Clinical Cases in Diabetes Management

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Objectives

- State the prevalence of Diabetes Mellitus in Ohio
- State the percentage of diabetic patients in the U.S. treated by Primary Care Physicians
- List the routine labs/exams that should be performed for patients with Diabetes Mellitus
- States the percentage of people with diagnosed Diabetes Mellitus who are able to achieve the recommended glycemic, blood pressure, and LDL cholesterol target levels at the same time
- List and describe the medications used for glycemic control in Diabetes Mellitus Type 2
- Choose an appropriate glycemic control treatment plan for your patients with Diabetes Mellitus

Prevalence of Diabetes Mellitus in Ohio

11% of adults in Ohio have been diagnosed with Diabetes

The State of Obesity 2016 [PDF]; 2010 diabetes, hypertension, heart disease, arthritis and obesity-related cancer numbers and projected cases of obesity-related health problems related are from F as in Fat 2012 [PDF].
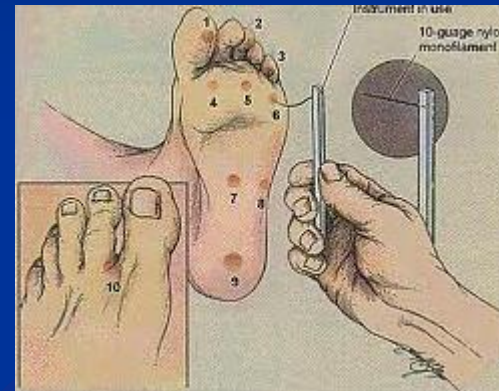
Percentage of Diabetic Patients in the U.S. Treated by Primary Care Physicians

Primary Care physicians treat at least 90% of the patients in the United States with Diabetes Mellitus

https://dx.doi.org/10.4065%2Fmcp.2010.0466

Routine Labs/Exams That Should Be Performed For Diabetic Patients

- A1C
- Blood Pressure
- Lipids
- Foot Exam
- Eye Exam
- Urine Microalbumin

Percentage of People with Diagnosed Diabetes Mellitus who are able to Achieve the Recommended Glycemic, Blood Pressure, and LDL Cholesterol Target Levels at the Same Time

Only 1 in 8 people with diagnosed DM was able to achieve the recommended glycemic, blood pressure, and LDL cholesterol target levels at the same time

Note: 2013 ACC/AHA guideline does not endorse a treat-to-target strategy but instead specifies the appropriate intensity of statin for each risk category.

HgbA1C

Current Percentage: %
Date:
Your Personal Goal: %

A1C (%) (ADA Goal < 7%)	Average Blood Sugar Level (mg/dL)
13	330
12	300
11	270
10	240
9	210
8	180
7	150
6	120
5	90

Target cholesterol goals:

Total cholesterol: less than 200 mg/dL
HDL cholesterol: greater than 40 mg/dL for men
                            greater than 50 mg/dL for women
LDL cholesterol: less than 100 mg/dL for most
                            less than 70 mg/dL if there is a history of
                                     heart disease
Triglycerides: less than 150 mg/dL
Target Blood Pressure: less than 130/80 for most
                            less than 125/75 if there is a history of kidney disease

