

 OPTUMHealth™  
Education



**Diabetes**  
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March 2018

## Disclosures

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Vikesh Patel, MD has no relevant financial relationships to disclose.

Bhupendra Rajpura, MD has no relevant financial relationships to disclose.

Kelly Masters PharmD has no relevant financial relationships to disclose.

## Agenda

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- Types of Diabetes and Etiology
- Risk Factors
- Screenings
- Diagnosing
- Medical Care
- Medical Evaluations
- Mental Health Factors
- Lifestyle Managements
- Preventions
- Treatments
- Complications
- Case Study

## Objectives

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### At the end of this activity, participants should be able to:

- Explore clinical features, risk factors, screening, prevention, evaluation and treatment of diabetes.
- State the relationship between physical and behavioral health and its impact on diabetes.
- Discuss the pharmacologic and nonpharmacologic treatments for managing diabetes.
- Discuss the importance of a multidisciplinary approach when treating diabetes.
- Identify optimal clinical management strategies for diabetes through case study examples.

## Types of Diabetes and Etiology

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- **Type I Diabetes**
  - Pancreatic B-cell destruction
- **Type II Diabetes**
  - Progressive loss of B-cell function, typically associated with insulin resistance
- **Gestational Diabetes**
  - Diabetes that develops in the second or third trimester of pregnancy
- **Other Types**
  - Monogenic diabetes, diseases of the pancreas, and drug induced

## Type I Diabetes

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- Previously called *“insulin dependent diabetes”* or *“juvenile-onset diabetes”*
- 5-10% of those with diabetes are type I
- Develops when the immune system destroys pancreatic beta cells and the rate of beta cell destruction is variable

### Risk Factors for Type I Diabetes

- Multiple genetic predispositions
- Environmental factors

**Patients with type I diabetes have a high risk of developing other autoimmune diseases**

## Type II Diabetes

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- Previously called “*non-insulin dependent diabetes*” or “*adult onset diabetes*”
- 90-95% of those with diabetes are type II
- Suffer from insulin deficiency and/or peripheral insulin resistance
- Most are overweight or obese
- Usually goes undiagnosed for many years as hyperglycemia develops gradually

## Gestational Diabetes

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- Gestational diabetes for years had been defined as “*glucose intolerance*” that was first diagnosed during pregnancy
- More women of child bearing age have undiagnosed type II diabetes
- Gestational diabetes is usually diagnosed in the second or third trimester of pregnancy
- Testing should occur at 24-28 weeks of gestation
- Those who have been diagnosed with gestational diabetes have an increased risk of developing diabetes in the future
- Testing for persistent diabetes should occur at 4-12 weeks postpartum
- Lifelong screening should continue and occur at least every 3 years

## Other Types of Diabetes

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Other Types of Diabetes Account for < 5% of Patients with Diabetes

- **Neonatal Diabetes (NDM)**
  - Rare form of diabetes that occurs < 6 months of age
  - 80-85% have an underlying monogenic (genetic mutation) cause
- **Maturity – Onset Diabetes of the Young (MODY)**
  - Effects 1-2% of the diabetes population
  - Onset of hyperglycemia occurs at an early age (typically < 25 years of age)
  - Characterized by impaired insulin secretion with minimal or no defect in insulin action
  - Autosomal dominant inheritance pattern

*It is important to correctly diagnosis patients with diabetes*

## Prediabetes

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- Prediabetes leads to an increased risk of developing diabetes and cardiovascular disease
- Patients with prediabetes may have impaired fasting glucose (IFG) and/or impaired glucose intolerance (IGT)
  - IFG: Fasting blood sugar level is elevated between 100 and 125 mg/dL
  - IGT: Blood sugar level is elevated between 140 and 199 mg/dL after a 2 hour oral glucose tolerance test
- A1C values between 5.7% and 6.4% can also identify those with prediabetes
- Patients should be counseled on their increased risk of developing diabetes and cardiovascular disease

## Diabetes – Major Risk Factors

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- Overweight or obese (BMI  $\geq 25$  kg/m<sup>2</sup> or  $\geq 23$  kg/m<sup>2</sup> in Asian Americans)
- First degree relative with diabetes
- High risk race or ethnicity
- History of cardiovascular disease
- Hypertension
- Low high-density lipoprotein (HDL) and/or elevated triglycerides
- Polycystic ovarian syndrome
- Physical inactivity

