

Diabetes Complications Assessment, Recognition, Prevention and Treatment: Workshop

Edward Shahady, MD, FAAFP



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Edward Shahady, MD, FAAFP

Medical Director, Diabetes Master Clinician Program; Clinical Professor, University of Miami, Florida; Clinical Professor, University of Florida, Gainesville.

Dr. Shahady is a graduate of the West Virginia University School of Medicine in Morgantown and board certified in Clinical Lipidology. As medical director of the Diabetes Master Clinician Program, he visits physicians' offices and teaches them how to use an Internet-based diabetes registry and conduct group visits. The program enables population-based achievement of quality goals for diabetes, lipids, and blood pressure. More than 500 physicians and 1,000 office staff use the program in seven other states. Dr. Shahady has contributed more than 190 scientific articles and five books to the medical literature in the areas of diabetes, lipidology, the metabolic syndrome, group medical visits, sports medicine, musculoskeletal medicine, behavioral science, physician retirement, patient centered medical home, participatory teams, and the contribution of family medicine to effective health systems. He serves on the editorial boards of Consultant, Consultant for Pediatricians, and the Journal of Clinical Lipidology. He created and manages three websites to help teach primary care physicians and their office staff, Diabetes Master Clinician Program, Diabetes University, and Family Medicine Teams.



Learning Objectives

- Practice applying new knowledge and competencies gained from diabetes complications sessions, and receive feedback from expert faculty.
- Interact collaboratively with peers to solve complex and challenging case-study scenarios.
- Develop problem-solving skills that promote effective reasoning to manage diabetes complications within the context of professional practice.



Audience Engagement System

The screenshots illustrate the user interface of the Audience Engagement System. Step 1 shows the home screen with navigation icons and a 'Sign Up' button. Step 2 shows a list of CME events with details like date, time, and location. Step 3 shows the details for a specific event, including the title 'CME011 Adult Coronary Syndromes: Unchain My Heart' and a description.



Pre-Polling Question

Latent Autoimmune Diabetes in Adults (LADA) is associated with which of the following?

- A. High C-Peptide Levels
- B. Insulin auto antibodies
- C. Both A & B
- D. None of the above

FMX

Pre-Polling Question

Which of the following is true about Non-HDL Cholesterol

- A. Requires Advanced Lipid Testing to obtain the value
- B. Is of value when triglycerides are very low
- C. Calculated by subtracting HDL from total Cholesterol
- D. None of the above

FMX

Pre-Polling Question

Which of the following medications is most effective for treating post prandial hyperglycemia

- A. Basal Insulin
- B. Exenatide (Byetta)
- C. Liraglutide (Victoza)

FMX

Pre-Polling Question

When a HbA1c is 8.2 what % of the A1C is contributed by post prandial glucose

- A. 70%
- B. 54%
- C. 45%
- D. 30%

FMX

Pre-Polling Question

Nationally how many patients with Diabetes reach goals for A1C, LDL, B/P at the same time.

- A. 50%
- B. 30%
- C. 19%
- D. 10%

FMX

History of Present Illness

- 43 year old man with Type 2 diabetes for 3 years
- Diabetes well controlled for 2 years (A1C <7) but now not well controlled
- HbA1c 11, FBS 240, Post meal Glucose 375.
- Currently takes Metformin 2000 mg a day and Glipizide XL 10 mg a day
- 4 month history of being tired.
- Has lost 5 pounds
- Notes increased appetite and increased urination

FMX

Past Medical History

- Nothing of significance

FMX

Family History

- Both parents still living—Father has mild hypertension
- Grandparents deceased with heart disease and cancer in their 80's
- No family history of Diabetes

FMX

Social History

- Married with 2 children
- Non Smoker
- Walks 3 to 4 times a week with spouse
- Employed as a computer scientist

FMX

Review of Systems

- Some increased dryness of his skin
- Thinks he may need to buy glasses to improve his vision
- 4 month history of being tired.
- Has lost 5 pounds
- Notes increased appetite and increased urination
- No other significant symptoms or past history

FMX

Physical Examination

- Blood Pressure 145/92
- BMI 24
- Remaining parts of the exam WNL

FMX

Laboratory

- HbA1c 11, FBS 240 Post meal Glucose 375.
- Triglycerides 350, HDL 35, LDL 99 Total Cholesterol 204, Non HDL 169
- AST and ALT 4 times normal
- GFR 80
- AM urine Albumin to Creatinine ratio <30 mg/g

FMX

Assessment

- Diabetes Not controlled
- Increased Triglyceride
- Decreased HDL
- LDL???
- Increased Non-HDL (TC—HDL)
- Increased AST and ALT

FMX

Question

- Would you order any other tests?