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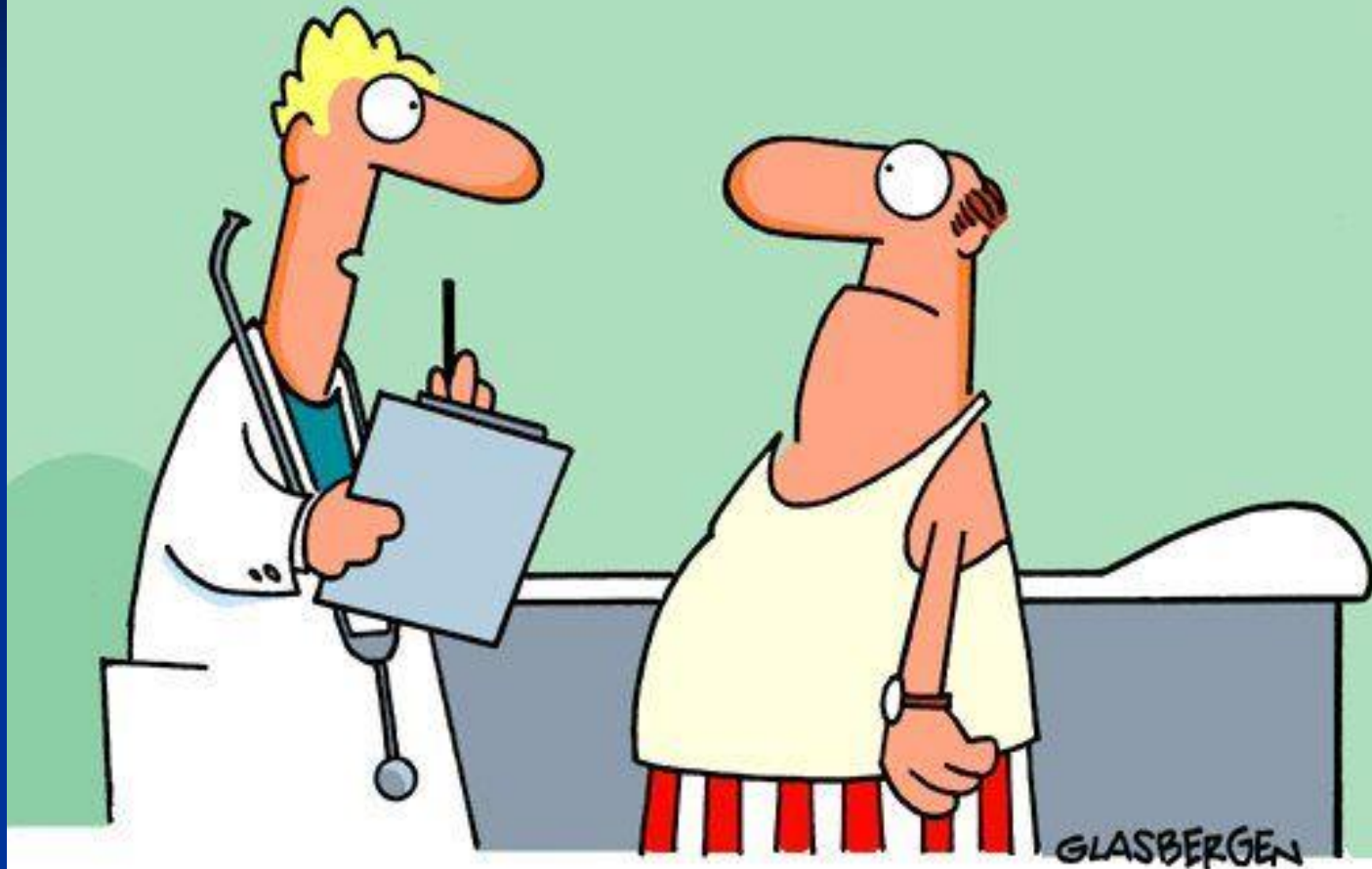
"What fits your busy schedule better, exercising one hour a day or being dead 24 hours a day?"

Lifestyle changes should always be encouraged to help to get diabetic patients to goal

Note: Dieticians and Diabetic educators can be very helpful

Medications for DM Type 2

Medications for DM Type 2

Biguanides – Metformin (Glucophage)

Note: New guidelines related to Metformin and GFR

US Food and Drug Administration. FDA Drug Safety Communication: FDA revises warnings regarding use of the diabetes medicine metformin in certain patients with reduced kidney function. April 8, 2016. http://www.fda.gov/downloads/Drugs/DrugSafety/UCM494140.pdf Accessed May 12, 2016.

