Outpatient Management of Type 2 Diabetes (T2DM)
A curricular development project for primary care residents

Caroline Hurd R3
Research Mentor: Caroline Rhoads MD
Primary Research Objective

- Build skills relevant to a career as an academic clinician educator

Clinician Educator Skills

Goal 1: Curriculum Development
Goal 2: Teaching and Mentorship
How I became interested...

- The primary care track was lacking a standardized curriculum to cover core medical knowledge over the course of residency training.
- Saw a need to utilize alternative forms of learning beyond traditional didactics.
- Desire to pursue a career in medical education and obtain skills that would not be fulfilled with conventional clinical or basic science research.
Clinician Educator Skills

Goal 1: Curriculum Development
Goal 1: Curriculum Development

- Self-directed, web based module on the screening, diagnosis, and initial management of T2DM

- Medication Summary Table for T2DM

- Quick reference pocket guide for T2DM
Self Directed Web Module: Contents

- Part 1
  - Screening
  - Diagnosis

- Part 2
  - Treatment
    - Goal A1C
    - Lifestyle Modifications
    - Non-insulin Medications
    - Insulin

- Part 3
  - Management of Nonglycemic Risk Factors
TYPE 2 DIABETES MELLITUS

ONLINE TRAINING PROGRAM

created by: Caroline Hurd, MD, R3
research mentor: Caroline Rhoads, MD

LAST UPDATED: MARCH 20TH, 2010
Web Module: Part 1
Screening and Diagnosis
Week 1

Mr. Awon See is a 47 y/o man who presents to your clinic to establish care. He thought he should see a doctor since both his brother and mother have T2DM and he is wondering if he should also be screened. In order to better understand Mr. A1C’s overall risk of T2DM you ask him more about his medical history. He tells you he is stably housed and self employed as a tow truck operator. He does not get regular exercise, has smoked a ½ pack of cigarettes daily since he was 17 and drinks ~3-4 beers per week. His ROS is negative, aside from some episodic low back pain related to heavy lifting during his job. He’s been told in the past that he needed to lose weight and that he has high blood pressure but takes no medications.
Click on the following images to learn about the different categories of risk factors, then try to identify Mr. A1C’s risk factors by clicking on those from obtained from his history.
Click on the following images to learn about the different categories of risk factors, then try to identify Mr. A1C’s risk factors by clicking on those you can identify from his history.

**Note: Mr. A1C’s risk factors are underlined**

**METABOLIC**
- Obesity
- PCOS
- Pre-diabetes
- Gestational T2DM
- Metabolic Syndrome
Click on the following images to learn about the different categories of risk factors, then try to identify Mr. A1C’s risk factors by clicking on those you can identify from his history.

**DEMOGRAPHIC FACTORS**
- FHx
- Age
- Race/Ethnicity
- Socioeconomic Status

**METABOLIC**
- Obesity
- PCOS
- Pre-diabetes
- Gestational T2DM
- Metabolic Syndrome

**MODIFIABLE LIFESTYLE FACTORS**
- Exercise
- Smoking
- Diet

**MEDICATIONS**
- Pentamidine
- Beta Blockers
- Corticosteroids
- Niacin (high dose)
- Thiazides (high dose)
- SSRI + TCA, clomipramine
- Hormones (progestin-only OCPs)
- Antiretrovirals (protease inhibitors)
- Antipsychotics (olanzapine, clozapine)

**CO-MORBID CONDITIONS**
- HTN
- Depression
- Chronic Hep C
- Hemochromatosis
Q: Based on the ADA screening guidelines which of these patients should be screened?