FMX

LADA Latent Autoimmune Diabetes in Adults

- In an attempt to standardize the definition of LADA, the Immunology of Diabetes Society has recently proposed the following criteria:
- patients should be at least 30 yr of age, positive for at least one of the four antibodies commonly found in type 1 diabetic patients (ICAs and autoantibodies to GAD 65, IA-2, and insulin), a
- not treated with insulin within the first 6 months after diagnosis.

Ramachandra G. et al. Latent Autoimmune Diabetes in Adults. J Clin Endocrinol Metab 2009;94: 4635–4644

Latent Autoimmune Diabetes in Adults

Table. Primary Features of Type 1 Diabetes, Type 2 Diabetes, and LADA in Adults

	Type 1 Diabetes	Type 2 Diabetes	LADA
Age at diagnosis	Most commonly in childhood	Most commonly in adults	Usually age \geq 30
Presence of insulin resistance	No	Yes	Maybe
Time to requiring insulin	At onset	Many years	Greater than 6 months, less than 6 years
Presence of auto-antibodies	Yes	No	Yes
Insulin level at diagnosis	Undetectable or extremely low	Very high	Low

Kilpatrick R, Carmichael K. Accessed on line at <http://www.consultant360.com/articles/how-latent-autoimmune-diabetes-adults-best-diagnosed-and-treated> July 2015

C-Peptide Levels

Questions

- How would you treat his hyperglycemia?

FMX

Questions

- How would you treat his \uparrow Triglycerides?
- How would you treat his \downarrow HDL?
- LDL???
- How would you treat his \uparrow Non HDL?

FMX

Impact of High Triglycerides on LDL?

- High serum triglyceride levels mathematically decrease LDL levels when the LDL is measured through indirect methodology using the Friedewald formula. Common way LDL is measured on your lab reports.
- When they are measured by direct analysis through ultracentrifuge the LDL levels are more accurate.
- Friedewald formula estimates LDL levels
 - $LDL = \text{Total Cholesterol} - HDL - \text{Triglycerides}/5$.
 - An example would be Total Cholesterol (204) minus HDL (35) and Triglycerides (350) divided by 5 equals 70 so the $LDL = 204 - 35 - 70 = 99$.
 - If the Triglycerides level was 100 the LDL would now be $204 - 35 - 20 = 149$. Triglycerides/5=20. A lower triglyceride level led to a higher calculated LDL. (99 vs. 149).

Friedewald WT, Levy RI, Fredrickson DS. Estimation of the concentration of low-density lipoprotein cholesterol in plasma, without use of the preparative ultracentrifuge. Clin Chem 1972;18:499-502.

Questions

- How would you evaluate and treat his elevated AST and ALT (4 x)

FMX

Questions

- What goals do you have your patients attempt to reach for A1C, LDL, B/P?
- How many of your patients do you think are reaching goal for A1C, LDL and B/P
- How many of your patients do you think are reaching goal for A1C, LDL and B/P at the same time?

FMX

The Prevalence of Meeting A1C, Blood Pressure, and LDL Goals Among People With Diabetes

- 4,926 adults aged ≥ 20 years with self-reported diabetes who completed the interview and physical examination NHANES
 - 52.5% achieved A1C $< 7.0\%$,
 - 51.1% achieved BP $< 130/80$, 70% if B/P goal $< 140/90$,
 - 56.2% achieved LDL < 100 mg/dL, and
 - 19% achieved all three goals simultaneously
- Pooled analysis from three large US prospective studies demonstrated 60% reduction in CVD risks when all three goals met simultaneously

Casagrande S. S. et al. The Prevalence of Meeting A1C, Blood Pressure, and LDL Goals Among People With Diabetes, 1988-2010. Diabetes Care 2013;36:2271-2279 Wong ND et al, Pooled project of Atherosclerosis risk in Communities study, Multi-Ethnic Study of Atherosclerosis and Jackson Heart Study. Diabetes Care 2016;39:668-676

FMX

Patient 2

- 58 year male with T2 Diabetes
- Family History positive for Diabetes
- BMI 33
- B/P 133/79 Rx with Losartan/HZT
- LDL 85 Rx with Atorvastatin 40 mg a day

FMX

Patient 2

- Treated with Metformin 2000 mg a day for 5 years
- HbA1c initially well controlled now 8.7
- Fasting blood sugar 215
- How would you treat his Hyperglycemia?

