DDM 4 Case 3
Group 8

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Collect	**CC:** Presents for annual physical **PMH:** Type 2 DM for 6 months, Hypertension for 17 years, Bipolar disorder for 25 years, dyslipidemia for 12 years, morbid obesity for 20 years **Allergy:** Penicillin allergy that results in hives. **FH:** No relevant family history **Relevant SH:** Patient has been married for 23 years. She is 55 years old and has two children who are teenagers and one child in college. She works as a sales associate in the electronics department of a local mass merchandiser. She denies any use of tobacco products after stopping smoking 10 years ago but does drink alcohol occasionally (three beers or glasses of wine per week). **ROS:** Complains of nocturia, polyuria, polydipsia and paresthesias in lower extremities on a daily basis. Denies nausea, constipation, diarrhea, signs or symptoms of hypoglycemia, and dyspnea. **Lab Test Results:** Lad test results show high CO_2 levels, high glucose levels, high A1C levels, high total cholesterol levels, high LDL levels, high triglycerides levels, and urinalysis showed 1+ protein and positive microalbuminuria. CO_2: 31 Glucose: 243 A1C: 10% Fasting Lipid Profile: Total cholesterol: 244 LDL: 141 Triglycerides: 305

	UA: 1+ protein, (+) microalbuminuria **Physical Exam Findings:** General: WDWN severely obese white woman in NAD Vital Signs: BP: 160/90 mm Hg, P 98 bpm, RR 18, T 37.0○ C; Wt 109kg (current), 104kg (last year) Ht 5'8", waist cir 38 in Skin: HEENT: PERRLA, EOMI, R&L fundus exam without retinopathy Neck/Lymph Nodes: No LAN Lungs: Clear to A & P CV: RRR, no m/r/g Abd: NT/ND GU/R: Deferred MS/Ext: Carotids, femorals, popliteals, and right dorsalis pedis pulses 2+ throughout; left dorsalis pedis 1+; feet show mild calluses on MTPs Neuro: DTRs 2+ throughout, feet with loss of protective sensation (4.56 monofilament) and vibration **Relevant Medications:** ● Metformin 1,000 mg po BID with food ● Lisinopril 20 mg po once daily ● Zyprexa 5 mg po QHS ● Carbamazepine ER 200 mg po BID ● Lorazepam 1 mg po TID PRN ● Fluoxetine 20 mg po ● Lovastatin 20 mg once daily

Assess	**1.Uncontrolled Type 2 Diabetes Mellitus** **2.Hypertension** **2.Dyslipidemia** **3.Obesity** **3.Bipolar Disorder** **3.Neuropathy** **4.Vaccines**
Plan	**1.Uncontrolled Type 2 Diabetes Mellitus: based on ADA guideline** 1. Target FBG 80-130mg/dL 2. Target A1C <7% 3. Ameliorate symptoms 4. Reduce risk of microvascular and macrovascular complications 5. Reduce mortality, and improve the quality of life **2.Hypertension** 1. Reduce blood pressure to goal <140/90 2. Reduce cardiovascular risk, morbidity, and mortality 3. Improve quality of life **2.Dyslipidemia: based on ADA guideline** 1. Lower total cholesterol to < 200 mg/dL 2. Lower LDL cholesterol to <100 mg/dL 3. Lower TG < 150 mg/dL 4. Reduce risk of MI, angina, heart failure, ischemic stroke, or peripheral arterial disease 5. Prevent macrovascular complications (PVD, CVD, HTN) associated with diabetes **3.Obesity** -Target a BMI between 18-25 kg/m2 to decrease cardiovascular risk factors and decrease the progression of the diabetes. **3.Bipolar Disorder:** 1. Stabilize mood and behavioral symptoms 2. Avoid extrapyramidal side effects 3. Limit manic symptoms such as depression, racing thoughts, loss of interest, feelings of guilt.

	3.Neuropathy -treat early symptoms of neuropathy to prevent ulcers and mortalities like amputations. - Glucose and blood pressure control to slow and prevent progression of nephropathy. **4.Vaccines** Ensure patient is up to date on vaccinations to prevent risk of infections, morbidity and mortality.
Implement	**1.Uncontrolled Type 2 Diabetes Mellitus:** Non-Pharmacological 1. Educate the patient on glycemic control using insulin and oral antidiabetic medication 2. Educate the patient on how to monitor blood glucose in the morning, evening, and before each meal. 3. Recommend at least 150 minutes of moderate-intensity aerobic exercise a week, resistance training three days a week 4. Influenza vaccine annually 5. Pneumococcal polysaccharide 23-valent vaccine 6. Hepatitis B is previously unvaccinated 7. Behavioral support Pharmacological 1. Continue taking Metformin 1000mg BID with food 2. Start Insulin Lantus 10 U/day or 0.15 U/Kg/day, tritate every 3 days needed to achieve FBG target 3. Start Canagliflozin (Invokana) 100mg QD 4. Initiate Aspirin 81mg QD as secondary prevention. **2.Hypertension** Non Pharmacological 1. Recommend DASH diet 2. Decrease alcohol consumption 3. Reduce sodium intake to no more than 2.4mg/day

