Case Study #3 Part 1

Sxxxxxx, Lxxxx	Female	34 yo
Allergies: NKA	**Code:** FULL	**Isolation:** NONE
Pt. Location: RM 1892	**Physician:** J. Marsh	**Admit Date:** 12/04/17

Pt Summary: L.S. is a 34 yo F filipina admitted through the ED with c/o excessive thirst and frequent urination of 2 wk duration, in addition to increased appetite and weight loss of 12 pounds in 3 weeks.

PMH: pt was product of normal pregnancy and delivery; had varicella at age 7, and a tonsilectomy at age 12. No medications on admit.

FH: Parents L&W. Maternal aunt has Type 1 DM; mother had gestational diabetes. Grandparents L&W. 2 siblings, older brothers, L&W.

Social Hx: Nurse at Sutter Davis. Pt typically plays tennis twice a week; has not played in the last month as she tires easily. Married with two children, ages 7 and 10

ROS:

GI:	No hx of N/V, or diarrhea
GU:	No hx of urgency, frequency, or burning urination except for present complaint of polyuria
CNS:	Alert and oriented, no hx of impaired LOC, convulsions, or difficulty walking

PE:

General:	Underweight, tired appearing female; wt: 100# ht: 63”
Vitals:	T 98.2°F; P 120; R 27 with fruity odor; BP 110/70 mm Hg
Lungs:	Clear to percussion and auscultation
Heart:	Normal sinus rhythm, no murmurs
HEENT:	Non-contributory
Abdomen:	Flat, non-tender, no liver enlargement
Genitalia:	nl
Extremities:	Non-contributory
CNS:	Normal gait and deep tendon reflexes
Skin:	Smooth, warm, dry, no edema
Peripheral Vascular:	Pulse +4 bilaterally

Laboratory Results

	Ref. Range	**12/04/17 1210 (non-fasting)**
Chemistry		
Sodium (mEq/L)	136-145	128 ! ↓
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	17
Creatinine serum (mg/dL)	0.6-1.2	1.1
Glucose (mg/dL)	70-110	374 ! ↑
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	302 ! ↑
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	3.3 ! ↓
Prealbumin (mg/dL)	16-35	14 ! ↓
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	180
Triglycerides (mg/dL)	35-135 F; 40-160 M	150
T_4 (ug/dL)	4-12	8
T_3 (ug/dL)	75-98	81
HbA_{1C} (%)	3.9-5.2	8.65 ! ↑
C-peptide (ng/mL)	0.51-2.72	0.52
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	-	Clean catch
Color	-	Yellow
Appearance	-	clear
Specific Gravity	1.003-1.030	1.008
pH	5-7	4.8 ! ↓
Protein (mg/dL)	Neg	+1 ! ↑
Glucose (mg/dL)	Neg	+4 ! ↑
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

Dx: New Onset Type 1 Diabetes Mellitus

MD's Plan: Admit, achieve glycemic control with Regular Insulin then adjust to daily therapy with mixed insulin therapy; initiate DSM training; nutrition consult for hospital and home diet planning and pt education.

You are the in-patient R.D.
You meet with L.S. to do a nutrition assessment and begin a general introduction to dietary management of diabetes. You take a diet history (listed below) as part of your assessment. L.S. states that these are the types of foods that she usually eats, but the quantity is much greater than usual because she has felt so hungry lately.

L.S. is a 34 yo F Filipina, raised in the San Francisco Bay Area. She loves to eat traditional Filipino foods but also enjoys trying new recipes and experimenting with new foods. L.S. takes pride in her cooking abilities and she and her family seldom eat in restaurants. Weekends are typically spent with the extended family and revolve around family meals.

L.S. works as a nurse and she does not "exercise" except for playing tennis 2-3x/w. Occasionally, she will walk the family dog if the kids are too busy to do so. Sometimes "walking the dog" means driving to the local dog park and letting it run loose.