FMX

Patient 2

- He was treated with glargine titrated up 30 units at night
- For 2 years he did well HbA1c decreased to <7 but HbA1c now is 8.2
- Fasting blood sugar 115, 2 hr post prandial blood sugar 225

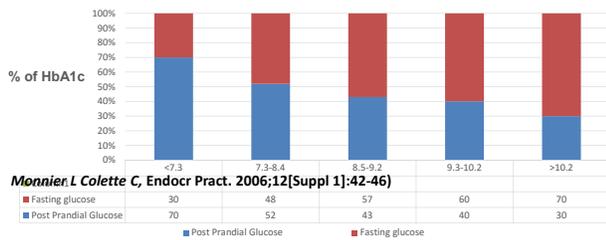
FMX

Patient 2

- How much of his A1C is accounted for by post prandial blood sugar?

FMX

Contributions of Fasting and Postprandial Glucose to HbA1c



FMX

Patient 2

- How would you treat his Hyperglycemia?

FMX

GLP 1 RA Basal Insulin Complementary Features

	Basal Insulin	GLP-1 Receptor Agonists
Primary Effects	↓ Fasting Glucose	↓ Post Prandial glucose excursions and fasting glucose
Mechanisms	↓ Hepatic Glucose Production ↓ Glucagon Secretion	↓ Hepatic Glucose Production ↓ Glucagon Secretion
	↑ Non Glucose dependent Insulin-↑ Hypoglycemia	↑ Glucose dependent Insulin ↓ Hypoglycemia
		↓ Gastric Emptying ↑ Satiety and ↓ Food Intake
Effect on Weight	↑ Body Weight <small>Balena R et al, Diabetes Obes Metab-2013;15:485-502</small>	↓ Body Weight

FMX

Value of a Diabetes Registry

- Patient Report Card for a Planned Visit—helps with Patient Education

	Goal	Sep 2016	Feb 2016	Nov 2015	Mar 2015	Oct 2014
Weight		190	188	188	185	198
BP	Less than 140/80	138/90	140/68	140/80	139/85	123/77
Tests						
HbA1c (Sugar for 3 months)	Less than 7	7.5	7.1	8.3	6.6	7.1
LDL (Lousy or bad cholesterol)	Less than 100 Best # 70	125	123	145	110	133
HDL (Happy or good cholesterol)	Greater than 40	43	45	38	46	39
Triglycerides (another bad fatty substance)	Less than 150	166	278	144	139	133
Medication						
Aspirin or Anti-coagulant (to prevent heart attacks)	Take daily	Yes	Yes	Yes	Yes	Yes
Important Yearly Activities	Goal	Status	Next Test Due	Most Recent Test		
Eye Check (to prevent blindness)	1 time a year	OVERDUE	3/29/2016	3/30/2015		
Foot Check (to check for numbness and sores)	1 time a year	Completed	9/21/2017	9/21/2016		
Urine Micro Albumin (to check for kidney failure)	1 time a year	Completed	9/21/2017	9/21/2016		
Flu Shot (to prevent flu)	1 time a year	Completed	2/24/2017	2/25/2016		
Special Vaccine	Goal	Status				
Pneumovax (to prevent a special pneumonia; given once in a lifetime - twice if first was given before age 65)	2 nd	1st Shot Completed 2nd Shot Completed				

Shahady E. Practical Diabetology, 2010;29:20-25.