4. Physical activity 2-4 days a week averaging 40 minutes per session

Pharmacological:

1. Increase Lisinopril from 20mg to 40mg po daily
2. Initiate Chlorthalidone (long acting thiazide) 25mg QD.

2.Uncontrolled dyslipidemia

Non-pharmacologic

1. Exercise for 30 minutes, four to five times a week
2. Modify diet to reduce intake of saturated fats and complex carbohydrates to target BMI < 25 kg/m^2
3. Decrease alcohol consumption
4. Recommend Fish Oil to reduce TG and VLDL for cardioprotection purpose
5. Increase intake of soluble fiber which can reduce TC and LDL by 5 to 20%

Pharmacological

1. Discontinue Lovastatin (moderate intensity)
2. Initiate high intensity Rosuvastatin (Crestor) 20 mg 1 tablet po QD

3.Obesity

Non pharmacological

Healthy lifestyle modifications:
-Nutritional intervention
-Regular physical activity
-Weight loss
-DASH diet to control blood pressure and maintain weight BMI < 25kg/m2

3.Uncontrolled Bipolar Disorder:

1. Discontinue Zyprexa due to higher chance of weight gain
2. Initiate Abilify 10mg po QD (lowest risk of metabolic syndrome)
3. Increase dose of Carbamazepine ER to 400mg po BID
4. Increase dose of Fluoxetine to 50mg po QAM
5. Continue Lorazepam 1mg po TID PRN

3.Neuropathy

	Non-Pharmacological Exercising, stretching, or massaging the affected areas can rapidly dissipate the tingling and sensations of numbness. Pharmacological Continue current increased dose of carbamazepine (400 mg BID) to prevent progression of paresthesia to neurologic pain. **4.Vaccines** Flu vaccine Pneumovax 23 (Pneumococcal Polysaccharide 23-valent) vaccine Hepatitis B vaccination
Follow-up: Monitor and Evaluate	**1.Uncontrolled Type 2 Diabetes Mellitus:** 1. Monitor A1C four times a year until at goal, then two times a year 2. Self-monitor blood glucose in the morning, evening, and before meals 3. Blood pressure check at each doctor visit 4. Foot exam annually 5. Lipid panel, urinalysis, eye exam, dental exam annually Safety: Invokana (Canagliflozin): may increase risk of infection, can cause hyperkalemia, ketoacidosis, hypersensitivity reactions, bone fractures. **2.Hypertension** Efficacy: blood pressure at every visit. Target goal blood pressure is <140/90. Safety: Lisinopril - monitor serum creatinine, BUN, potassium, angioedema, cough **2.Dyslipidemia** Efficacy: Obtain a lipid panel within 4-12 weeks to monitor lipid levels Expected LDL reduction ≥ 50% with high intensity statin Safety: Warn patient about Skeletal muscle effects (Myalgia, myopathy, rhabdomyolysis)

3.Obesity

Monitor weight every 1 - 2 weeks, to assess weight, waist circumference, BMI and blood pressure, then encourage patient to comply with weight loss goals.

3.Bipolar Disorder:

Efficacy:

- Order baseline lab work to include complete blood count (CBC),electrolytes, hepatic function, renal function, electrocardiogram (ECG),fasting serum glucose, serum lipids, thyroid function, and urine drug screen.
- Monitor body weight monthly for 3 months, then every 3 months
- Monitor body mass index, waist circumference, blood pressure, fasting plasma glucose (FBS or HbA1c), and fasting lipid profile at the end of 3 months, then annually
- Monitor for extrapyramidal and anticholinergic side effects at each visit.

Safety:

- Suicide ideation
- May be taken with or without food
- Caution: orthostatic hypotension

3.Neuropathy

Efficacy:

- Monitor for signs and symptoms of neuropathy
- Assess limb pulses at each visit.
- Test for loss of protective sensation.

Safety:

- BUN/Cr
- CBC w/ diff
- LFTs, urinalysis
- eye exam at baseline, then periodically serum drug levels suicidality

4.Vaccines

Efficacy:

	Immunity to the influenza virus, hepatitis B virus, and Pneumococcal infections. Safety: ● Hypersensitivity reactions ● Injection site reactions ● Fever ● Muscle ache

References

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Overview and Discussion of Diabetes Mellitus Type 2

Epidemiology of the Disease

- Globally, about 1 in 11 adults now have diabetes mellitus, 90% of whom have type 2 diabetes mellitus (T2DM).
- The global prevalence of diabetes among adults over 18 years of age has risen from 4.7% in 1980 to 8.5% in 2014.
- Cardiovascular complications are the leading cause of morbidity and mortality, and kidney complications are highly prevalent in patients in Asia with diabetes mellitus.
- Almost half of all deaths attributable to high blood glucose occur before the age of 70 years of age. The World Health Organization estimates that diabetes was the seventh leading cause of death in 2016.