Breakfast (eaten at home):
1 c. arroz caldo (congee)
1 c. juice (orange, apple, or cranberry)
Toast (2 slices or English muffin) w/ butter & jelly
Coffee with sugar and coconut milk
(occasionally 2 scrambled eggs instead of the porridge)

Lunch (eaten at the hospital cafeteria on weekdays):
2 slices of cheese pizza with a small salad ***or***
Grilled cheese and French fries ***or***
Leftovers from the night before (2-3x/w)
16 oz of sweetened iced tea
dessert such a cookies or a brownie
(sometimes 8 oz of soy or coconut milk instead of the iced tea)

Mid afternoon:
medium mocha or latte, cookie, or a piece of fruit

Dinner:
~6 oz. meat (chicken/beef/pork/fish)
1 cup rice
Vegetables in season
12 ounces of coconut milk or sweetened iced tea
or
similar leftovers if she does not have time to cook

HS:
L.S. eats one of the following:
Bag of microwave popcorn w/ 1-12 oz can of regular soda
2 scoops of ice cream
1 c coconut milk and 4-5 cookies
2 oz. cheese and 12 "Wheat Thin" crackers
1 cup halo halo

1. Compare L.S.'s admission laboratory values with normal values. What does each value indicate, based on the hospital's lab value reference ranges above? Use your text for non-fasting values. (5 pts)

Test	nl Values	L.S.'s Values	Comparison: ≤ or ≥ nl values	What do L.S.'s lab values suggest about her metabolic state?
BG	70 – 110 mg/dL	374 mg/dL	>	High BG value indicates that L.S. is hyperglycemic, and tissue cells are not able to properly uptake circulating glucose. (non-fasting BG should be < 200 mg/dL)
Urinary glucose	Neg	+4	>	Hyperglycemic. Kidneys are no longer able to filter the amount of glucose from the blood.
Urinary ketones	Neg	+4	>	DKA. Her body is undergoing lipolysis to compensate for low amounts of available energy (due to insulin deficiency).
PreAlb	16 – 35 mg/dL	14 mg/dL	<	Sign of malnutrition, illness, and/or inflammation.
HbA_{1C}	3.9 – 5.2 %	8.65 %	>	Above normal levels indicate L.S. has been hyperglycemic for approximately the last 2-3 months. Since blood glucose concentration is high, glucose is glycosylating hemoglobin.

2. What is HbA_{1C} and what does HbA_{1C} measure? (1 pt)

HbA_{1C} is glycosylated hemoglobin, meaning that a glucose molecule has been added to amino acid side chains of hemoglobin. Hemoglobin becomes more glycated with rising concentrations of circulating glucose. Measuring HbA_{1C} will give you the amount of glucose bound to hemoglobin protein. Because red blood cells have a life span of 120 days, this measurement will tell you the average blood glucose concentration for the previous 2 – 3 months. This method can be used to keep track of how well pt is controlling BG, and is now commonly being used as an additional option for diagnosis.

3. Explain the role/relationship of HbA_{1C} in the development of micro- and macro-vascular complications of diabetes. (2 pts)

Hyperglycemia is one of the risk factors for CVD and atherosclerosis, which are macrovascular complications of DM. Long term hyperglycemia, which can be measured with HbA_{1C}, makes blood vessels prone to endothelial damage, leading to thickening and changes in composition of the subendothelial layer (can lead to increases bp and accelerate atherosclerosis). HbA1C above 5.2 % can be indicative of possible endothelial damage.

Hyperglycemia is also one of the risk factors for microvascular complications of DM, nephropathy and retinopathy. In nephropathy, hyperglycemia changes the capillary structure of blood vessels through the functioning unit of the kidney (glomerulus). Changes in the structure of these capillaries result in increased permeability and decreased filtration ability. This can lead to albumin in the urine.
In retinopathy, blindness can be caused by damage to the eye's blood vessels, decreasing the amount of oxygen the eye receives, as well as the accumulation of sorbitol . This damaged appears to be directly related to hyperglycemia.

