UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL SCIENCES & AGRIBUSINESS
DISCIPLINE OF DIETETICS & HUMAN NUTRITION

EXAMINATION: NOVEMBER 2011

SUBJECT, COURSE AND CODE: DIET 360 P2
DIET 3: DIET THERAPY - SURGICAL

DURATION : 3 HOURS **TOTAL MARKS : 100**

External Examiner : Mrs. A Raffner-Basson
Internal Examiner : Ms Chara Biggs

NOTE: THIS PAPER CONSISTS OF 9 PAGES
AND A 2 PAGE APPENDIX AND A 22 PAGE FORMULA HANDOUT
PLEASE CHECK THAT YOU HAVE ALL OF THEM

DO TWO (2) OUT OF THREE (3) QUESTIONS

QUESTION 1.1

Mr Pantecnikon was admitted to the Intensive Care Unit (ICU) on Friday at the beginning of a long weekend when you were off duty. He lost control of his truck on the way to Durban and plunged down the side of an embankment sustaining multiple fractures and is still unconscious. In spite of his extensive injuries he is medically stable and his gastrointestinal tract is functional. Although there is no abdominal distention there are also no bowel sounds. No emergency surgery is required. The anaesthetist, who is passionate about early feeding enteral feeding, began feeding on Friday down the nasogastric drainage tube as the gastric residuals were 100 ml per day. Mr Pantecnikon was given continuously 2 litres of a semi elemental feed per day which contained 6.4 kJ/ml. To save costs the feed was mixed from powder in the ICU. He was started on metoclopramide (Maxilon). To his surprise Mr Pantecnikon aspirated and his gastric residuals increased to 800 ml per day.

1.1.1 Is the gastric residual volume taken into consideration when determining whether to begin gastric feeding? Discuss briefly. (2)

1.1.2 Are there things that you could suggest/implement <u>in this case</u> which would have reduced the risk of aspiration? Elaborate looking at all possible options. (3)

1.1.3 In hindsight would you have fed this patient in the absence of bowel sounds and with a gastric residual volume of 100 ml? Defend your answer in detail. (4)

QUESTION 1.1 CONINTUED

1.1.4 The nursing staff would have preferred to use parenteral nutrition as, in their experience, patients on enteral nutrition get diarrhoea in spite of always being fed lactose free feeds continuously rather than bolus. In their mind there are no advantages to enteral feeding especially when a patient aspirates. Caught on the spot you need to market the benefits (if any) of enteral feeding. Briefly list what you would say. (6x½=3)

1.1.5 Clearly an in service lecture for the nursing staff in this ICU is required on the causes and prevention of diarrhoea when enterally feeding. Outline your lecture below. (10)

QUESTION 1.2

Mr Herbal (black African male, 30 years old) has been admitted into the ICU in stage III liver encephalopathy. He took some herbal preparations to increase his sexual potency with disastrous results. His blood results on admission are included below. His family tell you that his weight has been stable at 70 kg for years. He is 1.72 m tall. His TST is 15 mm and MUAC is 288 mm. As yet he is not ascitic but does have moderate oedema and jaundice. His urine output is normal.

Blood tests	Results
Sodium (mmol/l)	120
Potassium (mmol/l)	3.7
Chloride(mmol/l)	98
Bicarbonate (mmol/l)	21
Urea (mmol/l)	13.5
Creatinine (mmol/l)	230
ALT (U/l)	4146
GGT (U/l)	2054
AST (U/l)	262
ALT (U/l)	123
LDH (U/l)	2162
Total bilirubin (umol/l)	821
Conjugated bilirubin (umol/l)	687
Albumin (g/l)	25
Ammonia (mmol/l)	86

1.2.1 Using anthropometry assess his nutritional status. (6)

QUESTION 1.2 CONINTUED

1.2.2. Interpret his blood results focussing on the abnormal results and relating them to his symptoms. Explain the reason for determining the conjugated bilirubin levels. (7)

1.2.3. Based on his blood results the medical team has decided to commence daily haemodialysis. Taking all his medical problems into consideration calculate an energy and macronutrient prescription. From a liver point of view the medical team are very confident that he is not protein sensitive. (6)

1.2.4. Due to his lowered state of consciousness a nasogastric feeding tube has been placed. Looking at the content of each feed below motivate which is the one that you think is the most appropriate. (4)

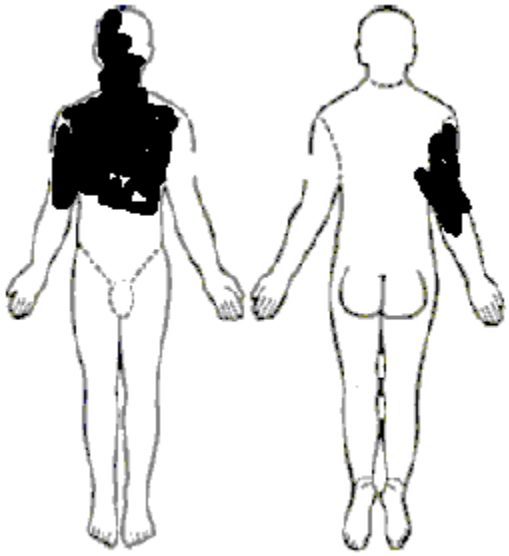
	Feed 1	**Feed 2**	**Feed 3**	**Feed 4**
Protein (g)	80	90	76	60
Energy (kJ)	9500	10 100	9600	10 200
Sodium (mg)	4000	2000	2000	3000
Glutamine	No	Yes	No	Yes
BCAA	No	Yes	Yes	No
Arginine	No	Yes	No	No

