

## Chapter 28

# Diabetes and Long-Term Care

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### SUMMARY

**L**ong-term care, which includes nursing facilities and home health care, provides care to an increasing population of disabled, elderly persons with diabetes. Nursing facilities provide the majority of formal long-term care. Data from the Institutional Component of the 1987 National Medical Expenditure Survey (NMES-2) provide a profile of the demographics, health status, health care use, and nursing facility expenditures of residents with and without diabetes.

In 1987, 389,000 residents of nursing facilities age  $\geq 55$  years had diagnosed diabetes. About 18.3% of all nursing home residents age  $\geq 55$  years had been diagnosed with diabetes, compared with 12.6% of the general population. Persons with diabetes age  $\geq 55$  years were twice as likely as nondiabetic persons to reside in a nursing facility. The percent of nursing facility residents who have diagnosed diabetes has doubled over the past two decades in all age groups  $>55$  years.

Diabetic residents are more likely to be younger and nonwhite, compared with nondiabetic residents, but are similar in gender, marital status, and geographic location of the nursing facility. More than 80% have cardiovascular disease, 56% have hypertension, 39% have senile dementia, and 69% have two or more chronic conditions in addition to their diabetes. About 24% have impaired hearing, 33% have impaired vision, and 6% are blind. Almost all are limited in their ability to perform the activities of daily living.

Diabetic and nondiabetic residents were in nursing facilities in 1987 for a similar length of time (median of 243 versus 252 days) and had similar total expenditures for care (\$13,045 versus \$13,203). However,

Medicaid contributed an average of \$1,226 more per diabetic resident in 1987 than per nondiabetic resident. This was due, in part, to the higher rate of eligibility for Medicaid coverage of diabetic compared with nondiabetic residents (62% versus 52%).

Diabetic residents have higher rates of acute and chronic complications of diabetes, resulting in higher rates of expensive hospitalizations and death compared with nondiabetic residents. These complications can be delayed, if not prevented, by appropriate preventive care. The care of diabetic residents is complicated by age-associated changes and the number of chronic conditions and disabilities in these persons. Providing quality care for diabetic residents in nursing facilities is hampered by staff shortages, frequent staff turnover, poor pay, and lack of education and educational materials on diabetes in the nursing home environment. The increased emphasis on quality care mandated by the 1987 congressional Omnibus Budget Reconciliation Act (OBRA) provides new opportunities for improving the quality of care for residents with diabetes.

Home health care agencies serve as an increasingly important source of formal long-term care for patients with diabetes. However, little information is currently available about the demographics, use, expenditures, and quality of home health care.

The number of Americans who will need long-term care is increasing due to an increase in life expectancy and the large number of Americans moving into the older age groups. When this demographic shift is coupled with the increasing prevalence rates of diabetes in older persons, diabetes care will be required for an even greater number of residents.

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## INTRODUCTION

Long-term care is a "set of health, personal care, and social services delivered over a sustained period of time to persons who have lost or never acquired some degree of functional capacity"<sup>1</sup>. Long-term care can be provided in the home by family members or by a professional home health organization. Nursing facilities, also known as nursing homes, provide more intensive care for those whose needs cannot be met in the home environment.

Nursing facilities are the major providers of custodial care to the disabled and aged. Nursing home use increases with advancing age, female gender, chronic disease, and disability<sup>2</sup>. Thus, it should be no surprise that persons with non-insulin-dependent diabetes mellitus (NIDDM), a disease associated with advancing age, female gender, and disability, are overrepresented in the nursing home population, compared with the general population.

In this chapter we provide an overview of the demographics, health status, nursing home care use, and expenditures for nursing facility care for nursing facility residents with diabetes. We review the clinical implications of these findings and describe recent efforts to improve the quality of care received by diabetic residents of nursing facilities.

Most of the data presented in this chapter are from the

1987 NMES-2. This national survey was composed of a special survey of nursing homes (Institutional Population Component) and a survey of the U.S. civilian noninstitutionalized population (Household Survey). This is the most recent survey of nursing homes available and contains extensive information on year-long expenditures for nursing facility care. The methods used to collect data on the nursing home population were similar to those used for the general population, allowing comparisons between the populations. Appendix 28.1 provides a description of the surveys and data analyses.

## NURSING HOME ENVIRONMENT

In 1987, there were 22,064 licensed nursing facilities with 1.6 million beds in the United States<sup>3</sup>. Sixty-nine percent of the facilities had <100 beds, 20% had 100-149 beds, and 11% had ≥150 beds. Fifty-eight percent were in metropolitan counties. Seventy-three percent were owned by for-profit organizations, 23% were owned by nonprofit organizations, and 5% were publicly owned facilities. The number of beds was equally divided among facilities with <100 beds, 100-149 beds, and ≥150 beds.

