MTM for Patients with Type 2 Diabetes: A Patient Centered Approach

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Learning Objectives

2. Develop an appropriate diabetes care plan for a patient based on individual patient clinical and psychosocial characteristics.
3. Identify tools to improve patient adherence to diabetes treatments.

A1C Goals

- ACE/AACE <6.5%
- ADA <7%
- MN Community Measures: <8%
Lowering A1C to below or around 7% has been shown to reduce microvascular complications of diabetes and, if implemented soon after the diagnosis of diabetes, is associated with long-term reduction in macrovascular disease. Therefore, a reasonable A1C goal for many nonpregnant adults is <7%. (B)

Providers might reasonably suggest more stringent A1C goals (such as <6.5%) for selected individual patients, if this can be achieved without significant hypoglycemia or other adverse effects of treatment. Such patients might include those with short duration of diabetes, long life expectancy, and no significant CVD. (C)

Less stringent A1C goals (such as <8%) may be appropriate for patients with a history of severe hypoglycemia, limited life expectancy, advanced microvascular or macrovascular complications, extensive comorbid conditions, and those with longstanding diabetes in whom the general goal is difficult to attain despite DSME, appropriate glucose monitoring, and effective doses of multiple glucose-lowering agents including insulin. (B)
At diagnosis:
Lifestyle + Metformin
Lifestyle + Metformin + Basal Insulin
Lifestyle + Metformin + Sulfonylurea

OLD ADA Algorithm
Tier 1: Well-validated core therapies
Step 1
Step 2
Step 3

At diagnosis:
Lifestyle + Metformin
Lifestyle + Metformin + Pioglitazone
Lifestyle + Metformin + GLP1 agonist

OLD ADA Algorithm
Tier 2: Less well validated therapies
Step 1
Step 2
Step 3
Step 4

At diagnosis:
Lifestyle + Metformin
Lifestyle + Metformin + Pioglitazone + Sulfonylurea
Lifestyle + Metformin + Basal Insulin

Classes not included:
Glinides, Alpha-glucosidase inhibitors, amylin analogue, DPP4i

New Diabetes Position Statement

Management of Hyperglycemia in Type 2 Diabetes: A Patient-Centered Approach
Position Statement of the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD)

Inzucchi, et. al. Diabetes Care. 2012. 35:1364-1379. DOI: 10.2337/dc12-0413
Rationale for a new position statement

“Many clinicians are therefore perplexed as to the optimal strategies for their patients”

Inzucchi, et. al. Diabetes Care. 2012. 35:1364-1379. DOI: 10.2337/dc12-0413

Background for a new position statement

• Less prescriptive; less algorithmic
• Intended to encourage appreciation for the:
  • Variable and progressive nature of Type 2 diabetes
  • Specific role of each drug
  • Patient and disease factors driving clinical decision making
  • Constraints of age and comorbidities

Inzucchi, et. al. Diabetes Care. 2012. 35:1364-1379. DOI: 10.2337/dc12-0413

Patient Centered Care

“Providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions”

Patient-Specific Goals

“Importantly, utilizing the percentage of diabetic patients who are achieving an HbA1c ≤ 7.0% as a quality indicator, as promulgated by various health care organizations, is inconsistent with the emphasis on individualization of treatment goals.”


Impact of Intensive Therapy for Diabetes: Summary of Major Clinical Trials

<table>
<thead>
<tr>
<th>Study</th>
<th>Microvasc</th>
<th>CVD</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>UKPDS</td>
<td>↓</td>
<td>↓</td>
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</tr>
<tr>
<td>DCCT / EDIC*</td>
<td>↓</td>
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</tr>
<tr>
<td>ACCORD</td>
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<td>ADVANCE</td>
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<td>VADT</td>
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* in T1DM

Approach to management of hyperglycemia:

More stringent

- Patient attitude and expected treatment efforts
- Risk potentially associated with hyperglycemia, other severe events
- Disease duration
- Life expectancy
- Important comorbidities
- Established vascular complications
- Resources, support system

Less stringent

- Less motivated, non-adherent, poor self-care capabilities
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### Table 1: Properties of anti-hyperglycemic agents