Medications for DM Type 2

Secretagogues

- sulfonylureas – Glyburide (DiaBeta),
                        Glimepiride (Amaryl),
                        Glipizide (Glucotrol)

- non-sulfonylureas – Nateglinide (Starlix),
                            Repaglinide (Prandin)

Note: Risk of low blood sugar

Medications for DM Type 2

Thiazolidinediones (TZDs) – Pioglitazone (Actos), Rosiglitazone (Avandia)

Medications for DM Type 2

Alpha-Glucosidase Inhibitors - Acarbose (Precose),
Miglitol (Glyset)

Medications for DM Type 2

Bile Acid Sequestrants – Colsevelam (Welchol)

Medications for DM Type 2

GLP-1 Agonists - Exenatide (Byetta/Bydureon

- Liraglutide (Victoza)

- Lixisenatide (Lyxumia)

- Albiglutide (Tanzeum)

- Dulaglutide (Trulicity)

Note: Be sure to discuss Hx of pancreatitis/thyroid tumors

Medications for DM Type 2

DPP-4 Inhibitors – Sitagliptin (Januvia),
Saxagliptin (Onglyza),
Linagliptin (Tradjenta),
Alogliptin (Nesina)

Medications for DM Type 2

SGLT 2 Inhibitors - Canagliflozin (Invokana),
- Dapagliflozin (Farxiga),
- Empagliflozin (Jardiance)

Medications for DM Type 2

Bolus Insulin   - Lispro (Humalog

                          - Aspart (Novolog)

                          - Glulisine (Apidra)

Basal Insulin   - Glargine (Lantus, Toujeo)

                          - Detemir (Levemir)

                          - Degludec (Tresiba)

Clinical Case #1

■ James is a 43 year old male presenting as a new patient with complaint of "my previous doctor never examined my hand"; Hx of Bipolar Disorder; Hx of DM Type 2; Ran out of his meds (Glipizide and Metformin) 2 weeks ago; Not checking sugars at home; A1C on today is 11.4%. Non-fasting FSBG 585; No other specific complaints

Clinical Case #1

What would you do next?

Clinical Case #1

- Give 2 large glasses of water
- Assess for signs/symptoms of DKA
  - UA for ketones (Mild)
  - Dehydration (not present)
  - Nausea/Vomiting/Diarrhea/Abdominal Pain
   (not present)
- Given 20 units of Novolog and sample pen/needles
   and asked to call back in 2 hours with FSBG
- Given log sheets and asked to check sugars AC and
   bedtime and keep log of sugars and come back
   tomorrow for appt.
- Resume Glipizide and Metformin

Blood Glucose Log

Name: _____   Date: _____

Diabetes Medication(s)/Dose(s): _____

Insulin(s)/Dose(s): _____

Carb Ratio(s): _____

Date	3 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 AM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM	12 PM

Clinical Case #1

- He called with his FSBG in 2 hours that was 532 ….asked to give 20 units of Novolog and call in 2 hours
- Called with FSBG at bedtime that was 548 ...asked to give 20 units of Novolog and call in AM with sugar

Blood Glucose Log

Name: _____

Date: _____

Diabetes Medication(s)/Dose(s): _____

Insulin(s)/Dose(s): _____

Carb Ratio(s): _____

Date	3 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 AM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM	12 PM	12:30
1-10					(scribble)							598	532	528	532	548	548				437
1-11				341					576	769											
1-12																					
1-13																					
1-14																					
1-15																					
1-16																					

Clinical Case #1

- He was started on Tresiba and Novolog ..see insulin dosing sheet

Insulin Dosing

1. Tresiba   __10___ units at bedtime

2. Novolog   ___3_____ units before breakfast

    ___3_____ units before lunch

    ___3 _____ units before dinner

    PLUS a correction scale of the following:

If blood sugar is:

Blood sugar	Dose	Instructions
0 – 50	_____units	Treat hypoglycemia first; Provide meal insulin when blood sugar is improved to greater than 70
51 – 70	_____units	Treat hypoglycemia first; Provide meal insulin when blood sugar is improved to greater than 70
71 – 100	_____units	Provide meal insulin about half-way through meal
101 – 150	_____units	Provide insulin before meal as usual
151 – 200	_____units	Provide insulin before meal as usual
201 – 250	_____units	Provide insulin before meal as usual
251 – 300	_____units	Provide insulin before meal as usual
301 – 350	_____units	Provide insulin before meal as usual
Greater than 350	_____units	Provide insulin before meal as usual and call Dr. Cook

Clinical Case #2

- Tina is a 46 year old female new patient seen for uncontrolled DM Type 2. This was diagnosed about 7 years ago on routine blood work.   She is currently on Metformin 2000 mg daily, Actos 30 mg daily, and Lantus insulin 75 units SubQ qHS. A1C on today is 8.9%. She relates that the Lantus insulin has been gradually increased to help to get better control of her sugars.   She is concerned as she has been waking up feeling weak, sweaty, and lightheaded. She does not bring in a log of her blood sugars.