## Diabetes and Mental Health

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- A team of providers may be needed to help evaluate and care for diabetes
- Only about one third of patients with diabetes receive mental health screening
- Potential consequences of co-occurring psychiatric disorders in patients with diabetes are:
  - Impaired quality of life
  - Poor treatment adherence
  - Poor glycemic control
  - Increased emergency room visits due to diabetic ketoacidosis
  - Higher frequency of hospitalization
  - Higher rate of absenteeism
  - Increased cost of medical care

## Diagnosing of Diabetes – Type I and Type II

- Diagnosing of type I diabetes usually occurs when individuals present with acute symptoms such as polyuria, polydipsia, and at times diabetic ketoacidosis, along with significantly elevated blood glucose levels
- Diagnosis of type II diabetes
  - Fasting glucose of  $\geq 126$  mg/dL
  - 2 hour glucose tolerance test results  $\geq 200$  mg/dL
  - A1C  $\geq 6.5\%$
- There are various risk assessment tools such as the ADA diabetes risk test which can help guide providers on when to consider testing\*

\* <http://www.diabetes.org/are-you-at-risk/diabetes-risk-test/>

## Diagnosing of Diabetes – Type II

- Testing
  - Fasting glucose (defined as no calorie intake for at least 8 hours)
  - 2 hour glucose tolerance test
  - A1C lab value
  - Clinical symptoms of hyperglycemia
  - Random glucose of  $\geq 200$  mg/dL
- A second test is typically required for confirmation
- Testing for prediabetes/diabetes should be considered for those who are overweight/obese and have one or more risk factor for developing diabetes
- All individuals over the age of 45 should have screening completed
- For children and adolescents that are overweight or obese with additional risk factors, screening should be considered

## Medical Care of Diabetes

- A patient centered collaborative approach should be undertaken to treat diabetes
  - Reviewing and discussing patient preferences, beliefs, health care literacy, and barriers to care is important to achieve a collaborative treatment plan
- The chronic care model is an effective framework to help deliver, optimize and improve diabetes care
  - Delivery system that is proactive vs reactive
  - Self-management support
  - Decision support based on evidence based guidelines
  - Clinical information systems such as patient registries
  - Community resources
  - Health systems

*Treatment goals and plans should be individualized*

## Medical Evaluation of Diabetes

A comprehensive medical evaluation should be completed at the initial visit. This can include:

- Classify type of diabetes
- Review previous treatments
- Assess past hospitalizations
- Review family history
- Review possible disease complications and common comorbidities
- Lifestyle and behavior patterns
- Medication history
- Vaccination history
- Technology use
- Psychosocial conditions
- Diabetes self-management education and support
- Hypoglycemia
- Pregnancy planning
- Physical Exam: height/weight, BMI, BP, skin exam, comprehensive foot exam
- Lab Evaluation: A1C, lipid profile (total, LDL, HDL and triglycerides) LFT's, spot urinary albumin to creatinine ratio, creatinine/estimated GFR



## Medical Evaluation of Diabetes

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### Assessment and Planning

- Set A1C and blood glucose target and monitoring frequency
- Blood pressure goals
- Diabetes education and self-management support
- Cardiovascular risk assessment
- Chronic kidney disease (CKD) assessment
- Lifestyle management
- Medication therapy
- Referrals to specialist and other support staff

## Medical Evaluation of Diabetes

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Follow-up visits should include most of the components of the initial comprehensive medical evaluation:

- Interval medical history
- Assessment of medications, adherence, review for intolerances/side effects
- Physical exam
- Diabetes self-management behavior
- Nutrition
- Psychosocial health
- Other routine health maintenance screenings
- Lab evaluations
  - A1C
  - Lipid profile
  - LFTs, spot urine to creatinine ratio, serum creatinine, eGFR
  - Other testing as appropriate

## Medical Care Immunizations

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Providers should review recommended immunizations based on CDC age specific guidelines

- Annual vaccination against influenza is recommended for all people  $\geq 6$  months of age
- Pneumococcal vaccination with 13-valent vaccine is recommended for children before the age of 2
  - Those with diabetes between the age of 2 and 64 should receive 23-valent vaccine
  - At age  $\geq 65$  regardless of history an additional 23-valent vaccine is recommended
- 3 dose series of hepatitis B vaccine to adult diabetics between the ages of 19-59 is recommended; unvaccinated adults over the age of 59 should consider having the 3 dose series completed

