WRITE-UP OF PHONE-DICTATED TO-DO LIST FOR 8/5

I) Diabetes in Medicare -- Talking with Joan Steiberg

The new legislation expands two types of benefits:

1) Outpatient self-management training for People with diabetes, training for how to manage the condition. The current law pays for outpatient services only in hospital-based programs. The new law covers out-patient programs in other location (i.e. someone covered by medicare can go to his physician and receive self-management training which is covered by medicare).

2) Coverage of blood glucose monitors and testing strips: A person can take his own blood sample to monitor glucose samples in their blood. Medicare has paid for the blood testing equipment and glucose strips for only people who are insulin-depended. Most elderly people with diabetes are not insulin-dependent, so this benefit didn't mean much to people on medicare. However, the expanded benefits are paid for for everyone with any kind of diabetes. Medicare has also reduced the payments for testing strips by 10%.

*Joan faxed us some stuff which is attached. This stuff is UNAUTHORIZED -- it has to stay in our office.

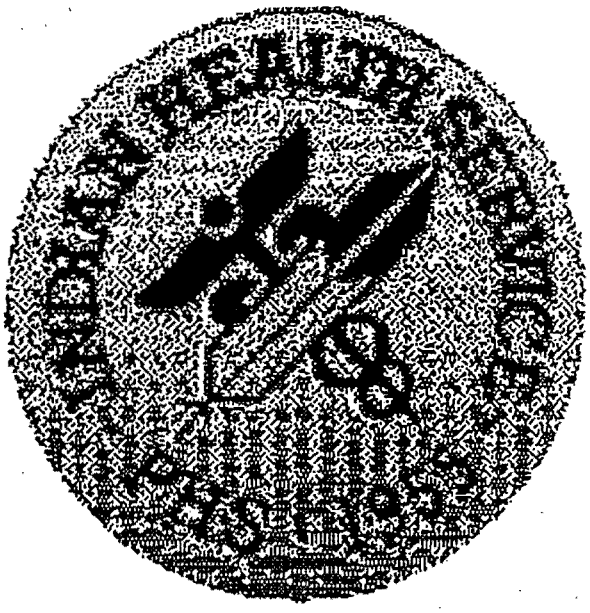
II) Left a message for Peter Bouxein asking for the one page summary of what they're doing and telling him that he's invited to the event.

III) **I left the message for Jen Klein** explaining that Chris and Sally had worked out the policy issues with OMB

IV) **The Indian Health Services Funding levels are attached** -- the levels are actually substantially higher than the figures they give us since they don't count certain service in their appropriation levels. I asked if it were possible to get an accurate figure and they said no since they only track certain parts of their funding.

V) **Linda took care of the Quality Commission** Congressman/constituent deal.

VI) **As for diabetes in children**, there are no substantial differences between kids and adults in terms of how they are affected by diabetes. Kids only get type I diabetes. 127,000 children have diabetes -- if they don't control their diabetes effectively, they may experience severe complications later on. Children, especially teens who don't receive proper care for diabetes can die and those who don't control it properly can experience flu-like symptoms and may pass out. Parent-education is extremely important when dealing with diabetes in children as parents are often the ones administering insulin shots.



INDIAN HEALTH SERVICE

Division of Financial Management

Parklawn Building, Room 5A-54
5600 Fishers Lane
Rockville, MD 20857

Phone: (301) 443-1270
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This transmission consists of 2 pages (with cover page).

Date: 8/4/97

Deliver to: Sarah Hurwitz / White House

Phone: 202-456-5594

From: Carl Fitzpatrick / R Tracy DFM

Subject: Diabetes funding between FY'93 and FY'97, as requested

Comments:

INDIAN HEALTH SERVICE
Diabetes Program

REQUEST: Ms. Sarah Hurwitz, with the White House, requested information on funding allocation for diabetes program for American Indians and Alaska Natives from fiscal years 1993 through 1997.

RESPONSE: The cost of care for diabetes and diabetes related complications among American Indians and Alaska Natives is extremely high. Most of these costs (e.g., hospitalization, foot care, eye care, dental care, laboratory, etc.) are covered in the IHS clinical and contract health care budgets, and it is not feasible to track separately the cost of diabetes treatment. However, the Model Diabetes program funding is allocated separately, as provided in the table below. The IHS allocated a total of $36,708,500 over the past 5 years to the 12 Area Offices (regional offices) for the Model Diabetes program. The Model program allocations do not include all costs associated with diabetes prevention and treatment services. The following table shows the allocation by fiscal years.

Fiscal Year	Recurring	Non-Recurring	Total Allocation
1993	$ 6,661,900	$ 60,000	$ 6,721,900
1994	6,783,000	100,000	6,883,000
1995	6,952,200	749,000	7,701,200
1996	7,701,200	-0-	7,701,200
1997	7,701,200	-0-	7,701,200
Total:	**$ 35,799,500**	**$ 909,000**	**$ 36,708,500**

Background of the Model Diabetes Program: In recognition of the growing burden of diabetes in American Indians and Alaska Natives, the National Commission on Diabetes recommended that IHS develop a special diabetes program. In 1979, Congress authorized and funded the IHS Model Diabetes program. The program has grown from 5 model care diabetes programs in rural, isolated Indian communities to a nationwide program of 19 model care diabetes programs in 23 sites and regional network of 12 area diabetes coordinators reaching patients, health providers in the 176 IHS, tribal and urban facilities, and leaders in over 500 Indian communities. Diabetes control efforts in IHS focus on primary, secondary and tertiary activities combining scientifically-based standards of care with clinical implementation strategies. A unique surveillance system monitors the implementation of these preventive care practices.

FAX COVER SHEET

OFFICE OF LEGISLATIVE & INTER-GOVERNMENTAL AFFAIRS

Number of Pages: 2 + cover page

Date: 8/04/97

To:	From:
Sarah Hurwitz White House	JOAN STIEBER Medicare Part B Analysis Division
Fax: (202) 456-5594 Phone: (202) 456-5557	Fax: (202) 690-8168 Phone: (202) 690-6884

REMARKS:

NOTE: this is an UNAUTHORIZED DRAFT: It can't leave our office - it's VERY unofficial.

HEALTH CARE FINANCING ADMINISTRATION
200 Independence Ave., SW
Room 341-H, Humphrey Building
Washington, DC 20201

DRAFT

EXPANDED DIABETES BENEFITS INCLUDED IN THE PRESIDENT'S FY 98 BUDGET PROPOSAL AND IN THE BALANCED BUDGET ACT OF 1997

- Expansion of coverage for diabetes outpatient self-management training

  Under prior law, Medicare covered outpatient diabetes self-management training in hospital-based programs. The Balanced Budget Act expands Medicare coverage of outpatient self-management training to non-hospital-based programs, effective 7/1/98.

- Expansion of coverage for blood glucose monitors and testing strips

  Under prior law, Medicare covered blood glucose monitors (including testing strips) for insulin-dependent diabetics. The Balanced Budget Act expands coverage of blood glucose monitors (including testing strips) to all diabetics, effective 7/1/98.

- Reduction in payment for strips used with blood glucose monitors

  Payment for durable medical equipment (including testing strips used with blood glucose monitors) is based on statutorily prescribed fee schedules. The fees for testing strips are excessive when compared with retail prices and prices paid by the VA. The Balanced Budget Act reduces payment for this item by 10 percent, effective 1/1/98. The savings from this reduction will partially offset the cost of expanding coverage of glucose monitors and testing strips for non-insulin-dependent diabetics.

ADDITIONAL PROVISION INCLUDED IN BALANCED BUDGET ACT OF 1997 (NOT IN THE PRESIDENT'S FY 98 BUDGET PROPOSAL)

- Establishment of outcome measures and recommendations to Congress

  The Balanced Budget Act also calls for the Department of Health and Human Services to establish outcome measures for evaluating improvements in the health status of Medicare beneficiaries with diabetes, and to periodically submit recommendations to Congress on modifications to coverage of services for diabetics.

DRAFT

NOTES ON COVERAGE OF DIABETES-RELATED SERVICES 4/01/97

What we cover:

Diabetes-specific:

- eye exams
  - o no national policy but BPD encourages carriers to cover (based on model policy developed by carrier medical directors)
  - o coded as "evaluation & management " or "eye exam" (considered diagnostic)
- foot care for patients under doctor's care for a "systemic condition", including diabetes (manual section being revised, criteria tightened)
- therapeutic shoes (one pair per year)
  - o demo mandated by Congress, savings results inconclusive, but coverage extended beyond demo anyway, as of 5/01/93
- self-management training in hospital OPD's — now expanded to other outpatient settings
- blood glucose monitors and testing strips for insulin-dependent diabetics — now expanded to all diabetics

Not diabetes-specific:

- other medically necessary diagnostic and treatment items and services (hospitalization, physician services, DME, laboratory tests, etc.)

What we don't cover:

- insulin or drugs (self-administered)
- insulin pumps
- routine screening exams and procedures, absent a diagnosis or sign of possible disease

Department of Health and Human Services

National Institutes of Health

DIABETES FUNDING - Fiscal Years 1994 - 1998

	1994 Actual	1995 Actual	1996 Actual	1997 Estimate	1998 House Level
National Institute of Diabetes and and Digestive and Kidney Diseases	$191,409,000	$193,597,000	$197,542,000	$209,100,000	229,000,000
National Cancer Institute	1,279,000	1,070,000	938,000	981,000	1,050,000
National Heart, Lung and Blood Institute	19,779,000	20,393,000	21,010,000	22,275,000	23,500,000
National Institute of Dental Research	2,505,000	2,577,000	2,395,000	2,568,000	2,721,000
National Institute of Neurological Disorders and Stroke	5,717,000	4,535,000	3,793,000	3,972,000	4,150,000
National Institute of Allergy and Infectious Diseases	4,898,000	4,737,000	5,545,000	5,767,000	5,766,000
National Institute of General Medical Sciences	1,704,000	1,762,000	1,850,000	1,955,000	2,065,000
National Institute of Child Health and Human Development	12,329,000	12,631,000	13,373,000	14,200,000	15,000,000
National Eye Institute	22,605,000	22,001,000	21,509,000	22,855,000	24,327,000
National Institute of Environmental Health Sciences	415,000	318,000	358,000	374,000	387,000
National Institute on Aging	6,666,000	6,652,000	7,598,000	7,830,000	8,070,000
National Institute of Mental Health	2,036,000	1,230,000	1,668,000	1,801,000	1,930,000
National Institute on Alcohol Abuse and Alcoholism	329,000	302,000	0	0	0
National Center for Research Resources	18,577,000	19,501,000	17,952,000	19,044,000	19,698,000
National Institute for Nursing Research	1,130,000	1,276,000	718,000	770,000	800,000
National Human Genome Research Institute	2,181,000	2,603,000	2,671,000	2,800,000	2,910,000
Fogarty International Center	56,000	0	0	0	0
Total, NIH	293,615,000	295,185,000	298,920,000	316,292,000	341,374,000

against that of younger individuals. By interpreting the glucose test this way, fewer people will be incorrectly diagnosed as diabetic.

A panel of experts brought together by the National Institutes of Health recently recommended such an adjustment in diagnostic standards. This recommendation, which applies to all age groups, has been widely accepted by doctors specializing in the treatment of diabetes.

Symptoms

Some people with diabetes feel "run down" or have only vague symptoms that may go unrecognized. Others have symptoms such as increased thirst, frequent urination, unexplained weight loss, fatigue, blurred vision, skin infections or itching, and slow-healing cuts and bruises. These problems should be reported promptly to a doctor.

Treatment

Diabetes cannot be cured, but it can be controlled. Good control requires a careful blend of diet, exercise, and, if necessary, insulin or oral drugs.

Diet planning is vitally important to lowering blood glucose levels. In planning a diet, the doctor considers the patient's weight and the amount of physical activity he or she engages in each day. For overweight patients, a weight-reducing plan is essential to achieving proper blood glucose control.

Food exchange lists to help with meal planning are available from physicians and from the American Diabetes Association.

Exercise is also important because it helps the body burn off some of the excess glucose as energy. A doctor can help plan an exercise program that balances the diet and medication needs of the patient with his or her general health. It is important to be consistent, exercising about the same amount each day.

Drugs are not needed for noninsulin-dependent diabetes if good control can be achieved through diet and exercise. But when these measures fail, insulin injections or oral drugs may be prescribed. Sometimes a patient who normally does well without drugs will need one on a short-term basis during acute illnesses.

Proper *foot care* is essential for people with diabetes, since the disease can cut down the blood supply to the feet and reduce feeling.

Diabetics should examine their feet every day, taking note of any redness or patches of heat. Any sores, blisters, breaks in the skin, infections, or buildup of calluses should be reported immediately to a podiatrist or family doctor.

Care of the *skin* on other parts of the body is also very important. Diabetics are less able than others to resist injury and infection. They should protect their skin against injury, keep it clean, use skin softeners to treat dryness, and take care of minor cuts and bruises.

To avoid serious infections, *teeth and gums* must receive special attention. People who have diabetes should tell their dentist they have the disorder, and see him or her when any problems occur in the mouth.

Self-Help

Diabetes is a self-help disease: if the person who has it sticks to the diet plan, exercises regularly, takes prescribed medication, and observes good health practices, he or she can enjoy a normal and productive life. The American Diabetes Association (2 Park Avenue, Box AP, New York, NY 10016) can send you additional information on diabetes. Write to them for a list of their free or low-cost publications.

May 1983

☆ U.S. Government Printing Office: 1985—461-308/20013

American Diabetes Association.
National Center, 1660 Duke Street
Alexandria, VA 22314 (703) 549-1500
Telex: 901132

FACSIMILE TRANSMISSION
FACSIMILE TELEPHONE NUMBER (703) 549-6294
COMMUNICATIONS DEPARTMENT

TO: Chris Jennings
Sarah Bianchi

FROM: Kenneth Inchausti
703/299-5506 (direct)

DATE: 08/01/97

Please call if you have any trouble receiving transmission or did not receive the number of pages shown below.

Total of 4 pages, including this cover

MESSAGE FOLLOWS

Attached is information about the impact of diabetes in the Native American community. There's a lot of information to choose from. Please feel free to call us if you have any other questions.

DIABETES FACTS

Diabetes Among Native Americans

What is Diabetes?

Diabetes is a disease that affects the body's ability to produce or respond to insulin, a hormone that allows blood glucose (blood sugar) to enter the cells of the body and be used for energy. Diabetes falls into two main categories: type 1, which usually occurs during childhood or adolescence, and type 2, the most common form of the disease, usually occurring after age 40.

Diabetes is a chronic disease that has no cure.

How Does it Affect Native Americans?