Successfully controlling BG levels will result in significantly lower HbA_{1C} values, improving cardiovascular outcomes, and reducing the incidence of retinopathy and nephropathy.

4. What are three metabolic reasons for L.S.'s weight loss (number each for full credit). (2 pts)

1. Cell Starvation: Because insulin is not available to aid in tissue cell uptake of glucose, there is very little energy available for use and/or storage, resulting in weight loss.
2. Proteolysis due to counter-regulatory hormones: Muscle is broken down for energy when glucose energy is unavailable for cell's use due to insulin deficiency. (muscle wasting)
1. Glycosuria/polyuria: Excess glucose is excreted in the urine. Frequent urination causes hypovolemia, which accounts for some of the weight loss.

5. You are educating L.S. on being prepared for "sick days." Typically, when she is sick, she will consume chicken soup and lime soda. What advice will you give her and <u>why</u>? (2 pts)

I would educate her on the importance of monitoring BG and urine ketones at least 4x a day when sick. Being ill can elevate BG levels, specially with fever or stress. When under stress, the body releases hormones that activate glucose production in the liver, which can lead to hyperglycemia. Insulin should be taken as usual, but might require more depending on levels monitored throughout the day. I would advise her to try to eat more solids, but if she is unable to, the lime soda, soup, and other juices or jello are okay as well so that she's meeting her daily requirements. She should also make sure to stay hydrated.

6. You determine that L.S. needs 1685-1966 kcals/day based on MSJ calculations and the fact that L.S. needs to gain weight to achieve her normal weight. You want to follow her normal eating pattern as much as possible while still meeting her protein requirements and keeping the kcal from fat at 30-40% of total kcals and CHO at 40-50%. Using the Exchange Lists, develop a "pattern" for L.S.'s diet (refer to lecture notes on DM for dietary "patterns"). (15 pts)

L.S.'s typical diet (modified)

Food group Highlight the correct category for each: (Starch/CHO/S. veg type, milk type, pro type)	**Number of Exchanges**	**CHO grams**	**Protein grams**	**Fat grams**
Breakfast				
Starch/CHO/Starchy Veg	2	30	6	2
Fruit	1	15		
Milk & Subs.(skim, 1%, 2%, or whole)				
Non-starchy vegetables				
Protein (lean, med- or high-fat)	2		14	10
Fats				
Morning Snack				
Starch/CHO/Starchy Veg	1	15	3	1
Fruit	1	15		

Milk & Subs.(skim, 1%, 2%, or whole)				
Non-starchy vegetables				
Protein (lean, med- or high-fat)				
Fat				5
Lunch				
Starch/CHO/Starchy Veg	1	15	3	1
Fruit	1	15		
Milk & Subs.(skim, 1%, 2%, or whole)				
Non-starchy vegetables	2	10	4	
Protein (lean, med- or high-fat)	2		14	10
Fats				5
Afternoon Snack				
Starch/CHO/Starchy Veg	1	15	3	1
Fruit	1	15		
Milk & Subs.(skim, 1%, 2%, or whole)				
Non-starchy vegetables				
Protein (lean, med- or high-fat)				
Fat	1			5
Dinner				
Starch/CHO/Starchy Veg	2	30	6	2
Fruit	1	15		
Milk & Subs.(skim, 1%, 2%, or whole)				
Non-starchy vegetables	3	15	6	
Protein (lean, med- or high-fat)	1		7	2
Fats	1			5
HS Snack				
Starch/CHO/Starchy Veg				
Fruit				
Milk & Subs.(skim, 1%, 2%, or whole)				
Non-starchy vegetables	1	5	2	
Protein (lean, med- or high-fat)	1		7	2
Fats	1			5
Total grams		210	75	56
kcal from each macronutrient		840	300	504
TOTAL KCAL	1644			
%		51%	18%	31%

7. L.S. is taught about her diet, insulin injections, SMBG, and other self-care issues prior to discharge. She is discharged on a basal injection of Lantus, with bolus injections of Humalog regular insulin at mealtimes. Complete the table below for each medication. (3 pts)

