Last Name _Maheri_____ First Name_Maryam_____

Diabetes Mellitus

DUE Wednesday 12/17/14 (by 4:00 pm in Meyer 3241)

Pt. Summary: Mr. B is a 48-yo Native American man admitted from the ER to the endocrinology service.

Hx:

Onset of disease: pt transported to ER when found ill in his house by his wife. During ER assessment, pt was noted to have a S. glucose of 610 mg/dL. Mr. B was diagnosed with T2DM one year ago and has been on metformin since that dx. He does not take the medication regularly as he felt it really wasn't necessary.

Medical hx: product of nl pregnancy and delivery; NKA

Surgical hx: none

Tobacco use: Smoked 1 ppd x 10 years (no longer smokes)

Alcohol use: occasional

FH: Father – MI; mother – ovarian CA, T2DM

Demographics:

Social hx: married, 3 children, works driving trucks

Years education: 12

Language: English & O'odham

Ethnicity: Pima Native American

Religious affiliation: Catholic

Admitting Hx/PE:

Chief complaint: Wife states that Mr. B had not been feeling well the previous day. He thought he was fighting off a virus. When he didn't answer the phone this morning, his wife went to check on him and found him groggy and almost unconscious at home. She called 911 and the pt was transported to University Hospital.

General appearance: Slim male, in obvious distress.

PE:

General:	WDWN 48 yo male; 5'10" 160#
Vitals:	T 99.6°F; P 100; RR 24; BP 100/78 mm Hg
Chest/Lungs:	Respirations are rapid – clear to percussion and auscultation
Heart:	Tachycardia
HEENT:	Head: WNL, Eyes: PERRLA, Ears: clear, Nose: clear, Throat: dry mucous membranes w/o exudates or lesions
Abdomen:	Active bowel sounds x4; tender, non-distended
Extremities:	+4 ROM; DTR 2+
Neurologic:	Lethargic but able to arouse. Follows commands appropriately. Glasgow Coma Scale: 13.
Skin:	Smooth, warm, dry, no edema
Peripheral Vascular:	Pulse 4+ bilaterally, warm, no edema
Genitalia:	Deferred

Admission Orders:

1. Regular insulin 1 unit/mL in NS 40mEq KCl/liter @ 300 mL/hr. Begin infusion at 0.1 unit/kg/hr = 3.7 units/hr and increase to 5 units/hr. Flush new IV tubing with 50mL of insulin drip solution prior to connecting to pt and starting insulin infusion.
2. Labs: stat
3. NPO except for ice chips and medications. After 12 hours, clear liquids when stable. Then advance to consistent CHO diet order: 70-80g breakfast and lunch; 85-95 g dinner; 30 g snack pm and HS.
4. Consult diabetes education team for self-management training to begin education after stabilized.

Nursing Assessment:

	12/9/14
Abdominal appearance (concave, flat, rounded, obese, distended)	Flat
Palpation of abdomen (soft, rigid, firm, masses, tense)	Tense w/ guarding
Bowel function (continent, incontinent, flatulence, no stool)	continent
Bowel sounds (P=present, AB=absent, hypo, hyper)	
RUQ	P
LUQ	P

RLQ	P
LLQ	P
Stool color	Light brown
Stool consistency	Soft
Tubes/ostomies	NA
Genitourinary	
Urinary continence	Catheter in place
Urine source	Clean specimen
Appearance (clear, cloudy, yellow, amber, fluorescent, hematuria, orange, blue, tea)	Cloudy, amber
Integumentary	
Skin color	Pale
Skin temperature (DI=diaphoretic, W=warm, dry, DL=cool, CLM=clammy, CD+=cold, M=moise, H=hot)	DI; CLM
Skin turgor (good, fair, poor, TENT=tenting)	Fair
Skin condition (intact, EC=ecchymosis, A=abrasions, P=petechiae, R=rash, W=weeping, S=sloughing, D=dryness, EX=excoriated, T=tears, SE=subcutaneous emphysema, B=blisters, V=vesicles, N=necrosis)	Intact
Mucous membranes (intact, EC=ecchymosis, A=abrasions, P=petechiae, R=rash, W=weeping, S=sloughing, D=dryness, EX=excoriated, T=tears, SE=subcutaneous emphysema, B=blisters, V=vesicles, N=necrosis)	Intact
Other components of Braden Scale: special bed, sensory pressure, moisture, activity, friction/shear (>18=no risk, 15-16=low risk, 13-14=moderate risk, <12=high risk)	20

