

Treatment Pearls

- P1.** Diabetes management requires multi-system evaluation and care (see Monitoring).
- P2.** First-line agents are sulfonylureas (glipizide, glyburide), biguanide (metformin), thiazolidinediones (rosiglitazone, pioglitazone) and insulin.
- P3.** Goals:
 - A1C < 7%
 - Pre-Prandial Glucose = 90-130 mg/dl
 - Post-Prandial Glucose < 180 mg/dl
 - Blood pressure < 130/80 (< 125/75 with kidney disease)
 - LDL < 100 mg/dl
 - HDL > 50 mg/dl
 - TG < 150 mg/dl

Physicians Plus recently added a diabetes focus to our case management program. Contact Dana Hanson, RN, for more information at (608) 260-7171.

Links

Physicians Plus diabetes guidelines:

www.pplusic.com/providers/preventive_guidelines.htm

Wisconsin Diabetes Control & Prevention Program:

www.dhfs.wisconsin.gov/health/diabetes/

Treatment Costs

Tier 1 Agents (low-level copay)

Glipizide: 5 to 20 mg/day, \$1.22-\$2.45

Glyburide: 1.25 to 20 mg/day, \$2.70-\$3.75

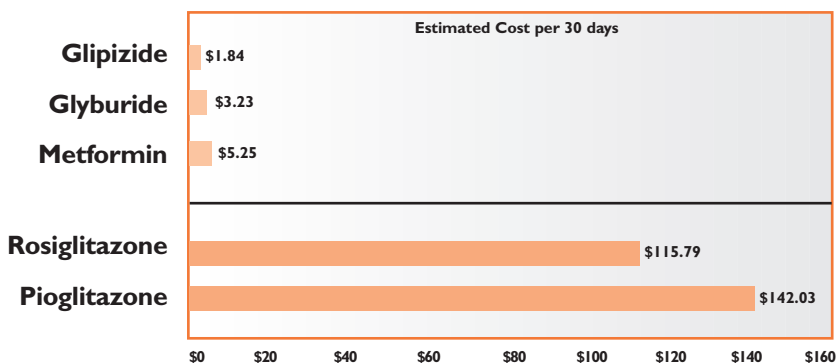
Metformin: 1000 to 2550 mg/day, \$4.50-\$6

Tier 2 Agents (high-level copay)

Rosiglitazone (Avandia®): 4 to 8 mg/day, \$63.54- \$168.04

Pioglitazone (Actos®): 15 to 45 mg/day, \$103.80- \$180.26

Formulary Options by Treatment Line and Cost*



*Price Bases: Average Wholesale Price or Maximum Allowable Cost. January 2004

Background

Adults:

- Prevalence of diabetes,
 - US: age ≥ 20 years, 2002: 18 million (8.7%).
 - Wisconsin: age ≥ 18 years, 2000: 327,000 (8%).
 - Dane County: age ≥ 18 years, 2000: 21,250 (6%).
- Type 2 diabetes may account for 90-95% of all diagnosed cases.
- Each 1% decrease in A1C is associated with a decrease in risk of:
 - 21% for any endpoint associated with diabetes
 - 21% for deaths
 - 14% for myocardial infarction
 - 37% for microvascular complications
- Each 10 mmHg decrease in mean systolic blood pressure is associated with a decrease in risk of:
 - 12% for all complications
 - 15% for deaths
 - 11% for myocardial infarction
 - 13% for microvascular complications

Adolescents:

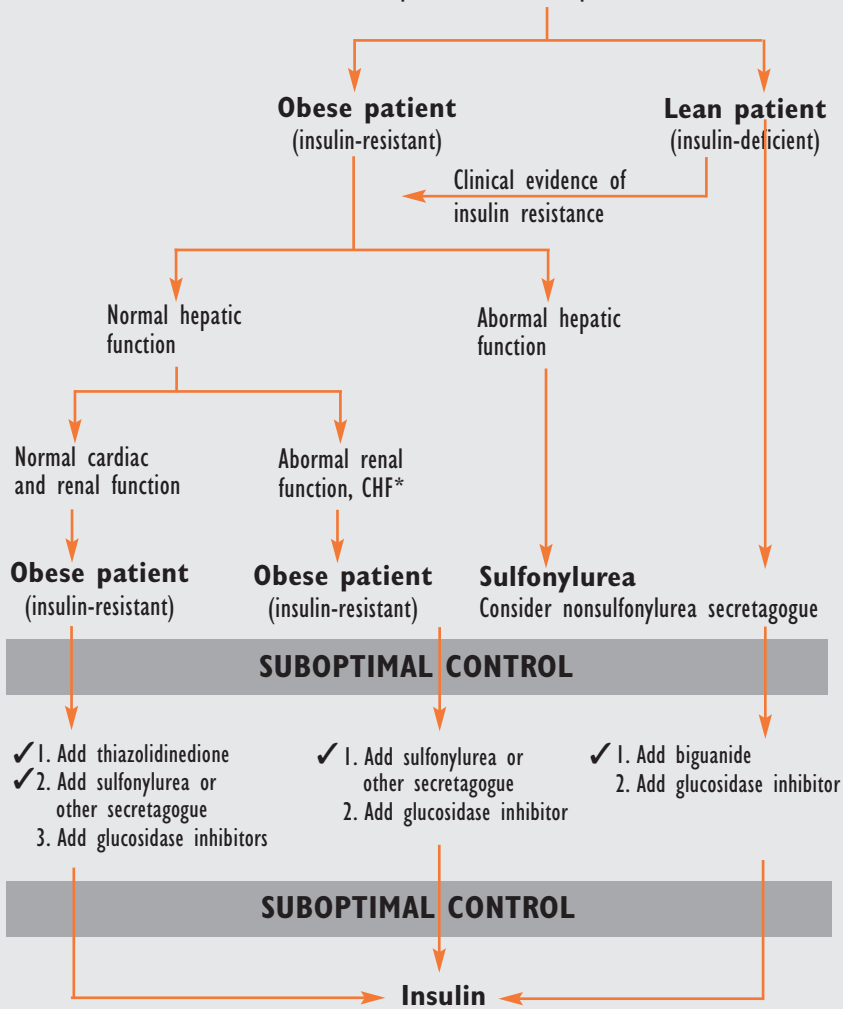
- Prevalence of diabetes in the U.S., age < 20 years, 2002: 206,000 (0.25%).
- Type 2 diabetes is becoming more common among children and adolescents.
- Children and adolescents diagnosed with Type 2 are generally 10-19 years old, obese, have a family history of Type 2, insulin resistance and poor glycemic control (A1C = 10%-12%).
- Obesity, low level of physical activity, as well as exposure to diabetes in utero may be major contributors to the increase in Type 2 diabetes among children and adolescents.

