

Case Study #2: Type 2 Diabetes Mellitus

1. Labs

Test	Result	Norm	Test	Result	Norm	Test	Result	Norm
Hgb	12.0 g/dl	12-16g/dl	BUN	26mg/dl	10-20mg/dl	MCV	83um ³	80-95um ³
Hct	37%	37-47%	Creat	1.3 mg/dl	.5-1.1mg/dl	K	4.8 mEq/L	3.5-5mEq/L
Glucose	347 mg/dl	70-100mg/dl	Na	147 mEq/L	136-145mEq/L	Cl	104mEq/L	98-106mEq/L
TC	265 mg/dl	<200mg/dl	TG	350 mg/dl	<150mg/dl	HDL	25 mg/dl	>55mg/dl
LDL	170 mg/dl	<100mg/dl	AST	22 U/L	0-35U/L	HbA1c	12.2%	4-6%
ALT	38 U/L	4-36U/L						

(Pagana, Pagana 521,518, 489, 262, 602, 28, 961, 323, 874, 946, 143, 800, 750, 260).

HbA1c measures glycosylated hemoglobin which is a substance formed when glucose attaches to hemoglobin. HbA1c indicates the average blood glucose levels, for both fasting and fed states, in a person over the past 3 months. In Mrs. R's case, her HbA1c of 12% indicates that for the past 3 months her average blood sugar was about 345 mg/dl. High levels of HbA1c in the blood indicate poorly controlled diabetes over the last few months increasing the diabetic patient's risk for kidney disease, nerve damage, stroke, heart disease and eye disease ("HbA1c").

Mrs. R has many abnormal blood values. High glucose, along with elevated HbA1c, is an indication of uncontrolled diabetes. Her body is not responding very well to insulin so it takes longer for glucose to be cleared from the bloodstream and enter the cells. It is common to find diabetic dyslipidemia characterized by high TC, LDL, TG and low HDL levels in diabetic patients. Controlling blood sugar levels can help reduce LDL and TG levels ("Treating high cholesterol in people with diabetes"). Having such high cholesterol and LDL levels significantly increase her risk of heart disease and thus should be monitored closely. An elevated BUN and Na indicates dehydration. Elevated BUN and creatinine together may indicate kidney disease

which is a common problem among diabetic patients. However, these elevated values may simply be due to Mrs. R's dehydration status because her creatinine levels are not excessively high. High ALT may be due to the drug Glucotrol that Mrs. R is taking (Pagana, Pagana 350).

2. Anthropometry

BMI: $(190/66^2) \times 703 = 31$ (Class 1 obesity)

IBW: $100 + 30 = \mathbf{130} + 10\% = 143$; $-10\% = 117$ (Range: 117-143)

%IBW: $190/130 \times 100 = 146\%$ (Obese)

%UBW: $190/205 \times 100 = 93\%$; so she's had 7% weight loss in 3 weeks which is considered severe weight loss.

Adjusted weight for obesity: $[(190-130) \times .25] + 130 = 145$

Energy needs for weight reduction: $655 + (9.6 \times 65.9) + (1.8 \times 167.64) - (4.7 \times 48) = 1364$

BEE = 1364×1.3 (ambulatory) = $1773 - 250 = \mathbf{1523}$ calories for weight reduction plus encouraging a lot of exercise.

3.) Pathophysiology

Mrs. R is presenting with many symptoms. She has been repeatedly treated for UTIs and has frequent colds. People with diabetes often have suppressed immunity and are susceptible to infection especially in the bladder. High glucose in the bloodstream will end up spilling into the urine which then becomes a breeding ground for bacteria. Urine is supposed to be sterile and thus when bacteria is present a UTI will result ("Diabetes and Infection"). Mrs. R has also been becoming fatigued easily. This is very typical for Type 2 diabetics because their cells aren't responding to insulin as well so it takes a lot longer for glucose to enter the cell to be used as fuel. Once glucose levels normalize, Mrs. R should regain her energy ("Diabetes symptoms"). Another symptom Mrs. R presents with is insatiable hunger with unexplained weight loss. This

is also due to the fact that the glucose is having trouble entering the cells to be used for growth and energy. She's also urinating more frequently because the sugar in the urine creates a hypertonic solution which draws water from the tissues. Thus, the tissues become dehydrated and excess urination and thirst develops ("Weight loss: When it's unexpected"). Uncontrolled diabetes can wreak havoc on the body and cause damage to the eyes, kidneys, nerves, and heart. Mrs. R has been experiencing blurred vision which is another consequence of high glucose in the bloodstream. High glucose will increase the osmotic load in the blood and can cause swelling in the capillaries of the eye leading to blurred vision. The only way to correct lens swelling is to get glucose levels under control and even then it may take a few months before vision is back to normal again ("Eye problems and diabetes").

Obesity is often connected with type 2 diabetes because it contributes to the insulin resistance of the cells. It has been suggested that fat cells are even more unresponsive to insulin than muscle cells and that if a person has more fat than muscle, insulin will be very inefficient at allowing glucose into the cells for energy (Manzella). The body will sense that it needs energy, even though there is plenty of glucose in the bloodstream, and polyphagia may result. Excess eating leads to further obesity which leads to further insulin resistance and the damaging cycle continues.

4.) An elevated BUN and Na suggest that Mrs. R is dehydrated and has experienced rapid weight loss.

5.) I expect to see Hgb and Hct levels fall once her hydration status is normalized making her look anemic. She will then be below normal for these values and this will further worsen her nutritional status. Her BUN and Na will also drop and will fall within the normal range. Her potassium and chloride levels should decrease as well but probably not enough to fall under the

normal values (Pagana, Pagana 752, 261). Her glucose levels will still be very high and she will still be hyperglycemic.

6.) The American Diabetes Association has set the following blood glucose goals for those with diabetes: before eating 90-130mg/dl, 1-2 hours after the beginning of eating (peak glucose) <180mg/dl, and a HbA1c <7% (“Blood sugar goals”).

7.) Glipizide is in the sulfonylureas drug class. Its function is to stimulate the pancreas to produce more insulin in order to decrease the blood sugar in a Type 2 diabetic patient (“Glucotrol 1”). Nutritional complications include increased or decreased appetite, weight gain, dyspepsia, nausea, diarrhea, and constipation (Pronsky 350).

8.) The MNT for this patient would consist primarily of weight loss, exercise, and blood sugar control. Weight loss and exercise are important because they both make the cells more sensitive to insulin. When glucose is allowed into the cells, it will be able to be utilized for energy and there will also be a decreased risk of excess glucose in the bloodstream causing damage throughout the body. Weight loss and exercise will also decrease blood lipids and blood pressure thus decreasing cardiovascular disease risk. There is a significantly high risk of developing cardiovascular disease in people with chronic diabetes so decreasing this risk, which includes decreasing TG, LDL and TC is of critical importance (Nelms, Sucher, Long 596-597).

A diabetic patient will want to be educated on the importance of eating small, balanced meals throughout the day to maintain steady blood glucose levels. Eating carbohydrates by themselves may cause blood glucose levels to spike rapidly but if those carbohydrates are eaten with other food sources such as protein, fat, or vegetables, there will be more of a steady rise in blood sugar. Also, because cardiovascular disease is so prevalent among diabetics, saturated fat and trans fat intake will want to be monitored and reduced as much as possible (“Diabetes”).

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