Lantus®

Generic name:	Insulin glargine
Classification: (type of drug/ mechanism of action)	Antidiabetic, Hypoglycemic. (Long acting basal insulin)
Onset of Action:	1.1 hr
Peak:	Peakless
Duration:	20 – 24+ hrs

Humalog®

Generic name:	Insulin lispro
Classification: (type of drug/ mechanism of action)	Antidiabetic, Hypoglycemic. (Rapid acting bolus insulin)
Onset of Action:	15 - 30 min
Peak:	2.4 hr (0.5 – 2.5 hr)
Duration:	3 – 5 hrs

Lantus® & Humalog®

Indication: (types of health conditions the Rx treats)	Diabetes, Hyperglycemia
Dietary recommendations:	Diabetic meal plan to balance carbohydrate with insulin.
Possible Food-Medication Interactions:	Use alcohol with caution and under advice from a physician. Alcohol increases hypoglycemic effect of insulin.
Potential Nutrition, Oral/GI Side Effects:	Nutr: Weight gain. Other: Hypoglycemia

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Case Study #3 Part 2 – ADIME Note

A: (8 pts)

Patient History: 34 yo Filipina F. Pt admitted through ED with c/o excessive thirst and frequent urination of 2 wk duration. Pt experienced weight loss of 12 lb in 3 wk, as well as increased appetite. Dx: New onset T1DM. Family hx of diabetes: Maternal aunt has T1DM, and mother had gestational diabetes, though pt was a product of normal pregnancy. Nutrition consult for hospital and home diet planning, and pt education.

MD Diet Order/Rx: Regular

Anthropometrics:
Ht: 160.0 cm, **CBW:** 45.4 kg, **IBW:** 52.2 kg, **%IBW:** 87, **BMI:** 17.7 kg/m^2 (underweight). 12 lbs wt loss in 3 wks (10.7% of body weight).

Weight Hx: pt experienced a severe wt loss of 10.7% total body wt in three week, dropping from 112 lbs to 100 lbs, losing a total of 12 lbs.

Nutrition focused physical finding:
Overall appearance: Pt is underweight and has a tired appearance; Flat, non-tender abdomen.
GI: N/C
Cognition: Alert and oriented, no hx of impaired LOC, convulsions, or difficulty walking.
Skin: Smooth, warm, dry, no edema.

Biomedical data/labs: All are non-fasting values – **Chemistry:** Glu: 372 mg/dL (elevated), Total Protein: 6.9 g/dL (wnl), Albumin: 3.3 g/dL (low), Prealbumin: 14 mg/dL (low), Osmolality: 302 mmol/kg/H_2O (elevated), Cholesterol: 180 mg/dL (wnl), Triglycerides: 150 mg/dL (wnl), HbA_{1c}: 8.65% (elevated), ICA: + (elevated), GADA: + (elevated), IA-2A: - (wnl), IAA: + (elevated).
Urinalysis: Specific gravity: 1.008 (wnl), pH: 4.8 (low), Protein (mg/dL): +1 (elevated), Glucose (mg/dL): +4 (elevated), Ketones: +4 (elevated).

Medications/Supplements/OTC: Discharged on a basal injection of Lantus, with bolus injections of Humalog regular insulin at mealtimes.

Estimated Nutrient Needs (based on 45.4 kg wt):
Energy: 1685 – 1966 kcals/d; **Protein:** 45 – 59 g/d; **Fluid:** 1685 – 1966 mL/d

Food and Nutrition Hx: pt enjoys traditional Filipino foods as well as trying new recipes and experimenting with food. She takes pride in cooking for her family, and they do not tend to eat out at restaurants. Weekends normally revolve around family meals with extended family members. Diet hx assessment, which pt says is representative of what she typically eats, shows a diet high in added sugars and CHO, and low in protein rich sources. Pt reports an increase in appetite in last 3 wks, so intake has been a lot higher than usual d/t the polyphagia.

