Diabetes Mellitus

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Diabetes Mellitus

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Definition

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- Diseases of abnormal carbohydrate metabolism that present with high blood sugars (hyperglycemia)
  - Associated with a relative or absolute impairment in insulin secretion that is accompanied with varying degrees peripheral resistance to insulin
  - Recommendations are updated
- Usually due to progressive loss of insulin secretion combined insulin resistance
- This results in relative insulin deficiency

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Predominate Types

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- Type 2 Diabetes Mellitus
  - Most Common
  - Greater than 90% of adults with DM
- Type 1 Diabetes Mellitus
  - 5-10% in adults
- Gestational Diabetes
- Other causes of persistent hyperglycemia in adults
  - Severe illness without known DM
  - Stress hyperglycemia hormones

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Type 2 Clinical Presentation

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- Most are asymptomatic at presentation
  - Usually detected on routine evaluation
  - The frequency of symptomatic initial presentations decreasing
    - Due to earlier detection
  - Other risk factors
    Obesity
    Positive family history

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Type 2- Classic Symptoms

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- Polyuria “I have to go to the bathroom all the time”
- Polydipsia “I stay thirsty all the time”
- Nocturia “I have to go to the bathroom at night”- multiple times
- Blurred vision “I can’t see clearly”
- Weight loss “I don’t know why I am losing weight

- Crises type Usually hyperosmolar hyperglycemic

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Cycle

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- Increase in blood glucose results in a greater sugar load than the kidneys can reabsorb
- That decreased renal reabsorption leads to higher sugar levels in the urine
- Higher glucose in the urine causes
  - Osmotic diuresis   Solids attracting liquids
  - Hypovolemia   Decreased fluids

Sugary drinks increase blood sugar and urination

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Type 1 DM

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- Results from an autoimmune (body fighting itself) destruction of beta cells in the pancreas
- Leads to an absolute insulin deficiency
- Adults-   5-10%
- 25% of adults with Type 1 DM present in Diabetic ketoacidosis (DKA)
- Adults may have a more prolonged onset with polyuria, polydipsia and fatigue

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Diagnostic Studies Types

- Fasting Plasma Glucose (FPG)
- 75 gram oral glucose tolerance (OGTT/GTT)
- Glycated hemoglobin (A1C)
- Correlations between tests are not perfect
  - Various tests may not completely agree
- Those with higher values in the prediabetes range show increased risks

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End Organ Damage

- Renal
- Cardiovascular
- Hepatic
- Ophthalmologic
- Nervous System
- Skin
- May result in behavioral changes

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Cardiac

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- Correlation between hyperglycemia and cardiac risk
- Traditional CVD risk factors are stronger predictors of CVD
  - Age
  - Gender
  - Blood pressure
  - Total and HDL cholesterol
  - Smoking
  - Diabetes Mellitus
    - More dominant role with Type 1 DM
  - Multiple risk factors have an increased risk for CVD

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FPG Fasting Plasma Glucose)

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- As name implies member must be fasting
- Glucose greater than 125 mg/ dL, (126 mg/dL and greater)

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A1C (HG A1C)

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- Value of 6.5 % or greater
- More standardization than the past
- Prevalence of diabetic retinopathy detected better with A1C of 5.5% compared to FPG 0f 104
- Considered to be least restrictive
  - Not required to be fasting

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Glucose Tolerance Test (GTT)

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- 2 hour post- ingesting 75 grams of glucose
- Plasma level 200 mg/dL or greater
- Most commonly used to screen for gestational diabetes

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Prediabetes

- FPG IGT Between 100 and 125mg/Dl
  - » WHO Between 110-125mg/DL
- GGT IGT Between 140 to199mg/dL
  - » WHO Between 140 less than 200 mg/dL and
  - » FPG less than 126 mg/dL
- A1C Between 5.7 to 6.5%