## Diabetes Mental Health Factors

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### Major Depressive Disorder

Affects 6.7% of US adults 18 years or older. Rates of depression among individuals with type I or type II diabetes across the life span are two times greater than in the general population

### Anxiety Disorders

Many patients with diabetes and depression also have comorbid anxiety disorders, such as generalized anxiety disorder, panic disorder, or posttraumatic stress disorder. Anxiety disorders also can occur in patients with diabetes but without comorbid depression

### Eating Disorders

Women with type I diabetes have a 2-fold increased risk for developing an eating disorder and a 1.9-fold increased risk for developing subthreshold eating disorders than women without diabetes

## Diabetes and Mental Health

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### Medications

- Patients taking psychiatric medications such as Zyprexa® (olanzapine), and Seroquel® (quetiapine) are at increased risk of weight gain, developing dyslipidemia and diabetes
- Patients taking anti-depressant medication, such as Remeron® (mirtazapine) are at risk for weight gain

## Diabetes Lifestyle Management

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Lifestyle management is a very important part of diabetes care, as this includes:

- Diabetes self-management education and support (DSMES)
- Physical activity
- Medical nutrition therapy (MNT)
- Smoking cessation counseling
- Psychosocial care

## Diabetes Lifestyle Management

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### Nutrition Therapy

- There is no one size that fits all eating plan for patients with diabetes
- Meal planning should be individualized
- An individualized medical nutritional therapy (MNT) program, preferable provided by a registered dietician
- Emphasis should be on consuming a variety of nutrient dense foods in appropriate portion sizes
- Weight loss > 5% for obese individuals with type II prediabetes/diabetes from the combination of reduced calorie intake and lifestyle modifications is beneficial
- For those with type I diabetes and type II diabetes on flexible insulin therapy, education on carbohydrate counting to determine mealtime insulin dosing is recommended to improve glycemic control

## Diabetes Lifestyle Management

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### Physical Activity Recommendations

- Children and adolescents with prediabetes/diabetes should have 60 min/day or more of moderate to vigorous aerobic activity in addition to vigorous muscle/bone strengthening activities at least 3x per week
- Adults with type I and type II diabetes should have at least 150 min or more moderate to vigorous aerobic activity per week at least 3x per week with no more than 2 consecutive days without activity; 2-3 sessions of resistance training per week is also recommended
- Prolonged sitting should be avoided; sitting for more than 30 minutes at a time should be avoided
- Flexibility and balance training is recommended 2-3x per week for older adults

## Diabetes Lifestyle Management

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### Smoking Cessation

- All patients should be advised not to use cigarettes, other tobacco products or e-cigarettes
- There are no studies showing e-cigarettes are a healthier alternative to smoking or that they can help with smoking cessation
- Review smoking cessation counseling and support available through quit lines and add pharmacologic therapy if appropriate
- Smoking cessation counseling should be a routine part of diabetes care

## Diabetes Lifestyle Management

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### Psychosocial Issues

- Can include review of:
  - Attitudes about diabetes
  - Expectations for treatments and outcomes
  - Affect or mood
  - General and diabetes related quality of life
  - Review of available resources such as financial, social and emotional
  - Routine screening for distress, depression, anxiety, disordered eating and cognitive capacities should be considered
  - Diabetes Distress

## Obesity

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- Patients with diabetes should have their body mass index (BMI) calculated at every visit to identify patients that are overweight and obese
- Remember: In the Asian American population, the BMI cutoff points to define overweight and obesity are lower
- Treatment Options
  - BMI 25-26.9 (23-26.9 Asian Americans): Diet, physical activity and behavioral therapy
  - BMI 27-29.9: Pharmacotherapy can be considered
  - BMI 30-34.9 (27.5-32.4 Asian Americans): Metabolic surgery may be considered

## Obesity and Weight Loss

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- Overweight and obese patients that are ready to work on weight loss program should have a weight loss goal of > 5% through a combination of diet, physical activity and behavioral therapy
- This intervention should be intensive with a goal to achieve a 500-750 kcal/day calorie deficit
- Diets should be individualized to determine the appropriate mix of protein, carbohydrates and fat
- Those that are successful in short term weight loss should be enrolled in a long term weight maintenance program
- There are various weight loss medications which can be effective in combination with lifestyle modifications
- Risk vs benefits should be reviewed with the patient
- If there is < 5% weight loss after 3 months, or if there are any safety or side effect issues the treatment should be discontinued

