


**Welcome to Diabetes  
MiniSeries – Course 2**

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**Diabetes MiniSeries  
Session 2**

- ▶ Prevention and lifestyle interventions
- ▶ It's worth the work - Why control matters
- ▶ National goals and getting to target

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**Complications - Why?**



- ▶ Degree of hyperglycemia  
"glucose toxicity"
- ▶ Duration of hyperglycemia
- ▶ Genes
- ▶ Multiple risk factors:  
smoking, vascular disease,  
dyslipidemia, hypertension,  
other

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## Diabetes Complications

- ▶ Heart disease leading cause of death.
- ▶ CAD death rates are about 2 -4x's as high as adults without diabetes (it's not getting better)
- ▶ Risk of stroke is 2 - 4 times higher
- ▶ 60% - 65% of people with DM have HTN.
- ▶ DM accounts for 40% of new cases of ESRD
- ▶ 60 - 70% have mild - severe forms of neuropathy
- ▶ Diabetes is the leading cause of blindness
- ▶ Accounts for 50% of lower limb amputations



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## Control Matters

- ▶ **Trials**
- ▶ **Practice Recommendations**



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## Financial Advisor

- ▶ Mid 30s, friendly, he smiles to greet you and you notice his gums are inflamed. You'd guess a BMI of 26 or so, with most of the extra weight in the waist area.
- ▶ If you could give him some health related suggestions, what would they be?



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## Periodontal disease - 6th complication of diabetes?

- ▶ Chronic inflammatory disorder by the anaerobic bacteria invasion into periodontal tissues including gingival connective tissue, periodontal ligament, and alveolar bone.
- ▶ Periodontal disease major stages-
  - ▶ gingivitis – inflammation of the gums
  - ▶ Periodontitis inflammation and infection of the ligaments and bones that support the teeth



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## Gingivitis



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## Periodontitis

- ▶ 17% people with diabetes
- ▶ 9% in general population
- ▶ Diabetes + Smoking = 20xs the risk of periodontitis plus loss of supporting bone
- ▶ Due to decreased or impaired immune response, loss of collagen, delayed wound healing due to AGEs (inflammation)
- ▶ Assoc w/ vascular disease/ cardiorenal dx



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### Mild to Severe Periodontitis



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### Salivary Dysfunction and Xerostomia (dry mouth) in DM

- ▶ Less saliva uptake and excretion = less protection against bacteria
- ▶ Hyperglycemia increases glucose levels in saliva, providing medium for bacterial growth-also promotes dry mouth
- ▶ Dry mouth increases risk of infection and can alter nutritional intake (due to chewing, swallowing difficulties)



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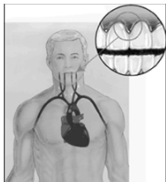
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### Periodontal disease and Heart Disease



- Heart disease link:
  - oral bacteria enter the blood stream, attach to fatty plaques in coronary arteries increasing clot formation
  - inflammation increases plaque build up, which may contribute to arterial inflammation
- Hyperglycemia = Gingivitis = Heart Disease



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### Economics Affects Dental Care



- ▶ For many people, dental care = cash out of pocket
- ▶ Medicare – no dental benefits
- ▶ Medicaid- limited
- ▶ Private payors – limited
- ▶ People who make less money, less likely to get dental care (up to 50%)



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### Smoking and Diabetes

Smoking increases risk of diabetes 30%



- Ask
- Assess
- Advise
- Assist
- Arrange
- Organize your clinic



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### Keeping Oral Healthy

- Oral disease linked with heart disease
- ▶ Dental exams (every 6 mo's)
- ▶ Metabolic control critical
- ▶ Quit smoking
- ▶ Pts may not understand importance of dental hygiene.
- ▶ Treat infections with ATB's, can lower A1c by 1-2%. Lowering BG shortens infection.



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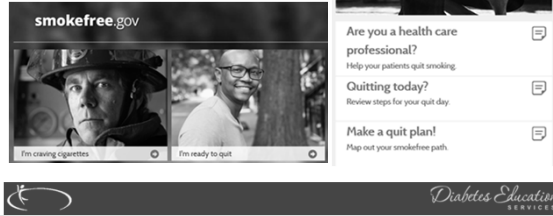
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## Smoking Resources

- ▶ SmokeFree.gov
  - ▶ Info in English, Spanish, for kids
  - ▶ Sign up for text messaging
- ▶ 1-800-NO – BUTTS in CA



The screenshot shows the smokefree.gov website. At the top left is the logo 'smokefree.gov'. Below it are two small images: one of a man in a hat with the text 'I'm craving cigarettes' and another of a man with glasses with the text 'I'm ready to quit'. To the right is a larger image of a man sitting outdoors. Below the images are three menu items: 'Are you a health care professional? Help your patients quit smoking', 'Quitting today? Review steps for your quit day', and 'Make a quit plan! Map out your smoke-free path'. The Diabetes Education Services logo is at the bottom right.