- Testing should be repeated annually

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Newly Diagnosed Evaluation

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- General H and P- onset symptoms, asymptomatic labs, nutrition, weight history, physical activity, CVD risk factors, , history of diabetic complications-crises, family history and current medications
- In last 3 months- A1C
- In last year
  - Fasting lipid panel
  - Urine albumin to creatinine ratio-spot urine
  - Serum creatinine with estimated glomerular filtration rate (eGFR)
- Type 1- TSH, Celiac antibodies

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Differentials

- Type 2 usually distinguished by presentation
- Type 1 may require additional testing
  - Antibodies
  - Glutamic acid decarboxylase (GAD-65), insulin
  - Tyrosine phosphatase 2
  - May require 2 tests
    - islet cell antibodies
    - GAD-65
- Paired C-Peptide and glucose level
  - Low C-Peptide and hyperglycemia suggestive of Type 1 DM

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Screening for Antibodies

- Weight loss
- ketonuria
- Lean body
- Personal History of autoimmune disease
- Strong family history of autoimmune disease
- Overweight or obese adolescents or young adults with presumed Type 2 DM

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Treatment for Type 2 DM

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- Weight loss
- Healthy eating
- Regular exercise
- Possibly Diabetes medication/ insulin
- Blood Sugar monitoring

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Weight loss

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- Losing 5 to 10 % of body weight can make a difference
- Sustained weight loss of 7% is ideal

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Healthy Eating

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- Fewer calories
- Fewer refined carbohydrates-sweets
- Fewer foods with saturated fats
- More fruits and vegetables
- Foods with higher fiber content
- Consult with registered dietician

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Exercise

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- Regular aerobic exercise
  - Check with PCP first
- 30 to 60 minutes of moderate or 15 to 30 minutes of vigorous exercise at least 5 days a week
  - Aerobic 5 days a week
  - Resistance or yoga twice a week
- Check blood sugar level before exercise
- Decrease inactive time- watching TV

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Blood glucose monitoring

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- Multiple times a day
- Continuous glucose monitoring

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Medications

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- Insulin Sensitizers
- Biguanides
- Thiazolidinediones
- Insulin secretagogues
- Sulfonylureas
- Glinides
- Alpha-glucosidase inhibitors
- Incretins
- Others

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Table 3: Noninsulin Therapies

Noninsulin therapies

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Subgroup	Generic name (Brand)	Route	Comments
Insulin sensitizers			
Biguanides	Metformin	Oral	Weight loss No hypoglycemia GI upset
Thiazolidinediones	Rosiglitazone Pioglitazone	Oral	Weight gain Peripheral edema
Insulin secretagogues			
Sulfonylureas	Chlorpropamide Glimepiride Glipizide Glyburide Tolazamide Glyburide	Oral	Hypoglycemia Weight gain
Glinides	Nateglinide Repaglinide	Oral	Weight gain
Alpha-glucosidase inhibitors			
	Acarbose Miglitol	Oral	GI upset No hypoglycemia
Incretins			
GLP-1 receptor agonists			
Short-acting (4-6 hrs)	Exenatide (Byetta)	SC	Weight loss GI upset
Intermediate-acting (24 hrs)	Liraglutide (Victoza)	SC	Weight loss Nausea
Long-acting (7 days)	Exenatide ER (Bydureon) Albiglutide (Tanzeum) Dulaglutide (Trulicity)	SC	Weight loss Nausea
DPP-4 inhibitors	Sitagliptin (Januvia) Saxagliptin (Onglyza) Linagliptin (Tradjenta) Alogliptin (Nesina)	Oral	No hypoglycemia Nasopharyngitis Weight neutral
Others			
Pramlinitide	Pramlinitide (Symlin)	SC	Weight loss GI upset Adjunctive treatment with insulin
Rapid-release bromocriptine	Bromocriptine	Oral	Take within 2 hrs of awakening Nausea, stuffy nose
SGLT-2 inhibitors	Canagliflozin (Invokana) Dapagliflozin (Farxiga) Empagliflozin (Jardiance)	Oral	Polyuria UTIs