Nutrition:
Meal type: NPO then progress to clear liquids and then consistent CHO-controlled diet
Fluid requirement: 2200mL
Hx: Does not follow traditional tribal eating pattern, with a few exceptions; likes fry bread and prepares wojapi seasonally. Pt does not tolerate milk and only eats cheese when obtained through government commodities. Fresh vegetables are grown at home: squash, peppers, beans, corn, and some greens. There is very little fruit in his diet and meat is only eaten at dinner.
Usual intake (for past several months):

AM:	toast, jelly, coffee, scrambled egg, juice
Lunch:	soup or stew or corn tortillas with cheese
Dinner:	Wife usually cooks rice or cornmeal, some type of meat (pork, beef, poultry, venison), vegetables, cornbread or fry bread.

MD Progress Note:
12/9/14 07:00
Subjective: Mr. B previous 24 hours reviewed. Previously diagnosed with T2DM; treated with metformin but appears to not have taken it regularly.
Vitals: Temp: 99.5, Pulse: 82, RR: 25, BP 101/78
Urine Output: 2660 mL (71.8mL/kg)
PE: General: Alert and oriented to person, place, time
HEENT: WNL
Neck: WNL
Heart: WNL
Lungs: Clear to auscultation
Abdomen: Active bowel sounds
Assessment: Results: + ICA, GADA, IAA consistent with T1DM. Negative c-peptide.
Dx: T1DM
Plan: Begin Novolog 0.5 u every 2 hour until glucose is 150-200 mg/dL. Tonight begin Glargine 15 u at 9 pm. Progress Novolog using ICR 1:15. Continue bedside glucose checks hourly. Notify MD if BG> 200 or < 80. RDN consult on SMBG.
C. Johnston, MD

Intake/Output

Date		**12/9/14 0701 – 12/10/14 0700**			
Time		07001-1500	1501-2300	2301-0700	Daily Total
IN	P.O.	**NPO**	**NPO**	**720**	**720**
	I.V. (mL/kg/hr)	**2,400 (4)**	**2,400 (4)**	**2,400 (4)**	**7,200 (4)**
	I.V. piggyback	0	0	0	0
	TPN	0	0	0	0
	Total itake (mL/kg)	**2,400** (32)	**2,400** (32)	**3,120** (41.6)	**7,920** (105.6)
OUT	Urine (mL/kg/h)	**2,150** (3.58)	**2,671** (4.45)	**3,000** (5)	**7,821** (4.34)
	Emesis output	150	0	0	150
	Other	0	0	0	0
	Stool	0	x 1	0	x 1
	Total output (mL/kg)	**2,300** (30.7)	**2,671** (35.6)	**3,000** (40)	**7,971** (106.3)
Net I/O		**+ 100**	**-271**	**+120**	**-51**
Net since admission (12/9)		**+ 100**	**-271**	**+120**	**-51**

Laboratory Results

	Ref. Range	**12/9/14 1780**
Chemistry		
Sodium (mEq/L)	136-145	130 ! ↓
Potassium (mEq/L)	3.5-5.5	3.6
Chloride (mEq/L)	95/105	101
Carbon dioxide (CO_2, mEq/L)	23-30	31 ! ↑
BUN (mg/dL)	8-18	18
Creatinine serum (mg/dL)	0.6-1.2	1.1
Glucose (mg/dL)	70-110	683 ! ↑
Phosphate, inorganic (mg/dL)	2.3-4.7	2.1 ! ↓
Magnesium (mg/dL)	1.8-3	1.9
Calcium (mg/dL)	9-11	10
Osmolality (mmol/kg/H_2O)	285-295	306 ! ↑
Bilirubin total (mg/dL)	≤1.5	0.2
Bilirubin, direct (mg/dL)	<0.3	0.01
Protein, total (g/dL)	6-8	6.9
Albumin (g/dL)	3.5-5	4.4
Prealbumin (mg/dL)	16-35	32
Ammonia (NH_3, umol/L)	9-33	9
Alkaline phosphatae (U/L)	30-120	110
ALT (U/L)	4-36	6.2
AST (U/L)	0-35	21
CPK (U/L)	30-135 F 55-170 M	61
Lactate dehydrogenase (U/L)	208-378	229
Cholesterol (mg/dL)	120-199	210 ! ↑
Triglycerides (mg/dL)	35-135 F 40-160 M	175 ! ↑
T_4 (ug/dL)	4-12	8
T_3 (ug/dL)	75-98	81
HbA_{1C} (%)	3.9-5.2	12.5 ! ↑
C-peptide (ng/mL)	0.51-2.72	0.09 ! ↓
ICA	-	+ ! ↑
GADA	-	+ ! ↑
IA-2A	-	-
IAA	-	+ ! ↑
tTG	-	-
Hematology		