1.2.5 Is it possible that his ammonia levels have affected his level of consciousness? Elaborate. (5)

[50]

QUESTION 2

Miss Graft (28 years old) was rushed into your burns unit with a mixture of partial and full thickness burns. She was with a University research group studying the food and fluid intakes of rural forestry workers when a fire had swept through the area. She has been burnt on the upper half of her chest, the whole upper part (back and front) of her right arm and most of her face (see diagram). Immediately after admission a nasogastric tube was inserted and nasogastric drainage commenced. An antacid was put down the tube and the wounds were buttered with Betadine and then banadaged. She has cant sit up in bed as yet. Her parents informed you that she weighs 58 kg and is 1.68 m tall.



2.1.1 Estimate the percentage body surface area burnt showing your calculations. (1)

2.1.2 Calculate her energy and macronutrient needs. (8)

2.1.3 The next day, the nasogastric drainage tube has been removed and she is going to theatre for debridement and skin grafting. In theatre the doctors want to place either a gastrostomy or jejunostomy tube for feeding. Which would you motivate for? Explain. (2)

QUESTION 2.1 CONTINUED

2.1.4 In a patient such as this one (and in other hypermetabolic patients) how soon should enteral feeding begin after admission? Elaborate as to the benefits in both burns and hypermetabolism. (10X½=5)

2.1.5 Her biochemical results on Day 3 show an albumin of 18 g/l and a haemoglobin of 13 g/dl. When the results were repeated on Day 6 the albumin was 19 g/l and the haemoglobin was 8 g/dl. Are these results what you would have expected and can they influence the success of the skin grafts? (5)

2.1.6 Is it possible to nutritionally access her progress? (2)

2.1.7 A news burns enteral feed is on the market which you have been asked an opinion of. The feed is high in antioxidants as the manufacturer claims that there is an increased need especially for vitamin C. Would you agree with this? Discuss. (3)

QUESTION 2.2

A doctor from a hospital in your district has phoned and asked for some advice. She has a patient who is pregnant and whose intractable vomiting has necessitated the need for total parenteral nutrition. She was stable when the regime was initiated 2 days ago. See changes in results below.

Results	**2 days ago**	**Currently**
Blood sugar (mmol/l)	6 mmol/l	15 mmol/l
Respiratory quotient	0.7	1
Breathing (breaths per minute)	15	40
Urine output (ml per day)	1500	3000

2.2.1 The doctor wants to know whether these changes are related to feeding as this is the only thing in her management that has changed. If they are related to feeding what must the doctor do as the parenteral nutrition is the focus of her treatment. (7)

QUESTION 2.2 CONTINUED

2.2.2 Grateful for your advice the doctor wants to know whether he should use a standised product such as Clinomel in a patient like this - as he understands it, the product is shelf stable and just needs mixing to break the compartments before being hung up. It seems very convenient to have everything all in one. Comment on when you would use it in general and whether you would use it for this patient. (3)

2.2.3 The same doctor has a 20 year old patient with a Glascow Coma Scale of 6/15 in the ICU for whom he would like your expert advice. This patient has both a central line and a jejunostomy tube in situ. The doctor, who understands the benefits of feeding into the gastrointestinal tract, is unsure whether to begin parenteral or enteral nutrition. Her blood pressure is 65/60, her heart beat is 135 beats per minute and she is being medicated with adrenalin. What route of feeding would you recommend? Justify. (5)

2.2.4 Probiotics has been the buzz word at all recent conferences that this doctor has been too – should he be using them in the adult or children's ICU? Elaborate on how the ICU environment potentially affects the colonic bacteria, whether probiotics should be routinely used and if so which ones? (9)

[50]

QUESTION 3

3.1 The determination of the energy needs of critically ill adults and children in the ICU is complex and controversial in the absence of a metabolic cart to determine direct calorimetry. The flow response causes hypermetabolism – other factors impact on E requirements and need to be factored in. Discuss the factors that increase and decrease energy requirements in patients in the ICU. (7)

3.2 Many patients in the ICU are either over or underfeed. Discuss the reasons. (7)

3.3 You are considered to be the renal specialist dietician in the hospital and have been called into the renal unit. Only three patients so far (aren't you lucky) have been referred to you today for your excellent input. The referral notes follow on the next page.

QUESTION 3.3 CONTINUED

Note from doctor for Patient one

Dear Dietician

Mrs Sad was diagnosed today with renal failure and is about to begin conservative management. The following are her blood results - urea = 10 mmol/l, creatinine 300, potassium 4.5 mmol/l, sodium 138 mmol/l, bicarbonate 19 mmol/l. Please put her on a 65g protein and 8000 kJ diet. She weighs 60kg and is 1.60m and is in Medical Ward 1. Thanks.

Note from doctor for Patient two

Dear Nutrition Lady

I am currently treating a young athlete who has not been feeling well lately after running the comrades - he appears to be in renal failure as a result of the race as you can see from his blood results (urea 10 mmol/l, creatinine 120 mmol/l) - please contact me (0332606450) to discuss the diet that he needs to follow as he is in training for the South African championships. Anticipating your call.