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Types of insulin

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Rapid-acting
Aspart (Novolog)
Lispro (Humalog)
Glulisine (Apidra)
Short-acting
Regular insulin (Humulin R, Novolin R)
Intermediate-acting, basal
Insulin NPH
Long-acting, basal
Insulin glargine (Lantus, Toujeo, Basaglar)
Insulin detemir (Levemir)
Insulin degludec (Tresiba)
Premixed
75% Insulin lispro protamine/25% insulin lispro (Humalog mix 75/25)
50% Insulin lispro protamine/50% insulin lispro (Humalog mix 50/50)
70% Insulin lispro protamine/30% insulin aspart (Novolog mix 70/30)
70% NPH insulin/30% regular
Inhaled
Technosphere insulin-inhalation system (Afrezza))

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Diabetic Foot Care Education

- Inspect feet daily
- Have your PCP check your feet at each office visit
- Monofilament test for neuropathy
- Bath feet in lukewarm water- check temperature before placing feet in water
  - Be gentle- use a soft washcloth or sponge
  - Dry feet by blotting or patting
- Moisturize feet daily but not between toes
- Cut nails carefully
- Dry feet thoroughly
- Do not walk bare feet/ wear shoes or slippers

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Foot Care continued

- Always have corns or calluses treated medically never personally
- Wear clean, dry socks
  - There are special diabetic socks
- Wear socks to bed if feet get cold-no heating pad or hot water bottle
- Shake out shoes before wearing them
- Keep feet warm and dry
- Consider using powder on soles of the feet if there is excessive sweating
- Get periodic foot exams by a specialist

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Resources and Support

- Academy of Nutrition and Dietetics
- American Association pf Clinical Endocrinologists
- American Diabetes Association
- American Association of Diabetic Educators
- Juvenile Diabetes research Foundation International
- National Institute of Diabetes and Digestive and Kidney Diseases

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Support Groups

- Local groups- many are free
- Houston Diabetes resource center

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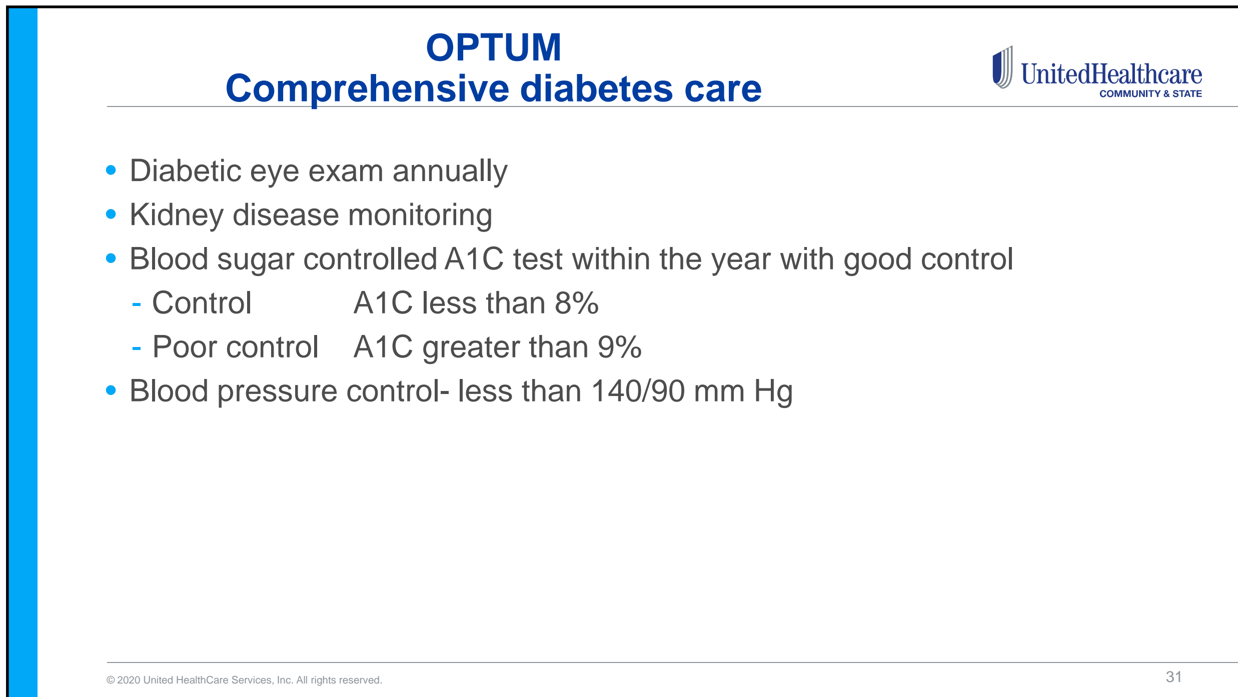