Prevalence

- Prevalence of type 2 diabetes among Native Americans in the United States is **12.2%** for those over 19 years of age.
- One tribe, the Pimas of Arizona, have the **highest rate of diabetes in the world.** About 50% of Pimas between the ages of 30 and 64 have diabetes.
- Today, diabetes has reached **epidemic proportions** among Native Americans. Complications from diabetes are major causes of death and health problems in most Native American populations.

Native Americans and Diabetic Complications

The serious complications of diabetes are **increasing** in frequency among Native Americans. Of major concern are increasing rates of kidney failures, amputations and blindness.

- Ten to twenty-one percent of all people with diabetes develop **kidney disease.** In 1992, 19,800 people initiated treatment for **end stage renal disease (kidney failure)** because of diabetes. Among people with diabetes, the rate of diabetic end stage renal disease is **six times higher** among Native Americans.

(over)

- Diabetes is the most frequent cause of non-traumatic lower limb **amputations.** The risk of a leg amputation is 15 to 40 times greater for a person with diabetes. Each year 54,000 people lose their foot or leg to diabetes. Amputation rates among Native Americans are 3 4 times higher than the general population.

- **Diabetic retinopathy** is a term used for all abnormalities of the small blood vessels of the retina caused by diabetes, such as weakening of blood vessel walls or leakage from blood vessels. Diabetic retinopathy occurs in **18% of Pima Indians and 24.4% of Oklahoma Indians.**

What is Needed?

In ideal circumstances, Native Americans with diabetes will have their disease under good control and be monitored frequently by a health care team knowledgeable in the care of diabetes.

- **Patient education is critical.** People with diabetes can reduce their risk for complications if they are educated about their disease, learn and practice the skills necessary to better control their blood glucose levels, and receive regular checkups from their health care team.

- People with diabetes, with the help of their health care providers, should **set goals for better control of blood glucose levels, as close to the normal range as is possible for them.**

- **Health care team education is vital.** Because people with diabetes have a multi-system chronic disease, they are best monitored and managed by highly skilled health care professionals trained with the latest information on diabetes to help ensure early detection and appropriate treatment of the serious complications of the disease. A team approach to treating and monitoring this disease serves the best interests of the patient.

6/97

- The epidemic of type 2 in Native American communities has occurred primarily during the second half of this century.
- Incidence and prevalence of the disease have increased dramatically as traditional lifestyles have been abandoned in favor of westernization.
- Native American communities experience high rates of microvascular complications from diabetes.
- Because American Indians living on reservations are not included in U.S. national health surveys, data on the prevalence of diabetes in Native Americans in the U.S. are limited.
- Diabetes rates are highest in full-blooded Native Americans, than those of mixed ancestry.
- In Pimas, diabetes rates are highest in the offspring of parents who themselves developed diabetes at a young age.
- Gallbladder disease and diabetes have been linked together in Native Americans as part of a "New World Syndrome" with both a genetic and evolutionary basis.
- Cataract surgery rates increased with longer duration of diabetes and in those treated with insulin.
- In Pima Indians, a tribe with low coronary heart disease rates, diabetes is a major risk factor for coronary artery disease.
- Hypertension in diabetic individuals has been reported in 46.5% of Navajos, 53% of Cherokees, and 48% of Canadian Cree and Ojibwa tribes, yet hypertension appears to be less prevalent than in the general U.S. population.
- Longitudinal studies of diabetes in the Pima community have revealed striking associations of diabetic pregnancy with obesity and diabetes in the offspring.
- 60-71 % of Native American women have a body mass index of greater than or equal to 30.
- Diabetes is the third underlying cause of death on death certificates of American Indian women age 65-74 years.
- Mortality attributed to diabetes on death certificates is higher in Native Americans than any other ethnic population. Native Americans have a higher mortality than either whites, blacks, Hispanics, or the general population.

American Diabetes Association.

Diabetes in the Elderly

Ira J. Laufer, M.D.

Diabetes in the elderly shares many features present in any age group. The common denominator in diabetes is the inability of the individual to maintain a relatively stable blood sugar in the face of various activities and stresses, an effort normally accomplished automatically. The chain of events responsible for this is not completely clear, although different mechanisms seem to be operating in Type I and Type II diabetes. The ultimate result is the inability to maintain a narrow amplitude of glucose excursion over the course of time. The patient with diabetes has an elevated mean amplitude of glucose excursion if blood sugars are measured frequently over the course of the day.

Contemporary therapeutic efforts have been directed towards the reduction of this chronic hyperglycemic state so that the average blood sugars will not be excessively high. It is now believed that it is the prolonged exposure to elevated sugars that cause microvascular disease, the ultimate complication of diabetes. There is a great deal of experimental data, both animal and human, to support this view and modern treatment is directed at trying to keep the blood sugars constantly lower rather than higher in hopes of retarding or possibly even preventing these complications completely. It is too soon to tell – since this new aggressiveness in therapy is fairly recent – whether or not these efforts will prove fruitful in reducing the awesome mortality and morbidity brought about by diabetic microvascular disease.

Aside from this basic conceptual similarity in all diabetes, there are several specific areas in which the nature of glucose intolerance and its expression and treatment is significantly modified by the age of the patient. The most relevant ones involve the diagnosis of diabetes, the treatment of Type II diabetes, and the use of insulin in the aged. (Hyperosmolar non-ketotic coma, the treatment of infections, surgical considerations, anesthesia, and related large vessel disease are also of special interest and concern in elderly patients, but will not be discussed in this article.)

Dr. Laufer is Clinical Associate Professor of Medicine at New York University School of Medicine in New York City.

Diagnosis of Diabetes

The diagnosis of diabetes in an elderly individual is not difficult if the symptoms are classical and there is significant fasting and postprandial hyperglycemia. Sugar may not appear in the urine even when there is marked hyperglycemia because of the elevation of renal threshhold which occurs with advancing age, so urine testing alone is a poor diagnostic tool. When the situation is not so clear, however, the diagnosis may be more difficult than in younger individuals. Physiological age produces blood sugar results which cannot be interpreted by the same standards as in younger groups. Several factors may be involved in this: (1) There may be decreased food intake and physical activity. (2) There may be a decrease in lean body mass so that for a given weight an older person has less tissue in which to store carbohydrates, so that there is a consequent rise in serum glucose due to incomplete or inadequate clearance from the serum. (3) There may be decreased insulin secretion and decreased binding on receptor sites, although there has been no experimental evidence to support this. (4) There may be insulin antagonism at the post-receptor level. This has been given more experimental support than any of the other possibilities. See Table 1 for age-adjusted limits on the two-hour value for the oral glucose tolerance test.

CONTINUED ON PAGE 3

Table 1. *Maximum Normal Two-Hour Blood Sugar per Decade*

Age (years)	Blood sugar (mg/dl)
20	142–148
30	152–163
40	161–178
50	169–193
60	177–208
70	185–224
80	198–239

Diabetes in the Elderly

CONTINUED FROM PAGE 7

More care must be used when making the diagnosis of diabetes in elderly individuals. Minor changes are probably not very significant and should not be overemphasized as having clinical meaning. Fasting hyperglycemia, a markedly deviant glucose tolerance test, an appropriate clinical picture, and possibly even the glycohemoglobin value should be looked at to support the diagnosis. The glycohemoglobin determination is of help mainly in following the results of therapy in diabetes, but it may also be used in trying to assess what the ambient blood glucose concentration has been over the preceding six to eight weeks. It may be helpful in evaluating some difficult diagnostic situations.

The newer classification of Type I and Type II diabetes does not depend on age of onset as did the previous ones, although Type I diabetes usually occurs in younger individuals who require insulin treatment for survival. The Type II patient is usually older, often obese, and can often be treated successfully with diet and oral hypoglycemic agents. Occasionally insulin may have to be used to control hyperglycemia.

Treatment of Type II Diabetes

Although proper dietary prescription and exercise are basic to treatment of all patients in all age groups with diabetes, exercise must often be encouraged in the elderly. Many calories may be expended in noncompetitive and gentle exercise, which elderly individuals can participate in without overtaxing their circulatory systems. For a listing of these exercises, see Table 2.

The oral hypoglycemic agents will probably find their greatest use in the Type II elderly diabetic individual. Drug interactions are of special concern in this group, since many older individuals are receiving medications for conditions other than diabetes, and there may have either potentiating or negating effects on the hypoglycemic activity of the oral agent. The incidence of drug interactions seen with the second-generation oral agents has been reported to be much less than with the first-generation drugs, and so perhaps they should be considered when starting a new elderly Type II patient on medication, or when considering a change from a first-generation agent to insulin.

Inappropriate ADH secretion has been noted to occur in a small percentage of patients receiving chlorpropamide. In elderly patients with heart disease, the hyponatremia and water retention that occur with this medication in susceptible individuals might provoke or cause decompensation of congestive heart failure and therefore the use of chlorpropamide in these patients must be closely monitored.

The Use of Insulin

The use of insulin in older individuals presents some problems that may not be seen in younger people. In this era of more aggressive therapy with insulin, one of the most popular regimens to use is a mixture of rapid- and intermediate-acting insulin, given once or twice daily. Elderly individuals may have difficulty in seeing well enough to fill the syringe accurately with the two kinds of insulin, or they may have manual dexterity problems. They may live alone, making the occurrence of an insulin reaction, especially a nocturnal one, an extremely dangerous situation.

The danger of severe hypoglycemia in an elderly individual is of much more concern than less-than-ideal glucoregulation, and one must keep in mind the nature of the individual's circumstances, and try to steer a course of compromise which will not allow unbridled hyperglycemia, but which will avoid hypoglycemic reactions. The presumed benefits of careful glucoregulation will be seen over the course of time and in many elderly patients, life expectancy might not warrant the risks attendant upon the use of meticulous control techniques.

Patient Education

Self-help and educational programs have become an integral part of the treatment of diabetes. The total immersion of elderly patients in these programs without their full understanding and consent may be counterproductive. Complicated regimens may be doomed to fail if presented where there may be some memory impairment. Elderly individuals may be most concerned with whether they will

be a burden to their children, whether they will be hospitalized, and how their dietary likes and preferences will be affected by careful control regimens. They may have a high rate of denial. Good clinical judgment must be used in selecting patients for more aggressive therapy. An older patient should not be denied participation in this type of program if he wishes, but well-defined and realistic goals arrived at mutually must be striven for. In a young person, the goal might be to avoid retinopathy, whereas in an older person, it might be to lose ten pounds or to test the urine twice a day.

Conclusion

Although there are significant differences in a number of areas between young and old patients with diabetes, there are still very common concerns. The elderly should not be excluded from current therapeutic enthusiasm and optimism just because of age, nor should they be routinely made to participate in all areas of therapy, education, and self-help. As is basic to all good patient care, it must be individualized and the goals of the patient as well as the health-care providers must be given careful consideration and representation. PD

Table 2. *Caloric Expenditures for Various Activities*

	Energy Expenditure	
Activity	Calories / Minute	Calories / Hour
Rest (supine)	1.0	60
Standing (relaxed)	1.4	84
Eating	1.4	84
Walking, 2.5 mph	3.6	216
Walking, downstairs	5.2	312
Driving car	2.8	168
Horseback riding (slow)	3.0	180
Playing volleyball	3.5	210
Bowling	4.4	264
Cycling, 5.5 mph	4.5	270
Golfing	5.0	300
Swimming, 20 yards/minute	5.0	300
Dancing	5.5	330
Gardening	5.6	336
Playing tennis	7.1	426
Skiing	9.9	594
Playing squash	10.2	612
Carpentry	6.8	408
Mowing lawn (by hand)	7.3	438
Shoveling	8.0	480
Tending furnace	10.2	612
Master's two-step test	8.2	492

Adapted from Gordon, E.E.: Arch. Intern Med. *101*:702, 1958.

Kenneth L. Minaker, MD

What Diabetologists Should Know About Elderly Patients

New challenges face the diabetologist from the enlarging elderly population with its increased prevalence of diabetes mellitus. Health-care utilization increases with both age and diabetes mellitus. The ways in which the elderly enter and respond to the health-care system have changed significantly. Aging exerts a variable and recognizable influence on the way illnesses develop and how patients perceive their symptoms. The most important interaction of aging and disease is increased vulnerability to the development of severe diabetic complications. The techniques of history and physical examination are modified with age. An overall assessment of function becomes an important technique that assists in both diagnosis and management of elderly patients. Several important geriatric syndromes including delirium, urinary incontinence, falls, systolic hypertension, and polypharmacy are particularly common in elderly diabetic patients. Approaches to these prevalent conditions in the elderly are discussed.
***Diabetes Care* 13 (Suppl. 2):34–46, 1990**

The age-related increase in prevalence of clinical diabetes and the rapid growth in the elderly population offer new challenges to the diabetologist. Health-care delivery needs, disease complexity, and symptoms of illness change with advancing age. Awareness of the principle features of geriatric medicine will assist the diabetologist in caring for this growing population.

From the Division on Aging, Harvard Medical School, Gerontology Division, Joint Department of Medicine, Beth Israel and Brigham and Women's Hospitals, Boston, Massachusetts; and the Geriatric Research Education Clinical Center, Brockton/West Roxbury Veterans Administration Medical Center, West Roxbury, Massachusetts.

Address correspondence and reprint request to Kenneth L. Minaker, MD, Gerontology Division, Beth Israel Hospital, 330 Brookline Avenue, Boston, MA 02215.

DEMOGRAPHY AND HEALTH-CARE UTILIZATION

Aging of westernized societies has been a progressive phenomenon in the 20th century. In 1920, 4.6% of Americans were >65 yr of age. By 2020, 20% of the population will be >65 yr of age. Between now and 2030, the number of elderly will more than double to >65 million individuals (1). Particularly rapid growth will occur in the population >85 yr of age, which will triple to >7.3 million by 2020 (2; Fig. 1). Because physician visits, hospitalization rates, and needs for long-term care accelerate with age, aging will dominate health-care policy and resource allocation.