<table>
<thead>
<tr>
<th>Class</th>
<th>Mechanism</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biguanides</strong> (Metformin)</td>
<td>• Activates AMP-kinase&lt;br&gt;• Hepatic glucose production</td>
<td>• Extensive experience&lt;br&gt;• No hypoglycemia&lt;br&gt;• Weight neutral&lt;br&gt;• ↓ CVD events</td>
<td>• Gastrointestinal&lt;br&gt;• Lactic acidosis&lt;br&gt;• H.2 deficiency&lt;br&gt;• Contraindications</td>
<td>Low</td>
</tr>
<tr>
<td>SUs / Meglitinides</td>
<td>• Closes KATP channels&lt;br&gt;• ↑ Insulin secretion</td>
<td>• Extensive experience&lt;br&gt;• ↓ Microvascular risk</td>
<td>• Hypoglycemia&lt;br&gt;• Weight gain&lt;br&gt;• Low durability&lt;br&gt;• ↓ Ischemic preconditioning</td>
<td>Low</td>
</tr>
<tr>
<td>TZDs</td>
<td>• Activates PPARγ&lt;br&gt;• ↑ Insulin sensitivity</td>
<td>• No hypoglycemia&lt;br&gt;• ↓ Microvascular risk&lt;br&gt;• ↓ TGs, ↑ HDL-C&lt;br&gt;• ↓ CVD events (pioglitazone)</td>
<td>• Weight gain&lt;br&gt;• Edema / heart failure&lt;br&gt;• Bone fractures&lt;br&gt;• ↑ MI (rosiglitazone)&lt;br&gt;• ↑ Bladder ca (pioglitazone)</td>
<td>High</td>
</tr>
<tr>
<td>α-GIs</td>
<td>• Inhibits α-glucosidase&lt;br&gt;• Slows carbohydrate absorption</td>
<td>• No hypoglycemia&lt;br&gt;• Non-systemic&lt;br&gt;• ↓ Post-prandial glucose&lt;br&gt;• ↑ CVD events</td>
<td>• Gastrointestinal&lt;br&gt;• Dosing frequency&lt;br&gt;• Modest ↓ A1C</td>
<td>Med.</td>
</tr>
<tr>
<td>DPP-4 inhibitors</td>
<td>• Inhibits DPP-4&lt;br&gt;• Increases GLP-1, GIP</td>
<td>• No hypoglycemia&lt;br&gt;• Well tolerated&lt;br&gt;• ↓ Pancreatitis&lt;br&gt;• ↓ Urticaria</td>
<td>• Modest ↓ A1C&lt;br&gt;• ↓ Pancreatitis&lt;br&gt;• ↓ URticaria</td>
<td>High</td>
</tr>
<tr>
<td>GLP-1 receptor agonists</td>
<td>• Activates GLP-1 receptor&lt;br&gt;• ↑ Insulin, ↓ glucagon&lt;br&gt;• ↑ Gastric emptying&lt;br&gt;• ↑ Satiety</td>
<td>• Weight loss&lt;br&gt;• No hypoglycemia&lt;br&gt;• ↓ Body cell mass&lt;br&gt;• ↓ CV protection&lt;br&gt;• ↓ GI&lt;br&gt;• ↓ Pancreatitis&lt;br&gt;• ↓ Medullary ca&lt;br&gt;• ↓ Injectability</td>
<td>• GI&lt;br&gt;• ↓ Pancreatitis&lt;br&gt;• ↓ Medullary ca&lt;br&gt;• ↓ Injectability</td>
<td>High</td>
</tr>
<tr>
<td>Amylin mimetics</td>
<td>• Activates amylin receptor&lt;br&gt;• ↓ Glucagon&lt;br&gt;• ↑ Gastric emptying&lt;br&gt;• ↑ Satiety</td>
<td>• Weight loss&lt;br&gt;• ↓ Post-prandial glucose&lt;br&gt;• ↓ GI&lt;br&gt;• ↓ Pancreatitis&lt;br&gt;• ↓ Hypo w/ insulin&lt;br&gt;• ↓ Dosing frequency&lt;br&gt;• ↓ GI&lt;br&gt;• ↓ Pancreatitis&lt;br&gt;• ↓ Medullary ca&lt;br&gt;• ↓ Injectability&lt;br&gt;• ↓ Hypo w/ insulin&lt;br&gt;• ↓ Dosing frequency&lt;br&gt;• ↓ GI&lt;br&gt;• ↓ Pancreatitis&lt;br&gt;• ↓ Medullary ca&lt;br&gt;• ↓ Injectability</td>
<td>• GI&lt;br&gt;• ↓ Pancreatitis&lt;br&gt;• ↓ Medullary ca&lt;br&gt;• ↓ Injectability&lt;br&gt;• ↓ Hypo w/ insulin&lt;br&gt;• ↓ Dosing frequency&lt;br&gt;• ↓ GI&lt;br&gt;• ↓ Pancreatitis&lt;br&gt;• ↓ Medullary ca&lt;br&gt;• ↓ Injectability</td>
<td>High</td>
</tr>
</tbody>
</table>
| Bile acid sequestrants | • Binds bile acids<br>• Hepatic glucose production | • No hypoglycemia<br>• Non-systemic<br>• ↓ LDL-C<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency<br>• ↓ GI<br>• ↓ Pancreatitis<br>• ↓ Dosing frequency