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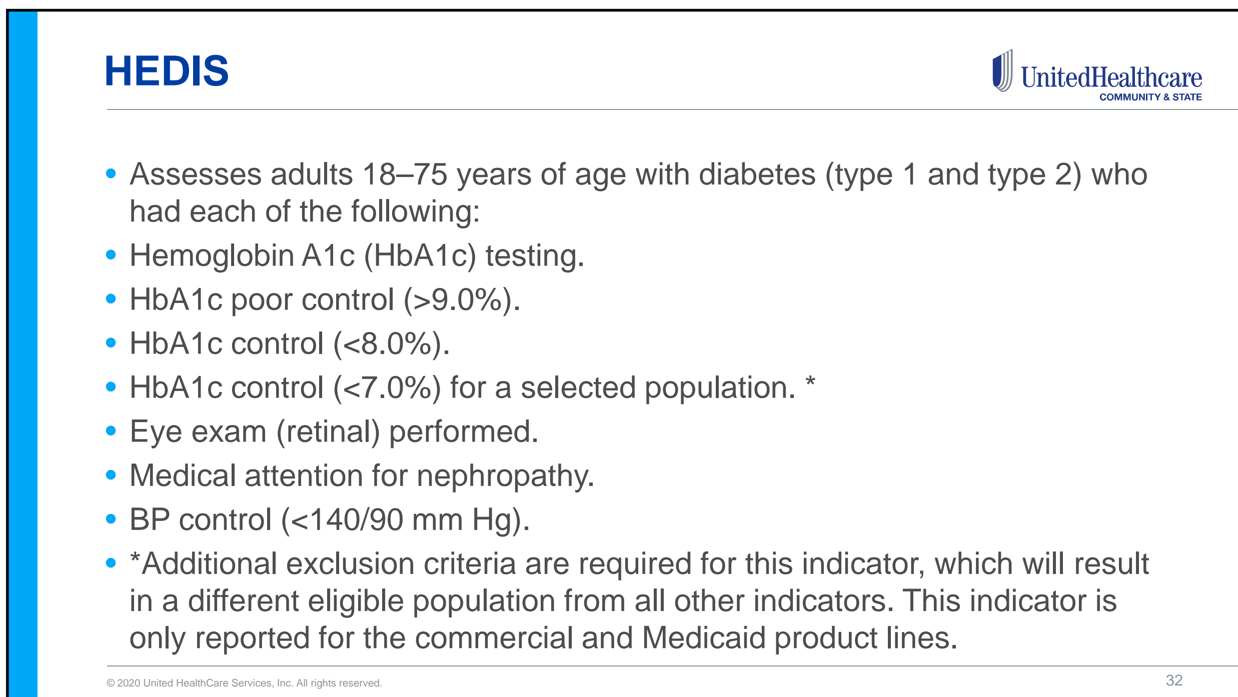

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Diabetes Mellitus

- QUESTIONS?

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