Nurses aides provide most of the direct personal care under the supervision of a licensed practical nurse (LPN) or registered nurse (RN). Nursing homes employ six times as many nurses aides as registered

**Table 28.1**  
**Prevalence of Diabetes Among Persons Age ≥55 Years in Nursing Homes and in the General Population, U.S., 1987**

Sex and age (years)	Nursing home residents		General population		Relative risk	Confidence interval
	Number (thousands)	Rate (%)	Number (thousands)	Rate (%)		
Total persons	389	18.3	6,332	12.6		
Both sexes						
55-64	24.0	19.2	2,175	9.8†	2.2	1.4-3.4
65-74	76.0	23.8	2,735	15.6†	1.7	1.3-2.2
75-84	162.8	21.2	1,156	13.3†	1.8	1.5-2.1
≥85	125.8	13.8	266	12.9	1.1	0.9-1.3
Males						
55-64	8.1	13.7‡	993	9.6	1.5	0.7-3.1
65-74	28.6	21.1	1,202	15.7*	1.4	1.0-2.2
75-84	53.6	22.7	516	15.7†§	1.6	1.2-2.2
≥85	26.2	13.4	110	14.7	0.9	0.6-1.4
Females						
55-64	16.0	24.2	1,183	10.0†	2.9	1.6-5.0
65-74	47.3	25.8	1,533	15.6†	1.9	1.3-2.6
75-84	109.2	20.6	640	11.8†	1.9	1.5-2.4
≥85	99.6	13.8	157	11.9	1.2	0.9-1.6

\*significantly different from diabetic nursing home residents at the .05 level. †significantly different from diabetic nursing home residents at the .01 level. ‡significantly different from diabetic female nursing home residents at the .05 level. §significantly different from diabetic females in the general population at the .05 level.

Source: 1987 National Medical Expenditure Survey, Household Survey and Institutional Population Component, Agency for Health Care Policy and Research, DHHS

nurses and four times as many nurses aides as licensed practical nurses per set-up bed<sup>4</sup>. Nursing care is conducted according to orders provided by physicians, who visit the facility periodically. Other than these visits, mandated at monthly or bimonthly intervals by most payers, physicians play a minor role in the day-to-day care of nursing home residents. Other personnel include food service directors, nutritionists and dietitians, social workers, and physical and occupational therapists. Nursing facilities employ a mean of 83 full-time equivalents for each 100 beds<sup>4</sup>.

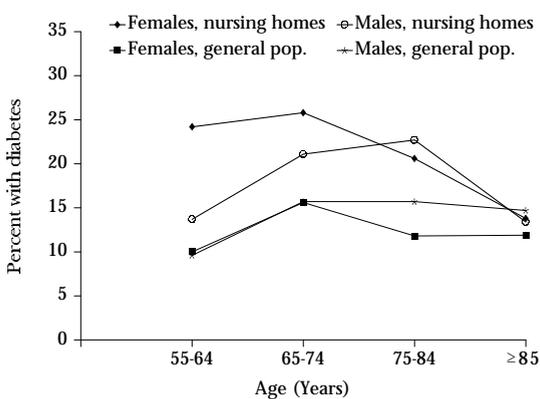
### DEMOGRAPHICS OF NURSING HOME RESIDENTS

According to the NMES-2, 388,656 diabetic persons age  $\geq 55$  years resided in nursing facilities in 1987, and this age group constituted 98% of all diabetic residents in nursing facilities. Table 28.1 and Figure 28.1 show the prevalence of diagnosed diabetes in nursing home residents and the general population age  $\geq 55$  years by age and sex. Diabetes is relatively common; 18.3% of nursing home residents have been diagnosed with diabetes. Persons age 55-64 years in nursing homes were 2.2 times more likely to have diabetes as persons in the general population, but this difference decreased with age, and rates were similar for those age  $\geq 85$  years. The prevalence of diagnosed diabetes is higher for female nursing home residents age 55-64 years, compared with male nursing home residents of the same age, but is similar for those age  $\geq 65$  years.