Contact with the health-care system changes with age. Annual physician visits per capita increase from 4.4 at 17–44 yr of age to 5.5 at 45–64 yr of age and peak at 6.6 at >65 yr of age. Hospitalizations increase from 13.4 to 21.9 and 30% annually for the respective age groups (3). Americans >65 yr of age account for 40% of acute hospital days, consume 30% of the health-care budget, and purchase 20% of all prescription drugs (4). As noted by Dr. Barrett-Connor (p. 3), the prevalence of diabetes and impaired glucose tolerance increases with age, making quality care of the elderly diabetic patient an increasing priority. More than 40% of individuals 65–74 yr of age and 50% of individuals 80–89 yr of age have impaired glucose tolerance or diabetes mellitus. Despite its increasing prevalence with age, diabetes mellitus decreased from the fifth cause of death (65–74 yr of age) to eighth (≥85 yr of age) (1; Fig. 2). However, diabetes has a major role in accelerating mor-

	65-74	75-84	85 PLUS
1	Heart Disease (40.6%)	Heart Disease (44.7%)	Heart Disease (48.6%)
2	Cancer (Malignant Neoplasms) (27.3%)	Cancer (Malignant Neoplasms) (18.4%)	Cerebrovascular Disease (14.3%)
3	Cerebrovascular Disease (7.3%)	Cerebrovascular Disease (11.8%)	Cancer (Malignant Neoplasms) (10%)
4	Chronic Obstructive Pulmonary Disease and Related Conditions (4.3%)	Chronic Obstructive Pulmonary Disease and Related Conditions (3.4%)	Pneumonia and Influenza (5.5%)
5	Diabetes (2.2%)	Pneumonia and Influenza (3.3%)	Atherosclerosis (4.1%)
6	Accidents (1.9%)	Diabetes (2%)	Accidents (1.8%)
7	Pneumonia and Influenza (1.9%)	Atherosclerosis (1.9%)	Chronic Obstructive Pulmonary Disease and Related Conditions (1.7%)
8	Chronic Liver Disease and Cirrhosis (1.4%)	Accidents (1.8%)	Diabetes (1.4%)
9	Nephritis, Nephrotic Syndrome and Nephrosis (.8%)	Nephritis, Nephrotic Syndrome and Nephrosis (1%)	Nephritis, Nephrotic Syndrome and Nephrosis (1%)
10	Atherosclerosis (.8%)	Flu (Septicemia) (.5%)	Hypertension (.6%)

FIG. 1. Ten leading causes of death by age group. Note decreasing mortality from diabetes mellitus with advancing age. (From National Center for Health Statistics [61].)

tality from heart and cerebrovascular disease and produces substantial morbidity.

Fifty percent of diabetes remains undiagosed in the elderly despite their increased rates of medical care consult (nearly 9% of the population >65 yr of age). Patient, physician, and community factors are potential contributors. Leaders who organize care for the diabetic patient must address each of these factors. Medical knowledge of the older patient is clearly less than ideal and, in part, reflects the formal education of this population. Of those currently >75 yr of age, only 15% received any postsecondary school education, and most were born in foreign countries. Awareness of symptoms of illness and the need to seek health care is clearly decreased but can be expected to improve with time. By 2030, nearly 50% of septuagenarians will have had postsecondary school education, and nearly 90% will have had substantial exposure to health-care issues in high school. Thus, increased interest in health care can be expected to improve diagosis and demand for care.

Diabetologists are seldom asked by primary-care physicians to visit the frail elderly at home or in the nursing home. Nearly 1.5 million individuals and 30% of the >85 yr of age cohort reside in nursing homes (5). Few have the benefit of elective and preventive diagnostic and therapeutic efforts of the skilled diabetologist. Phy-

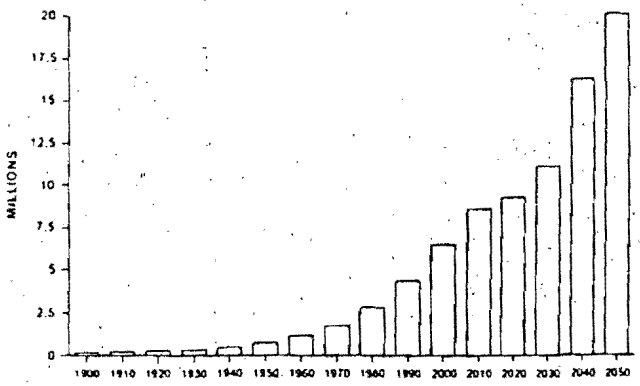

FIG. 2. Actual and projected increase in population ≥85 yr of age, 1900–2050. (From U.S. Bureau of Census, Decentennial Census, 1900–1980 [62].)

sician referrals from nursing homes are largely due to acute hospital emergency rooms for medical crises and not for careful ongoing specialist care. As nursing homes become more medically intensive, this population's access to specialized care will surely increase. Criteria for patient referral to diabetic clinics and centers for nursing home patients must be developed. A final distinctive feature of the health-care milieu of the elderly is their dependence on an informal support system. Caring for the elderly always involves communication with family members who provide transportation, direct therapy, and personal supervision. Home care of the blind immobile insulin-requiring diabetic patient is not possible without close physician/family communication. Although commonly thought to be alone, 60% of elderly Americans have two surviving children, and 75% of children live with or near their parents. Over half of these families visit every day. Thus, there is a substantial pool of individuals to assist older diabetic patients to receive good medical care.

These features of the demography and health-care experience of the elderly should impress on the diabetologist the present unmet diagnostic and therapeutic needs of the elderly, the future burden that the rapidly growing >85 yr of age group will bring, and the relatively good potential for excellent diabetes management.

AGING AND ITS INTERACTION WITH DISEASE

Advancing age produces increased medical complexity and variability in health and disease (6). Twelve percent of the elderly never require access to the health-care system (3). However, most chronic diseases produce an increased morbidity with advancing age and an increased need for health care. Diabetes mellitus is one of the major illnesses increasing morbidity in late life and can develop in both previously healthy and chronically ill patients. Awareness of the variability in health of elderly patients will assist in delivering health care to the late-life–onset diabetic patient (2).

Aging changes, by definition, occur in all members of a species with advancing age. A spectrum of clinical significance can be identified as part of aging from insignificant to producing severe sequelae. Increases in the vulnerability to disease, alterations of the symptoms of clinical illness, or conversely, no change in illness behavior are the most important changes associated with aging (7).

PHYSIOLOGICAL CHARACTERISTICS UNAFFECTED BY AGING

Perhaps the most important change that occurs with age, from a clinical standpoint, is no change at all. Routine hematologic values including hematocrit, total neutrophil count, lymphocyte count, and platelet count are unaltered with age (8). There is no "anemia of old age," and reductions in hematocrit signify the presence of illness that deserves proper investigation and treatment. Iron deficiency anemia due to blood loss, anemia of chronic diseases such as renal failure, nutritional anemias such as pernicious anemia, and myeloproliferative disorders are frequent in the elderly. Although cardiac output in the recumbent position is lessened with age, upright cardiac output at rest or during vigorous exercise is not limited by the aging process (9). Measures of hepatic function, electrolytes, and most basal hormonal values are unaltered with age. Basal levels of testosterone, insulin, glucagon, growth hormone, thyroxine, and cortisol are unchanged with age (7).

AGING AND INCREASED VULNERABILITY TO DISEASE

However, there are important changes that produce vulnerability during aging. A progressive and uniformly silent impact of aging is the normative decline in major organ function required for homeostasis during acute medical illness. Maximum ventilatory capacity, glomerular filtration rate, many measures of immune competence, ability to maintain a stable upright posture, and carbohydrate tolerance all demonstrate decrements of nearly 10% per decade starting at the peak of homeostatic capacity near age 30 yr of age (10). These changes in organ function become clinically relevant when reserve organ function must be acutely drawn on or when the magnitude of a chronic demand is large, not during everyday living. Simultaneous linear reductions in reserve function of many organs result in a geometric reduction in total homeostatic capacity. The markedly enhanced vulnerability of the elderly to the morbid effects of acute illness such as head injury, major surgery, trauma, burns, and administration of medications is explained in part by these normal changes with age. Because of this aging-produced "frailty," advances in therapy may not extend equally to patients of all ages. This may account, in part, for the lack of improvement in survival from burns in the elderly in the past 10 yr, despite a significant improvement for young individuals (11).

AGING AND ALTERATIONS IN PRESENTATION OF DISEASE

Altered presentation of disease has long been recognized as a consequence of changes produced by the aging process. The classic example is hyperthyroidism (12). Although in young individuals, this condition presents a generalized symptom complex of agitation, hyperkinesis, goiter, hyperdynamic circulation, and hyperphagia, older individuals seldom appear agitated, frequently show no thyromegaly, often appear apathetic, and commonly show a deterioration in cardiac function, usually congestive heart failure or atrial fibrillation. The major clinical importance is to recognize these changed symptoms and signs of hyperthyroidism in the elderly, because treatment brings the same excellent results as in younger patients.

An overriding principle of gerontology is the marked inter- and intraindividual variability in rates of true aging changes. Thus, organs such as kidney, heart, and lung age at different rates in different individuals, and within the same individuals the rates of aging may vary greatly from one organ to another (6). In contrast, certain physiological functions remain largely intact into extreme old age without detectable differences among individuals.

PASSAGE OF TIME VERSUS AGING IN ILLNESS PRODUCTION

Some changes that occur during aging are the result of accumulated exposure over time and are not aging changes per se. The development of skin cancer on ultraviolet light–damaged skin, pulmonary cancer secondary to smoking for many years, and the appearance of polycystic renal disease represent changes secondary to toxin exposure or delayed expression of genetic disease (13).

Age-related diseases increase the active-problem list progressively, making skill at concurrent care of other disabilities an increasing priority for the diabetologist caring for elderly diabetic patients. The prevalence of heart, sensory, hypertensive, arthritic, vascular, urinary, foot, and gastrointestinal conditions is usually twice as great in the >65 yr of age population than those 45–64 yr of age (Fig. 3).

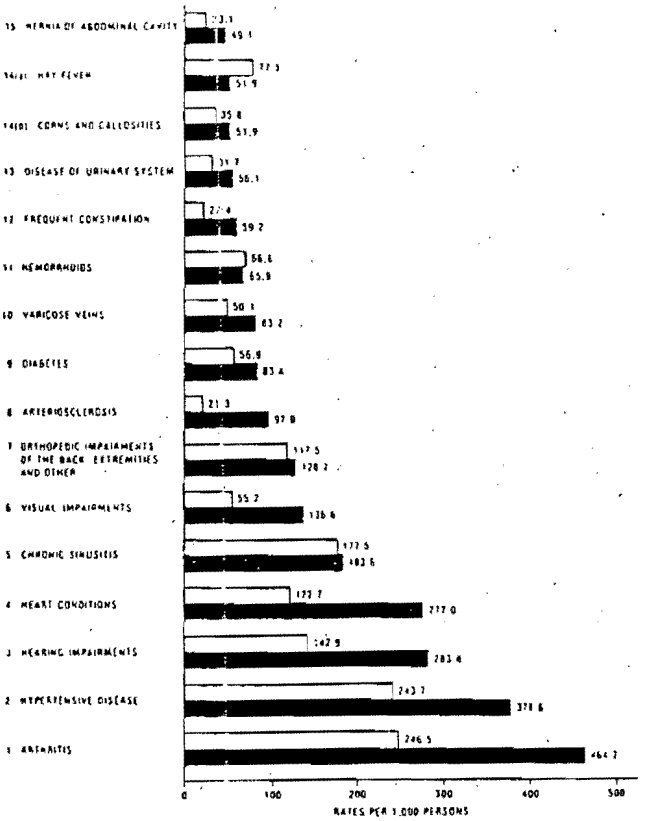

FIG. 3. Prevalence of top chronic conditions in people 45–65 yr of age (□) and ≥65 yr of age (■). (From National Center for Health Statistics [6].)

DIABETES AND ITS INTERACTION WITH AGING PROCESS

Older diabetic patients have symptoms that are significantly altered by the passage of time and the aging process (14). Most familiar is the progressive accumulation of diabetic complications with advancing age, the majority of which are vascular. The hypotheses relating the vascular consequences of the interaction between diabetes mellitus and aging are that diabetes accelerates the aging process or results in premature vascular events through effects on platelets, glycosylation of vascular tissues, cellular proliferative capacitites, and the production of hypertension (15). The important role of lipoprotein level alterations in diabetes may contribute to these vascular changes.

Many of the tissue effects of diabetes mellitus can be listed as accelerating effects known to be characteristic of the aging process. The age-related thickening of the basement membrane of cells may be accelerated by diabetes mellitus (16). Aging of collagen is greatly enhanced by the diabetic state. These changes associated with diabetes have led to an in-depth examination of cellular influences of diabetes on capacities expressed by cells aging in culture. It has been demonstrated that diabetes decreases cell density of skin fibroblasts at confluence, and cell-population–doubling time is slower in cell cultures from diabetic patients (17). Cell-population–doubling times are decreased when fibroblasts from diabetic patients are cultured (18). Plating efficiency and thymidine incorporation into cells are decreased in diabetic patients (19). All the changes observed in diabetic fibroblasts an be viewed as complementing the trends seen with aging.

Strong evidence suggests that aging enhances morbidity for one metabolic effect of diabetes. Average mortality rates for diabetic ketoacidosis increase exponentially after 65 yr of age, reflecting the decreased homeostatic capacity of the elderly. The capacity to sur-

vive the hypotension, dehydration, acidosis, hyperglycemia, and electrolyte imbalance during diabetic ketoacidosis taxes the age-related depletion in reserve function in cardiovascular, pulmonary, renal, and hepatic function. The resultant effect is to make the elderly less able to survive the well-developed ketoacidotic or hyperosmolar state (20).

Much of the morbidity in the elderly diabetic patient is not due to aging per se but to the accumulation of diabetic pathology with time. This seems to be the case with the cumulative incidence of peripheral vascular disease, measured as arterial calcification (45% after 10 yr), absence of dorsalis pedis pulses (35% after 10 yr), or intermittent claudication (30% after 10 yr). The most severe expression of this disorder, amputation, shows increased incidence with advancing age. Below 44 yr of age, amputation rates are 12 per 10,000 diabetic patients; between 45 and 64 yr of age, they are 45 per 10,000; and after 65 yr of age, they are 100 per 10,000 (21,22).

Hypertension prevalence, a major risk factor for stroke, cerebral hemorrhage, and hypertensive heart disease, enhances the morbidity of vascular disease in diabetes. A very clear increase in the prevalence of hypertension was demonstrated in the National Health and Nutrition Examination Survey as glucose tolerance progressed from normal through the categories of impaired glucose tolerance and undiagnosed diabetes to diagnosed diabetes (23). Advancing age, in addition to disease, is known to increase blood pressure, and as progressively older cohorts are studied, it becomes clear that aging and diabetes both contribute to the prevalence of hypertension (24). This combination of diabetic and age-related risks almost certainly contributes to the increased risk of vascular morbidity and mortality among elderly diabetic patients (25).

Aging does not uniformly increase the risk of diabetic complications. Although the incidence of blindness and retinopathy in diabetic patients increases within the first decade of the development of diabetes, advanced-age–onset diabetes is associated with smaller increases in the prevalence of retinopathy. In onset of diabetes before 30 yr of age, legal blindness first occurs in patients with diabetes for ≥15 yr. Its rate increases from 3% in patients with diabetes for 15–19 yr to 12% in those with diabetes for >30 yr. In patients with onset of diabetes after 30 yr of age, rates of legal blindness increase over time but reach only 7% in patients with diabetes for 20–24 yr (26).