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## Can Type 2 be Prevented in Older Adults?



- Physical activity (30 mins a day)
- Dietary score (higher fiber intake, low saturated fat and *trans-fat*, lower mean glycemic index)
- Not Smoking
- Alcohol use (up to 2 drinks a day);
- BMI <25 and waist circumference

Dariusz Mozaffarian, MD,  
*Arch Intern Med.* 2009;169(8):798-807.

Overall, 9 of 10 new cases of diabetes attributable to these 5 lifestyle factors.

89% risk reduction when all at goal.

35% rel risk reduction for each additional



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## Can we stop pre diabetes from progressing?

3, 234 people w/ Pre-Diabetes randomized:

- ▶ Placebo
- ▶ Diet/Exercise or
- ▶ Metformin

over a three year period



Diabetes Prevention Program (DPP) 2001



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## Diabetes Prevention Program

- ▶ Standard Group - 29% developed DM
- ▶ Lifestyle Results - 14% developed DM
  - ▶ 58% (71% for 60yrs +) Risk reduction
    - ▶ 30 mins daily activity
    - ▶ 5-7% of body wt loss
- ▶ Metformin 850 BID - 22% developed DM
- ▶ 31% risk reduction (less effective with elderly and thinner pt's)



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## Weight loss and Prevention

- ▶ For every 2.2 pounds of weight loss, risk of type 2 diabetes was reduced by 13%.



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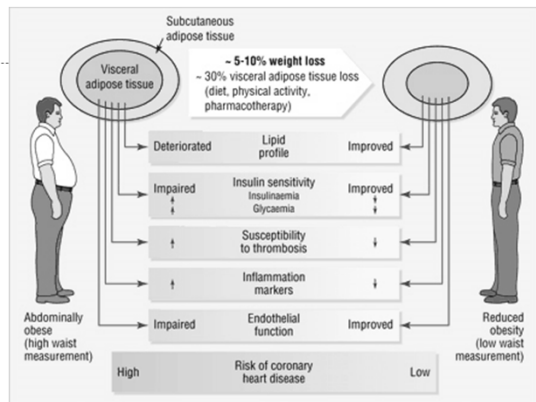
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## Good Exercise Info / Quotes



- ▶ 20 % of people walk 30 mins a day
- ▶ Exercise decrease A1c 0.7%
- ▶ No change in body wt, but 48% loss in visceral fat
- ▶ ADA PostGrad 2010

• “If you don’t have time for exercise, you better make time for disease.”

“I don’t have time to exercise, I MAKE time.”

Mike Huckabee

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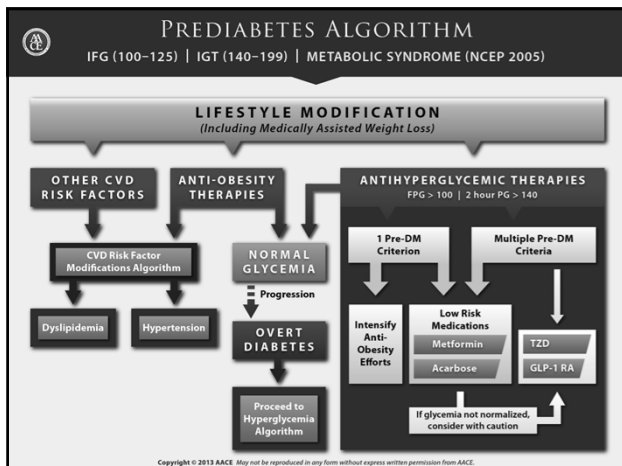
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## Pre-Diabetes? Steps to Prevent Type 2

- ▶ Lose 7% of body weight
  - ▶ Healthy eating, high fiber, low fat, avoid sugar sweetened beverages, reduce total caloric intake
- ▶ Exercise 150 minutes a week
- ▶ Consider Metformin Therapy for
  - ▶ Women with history of GDM
  - ▶ Patients with BMI of 35 or greater
  - ▶ Under the age of 60
- ▶ Follow-up and group education
- ▶ Annual monitoring and tx of CVD risk factors



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## Diabetes Control and Complications Trial (DCCT)

In June, 1993 the New England Journal of Medicine published the results of the landmark DCCT. The largest, most comprehensive diabetes study ever conducted. The 10 year study involved more than 1400 subjects with Type 1 DM. It compared the effects of two treatment regimens-standard therapy and intensive control-on the complications of diabetes.