Clinical Case #2

- PMHx: DM Type 2, HTN, Hyperlipidemia
- PSHx: Hernia repair
- Meds: Metformin, Actos, Lantus insulin, Lisinopril, Lipitor, ASA
- Allergies: NKDA
- SocHx: Denies tobacco, alcohol, illicit drug use;
  Walks 30 min per day, 5 days per week;
  Eats 3 meals per day, with supper being the

  largest meal

Clinical Case #2

- FamHx: Mother with DM Type 2, CAD, HTN; Father with HTN; No brothers or sisters

- ROS: As described above; Has not checked blood sugars when symptoms occur. Eating breakfast helps

- Vitals: BP 132/84 HR 68 RR 14
                    BMI 32; FSBG 284 (2 hours after breakfast)

- Exam is unremarkable

Clinical Case #2

How would you treat her uncontrolled DM??

Clinical Case #2

- Tina was asked to check her sugars fasting, at bedtime, and occasionally 2 hours after eating; Asked to bring log to next appointment in 1 week; Call with any sugars below 60.

- She was also asked to check her sugar whenever she feels her sugar is low; Discussed treatment of hypoglycemia …

- Lantus was decreased to 60 units at bedtime

Note: "Rule of 15s" for treatment of low sugars

Clinical Case #2

Date	AM	PP Breakfast	PP Lunch	PP Supper	Bedtime
5/11/16	65		253		332
5/12/16		214			357
5/13/16	63			421	322
5/14/16	93	316			296
5/15/16			279		421
5/16/16	62				321
5/17/16		297	347		

What pattern do you see?

Clinical Case #2

- Tina is having AM lows, likely from too much basal insulin (Lantus)
- She is also having postprandial highs …she needs meal-time coverage
- What would you use for meal-time coverage?

Note: Log sheets are a necessary tool in the treatment of diabetes

Clinical Case #2

- Tina was started on Novolog insulin 5 units before breakfast and lunch, and 7 units before supper. Asked to check her sugars before each meal and to add 1 unit of Novolog for every 50 points above 150 (correction scale)
- Would you continue with 60 units of Lantus at bedtime???

Blood Glucose Log Sheet

Patient:_____ Fax To:_____

Phone (home)_____ DOB:_____

(work):_____ ext:_____

Basal Rate	Time	Rate
1	11 AM	
2		
3		
4		
5		

Meal Bolus- 1 unit insulin covers this many grams carbohydrate
Insulin Sensitivity Factor- 1 unit insulin lowers BG _____ mg/dl
(Current BG – Target) ÷ Sensitivity Factor = Corrected dose
BG Target Range Daytime = 90 - 100 mg/dl
BG Target Range Nighttime = 100 – 120 mg/dl

Carb Ratio: | B | L | D |

Date ___/___/___	12 AM	3 AM	Pre-Breakfast	Post-Breakfast	Pre-Lunch	Post-Lunch	Pre-Dinner	Post-Dinner	Bedtime
Time									
Blood Glucose									
Carb Grams									
Food Dose									
Correction Dose									
Total Bolus									

Date:___/___/___	12 AM	3 AM	Pre-Breakfast	Post-Breakfast	Pre-Lunch	Post-Lunch	Pre-Dinner	Post-Dinner	Bedtime
Time									
Blood Glucose									
Carb Grams									
Food Dose									
Correction Dose									
Total Bolus									

Date ___/___/___	12 AM	3 AM	Pre-Breakfast	Post-Breakfast	Pre-Lunch	Post-Lunch	Pre-Dinner	Post-Dinner	Bedtime
Time									
Blood Glucose									
Carb Grams									
Food Dose									
Correction Dose									
Total Bolus									