- 40 yo M
  - BMI 30 kg/m²
  - Sedentary
  - SCREEN
  - NOT SCREEN

- 35 yo F
  - Waist Circ 36 inc
  - Pacific Islander
  - SCREEN
  - NOT SCREEN

- 65 yo M
  - Waist Circ 39 inc
  - HTN
  - SCREEN
  - NOT SCREEN

- 38 yo F
  - BMI 24 kg/m²
  - Mother has T2DM
  - SCREEN
  - NOT SCREEN
Diagnosis: Testing

Below are the four different ways, according to the ADA, that T2DM can be diagnosed. Any positive test needs to be confirmed on a subsequent day. Click on the icon for each test to reveal the threshold for diagnosing T2DM.
Below are the four different ways, according to the ADA, that T2DM can be diagnosed. Any positive test needs to be confirmed on a subsequent day. Click on the icon for each test to reveal the threshold for diagnosing T2DM.

- **A1C**: 
  Answer: \( \geq 6.5\% \)

- **8-12hr FPG**: 
  Answer: \( \geq 126\text{mg/dl} \)

- **2 hr OGTT**: 
  Answer: \( \geq 200\text{mg/dl} \)

- **RPG w/ polyuria and polydipsia**: 
  Answer: \( \geq 200\text{mg/dl} \) w/ symptoms
Web Module: Part 2
Treatment
## Treatment: Goal A1C

### Microvascular Complications

<table>
<thead>
<tr>
<th>Study</th>
<th>Change in A1C</th>
<th>Retinopathy</th>
<th>Nephropathy</th>
<th>Neuropathy</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCCT(^{14}) (Type 1)</td>
<td>9% ➔ 7%</td>
<td>↓ 47-76%</td>
<td>↓ 34-54%</td>
<td>↓ 60%</td>
</tr>
<tr>
<td>ADVANCE (^{17})</td>
<td>7.3% ➔ 6.5%</td>
<td>No Difference</td>
<td>↓ 21%</td>
<td>No difference</td>
</tr>
<tr>
<td>UKPDS 33(^{15})</td>
<td>7.9% ➔ 7%</td>
<td>↓ 17-21%</td>
<td>↓ 24-33%</td>
<td></td>
</tr>
</tbody>
</table>

Comparison of trials that assessed intensive versus standard therapy for T2DM and the impact on microvascular complications. Click on each study to read the abstract.
Week 4

Mr. A1C returns two weeks later. He has been worrying about his T2DM because even though he found the time to attend one of the education classes that you recommended, he has been too exhausted after his 12 hour days at work to come home and exercise or cook a healthy meal. He is wondering about starting a medication.

Q: In addition to reemphasizing lifestyle modifications, what medication would you start first for Mr. A1C?

- A: Metformin
- B: Sulfonylurea
- C: Metformin + Sulfonylurea
- D: Insulin
T2DM Dx \(\rightarrow\) Start Lifestyle + Metformin (M) \(\rightarrow\) Check A1C in 3mths

Note: Expert opinion suggests that if the A1C is >8.5% after lifestyle changes and metformin or >10% at the beginning of treatment to skip to step 3 and start basal insulin. After control is achieved, one may be able to titrate down the insulin and return to oral agents alone.
Treatment: Medications
2009 ADA Consensus Algorithm

**Tier 1**

**Step 1**
- T2DM Dx
- Start Lifestyle + Metformin (M)
- Check A1C in 3mths

**Step 2**
- A1C >7%
- Lifestyle + M + Sulfonylurea (SU)
- Check A1C in 3mths

Note: Expert opinion suggests that if the A1C is >8.5% after lifestyle changes and metformin or >10% at the beginning of treatment to skip to step 3 and start basal insulin. After control is achieved, one may be able to titrate down the insulin and return to oral agents alone.
**Treatment: Medications**

**2009 ADA Consensus Algorithm**

**Tier 1**

**Step 1**
- **T2DM Dx** → **Start Lifestyle + Metformin (M)** → **Check A1C in 3mths**

**Step 2**
- **A1C >7%** → **Lifestyle + M + Sulfonylurea (SU)** → **Check A1C in 3mths**

**Step 3**
- **A1C >7%** → **Lifestyle + M + Basal Insulin** → **Check A1C in 3mths**

**Note:** Expert opinion suggests that if the A1C is >8.5% after lifestyle changes and metformin or >10% at the beginning of treatment to skip to step 3 and start basal insulin. After control is achieved, one may be able to titrate down the insulin and return to oral agents alone.
Treatment: Medications
2009 ADA Consensus Algorithm

