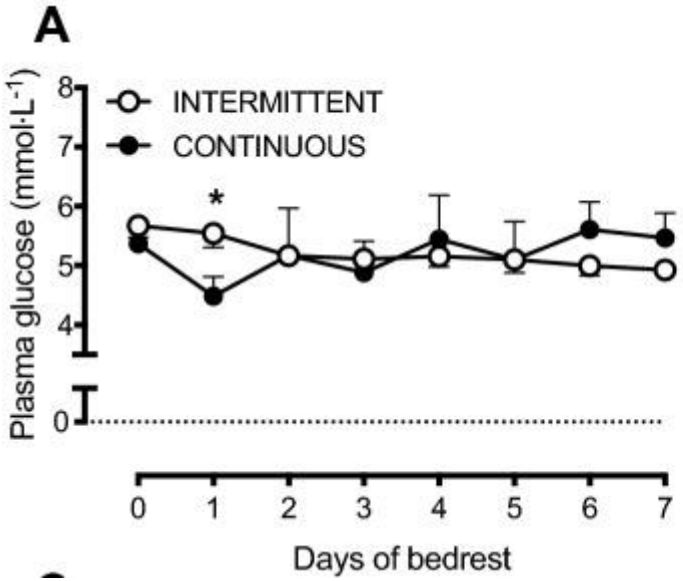
GLP-1



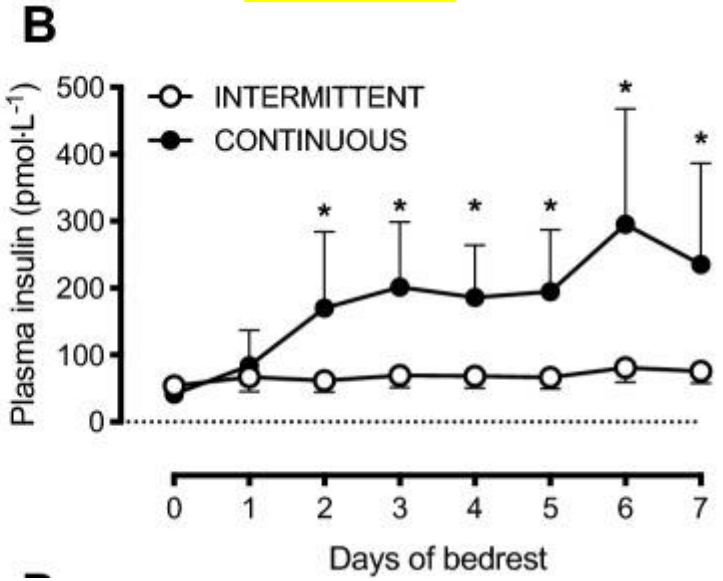
Intermittent versus continuous enteral nutrition attenuates increases in insulin and leptin during short-term bed rest. Eur J Appl Physiol. 2020 Sep;120(9):2083-2094.

Average response to feeding in humans

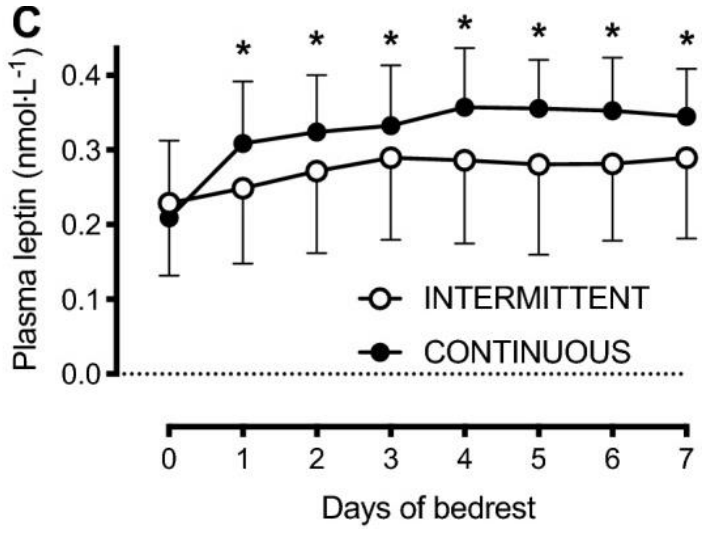
Glucose



Insulin



Leptin



Intermittent versus continuous enteral nutrition attenuates increases in insulin and leptin during short-term bed rest. Eur J Appl Physiol. 2020 Sep;120(9):2083-2094.