QUESTION

Note from doctor for Patient three

Dear Diet Person

Please could you consult with us re this patient in the Intensive Care Unit. They were involved in a motor vehicle accident last week and the blood urea levels have increased from 4 mmol/l to 13 mmol/l and seem to be steadily increasing. The creatine levels have increased from 80 to 120 mmol/l. This is of concern as the patients albumin levels are 20 and we feel that he is malnourished and needs a high protein diet.

3.3.1 You go to Medical Ward 1 to deal with Mrs Sad (patient number 1). Are you going to implement the doctor's prescription or do you need to discuss this with the doctor? Elaborate. (3)

3.3.2 On returning to your office you phone the doctor referring patient number two to discuss the runners blood results. What are your conclusions re the renal status of this patient? Give your reasons. (2)

3.3.3 After dealing with that you rush off to the Intensive Care Unit hoping to catch the team during their tea break. Comment in detail on what you are going to recommend for this patient taking all the results into consideration. Show all your reasoning. (4)

3.3.4 The pharmacist has just dropped in - it is time to do the motivations for the State Contracts - she feels that in general renal patients need to be given supplements of water soluble vitamins. However to get these onto the contract she needs to motivate for these with good reasons. Give her the reasons! (4by ½ =2)

QUESTION 3.4

Using the exchanges below, plan a diet for a black African male (if you are Indian or white) or Indian male (if you are black). FILL THIS IN ON THE APPENDIX PLEASE. Make the most suitable choices please taking into account all you have been told about him. He is suffering from end stage chronic liver cirrhosis with cholestasis (no jaundice) as a consequence of too much alcohol. Surprisingly he is still employed in a good job. On assessment you discover that he is very ascitic and suffers from muscle cramps (which annoy him immensely) and he keeps falling over at night as he says he sometimes does not see things in his way. He says that his food tastes funny and he gets full very quickly. His blood sugar results are usually between 2.1 and 2.9 mmol/l. (25)

Type of exchange	**Number**
Meat (any type)	3
Milk	2
Starch (any type)	8
Fruit	2
Vegetables	2
Sugar	0
Fat	6

[50]

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PAGE 1

STUDENT NUMBER:____

QUESTON 1.3

Exchange	Number	Code	Example

QUESTON 1.3 CONTINUED

Exchange	Number	Code	Example

MODEL ANSWER

QUESTION 1

Mr Pantecnikon was admitted to the Intensive Care Unit (ICU) on Friday at the beginning of a long weekend when you were off duty. He lost control of his truck on the way to Durban and plunged down the side of an embankment sustaining multiple fractures and is still unconscious. In spite of his extensive injuries he is medically stable and his gastrointestinal tract is functional. Although there is no abdominal distention there are also no bowel sounds. No emergency surgery is required. The anaesthetist, who is passionate about early feeding enteral feeding, began feeding on Friday down the nasogastric drainage tube as the gastric residuals were 100 ml per day. He was given continuously 2 litres of a semi elemental feed per day which contained 6.4 kJ/ml. To save costs the feed is mixed from powder in the ICU. He was started on metoclopramide (maxilon). To his surprise Mr Pantecnikon aspirated and his gastric residuals increased to 800 ml per day.

1.1.1 Is the gastric residual volume taken into consideration when determining whether to begin gastric feeding? Discuss briefly. (2)

Chara Comments: Many answered this in relation to this patient – the question was asking in general do you take gastric residual volume into account and why.

High gastric residuals means that the stomach is not draining and there is a large volume of fluid in the stomach which cant go down and therefore has to come up (vomit) ✔ which increases the risk especially if unconscious of the vomit running back down into the lungs ie aspiration. ✔ The amount of gastric residuals is not always associated with the incidence of aspiration however.

1.1.2 Are there things that you could suggest/implement <u>in this case</u> which would have reduced the risk of aspiration? Elaborate looking at all possible options. (3)

This was specific to the patient ie what could you have altered for this patient so no marks were given for general comments here. You needed to look at what was being done wrong on this patient and correct this first

Nurse at 45 degrees as there is no information given as to the angle of nursing and as told in class this is a leading cause of aspiration. ✔

Could have checked that the tube was still in place - no mark as this would not have increased the gastric residuals which was the problem and also the ng drain is a huge thick tube which is very unlikely to have moved.

Change the rate of administration ie started on 20 ml per hour instead of 80 ml per hour and therefore reduce the volume. ✔

Feed is high in energy ie change feed ✔

Accepted food poisoning as powdered feed

Change to a fine bore tube ie not the ng drain as this reduces reflux and/or change the tube placement eg jejunal ✔ not that I would have actually done this as they were testing for feed tolerance.

1.1.3 In hindsight would you have fed this patient in the absence of bowel sounds and with a gastric residual volume of 100 ml? Defend your answer in detail. (4)

Absolutely the GRV need to be below 200 ml before feeding commences so appropriate to fed at 100 ml. ✔ Can feed in the absence of bowel sounds and flatus. Bowel sounds represent contractility and "not necessarily mucosal integrity, barrier function or absorptive capacity" ✔EN stimulates peristalsis - safe to feed through mild to moderate ileus if haemodynamically stable which this patient was ✔- ileus may be encouraged if NPO May be able to feed into the small intestine ie jejunostomy or use prokinetic medication (Cisapride, erythromycin, metoclopramide) plus had started metoclopramide ✔

1.1.4 The nursing staff would have preferred to use parenteral nutrition as, in their experience, patients on enteral nutrition get diarrhoea in spite of always being fed lactose free feeds continuously rather than bolus. In their mind there are no advantages to enteral feeding especially when a patient aspirates. Caught on the spot you need to market the benefits (if any) of enteral feeding. Briefly list what you would say. (6x½=3)