Table 1. Properties of anti-hyperglycemic agents
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<tr>
<th>Class</th>
<th>Mechanism</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Cost</th>
</tr>
</thead>
</table>
| Dopamine-2 agonists | • Activates DA receptor  
• Modulates hypothalamic control of metabolism  
• ↑ Insulin sensitivity | • No hypoglycemia  
• ↓ CVD events | • Modest ↓ A1c  
• Dizziness/syncope  
• Nausea  
• Fatigue | High |
| Insulin    | • Activates insulin receptor  
• ↑ Glucose disposal  
• Hepatic glucose production | • Universally effective  
• Unlimited efficacy  
• ↓ Microvascular risk | • Hypoglycemia  
• Weight gain  
• ↑ Mitogenicity  
• Training requirements  
• “Stigma” | Variable |

Table 1. Properties of anti-hyperglycemic agents

Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596
Adherence Strategies

- Comprehensive Medication Therapy Management
- Understanding of the medication experience
- Shared decision making
- Health Literacy Assessment
- Motivational Interviewing
- Medication reminder devices
- Mobile device technology

Patient Perceptions of Benefit

- In an interview-based research design, researchers found that comprehensive diabetes care has a negative quality of life effect similar to that of intermediate diabetes complications.

  701 adult patients living with diabetes
  Evaluated 9 complication states and 10 treatment states on quality of life

  0 = death; 1 = perfect health

Huang, et. al. Diabetes Care. 2007. 30:2478-2483
Shared Decision Making

- Shared decision making promotes a patient-centered approach to care decisions
- Takes into account patient preferences, values and goals

Diabetes Decisions Aids

- Tools designed to involve patients in shared decision making
- Evidence shows diabetes decision aids improve patient involvement in making treatment decisions
- Studies evaluating decision aids impact on compliance and patient outcomes are ongoing
- Mayo Clinic has an online version at: http://diabetesdecisionaid.mayoclinic.org/index.php/site/index

Huang, et. al.  Diabetes Care. 2007. 30:2478-2483

Patient Case Example: MZ

- 58 year old male
- PMH: Type 2 diabetes x 12 years, dyslipidemia, osteoarthritis, generalized anxiety disorder
- HPI: Patient’s BG’s have been increasing over the past year and one-half. He has consistently been refusing insulin. He cannot pinpoint any specific changes to his lifestyle causing the increasing BG.

Patient Case Example: MZ

- Current Medications:
  - Atorvastatin 20mg once daily
  - Metformin 1000 mg BID
  - Glipizide XL 20 mg once daily
  - Venlafaxine 150mg daily
  - Aspirin 81 mg once daily
  - Acetaminophen extended release 650mg 2-3 x/daily
Patient Case Example: MZ

• Social History: No tobacco, 1 alcoholic drink/day; Married. Works as an accountant
• Vitals: BP today: 120/80; Weight: 190 lbs., Height: 5’10”, BMI: 27
• Labs:
  • A1C: 7.2% (last readings: 6.8%, 6.5%, 6.4%)
  • TC: 188, HDL: 41, LDL: 94, TG: 180

Patient Case Example: MZ

• What patient characteristics would impact goal setting for MZ?