Etiology

- Overweight and obesity
- Sedentary lifestyle
- Increased consumption of unhealthy diets containing high levels of red meat and processed meat, refined grains and sugar-sweetened beverages
- Genetic predisposition

Pathophysiology of the Disease

- Diabetes is a major cause of blindness, kidney failure, heart attacks, stroke and lower limb amputation
- The dysfunction of pancreatic β-cells in decreased insulin secretion, the muscles in inefficient glucose uptake, and the liver in increased endogenous glucose secretion all play a role in T2DM's pathophysiology

Clinical Presentation

- Obesity is the hallmark of T2DM
  - Most children and adolescents are diagnosed with T2DM over the age of 10 years and are in middle to late puberty
  - Acanthosis nigricans and polycystic ovarian syndrome (PCOS), disorders associated with insulin resistance and obesity, are common in youth with T2DM.
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Diagnosis

- The American Diabetes Association (ADA) recommendations suggest screening obese adults (aged ≥18 years) who have one or more diabetes risk factors, as well as screening everyone aged ≥45 years at least every 3 years.
- According to the ADA, negative screening tests should be repeated every 3 years
- For children, T2DM presents itself with glycosuria without ketonuria, absent or mild polyuria and polydipsia, and little to no weight loss
  - When T2DM in its mildest form, the diagnosis is made in an asymptomatic child by screening or during a routine medical check-up by detection of glycosuria, and subsequent hyperglycemia

- In its severest form, the child presents with evidence of severe insulin deficiency, polyuria, polydipsia, and weight loss.

· Usually have elevated laboratory tests
  - Glycated hemoglobin (A1C) test
    - § If greater than 6.5% or higher on two separate tests
  - Random blood sugar test
    - § Regardless of when you last ate, a blood sample showing that your blood sugar level is 200 mg/dL (11.1 mmol/L)
  - Fasting blood sugar test
    - § Fasting blood sugar is 126 mg/dL (7 mmol/L) or higher on two separate tests
  - Oral glucose tolerance test
    - § A reading between 140 and 199 mg/dL (7.8 mmol/L and 11.0 mmol/L) indicates prediabetes.
    - § A reading of 200 mg/dL (11.1 mmol/L) or higher after two hours suggests diabetes.

Treatment guidelines and alternatives

- American Diabetes Association Standards of Medical Care in Diabetes
- American Association of Clinical Endocrinologists Comprehensive Type 2 Diabetes Management Algorithm

Discussion of treatment options, including drugs of choice, alternatives, monitoring, and side effects
Based on ADA guidelines:

· Metformin is the preferred initial pharmacologic agent for the treatment of type 2 diabetes.

- Recommended with lifestyle changes

· If there is established ASCVD or CKD risk, and ASCVD risk predominates, initiate GLP-1 receptor agonists (GLP-1 RA), which has proven cardiovascular disease (CVD) benefit or SGLT2 inhibitors (SGLT2i), which also have CVD proven benefit, with metformin.

- If HbA1c is above target (A1C ≥1.5%), further intensification is required with agents that are proven to have cardiovascular benefit
  - § Add another class (GLP-1 RA or SGLT2i) with proven CVD benefit
  - § DPP-4i if not on GLP-1 RA
  - § Basal insulin (Insulin Degludec or U100 Glargine)
  - § Thiazolidinediones (TZD)
  - § Sulfonylureas (SU)

· If there is an established ASCVD or CKD risk, and HF or CKD risk predominates, initiate SGLT2i, with evidence of reducing HF and/or CKD, if eGFR is adequate, or initiate GLP-1 RA (liraglutide > semaglutide > exenatide ER) with metformin

  - If HbA1c is above target (A1C ≥1.5%):
    - § Avoid TZD in the setting of HF
    - § Choose agents that demonstrate cardiovascular safety, such as DPP-4i (not Saxagliptin), basal insulin, or a sulfonylurea.

· If there is no established ASCVD or CKD, and there is a compelling need to minimize hypoglycemia, initiate a DPP-4i, GLP-1 RA, SGLT2i, or a TZD with metformin

  - If HbA1C above target, give another diabetic medication that does not have any interactions with current therapy (SGLT2i, TZD, DPP-4i, or GLP-1 RA).
  - If HbA1C is still above target, continue to add other agents
  - If HbA1C is still elevated after adding additional agents, consider a later generation sulfonylurea (such as glipizide), or a basal insulin

· If there is no established ASCVD or CKD, and there is a compelling need to minimize weight gain or promote weight loss, give a GLP-1 RA with good efficacy for weight loss, such as Semaglutide, or a SGLT2i with metformin

  - If HbA1C is above target initiate the other drug class not used previously
  - If HbA1C is still above target, and if triple therapy is required or SGLT2i and/or GLP-1 RA is not tolerated, give a DPP-4i, if not already on a GLP-1 RA.
  - If the DPP-4i is not tolerated, give sulfonylurea (glipizide), TZD, or basal insulin cautiously

· If there is no established ASCVD or CKD and cost is a major issue, give sulfonylurea or TZD

  - If HbA1C is above target, give the other drug not used previously
  - If HbA1C is still above target, initiate basal insulin with lowest cost or consider DPP-4i or SGLT2i with lowest cost

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