

Achieving Diabetes Targets

Where are we, and how can we do better?

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 Washington, DC

Diabetes: The Numbers

EVERY 24 HOURS

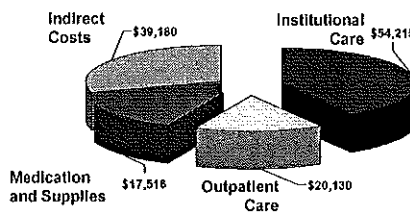
- New Cases – 4,100
- Amputations – 230 (60% of non-traumatic amputations annually)
- Blindness – 55 (#1 cause)
- Kidney Failure – 120 (#1 cause)
- Deaths – 810 - >60% due to CVD

Derived from NEDDY, National Diabetes Statistics fact sheet, NIDDK, NIH, 2005. December 2006

The National Diabetes Education Program
 www.nidap.nih.gov
 A joint program of NIDDK and CDC

\$132 Billion for Total Excess U.S. Cost Attributable to Diabetes in 2002

Costs in Millions of Dollars

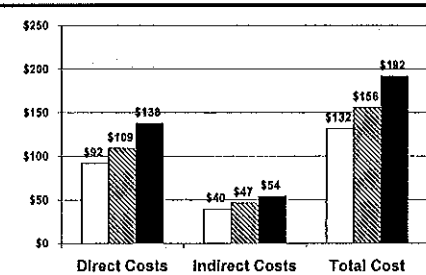


Category	Cost (Millions of Dollars)
Indirect Costs	\$39,180
Institutional Care	\$54,215
Medication and Supplies	\$17,516
Outpatient Care	\$20,130

American Diabetes Association. *Diabetes Care* 2003; 26:917-932.

Projected impact of changing demographic characteristics on the national cost of diabetes: 2002–2020

(in 2002 billions of dollars)



Category	2002	2010	2020
Direct Costs	\$92	\$109	\$138
Indirect Costs	\$40	\$47	\$54
Total Cost	\$132	\$156	\$192

Source: Economic Costs of Diabetes in the U.S. in 2002, Lewin Group, Inc., for the American Diabetes Association, 2002. (<http://care.diabetesjournals.org/cgi/content/full/25/3/961>)

Diabetes: The Numbers

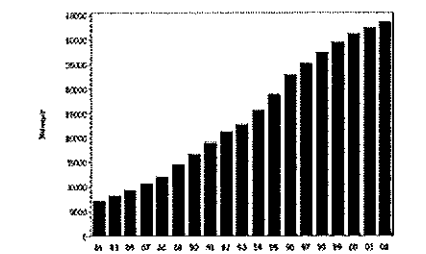
Preventing Diabetes Complications

- Glucose control
- Blood pressure control
- Blood lipid control
- Preventive care practices for eyes, kidneys, feet, teeth and gums
- Aspirin as directed by physician

NIDDK, National Diabetes Statistics fact sheet, NIDDK, NIH, 2005. December 2006

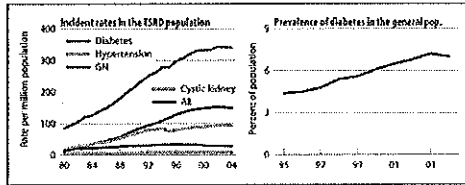
The National Diabetes Education Program
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Number of Persons Initiating Treatment for End-Stage Renal Disease Related to Diabetes, United States, 1984–2002



Source: National Diabetes Surveillance System – CDC website (<http://www.cdc.gov/diabetes/statistics/index.html>)

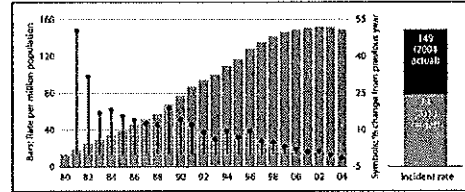
Adjusted ESRD incident rates, by primary diagnosis, & diabetes in the general population



ESRD incident rates, rates adjusted for age, gender, & race.