The true prevalence of diabetes in residents of nursing facilities may be much higher than shown in Table 28.1. In the Second National Health and Nutrition Examination Survey (NHANES II) conducted in 1976-80, 9.3% of the population age 65-74 years had diagnosed diabetes and another 8.4% had undiagnosed diabetes based on oral glucose tolerance testing, suggesting that half of individuals in the general population with diabetes are undiagnosed<sup>5</sup>. A longitudinal screening effort in a Jewish home for the aged found the prevalence of diabetes to be  $>30\%$ <sup>6</sup>, but no other published data are available on the prevalence of undiagnosed diabetes in nursing facilities. Unfortunately, glucose screening is rarely included in recommendations for routine health screening in nursing facilities<sup>7-10</sup>.

Figure 28.2 summarizes time trends in the percent of nursing home residents who have diabetes. Data from the 1987 NMES-2 are compared with data from the 1973-74 and 1977 National Nursing Home Surveys (NNHS) and the 1964 and 1969 Residents Places Surveys<sup>11</sup>. The percent of persons in each age group who have diabetes has doubled during these 23 years. This increase parallels the reported 2.5-fold increase in the prevalence of diagnosed diabetes in persons age  $>45$  years during the past 30 years<sup>12</sup>. Alternative explanations for this increase may be that the residents are receiving more thorough screening for diabetes than in the past or that nursing facilities now have sicker residents than in the past<sup>13</sup>.

**Figure 28.1**  
Prevalence of Known Diabetes Among Persons in Nursing Homes and in the General Population, Age  $\geq 55$  Years, U.S., 1987



Source: 1987 National Medical Expenditure Survey, Household Survey and Institutional Population Component, Agency for Health Care Policy and Research, DHHS

**Figure 28.2**  
Trends in the Prevalence of Diabetes Among Nursing Home Residents, U.S., 1964-85



Source: Division of Health Care Statistics, 1973-74 and 1987 National Nursing Home Survey and 1964 and 1969 Resident Places Survey, National Center for Health Statistics; 1987 National Medical Expenditure Survey

Table 28.2

Selected Demographic Characteristics of Nursing Home Residents and the General Population, Age  $\geq 55$  Years, U.S., 1987

Demographic characteristic	Nursing home residents		General population	
	Diabetic (%)	Nondiabetic (%)	Diabetic (%)	Nondiabetic (%)
Gender				
Men	30.0	29.3	44.5†	43.6
Women	70.0	70.7	55.5†	56.4
Age (years)				
55-64	6.2	5.8	34.4†	45.2
65-74	19.6	14.0†	43.2†	33.6
75-84	41.9	34.8†	18.3†	17.1
$\geq 85$	32.4	45.4†	4.2†	4.1
Race				
White	87.2	92.6†	81.0†	88.4
Black	10.7	5.9†	15.3†	8.1
All other	2.1	1.6	3.7*	3.5
Hispanic origin				
Yes	3.9	2.2	4.2†	3.9
No	96.1	97.8	95.8	96.1
Marital status, males				
Married	34.6	34.3	78.2†	79.7
Widowed	33.9	35.6	10.2†	8.3
Divorced or separated	8.5	11.3	8.7	7.1
Never married	23.0	11.0	2.9†	5.0
Marital status, females				
Married	13.5	11.4	48.0†	52.8
Widowed	72.4	71.9	42.0†	32.8
Divorced or separated	3.9	5.7*	6.4*	9.9
Never married	10.3	11.0	3.7†	4.4
Highest year of school completed				
No formal education	3.3	1.7*		0.4
1-6	12.5	9.5*	12.2	8.3
7-8	18.7	19.1	18.2	14.9
9-11	7.7	8.2	19.9†	16.6
12	16.2	21.2†	30.7†	33.7
$\geq 13$	9.6	12.8†	18.2†	25.6
Unknown	32.1	27.7†		0.5
Location of nursing facility				
Within an SMSA	66.6	65.7	70.5	74.2
Not within an SMSA	33.4	34.3	29.5	25.9
Income				
<\$4,999	45.6	41.0*	14.1*	10.1
\$5,000-9,999	33.6	34.8	21.8†	19.0
\$10,000-19,999	15.0	16.4	29.6†	26.6
\$20,000-39,999	5.0	5.5	21.1†	25.1
$\geq$ \$40,000	0.8	2.3	13.5†	19.1
Total persons (thousands)	389	1,738	6,332	44,070

\*significantly different from diabetic nursing home residents at the .05 level. †significantly different from diabetic nursing home residents at the .01 level. SMSA, standard metropolitan statistical area; 1% of the general population was admitted to a nursing home at some time in 1987; income data are shown for the individual if there was no spouse or for the spousal pair; in cells with no entry, the estimate is unreliable or data were not obtained.