WBC (x $10^3/mm^3$)	4.8-11.8	10.6
RBC (x $10^6/mm^3$)	4.2-5.4 F 4.5-6.2 M	5.8
Urinalysis		
Collection method	-	Catheter
Color	-	Yellow
Appearance	-	clear
Specific Gravity	1.003-1.030	1.008
pH	5-7	4.9 ! ↓
Protein (mg/dL)	Neg	+1 ! ↑
Glucose (mg/dL)	Neg	+3 ! ↑
Ketones	Neg	+ 4 ! ↑
Blood	Neg	Neg
Bilirubin	Neg	Neg
Nitrites	Neg	Neg
Urobilinogen (EU/dL)	<1.1	Neg
Leukocyte esterase	Neg	Neg
Protein check	Neg	tr ! ↑
WBCs (/HPF)	0-5	0
RBCs (/HPF)	0-5	0
Bacteria	0	0
Mucus	0	0
Crys	0	0
Casts (/LPF)	0	0
Yeast	0	0
Arterial Blood Gases (ABGs)		
pH	7.35-7.45	7.31 ! ↓
pCO_2 (mm Hg)	35-45	35
SO_2 (%)	≥95	97
CO_2 content (mmol/L)	25-30	28
O_2 content (%)	15-22	21
pO_2 (mm Hg)	≥80	89
Base excess (mEq/L)	>3	-
Base deficit (mEq/L)	<3	-
HCO_3^- (mEq/L)	24-28	22 ! ↓
COHb (%)	<2	1.1

1. **What are the differences between T1DM and T2DM? Explain the pathophysiology, dx, and treatment of each. (4 pts)**

Type 1 Diabetes:
Pathophysiology: it is an autoimmune destruction of beta-cells that causes pancreas makes very little or no insulin. Usually diagnosed in childhood.
Treatment must include insulin therapy, as well as diet & physical activity (healthy lifestyle)
Diagnosis: Casual (non-fasting) plasma glucose > 200 mg/dl + symptoms of uncontrolled diabetes. Fasting plasma glucose > 126 mg/dl. 2-hour post-prandial glucose > 200 mg/dl during an oral glucose tolerance test.
Symptoms: Deep, rapid breathing. Dry skin and mouth. Flushed face. Fruity breath odor. Nausea or vomiting; inability to keep down fluids. Losing weight.

Type 2 diabetes: Insulin resistance in peripheral tissues. Cells do not use insulin well. Progressive insulin secretory dysfunction. Ability of pancreas beta cells to produce insulin may be high initially, but decreases over time. Often increased endogenous glucose production. Altered adipocyte biology. Typically diagnosed in adulthood.
Associated usually with overweight & obesity; has genetic contribution
Can be controlled with diet, exercise & medications added as needed and insulin
symptoms :

- Hunger
- Increased thirst
- increased urination
- blurred vision
- Fatigue
- symptoms of uncontrolled diabetes
- Fasting plasma glucose > 126 mg/dl
- 2-hour post-prandial glucose > 200 mg/dl during an oral
- glucose tolerance test (OGTT)

2. **Why do you think Mr. B was originally diagnosed with T2DM? Why does the MD now state that he has T1DM? (2 pts)**