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## DCCT Conclusions

By maintaining A1C < 7%:

- ▶ Eye disease - 76% reduced risk
- ▶ Kidney disease - 50% reduced risk
- ▶ Nerve disease - 60% reduced risk

### Management elements included:

- ▶ SMBG 4 or more times a day
- ▶ 4 daily insulin injections or insulin pump
- ▶ Greater risk of hypoglycemia



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## UKPDS Results

United Kingdom Prospective Diabetes Study

- ▶ Conducted over 20 years involving over 5,100 patients with Type 2 diabetes
- ▶ 1% decrease in A<sub>1c</sub> reduces microvascular complications by 35%
- ▶ 1% decrease in A<sub>1c</sub> reduces diabetes related deaths by 25%
- ▶ B/P control (144/82) reduced risk of:
  - ▶ Heart failure (56%)
  - ▶ Stroke (44%)
  - ▶ Death from diabetes (32%)



Lancet 352:837-853, 1998  
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## “Legacy Effect”

- ▶ For participants of DCCT and UKPDS
  - ▶ long lasting benefit of early intensive BG control prevents
    - ▶ microvascular complications
    - ▶ Macrovascular complications (15-55% decrease)
  - ▶ Even though their BG levels increased over time
  - ▶ Message – Catch early and Treat aggressively



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## Diabetes Self Management Education and Support (DSMES)

- ▶ People w/ DM and prediabetes need education that:
  - ▶ Addresses psychosocial and emotional well-being
  - ▶ Meets National Standards
  - ▶ Focuses on promoting self-care and behavior change
- ▶ Evidence that DSMES programs work
  - ▶ Lower A1c, wt loss, improved quality of life, better coping and lower costs



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## Goals of Care



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## Diabetes Care Guidelines- ADA

<u>Test / Exam</u>	<u>Frequency</u>
▶ A1c	At least twice a year
▶ B/P	Each diabetes visit
▶ Cholesterol (LDL, HDL, Tri)	Yearly (less if normal)
▶ Weight	each diabetes visit
▶ Microalbumin/GFR/Creat	Yearly
● Eye exam	Yearly
● Dental Care	At least twice a year
● Comprehensive Foot Exam	Yearly (more if high risk)
● Physical Activity Plan	As needed to meet goals
● Preconception counseling	As needed



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## Vaccinations- Immunizations

- ▶ Flu vaccine
  - ▶ every year starting 6 months
- ▶ Pneumococcal starting at 2 years.
  - ▶ One time Revaccination for those over 64 and had first vaccine >5 years prior
- ▶ Hepatitis B Vaccine
  - ▶ For diabetes pts age 19 – 59 (not previously vaccinated)
  - ▶ Double risk of Hep B due to lancing devices/ glucose meter exposure



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## ABC's of Diabetes

A1C

Blood Pressure

Cholesterol

*Standards of Medical Care – American Diabetes Association*



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## A1c Test

- ▶ Measures glycation of RBC's over 2-3 months
- ▶ Weighted mean (50% preceding month)
- ▶ Each 1% ~ 29mg/dl
- ▶ Accuracy: affected by some anemias, hemoglobinopathies
- ▶ A measurement of glucose in fasting and postprandial states



Red Blood Cell



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## A1c Goals for Non Pregnant Adults Individualize Targets – ADA

- ▶ < 7% for patients *in general*
- ▶ For individual pts, as close to normal as possible (<6%) w/out significant hypo\*
  
- ▶ *Goals based on:*
  - ▶ *Duration of dm*
  - ▶ *Life expectancy*
  - ▶ *Co morbid conditions*
  - ▶ *Know CVD or advanced micro complications*
  - ▶ *Individual patient considerations*



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## Recommendations: Glycemic Goals in Adults

### • Less stringent A1C goals (such as <8%) may be appropriate for patients with

- History of severe hypoglycemia, limited life expectancy, advanced microvascular or macrovascular complications, extensive comorbid conditions
- Those with longstanding diabetes in whom the general goal is difficult to attain despite diabetes self-management education, appropriate glucose monitoring, and effective doses of multiple glucose lowering agents including insulin