Source: 1987 National Medical Expenditure Survey, Household Survey and Institutional Population Component, Agency for Health Care Policy and Research, DHHS

Table 28.2 provides a demographic profile of diabetic and nondiabetic nursing home residents compared with diabetic and nondiabetic persons in the general population. Diabetic nursing home residents are more likely to be age 65-85 years, nonwhite, and have lower income, compared with nondiabetic residents (income being defined as income of the individual if unmarried or spousal pair income if married). Other-

wise, the two groups are similar in gender, marital status, and geographic location of the nursing facility. Diabetic nursing home residents are more likely to be women, white, unmarried, and have lower income, compared with diabetic persons in the general population. Many of these differences are due to the considerably older age of persons with diabetes in nursing homes compared with the general population. Differ-

ences in educational status among the groups are difficult to interpret because of the high rate of unknown educational status in the nursing facility resident population.

Nonwhite races appear to be equally underrepresented in both the diabetic and nondiabetic nursing home population, especially when the higher prevalence of diabetes in these populations is taken into consideration. Lower use rates of nursing homes by blacks and Hispanics has been noted<sup>14,15</sup>. The lower admission rates may be due to cultural differences such as large families providing more personal care, racial discrimination, inadequate number of facilities in minority communities, or financial barriers<sup>16</sup>. Further investigation of these differences is needed.

Residents in nursing homes have lower income, compared with the general population of the same age. However, income data for nursing facility residents, which were obtained from the next of kin and nursing facility records, may not be as complete or accurate as the data obtained directly from the family respondent in the Household Survey, so the differences between these two populations may be spurious.

### LIVING ARRANGEMENTS PRIOR TO ADMISSION

Table 28.3 shows the living arrangements of nursing

**Table 28.3**  
**Living Arrangements Prior to Nursing Home Admission, Age ≥55 Years, U.S., 1987**

Living arrangement before admission	Diabetic persons (%)	Nondiabetic persons (%)
Private or semiprivate residence		
House/apartment	37.4	42.4†
Retirement home	2.0	2.8
Group home, boarding house, foster home, or family care facility	2.8	2.5
Health facility		
Hospital	45.1	40.6*
Another nursing home	11.8	10.8
Mentally retarded or correctional facility, or on the street	0.7	0.7
Other	0.2	0.2
Total persons (thousands)	389	1,738

\*significantly different from diabetic nursing home residents at the .05 level.  
†significantly different from diabetic nursing home residents at the .01 level.

Source: 1987 National Medical Expenditure Survey, Institutional Population Component, Agency for Health Care Policy and Research, DHHS

**Table 28.4**

**Living Arrangements Prior to Hospitalization for Residents Admitted to Nursing Facility from a Hospital, Age ≥55 Years, U.S., 1987**

Living arrangement before hospitalization	Diabetic persons (%)	Nondiabetic persons (%)
House or apartment	70.8	66.7
Another hospital	18.2	19.5
Another nursing home	4.9	6.4
Retirement home, group home, or other site	5.0	4.4
Total persons (thousands)	389	1,738

There were no statistically significant differences between diabetic and nondiabetic persons.

Source: 1987 National Medical Expenditure Survey, Institutional Population Component, Agency for Health Care Policy and Research, DHHS

home residents prior to admission, by diabetes status. Diabetic nursing home residents are more likely to have come from a hospital and less likely to have come from a private residence, compared with nondiabetic nursing home residents. About 39.4% of diabetic residents had lived in a home or retirement home prior to admission, and 11.8% had been in another nursing home prior to the current nursing home stay. Forty-five percent of diabetic nursing home residents had been in a hospital prior to admission to the current nursing home. Table 28.4 shows the living arrangements of these individuals prior to that hospitalization. There were no differences between diabetic and nondiabetic residents in their living arrangements prior to the acute hospitalization that preceded nursing home placement.

### MEDICAL CONDITIONS IN NURSING HOME RESIDENTS

Table 28.5 shows the frequency of all diagnoses noted in the medical record for nursing home residents, by diabetes status (see also Appendices 28.1 and 28.2). Diabetes was listed on the records of 73% of diabetic residents. The remaining 27% of diabetic residents had diabetes ascertained from other sources, such as hospitalization records. The most common diagnoses for patients with diabetes were diseases of the circulatory system (70.7%), mental disorders (30.1%), and diseases of the nervous system (25.1%).

