

Type 2 Diabetes: Master DecisionPath Revised for Family Medical Center 9/2010

At Presentation

A1C <8% and/or
Fasting Plasma Glucose <200 mg/dL
Casual Plasma Glucose <250 mg/dL
See Medical Nutrition Therapy Assessment Below; Refer to Diabetes Education

A1C 8 - 12% and/or
Fasting Plasma Glucose 200-325 mg/dL
Casual Plasma Glucose 250-400 mg/dL
See Medical Nutrition Therapy Assessment Below; Refer to Diabetes Education

A1C >12% and/or
Fasting Plasma Glucose >325 mg/dL
Casual Plasma Glucose >400 mg/dL
See Medical Nutrition Therapy Assessment Below; Refer to Diabetes Education

Medical Nutrition Therapy and Activity (MNT) Stage

If target goals not reached or no significant improvement within 3 months, start Oral Agent Stage

Potential Cumulative Benefit: ~1 percentage point reduction in A1C

Oral Agent Stage + MNT

Insulin Resistance* - Metformin or Pioglitazone (*INSULIN SENSITIZER*)
Insulin Deficiency* - Sulfonylurea, Nateglinide or Sitagliptin
If target goals not reached or no significant improvement after clinically effective dose for 3 months, start Combination Therapy or Insulin Stage

Potential Cumulative Benefit: 1-2 percentage point reduction in A1C

Combination Therapy Stage + MNT

Current Therapy:
Sulfonylurea
Metformin
Pioglitazone
Nateglinide
Sitagliptin

Add Agent Based on Clinical Indicators*:
Metformin, Exenatide, Liraglutide, Sitagliptin or Pioglitazone
Sulfonylurea, Nateglinide, Pioglitazone, Exenatide, Liraglutide or Sitagliptin
Sulfonylurea, Metformin, Exenatide, Liraglutide or Sitagliptin
Metformin
Metformin, Sulfonylurea or Pioglitazone

If target goals not reached or no significant improvement after clinically effective dose for 3 months, start Insulin Stage

Potential Cumulative Benefit 2-4 percentage point reduction in A1C

Insulin Stage + MNT ± Oral Agent(s)

Potential Cumulative Benefit >4 percentage point reduction in A1C
For new insulin starts, if glucose ≥350 mg/dL, may give one time injection of 0.10 units/kg regular insulin

Background Insulin Oral Agent(s) + LA

Background & Mealtime Insulin
RA - RA - RA - LA
± Insulin Sensitizer
0.3 - 0.4 units/kg total daily dose; 50% long-acting and 50% RA/3 meals

Premixed Insulin
RA/N - 0 - RA/N - 0
± Insulin Sensitizer
0.3 - 0.4 units/kg total daily dose; 50% with breakfast and 50% with supper

* Clinical Indicators

Insulin Resistance: Obesity, HTN, elevated fasting BG, elevated triglycerides, low HDL
Insulin Deficiency: Leaner, elevated post-meal BG, symptoms

Insulins

RA= Rapid-Acting (glulisine [Apidra], lispro [Humalog], aspart [Novolog])
LA= Long-acting insulin (detemir [Levemir] or Glargine [Lantus])
N= NPH
0= None
Dose Schedule: AM - Midday - PM - Bedtime

Comments

1. Continue with medical nutrition therapy throughout all stages of therapy
2. This DecisionPath is bi-directional; patients may move in either direction between therapies
3. Consider insulin sensitizer (metformin) with all insulin therapies, especially when insulin dose >0.7 units/kg

Hospital Admission Criteria

BG >250 mg/dL, ketonuria, evidence of acidosis, defined as bicarbonate <19, and anion gap >12.
BG >500 mg/dL and evidence of dehydration (postural hypotension, tachycardia, increased BUN)

Medical Nutrition Therapy Assessment

- Q: How much regular pop, Koolaid, or juice do you drink per day?
Recommend: patient eliminate sweetened beverages from diet.
- Q: How much rice or potatoes do you eat at a meal?
Recommend: 1 cup of rice or potatoes per meal.
- Q: How many tortillas or bread slices do you eat at each meal?
Recommend: 2 to 4 tortillas or bread slices per meal.
- Q: How many meals do you eat per day?
Recommend: eat three meals per day and bedtime snack.
- Inform patient that the above recommendations are to be followed until their initial appointment with the dietitian.

Labs for Newly Diagnosed Patient with Diabetes

Plasma glucose (fasting or casual); A1C; Serum Creatinine; Microalbumin Screen (Albumin Creatinine/Ratio); ALT; urinalysis
If evidence of diabetic ketoacidosis (DKA) or hyperglycemic hyperosmolar syndrome (HHS) obtain BMP and CBC if infection is suspected; see Hospital Admission Criteria.