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## A1c and Estimated Avg Glucose (eAG)

A1c (%)	eAG
5	97
6	126
7	154
8	183
9	212
10	240
11	269
12	298

Order  
teaching tool  
kit free at  
[diabetes.org](http://diabetes.org)



**eAG = 28.7 x A1c - 46.7 ~ 29 pts per 1%**

Translating the A1c Assay Into Estimated Average Glucose Values – ADAG Study  
Diabetes Care: 31, #8, August 2008



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## Glucose Goals Individualize Targets – ADA

- ▶ Pre-Prandial BG 70- 130
  - ▶ 1-2 hr post prandial < than 180
- \*for nonpregnant adults



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## GOALS FOR GLYCEMIC CONTROL

**A1c ≤ 6.5%**

For healthy patients  
without concurrent  
illness and at low  
hypoglycemic risk

**A1c > 6.5%**

Individualize goals  
for patients with  
concurrent illness  
and at risk for  
hypoglycemia

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## BP Goal

ADA Clinical Practice Recommendations



### BP < 140 / 80

- ▶ Some pts may benefit from B/P 130/80
- ▶ Lifestyle changes +
- ▶ First Line B/P Drugs
  - ▶ ACE Inhibitors-
  - ▶ Angiotensin receptor blocker (ARBs) (type 2)
  - ▶ Then add diuretic
- ▶ Many pts require 2 or > anti-HTN meds at max dose



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## Detecting Hypertension

If either

- systolic 140 or > diastolic 80 or > repeat on separate day.

Hypertension = Repeat systolic or diastolic above or equal to these levels

When taking B/P

- Pt sit still for 5 min's
- Feet on floor,
- Arm supported at heart level
- Right size cuff



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## ACE Inhibitors "ils" for HTN

▶ Dosing:

- ▶ 1-3 x's a day (start low dose, same time everyday).
- ▶ Adding diuretic may be more effective than increasing dose.

▶ Adverse effects: cough (10-20%)

- ▶ Can try different ACE- I
- ▶ Caution in pts w/ renal stenosis, hepatic dysfunction

▶ Monitor: B/P, lytes esp K+, renal function at baseline and periodically



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### Angiotensin Receptor Blockers (ARBs) “sartans” for HTN

- ▶ Dosing: Once daily (same time everyday)
- ▶ Adverse Effects
  - ▶ Well tolerated. Dizziness, drowsiness, hyperkalemia, hypotension, allergic reaction
- ▶ Monitor: B/P, lytes- esp K+, renal function at baseline & periodically after (monitor ↑ creat).



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### Beta Blockers “Iols” for HTN

- ▶ Beneficial for DM pts w/ concurrent cardiac problems (esp post MI, heart failure)
- ▶ Dosing: Once or twice daily (strive for lowest dose possible), Do not abruptly stop can cause HTN crisis
- ▶ Adverse Effects
  - ▶ Dizziness, drowsiness, lightheadedness, erectile dysfunction, bad dreams
  - ▶ Contraindicated in sinus bradycardia (HR < 50)
  - ▶ Can block signs of hypoglycemia, including tachycardia
- ▶ Monitoring: heart rate (watch for pulse < 50), watch for exercise intolerance



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### Diuretics

- ▶ Thiazide (combined w/ other meds)
  - ▶ 1 x daily in am
  - ▶ Watch for lyte imbalances, muscle cramps, weakness, arrhythmias.
- ▶ Loop for resistant HTN
  - ▶ 1x daily, same side effects as Thiazide, but more intense.
  - ▶ Need potassium replacement, used if GFR < 30 or greater diuresis required.



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## \*Lipid Goals

ADA Clinical Practice Recommendations

- ❖ LDL < 100 mg/dL
  - ❖ LDL < 70 in high risk pts = CVD + DM
  
- ❖ HDL > 40 mg/dL men
- ❖ HDL > 50 mg/dL women
  
- ❖ Trig < 150 mg/dl

\*alternative goal is 40% lower than baseline levels if on max statin therapy & above goals not met  
Screen biannually or annually, more often if indicated



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## Lipid Management

ADA Clinical Practice Recommendations



- ▶ Treatment Recommendations
  - ▶ Lifestyle interventions
    - ▶ reduce saturated & trans fat, cholesterol,
    - ▶ More viscous fiber, omega 3 fatty acids, plant sterols/sterols
    - ▶ wt loss, exercise, stop smoking,
  - ▶ Add Statins for pts (regardless of LDL)
    - ▶ With CVD
    - ▶ Without CVD who are 40+ with CVD risk factor