Monitoring

- Mnemonic Aid for use during patient examinations:
 - S**ight (eye examination) and smoking cessation
 - U**rine albumin (and creatinine clearance)
 - G**lycosylated hemoglobin (A1C)
 - A**therosclerosis (aspirin and lipids, palpate arteries) and alcohol consumption
 - R**educe weight (diet, exercise), reduce blood pressure and remove footwear (monofilament testing, foot examination)
- Immunizations: influenza, pneumococcal
- Dental checkups



Newly diagnosed mild-to-moderate type 2 diabetes with suboptimal control despite diet and exercise



*CHF, congestive heart failure. Use Thiazolidinediones with caution in patients with CHF (not indicated if class III or IV CHF). Unless liver function is abnormal. Insulin likely will be more cost-effective and has greater glucose-lowering power.

Figure 1. Proposed treatment protocol for type 2 diabetes. Check mark indicates combination is approved by the US Food and Drug Administration.

Adapted from Inzucchi SE. Yale Diabetes Center Diabetes Facts & Guidelines. New Haven, Conn:Yale Diabetes Center, 2001.

Indications for Insulin Use in Type 2 Diabetes:

1. Newly diagnosed, symptomatic with severe hyperglycemia
2. Poor glucose control with maximal doses of oral medications
3. Concurrent illness (infection, myocardial infarction) or operation
4. Pregnancy
5. Renal disease
6. Liver disease
7. Allergy intolerance to oral medications

Medication Parameters

Sulfonylureas (glipizide, glyburide):

- 0.9% to 1.8% A1C reduction
- For thin patients with insulinopenia
- Stimulates insulin secretion
- Adverse Effects/Precautions: weight gain, hypoglycemia, sulfa allergy, renal impairment

Biguanide (metformin):

- 0.8% to 2.0% A1C reduction
- For overweight patients, insulin-resistant patients, with dyslipidemia
- Decreases hepatic glucose production
- Adverse Effects/Precautions: lactic acidosis, do not use if $SCr > 1.5$, CHF, ETOH, liver impairment, iodinated radio-contrast

Thiazolidinediones (rosiglitazone, pioglitazone):

- 1.1% to 1.6% A1C reduction
- For insulin-resistant patients, with dyslipidemia
- Increases insulin sensitivity in muscle and adipose tissue
- Adverse Effects/Precautions: liver-monitor LFT's at baseline, every two months for one year, then periodically, CHF (fluid retention)

References:

1. CDC National Diabetes Fact Sheet web page. Center for Disease Control Web site. Available at: www.cdc.gov/diabetes/pubs/estimates.htm Accessed Feb. 18, 2004.
2. CDC Diabetes Project web page. Center for Disease Control Web site. Available at www.cdc.gov/diabetes/projects/cda2.htm Accessed Feb. 18, 2004.
3. Wisconsin Diabetes Prevention and Control Program web page. Department of Health & Family Services Web site. Available at: www.dhfs.wisconsin.gov/health/diabetes/Diabetes_facts.HTM Accessed Feb. 24, 2004.
4. American Diabetes Association. Standards of medical care in diabetes. *Diabetes Care*. 2004;27:S15-S35.
5. American Association of Clinical Endocrinologists. AACE Diabetes Guidelines. *Endocr Pract*. 2002;8:48-56.
6. Mayerson AB, Inzucchi, SE. Type 2 diabetes therapy. *Postgrad Med*. 2002;111:83-95.
7. Pharmacist's Letter. Oral Agents in the treatment of type 2 diabetes. Pharmacist's Letter. 2002;18: Detail-Document #180608.
8. Adler AI, Stratton IM, H Andrew WN, et al. Association of systolic blood pressure with macrovascular and microvascular complications of type II diabetes (UKPDS 36): prospective observational study. *BMJ*. 2000;321:405-412.