This question asks you to state why enteral feeding is safer/more beneficial than parenteral nutrition and is not a general question on the benefits of enteral feeding or early enteral feeding

Using the GIT (EN):

✓ is <u>safer</u> as TPN needs a central venous line (catheter) which can cause many life threatening complications - and the patient should not have aspirated if EN done correctly ✔ ½

✓ maintains <u>GI integrity</u> eg villi height etc therefore making <u>bacterial translocation</u> and thus sepsis less likely (more intact GI) ✔ ½

✓ keeps the intestine and liver/gall bladder functioning ✔ ½
Gall bladder contracts to release bile which prevents gall stones

✓ Prevents liver dysfunction found with TPN ✔ ½

✓ gives a more appropriate plasma insulin response ✔ ½

✓ results in a lower incidence of infections ie appears to be a higher incidence of infections (unrelated to catheter complications) when feeding via TPN
ie suggested that TPN causes immune dysfunction ✔ ½

✓ PN is associated with lower survival, poorer tumour response and more infections in people on chemotherapy or radiotherapy for cancer ✔ ½

Accepted less risk of abscess and earlier recovery in head injury

Accepted less expensive

Accepted that enteral has more immunonutrients.

1.1.5 Clearly an in service lecture for the nursing staff in this ICU is required on the causes and prevention of diarrhoea when enterally feeding. Outline your lecture below. (10)

Oh dear – I repeated endlessly in class that you needed to know the causes of diarrhoea in enteral nutrition therefore I am very very surprised that this question was done so badly as if you had know this it was an easy ten marks….

Diarrhoea	Medications are the most likely	Sorbitol, elixirs. Aminophylline given in sorbitol containing elixir is a major cause. Most antibiotics. Metoclopramide (increase GI motility) ✔
	Large volume given too fast	Initiate feeding at low rate [20ml/hr], gradually increase the rate in 20ml per hour increments as per patient tolerance ✔
	Bolus may be too cold	Warm to body temperature not feeding bolus so no marks as this was mentioned in the lead in to the question ie in spite of giving continuously and lactose free
	Hyperosmolar E dense feed especially if jejunostomy	Isotonic feed continuously using a feeding pump ✔
	Hypoalbuminaemia (oedematous gut/flat villi)	Some what controversial as a cause ✔
	Nutrient malabsorption	Assess for fat and CHO malabsorption ie lactose intolerance - lactose free feed no marks as this was mentioned in the lead in to the question ie in spite of giving continuously and lactose free

	Low residue feed	Give at least l litre of high fibre feed ✔
	Lactose intolerant	Give lactose free feed eg Nutrison, Osmolite, Fresubin, Nutren, no marks as this was mentioned in the lead in to the question ie in spite of giving continuously and lactose free
	Microbial contamination/ unsterile feed	Check preparation procedures of powdered feeds, transport and storage at wards
	Check for *Clostridium difficile* (stool culture)	Check for *Clostridium difficile* (stool culture) ✔
		Use RTH instead of powdered ✔
		Change giving set every 24 hours ✔
		Wash hands before connecting giving set and hanging the feed ✔
	Feed been left up too long	Powdered feeds should not be left up for longer than 8 hours ✔ RTH and RTP not longer than 24 hours
	Results in contamination or coagulation	Perhaps 48 hours in a sterile environment
	MOSF	GIT is an organ therefore may have begun to shut down as part of this syndrome - relevant as this is the ICU ✔

QUESTION 1.2

Mr Herbal (black African male, 30 years old) has been admitted into the ICU in stage III liver encephalopathy. He took some herbal preparations to increase his sexual potency with disastrous results. His blood results on admission are included below. His family tell you that his weight has been stable at 70 kg for years. He is 1.72 m tall. His TST is 15 mm and MUAC is 288 mm. As yet he is not ascitic but does have moderate oedema and jaundice. His urine output is normal.

Blood results	Reading
Sodium (mmol/l)	120
Potassium (mmol/l)	3.7
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LDH (U/l)	2162
Total bilirubin (umol/l)	821
Conjugated bilirubin (umol/l)	687

Albumin (g/l)	25
Ammonia (mmol/l)	86

1.2.1 Using anthropometry assess his nutritional status. (6)

INCLUDE TST, MAC, MAMC CHARTS AND BLOOD INTREPATION CHART and include chart for ascites and oedema

To those who did not correct the BMI to 1 decimal place no marks were given ie 22 or 21 was not given marks as not corrected properly

PLEASE SEE YOUR TUTOR ON HOW TO DO AN ANTHROPOMETRIC NUTRITIONAL ASSESSMENT PLEASE

1.72 * 1.72 = 2.96
Actual body weight is 70 as this is his usual body weight ✔
70/2.96 = 23.7 so BMI is normal so he is the correct weight for his height ✔
TST = 15 mm – on 75th percentile – fat stores are high. ✔
MAC = 288 – on 25th percentile – thin arms ✔
MAMC = 24.25 or there abouts – just above the 5th percentile so has low muscle stores ✔

Basically a good nutritional status with too much fat and too little muscle. ✔

1.2.2. Interpret his blood results focussing on the abnormal results and relating them to his symptoms. Explain the reason for determining the conjugated bilirubin levels. (7)

Please stop wasting time by writing out the normal blood levels. Otherwise this question was reasonably well done.