USRDS, accessed July 13, 2007

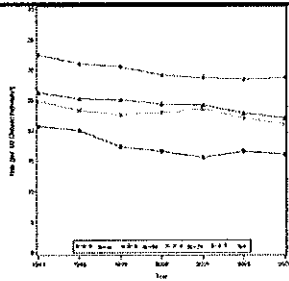
Adjusted ESRD incident rates of ESRD due to diabetes



ESRD incident rates, rates adjusted for age, gender, & race.

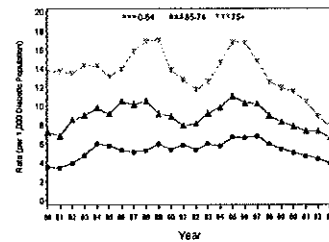
USRDS, accessed July 13, 2007

Prevalence of Visual Impairment per 100 Adults with Diabetes, by Age, United States, 1997–2003



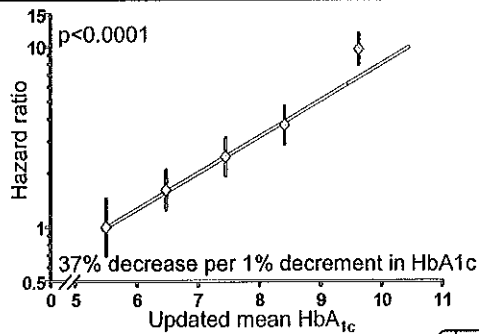
Source: National Diabetes Surveillance System - CDC website (<http://www.cdc.gov/diabetes/statistics/index.htm>)

Hospital Discharge Rates for Nontraumatic Lower Extremity Amputation per 1,000 Diabetic Population, by Age, United States, 1980–2003

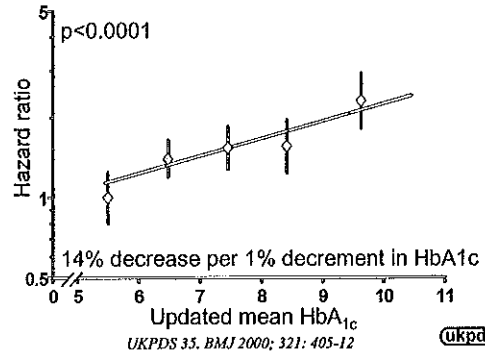


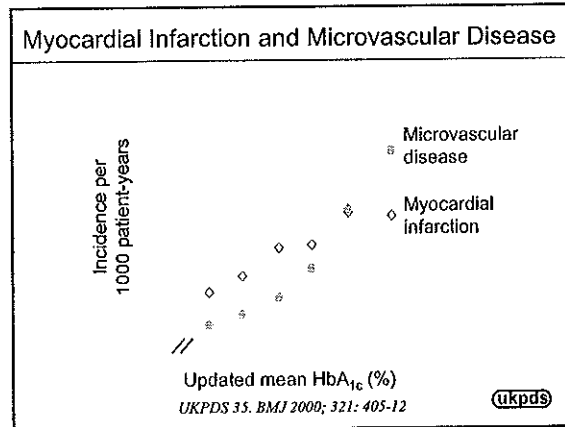
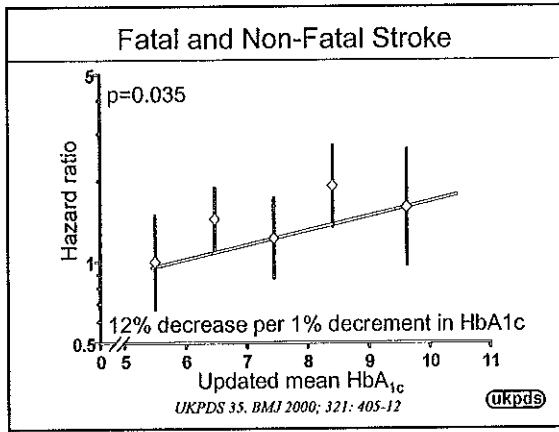
Source: National Diabetes Surveillance System - CDC website (<http://www.cdc.gov/diabetes/statistics/index.htm>)