Chronic conditions known to be related to diabetes were more common in diabetic residents, compared with nondiabetic: hypertension (20.9% versus 13.0%), heart disease (44.6% versus 38.2%), and kid-

Table 28.5

**Frequency of Diagnoses Listed on the Patient Record of Nursing Home Residents, Age ≥55 Years, U.S., 1987**

Diagnosis	Diabetic persons (%)	Nondiabetic persons (%)
Infectious and parasitic diseases	1.5	2.1
Neoplasms—all	6.5	9.7†
Malignant neoplasms	5.8	8.7†
Endocrine, nutritional, metabolic and immunity disorders	76.2	8.6†
Diabetes mellitus	73.2	
Disease of the blood and blood-forming organs	4.4	5.3
Mental disorders	30.1	35.6†
Senile dementia and other organic psychotic conditions	4.5	7.2†
Other psychosis	9.0	10.4
Organic brain damage	11.8	13.5
Diseases of the nervous system	25.1	27.9
Alzheimer's disease	4.2	6.3†
Parkinson's disease	3.0	5.0†
Diseases of the circulatory system	70.7	59.2*
Essential hypertension	20.9	13.0†
Heart disease	44.6	38.2†
Coronary atherosclerosis	15.8	12.6*
Other ischemic heart disease	9.3	6.4†
Congestive heart failure	13.2	12.8
Other heart disease	18.5	17.4
Cerebral vascular disease	15.5	13.0
Atherosclerosis	3.7	4.6
Disease of the respiratory system	9.6	14.4†
Chronic obstructive pulmonary disease	6.4	9.9†
Diseases of the digestive system	8.7	12.9†
Diseases of the genito-urinary system	11.0	9.6
Kidney failure	2.8	1.5*
Diseases of the skin	3.8	3.6
Disease of the musculo-skeletal system	22.7	24.7
Rheumatoid arthritis and osteoarthritis	8.7	11.5*
Rheumatism	5.8	5.6
Osteoporosis	2.9	4.9†
Symptoms, signs, and ill-defined conditions	12.7	16.6†
Senility without psychosis	1.6	3.0*
Injury or poisoning	10.3	14.7†
Fracture of the neck of femur	3.3	7.5†
Other fractures	3.6	5.1*
Amputation of lower limb	1.9	0.5
Supplementary classifications	11.1	12.3
Total persons (thousands)	389	1,738

\*significantly different from diabetic nursing home residents at the .05 level.  
 †significantly different from diabetic nursing home residents at the .01 level.  
 The diagnoses were based on all diagnoses listed on the medical record on January 1, 1987, for persons residing in a nursing facility on that date, and on admission diagnoses for persons admitted during 1987.

Source: 1987 National Medical Expenditure Survey, Institutional Population Component, Agency for Health Care Policy and Research, DHHS

Table 28.6

**Prevalence of Selected Chronic Conditions in Nursing Home Residents, Age ≥55 Years, U.S., 1987**

	Diabetic persons (%)	Nondiabetic persons (%)
Individual conditions		
Cardiovascular conditions	80.4	71.7†
Arteriosclerosis	51.9	44.6†
Heart disease	58.2	49.7†
Heart attack	22.1	12.7†
Stroke	40.8	30.9†
Hypertension	55.9	35.0†
Cancer	14.2	18.0†
Arthritis	44.7	45.9
Rheumatism	1.5	1.5
Emphysema	7.4	10.1†
Senile dementia	38.5	43.6†
Mental retardation	3.0	2.2
Psychosis	14.8	16.2
Depression	15.8	14.5
Number of chronic conditions (excluding diabetes)		
None	7.4	11.3†
One only	23.6	27.4*
Two	35.0	35.2
Three	27.1	20.0†
Four or more	7.0	6.1
Total persons (thousands)	389	1,738

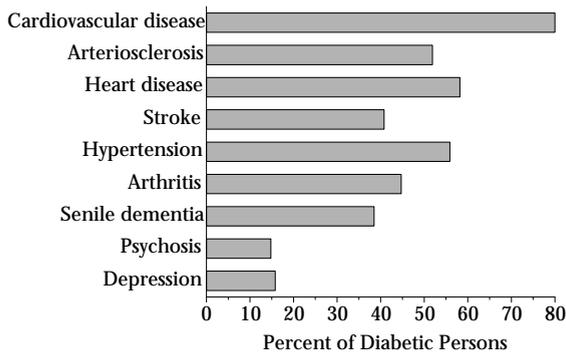
\*significantly different from diabetic nursing home residents at the .05 level.  
 †significantly different from diabetic nursing home residents at the .01 level.