An example of aging producing an alteration in the presentation of diabetes mellitus is hyperosmolar, nonketotic, hyperglycemic coma. This diabetic state, which has now become a largely geriatric illness, may present without the polydipsia and polyuric complaints that accompany hyperglycemia in young individuals. Indeed, one-third of elderly individuals with this condition have not been previously characterized as diabetic, and in many, the clinical presentation is an altered sensorium (27).

HISTORY, PHYSICAL EXAMINATION, AND FUNCTIONAL ASSESSMENT OF GERIATRIC PATIENTS

It has long been recognized by geriatricians that elderly patients monitor body function, assess their symptoms, and access the health-care system in ways that may differ from younger individuals. Several features of illness behavior in elderly patients deserve mention, because the diabetologist will have to interpret nonspecific or altered symptoms in the aging diabetic patient to avoid over- or underevaluation.

Disease experience has a substantial influence on self-esteem, autonomy, and quality of life. There are important differences between elderly individuals' perceived expectations and experiences and those observing them. The so-called myths about aging versus patients' realities should be appreciated by the practicing diabetologist who must set the priorities for intensity of therapy for his patients. In general, elderly individuals' personal experiences with health, loneliness, income, transportation, financial resources, and a host of other quality-of-life issues are much better than younger individuals believe and better than elderly people perceive about themselves as a group. Poor or fair health is reported by only 20% of those 45–54 yr of age and 30% of those >75 yr of age. Thus, those who have a disability carry a disproportionate amount of it, creating a minority with multiple complex function-robbing disabilities. There is likely to be a progressively greater interest in the elderly diabetic patient for more intensive diabetic management, particularly if there is improved function anticipated from this therapy.

As reviewed by Levkoff et al. (28), many elderly patients are health-care optimists, even when experiencing the same number of symptoms as control populations. A corollary of this is that elderly patients fail to report 39–50% of their medical problems. On the other hand, we are all familiar with the health-preoccupied elderly patient, and it is apparent that 14–37% of patients overestimate their disabilities. Those elderly patients have a greater amount of depression, hypochondriasis, dissatisfaction with life, and preoccupation with body function. Contributors to these changes, some of which were discussed earlier, include educational level, high prevalence of chronic disease, disorders of psychiatric and cognitive function, cultural background, and different expectations of the health-care system.

HISTORY

The gathering of historic material should have begun before the interview and is based on the four Rs: *records* (your own and relevant hospital records); historic input from *relatives*; *respect* for the individual's expectations and for potential and function; and finally, during the interview, patient *recall*. The major barriers to incorporating the four Rs into history taking in elderly subjects are the time required to assemble these data and the lack of financial reimbursement for this effort. Necessity,

common sense, and physician competition are leading to a fuller incorporation of the four Rs in the geriatric interview process.

Patients with complex histories should be accompanied by a relative and their previous records. Four or five chronic illnesses usually coexist in elderly patients. The time span over which these illnesses developed, the changes in therapies (i.e., varied pharmacological agents for hypertension over the past 20 yr), the complications and intolerances, and the interrelatedness of illnesses all tax even a very lucid elderly person's memory, making the patient's past records an important data base from which to continue care.

Relatives should be encouraged to provide their historic perspective for numerous reasons. In most complex geriatric patients, relatives obtain, maintain, and retain prosthetic or pharmacological interventions, and they assume progressively greater responsibility in determining the health-care utilization patterns of the elderly patient. Supportive relatives are, in most cases, case managers, assurers of compliance, and monitors of therapy. They should have access to the physician before investigation and therapy begin.

The interview technique can be expanded beyond the doctor-patient interview in several ways. Self- or family-completed questionnaires, which include demographic, functional, and medical components including a detailed list of medications specifically designed for the elderly patient, are becoming available and can serve as a checklist for the physician and can assist the family and patient to crystallize the elements of a deteriorating situation.

For a more detailed evaluation, physician-extending professionally administered interview tools are available to evaluate mental status and functional capacity, essential factors that can be in place before physician evaluation but are crucial to an efficient doctor-patient interview. It is crucial to enlist the assistance of responsible relatives by having them participate in the interview at some point, to emphasize their responsibilities, and to reward their care giving at the end of the examination. They become physician extensions and monitors and will ensure compliance with any recommended therapy. In practical terms, if no medical emergency exists, it is best to conduct the interview over a comfortable series of visits, which permits familiarity to develop, some short-term longitudinal impressions to be gained, and completion of a sound data base.

The physician-patient intraction assumes a distinctly different ambience with the background thus obtained. The major skills in interview technique that require special attention in elderly patients relate primarily to communication and patient comfort. The deaf, blind, confused, or immobile patient must be comfortably positioned, and sensitivity to and compensation for sensory deficits must be made. A hearing tube should be available. Avoid backlighting to minimize glare in the patient's eyes. Simplify the history, and carefully position patients for each clinical assessment.

Although it has been demonstrated that in the U.S. the elderly patient spends less time per visit with his or her physician than a younger individual, complex patients clearly require more time. With family presence, good background data, and a reasonably cooperative patient, I believe that direct doctor-patient time will generally be in the 30-min range for an initial interview, which, done properly, leads to dramatically shorter and progressively more successful subsequent follow-up appointments.

PHYSICAL EXAMINATION

The physical examination requires several modifications. Because the examination is commonly more lengthy than in younger individuals, it is best to establish priorities in the initial examination for urgent medical problems and aim to complete the evaluation in subsequent visits (29). The components of special relevance to the physical examination in the elderly patient are the mental status examination, the funtional assessment, and quantification of the impact of sensory impairment.

Mental status. The mental status examination is an important adjunct to physical examination in elderly patients because 10% of Americans >65 yr of age will suffer from some form of progressive memory failure (30). Impaired cognition has a broad range of impacts on medical care, including reliability of the history, compliance with therapies, and reporting of complications (31). The principal areas of cognitive function that should be evaluated include attention, language, memory, visuospatial ability, and conceptualization. For clinicians in the office setting, the most practical approach is to employ a standardized valid testing instrument that has been shown to be useful for mild to moderate degrees of cognitive impairment. From the patient-care perspective, mild to moderate impairment is the most clinically relevant, because it leads to the greatest degree of medical management problems. Severe degrees of memory failure are obvious. Subtle changes in memory often require formal neuropsychological testing for full characterization.

Although various tests are available, perhaps the most widely applied test is the Mini-Mental State Examination of Folstein et al. (32). It provides a general overview of the major areas of cognitive assessment, is reliable and reproducible, and can be completed in <10 min. The score generated is a quick way to document changes over time. Because any test of this kind can be perceived as threatening, it is best to introduce such testing as standard practice for elderly patients.

Functional assessment. An essential component of the clinical assessment of the ill elderly patient is measurement of the functional impact of an unweighted list of diagnoses. This is necessary because diagnosis or physical findings provide an inadequate index of health because the range of functional impact of a given diagnosis is very great in elderly patients (33).

Functional assessment helps the clinician understand health capacities of frail elderly patients. The goal in

modern health care is not the complete elimination of illness but facilitation of the highest possible level of personal function. Familiarity with this component of geriatric assessment orients the clinician to management goals for elderly patients. Several types of function are assessed (34). The first set of functions or activities of daily living include the patient's ability to feed, toilet, dress, and perform personal hygiene together with an assessment of mobility. The second set of functional abilities, termed instrumental activities, include shopping, cooking, managing money, housekeeping, and traveling. History is important in identifying the need to evaluate function, but its formal observation and quantitation are crucial (35,36). For example, the elderly patient with arthritic hands should be observed opening pill bottles and performing self-hygiene if the history suggests clinically important impairment. The local visiting nurse is skilled in completion of this type of evaluation in the home, in which success in these activities is most relevant (37,38). Detailed knowledge of a patient's function often leads to the procurement of support services that actually promote or increase function, improve hygiene, and permit the patient to remain at home.

Unfortunately, no clear choices are available in standardized measures of function, but this area has become a high priority in technology assessment for elderly patients (34).

Sensory function. The third area of physical assessment of special importance to the elderly patient is the documentation of sensory impairment. Visual impairment affects 15% of elderly patients and is a major contributor to falls and functional impairment in late life. Visual acuity declines slightly up to 60 yr of age. The decline accelerates between 60 and 80 yr of age (39). Only 14% of healthy 60-yr-olds have visual acuity of 20/20 with prescription lenses. Constriction of visual fields has been documented in recent studies (40), again with a dramatic acceleration after 60 yr of age, with the widest perimeter of the visual field falling to the level of the physiological blind spot. Smaller deficits in color sensitivity, particularly to blue vision, have been documented (41). Accommodation impairment is the most predictable age-related decline in the visual system, and between 40 and 55 yr of age, lenses become necessary for reading. The oculomotor system shows a progressive failure of upward gaze, so that nonagenarians usually can elevate their center of vision 16°, in contrast to the 40° of young adults (40). Physicians capable of performing ocular examinations of their elderly patients and aware of the age-related physiological changes will be able to facilitate appropriate referrals. The major skills required are documentation of visual acuity, finding abnormalities on retinoscopy, and the ability to perform tonometry. Elderly patients are particularly prone to several syndromes requiring prompt care, which the aforementioned data base and skills will prepare the clinician to handle. Giant cell arteritis can produce an ophthalmic catastrophe and occurs exclusively in elderly patients. It most commonly produces ischemic optic neuritis (75% of ocular events) due to arteritis of the posterior ciliary artery. Therapy with high-dose steroids followed by temporal artery bioposy should be initiated immediately. Acute monocular blindness may be caused by other illnesses common in elderly patients, such as retinal detachment, hemorrhage, and vascular occlusion. Like ischemic optic neuritis, these are geriatric ophthalmic emergencies (42).

Amaurosis fugax, a syndrome characterized by transient monocular visual loss, is three times more common in elderly patients than in young individuals. One-half the cases in the elderly population may have underlying operable disease, a much higher percentage than in young individuals (43). Cataract and glaucoma are frequent causes of visual impairment in elderly patients, and it is the careful internist who can guide elderly patients, who often have limited contact with subspecialty care, to important preventive visual care.

One-half of those with significant hearing loss are >65 yr of age. With advancing age, a progressive sensorineural hearing loss occurs beginning at 20 yr of age but becoming clinically relevant only at 60–70 yr of age when deficits in the spoken voice frequencies (500–4000 Hz) appear (44). The incidence of hearing loss is 114 per 1000 at 45–64 yr of age and 231 per 1000 at 64–74 yr of age; this nearly doubles to 399 per 1000 at >75 yr of age. The practicing physician is responsible for the initial evaluation of hearing loss and approporiate referral for further care. The otologic examination should include examination for ceruminous impaction, thickened or perforated eardrums, and otitis media or externa. If hearing loss remains after appropriate therapy for the foregoing conditions, a baseline audiogram should be obtained. This will include air and bone conduction evaluation for pure tones initially. An air/bone gap confirms a conductive loss, and sensorineural loss is characterized by overlapping air and bone conduction thresholds.

The second component of a formal audiological examination is determination of a speech reception threshold that closely reflects functional hearing loss. The third component, the speech discrimination test, determines the patient's capacity to understand once the spoken voice has been received. Presbycusia leads to progressive sensorineural hearing loss. If a patient understands <20% of what is heard because of impaired speech discrimination, he/she will be a hearing aid failure, because the hearing aid is only an amplifier of sound. The pathology contributing to this age-related loss appears to predominate in the cochlea, with a significant added contribution from central auditory structures in the brain stem and cortex, leading to loss of speech discrimination capacity (45). The successful prescription of a hearing aid for the elderly presbycusic patient requires the thoughtful trial of a hearing aid under careful supervision by an audiologist. Ability to master the controls, adjustment to the altered character of the transmitted sound, and the stigma of the hearing aid may make

hearing rehabilitation difficult, but an attempt is always justified.

GERIATRIC SYNDROMES

Elderly patients seek health care for treatment of clearly defined acute illnesses, such as nosebleeds and hip fractures. However, much more commonly, elderly patients seek medical care for slowly progressive, multiply caused, chronic medical syndromes that induce long-term disablity and result in increased acute and long-term hospitalization. Delirium, urinary incontinence, falls, systolic hypertension, and polypharmacy are the usual reasons for referral of elderly patients for geriatric medical evaluation. A general understanding of the nature and magnitude of these syndromes is needed by the diabetologist, because diabetic complications produce or are associated with all of these syndromes.

DELIRIUM

Since the first clear description of postoperative disturbances of mental status in the 1800s, the syndrome of acute confusion has been recognized as a morbid one even though it often fails to appear in health statistics. Many synonyms, including delirium, toxic psychosis, and acute brain syndrome, may tend to obscure the basic features of this syndrome, which consists of the potentially reversible inability to maintain a coherent stream of thought and behavior (46). The clinical picture is dominated by an inability to maintain attention appropriately to the tasks at hand. The vulnerability of elderly patients to the development of this syndrome is documented in several studies (47), and clinical experience in geriatric consultation has identified the acute confusion state as a major management problem.

Elderly patients are vulnerable to the development of this syndrome for several reasons. The heightened autonomic arousal in elderly patients may provoke a failure to adjust to the stress of acute illness. There is a definite decline during aging in the ability to handle new information (fluid intelligence), particularly when speed or attention to multiple elements of the task are required. The high prevalence of cognitive and mental disorders in elderly patients is added to those normal facets of aging. Preexisting dementia almost certainly predisposes to the development of acute confusion during the stress of an illness.

The differential diagnosis of acute confusion is broad, with the majority of precipitating causes originating outside the central nervous system (Table 1). Pneumonia, cardiac failure, urinary infections, neoplasia, and depression appear to be the most common causes. Hyponatremia, a syndrome common to the first four causes just listed, is often found in hospitalized elderly patients and clearly contributes to acute confusion. Postoperatively confused patients have generally received more medications than nonconfused patients, and elderly patients are particularly sensitive to developing drug toxicity.

TABLE 1
Etiologic factors in acute confusional states in elderly patients

Drugs: sedatives-hypnotics; anticholinergics, including phenothiazines, tricyclic antidepressants, and antihistamines; narcotics; diuretics; digitalis; antiparkinsonism drugs; antihypertensives; chlorpropramide; cimetidine
Alcohol and drug withdrawal
Cardiac disease: cardiac failure; myocardial infarction; cardiac arrhythmia; endocarditis
Infection: especially pulmonary and urinary infection; bacteremia; septicemia; meningitis, encephalitis
Metabolic disorders: electrolyte, fluid, and acid-base imbalance; hepatic, renal, and respiratory failure; hypoglycemia; hyperglycemia; hypothyroidism; thyrotoxicosis; hypothermia; hyperthermia; vitamin B complex deficiency
Cerebrovascular disorders: stroke; transient ischemic attacks; subdural hematoma; temporal arteritis; cerebral vasculitis
Neoplasm: intracranial; extracranial (especially bronchogenic carcinoma)
Trauma: head injury; burns; hip fracture; surgery
Epilepsy

From Lipowski (46).