Low blood sodium possibly from the oedema. ✔
Urea is high in conjunction with creatinine therefore renal failure as well ✔
All the liver enzymes are extremely raised indicating severe liver disturbance ✔
Bilirubin is very high confirming the jaundice ✔
Bilirubin is conjugated in the liver – so high levels mean that the liver has conjugated it but it cant be released via the bile but diffuses back into the blood – so problem is in the liver or in the bile ducts ✔
Albumin is low but the nutritional status according to the anthropometry is reasonable therefore this is probably due to the liver and renal failure as both of these are involved with albumin. ✔
Ammonia is very high ie cause of the HE – the liver can not remove ammonia from the blood and convert it to urea ✔

1.2.3. Based on his blood results the medical team has decided to commence daily haemodialysis. Taking <u>all his medical problems</u> into consideration calculate an energy and macronutrient prescription. From a liver point of view the medical team are very confident that he is not protein sensitive. (6)

The schofield equation was not acceptable. Max oxidative rate is corrected to 1 decimal place therefore 3 instead of 2.5 did not get marks.

Calculations in excel file: Diet 360 Exam 2011 renal and liver calculations

ESPEN recommendations:
Encephalopathy III to IV then:
0.5 to 1.5 g per kg per day aiming for 1.2 g/kg/day as not protein sensitive use 1.2 g per kg per day as it is the same as for dialysis 1.2 g/kg IBW/day

Use actual body weight as ideal ie 70 kg which is fine as the liver is for actual and the renal is for ideal so no dilemma
Therefore
Energy 105 kJ to 146 kJ (25 to 35 kCal) per kg per day (ESPEN) for liver and 150 kJ for renal dialysis so 146 to 150 kJ
Renal Fat 30 to 40% Liver 25 to 40

Dry weight	70		
Height	1.72		
BMI	23.7		
IBW	70		
Protein (g/kg)	1.2		
Protein final	84	✔	
Protein %	14		
Protein energy	1428		
Energy used	150		
Energy	10500	✔	
Non protein E	9072		
G of N	13.44		
NPE	675	✔	
CHO %	55		
CHO in g	339.7	✔	
mg/kg/min	3.4	✔	
Fat %	31	✔	
Fat in g	88.0		
Total % e	100		Must add up to 100%

1.2.4. Due to his lowered state of consciousness a nasogastric feeding tube has been placed. Looking at the content of each feed below motivate which is the one that you think is the most appropriate. (4)

This was marked very liberally – basically marks given for acknowledging to avoid glutamine and arginine and include BCCA and use a low sodium feed.

	Feed 1	Feed 2	Feed 3	Feed 4
Protein (g)	80	90	76	60
Energy (kJ)	9500	10 100	9600	10 200
Sodium (mg)	4000	2000	2000	3000
Glutamine	No	Yes	No	Yes
BCAA	No	Yes	Yes	No
Arginine	No	Yes	No	No

Exclude feeds containing glutamine and arginine ie Feed 2 and 4. ✔
Leaves feed 1 and feed 3 – Feed 3 appropriate because of low sodium ✔ and containing bCCA ✔ in spite of the protein and energy being slightly less than what is wanted. ✔

1.2.5 Is it possible that his ammonia levels have affected his level of consciousness? Elaborate. (5)

This was straight forward learning – liver notes page 19

Suggested HE is caused by the toxic effects of ammonia but not always a relationship between blood ammonia levels and the depth of coma. ✔ If ammonia compounds are given experimentally HE results so there must be some relationship (Bianchi et al, 1993 citing Van Caulert et al, 1932). ✔ Suggested that the brain might become more sensitive to ammonia in liver failure and there is also a change in the permeability of the blood brain barrier (BBB). ✔ As the liver fails to detoxify ammonia the brain increases its detoxification of ammonia by converting it into glutamine and glutamate (E dependent process) - in turn glutamine flux out the brain increases encouraging the influx of aromatic amino acids (AAA) (Gerber & Schomerus, 2000). Perhaps this causes the HE but the increased production of neurotransmitters. ✔High ammonia levels cause swelling of the astroglial cells which is a classic occurrence in HE. ✔

QUESTION 2

Miss Graft (28 years old) was rushed into your burns unit with a mixture of partial and full thickness burns. She was with a University research group studying the food and fluid intakes of rural forestry workers when a fire had swept through the area. She has been burnt on the upper half of her chest, the whole upper part (back and front) of her right arm and most of her face (see diagram). Immediately after admission a nasogastric tube was inserted and nasogastric drainage commenced. An antacid was put down the tube and the wounds were buttered with Betadine and then banadaged. She has cant sit up in bed as yet. Her parents informed you that she weighs 58 kg and is 1.68 m tall.

2.1.2 Estimate the percentage body surface area burnt showing your calculations. (1)

Was quite liberal in what I accepted ie between 15 to 20% but was not well answered.