How often?

- Fasting in between meals is physiologically, immunologically, and neurologically beneficial
- Intermittent feeding preferable to continuous
- 4 x per working day is reasonable
- Spread out as much as possible

How much?

Feeding schedule

Anorexia +/- disease ⇒

- Reduced motility or ileus
- Mucosal atrophy
- Decreased brush border enzyme expression
- Decreased pancreatic secretion
- Altered microflora
- Effect of tube feeding
- Altered metabolism
  - Reduced insulin sensitivity
  - Lipolysis + ketogenesis

How much to feed?

RER (kcal) = BW $kg^{0.75}$ × 70

- Calculate RER
  - Usually RER ≈ MER for hospitalized patients
- Start with 25 - 30% RER regardless of nutritional status
  - i.e. 5 – 7 % of RER in 4 feeds
  - 100% RER by day 3-4
- Monitor for hyperglycaemia and hyperlipidaemia

What?

Diets

Which is best?

Diets: Nutritional Considerations

- Short term feeding
  - Exact dietary composition rarely critical
  - Ideal unknown

- Long term feeding may have specific requirements:
  - Chronic kidney disease: low phosphorus
  - Lymphangiectasia: low fat
  - Glomerulonephritis / Hepatic encephalopathy: Low protein
  - IBD: Novel protein
  - Diabetes: Low CHO

Canned diets

Product	%ME Protein	%ME Fat	%ME CHO	Kcal/g as fed
Hill's a/d	33	55	12	1.15
Royal Canin Recovery	44	47	8	1.20

Tube feeding canned diets

- Both require thinning
- Neither can be easily passed through <12 Fr
- Dilution with H_2O
  - Reduces energy density
  - Increases volume
  - May fluid overload
- Dilution with fat
  - Imbalances and fat excess

Liquid diets

Jevity® *+ supplements*

+ whey protein isolate (free of lactose), multi-mineral/vitamin

- 1.2kcal / mL

	% of metabolizable energy
Protein	26
Fat	26
Carbohydrate	48

- Adequate quantity of soy fibre.
- Flows easily through a 5Fr feeding tube

Liquid enteral diets

- Clinicare®
- 250mL cans
- 1.2 kcal / mL
- But much more expensive (> 2x)

	% of metabolizable energy
Protein	30
Fat	45
Carbohydrate	25

Liquid enteral diets

- Royal Canin Recovery Liquid®
- 200mL bottles
- 1 kcal/mL
- Convenient syringe attachment

	% of metabolizable energy
Protein	33
Fat	45
Carbohydrate	21

Problems

Problems with feeding tubes

- 37% incidence
- Patient discomfort
- Restless, salivating, gulping, retching and even vomiting
- Reduce volume and/or infusion rate
- If persists, consider:
  - Gastritis, oesophagitis
  - Tube misplacement
  - Adverse food reaction

Comparison of complication rates in dogs with nasoesophageal versus nasogastric feeding tubes. Journal of Veterinary Emergency and Critical Care, 23: 300-304

Problems with feeding tubes

- Diarrhoea is common
  - Primary disease process
  - Intestinal atrophy
  - Reduced mucosal blood flow
  - Ileus
  - Maldigestion / malabsorption

    ⇒ **<u>Overfeeding</u>**
- Reduce back to 25%
- Add fibre
- If non-responsive: consider primary GI dz / ARF

Problems with feeding tubes

- Blockage
- Always flush with water
  - Incorporate volume into total daily water intake
- Acidic / carbonated beverages are *not* more effective
- Leave a column of water
- Tube diameter not a risk
- Kinks, displacement, and medication biggest risks

Summary

- Benefits of early feeding small volumes:
  - ileus, appetite, anti-nausea, anabolism, healing, immunity
- Should be second place
  - E.g. leaving IV fluids running after surgery, pain relief, placing a feeding tube
- Be proactive - Minimal harm in placing a tube and removing it
- Composition less important than instigating feeding
- Owners don’t need convincing

Questions?