## Obesity and Metabolic Surgery

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- Metabolic surgery can be an effective treatment for overweight/obese patients with type II diabetes
- In appropriate patients metabolic surgery should be a recommended treatment option for those with BMI >40 (37.5), and in those with BMI 35-39.9 (32.5-37.4) when diabetes is not well controlled despite lifestyle modifications and optimal medical therapy
- Metabolic surgery may be considered in those with a BMI 30-34.9 (27.5-32.4) if diabetes is not well controlled despite optimal medical therapy

## Type II Diabetes Prevention

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- Those who have been diagnosed with prediabetes should be monitored at least yearly for the development of diabetes
- Prediabetes patients should be referred to an intensive behavioral lifestyle intervention program
- These programs should be modeled after the diabetes prevention program (DPP) which demonstrated that an intensive lifestyle intervention can reduce the future risk of diabetes significantly
- Goals of the program are to achieve and maintain a minimum of 7% weight loss and 150 minutes of physical activity per week
- Technology platforms may be able to assist and deliver core components of the DPP
  - Virtual small groups
  - Internet social networks
  - Mobile applications

## Type II Diabetes Prevention

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- Glucophage® (metformin) should be considered to help prevent progression to type II diabetes
- Those with BMI  $\geq 35$  kg/m<sup>2</sup>, < 60 years of age and women with prior history of GDM, care providers should consider Glucophage® (metformin) therapy
- Prediabetes should be screen and treated for modifiable risk factors for cardiovascular disease

## Diabetes Treatment Targets

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### A1C Goals

- In most non-pregnant adults A1C goal should be < 7%
- A1C goal of < 6.5 may be suggested for select individuals if it can be attained without hypoglycemia or adverse effects
- A1C goal of < 8% may be appropriate for patients with significant comorbidities

### Blood Glucose Goals

- In most non-pregnant adults, the goal of preprandial blood glucose should be between 80-130 mg/dL, and < 180 mg/dL postprandial

### Hypoglycemia

- Glucose values of  $\leq 70$  mg/dL should trigger review of diabetic treatment regimen
- Glucose values of  $\leq 54$  mg/dL represents clinically significant hypoglycemia
- Severe hypoglycemia is associated with significant cognitive impairment requiring assistance from another person



## Diabetes Treatment Monitoring

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### Self-Monitoring of Blood Glucose

- Most individuals treated with intensive insulin regimens should self-monitor blood glucose. This is typically completed prior to meals and snacks, at bedtime, prior to exercising and after meals if needed.
- Those who are not treated with intensive regimens or who are taking non insulin based treatment, they should discuss with their provider if self-monitoring is needed

### Continuous Glucose Monitoring

- Useful in adults with type I diabetes who are not meeting glycemic targets

### A1C Testing

- Should be completed at least 2 times per year in patients meeting targets and quarterly for those not meeting goals or when there has been a change in therapy
- More frequent testing may be indicated in patients who are unstable or intensively managed

## Diabetes Treatment: Type I

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- Multiple daily injections combining both short and long acting insulins
- Rapid acting insulin to cover prandial needs reduce the risk of hypoglycemia
- Insulin Pumps (continuous subcutaneous insulin infusion)
- Continuous glucose monitors
- The first hybrid closed loop system pump has been approved by the FDA

## Diabetes Treatments: Type II

- Glucophage® (metformin) monotherapy should be started upon the diagnosis of type II diabetes if tolerated, unless there are contraindications
- If A1C is  $\geq 9\%$  dual therapy may be considered
- If A1C is  $\geq 10\%$  or patients have symptoms of hyperglycemia insulin therapy should be considered
- In individuals without atherosclerotic cardiovascular disease who are not meeting A1C goals on Glucophage® (metformin) monotherapy, the choice for additional therapy is at the discretion of the provider and patient
- For individuals with atherosclerotic cardiovascular (CV) disease the second agent should be on that reduces CV risk
  - Jardiance® (empagliflozin -SGLT2 inhibitor) and Victoza® (iraglutide -GLP-1 agonist) have been shown to reduce major CV events and mortality
  - Invokana® (canagliflozin -SGLT2 inhibitor) has been shown to reduce major CV events