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Shahady E. Practical Diabetology, 2010;29:20-25. Planned Visit

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Value of a Diabetes Registry

- Helps you and your staff track your quality data with your patients
- Provides a report card for your quality data.
- Decreases number of patients who are not at goal or missing quality indicators

Patients Meeting ADA Goals On Most Recent Tests					
Clinic ID	Percentage Met Goals Patients	HbA1c	LDL	BP	HbA1c & LDL & BP
111	43%	63%	69%	21%	
All Clinics	57%	62%	58%	23%	
GOALS		<7.0	<100	SP<=130	
# of Patients	20474	182			
# of Visits	106758	498			
Weight	213	214			
BMI	34	35			
Waist Range	42				
BP	<=130/80	138/74	138/74		
EyeCheck	Once a year	28%	24%		
FootCheck	Once a year	38%	63%		
HbA1c	<7 (<6 Best)	7.4	7.7		
Total Goal	<200	173	180		
LDL	<70	34	33		
HDL	(M: >40 F: >30)	46	48		
Non-HDL	<100	32%	33%		
Triglycerides	<150	14%	18%		
U Micro Alb	Once a year	39%	60%		
Pneumovax	Once	38%	71%		
FluShot	Once a year	28%	49%		
Daily ASA	100%	55%	43%		

Patients Meeting ADA Goals On Most Recent Tests					
Clinic ID	Percentage Met Goals Patients	HbA1c	LDL	BP	HbA1c & LDL & BP
111	43%	63%	69%	21%	
All Clinics	57%	62%	58%	23%	
GOALS		<7.0	<100	SP<=130	
Met Goals	72	103	126	33	
Patients	168	163	182	158	
Met Goals	11362	11803	11775	4366	
Patients	20017	19126	20477	18597	

	Goals	All Clinics	Clinic's Average
# of Patients		20474	182
# of Visits		106768	495
Weight		213	214
BMI		34	35
Waist Range		42	
B/P	<=130/80	131/76	128/76
EyeCheck	Once a year	28 %	24 %
FootCheck	Once a year	38 %	65 %
HbA1c	<7 (<6 Best)	7.3	7.7
Total Chol	<200	172	180
LDL	<70	94	95
HDL	(M: >40 F: >50)	46	48
Non-HDL	<100	126	132
Triglycerides	<150	168	188
U-Micro Alb	Once a year	39 %	60 %
Pneumovax	Once	58 %	71 %
FluShot	Once a year	32 %	40 %
Daily ASA	100%	88 %	43 %

Dr. Sample Clinic's Clinic

Most Recent HbA1c					
Clinic	Very High (>9)	High (>=7 & <=9)	Target (<7)	# Patients Not Tested	# Patients Tested
1	9	114	83	41	247

Very High HbA1c On Most Recent Test				
Very High	High	Target	Not Tested	ALL
MR Number	Patient	Most Recent HbA1c		
89493	Hager, Kevin	12.3		
333-45-3333	Jones, Bubba	10.0		
000000000	Jones, Mary	10.0		
b98t	Pants, Meanie	12.0		
012	T, Mr	12.7		
d14	Tucker, Samantha	12.0		
444991212	Vandross, Felicia	14.0		
2456	Wuamore, Lula	13.0		
	White, Snowy	10.0		

Planned Visit

Post-Polling Question

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Post-Polling Question

Which of the following is true about Non-HDL Cholesterol

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Which of the following medications is most effective for treating post prandial hyperglycemia

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- B. 54%
- C. 45%
- D. 30%

FMX

Goals to work on in the future

- Increase awareness for LADA-order insulin antibodies and c-Peptide levels in appropriate patients
- Increase obtaining 2 hour postprandial glucose values
- Consider use of use of GLP1RA in patients not able to reach A1C goal on basal insulin
- Establish baseline and increase number of patients at goal for A1C, LDL & B/P at same time-choose 30 patients with diabetes to follow for next 6 months and compare number reaching goals at baseline and 6 months later

FMX

Goals to work on in the future

- In same 30 patients increase completed foot exams to 75%
- In same 30 patients increase completed dilated eye exams to 75%
- In same 30 patients increase number of patients with urine microalbumin to 75%
- To use a diabetes on line registry contact Dr. Shahady via email eshahady@att.net or 850-443-1230

FMX

Contact information

Edward Shahady MD
eshahady@att.net

Web Sites

www.diabetesmasterclinician.org
www.diabetesuniversitydmcp.com
www.familymedicinetteams.org

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Associated Session

- Diabetes Complications Assessment, Recognition, Prevention and Treatment

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Interested in More CME on this topic?
aafp.org/fmx-endocrine

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