Supplemented Jevity Recipe

Ingredients

1 litre bottle of Jevity

10 tablespoons (levelled) - Red 8 Whey Protein Isolate (50 grams)

2 ½ teaspoons (levelled) – Balance It® Carnivore Blend (11.5 grams)

½ teaspoon (levelled) – Di-calcium Phosphate (2.5 grams)

Directions

1. In a large bowl, add the whey protein powder, carnivore blend and di-calcium phosphate.
2. Pour ½-1 cup of Jevity onto the mixture and mix to create a "dough". This will reduce lumping.
3. Pour the remaining amount of Jevity into the bowl and mix by hand.
4. Blend with a hand-mixer until well suspended.
5. Pour the mixture back into the Jevity bottle. Not all will fit, you will need to use another contain to hold the extra.
6. Date the bottle and place in refrigerator. Keep for up to a week.
7. Shake well every time before use.

EXAMPLE NUTRITIONAL PLAN

ROYAL CANIN
a division of Mars Petcare

Eukanuba ROYAL CANIN

	0800	1200	1600	2000	2400	Notes
Date						NG Tube
% RER	25%	25%	25%	25%	25%	
Amount	18ml + 5ml flush	18ml + 5ml flush	18ml + 5ml flush	18ml + 5ml flush	18ml + 5ml flush	
	At 25% RER patient receiving 80ml H_2O					
	0800	**1200**	**1600**	**2000**	**2400**	**Notes**
Date						NG Tube
% RER	50%	50%	50%	50%	50%	
Amount	36ml + 5ml flush	36ml + 5ml flush	36ml + 5ml flush	36ml + 5ml flush	36ml + 5ml flush	
	At 50% RER patient receiving 140ml H_2O					

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IN CRITICALLY ILL PATIENTS, THERE IS NO TIME TO WASTE.

RECOVERY LIQUID

A liquid diet recommended for canine and feline tube feeding.

Royal Canin are proud to support you and your critical care patients with our new Recovery Liquid diet. Tube feeding often plays a vital role in the care of these patients. Dr Corey Regnerus has put together a short presentation outlining the importance of nutritional support in critical care patients, and the role that our Recovery Liquid diet can play during their hospitalisation.

HIGH PROTEIN
High protein level to help maintain muscle mass during hospitalisation and convalescence.

HIGH ENERGY
High energy density that provides daily energy requirements in a reduced feeding volume.

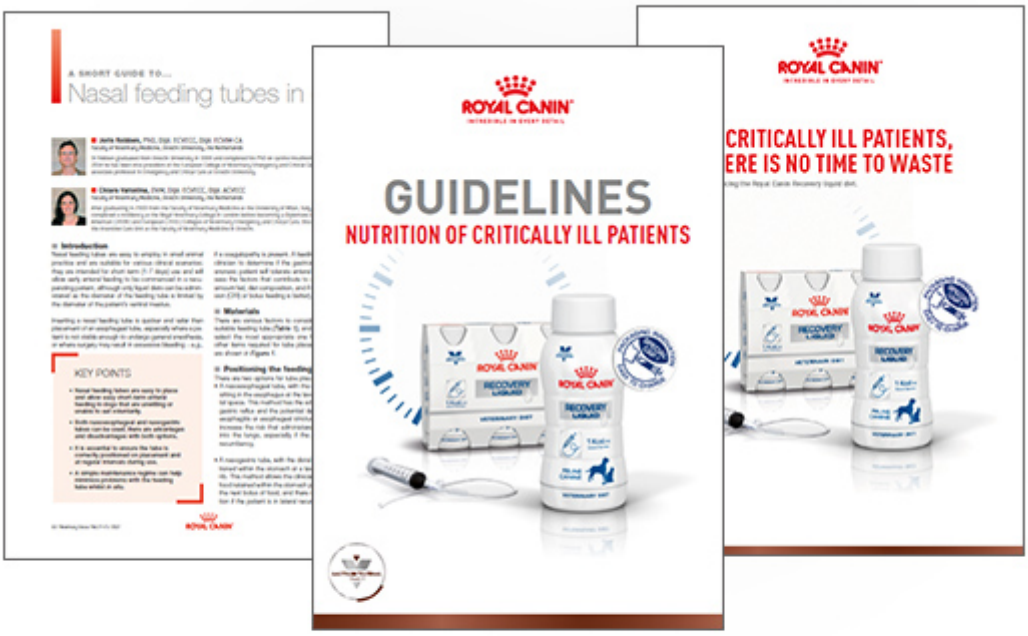
COMPLETE NUTRITION
Complete and balanced liquid diet to support nutritional restoration and convalescence of dogs requiring assisted enteral nutrition.