Adult so use the rule of nines ie 9% for upper front, 4.5% for complete upper arm and about 2 to 3% for face so approximately 15.5 to 16.5 %. ✔

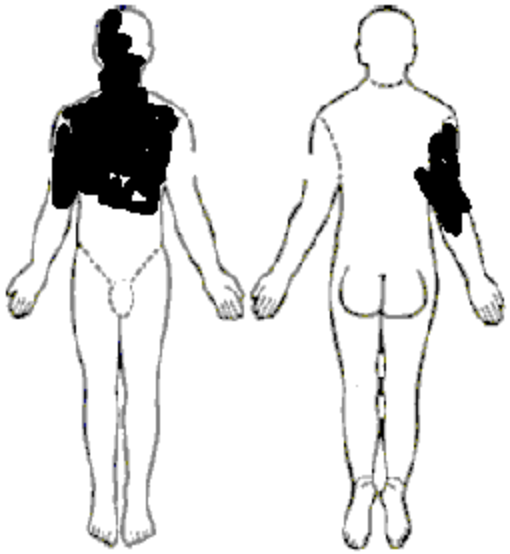
2.1.2 Calculate her energy and macronutrient needs. (8)

Calculations in excel file: Diet 360 Exam 2011 renal and liver calculations

Protein is 1.5 g per kg actual body weight and the schofield is done on actual body weight so no need to convert to ideal body weight in this case. Stress factor is 10 to 28%. The CHO and FAT energy is not NPE energy – it is calculated from total energy.

Most of you did this very well.

Weight	58
BMR	✔ 6446
Activity factor	10



Activity Energy	✔645
Stress factor	10
Stress energy	✔645
Total energy	7736
Protein (g)	1.5
Protein total	✔87
Protein percent	19.1
protein energy	1479
NPE	6257
NPE to N ratio	✔449
CHO %	55
CHO g	✔250
mg/kg/min	✔3
fat %	✔25
Fat g	51
Total %	99.1

2.1.3 The next day, the nasogastric drainage tube has been removed and she is going to theatre for debridement and skin grafting. In theatre the doctors want to place either a gastrostomy or jejunostomy tube for feeding. Which would you motivate for? Explain.(2)

Burns notes pg 11

jejunostomy tube ✔because high incidence of gastric ileus in first 2 to 3 days post burn (Jeng & Palmieri, 2001) so often tubes are placed in the duodenum or jejunum. ✔ and also gastrostomy placement too close to burns site. ✔

2.1.3 In a patient such as this one (and in other hypermetabolic patients) how soon should enteral feeding begin after admission? Elaborate as to the benefits in both burns and hypermetabolism. (10X½=5)

This was straight forward leaning – the emphasis here was on early enteral nutrition – hypermetabolism notes pg 12

It is important to feed early (within 24 hours to 48 hours) ✔½with enteral nutrition to:

- ✓ maintain gut integrity ✔½
- ✓ control the stress and immune system response ✔½
- ✓ diminish disease severity ✔½
- ✓ prevent stress ulcers particularly in burns ✔½
- ✓ decrease incidence of infections and sepsis ✔½

✓ lower incidence of abdominal abscess in trauma and perhaps "earlier return of cognitive function in head injury patients" ✔½
✓ improved wound healing ✔½
✓ decrease protein catabolism and improve N balance ✔½
✓ reduced hospital stay ✔½
✓ reduces weight loss in burns ✔½

2.1.5 Her biochemical results on Day 3 show an albumin of 18 g/l and a haemoglobin of 13 g/dl. When the results were repeated on Day 6 the albumin was 19 g/l and the haemoglobin was 8 g/dl. Are these results what you would have expected and can they influence the success of the skin grafts? (5)

INCLUDE LAB RESULTS TABLE

Burns notes – pg 23

Yes as the albumin levels will be low because alb is lost via the wounds exudate ✔plus very hypermetabolic ✔ and would expect the haemoglobin to decrease because of blood loss from wounds and curlings ulcer (although in theory because of the antacid there should be no curlings ulcer) ✔ , rbc bursting from heat and other rbcs being damaged and bursting later. ✔ Low alb levels (below 30 g/l) lead to skin graft failure ✔

2.1.6 Is it possible to nutritionally access her progress? Need to use a little initiative here. (2)

Burns notes monitoring pg 24

No body weight as cant sit up but even so there is the weight of the bandages so could weigh when bandages are being changed. ✔

Cant do skinfolds on the left as you want progressive readings not a single reading ie comparing the first reading to the next reading and not against standards and this can be done lying down. ✔

Biochem is not useful because alb etc is affected by burns and hypermetabolism. ✔

2.1.7 A news burns enteral feed is on the market which you have been asked an opinion of. The feed is high in antioxidants as the manufacturer claims that there is an increased need especially for vitamin C. Would you agree with this? Discuss. (3)

Straight out the burns notes – pg 6 to 7

The first 5 days after "major burns (>30%) is associated with enhanced ROS production ✔ evidenced by depressed levels of trace elements (Se) and antioxidant vitamins (E, C, beta-carotene, lycopene) and increased products of lipid peroxidation" (Bertin-Maghit *et al*, 2000 - 20 people with major burns) ✔ Very few studies in humans

Some very limited evidence in animals and humans showing that vitamin C supplementation post burn reduces the amount of fluid lost as shown by the requirement for 24 hour fluid resusitation volume (Tanake *et al*, 1997, Tanuke *et al*, 2000). ✔

QUESTION 2.2

A doctor from a hospital in your district has phoned and asked for some advice. She has a patient who is pregnant and whose intractable vomiting has necessitated the need for total parenteral nutrition. She was stable when the regime was initiated 2 days ago. See changes in results below.