Tier 1

Step 1
- T2DM Dx
  - Start Lifestyle + Metformin (M)
  - Check A1C in 3mths

Step 2
- A1C >7%
  - Lifestyle + M + Sulfonylurea (SU)
  - Check A1C in 3mths

Step 3
- A1C >7%
  - Lifestyle + M + Basal Insulin
  - Check A1C in 3mths

Step 4
- A1C >7%
  - Lifestyle + M + Intensive Insulin
  - Check A1C in 3mths

Note: Expert opinion suggests that if the A1C is >8.5% after lifestyle changes and metformin or >10% at the beginning of treatment to skip to step 3 and start basal insulin. After control is achieved, one may be able to titrate down the insulin and return to oral agents alone.
Sulfonylureas

A1C Case Study: Year 2

You decide to start Mr. A1C on a sulfonylurea based on the treatment algorithm. You choose glimepiride because it is once a day dosing. What are side effects you should warn Mr. A1C about before starting this medication (check all that apply)?

- A) Weight gain
- B) Hypoglycemia
- C) Rash
- D) GI symptoms
**Sulfonylureas**

**A1C Case Study: Year 4**

You decide to start Mr. A1C on sulfonylureas. You choose glimepiride because you should warn Mr. A1C about:

- Weight gain
- Hypoglycemia

**Sulfonylureas**

A) Weight gain

*This is common and averages ~2-4kg.*

B) Hypoglycemia

*Also common. Patients need to be educated about symptoms of hypoglycemia (see next slide).*

C) Rash

*This is uncommon but can still occur.*

D) GI symptoms

*All though we typically think of metformin as causing GI side effects, SU’s can also cause these symptoms so warn patients early and they are usually tolerated and improve with time.*
Treatment: Insulin

This graph shows profiles of different types of insulin, place your mouse over the different lines to find out what kind of insulin provides each different curve. In the following slides, we will look more closely at each type of insulin.
Treatment: Insulin

This graph shows profiles of different types of insulin, place your mouse over the different lines to find out what kind of insulin provides each different curve. In the following slides, we will look more closely at each type of insulin.
Web Module: Part 3
Management of Nonglycemic Risk Factors
Nonglycemic Risk Factors

- BP <130/80, use of ACEI/ARB
  - LDL <100mg/dl
- ASA
- Tobacco cessation
- Nephropathy/ACR screening
- Retinopathy Screening
- Peripheral Neuropathy Screening
  - Autonomic dysfunction
- Foot Care
- Immunizations
Nonglycemic Risk Factors

- BP <130/80, use of ACEI/ARB
- LDL<100mg/dl
- ASA
- Tobacco cessation
- Nephropathy/ACR screening
- Retinopathy Screening
- Peripheral Neuropathy Screening
  - Autonomic dysfunction
- Foot Care
- Immunizations
Nonglycemic Risk Factors: BP

Week 4

Let's go back to when Mr. A1C was diagnosed with T2DM. When you met him his BP was 155/88. 4 weeks later his BP is still 148/88. Cardiovascular exam discloses RRR, no M/R/G, a normal PMI, no JVD, and no peripheral edema.

Q: What should Mr. A1C’s target blood pressure be now that he has T2DM?