T1DM: Pt has high cholesterol (210 mg/dL), high glucose and triglyceride (175 mg/dL), his mother has T2DM. His father has cardiovascular disease. He used to be a heavy smoker. His diet was full of CHO and poor fiber.
T2DM: they have had a blood test and the result came back with positive for ICA, GADA and IAA. This test measures the level of islet cell antibodies in blood. It is used to evaluate and manage endocrine disorders such as type I diabetes mellitus. Islet Cell Cytoplasmic Autoantibodies, nsulin Autoantibodies and Glutamic Acid Decarboxylase Autoantibodies are all cytoplasmic antibodies that appear in blood test when there is a endocrine disorder such as type I diabetes mellitus. He has polyuria, polydipsia, and uncontrolled blood glucose (683 mg/dL), low pH (indicative of high risk for ketoacidosis).

3. **Describe the metabolic events that led to Mr. B's symptoms and subsequent admission to the ER (polyuria, polydipsia, polyphagia, fatigue, and weight loss), integrating the pathophysiology of T1DM into your discussion. (2 pts)**

Limited/or No glucose uptake by cells → hyperglycemia in blood…cells lacking glucose energy
↓ intracellular glucose → → polyphagia
↓ Insulin, ↑ Glucagon → stimulates ↑ hepatic glucose output → hyperglycemia worsens
Glucosuria occurs when renal threshold for glucose is exceeded→ osmotic diuresis → therefore polyuria occurs → → fluid loss/dehydration leads to polydipsia
Cellular dehydration & shrinking (hyperglycemic, hyperosmolar syndrome) when glycemia is extreme → nervous system
Malfunction causes irritability, fatigue, weight loss and blurred vision.

4. **Describe the metabolic events that result in the signs and symptoms associated with DKA. Was Mr. B in this state when he was admitted? What precipitating factors may lead to DKA? (2 pts)**

↓ TG synthesis, ↑ lipolysis due to counterregulatory hormones → ↑ FA as energy source → Diabetic ketoacidosis (DKA)
Ketosis occurs → osmotic diuresis and electrolyte imbalance →dehydration → hypovolemia → death
Ketosis → ↓ pH, bicarbonate concentration is reduced →Ketoacidosis→ breathing labored, mental status changes & coma possible → death

5. **What is the relationship of HgbA1c values to the micro- and macro-vascular complications of diabetes? List 3 micro-vascular complications of DM. (2 points)**

HbA1C = glycosylated hemoglobin. Reflects the average blood glucose over the past 3 months. Our target is lower than 7%. When glucose is in blood for so long they attach to HgB and make HbA1C and long term consequences of insulin deficiency and hyperglycemia can cause micro and macro vascular complications. The HbA1C can cause blockage of the circulation, causing blockage of the arterial walls.
micro-vascular: 1-Nephropathy 2- Retinopathy 3-Neuropathy

6. **Mr. B will be started on a combination of Glargine given in the pm with Novolog prior to meals and snacks. Describe the onset, peak, and duration for each of these types of insulin. (2 pts)**

Glargine: The onset is how soon the insulin starts to lower your blood glucose after you take it.
The peak is the time the insulin is working the hardest to lower your blood glucose.
The duration is how long the insulin lasts-the length of time it keeps lowering your blood glucose.
It is a long acting insulin which have an onset of insulin effect in 1-2 hours. The insulin effect plateaus over the next few hours and is followed by a relatively flat duration of action that lasts 12-24 hours for insulin.

Novolog:
This is rapid acting insulin. Onset <15 minutes. Peak 30-90 min. duration 2-3 hours.

7. **Identify any abnormal laboratory values measured upon Mr. B's admission. Explain how they may be related to his newly diagnosed T1DM. Discuss only relevant labs. (2 pts)**

Blood glucose level of 683 mg/dL: this shows an uncontrolled blood glucose levels.
Abnormal osmolality of 306 mmol/kg.
Due to pancreatic cell destruction there are GADA, IAA, TCA antibodies present in serum.
Phosphate value is below normal.
HCO_3^- 22 mEq/L: lower pH of blood which indicates ketoacidosis .
pH 7.31: can indicates DKA.
HbA1c, 12% indicating larger than normal glycosylation of hemoglobin. Goal is under 7%
Due to pancreatic cell destruction there are GADA, IAA, TCA antibodies present in serum.