Family and Social Hx: Pt works as a nurse at Sutter Davis. Family Hx of diabetes: Maternal aunt has T1DM and mother had gestational diabetes (pt not a product of that pregnancy). Her parents, grandparents, and 2 older brothers are L&W. Pt normally plays tennis 2-3x wk, but has not played in the last month as she is easily tired. She drives family dog to the local dog park and lets it run loose when her kids are too busy to walk him. She considers this "walking the dog." She enjoys cooking and time spent with extended family normally revolves around family meals.

D: (2 pts)

Self-monitoring deficit (NB-1.4) r/t newly diagnosed T1DM AEB elevated HbA_{1C} levels of 8.65%, meaning BG levels have been elevated for approx 2-3 months; positive test for glucose in urine (+4), meaning kidneys can no longer filter the amount of glucose in the blood; and diet hx high is sweetened foods, CHO, and low in protein rich sources.

Malnutrition (NI-5.2) r/t impaired nutrient utilization AEB severe weight loss of 10.7% body wt in 3 wks; elevated BG levels of 374 mg/dL and ketones in urine (+4), indicating that the body is using alternative sources for energy because tissue cells are not properly taking up BG for energy use.

I: (8 pts)

MNT Goal: Increase pt knowledge on self-management to achieve more glycemic control and improve nutritional status. This includes education about insulin administration, meal planning, BG monitoring, signs/symptoms and Tx, hypo-/hyperglycemia, and exercise.

Recommendations:
Diet Rx: Pt should plan meals to meet her daily caloric needs of 1685 – 1966 kcal/day. 45% of those kcals should come from CHO (758 – 885 kcals from CHO), and < 30% should come from fats (505 – 590 kcals from fat). Daily protein needs of 45.4 – 59.0 g/d should also be met. This can be done using an exchange list. Make sure to inject prescribed Humalog insulin at mealtime.
Specific Recommendations:

- Decrease intake of added sugars to better control BG. Choose nutrient dense CHO instead.
- Slightly increase intake of animal products to meet protein needs.
- Rec'd DM support groups and class.

Diet instructions: Provide pt with "4 Steps to Manage Your Diabetes for Life" handout (Rec'd reading section titled "know your ABCs"). This will increase knowledge on how to manages HbA_{1c}, BP, and Cholesterol, ultimately aiding in delay/prevention of complications. Also provide pt with "Diabetes and Healthy Eating" handout. This will aid in making better food choices for meal plans. Pt's family is also recommended to read handouts and provide support.

Behavioral goals:
- Check BG levels often
- Remember to inject prescribed Humalog insulin at meal time to prevent hyperglycemia.
- Keep SMBG log

Compliance: I believe compliance will be good. Pt is confident in her cooking abilities and enjoys experimenting with new foods, so she might enjoy making food to fit her nutrient needs. Pt also works as a nurse, meaning she has knowledge and interest in health.

M/E: (2 pts)

- Monitor wt
- Monitor BG levels
- Monitor Ketone urine levels to see if body continues to use alternative sources for energy.
- Monitor HbA_{1C} in approx. 2 – 3 month to measure improvement of glucose control.
- Look at SMBG log to ensure proper use.
- In person F/U in 2 wk

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12/11/17

References:

Nutrition Therapy & Pathology text book

MNT Pocket Guide

Food Medical Interactions: The Foremost Drug – Nutrient Interaction Resource

NUT 116A and NUT 116AL Diabetes Lectures

4 Steps to Manage Your Diabetes for Life Handout
https://www.niddk.nih.gov/health-information/diabetes/overview/managing-diabetes/4-steps

Diabetes and Healthy Eating Handout
https://www.diabeteswellness.net/sites/default/files/Diabetes%20and%20Healthy%20Eating.pdf

My Doctor Says I Should Learn Sick Day Rules
http://legacy.bd.com/resource.aspx?IDX=22107