The therapeutic approach is multidisciplinary. The first responsibility is to diagnose and treat any underlying medical problem after taking a careful history and performing physical and laboratory testing. Historic review of the premorbid mental status is imperative, and there is good reason to suggest a formal mental status test on every elderly individual before any operation.

Concurrent with the investigative initiative is attention to the patient's physical and social comfort, most recently termed milieu therapy and generally implemented by nursing staff. Careful control of extraneous stimuli, provision of familiar objects, facilitation of interaction with family members, adequate control of pain, and provision of a supportive relationship with primary care givers form the basis of this approach. Drug treatment, when necessary, usually involves major tranquilizers, chosen for their capacity to control agitation without altering the level of consciousness. Choices within the group are dictated by the type of side effects desirable to avoid. Restraints, properly supervised, are occasionally necessary.

The prognosis in elderly patients depends on the underlying causes but in general, is less optimistic than that in younger populations. In one study (47), 25% of patients died, and 35% recovered to be discharged; the other patients remained in the hospital at the study's termination. A study of postoperative patients of all ages revealed a 7.8% incidence of acute confusion; of those, 32% had not fully recovered by the time of discharge.

The genuine reversibility of a significant proportion of

acute confusional states justifies a thorough investigation for this common geriatric syndrome.

URINARY INCONTINENCE

Urinary incontinence is a prevalent and particularly distressing symptom in elderly patients, with major psychosocial, economic, and health consequences. Largely because of the social stigma attached, and a misunderstanding of potential causes and treatment outcomes, the symptoms of incontinence are often disguised and underreported. Estimates of its prevalence in elderly patients range from 5 to 20% among those living in the community (48) and from 40 to 75% among those in long-term facilities (49). Incontinence is associated with an increased incidence of pressure sores, use of indwelling catheters, and subsequent urinary infections. Psychosocially, incontinence can cause embarrassment, isolation, and regression, and it contributes to the decision to institutionalize an elderly person.

Incontinence may be characterized as either reversible or fixed. Elderly patients are particularly susceptible to reversible causes of incontinence, because the capacity of the bladder and competency of the urethral mechanism are diminished; hence, the first step in the assessment of urinary incontinence of the aged is to identify and remove all reversible causes, even if irreversible causes are also present. Fixed or irreversible incontinence may result from diminished central nervous system (CNS) inhibition of the bladder, spinal cord lesions, peripheral neuropathy, or local lesions such as bladder tumor, outlet obstruction, and pelvic floor laxity. Upturned toes, hyperreflexia, and spasticity of the lower extremities are signs of CNS or spinal cord lesions. Both the afferent and efferent limbs of sacral innervation are tested by the anal wink reflex. Voluntary anal sphincter contraction and sacral pin sensation should also be tested. A careful history, pelvic and urologic examination, and urinalysis should detect most local causes of incontinence. The cystometrogram can help establish the cause of incontinence and should be performed before surgical intervention in most cases, but it is poorly standardized in the aged, so clinical evaluation, removal of reversible causes, and a trial of therapy are generally indicated before cystometrography.

After decades of neglect of the topic, studies of incontinence suggest that the fixed or chronic type, which is unrelated to the causes of reversible incontinence listed in Table 2, can be treated successfully in many patients. The most common subtype, accounting for 50% of cases, is urge incontinence (50). In these cases, the patient senses an urge to void but is unable to prevent voiding; cystometric evaluation shows uninhibited contractions of the bladder. Decreased CNS or spinal cord inhibition of bladder contraction or local bladder disorders are the usual cause (Table 2). Urge incontinence often can be substantially improved by smooth muscle relaxants, such as Ca^{2+}-channel blockers (51), or by administration of anticholinergic medications, such as oxybutynin chloride (52), which are effective in decreasing bladder contractions. In one preliminary study in elderly patients, low-dose imipramine, a tricyclic antidepressant, was beneficial, probably because of the combined anticholinergic and direct smooth muscle relaxant effects on the detrusor along with the drug's α-adrenergic agonist properties, which would be expected to increase bladder outlet tone. However, this agent is associated with orthostatic hypotension and must be used with caution in elderly patients (53).

TABLE 2
Causes of incontinence in elderly patients

Reversible causes: acute confusional state; marked immobility; fecal impaction; symptomatic bladder infection; metabolic abnormalities (hypercalcemia, hyperglycemia); medications (sedatives, anticholinergic drugs, α-adrenergic agonists and antagonists, Ca^{2+}-channel–blocking agents)
Urge incontinence due to detrusor instability or hyperreflexia: lack of CNS inhibition (Alzheimer's disease, Parkinson's disease, other CNS disorders); interference with spinal inhibitory pathways (cervical spinal myelopathy due to spondylosis, other spinal cord lesions); local bladder disorders (interstitial cystitis, postradiation effects, bladder tumor or obstruction)
Stress incontinence: pelvic laxity from overstretching of pelvic musculature in childbirth, age-related weakness, or previous surgical damage; atrophic urethritis, urethral caruncle, and vaginitis; stress-induced detrusor instability (suggested by delay between stress and leakage, treated as urge incontinence)
Overflow incontinence: bladder outlet obstruction (prostatic hypertrophy, urethral stricture); neurogenic bladder (peripheral neuropathy due to diabetes, tabes, vitamin B_{12} deficiency, or herniated disk or other sacral nerve root lesions)
Reflex incontinence: spinal cord lesions (spondylosis, tumor); disorders of cerebral cortex

CNS, central nervous system. From Minaker and Rowe (63).

A second major form of chronic incontinence in elderly patients is stress incontinence, the involuntary loss of urine only when intra-abdominal pressure is transiently increased. The underlying abnormality is usually incompetence of the bladder outlet secondary to overstretching of pelvic musculature during childbirth, age-related weakening of the pelvic musculature, or damage from previous surgery (Table 2).

Though stress incontinence is often unreported by embarrassed patients and ignored by physicians, effective treatments are now available for this common disorder. Because the urethral mucosa contributes to outlet resistance and is maintained in women by estrogens, postmenopausal estrogen deficiency with atrophic urethritis can be an important contributing cause of stress incontinence. Local (vaginal cream) or systemic estrogens improve stress incontinence in many patients. Widespread use of estrogens for this disorder has been tempered by concerns about their long-term adverse effects.

More recently, pelvic floor exercises have been shown to be a very effective adjunct to estrogen in stress incontinence (54). Patients are trained to discontinue the

flow of urine several times during each voiding. Once the patient can easily contract the necessary muscles, the contractions are repeated frequently throughout the day. In 44 of 46 postmenopausal women with stress incontinence, a combined regimen of regular pelvic floor exercises and estrogen eliminated or markedly reduced incontinence in 3 mo. Stress incontinence recurred in all 11 patients who discontinued the exercises and was again controlled with resumption of the exercise regimen (54). In patients who are not responsive to this regimen, improved surgical techniques requiring <30 min are very effective, even in frail institutionalized patients (55).

Leakage of small amounts of urine throughout the night and day suggests overflow incontinence. The diagnosis is confirmed by finding a palpable distended bladder and large postvoid urinary residual volume. As a rule, overflow incontinence is caused by bladder outlet obstruction or neurogenic bladder. Complete evaluation, including cystometrography, is usually indicated. Treatment includes intermittent or indwelling catheterization to decompress the bladder for several weeks, maneuvers such as the Credé's maneuver for voiding, use of α-blockers such as prazosin or cholinergic agents such as bethanechol chloride, and surgical correction of obstruction if feasible. Reflex incontinence refers to frequent involuntary voidings throughout the day and night without warning. Because sacral reflexes are preserved, a moderate volume of urine is expressed, unlike the small more continuous urinary leakage associated with overflow incontinence. Reflex incontinence is usually caused by spiral cord lesions but may be due to cerebral cortical damage. Bladder decompression with prazosin, muscle relaxants (diazepam or baclofen), or intermittent catheterization is indicated (50). Because residual urine is present in overflow incontinence and reflex incontinence, treatment or prophylaxis of urinary tract infection may be indicated.

FALLS

Physicians dealing with elderly patients frequently encounter individuals whose chief complaint is falling. Increasing age has been shown to increase postural instability. Increasing debility is associated with a marked increase in the risk of and damage from falls. Not only do falls result in injury, but they create a lack of confidence that further impairs mobility in elderly individuals. The diabetic specialist may be asked to evaluate a fall and must broaden the differential diagnosis beyond seizure, dehydration, and neurological or vascular disorders.

Surveys of community-dwelling elderly individuals in Great Britain and the U.S. have repeatedly shown that 35–40% of individuals >65 yr of age will suffer at least one fall per year and that the risk of falling increases dramatically with advancing age. The overall annual incidence of falls in nursing home populations is 45% (56). Although this is somewhat higher than the incidence found in community-based studies, it is more likely to be accurate, because individuals in supervised environments have staff particularly interested in documenting episodes of falling. Elderly women seem to be especially vulnerable to falls and particulary prone to falling down stairs. Falls are likely to be recurrent.

Most falls are of no clinical consequence. Fifty-four percent result in no injury whatsoever, and an additional 28% are trivial; 18% are severe, with 6% resulting in fracture. In view of the high prevalence of falls in elderly individuals, this rather small percentage of severe injuries accounts for the major portion of their traumatic illness. The likelihood of significant fracture from a fall corresponds with the degree of structural strength of bones, which is less in Whites than in non-Whites and less in women than in men. Fracture rates increase progressively after 65 yr of age. The annual incidence of femur fracture increases from <100 per 100,000 at 40 yr of age to >500 per 100,000 at 60 yr of age (57). With regard to mortality, death rates from falls are <50 per 100,000 at 65 yr of age and increase progressively to 525 per 100,000 at 85 yr of age.

SYSTOLIC HYPERTENSION

Isolated systolic hypertension (systolic blood pressure >160 mmHg, diastolic blood pressure <90 mmHg) is found in ~25–30% of men and women >75 yr of age. Although convincing evidence indicates that elderly individuals with systolic and diastolic hypertension have lessened risk of death from cardiovascular events after treatment, it is not currently known whether treatment of isolated systolic hypertension is associated with reduction in risk. Hypertension is a common associate of diabetes mellitus in elderly patients. Treatment of one should help the other, but there is potential for the opposite to occur if careful monitoring of therapy is not possible.

In most developed countries, advancing age is associated with progressive increases in systolic blood pressure to levels of 150 mmHg by 70 yr of age, whereas diastolic blood pressure does not rise beyond the middle years and falls slightly after 60 yr of age. Follow-up studies of the oldest elderly patients are presently being supported, and changes in this age-group will soon be defined. The major factor responsible for age-related increases in systolic blood pressure is decreased distensibility of the aorta and major vessels secondary to arteriosclerosis.

Diabetes has a well-established association with hypertension and should be considered an additive factor to the risks of hypertension. After 70 yr of age, isolated systolic hypertension is more prevalent than diastolic hypertension. Several studies indiate that elevation of systolic blood pressure has been previously underrated as a risk factor for adverse cardiovascular events (58,59).

Our understanding of the importance of isolated systolic hypertension in elderly patients has increased substantially, and it is now recognized to be associated with a two- to threefold increase in mortality, especially related to cardiovascular disease and stroke. In addition,

several studies have shown, contrary to prior opinion, that systolic blood pressure can be safely lowered in elderly patients (60). However, the value of therapy remains uncertain. Evidence that the risk is attributable to systolic blood pressure itself, rather than the underlying vascular changes, is indirect, and there are currently no data on the value of treatment in reducing risk. Because the benefits of the therapy are uncertain, any but the most minor side effects should be considered unacceptable, and therapy should be modified or discontinued. Encouraged by a pilot study in elderly patients with isolated systolic hypertension, which demonstrated the ease and safety of treatment, the National Institutes of Health is launching a large multicenter, randomized, double-blind, placebo-controlled trial to determine the value of treatment.

The rational choice of antihypertensive agents in the elderly diabetic patient is based on the lowest dose of an efficacious agent unlikely to worsen the diabetic state or mask symptoms of hypoglycemia. Hypokalemia should be avoided. Vasodilator agents such as hydralazine, Ca^{2+}-channel blockers, and angiotensin–converting-enzyme inhibitors are the best choices of drugs for hypertension in the diabetic patient.

POLYPHARMACY

The elderly diabetic patient can expect to have more medications, side effects of medications, and difficulty in maintaining compliance. However, proper preparation and a good surveillance system can permit intensive diabetic treatment. Although our 25 million citizens >65 yr of age represent <12% of our population, they purchase 25% of the drugs sold in the U.S., spending nearly 20% of their personal funds. In Great Britain, outpatients >75 yr of age take three times as many medicines as the natioanal average, with women consuming twice as many drugs as men. This excess consumption of medicines is accompanied, not surprisingly, by higher rates of side effects. Of equal importance is the fact that when elderly people consume the same drugs with the same frequency as young people, toxicity is more frequent and severe in the elderly group. Standards for the use of most current therapeutic agents were obtained in young adults, and applying these guidelines to elderly patients is often hazardous.

Because the prevalence of disease rises sharply with age, an ill elderly person is likely to have several associated disorders, and multiple organ system dysfunction also increases the risk of adverse drug reaction. When the high prevalence of cognitive and visual impairment in elderly patients is juxtaposed to the similar size, shape, texture, and color of many medicines, errors involving drugs are especially likely. A better understanding of the special features of drug use in elderly patients is necessary to reduce toxicity.

As many as one-seventh of all hospitalizations result from adverse drug reactions, and elderly people comprise nearly one-half of the hospital admissions caused by drug intoxication. Rates of adverse drug reaction rise steadily after 50 yr of age, and patients >60 yr of age are twice as likely to suffer an adverse drug reaction as young patients. Those >80 yr of age have a one in four risk of drug intoxication, twice the rate seen in patients <50 yr of age. The elderly diabetic patient is just as prone to hypoglycemia as the young individual. Hospital stay is prolonged for all patients with adverse reactions, but elderly patients remain hospitalized longest. Two age-related phenomena, impaired kidney function and multiple drug use, are major risk factors for adverse reactions.

When a patient fails to improve with a prescribed therapeutic regimen, suspicion of medication failure, worsening disease, or both often impel the physician to change drugs. The possibility of noncompliance with the prescribed medication regimen may be overlooked unless the patient manifests obvious psychopathology. In most patients, noncompliance is highest among elderly patients and is related to the following age-related characteristics: *1*) poor vision, *2*) poor hearing, *3*) osteoarthritis (making childproof containers unusable), *4*) dementia, *5*) difficulty swallowing large pills, and *6*) taking >3 medications. Improved compliance, especially for elderly patients, can only be expected if the special problems related to drug treatment, packaging, education, and testing are recognized.