8. **You meet with Mr. B before d/c and review SMBG. Based on the information above, write your initial nutrition assessment ADIME note for Mr. B, including 2 PES statements (include calculations & references on an attached sheet). (12 points)**

A: Pt's wife mentioned that Mr. B had not been feeling well the previous day. She mentioned that he thought he was fighting off a virus. His wife found him groggy and almost unconscious at home. Native American 48 yo male, 5'10" 160#, EER 2320.9 kcal/day, BMI 23.0. Upon admission to ER, his Temp: 99.5, Pulse: 82, RR: 25, BP 100/78 mm Hg. His serum shows + for ICA, GADA, IAA antibodies which indicates T1DM. Negative c-peptide. Respirations are rapid, and heart rate indicative of tachycardia. Pt appears to be lethargic but able to follow commands. 24 hour recall indicates low consumption of protein and vegetables. His diet includes simple starches, low vegetables and fruits, low dairy and low meat.

D: his lab work is altered because of lack of insulin production. This can be due to pt's pancreatic beta cells autoimmune destruction, indicative of DM 1. Uncontrolled blood sugar at 610 mg/dL, which is leading to increased glycosylated HbA1C to more than 7% (12.5%). Pt's sodium is 130 mEq/L, potassium, and magnesium at borderline low levels. (NC-2.2) these can be caused by losing his electrolytes through excess urination (polyuria). Pt has high T-cholesterol levels at 210 mg/dL. (NB-1.4)

I: Pt should get an I.V to restore his electrolyte that was lost through urine and control his insulin. After that RD can go over his diet, CHO is counting and portion sizing. The RD should also find out where Pt is standing in the readiness category. He has to know that he has T1 DM so he needs insulin injection for the rest of his life and he has to take it seriously. This way he can control his BG and have a normal life. RD should teach about portion sizing, CHO counting, serving size. He should also learn skill for the case of emergencies. He should check his BG multiple a days.

M/E: he should be taught about carbohydrate, portion size, and CHO counting and survival skills. His readiness should be assets. If he is ready to learn more about his disease we can teach him about different options he has to get insulin. We can teach him about cause hyperglycemia or hypoglycemia and explain to him that he needs to use the proper amount of insulin in order to prevent cause hyperglycemia or hypoglycemia. He will have follow ups every week for the next 6 weeks, in outpatient setting to assess pt readiness, insulin/DM 1 education, CHO servings, and take blood test. We should check his BG, HgA1C, potassium, sodium level.

Maryam.N.Maheri RD

9. Mr. B comes back to clinic 2 weeks after his new diagnosis. List the important questions you will ask him in order to plan the next steps for providing the additional education that he might need. (2 pts)

Do know what macronutrients are? Do you know what CHO is? Do you know what a CHO counting is? DM I is a disease that is going to be with you all your life and there are ways to ease the complications, do you know what are does? Are you ready to make life changes such as eating more complex CHO and fibers and exercise more? Do you about different types of insulin and when and how much to use?

10. Mr. B's usual breakfast consists of 2 slices of toast, butter, 2 T jelly, 2 scrambled eggs, and orange juice (~1 cup). Using the ICR 1:15, how much Novolog should he take to cover the carbohydrate in this meal? (1 pt)

2 slice of toast has 30 g of carbohydrates. 2 T jelly has 30 g of carbohydrates. 1 cup of orange juice has 30 g of carbohydrates.
30+30+30=90/15=6 unit of insulin

11. You determine that Mr. B needs _2320.9_ kcals/day based on EER calculations. You want to follow his normal eating pattern as much as possible while still meeting his protein requirements and keeping the kcal from fat at 30% or less of total kcals. Using the Diabetes Exchange/Food List and the worksheet below, develop a "pattern" for Mr. B's diet. (15 points)

Food group	Exchanges	CHO grams	Protein grams	Fat grams
Breakfast				
Starch : 2 slices Whole grain toast	2 (starch)	30	6	2
Fruit :1 medium kiwi	1(CHO)	15	0	0
Milk (circle: whole, 2%, 1%, or NF) fat free yogurt 2/3 cup	1(fat free milk)	12	8	1
Meat (circle**: lean,** med or high fat) egg white 5	2.5 (lean protein)	0	17.5	5