Microvascular Endpoints



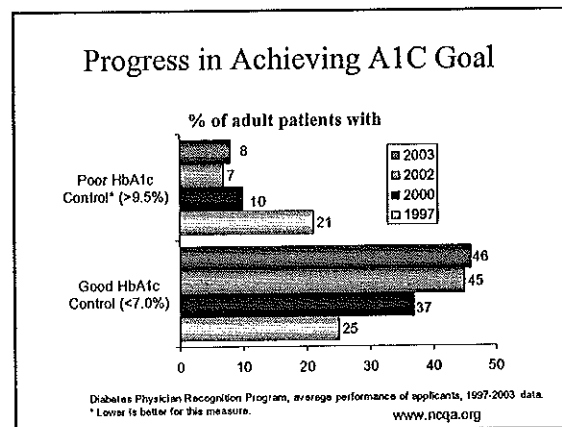
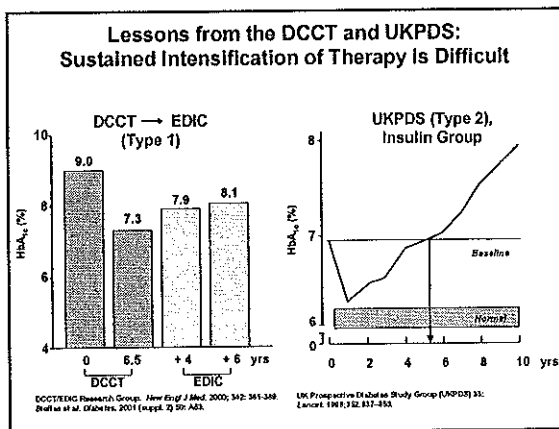
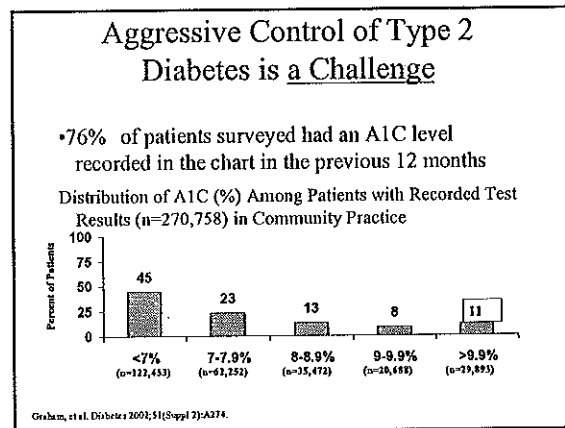
Fatal and Non-Fatal Myocardial Infarction





A1c is a good biologic correlate to microvascular disease complications

A1c is a less powerful correlate to macrovascular disease due to the multi-factorial nature of the CVD

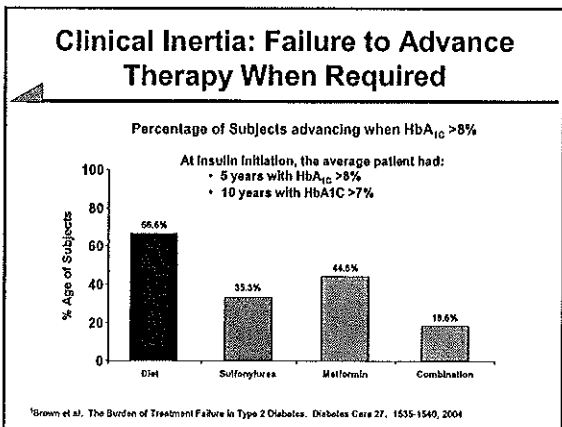
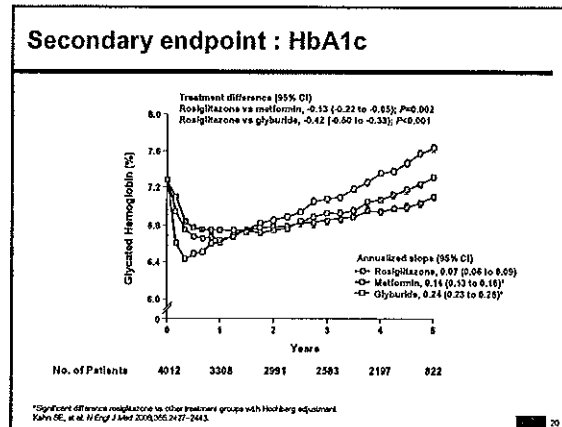