- A. <125/75
- B. <130/80
- C. <135/85
- D. <140/90
- E. <145/95
BP=130-139/80-89

Lifestyle changes x3mths

BP still >130/80

Lifestyle changes +
Start ACEI (ARB if can’t tolerate ACEI)

BP still >130/80
And GFR >30ml/min
Add thiazide diuretic

BP still >130/80
And GFR <30ml/min
Add loop diuretic

BP>140/90

Nonglycemic Risk Factors: BP

Note: Can tolerate up to 30% ↑ in Cr after staring an ACEI/ARB
Nonglycemic Risk Factors: Retinopathy

Click on each image to identify the stage or complication of diabetic retinopathy
Nonglycemic Risk Factors: Retinopathy

- Normal Retina
- Very Severe Non-Proliferative Diabetic Retinopathy
- Early Proliferative Diabetic Retinopathy
- Advanced Proliferative Diabetic Retinopathy
- Early Hemorrhage
- Tractional Retinal Diabetic Retinopathy

# Medication Summary Table

## Medications for Diabetes Mellitus Type 2

Prepared by Caroline Hurd R3, Adapted from Travis Baggett’s AMC/HMC Table 2007

<table>
<thead>
<tr>
<th>Line in Rx</th>
<th>CLASS</th>
<th>NAME/BRAND (Max Dose)</th>
<th>MOA</th>
<th>Expected HbA1C</th>
<th>PROS</th>
<th>CONS/SAFETY</th>
<th>COST 30d/60d (Eperates/HMC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st line</td>
<td>Biguanide</td>
<td>Metformin (850 mg TID)</td>
<td>Hepatic glucose output, ↑ intestinal absorption, ↑ tissue sensitivity to insulin, lowers fasting glucose</td>
<td>1-2%</td>
<td>-- Wgt neutral vs. loss</td>
<td>-- GI ex</td>
<td>$36/$8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-- ↓ risk of hypoglycemia</td>
<td>-- Rare risk of lactic acidosis (500,000)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-- UKPDS 34 found ↓ CVD outcomes/all cause</td>
<td>-- CI CKD esp if GFR&lt;30ml/min</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>mortality/microvascular outcomes</td>
<td>-- CI in unstable/hospitalized CHF, ESLD, impaired hepatic func, cirrhosis</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-- Been used for pre-diabetes (Diabetes, NEJM 2002)</td>
<td>-- Avoid w/ contrast</td>
<td></td>
</tr>
<tr>
<td>1st line</td>
<td>Sulfonylurea (SU)</td>
<td>Glipizide BID (20mg/d)</td>
<td>Enhanced pancreatic insulin secretion</td>
<td>1-2%</td>
<td>-- Rapidly effective</td>
<td>-- Hypoglycemia (uncommon but prolonged and can be severe, ↑ in elderly glyburide&gt;&gt;glipizide)</td>
<td>$13/$5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-- Low Cost</td>
<td>-- Wgt gain (~2kg)</td>
<td>$24/$8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-- Easy dosing</td>
<td>-- Glycemic benefit usually reached at ½ max doses, so higher doses usually avoided</td>
<td>$15/?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-- CI cirrhosis</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-- Caution renal insuff, ↑ risk of hypoglycemia, CI if GFR&lt;50, sulfa allergy?</td>
<td></td>
</tr>
<tr>
<td>1st line</td>
<td>Insulin</td>
<td>No maximal dose, see other insulin chart for dosing details</td>
<td>Variable</td>
<td></td>
<td>-- Improves TG and HDL</td>
<td>-- Freq dosing/inj</td>
<td>See insulin chart</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-- No dose limit</td>
<td>-- Freq monitoring</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-- Rapidly effective</td>
<td>-- Wgt gain (2-4 kg)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-- Cost (w/ analogues)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-- Hypoglycemia (NPH&gt;Glargine, Reg&gt;lispro)</td>
<td></td>
</tr>
<tr>
<td>2nd line</td>
<td>α-Glucosidase Inhibitor</td>
<td>Acarbose/Precose (100mg TID AC)</td>
<td>↓ carbohydrate digestion (glc) in prox sm. intestine, primarily ↓ in post-prandial gluc.</td>
<td>0.5-0.8%</td>
<td>-- ↓ risk of hypoglycemia</td>
<td>-- Wgt neutral</td>
<td>$90/$100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-- Cost</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-- Freq dosing</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-- GI sugars (25-45% dc)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-- Must rx hypoglycemia w/ sucrose</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-- Monitor LFTs q2wths xlyr then periodically</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-- CI cirrhosis, Cr&gt;2</td>
<td></td>
</tr>
<tr>
<td>2nd line</td>
<td>DPP-4 inhibitors</td>
<td>Sitagliptin/Saxenda (100mg/d)</td>
<td>Slow stroke /GLP-1 inhibition which ↑ gluc dep insulin release and ↓ gluc dep glucagon, ↓ in post-prandial and fasting gluc</td>
<td>0.6-0.9%</td>
<td>-- Wgt neutral</td>
<td>-- Cost</td>
<td>$181/$215</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-- Well tolerated</td>
<td>-- Some N/V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-- Low risk of hypoglycemia</td>
<td>-- Long term safety, immune func/UKI↑</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-- Improvement in lipids</td>
<td>-- Pancreatitis</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-- Caution renal dysfunc</td>
<td></td>
</tr>
</tbody>
</table>
## Quick Reference Pocket Guide