Results	**2 days ago**	**Currently**
Blood sugar (mmol/l)	6 mmol/l	15 mmol/l
Respiratory quotient	0.7	1
Breathing (breaths per minute)	15	40
Urine output (ml per day)	1500	3000

2.2.1 The doctor wants to know whether these changes are related to feeding as this is the only thing in her management that has changed. If they are related to feeding what must the doctor do as the parenteral nutrition is the focus of her treatment. (7)

Yes the new issues are related. The rise in blood sugar levels (hyperglycaemia) ✔ plus the rise in respiratory component✔are as a result of feeding a too concentrated CHO solution too rapidly ✔ which in turn has resulted in the increased urine production in an attempt to eliminate the excess glucose ✔

The increased RQ has resulted in hypercapnia (carbon dioxide retention) and the increased breathing rate.✔ An excess glucose converted to fat releases carbon dioxide which needs to be excreted via the lung therefore needs to breathe more ✔

Needs to adjust CHO content, rate of delivery and measure blood glucose levels every 6 hours. ✔

2.2.2 Grateful for your advice the doctor wants to know whether he should use a standised product such as Clinomel in a patient like this - as he understands it, the product is shelf stable and just needs mixing to break the compartments before being hung up. It seems very convenient to have everything all in one. Comment on when you would use it in general and whether you would use it for this patient. (3)

Convenient and shelf stable therefore can always have in stock ie over weekends when other TPN premixes are not available or when TPN is needed unexpectedly for a patient before the order arrives and for rural hospitals when getting the other premixes is not always possible - ✔ however it is not nutritionally complete ie needs to have vitamins and minerals added so can not

be used as such ✔ and therefore is not actually cheaper - not suitable for this patients as she would need extra vitamins and minerals due to the pregnancy as well as energy and protein ie needs more than a standardized feed. ✔ Could also argue that she needs a lower fat and higher CHO feed than a standardized patient because of the RQ ✔

2.2.3 The same doctor has a 20 year old patient with a Glascow Coma Scale of 6/15 in the ICU for whom he would like your expert advice. This patient has both a central line and a jejunostomy tube in situ. The doctor, who understands the benefits of feeding into the gastrointestinal tract, is unsure whether to begin parenteral or enteral nutrition. Her blood pressure is 65/60, her heart beat is 135 beats per minute and she is being medicated with adrenalin. What route of feeding would you recommend? Justify. (5)

Parenteral ✔ because of the potential for small bowel necrosis ✔ do not begin jejunostomy feeding if tachycardia of greater than 125 beats per minute ✔ getting inotropic drugs eg adrenalin - causes vasoconstriction of blood away from the GIT ✔ low flow state secondary to hypovolumemia (enteral feeding needs increased splanchic blood flow and because of low flow these needs can't be met) ie an issue because of low blood pressure ✔

2.2.4 Probiotics has been the buzz word at all recent conferences that this doctor has been too – should he be using them in the adult or children's ICU? Elaborate on how the ICU environment potentially affects the colonic bacteria, whether probiotics should be routinely used and if so which ones? (9)

Many factors impact on bacterial populations including:

use of broad spectrum antibiotics ✔

treatment for stress gastropathy ✔

vasoactive pressor agents ✔

changes in GIT motility ✔

volume and composition of nutrients being fed ✔

Seem to improve outcome (reducing infection) in transplantation, major abdominal surgery and severe trauma.

Unknown whether to use in general in the ICU as there is a lack of "consistent outcome effect" ✔

Different species have different properties/effects so don't know what to use ✔
Concern is that probiotics may cause septicemia by bacterial translocation ✔

Children

Not routinely used in the PICU as insufficient research re their benefits and safety. ✔

Recent study by Srinivasan et al (2005) demonstrated that their use appears safe in the PICU - this study excluded HIV, BMT and others with neutropenia.

Concern is that probiotics may cause septicemia by bacterial translocation

QUESTION 3

3.1 The determination of the energy needs of critically ill adults and children in the ICU is complex and controversial in the absence of a metabolic cart to determine direct calorimetry. The flow response causes hypermetabolism – other factors impact on E requirements and need to be factored in. Discuss the factors that increase and decrease energy requirements in patients in the ICU. (7)

This was a straight forward learning question out of your notes (pg 14 of hypermetabolism) – you were already told that the flow response causes hypermetabolism and therefore impacts on energy needs so marks were not given for this and stuff related to hypermetabolism such as burns – most of you did not learn this section therefore did not do very well.

Factors increasing E requirements include:

- Pain, fear and anxiety ✔
- Restlessness ✔
- Pyrexia (every 1^0 C raises EE by 10%) ✔
- Vasoactive drugs necessary for haemodynamic resuscitation elevates both metabolism and energy needs
- Inotrophic drugs eg dopamine (epinephrine) increases catabolism by reducing concentrations of anabolic hormones

Factors decreasing energy requirements include:

- Muscle relaxants non significantly decrease E ✔
- Sedation ✔
- Room temperature adjusted to patients temperature reduces insensible losses ✔
- Ventilation with humidified air reduces breathing cost plus heat loss ✔

3.2 Many patients in the ICU are either over or underfeed. Discuss the reasons. (7)

This question was also straight out of your notes pg 16 of hypermetabolism.

Reasons for inadequate intake include:

- elective procedures ✔
- management of airways ✔
- GI intolerance ✔

Risks for overfeeding included:

- number of routes used ie those being fed either with EN and PN or oral and EN ✔
- tracheostomy ✔
- those who spent longer than 16 days in the ICU ✔
- inappropriate use of nutrient dense formulas ✔

3.3 You are considered to be the renal specialist dietician in the hospital and have been called into the renal unit. Only three patients so far (aren't you lucky) have been referred to you today for your excellent input. The referral notes follow below.