SUMMARY

The diabetologist familiar with patterns of health care, disease burden, and syndromes associated with illnesses affecting the elderly diabetic patient will be better prepared for this rapidly enlarging and dynamically changing population.

ACKNOWLEDGMENTS

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General Diabetic Statistics

PREVALENCE

Number of people diagnosed w/diabetes (1993)
- Women: 4.2 Million
- Men: 3.6 Million
- Children 19 and younger: About 100,000
- Adults 65 and older: 3.2 million

Percent of adults with diabetes by race and ethnicity
(Diagnosed and undiagnosed)
- African American: 9.6 percent
- Mexican American: 9.6 percent
- Cuban American: 9.1 percent
- Puerto Rican American: 10.9 percent
- White Americans 6.2 percent
- American Indians: Ranges from 5 to 50 percent
- Japanese Americans: Japanese Americans 45-75 years of age in King County, WA, 20 percent of the men and 16 percent of the women had diabetes.

Joan Stieber
Richard Kahn
CDC
Peter ?? Bouxiene
HCFA

Sarah

In 1995, about 16 million people in the United States had diabetes, but only 8 million had been diagnosed with the condition. The number of persons with diagnosed diabetes has increased from 1.6 million in 1958 to 8 million in 1995, representing a fivefold increase. Diabetes is the seventh leading cause of death in the United States, resulting in 400,000 deaths. Each year, 650,000 Americans develop diabetes; each decade 6 million people develop diabetes.

HEALTH PROBLEMS CAUSED BY DIABETES

In any 24 hour period, 1,800 persons will be diagnosed with diabetes, 150 diabetes-related amputations will occur, 30-65 people will go blind because of diabetes, 55 people with diabetes will experience kidney failure, and more than 1,000 people will die from diabetes or its complications.

* **Blindness**: Diabetes is the main cause for blindness among working aged adults (adults over age 30). Diabetic retinopathy causes between 12,000 to 24,000 new cases of blindness each year.

* **Heart Disease**: Cardiovascular disease is 2 to 4 times more common in people with diabetes and is present in 75% of diabetes-related deaths. Middle-aged people with diabetes have death rates twice as high and heart disease death rates about 2 to 4 times as high as middle-aged people without diabetes.

* **Stroke**: The risk of stroke is 2 to 4 time higher among persons with diabetes.

* **High Blood Pressure**: An estimated 60% to 65% of persons with diabetes have high blood pressure.

* **Kidney Disease**: Diabetes is the leading cause of kidney failure requiring dialysis or transplantations, accounting for 36% of new cases. In 1992, 19,790 new cases occurred, and 56,059 people with diabetes were undergoing dialysis or transplantation treatment. Nearly 20,000 Americans develop end stage renal disease from diabetes each year.

* **Nerve Disease**: About 60% to 70% of people with diabetes have mild to severe forms of diabetic nerve damage (resulting in such symptoms of impaired sensation in the feet or hands, delayed stomach emptying, carpal tunnel syndrome and peripheral neuropathy). Severe forms of diabetic nerve disease are a major contributing cause of lower extremity amputations.

* **Amputations:** More than half of lower limb amputations in the United States occur among persons with diabetes; from 1989 to 1992, the average number of amputations performed each year among persons with diabetes was 54,000.

* **Dental Disease:** Periodontal disease, which can lead to tooth loss, occurs with greater frequency and severity among persons with diabetes. In one study, 30 percent of IDDM patients age 19 and older had periodontal disease. The rate of tooth loss is 15 times higher, and the incidence of periodontal disease is 2.6 times higher among Pima indians with NIDDM.

* **Pregnancy:** The rate of major congenital malformations in babies born to women with preexisting diabetes varies from 0 to 5 percent among women who receive preconception care to 10 percent among women who do not receive preconception care. Three to five percent of pregnancies among women with diabetes result in death of the newborn; this compares to a rate of 1.5 percent for women who do not have diabetes.

ECONOMIC COSTS OF DIABETES

* The costs of diabetes are estimated to be as high as $140 billion, comprising approximately 15% of the total US health expenditures. Contributing substantially to these costs are the complications of diabetes. For example, in 1992, the cost of treating kidney failure for 56,000 Americans with diabetes exceeded $2.1 billion. This figure did not include the costs associated with disabilities and premature death.

* In this same year, Medicare expenditures per person with diabetes on kidney dialysis averaged $38,700. Because kidney failure is increasing at an alarming rate, these costs are expected to rise.

Source

* More than 60% of lower extremity amputations that are not related to injury occur among persons with diabetes. Approximately 57,000 diabetes-related amputations were performed in 1993. The direct costs of diabetes related amputations are about $600 million annually.

* Many hidden costs are associated with diabetes. These costs include a failure to recognize the role of diabetes in premature deaths and the unknown costs related to undiagnosed diabetes.

* If only 10% of diabetes could be prevented or cured with gene therapy, then it would produce a savings of $10 billion a year.

* 47,800 workers are permanently disabled due to diabetes each year.

* the cost of foregone productivity attributable to diabetes is $27 billion a year

* diabetes costs the economy more than any other single disease. Source

ECONOMIC BENEFITS OF PREVENTION

* Screening and treatment for eye disease among persons with diabetes is saving the federal government about $248 million annually. If all persons with diabetes received recommended screening and treatment, the annual savings to the federal budget could exceed $470 million.

* Women with preexisting diabetes deliver more than 18,000 babies each year. For every $1.00 invested in preconception care for these mothers, $1.86 can be saved by preventing birth defects.

* The Diabetes Control and Complications Trial, a national 10-year study that involved 1,441 volunteers with insulin-dependent diabetes, confirmed that good control of blood sugar prevented the onset of delayed the progression of eye, kidney, and nerve damage by at least 50%.

* The ADA has asserted that we could save $6.5 billion if we established diabetes prevention and control programs.

Budget Appropriations

1992: 7 million, 1993 10 million, 1994 18 million, 1995 twenty million, 1996 23 million, 1997 26 million.

who spends this NIH?

Aaron

Infants and toddlers

Do kids typically die very young? How much does it cost to treat a child w/ diabetes 603-526-7713

Infants and children in the preschool age group who have insulin-dependent diabetes mellitus (IDDM) present a unique set of problems to the health care provider and to their families. These include:

- Difficulty in achieving maximal metabolic control.
- the limited ability of the child to communicate feelings and needs.
- a significant financial burden to many young families.
- increased family stress and altered psychodynamics seen in families with very young children with chronic illnesses.

there are stats on children. What about

Insulin-dependent diabetes mellitus (IDDM) has been on the rise, with the most marked increase in children under the age of five. In 1988, 26% of persons with IDDM were under the age of five. In this young age group, a majority of the children present with at least moderate diabetic ketoacidosis (D.A.), and often they are severely ill, even comatose.

How much has it risen

RDA can find out

Methodologies employed to help deal with the problem:

Education groups:

These groups help parents deal with the typical feelings that arise such as shock, resentment, anger, fear, guilt, anxiety, and denial. Many of these feelings persist for years following the diagnosis, and may continue to affect the parents' relationship with the child.

Family support and therapy:

This helps parents deal with psychological, emotional, and financial problems. Stress is common to those parents right after their child has been diagnosed. Parents may experience increased conflict in their own relationship. Mothers of preschool-aged children with IDDM experience more stress in the family, which they attribute to the diabetic child. Conflict often arises over who is responsible for giving shots and/or testing blood glucose levels. Parents may take less time for themselves as a couple because they feel guilty about time spent apart from their child. The impact of conflict and stress on the family's ability to cope with and manage IDDM, and on the child's physical and emotional well-being, is continually emphasized.

Financial problems are severe, as the cost of treating an "average" child with IDDM in 1989 was $2,500--$3,500 a year. The care of infants and toddlers with IDDM is very expensive because these patients often require more blood glucose testing. Testing materials are an expensive part

of the management regimen and often are not reimbursed by insurance, resulting in a significant increase in out-of-pocket cost to these families. Younger children may also require more clinic visits and have a higher frequency of hospitalization.

Children must constantly be monitored, as risk of seizure, a loss of fluid, and other problems associated with diabetes can be very serious and perhaps frequent.

100,000 children age 19 years or younger are diagnosed with diabetes.

I want to know
all of the other
medic implications
→ does it affect their
very they are at school
do they miss
do they spend time
lots of hospital
in the
do they die young.

LC

African Americans and Diabetes

Diabetes Mellitus is one of the most challenging health conditions facing 30 million African Americans. It is the 5th leading cause of death in African Americans between the ages of 45-64 and is the third leading cause of death in African American women of all ages in 1990. In 1993 1.3 million African Americans were known to have diabetes 3 times the number diagnosed in 1963.

STATISTICS (1993)

- for every white person who gets Diabetes 1.6 African Americans get Diabetes
- One in 4 black Women 55years and older has diabetes.
- 25% of blacks between 74-65 has diabetes.
- Afr.Amer. Are more likely to develop complications and disability from Diabetes.
- At age 45 or older the prevalence of Diabetes is 1.4 to 2.3 times as frequent as in whites.
- In the 65-74 age range 17.4 percent of black Americans had diagnosed diabetes compared to 9.5% of white Americans
- African American children have lower rates of Type 1
- African Americans 40 years of age and older have Type 2 or non-insulin-dependent Diabetes.

Diabetes and Pregnant African American Women

- Afri. Amer women have a 80percent higher gestational diabetes rate than white women
- These women are 2 times more likely to develop diabetes in future pregnancies and type 2 diabetes in 20 years.

Complications

- Afri. Amer develop a higher rate of blindness, kidney failure, and amputations from diabetes in comparison to white Americans

Kidney failure

- *2.5 -5.5 times more often than whites*

Visual Impairment

- *40 percent higher in African Americans than whites*

Amputations (1991 study)

- *19 percent higher than whites*

CONCLUSION:

Approximately 1.3 million African Americans have been diagnosed with Diabetes in the United States. They are more likely to suffer from diabetic related kidney failure, visual impariment, and amputations than there white counterparts. Pregnant African American women have a 80% higher gestational diabetes rate than white women. For these reasons we must incease diabetes funding.

FACSIMILE TRANSMISSION

FROM:

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Please contact the addressee below for delivery of this communication.

TO: Name: Linda Cooper

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more info. on children & elderly to follow this afternoon.

Number of pages in this transmission including this cover sheet: 13

Diabetes Overview

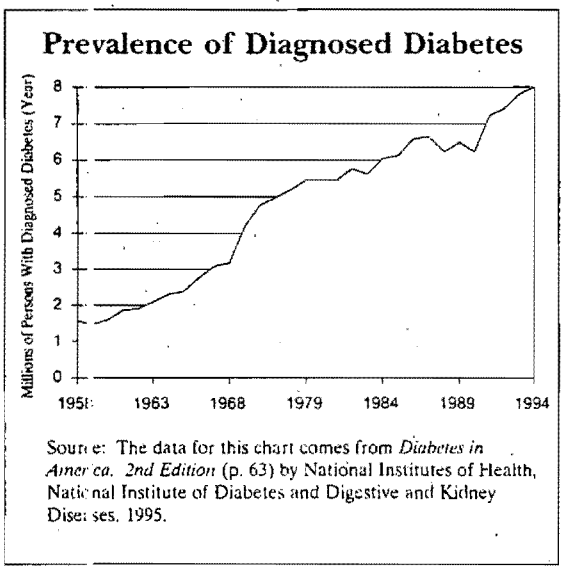
National Diabetes Information Clearinghouse

National Institute of Diabetes and Digestive and Kidney Diseases

NATIONAL INSTITUTES OF HEALTH

Almost every one of us knows someone who has diabetes. An estimated 16 million people in the United States have diabetes mellitus—a serious, lifelong condition. About half of these people do not know they have diabetes and are not under care for the disorder. Each year, about 650,000 people are diagnosed with diabetes.

Although diabetes occurs most often in older adults, it is one of the most common chronic disorders in children in the United States. About 127,000 children and teenagers age 19 and younger have diabetes.



Source: The data for this chart comes from *Diabetes in America, 2nd Edition* (p. 63) by National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, 1995.

What Is Diabetes?

Diabetes is a disorder of metabolism—the way our bodies use digested food for growth and energy. Most of the food we eat is broken down by the digestive juices into a simple sugar called glucose. Glucose is the main source of fuel for the body.

After digestion, the glucose passes into our bloodstream where it is available for body cells to use for growth and energy. For the glucose to get into the cells, insulin must be present. Insulin is a hormone produced by the pancreas, a large gland behind the stomach.

When we eat, the pancreas is supposed to automatically produce the right amount of insulin to move the glucose from our blood into our cells. In people with diabetes, however, the pancreas either produces little or no insulin, or the body cells do not respond to the insulin that is produced. As a result, glucose builds up in the blood, overflows into the urine, and passes out of the body. Thus, the body loses its main source of fuel even though the blood contains large amounts of glucose.

What Are the Different Types of Diabetes?

The three main types of diabetes are:

- Insulin-dependent diabetes mellitus (IDDM) or Type I diabetes
- Noninsulin-dependent diabetes mellitus (NIDDM) or Type II diabetes
- Gestational diabetes.

Insulin-Dependent Diabetes

Insulin-dependent diabetes is considered an autoimmune disease. An autoimmune disease results when the body's system for fighting infection (the immune system) turns against a part of the body. In diabetes, the

immune system attacks the insulin-producing beta cells in the pancreas and destroys them. The pancreas then produces little or no insulin.

Someone with IDDM needs daily injections of insulin to live. At present, scientists do not know exactly what causes the body's immune system to attack the beta cells, but they believe that both genetic factors and viruses are involved. IDDM accounts for about 5 to 10 percent of diagnosed diabetes in the United States.

IDDM develops most often in children and young adults, but the disorder can appear at any age. Symptoms of IDDM usually develop over a short period, although beta cell destruction can begin months, even years, earlier.

Symptoms include increased thirst and urination, constant hunger, weight loss, blurred vision, and extreme tiredness. If not diagnosed and treated with insulin, a person can lapse into a life-threatening coma.

Noninsulin-Dependent Diabetes

The most common form of diabetes is noninsulin-dependent diabetes. About 90 to 95 percent of people with diabetes have NIDDM. This form of diabetes usually develops in adults over the age of 40 and is most common among adults over age 55. About 80 percent of people with NIDDM are overweight.

In NIDDM, the pancreas usually produces insulin, but for some reason, the body cannot use the insulin effectively. The end result is the same as for IDDM—an unhealthy buildup of glucose in the blood and an inability of the body to make efficient use of its main source of fuel.