Source: 1987 National Medical Expenditure Survey, Institutional Population Component, Agency for Health Care Policy and Research, DHHS

ney failure (2.8% versus 1.5%). Rates of amputation were higher in diabetic patients, but this difference was not statistically significant. The true rate of complications such as end-stage renal disease and amputation may be higher because of the method used to collect and code the diagnosis data. The prevalence rate of chronic conditions obtained from medical records (the method used in NMES-2) is lower than the prevalence rate obtained from surveys using a checklist<sup>17</sup>. Other evaluations have reported lower rates of renal dialysis patients in nursing facilities compared with the general population<sup>18</sup>.

Conditions that have not been noted as complications of diabetes were less likely in the diabetic nursing home resident compared with the nondiabetic resident: neoplasms, senile dementia, Alzheimer's disease, Parkinson's disease, respiratory system disease including chronic obstructive pulmonary disease, digestive disease, arthritis, osteoporosis, injuries, and fractures, particularly of the hip. These differences are probably due to age differences between the diabetic and nondiabetic nursing home populations.

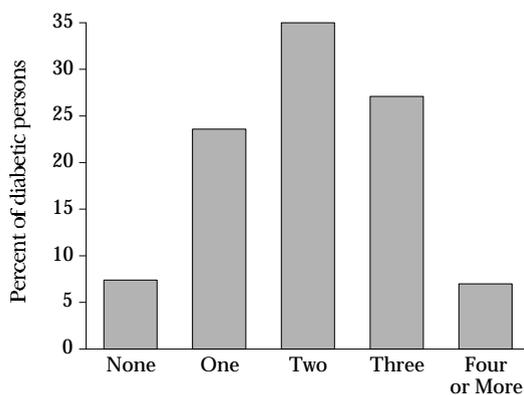
**Figure 28.3**  
**Prevalence of Selected Chronic Conditions in Nursing Home Residents with Diabetes, Age ≥55 Years, U.S., 1987**



Source: 1987 National Medical Expenditure Survey, Institutional Population Component, Agency for Health Care Policy and Research, DHHS

Table 28.6 and Figure 28.3 show the prevalence of selected chronic conditions in nursing home residents by diabetes status. Cardiovascular conditions were common in both populations. Nursing home residents with diabetes were more likely to suffer from all categories of cardiovascular conditions and from hypertension, compared with nondiabetic residents, but less likely to have cancer, emphysema, or senile dementia. Both nursing home groups had similar rates of arthritis, rheumatism, and mental conditions. Compared with the diabetic general population, diabetic nursing home residents were more likely to have

**Figure 28.4**  
**Number of Chronic Conditions in Addition to Diabetes in Nursing Home Residents with Diabetes, Age ≥55 Years, U.S., 1987**



Source: 1987 National Medical Expenditure Survey, Household Survey and Institutional Population Component, Agency for Health Care Policy and Research, DHHS

arteriosclerosis, heart disease, and stroke; similar rates of heart attack, cancer and emphysema; and lower rates of hypertension and arthritis (data not shown).

Table 28.6 and Figure 28.4 shows the percent of nursing facility residents by number of chronic conditions (excluding diabetes). Nursing facility residents with diabetes tended to have more chronic conditions than nondiabetic residents. Thirty-four percent had ≥3 chronic conditions in addition to diabetes. When diabetes is added as a chronic condition, 70% of persons with diabetes had ≥3 chronic conditions. Only 26% of nondiabetic residents had ≥3 chronic conditions.

Table 28.7 compares the vision and hearing status of nursing home residents by diabetes status. Diabetic residents were more likely to be blind compared with nondiabetic residents (5.9% versus 3.5%). Otherwise, the visual disabilities and hearing problems in both groups were similar. In 1987, approximately one-third of residents of nursing facilities had impaired vision and one-quarter had impaired hearing ability.

**Table 28.7**  
**Prevalence of Vision and Hearing Problems of Nursing Home Residents, Age ≥55 Years, U.S., 1987**

Vision and hearing status at best correction	Diabetic persons (%)	Nondiabetic persons (%)
<b>Vision</b>		
Sight not impaired	66.7	68.1
Sight impaired, but can read newsprint	6.8	6.8
Cannot read newsprint, but can watch TV at 8-12 feet	6.1	6.1
Cannot watch TV, but can recognize people at 3 feet	3.2	4.1
Blind	5.9	3.5
Unknown	11.4	11.5
<b>Hearing</b>		
Hearing not impaired	75.7	73.0
Hearing impaired, but can hear most of conversation	16.7	17.7
Cannot hear most of conversation, but can hear only a few words or loud noises	2.5	3.6
Deaf, cannot hear anything		0.7
Unknown	4.8	4.9
<b>Total persons (thousands)</b>	<b>389</b>	<b>1,738</b>

There were no statistically significant differences between diabetic and nondiabetic persons. In the cell with no entry, the estimate is unreliable.