Date ___/___/___	12 AM	3 AM	Pre-Breakfast	Post-Breakfast	Pre-Lunch	Post-Lunch	Pre-Dinner	Post-Dinner	Bedtime
Time									
Blood Glucose									
Carb Grams									
Food Dose									
Correction Dose									
Total Bolus									

Date: ___/___/___	12 AM	3 AM	Pre-Breakfast	Post-Breakfast	Pre-Lunch	Post-Lunch	Pre-Dinner	Post-Dinner	Bedtime
Time									
Blood Glucose									
Carb Grams									
Food Dose									
Correction Dose									
Total Bolus									

Clinical Case #3

- Nancy is a 35 year old female new patient seen for uncontrolled DM Type 2. She was diagnosed with DM Type 2 about 2 years ago after experiencing the "polys". She was started on Glucophage and Actos. Her sugars "did well" with these medications initially, but over the past year, her A1C has climbed to 9.4%.

Clinical Case #3

- PMHx: DM Type 2
- PSHx: None
- Meds: Actos, Glucophage
- Allergies: NKDA
- SocHx: Denies tobacco, alcohol, illicit drugs; Runs 2 miles per day; Weight training 3 days per week
- FamHx: Mother with "thyroid problem"

Clinical Case #3

ROS: Positive for the "polys" and weight loss of 9 pounds over the past 3 months

VS: BMI: 24   BP 124/76   HR 68   RR 15

    FSBG: 225 (3 hours after breakfast)

Exam: Unremarkable

Labs from prior PCP show CBC and CMP WNL. Lipids show TC 166, Trigs 126, HDL 48, LDL 92

Clinical Case #3

Glucometer Print-out

Date	AM	PP Breakfast	PP Lunch	PP Supper	Bedtime
3/11/16	232				
3/12/16	186				
3/13/16	242				
3/14/16	190				
3/15/16					
3/16/16	212				
3/17/16					

Thoughts?

Clinical Case #3

■ Based on progression of DM in short period of time, body habitus, lipid profile, and likely family history of autoimmune disease, this patient likely has LADA

Latent Autoimmune Diabetes in Adults

LADA

- Why is it important to identify a LADA patient?

  LADA patients will need both long-acting insulin (basal insulin) and fast-acting insulin (bolus insulin) …their beta cells are being depleted

Clinical Case #3

■ Which tests to order for this patient?

- Islet cell antibodies

- GAD antibodies

- Insulin antibodies

- C-peptide/glucose levels

Clinical Case #3

- This patient was started on Lantus insulin at bedtime and Humalog insulin before meals; Actos was stopped

Clinical Case #4

- A 46 year old female with new-onset DM
    - A1C of 7.5%
    - Eats a lot of snacks during the day
    - BMI 36
    - Hx HTN, Hyperlipidemia

Clinical Case #5

- A 72 year old male with new-onset DM
  - A1C of 7.5
  - Serum Cr of 1.6/GFR 29

Clinical Case #5

- A 49 year old male with DM Type 2
  - A1C of 7.5
  - BMI 34
  - Has been taking Actos and
    Metformin for 2 years

Clinical Case #6

- A 68 year old female with 10 year history of DM Type 2
  - A1C of 7.9%
  - BMI of 31
  - GFR 45
  - Taking Metformin, Actos

Clinical Case #7

- A 31 year old male with new-onset DM Type 2
  - A1C of 10.7%
  - BMI 35

Clinical Case #8

- A 58 year old female with DM Type 2 for 6 years
  - A1C of 7.9%
  - BMI of 35
  - Taking Metformin and Januvia
  - Exam reveals 1+ pitting edema
  - Sugars climbing after meals

Clinical Case #9

- A 61 year old male with DM Type 2 for 7 years
  - A1C of 6.8%
  - Taking Glucophage and Amaryl
  - Wakes up in middle of night and in morning frequently with low blood sugars

Clinical Case #10

- A 42 year old male with DM Type 2 for 10 years
  - A1C of 9.4%
  - Taking Glucophage, Januvia, Amaryl

Specials thanks to:

Jay Shubrook D.O.
Frank Schwartz MD

Questions???