Note from doctor for Patient one

Dear Dietician

Mrs Sad was diagnosed today with renal failure and is about to begin conservative management. The following are her blood results - urea = 10 mmol/l, creatinine 300, potassium 4.5 mmol/l, sodium 138 mmol/l, bicarbonate 19 mmol/l. Please put her on a 65g protein and 8000 kJ diet. She weighs 60kg and is 1.60m and is in Medical Ward 1. Thanks.

Note from doctor for Patient two

Dear Nutrition Lady

I am currently treating a young athlete who has not been feeling well lately after running the comrades - he appears to be in renal failure as a result of the race as you can see from his blood results (urea 10 mmol/l, creatinine 120 mmol/l) - please contact me (0332606450) to discuss the diet that he needs to follow as he is in training for the South African championships. Anticipating your call.

Note from doctor for Patient three

Dear Diet Person

Please could you consult with us re this patient in the Intensive Care Unit. They were involved in a motor vehicle accident last week and the blood urea levels have increased from 4 mmol/l to 13 mmol/l and seem to be steadily increasing. The creatine levels have increased from 80 to 120 mmol/l. This is of concern as the patients albumin levels are 20 and we feel that he is malnourished and needs a high protein diet.

3.3.1 You go to Medical Ward 1 to deal with Mrs Sad (patient number 1). Are you going to implement the doctor's prescription or do you need to discuss this with the doctor? Elaborate.. (3)

This was well done – about 5 of you got no marks for the BMI calculation as it was not rounded to 1 decimal place.

Will not implement the prescription as she needs 0.6 to 0.8 g per kg ie 36 to 48 g of protein ✔ as her BMI is 60/2.56 = 23.4 so will use this as her ideal weight ✔ and she needs 150 kJ by 60 = 9000 kJ not 8000 kJ ✔

3.2 On returning to your office you phone the doctor referring patient number two to discuss the runners blood results. What are your conclusions re the renal status of this patient? Give your reasons. (2)

Not well done – In notes (pg 2 under BUN)

He is not in renal failure but is still dehydrated ✔ as a result of running the comrades because the creatinine levels are not raised although his urea levels are high.✔

3.3 After dealing with that you rush off to the Intensive Care Unit hoping to catch the team during their tea break. Comment in detail on what you are going to recommend for this patient taking <u>all the results</u> into consideration. Show all your reasoning. (4)

<u>This was very poorly done – he is not in renal failure as the creatinine is still within the normal limits. In notes (pg 2 under BUN)</u>

They are not in renal failure because although the urea is rising rapidly and the creatine has risen it is still within the normal range ✔ - the ureas are up because of dehydration or excessive catabolism ✔ or catabolic drugs or internal bleeding. ✔ Therefore there is not need for a protein restriction - an albumin of 20 does not necc reflect malnutrition as this patient is catabolic and in this case the albumin levels reflect stress. ✔

3.5 The pharmacist has just dropped in - it is time to do the motivations for the State Contracts - she feels that in general renal patients need to be given supplements of water soluble vitamins. However to get these onto the contract she needs to motivate for these with good reasons. Give her the reasons! (4by ½ =2)

This question was in general ie not specific to dialysis etc – answer was on pg 28 of renal notes

Vitamin deficiency may be a problem because of:

- a decreased intake of milk (phosphorous) and fruit and vegetables (potassium) ✔½
- uraemia causes decreased activity of some vitamins ✔½
- possible drug nutrient interactions ✔½
- anorexia, nausea, vomiting ✔½

3.6 Using the exchanges below, plan a diet for a black African male (if you are Indian or white) or Indian male (if you are black). FILL THIS IN ON THE APPENDIX PLEASE. Make the most suitable choices please taking into account all you have been told about him. He is suffering from end stage chronic liver cirrhosis with cholestasis (no jaundice) as a consequence of too much alcohol. Surprisingly he is still employed in a good job. On assessment you discover that he is very ascitic and suffers from muscle cramps (which annoy him immensely) and he keeps falling over at night as he says he sometimes does not see things in his way. He says that his food tastes funny and he gets full very quickly. His blood sugar results are usually between 2.1 and 2.9 mmol/l.
(25)

Type of exchange	**Number**
Meat (any type)	3
Milk	2
Starch (any type)	8
Fruit	2
Vegetables	2
Sugar	0
Fat	6

You should have recognised the "BigWig" Question from the practicals

What is being marked here is that there needs to be 1 meat at B, L, S ie spread the protein out - the meat choices need to be low salt (very important), there needs to be 6

snacks to prevent hypoglycaemia (so 1 to 2 starches at each snack) – The foods need to be culturally acceptable – they should also choose high energy options as the person has very little appetite and is very malnourished. Would accept a push for food rich in vitamin A as he is clearly night blind – but dont really expect them to know good sources of zinc and magnesium

Marking Guide question 3.4 Exam Diet 360 – November 2011

Student Number:

Have they planned all the exchanges?

Type of exchange	Number
Meat (any type)	3
Milk	2
Starch (any type)	8
Fruit	2
Vegetables	2
Sugar	0
Fat	6

Is the food allocated to each exchange correct?

Is there 1 meat and B, L, S and how is the milk distributed ie the high quality protein needs to be spread out fairly evenly across the day?

Are the meat choices low salt (ascites)?

Have they chosen high energy options (reduced appetite)?

Are there 6 snacks to prevent hypoglycaemia with 1 to 2 starches at each snack?

Are foods culturally acceptable?

Have they planned some foods rich in Vitamin A/betacarotene?