Approach to management of hyperglycemia:

<table>
<thead>
<tr>
<th>More stringent</th>
<th>Less stringent</th>
</tr>
</thead>
<tbody>
<tr>
<td>High risk factors, high risk of complications</td>
<td>Low risk factors, low risk of complications</td>
</tr>
<tr>
<td>Long duration</td>
<td>Short duration</td>
</tr>
<tr>
<td>Poor adherence</td>
<td>Good adherence</td>
</tr>
<tr>
<td>Severe comorbidities</td>
<td>Mild comorbidities</td>
</tr>
<tr>
<td>Established vascular complications</td>
<td>Absent vascular complications</td>
</tr>
<tr>
<td>Resources, support system</td>
<td>Limited resources, support system</td>
</tr>
</tbody>
</table>

MZ
Patient Case Example: MZ

• What A1C goal would you set for this patient?
  • A. < 6.5%
  • B. < 7%
  • C. < 8%
  • D. < 9%

Patient Case Example: MZ

• What would be the best treatment option for this patient for his diabetes?
Patient Case Example: KL

• 52 year old female with a longstanding history of noncompliance
• PMH: Type 2 diabetes x 10 years, depression, HTN, hypothyroidism, dyslipidemia; non-healing wound on her foot
• HPI: Patient reports nonadherence to insulin because she is “too depressed to do shots.” Occasionally uses 30 units of lispro insulin 1-2 x/week. Sees psych 1x/month

Patient Case Example: KL

• Current Medications:
  • levothyroxine 50 MCG tablet once daily
  • pravastatin 40 MG tablet once daily
  • insulin aspart injection Inject Subcutaneous 3 times daily (before meals) as per sliding scale.
  • insulin glargine injection Inject 50 Units Subcutaneous every morning (before breakfast).
  • paroxetine 40 MG tablet once daily
  • aspirin 81 MG tablet once daily.

Patient Case Example: KL

• Social History: Smokes 1 PPD, no alcohol use. Lives alone. Is providing childcare for a grand-niece.
• Vitals: BP today: 120/80; Weight: 195 lbs., Height: 5’5”, BMI: 42
• Labs:
  • A1C: 13.2%
  • TC: 321, HDL: 29, LDL (cannot be estimated), TG: 1396
Patient Case Example: KL

• What patient characteristics would impact goal setting for KL?

KL

Approach to management of hyperglycemia:

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>More stringent</th>
<th>Less stringent</th>
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</thead>
<tbody>
<tr>
<td>Patient attitude and expected efforts</td>
<td>High motivation, abundant self-care capacities</td>
<td>Less motivated, non-adherent poor self-care capacities</td>
</tr>
<tr>
<td>Risk potentially associated with hyperglycemia, other adverse events</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Disease duration</td>
<td>Newly diagnosed</td>
<td>Long-standing</td>
</tr>
<tr>
<td>Life expectancy</td>
<td>Short</td>
<td>Long</td>
</tr>
<tr>
<td>Important comorbidities</td>
<td>Absent</td>
<td>Few</td>
</tr>
<tr>
<td>Established vascular complications</td>
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<td>Few</td>
</tr>
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<td>Resources, support system</td>
<td>Easily available</td>
<td>Limited</td>
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</table>

Patient Case Example: KL

• What A1C goal would you set for this patient?
  • A. < 6.5%
  • B. <7%
  • C. <8%
  • D. <9%
Patient Case Example: KL

• What would be the best treatment option for this patient for her diabetes?

KL

Patient Case Example: LC

• LC is a 67 year old female
• PMH: Type 2 diabetes x 6 years; HTN x 2 years, osteoarthritis in fingers x 9 years, h/o ischemic stroke
• HPI: Currently declining prescription therapy for diabetes and HTN. Sees an herbalist and follows those treatment recommendations. Has taken metformin in the past and states it “made her blind”
• Current Medications: Hawthorne/Cayenne herbal product, Unknown herbal for blood sugar
Patient Case Example: LC
• SH: No tobacco, alcohol 1x/week; walks 30 minutes every day; retired & lives alone but daughter is supportive
• Vitals: BP: 170/85, P: 75; Height: 5'3", Weight: 148 lbs, BMI: 26
• Labs
  A1C: 12.5%
  TC: 316, TG: 94, LDL: 239, HDL: 58

Patient Case Example: LC
• What patient characteristics would impact goal setting for LC?
Patient Case Example: LC

• What A1C goal would you set for this patient?
  • A. < 6.5%
  • B. <7%
  • C. <8%
  • D. <9%

Patient Case Example: LC

• What would be the best treatment option for this patient for her diabetes?

  Patient refuses injections
Patient Case Example: LC

• Which medical problem would you put the highest priority on?
  • A. Diabetes
  • B. Hypertension
  • C. Dyslipidemia

QUESTIONS?

Thank you!

QUESTIONS?