Screening	Screen all patients every 3 years starting at age 25. If risk factors present, start earlier and screen annually.
Risk Factors	<ul style="list-style-type: none"> • BMI > 25 kg/m² (> 23 kg/m² in Asian Americans) • Hypertension (≥ 140/90 mmHg) • Dyslipidemia (HDL ≤ 35 mg/dL and/or triglyceride ≥ 250 mg/dL) • High risk for diabetes (prediabetes): A1C 5.7-6.4%, impaired fasting glucose (IFG) 100 - 125 mg/dL; impaired 2 hr glucose tolerance 140 - 199 mg/dL (refer to dietitian for education) • Previous gestational diabetes: macrosomic or large-for-gestational age infant • Acanthosis Nigricans

Diagnosis	
Lab Tests	A1C ≥ 6.5%, casual ≥ 200 mg/dL plus symptoms or fasting ≥ 126 mg/dL; if positive, confirm diagnosis with second lab test (A1C, casual or fasting plasma glucose) unless unequivocal hyperglycemia (e.g. patient started on insulin with A1C > 12%) Hospital Admission Criteria: BG > 250 mg/dL, ketonuria, evidence of acidosis (bicarbonate < 19) and anion gap > 12; BG > 500 mg/dL and evidence of dehydration (postural hypotension, tachycardia, increased BUN)
Symptoms	Often none Common: Blurred vision; urinary tract infection; yeast infection; dry/itchy skin; numbness or tingling in extremities; fatigue Occasional: Increased urination, thirst, and appetite; nocturia; weight loss
Urine Ketones	Usually negative

Treatment Options	Medical Nutrition Therapy Stage; Oral Agent Stage; Combination Oral Agent Stage; Insulin Stage. <i>See Type 2 Master Decision Path</i>
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Targets	
Self-Monitored Blood Glucose (SMBG) Plasma Referenced Meters	<ul style="list-style-type: none"> • More than 50% of SMBG values within target range • Pre-meal: 70-130 mg/dL • Post-meal (2 hr after start of meal): < 180 mg/dL • Bedtime: 100-160 mg/dL • No severe (assisted) or nocturnal hypoglycemia Adjust pre-meal target upwards if decreased life expectancy; frail elderly; cognitive disorders; or other medical concerns (cardiac disease, stroke, hypoglycemia unawareness, ESRD)
Blood Pressure	< 130/80 mmHg
Lipids	Cholesterol < 200 mg/dL; HDL > 40 mg/dL men and > 50 mg/dL women; LDL < 100 mg/dL; Triglyceride < 150 mg/dL
EKG	Baseline testing in adults only
Hemoglobin A_{1c} (A1C)	<ul style="list-style-type: none"> • Target < 7.0%, consider < 8.0% if complex patient factors • Frequency: every 3 months if target not met; every 6 months if target met • Use A1C to verify SMBG data

Estimated Glucose and A1C correlation

A1C Value	Estimated Average Glucose (eAG)
6%	126 mg/dL
7%	154 mg/dL
8%	183 mg/dL
9%	212 mg/dL
10%	240 mg/dL
11%	269 mg/dL
12%	298 mg/dL
13%	326 mg/dL

Nathan et al. Diab. Care 31:1473-1478, 2008.

Monitoring	
SMBG	If on Medical Nutrition Therapy/Oral Medication: 2-3 times/day to start, every other day when targets met (before breakfast, before main meal, 2 hrs after main meal) If on insulin: 4 times/day (may be modified due to cost, technical ability, availability of meters); if on insulin, check 3 AM SMBG as needed
Instruct pt. to notify clinic if blood glucose is < 70 mg/dL two times in one week or > 200 mg/dL for three consecutive days	
Method	Meter with memory that is downloadable and log book

Follow Up	Give pt. Rx for all medications and supplies to cover them until next appointment
Weekly	Office visit when starting Oral Agent, Combination Oral Agent and Insulin Stages
Document on MD/NP Diabetes Flow sheet	<ul style="list-style-type: none"> • Monthly: Office visit during adjusting therapies or target not met • Every 3 Months: Hypoglycemia; medications; weight or BMI; BP; SMBG data (download and check meter); A1C; eye screen; foot check; medical nutrition therapy; preconception planning for women of childbearing age; smoking cessation counseling; aspirin therapy (if appropriate) • Yearly: In addition to the 3 month follow-up complete the following: history and physical; fasting lipid profile; albuminuria screen; dilated eye examination; dental examination; neurologic assessment; complete foot examination (pulses, sensation and inspection); referral for diabetes and nutrition education; adult immunizations

Complications Surveillance	Cardiovascular, renal, retinal, neurological, foot, oral and dermatological (<i>See SDM Prevention, Detection and Treatment of Diabetes in Adults Quick Guide, 5th Edition</i>)
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