Type 2 Diabetes and Glucose Control

Diagnosis of Type 2 Diabetes - Confirm the diagnosis with second test.

1. A1c > = 6.5%; this is the preferred method of testing.
2. Fasting Plasma Glucose (FPG) is > = 126 mg/dL.
3. Two-hour oral glucose tolerance test is > = 200 mg/dL.
4. Non-fasting laboratory glucose > = 200 mg/dL with symptoms of polydipsia, polyuria and or polyphagia.

Prediabetes is defined as an A1c between 5.7 to 6.4%, a fasting plasma glucose between 100 to125 mg/dL or 2-hour oral glucose tolerance test between 140 to 199 mg/dL.

Blood Glucose Targets for Type 2 Diabetes*

The premeal (or fasting) blood glucose target is between 70 to130 mg/dL.
The 2 hour post prandial blood glucose target is between 160 to180 mg/dL.
The A1c target level is < 7.0%.
*Individualize targets based on patient condition.

Treatment Algorithm for Diabetes Type 2

If any of the following occur **skip Steps 1 through 3 and go directly to Step 4**: FPG > 250, glucose > 300, A1c > 10%, active liver disease, ETOH abuse, ketonuria, or weight loss. If acidotic, patient should be hospitalized.

Step 1: Start with metformin and lifestyle interventions.

Step 2: If target levels are not reached with Step 1, add a sulfonylurea.

Step 3: If target levels are not reached with Step 2, add either basal insulin or a thiazolidinedione (TZD). To start basal insulin, use 10 units of NPH at bedtime or 10 units of a long-acting insulin.

Step 4: If target levels are not reached with Step 3, intensify the insulin therapy. See the Type 2 Diabetes and Insulin Algorithm Card.

Immunizations Recommendations

Pneumovax - at diagnosis and again at age 65 if it has been at least 5 years or longer since the first shot
Flu shots – yearly
Td /Tdap – per protocol or routine
PPD – once after diagnosis of diabetes--a positive reaction is ≥10mm

Don't forget the following information:
Glucose toxicity - Insulin production is decreased with prolonged hyperglycemia; insulin shots short-term reverses this condition.
Pancreatic Exhaustion - Almost all individuals with Type 2 diabetes will eventually require insulin.

Recommendations for Monitoring Type 2 Diabetes

A1c - every 3-6 months
Creatinine and eGFR – yearly
UACR - yearly
Lipid Panel - yearly
LFTs - yearly
ECG - every 2-5 years
Complete Foot Exam - yearly
Foot inspection - each visit
Retinopathy exam - yearly
Paps, Mammograms, Contraception
Evaluate sexual function
Depression, Tobacco, ETOH, DV screening – yearly

Estimated Average Glucose (eAG). The table below describes the linear relationships between A1c and mean plasma glucose levels.

A1c %	Mean Plasma Glucose mg/dL
6	126
7	154
8	183
9	212
10	240
11	269
12	298

Medications

Biguanides: Metformin & Metformin XR (Glucophage®)
Start 500 mg daily with meals and increase no faster than 500 mg each week. If GI symptoms are bothersome, slowly increase the dose.
Maximum dose: 2000 mg daily or divided with extended release (XR) tablets. Do not split XR tablets. Regular release tablets 2500 mg divided into two times a day (BID) or three times a day (TID).
These medications can decrease weight. Patient must have normal creatinine (males <1.5, females <1.4 mg/dL). Do not use when liver disease (check alanine aminotransferase [ALT]) or significant ETOH use is present. Discontinue before surgery or IV contrast dye administration.

Sulfonylureas: Glyburide (Micronase®) and Glipizide (Glucotrol®)
Start 2.5 to 5 mg daily. Maximum dose is 10mg BID.
These medications can increase weight and cause hypoglycemia.

Thiazolidinediones: Pioglitazone (Actos®)**
Start 15 mg daily; may increase to 30 mg daily. There is little benefit with dosing over 30 mg. Maximum A1c changes may take up to 12 weeks to occur. Check ALT at baseline and periodically. Do not use if underlying liver disease is present or if there is significant ETOH use. Warning: These medications may increase the risk of heart failure and bone fracture. They may be used in renal insufficiency and can cause weight gain.

DPP- 4 Inhibitors - These may reduce weight and result in mild to moderate A1c lowering.
Sitagliptan (Januvia®) -** Dose is 100 mg PO daily. Reduce dose if patient has Chronic Kidney Disease (CKD) at Stage 3 or greater.
Saxagliptan (Onglyza®) –** Dose is 2.5-5mg PO daily. Use the lower dose of 2.5 mg when strong P450 3A/4 enzyme inhibitors are used or if moderate to severe renal impairment exists.

GLP1 mimetic – These can decrease weight and result in mild to moderate A1c lowering. May be associated with pancreatitis; seek medical care if persistent severe abdominal pain with or without vomiting occurs.
Exenatide (Byetta®)** - Starting dose is 5 mcg BID subcutaneous (SC) injection in thigh, abdomen or upper arm. May increase dose to 10 mcg BID after 1 month of treatment. Administer within 60 minutes before meals. Does not use if patient has CKD at Stage 4 or greater.
Liraglutide (Victoza®)** - Staring dose is 0.6 mg daily SC injection in thigh, abdomen or upper arm. Increase to 1.2 mg daily in 1 week. May increase dose to 1.8 mg daily.

Pramlintide (Symlin®)** - Amylin mimetic
Results in mild A1c lowering; associated with small decrease in weight.
Starting dose is 60 mcg daily SC injection immediately before a major meal. Be sure to reduce preprandial (short-acting) insulin by 50%, as appropriate. Start with lower doses in type 1 diabetes. Dose may be increased to 120 mcg after significant nausea is gone in 3 to 7 days.
**** Drugs not on the IHS National Core Formulary**.

References:
American Diabetes Association Clinical Practice Recommendations 2010 Diabetes Care 2010;33 supplement 1. http://care.diabetesjournals.org/content/33/Supplement_1.toc

Medical Management of Hyperglycemia in Type 2 Diabetes: A Consensus Algorithm for the Initiation and Adjustment of Therapy. Diabetes Care 2009;32(1):193-203. http://care.diabetesjournals.org/content/32/1/193.full.pdf+html?sid=2f4cc723-ed36-4bd5-93f6-db645089e1ac