## Diabetes Treatments: Type II Insulin Therapy

- Type II diabetes is a progressive disease and many patients may eventually require insulin therapy
- Education and support should be given to include topics such as: medications, insulin, self-monitoring, and diet
- A self-titration algorithm for insulin should be reviewed with patients to improve glycemic control
- Typically providers will start with basal insulin coverage usually in combination with Glucophage® (metformin) therapy
- If A1C is not controlled the addition of one bolus rapid acting insulin can be added prior to the largest meal
- Alternatively basal insulin can be changed to a premixed insulin to be taken 2x per day before breakfast and dinner, or the addition of a GLP-1 to basal coverage can be considered
- If A1C is still not at goal, additional rapid acting insulin injections before meals, or increasing premixed insulin to 3x per day should be considered

## Diabetes Comorbidity Treatments

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- Cardiovascular disease is the major cause of morbidity and mortality in those with diabetes
- There are common risk factors that coexist with diabetes such as hypertension and dyslipidemia
- Diabetes is also an independent risk factor for cardiovascular disease
- Hypertension:
  - BP  $\geq$  140/90 mmHg
  - Lower target of 130/80 may be considered for those at high risk for cardiovascular disease

## Diabetes Treatments

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### Antiplatelet Therapy

- Aspirin<sup>™</sup> (acetylsalicylic acid-NSAID) 75-162 mg/day for those with a history of atherosclerotic cardiovascular disease
- Plavix<sup>®</sup> (clopidogrel) 75 mg/day can be used as alternative for those with aspirin allergy
- Primary prevention with Aspirin<sup>™</sup> (acetylsalicylic acid-NSAID) 75-162 mg/day can be considered in high risk individuals

## Diabetes Treatments

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### Lifestyle Modifications

- Weight loss and reduction in saturated fat, trans fat and cholesterol intake
- Increase physical activity, fiber, and omega 3 fatty acids

### Statins Indicated with These Risk Factors

- High intensity statins should be started in all patients with diabetes and atherosclerotic heart disease
- Age <40 with atherosclerotic risk factors, moderate intensity statin should be considered
- Age >40 without ASCVD, moderate intensity statin should be considered
- If low-density lipoprotein (LDL) is >70 on maximally tolerated statin, consider adding additional LDL lowering treatment

## Diabetes Complications

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### Diabetic Kidney Disease

- Spot urinary albumin to creatinine ratio at least yearly
- Occurs in 20-40% of patients
- Is a leading cause of end-stage renal disease (ESRD)
- Test type I diabetes with disease duration of at least 5 years
- Test type II diabetes at time of diagnosis and yearly thereafter
- All patients with diabetes with hypertension

### Diabetic Retinopathy

- Glaucoma, cataracts and other eye disorders are common in patients with diabetes
- Type I diabetes should start routine screening within 5 years of diagnosis
- Type II diabetes should start routine screening at time of diagnosis

## Diabetes Complications

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### Diabetic Neuropathy

- Type I diabetes screening should start 5 years after diagnosis
- Type II diabetes screening should start at time of diagnosis
- A full comprehensive foot exam should occur annually
- All patients with diabetes should have their feet examined at every visit
- General foot care and education should be provided to all those patients with diabetes

## Case Study

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Mr. Smith is a 51 year old male with history of smoking, and obesity. He has not been seen by a doctor in years. During a recent health screen he was noted to have an elevated A1C. He followed up with a primary care provider and the diagnosis of Type II Diabetes was confirmed.

Height: 5'10

Weight: 260 lbs

BMI: 37

A1C: 8.5%

Blood pressure: 145/85

Pulse: 85

He does not exercise and has a job where he sits for long periods of time. He was started on Glucophage<sup>®</sup> (metformin) therapy and was advised to follow up in 3 months. He has enrolled in case management and is looking for support to help manage his disease.

## Case Study

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- What are some of his major risk factors for developing diabetes?
- What additional clinical information would you like in this case?
- What are important components of his medical evaluation we should assess for?
- What referrals should be considered for Mr. Smith?
- How much physical activity would be recommended?
- What should a potential weight loss goal target be?
- What should their A1C target be?
- Should a statin be considered?
- Should Aspirin™ be considered for primary prevention?
- When and how often should follow up visits be scheduled?



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Thank You.

Questions? Contact OptumHealth Education at [moreinfo@optumhealtheducation.com](mailto:moreinfo@optumhealtheducation.com)

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