The symptoms of NIDDM develop gradually and are not as noticeable as in IDDM. Symptoms include feeling tired or ill, frequent urination (especially at night), unusual thirst, weight loss, blurred vision, frequent infections, and slow healing of sores.

Gestational Diabetes

Gestational diabetes develops or is discovered during pregnancy. This type usually disappears when the pregnancy is over, but women who have had gestational diabetes have a greater risk of developing NIDDM later in their lives.

What Is the Scope and Impact of Diabetes?

Diabetes is widely recognized as one of the leading causes of death and disability in the United States. According to death certificate data, diabetes contributed to the deaths of more than 169,000 persons in 1992.

Diabetes is associated with long-term complications that affect almost every major part of the body. It contributes to blindness, heart disease, strokes, kidney failure, amputations, and nerve damage. Uncontrolled diabetes can complicate pregnancy, and birth defects are more common in babies born to women with diabetes.

Diabetes cost the United States $92 billion in 1992. Indirect costs, including disability payments, time lost from work, and premature death, totaled $47 billion; medical costs for diabetes care, including hospitalizations, medical care, and treatment supplies, totaled $45 billion.

Who Gets Diabetes?

Diabetes is not contagious. People cannot "catch" it from each other. However, certain factors can increase one's risk of developing diabetes. People who have family members with diabetes (especially NIDDM), who are overweight, or who are African American, Hispanic, or Native American are all at greater risk of developing diabetes.

IDDM occurs equally among males and females, but is more common in whites than in nonwhites. Data from the World Health Organization's Multinational Project for Childhood Diabetes indicate that IDDM is

rare in most Asian, African, and Native American populations. On the other hand, some northern European countries, including Finland and Sweden, have high rates of IDDM. The reasons for these differences are not known.

NIDDM is more common in older people, especially older women who are overweight, and occurs more often among African Americans, Hispanics, and Native Americans. Compared with non-Hispanic whites, diabetes rates are about 60 percent higher in African Americans and 110 to 120 percent higher in Mexican Americans and Puerto Ricans. Native Americans have the highest rates of diabetes in the world. Among Pima Indians living in the United States, for example, half of all adults have NIDDM. The prevalence of diabetes is likely to increase because older people, Hispanics, and other minority groups make up the fastest growing segments of the U.S. population.

How Is Diabetes Managed?

Before the discovery of insulin in 1921, all people with IDDM died within a few years after the appearance of the disease. Although insulin is not considered a cure for diabetes, its discovery was the first major breakthrough in diabetes treatment.

Today, daily injections of insulin are the basic therapy for IDDM. Insulin injections must be balanced with meals and daily activities, and glucose levels must be closely monitored through frequent blood sugar testing.

Diet, exercise, and blood testing for glucose are also the basis for management of NIDDM. In addition, some people with NIDDM take oral drugs or insulin to lower their blood glucose levels.

People with diabetes must take responsibility for their day-to-day care. Much of the daily care involves trying to keep blood sugar levels from going too low or too high. When blood sugar levels drop too low—a condition known as hypoglycemia— a person can become nervous, shaky, and confused. Judgment can be impaired. Eventually, the person could pass out. The treatment for low blood sugar is to eat or drink something with sugar in it.

On the other hand, a person can become very ill if blood sugar levels rise too high, a condition known as hyperglycemia. Hypoglycemia and hyperglycemia, which can occur in people with IDDM or NIDDM, are both potentially life-threatening emergencies.

People with diabetes should be treated by a doctor who monitors their diabetes control and checks for complications. Doctors who specialize in diabetes are called endocrinologists or diabetologists. In addition, people with diabetes often see ophthalmologists for eye examinations, podiatrists for routine foot care, dietitians for help in planning meals, and diabetes educators for instruction in day-to-day care.

The goal of diabetes management is to keep blood glucose levels as close to the normal (nondiabetic) range as safely possible. A recent Government study, sponsored by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), proved that keeping blood sugar levels as close to normal as safely possible reduces the risk of developing major complications of diabetes.

The 10-year study, called the Diabetes Control and Complications Trial (DCCT), was completed in 1993 and included 1,441 people with IDDM. The study compared the effect of two treatment approaches—intensive management and standard management—on the development and progression of eye, kidney, and nerve complications of diabetes. Researchers

found that study participants who maintained lower levels of blood glucose through intensive management had significantly lower rates of these complications.

Researchers believe that DCCT findings have important implications for the treatment of NIDDM, as well as IDDM.

What Is the Status of Diabetes Research?

NIDDK supports basic and clinical research in its own laboratories and in research centers and hospitals throughout the United States. It also gathers and analyzes statistics about diabetes. Other institutes at the National Institutes of Health also carry out research on diabetes-related eye diseases, heart and vascular complications, pregnancy, and dental problems.

Other Government agencies that sponsor diabetes programs are the Centers for Disease Control and Prevention, the Indian Health Service, the Health Resources and Services Administration, the Bureau of Veterans Affairs, and the Department of Defense.

Many organizations outside of the Government support diabetes research and education activities. These organizations include the American Diabetes Association, the Juvenile Diabetes Foundation International, and the American Association of Diabetes Educators.

In recent years, advances in diabetes research have led to better ways to manage diabetes and treat its complications. Major advances include:

- New forms of purified insulin, such as human insulin produced through genetic engineering
- Better ways for doctors to monitor blood glucose levels and for people with diabetes to test their own blood glucose levels at home
- Development of external and implantable insulin pumps that deliver appropriate amounts of insulin, replacing daily injections
- Laser treatment for diabetic eye disease, reducing the risk of blindness
- Successful transplantation of kidneys in people whose own kidneys fail because of diabetes
- Better ways of managing diabetic pregnancies, improving chances of successful outcomes
- New drugs to treat NIDDM and better ways to manage this form of diabetes through weight control
- Evidence that intensive management of blood glucose reduces and may prevent development of microvascular complications of diabetes
- Demonstration that antihypertensive drugs called ACE-inhibitors prevent or delay kidney failure in people with diabetes.

What Will the Future Bring?

In the future, it may be possible to administer insulin through nasal sprays or in the form of a pill or patch. Devices that can "read" blood glucose levels without having to prick a finger to get a blood sample are also being developed.

Researchers continue to search for the cause or causes of diabetes and ways to prevent and cure the disorder. Scientists are looking for genes that may be involved in NIDDM and IDDM. Some genetic markers for IDDM have been identified, and it is now possible to screen relatives of people with IDDM to see if they are at risk for diabetes.

The new Diabetes Prevention Trial—Type I, sponsored by NIDDK, identifies relatives at risk for developing IDDM and treats them with low doses of insulin or with oral insulin-like agents in the hope of preventing IDDM. Similar research is carried out at other medical centers throughout the world.

Incidence

Total new cases diagnosed every day: About 1,700 (1990–92 averaged)

Total new cases diagnosed each year: 625,000 (1990–92 averaged)

- **NIDDM:** About 595,000 new cases per year
- **IDDM:** About 30,000 new cases per year

Prevalence

Number of people diagnosed with diabetes (1993 estimates)

- **Women:** 4.2 million
- **Men:** 3.6 million
- **Children age 19 years or younger:** About 100,000
- **Adults age 65 years or older:** 3.2 million

Percent of adults with diabetes by race and ethnicity (diagnosed and undiagnosed)

- **African Americans:** 9.6 percent
- **Mexican Americans:** 9.6 percent
- **Cuban Americans:** 9.1 percent
- **Puerto Rican Americans:** 10.9 percent
- **White Americans:** 6.2 percent
- **American Indians:** Ranges from 5 to 50 percent
- **Japanese Americans:** Among second-generation Japanese Americans 45 to 74 years of age residing in King County, WA, 20 percent of the men and 16 percent of the women had diabetes.

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Treatment for Diabetes

Treatment emphasizes control of blood glucose through blood glucose monitoring, regular physical activity, meal planning, and attention to relevant medical and psychosocial factors. In many patients, oral medications and/or insulin injections are also required for appropriate glucose control. Treatment of diabetes is an ongoing process that is planned and regularly reassessed by the health care team, the person with diabetes, and his/her family. Patient and family education are important parts of the process.

- **IDDM:** By definition, people with IDDM require insulin injections.
- **NIDDM:** About 40 percent use insulin, 49 percent use oral agents, 10 percent use combination of insulin and oral medications.

Amputations

- More than half of lower limb amputations in the United States occur among people with diabetes; from 1989 to 1992, the average number of amputations performed each year among people with diabetes was 54,000.

Dental disease

- Studies show that periodontal disease, which can lead to tooth loss, occurs with greater frequency and severity in people with diabetes. In one study, 30 percent of IDDM patients age 19 years or older had periodontal disease.
- The rate of tooth loss is 15 times higher in Pima Indians with NIDDM, compared to those without diabetes, and the incidence of periodontal disease is 2.6 times higher.

Pregnancy

- The rate of major congenital malformations in babies born to women with preexisting diabetes varies from 0 to 5 percent in women who receive preconception care to 10 percent in women who do not receive preconception care.
- Three to 5 percent of pregnancies in women with diabetes result in death of the newborn; this compares to a rate of 1.5 percent in women who do not have diabetes.

Gestational Diabetes

Gestational diabetes is a type of diabetes that develops in some pregnant women; the condition disappears when the pregnancy is over. A history of gestational diabetes, however, is a risk factor for eventual development of NIDDM.

- Occurs in 2 to 5 percent of pregnancies, with higher rates in African Americans, Hispanics/Latino Americans, and American Indians (rates in American Indians range from 1 to 14 percent).

Impaired Glucose Tolerance (IGT)

IGT refers to a condition in which blood sugar levels are higher than normal but not high enough to be classified as diabetes (between 140 to 199 mg/dL in a 2-hour oral glucose tolerance test). IGT is a major risk factor for NIDDM.

- Present in about 11 percent of adults.
- About 40 to 45 percent of persons age 65 years or older have either NIDDM or IGT.

The Following Organizations Collaborated in Compiling This Fact Sheet:

American Association of Diabetes Educators

American Diabetes Association

Centers for Disease Control and Prevention

Department of Veterans Affairs

Health Resource Services Administration

Indian Health Service

Juvenile Diabetes Foundation International

National Institute of Diabetes and Digestive and Kidney Diseases of the National Institutes of Health

The statistics reported in this fact sheet are based on data from the following sources: *Diabetes in America, 2nd Edition*, National Institute of Diabetes and Digestive and Kidney Diseases, 1995, NIH Publication No. 95-1468; Division of Diabetes Translation, Centers for Disease Control and Prevention; American Diabetes Association; National Center for Health Statistics; and the Bureau of the Census. A detailed list of references is available on request from:

National Diabetes
Information Clearinghouse
1 Information Way
Bethesda, MD 20892-3560
(301) 654-3327

National Diabetes Information Clearinghouse

1 INFORMATION WAY
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The National Diabetes Information Clearinghouse is a service of the National Institute of Diabetes and Digestive and Kidney Diseases, part of the National Institutes of Health, under the U.S. Public Health Service. The clearinghouse, established in 1978, is designed to increase knowledge and understanding about diabetes among patients and their families, health care professionals, and the public. NDIC answers inquiries; develops, reviews, and distributes publications; and works closely with professional and patient organizations and government agencies to coordinate resources about diabetes.

Publications produced by the clearinghouse are reviewed carefully for scientific accuracy, content, and readability. Materials produced by other sources are also reviewed for scientific accuracy and are used, along with clearinghouse publications, to answer inquiries.

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[1] Rubin, R.J., Altman, W.M., and Mendelson, D.N. "Health Care Expenditures for People with Diabetes Mellitus, 1992*" *Journal of Clinical Endocrinology and Metabolism*. 78: 809A-809F, 1994. (Also known as the Lewin-VHI Study, 1993)

[2] American Diabetes Association, "Direct and Indirect Costs of Diabetes in the United States in 1992," American Diabetes Association, 1993.

U.S. DEPARTMENT OF HEALTH
AND HUMAN SERVICES
Public Health Service
National Institutes of Health

NIH Publication No. 96-3926
June 1997

Department of Health and Human Services

National Institutes of Health

DIABETES FUNDING - Fiscal Years 1994 - 1998

	1994 Actual	1995 Actual	1996 Actual	1997 Estimate	1998 House Level
National Institute of Diabetes and and Digestive and Kidney Diseases	$191,409,000	$193,597,000	$197,542,000	$209,100,000	229,000,000
National Cancer Institute	1,279,000	1,070,000	938,000	981,000	1,050,000
National Heart, Lung and Blood Institute	19,779,000	20,393,000	21,010,000	22,275,000	23,500,000
National Institute of Dental Research	2,505,000	2,577,000	2,395,000	2,568,000	2,721,000
National Institute of Neurological Disorders and Stroke	5,717,000	4,535,000	3,793,000	3,972,000	4,150,000
National Institute of Allergy and Infectious Diseases	4,898,000	4,737,000	5,545,000	5,767,000	5,766,000
National Institute of General Medical Sciences	1,704,000	1,762,000	1,850,000	1,955,000	2,065,000
National Institute of Child Health and Human Development	12,329,000	12,631,000	13,373,000	14,200,000	15,000,000
National Eye Institute	22,605,000	22,001,000	21,509,000	22,855,000	24,327,000
National Institute of Environmental Health Sciences	415,000	318,000	358,000	374,000	387,000
National Institute on Aging	6,666,000	6,652,000	7,598,000	7,830,000	8,070,000
National Institute of Mental Health	2,036,000	1,230,000	1,668,000	1,801,000	1,930,000
National Institute on Alcohol Abuse and Alcoholism	329,000	302,000	0	0	0
National Center for Research Resources	18,577,000	19,501,000	17,952,000	19,044,000	19,698,000
National Institute for Nursing Research	1,130,000	1,276,000	718,000	770,000	800,000
National Human Genome Research Institute	2,181,000	2,603,000	2,671,000	2,800,000	2,910,000
Fogarty International Center	56,000	0	0	0	0
Total, NIH	293,615,000	295,185,000	298,920,000	316,292,000	341,374,000

Transplantation of the pancreas or insulin-producing beta cells offers the best hope of cure for people with IDDM. Some pancreas transplants have been successful. However, people who have transplants must take powerful drugs to prevent rejection of the transplanted organ. These drugs are costly and may eventually cause serious health problems.

Scientists are working to develop less harmful drugs and better methods of transplanting pancreatic tissue to prevent rejection by the body. Using techniques of bioengineering, researchers are also trying to create artificial islet cells that secrete insulin in response to increased sugar levels in the blood.

For NIDDM, the focus is on ways to prevent diabetes. Preventive approaches include identifying people at high risk for the disorder and encouraging them to lose weight, exercise more, and follow a healthy diet. The Diabetes Prevention Program, another new NIDDK project, will focus on preventing the disorder in high-risk populations.