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## Lipid Management

ADA Clinical Practice Recommendations

- ▶ LDL cholesterol lowering - first goal
  - ▶ 1st choice - statins
- ▶ HDL cholesterol raising
  - ▶ wt loss, stop smoking, exercise
  - ▶ Niacin (caution) or fibrates
- ▶ Triglyceride lowering
  - ▶ Glycemic control, lifestyle intervention
  - ▶ If > 1000 - Fibrates, or niacin, fish oil



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HMG-CoA Reductase inhibitors – Statins  
for Diabetic Dyslipidemia

- ▶ Main effect: ↓ LDL, secondary ↓ TG, ↑ HDL
- ▶ Dosing: once daily at hs
- ▶ Adverse effects: elevated liver enzymes, muscle aches, rare rhabdomyolysis (1-5% of pts), rare reversible memory loss, hyperglycemia
  - ▶ D/C statin if liver enzymes 3x greater than norm
  - ▶ Report muscle weakness, pain, tenderness, jaundice
- ▶ Monitor: baseline lipid profile, liver function test. Monitor labs closely for 6 mo's or if reported muscle pain
- ▶ Statins metabolized in liver through CYP-3A4 pathway, so high rate of drug interactions



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Niacin to treat Diabetic Dyslipidemia

- ▶ Main effect – increase HDL, lower Trig
  - ▶ Niaspan, Slo-Niacin (sustained release) at hs with food
- ▶ Dosing: start 100mg 3x day to 2-3gms a day
- ▶ Adverse effects: GI, N&V, diarrhea, flushing, BG elevations
  - Take w/ meals or aspirin to reduce flushing
- ▶ Monitor liver function, D/C if 3x's greater than normal



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Aspirin Therapy  
(75-162/day)



- ▶ **Use for men >50 yrs, or women >60 yrs who smoke or have CV risk factor – primary prev)**
- ▶ Use aspirin therapy for diabetes pts with history of CV disease (secondary prev)
- ▶ Combo therapy of aspirin + clopidogrel is reasonable for a year after MI
- ▶ Do not use in pts < 30, w/ allergy (use clopidogrel), bleeding tendency



ADA Clinical Practice Recognition Program  
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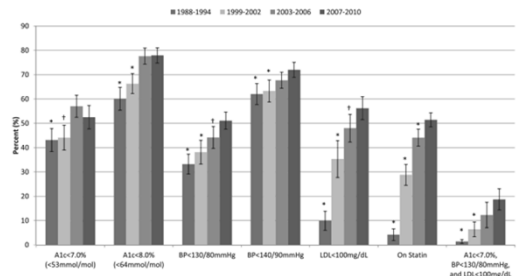
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## How are we doing? Reaching goal

Casagrande and Associates



Diabetes Care, 2/13



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## Mr. Jones - What are Your Recommendations for Self-Care

### Patient Profile

62 yr old with newly dx type 2.

History of previous MI.

Meds: Lasix, synthroid

### Labs:

- ▶ A1c 9.3%
- ▶ HDL 37 mg/dl
- ▶ LDL 156 mg/dl
- ▶ Triglyceride 260mg/dl
- ▶ Proteinuria - neg
- ▶ B/P 142/92

### Self-Care Skills

- ▶ Walks dog around block 3 x's a week
- ▶ Bowls every Friday
- ▶ Widowed, so usually eats out



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## DiaBingo- G

G ADA goal for A1c is less than \_\_\_\_\_%

G People with DM need to see their provider at least every month

G Blood pressure goal is less than \_\_\_\_\_

G People with DM should see eye doctor (ophthalmologist) at least \_\_\_\_\_

G The goal for triglyceride level is less than \_\_\_\_\_

G Goal for my HDL cholesterol is more than \_\_\_\_\_

G The goal for blood sugars 1-2 hours after a meal is less than: \_\_\_\_\_

G People with DM should get this shot every year \_\_\_\_\_

G People with DM need to get urine tested yearly for \_\_\_\_\_

G Periodontal disease indicates increased risk for heart disease

G The goal for blood sugar levels before meals is: \_\_\_\_\_

G The activity goal is to do \_\_\_\_\_ minutes on most days



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# Thank You



- ▶ Questions?
- ▶ Email  
[bev@diabetesed.net](mailto:bev@diabetesed.net)
- ▶ Web  
[www.diabetesed.net](http://www.diabetesed.net)



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