### DM TYPE 2: AT A GLANCE REFERENCE

<table>
<thead>
<tr>
<th>SCREENING</th>
<th>DIAGNOSIS (repeat test to confirm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age ≥ 45y</td>
<td>RPG ≥ 200mg/dl w/ symptoms</td>
</tr>
<tr>
<td>Age &lt; 45y w/ risk factors</td>
<td>FPG ≥ 126mg/dl (100-125 pre-diabetes)</td>
</tr>
<tr>
<td>BMI ≥ 25kg/m2</td>
<td>OGTT ≥ 200mg/dl (140-199 pre-diabetes)</td>
</tr>
<tr>
<td></td>
<td>(A1C ≥ 6.5% likely to be added soon)</td>
</tr>
</tbody>
</table>

### TREATMENT

<table>
<thead>
<tr>
<th>Target A1C</th>
<th>At least ≤ 7% (↓ microvascular complications) (check 2x/y if stable meds/at goal, otherwise check q3mths)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lifestyle modifications</td>
<td>Diet, wgt loss, exercise (↓A1C 1-2%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1&lt;sup&gt;st&lt;/sup&gt; line PO med</th>
<th>Metformin, start at time of diagnosis regardless of A1C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dose</td>
<td>500qd-850 TID</td>
</tr>
<tr>
<td>Side Effects</td>
<td>N/V/D, metallic taste, rare lactic acidosis</td>
</tr>
<tr>
<td>Contraindications</td>
<td>CKD, ESLD, severe pulm dz, unstable CHF bc ↑ risk lactic acid</td>
</tr>
<tr>
<td>Expected in ↓A1C/MOA</td>
<td>1-2%, ↓ hepatic glucose output,↑ insulin sensitivity</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2&lt;sup&gt;nd&lt;/sup&gt; line PO med</th>
<th>Sulfonylurea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name/Max dose</td>
<td>Glipizide 20mg/d, Glyburide 10mg QD, Glimepiride 4mg/d</td>
</tr>
<tr>
<td>Side Effects</td>
<td>Hypoglycemia, Wgt gain (~2kg)</td>
</tr>
<tr>
<td>Contraindications</td>
<td>ESLD/CKD bc ↑ risk of hypoglycemia</td>
</tr>
<tr>
<td>Expected ↓A1C/MOA</td>
<td>1-2%, ↑ pancreatic insulin secretion</td>
</tr>
</tbody>
</table>

| Insulin | D/c SU, Continue metformin |
| Side Effects | Hypoglycemia, Wgt gain (~2kg) |
Clinician Educator Skills

Goal 1: Curriculum Development

Goal 2: Teaching and Mentorship
Part 2: Teaching and Mentorship

- **Didactic Case Based Lectures**
  - 1st Primary Care R1s: Initial T2DM management
  - 2nd Primary Care R2s: Exceptions to the guidelines