Non-starchy vegetables: tomatoes 1 cup	1(non-starch)	5	2	0
Fat: extra virgin olive oil 1tsp	1(fat)	0	0	5
Morning Snack (list food groups)				
Carrot juice 1 cup	2 (non- starch)	10	4	0
Granola bar 1bar	1(starch)	15	3	1
Lunch				
Starch: saltine crackers 6 crackers	1(starch)	15	3	1
Fruit: honey dew melon 1 cup	1(CHO)	15	0	0
Milk (circle: whole, 2%, 1%, or NF): American cheese 1 oz	1(high fat protein)	0	7	8
Non-starchy vegetables: mixed vegetable 1 cup raw	1(non-starch)	5	2	0
Meat (circle: lean, med or high fat): backed beans 1/3 cup	2(lean protein)	15	10	3
Mixed vegetable soup 1cup	2(1starch+ 1 medium fat protein)	15	10	6
Fat				
Afternoon Snack (list food groups)				
Peppers 1 cup	1(non-starch)	5	2	0
Angel food 2oz	2(starch)	30	0	0
Goat cheese 2oz	2(high fat protein)	0	14	16
Dinner				
Starch: Brown rice 1 cup	2 (starch)	30	6	2
Fruit: mango 1 medium	1(CHO)	15	0	0
Milk (circle: whole, 2%, 1%, or NF): fat free ice cream ½ cup	1 ½(CHO)	22. 5	0	0
Non-starchy vegetables: broccoli ½ cup cooked	1(non-starch)	5	2	0
Meat (circle: **lean**, med or high fat): lamb chop 3 oz	3(lean protein)	0	21	6
Fat				
HS Snack (list food groups)				
Jello ½ cup	1(CHO)	15	0	0
Whole grain banana bread	3(2 CHO+1 fat)	30	0	5
Carrot juice 1 cup	2 (non-starch)	10	4	0
Total grams:		314.5	121.5	61
		X4	X4	X9
kcal from each macronutrient:		1258	486	549
% kcal from each macronutrient:		54.9%	21.2%	24%
% kcal GOAL:		50-60%	20-30%	Under 27%, saturated fat under 10%
TOTAL KCAL:		2293		

12. You review Mr. B's diet, insulin injections, SMBG, and other self-care issues. He continues on injections of Glargine and Novolog. You reinforce teaching Mr. B about carbohydrate counting. How many CHO "points" or servings are in his daily diet from question 11? (1 point)

There are 314.5 CHO in his diet.

13. If Mr. B's pre-prandial BG was measured at 200 mg/dL and he plans to eat a lunch consisting of a cup of vegetable bean soup, a piece of fry bread, a piece of fruit and a diet soda, how much insulin should he take to cover the meal, and how should it be adjusted to compensate for the BG level? Assume that the correction dose of 1 unit of insulin decreases blood glucose by 50 mg/dl, correct to 150 mg/dl, and an ICR of 1:15. (2 points)

vegetable bean soup: 1.5 CHO +1 lean protein=22.5g CHO
fry bread: 1starsch +1 fat=15g CHO
fruit: 1CHO=15 g CHO
diet soda: free food
total CHO=15+22.5=52.5g--→ CHO eaten= 52.5g CHO / 15g CHO/ unit insulin=3.5 unit of insulin
correction does 200mg/dl-150mg/dl=50mg/dl -→50mg/dl /50mg/dl/unit insulin=1 unit
3.5unit+1unit= 4.5 unit of insulin

14. Describe the Native American foods, fry bread and wojapi. These would be categorized as what type of exchange? Include the reference used. (1 point)

Fry bread or wojapi is a flat dough fried or deep fried in oil, shortening, or lard. The dough is generally leavened by soured milk, baking powder or yeast. 1-1/2 starch.
eatrightmontana. (n.d.). Retrieved 12 16, 2014, from http://www.eatrightmontana.org/PDF/TraditionalFoodsRecipes.pdf