ANTIOXIDANT COMPLEX
The synergistic antioxidant complex (including high levels of Vit E, Vit C, taurine & lutein) helps neutralise free radicals.

EASY TUBE FEEDING
Liquid formula with adapted viscosity for easy use whatever the tube size.

RESOURCES

- A short guide to Nasal Feeding Tubes
- Guidelines for Nutrition of Critically Ill Patients
- A detailer about Recovery Liquid



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SPECIAL TOPIC WEBINARS:
CRITICAL CARE NUTRITION WITH DR. NICK CAVE

14 APRIL 7PM — Developing Nutrition Plans for Hospitalised Patients

30 Minutes + Q&A

Join Dr. Nick Cave as he provides sound tips and techniques for when and how to intervene with assisted feeding of your hospitalised and critical care patients. We will discuss options for assisted feeding and how to develop best practice nutritional plans for your patients. Additional resources will be shared for ongoing support and confidence in providing care for these fragile cases.

21 APRIL 7PM — Best Practice Management for Hospitalised Patients

30 Minutes + Q&A

A second webinar focusing on the nursing and care of patients to follow through on the nutritional plans developed in the first webinar. Understanding the nursing care required for patients getting assisted feeding, as well as ongoing monitoring is just as important as the plan itself: “A goal without a plan is just a wish!”.

Click here to register

Click here to register

A CAREFUL NUTRITION PLAN IS VITAL

in hospitalised cats and dogs to speed up recovery and increase the survival rate.

COMPLETE NUTRITION
Highly digestible formulas dedicated to the nutritional assistance of cats and dogs.

OPTIMAL ENERGY
Precisely formulated liquid diet providing complete nutrition for critical care patients.

EASY TO USE
Liquid formulas specially designed for easy tube feeding, even for the smallest enteral tubes.

PACKAGING INNOVATION
A cap specially designed to fill syringes directly from the bottle.

73%
OF DOGS SUFFER FROM AN ENERGY DEFICIT DURING HOSPITALISATION

Hospitalisation is often a cause of anorexia.

Hospitalised cats are particularly sensitive to stress and they can develop an aversion to the food they are given during their stay in intensive care.

3 DAYS of anorexia is enough to produce severe metabolic changes and immune malfunction.

During hospitalisation, lack of proper nutrition will worsen the nutritional and metabolic state of patients. Therefore, it will be more difficult for them to recover.

CHOOSING THE APPROPRIATE DIET

Recovery Liquid for optimal energy and high protein to support enteral feeding in even the smallest of tube diameters.

Recovery Ultra Soft Mousse for bigger feeding tubes (≥10Fr) to allow for larger calorie intake with lower fluid volumes, and highly palatable for encouraging spontaneous consumption.

Product Pages

Looking for opportunities to upskill on placing feeding tubes?

Both Practical CPD and Veterinary Training Centre will be offering Gastrointestinal surgery courses this year. Both will cover the placement of all feeding tubes to support patient care and recovery. Check out their websites for more information on the courses and dates on offer.

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Pet Health Nutrition Team

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Email consumercare.anz@royalcanin.com

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