Source: 1987 National Medical Expenditure Survey, Institutional Population Component, Agency for Health Care Policy and Research, DHHS

## LIMITATIONS IN ACTIVITIES OF DAILY LIVING

Table 28.8 and Figure 28.5 show the limitations in activities of daily living for nursing home residents. Diabetic residents of nursing homes, compared with nondiabetic residents, were more disabled in terms of their ability to bathe (91.9% versus 88.7%), dress (82.4% versus 78.5%), perform toileting activities

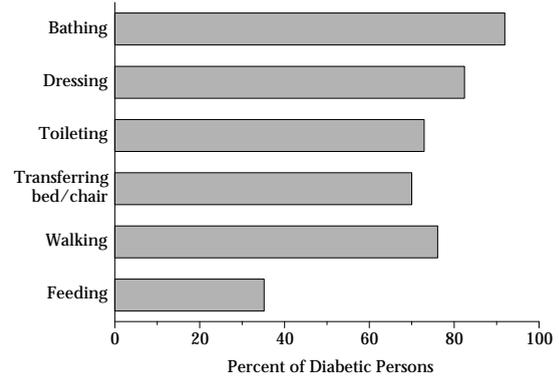
**Table 28.8**  
**Frequency of Limitations in Activities of Daily Living in Nursing Home Residents and the General Population, Age ≥55 Years, U.S., 1987**

Limitations in activities of daily living	Nursing home residents		General population	
	Diabetic (%)	Nondiabetic (%)	Diabetic (%)	Nondiabetic (%)
Limited in specific activities of daily living				
Bathing	91.9	88.7†	8.7	4.7
Dressing	82.4	78.5†	5.6	2.6
Toileting	72.9	68.6†	4.6	3.0
Transferring bed/chair	70.0	65.8*	5.8	3.3
Feeding	35.2	34.7	1.2	0.5
Walking	76.1	71.1†	8.9	4.0
Walking and at least one other ADL	75.5	70.3†	6.5	3.2
Requires personal assistance				
Bathing	90.9	88.0†	6.3	3.1
Dressing	81.4	77.6*	4.6	2.0
Toileting	68.7	64.7*	1.7	0.8
Transferring bed/chair	67.8	63.3*	2.6	1.5
Feeding	33.5	33.0	0.2	0.2
Walking	68.9	63.7*	2.6	0.8
Walking and at least one other ADL	68.7	63.2*	2.1	0.8
Unable to perform the activity at all				
Toileting	20.8	17.7*		
Transferring bed/chair	7.1	7.2		
Feeding	13.1	10.9		
Walking	34.4	30.6*		
Difficulty controlling urine				
	42.3	41.7	3.0	1.7
Difficulty controlling bowel movements				
	48.4	44.0*	1.8	1.0
Total persons (thousands)	389	1,738	6,332	44,040

\*significantly different from diabetic nursing home residents at the .05 level.  
 †significantly different from diabetic nursing home residents at the .01 level.  
 †1% of the general population was admitted to a nursing home during 1987; in cells with no entry, the estimate is unreliable or data was not obtained. ADL, activities of daily living.

Source: 1987 National Medical Expenditure Survey, Household Survey and Institutional Population Component, Agency for Health Care Policy and Research, DHHS

**Figure 28.5**  
**Prevalence of Limitations in Activities of Daily Living in Nursing Home Residents with Diabetes, Age ≥55 Years, U.S., 1987**



Source: 1987 National Medical Expenditure Survey, Household Survey and Institutional Population Component, Agency for Health Care Policy and Research, DHHS

(72.9% versus 68.6%), transfer from a bed to a chair (70.0% versus 65.8%), walk (76.1% versus 71.1%), and control bowel movements (48.4% versus 44.0%). Diabetic residents required more assistance with all of these activities. The two groups were similar in difficulty of feeding (35%) and controlling urine (42%). Although these differences between diabetic and nondiabetic nursing home residents were statistically significant, the clinical impact of these differences is probably minor due to the high rates of limitations in both groups. Nursing home residents were considerably more limited in activities of daily living than persons with diabetes in the general population (Table 28.8).

## LENGTH OF STAY AND MORTALITY

Table 28.9 shows the median number of days in the nursing facility and the median number of days since the resident resided in the community, by diabetes status and whether the resident was alive at the end of 1987. Almost half of residents were institutionalized for the entire year in the nursing facility. These year-long residents had left the community a median of ~3.5 years prior to 1987. About 18% of residents were admitted at some time during 1987 and had already been out of the community a median of 7 months (212 and 213 days). This group was still residing in the nursing facility at the end of the year, with a median stay of 7 months (208 and 213 days).