- **Journal Club**
  - R1s: Diabetes Prevention Program Randomized Trial
  - R2s: Comparison of Advance, Accord, VADT, and UKPDS

- **Feedback**
  - Weekly meetings with Dr. Rhoads
  - Reviewing videotaped lectures with Dr. Rhoads
Comparison of UKPDS 10-Year Follow-up, VADT, ACCORD, and ADVANCE trials

<table>
<thead>
<tr>
<th>BASELINE CHARACTERISTICS</th>
<th>UKPDS Insulin/SU</th>
<th>UKPDS Metformin</th>
<th>VADT</th>
<th>ACCORD</th>
<th>ADVANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>2729</td>
<td>279</td>
<td>1791</td>
<td>10,251</td>
<td>11,140</td>
</tr>
<tr>
<td>Duration of DM (yrs)</td>
<td>Newly dx’d</td>
<td>Newly dx’d</td>
<td>11.5</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Median A1C (%)</td>
<td>7.9</td>
<td>8.4</td>
<td>9.4</td>
<td>8.1</td>
<td>7.2</td>
</tr>
<tr>
<td>H/o CVD (%) (how they assessed CVD risk?)</td>
<td>7.5%</td>
<td>7.5%</td>
<td>40</td>
<td>35</td>
<td>32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INTERVENTIONS</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Target A1C (%)</td>
<td>FPG&lt;108mg/dl</td>
<td>FPG&lt;108mg/dl</td>
<td>1.5 Δ</td>
<td>&lt;6.0</td>
<td>≤6.5</td>
</tr>
<tr>
<td>Mean/Median duration (yr)</td>
<td>10 yr f/u post study</td>
<td>10 yr f/u post study</td>
<td>5.6</td>
<td>3.4</td>
<td>5.0</td>
</tr>
<tr>
<td>Thiazolidinedione</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>53 vs. 42</td>
<td>92 vs. 58</td>
<td>17 vs. 11</td>
<td></td>
<td></td>
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<table>
<thead>
<tr>
<th>OUTCOMES (Intensive vs. Standard)</th>
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</thead>
<tbody>
<tr>
<td>Median A1C at end of study (%)</td>
<td>~7.8 vs. ~7.8</td>
<td>~8.0 vs. ~8.0</td>
<td>6.9 vs. 8.4†</td>
<td>6.4 vs. 7.5†</td>
<td>6.3 vs. 7.0†</td>
</tr>
<tr>
<td>CVD/Diabetes related Deaths (%)</td>
<td>23 vs. 26†</td>
<td>24 vs. 29†</td>
<td>4.5 vs. 3.7</td>
<td>2.6 vs. 1.8†</td>
<td>4.5 vs. 5.2</td>
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<tr>
<td>All cause mortality (%)</td>
<td>43 vs. 47†</td>
<td>44 vs. 53†</td>
<td>11.4 vs. 10.6</td>
<td>5.0 vs. 4.0†</td>
<td>8.9 vs. 9.6</td>
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<tr>
<td>Myocardial infarction (%)</td>
<td>25 vs. 28†</td>
<td>15 vs. 31†</td>
<td>7.2 vs. 8.7</td>
<td>3.6 vs. 4.6†</td>
<td>2.7 vs. 2.8</td>
</tr>
<tr>
<td>Major/Severe hypoglycemia (%)</td>
<td>Not Reported</td>
<td>Note Reported</td>
<td>21.2 vs. 9.9</td>
<td>10.5 vs. 3.5†</td>
<td>2.7 vs. 1.5</td>
</tr>
<tr>
<td>Weight gain (kg)</td>
<td>No difference</td>
<td>No difference</td>
<td>7.8 vs. 3.4</td>
<td>3.5 vs. 0.4†</td>
<td>-0.1 vs -1.0†</td>
</tr>
</tbody>
</table>
THANK YOU

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- Dr. Ken Steinberg
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