Secondary Failure of Monotherapy Overweight Patients in the UKPDS

Percent with A1C <7% on
monotherapy

	3 years	6 years	9 years
Diet	23	12	11
Sulfonylureas	45	28	21
Metformin	44	34	13

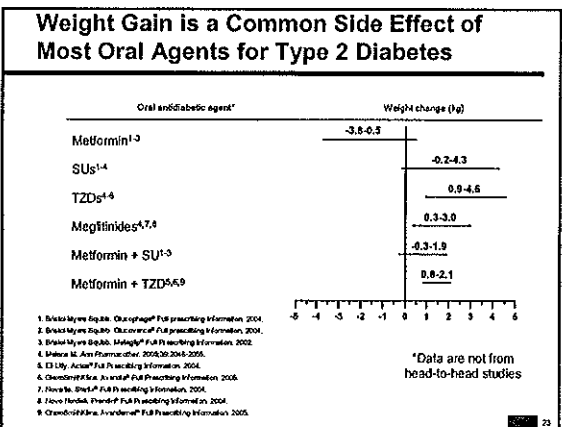
Turner RC et al. UKPDS 49. JAMA. 1999;281:2005-2012



Severe Adverse Effects Substantiated in Published Clinical Trials

	Hypoglycemia	CV	Lactic acidosis
Insulin	Yes	No	No
Sulfonylureas	Yes	Yes?	No
Metformin	No	No	Yes
α-Glucosidase inhibitors	No	No	No
Glitazones (TZDs)	No	Yes(CHF)	No
Repaglinide, nateglinide*	Yes	No	No
Incretin Mimetics/Enhancers	No	No	No

* Recently available agents with few trials documenting long-term outcomes
 CV=cardiovascular; CHF=congestive heart failure



Adherence to Prescribed Drugs in Patients with Type 2 Diabetes

Drug class	n	% Adherent	95% CI
Oral antidiabetic drugs	66	50.0	37.9-62.1
Antihypertensive drugs	62	50.0	37.8-62.4
Lipid-lowering drugs	33	69.7	54.0-85.4
Antiplatelet drugs	40	77.5	64.6-90.4
All drugs	82	35.4	25.0-45.7

Meteo JF et al. Int J Clin Pract. 2005;59:432-438.

Reviews/Commentaries/Position Statements

Diabetes Care. 2004 May 1; 27(5):1218-1224

A Systematic Review of Adherence With Medications for Diabetes

John A. Cohan

OBJECTIVE — The purpose of this study was to determine the extent to which patients with type 2 diabetes adhere to their medication regimens.

Insulin adherence among patients with type 2 diabetes was 62-64%

CONCLUSIONS — This review confirms that most patients do not adhere to their medication regimens. However, adherence to medication regimens was higher in patients with type 2 diabetes who were receiving insulin therapy. The adherence rate was higher in patients with type 2 diabetes who were receiving insulin therapy than in patients who were not receiving insulin therapy. The adherence rate was higher in patients with type 2 diabetes who were receiving insulin therapy than in patients who were not receiving insulin therapy.

RESEARCH DESIGN AND METHODS — A systematic literature search was conducted to identify all published studies that reported adherence rates with diabetes medications.

Medical Benefits Substantiated in Published Clinical Trials

	Microvascular	Cardiovascular
Insulin	Yes	Yes?
Sulfonylureas	Yes	No
Metformin	Yes	Yes?
α-Glucosidase inhibitors	No	Yes?
Glitazones (TZDs)	No	No
Repaglinide, nateglinide*	No	No
Incretin Mimetics/Enhancers*	No	No

* Recently available agents with few trials documenting long-term outcomes

Why do we need new therapies for Type 2 Diabetes?

- The epidemic of diabetes and its complications will soon swamp our medical delivery system
- A1c is a well validated short term target
- We are not currently achieving our glycemic targets
- Current therapies have either limited efficacy, marked complexity, or unacceptable side effects
- Therapies must be acceptable to patients and health care providers – They must be utilized!

What should drive diabetes drug development and approval?

- Safety (Hepatic, CVD, Hypoglycemia – While realizing that diabetes is a serious disease!)
- Efficacy (glycemic control, risk factor reduction)
- Side Effects (weight gain)
- Patient acceptability