Where Is More Information Available?

For more information about IDDM, NIDDM, and gestational diabetes, as well as diabetes research, statistics, and education, contact:

National Diabetes Information Clearinghouse
1 Information Way
Bethesda, MD 20892–3560
(301) 654–3327.

The following organizations also distribute materials and support programs for people with diabetes and their families and friends:

American Association of Diabetes Educators
444 North Michigan Avenue, Suite 1240
Chicago, IL 60611
(800) 832–6874
(312) 644–2233

American Diabetes Association
ADA National Service Center
1660 Duke Street
Alexandria, VA 22314
(800) 232–3472
(703) 549–1500

Juvenile Diabetes Foundation International
120 Wall Street
19th Floor
New York, NY 10005
(800) 223–1138
(212) 785–9500.

Points to Remember

What Is Diabetes?

- A disorder of metabolism—the way the body digests food for energy and growth.

What Are the Different Types of Diabetes?

- Insulin-dependent diabetes (IDDM)
- Noninsulin-dependent diabetes (NIDDM)
- Gestational diabetes.

What Is the Scope and Impact of Diabetes?

- Affects 16 million people
- A leading cause of death and disability
- Costs $92 billion per year.

Who Gets Diabetes?

- People of any age
- More common in older people, African Americans, Hispanics, and Native Americans.

National Diabetes Information Clearinghouse

1 INFORMATION WAY
BETHESDA, MD 20892-3560
(301) 654-3327

The National Diabetes Information Clearinghouse (NDIC) is a service of the National Institute of Diabetes and Digestive and Kidney Diseases, part of the National Institutes of Health, under the U.S. Public Health Service. The clearinghouse, authorized by Congress in 1978, provides information about diabetes to people with diabetes and their families, health care professionals, and the public. NDIC answers inquiries; develops, reviews, and distributes publications; and works closely with professional and patient organizations and government agencies to coordinate resources about diabetes.

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U.S. DEPARTMENT OF HEALTH
AND HUMAN SERVICES
Public Health Service
National Institutes of Health

NIH Publication No. 96-3873
October 1995

Diabetes Statistics

National Diabetes Information Clearinghouse

National Institute of Diabetes and Digestive and Kidney Diseases

NATIONAL INSTITUTES OF HEALTH

Prevalence* of Diabetes in the United States

Total (diagnosed and undiagnosed): 16 million (1995 estimate)

- **Diagnosed:** 8 million
- **Undiagnosed:** 8 million
- **Insulin-dependent diabetes (IDDM):** Estimates range up to 800,000 (No national registry for diabetes exists. These estimates are extrapolated from several regional registries.)
- **Noninsulin-dependent diabetes (NIDDM):** About 7 to 7.5 million diagnosed cases (1993 estimate)

** Prevalence breakdown on page 2*

Cost

Studies of the cost of illness are based on many factors, and estimates may vary, depending on what an individual study includes in its analysis. The NIH, CDC, ADA, JDFI and other members of the diabetes community estimate the annual cost of diabetes to the country based on two major studies, cited on the last page:

- **$91.1 billion for direct costs,** including items such as inpatient and outpatient care or all diagnoses in diabetes patients; drugs, medical supplies[1] and nursing home care.[2]
- **$46.6 billion for indirect costs,** such as loss of wages and productivity, and premature mortality.[2]

$137.7 billion is the total of both direct and indirect costs, derived by combining the above estimates.

Deaths

- In 1993 about 40,000 deaths from all causes are estimated to have occurred in people with diabetes. This figure represents 5 percent of all persons known to have diabetes and 18 percent of all deaths in the United States in persons age 25 years and older.
- Based on death certificate data, diabetes contributed to the deaths of more than 169,000 persons in 1992. It is well known that death certificate data under-represent diabetes deaths.
- Diabetes was the seventh leading cause of death listed on U.S. death certificates in 1993, according to the National Center for Health Statistics. It is the sixth leading cause of death by disease.

Long-Term Complications

Heart disease

- Cardiovascular disease is 2 to 4 times more common in people with diabetes.
- Cardiovascular disease is present in 75 percent of diabetes-related deaths.
- Middle-aged people with diabetes have death rates twice as high and heart disease death rates about 2 to 4 times as high as middle-aged people without diabetes.

Stroke

- The risk of stroke is 2.5 times higher in people with diabetes.

High blood pressure

- Affects 60 to 65 percent of people with diabetes.

Blindness

- Diabetes is the leading cause of new cases of blindness among adults 20 to 74 years of age.
- From 12,000 to 24,000 new cases of blindness per year are caused by diabetic retinopathy.

Kidney disease (treatment by dialysis or transplantation)

- Diabetes is the leading cause of end-stage renal disease, accounting for 36 percent of new cases.
- 19,790 new cases occurred in 1992 in people with diabetes.
- 56,059 people with diabetes were undergoing dialysis or transplantation treatment in 1992.

Nerve disease

- About 60 to 70 percent of people with diabetes have mild to severe forms of diabetic nerve damage (with such manifestations as impaired sensation in the feet or hands, delayed stomach emptying, carpal tunnel syndrome, peripheral neuropathy).
- Severe forms of diabetic nerve disease are a major contributing cause of lower extremity amputations.

Diabetes File

MEMORANDUM

October 4, 1998

TO: Erskine B

FR: Chris J.

RE: Background Information on Diabetes

Background on Diabetes

- An estimated sixteen million Americans suffer from diabetes. Eight million Americans are diagnosed with diabetes, but there are another 8 million who are believed to have the disease and have not been diagnosed.
- People with diabetes are two to four times more likely to suffer from cardiovascular disease, and two to four times more likely to have a stroke.
- Nearly two-thirds of people with diabetes suffer from high blood pressure.

Cost of Diabetes

The American Diabetes Association estimates that we spend $92 billion per year on diabetes care. Of that total, $45 billion is directly attributable to the disease, while indirect medical costs such as work loss, disability and premature death account for the remainder.

Administration Achievements in Diabetes.

Thanks to strong bipartisan support, the Balanced Budget Act the President signed into law in 1997 included new investment in treatment, prevention and research for American with diabetes that the American Diabetes Association described ***"as important for people with diabetes as the discovery of insulin in 1921."*** Those new investments include:

- **A new Medicare benefit to help older Americans with diabetes better manage their care.** BBA including a new Medicare benefit to help older Americans with diabetes better manage their disease and thereby helping to prevent the debilitating and costly complications too often associated with the disease. This new benefit, which costs $2.1 billion over five years ensure that Medicare now:
  - -- covers self-management training offered by physicians and other certified providers rather than only in hospital-based programs as it traditionally has. This will help ensure that more beneficiaries with diabetes can access the necessary education to manage this disease.
  - -- makes blood glucose monitors (including testing strips) available to all beneficiaries with diabetes, whereas Medicare previously covered only insulin-dependent patients.

- **A $150 million investment in diabetes research to prevent and cure juvenile or Type I diabetes.** Between 700,000 and one million Americans suffer from Type 1 diabetes. Half of those individuals are children. Each year about 30,000 Americans are diagnosed with Type I diabetes. These funds, which represent the largest single new investment in Type 1 diabetes, have been Health and Human Service Secretary Donna Shalala. Increasing our research efforts for Type I diabetes also will help improve our knowledge about all types of diabetes.

- **A $150 million investment for prevention and treatment of diabetes among Native Americans, who are almost three times as likely to die from the disease as other Americans.** In some tribes, more than one-third of the population suffers with diabetes. Native Americans are also far less likely to receive adequate treatment to manage the disease. This funding is helping improve prevention efforts and help identify the disease in its early stages and to expand access to affordable treatment, so that more Native Americans get the care they need to help reduce the costly and devastating complications.

- **A new Diabetes Quality Improvement Project.** The President also unveiled a major year-long collaborative effort to develop more consistent quality measures for diabetes patients, health plans, and health providers across America. The coalition between HCFA, FAACT, ADA, NCQA and now joined by CDC, AAFP, ACP etc, are developing a common set of performance and outcome measures are being developed. Together, in this unprecedented agreement these organizations will work to ensure that millions of consumers, purchasers, and health care providers have a common set of standards for diabetes care and utilize this new information to improve care.

Current Clinton Administration Proposals to Help People with Diabetes.

- **Historic multi-year investment in biomedical research at the NIH.** The President's budget contains a historic multi-year investment in biomedical research -- a $1.15 billion increase in FY 1999 -- and an increase in NIH funding of about 50 percent over the next five years. This increase would enable researchers to make investments in cutting edge, breakthrough treatments for critical diseases, like diabetes. Under the President's proposal, the NIH will devote over $20 billion to biomedical research in 2003. Funding at the National Institutes of Health has increased 32 percent, since the President took office (from $10.33 billion in FY 1993 to $13.65 billion in FY1998).

- **Race and Health Initiative.** The President's budget proposes over $400 million to develop new approaches and to build on existing successes to address racial and ethnic health disparities. This initiative is designed to eliminate disparities in six major health areas, including diabetes. It proposes $150 million over five years for grants to up to 30 communities to devise innovative new strategies to improve minority health status. Successful approaches learned in these communities will be applied to all health programs across the Department of Health and Human Services. The President has also proposed a $250 million investment over five years that would strengthen public health programs that have a proven record of effectively targeting these problems, including diabetes outreach and education programs.

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- **Patients' Bill of Rights.** The President has urged Congress to pass a strong enforceable patients' bill of rights to ensure Americans high quality care they need. A patients' bill of rights is particularly important for Americans with chronic diseases, such as diabetes, who need critical protections such as access to specialists and continuity of care if their employer changes health plans or their health plan drops their provider.

Early Draft — Prostate File

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- **A $150 million investment in diabetes research to prevent and cure juvenile or Type I diabetes.** Between 700,000 and one million Americans suffer from Type 1 diabetes. Half of those individuals are children. Each year about 30,000 Americans are diagnosed with Type I diabetes. These funds, which represent the largest single new investment in Type 1 diabetes, have been Health and Human Service Secretary Donna Shalala. Increasing our research efforts for Type I diabetes also will help improve our knowledge about all types of diabetes.

- **A $150 million investment for prevention and treatment of diabetes among Native Americans, who are almost three times as likely to die from the disease as other Americans.** In some tribes, more than one-third of the population suffers with diabetes. Native Americans are also far less likely to receive adequate treatment to manage the disease. This funding is helping improve prevention efforts and help identify the disease in its early stages and to expand access to affordable treatment, so that more Native Americans get the care they need to help reduce the costly and devastating complications.

- **A new Diabetes Quality Improvement Project.** The President also unveiled a major year-long collaborative effort to develop more consistent quality measures for diabetes patients, health plans, and health providers across America. The coalition between HCFA, FAACT, ADA, NCQA and now joined by CDC, AAFP, ACP etc, are developing a common set of performance and outcome measures are being developed. Together, in this unprecedented agreement these organizations will work to ensure that millions of consumers, purchasers, and health care providers have a common set of standards for diabetes care and utilize this new information to improve care.

Current Clinton Administration Proposals to Help People with Diabetes.

- **Historic multi-year investment in biomedical research at the NIH.** The President's budget contains a historic multi-year investment in biomedical research -- a $1.15 billion increase in FY 1999 -- and an increase in NIH funding of about 50 percent over the next five years. This increase would enable researchers to make investments in cutting edge, breakthrough treatments for critical diseases, like diabetes. Under the President's proposal, the NIH will devote over $20 billion to biomedical research in 2003. Funding at the National Institutes of Health has increased 32 percent, since the President took office (from $10.33 billion in FY 1993 to $13.65 billion in FY1998).

- **Race and Health Initiative.** The President's budget proposes over $400 million to develop new approaches and to build on existing successes to address racial and ethnic health disparities. This initiative is designed to eliminate disparities in six major health areas, including diabetes. It proposes $150 million over five years for grants to up to 30 communities to devise innovative new strategies to improve minority health status. Successful approaches learned in these communities will be applied to all health programs across the Department of Health and Human Services. The President has also proposed a $250 million investment over five years that would strengthen public health programs that have a proven record of effectively targeting these problems, including diabetes outreach and education programs.

- **Patients' Bill of Rights.** The President has urged Congress to pass a strong enforceable patients' bill of rights to ensure Americans high quality care they need. A patients' bill of rights is particularly important for Americans with chronic diseases, such as diabetes, who need critical protections such as access to specialists and continuity of care if their employer changes health plans or their health plan drops their provider.

Diabetes and the Elderly

The most common form of diabetes among older people is type II, or non-insulin-dependent diabetes. It accounts for 85% of all cases. More than 40% of individuals 65-74 yr of age and 50% of individuals 80-89 yr of age have diabetes. It is the fith cause of death in people between the ages of 65-74. Aging does not cause diabetes however diabetes mellitus is now largely a geriatric disease.

DIAGNOSIS

- Inaccurate diagnosing of the elderly as diabetic, (NIH Study) based on a natural increase in glucose level with aging.

TREATMENT

- Basic treatment of diabetes is dietary prescription and exercise, however the elderly mos often must be encouraged to do excercise that will not over tax their circulatory system.
- Drug treatment is also risky since it must not cause complications with other drugs
  Examples:
  - The oral hypoglycemic agents used for Type II diabetes may cause congestive heart failure in patients with heart disease
  - Poor eyesight and manual dexterity problems will complicate insulin injections

AMPUTATION

- **65 yr and older 100 per 100,000**
- **45-64 yr of age 45 per 100,000**
- **below 44 yr of age 12 per 100,000**

CONCLUSION:

Elderly diabetics can expect to have more medications, side effects to medications and difficulty in following and excercise and dietary regimens, but good surviellance, proper diagnosis can prevent intensive diabetic treatment.

DIABETES INVESTMENTS

Possible NIH Increases

General Increase to NIDDK	What is a realistic amount to make a tangible difference in NIH? Should it be clinical vs. basic? Is there any way to focus this increase? (I.e as we did with genetic breast cancer money).
New Clinical Trials	Could new money be used to answer questions about certain populations with diabetes, i.e. what effect diabetes has on pregnant women, the extent to which intensive treatment should be used on young children and on the elderly who may not be able to tolerate it. Could new money to go towards prevention in the general population or elderly population. The average trial costs between $1.5 million and $10 million. An expensive trial costs $25 million.
CDC Possible Increases	It would take $30 million increase to create a comprehensive program in all 50 states. It would take $3 million to fully fund the National Diabetes Education Program (NDEP). CDC is not ready to do any primary prevention?
Strategy for Funding	Vehicle for the increase i.e., budget amendment? Offsets

HCFA Changes

Clarifying coverage so that beneficiaries will know what plans cover with regard to indirect and direct diabetes services

Disseminate information we have learned from HCFA demos

Highlight budget package.