About one-fourth of residents died during the year.

Table 28.9

**Median Number of Days in the Facility and Days Since Resident Lived in the Community, Age ≥55 Years, U.S., 1987**

Total persons (thousands)	Diabetic persons (389)			Nondiabetic persons (1,738)		
	%	Median no. of days in facility during 1987	Median no. of days since resident lived in community*	%	Median no. of days in facility during 1987	Median no. of days since resident lived in community*
Total	100.0	306	478	100.0	338	503
Alive at end of 1987						
In facility all year	47.6	365	1,305	50.0	365	1,242
Admitted during the year, remained in institution	18.7	208	212	18.2	213	213
Returned to community	8.3	52	65	6.3	39	55
Died during 1987						
Died while in institution	19.1	95	297	19.8	94	338
Left nursing home and died	6.5	61	168	4.5	71	130

\*For persons resident on January 1, 1987, days were calculated from the last date in the community until January 1, 1987; for residents admitted during 1987, days were calculated from the last date in the community until the date of admission.

Source: 1987 National Medical Expenditure Survey, Institutional Population Component, Agency for Health Care Policy and Research, DHHS

Mortality was similar for diabetic and nondiabetic residents. Those who died in the institution had a median stay during 1987 of ~3 months (95 and 94 days) and had been out of the community less than a year (297 and 338 days). Those who left the nursing facility and died in a hospital or at home had stayed in the nursing facility a median of ~2 months (61 and 71 days) and had been out of the community prior to their nursing home stay a median of 4-5 months (168 and 130 days).

Only 8% of residents were discharged back into the community. This group had a median stay in the nursing facility of <2 months (52 and 39 days) and had been out of the community a median of <2 months (65 and 55 days) prior to the nursing home stay. This group represents those who used the nursing home for prolonged convalescence, such as hip fracture rehabilitation, rather than for long-term custodial care.

**EXPENDITURES AND SOURCES OF PAYMENT**

Table 28.10 shows the types of health insurance coverage held by nursing home residents at some time during 1987, by diabetes status. Diabetic residents, compared with nondiabetic residents, were more likely to be eligible for Medicaid coverage (65.1% versus 58.2%) and less likely to have private insurance (50.8% versus 55.5%). With regard to payment for nursing home care, diabetic residents were more

likely to have Medicaid cover some of the expenditures, while nondiabetic residents were more likely to pay themselves or have family pay some of the expenditures (Table 28.10). Although more than half of both groups had private insurance coverage, <4% of residents had any of their expenditures paid by private insurance. Virtually all of the expenditures for both

Table 28.10

**Percent of Nursing Home Residents by Insurance Coverage and Payment for Nursing Facility Care, Age ≥55 Years, U.S., 1987**

	Diabetic persons (%)	Nondiabetic persons (%)
Insurance status		
Medicaid	65.1	58.2†
Medicare	94.5	95.2
Other public coverage	27.3	29.9
Private insurance	50.8	55.5*
Source of payment for nursing facility care (any amount)		
Medicaid	61.5	52.0†
Medicare	15.5	12.6
Other public coverage	11.3	12.2
Private insurance	3.6	4.1
Self or family	83.5	87.3†
Total persons (thousands)	389	1,738

\*significantly different from diabetic nursing home residents at the .05 level.  
†significantly different from diabetic nursing home residents at the .01 level.  
Columns do not sum to 100% because persons may have more than one type of insurance coverage and multiple sources of payment.

Source: 1987 National Medical Expenditure Survey, Institutional Population Component, Agency for Health Care Policy and Research, DHHS

diabetic and nondiabetic residents were borne by Medicaid and by self and family.

Table 28.11 shows the distribution of total expenditures for nursing facility care by total payment, Medicaid, and self or family. There were no differences in the distribution of total expenditures between diabetic and nondiabetic residents, but the source of payment was more likely to be Medicaid and less likely to be self or family for diabetic residents.

Figure 28.6 depicts the mean expenditures paid by Medicaid, self or family, and other sources in 1987. Total expenditures were similar for diabetic (\$13,045) and nondiabetic (\$13,203) nursing home residents. Mean expenditure per day was \$57 for both groups. Medicaid paid a mean of \$1,226 more per year for each diabetic resident in a nursing facility, compared with nondiabetic residents. Self/family contributed ~\$1,255 less for nursing home expenditures of diabetic residents. Contributions from other insurance sources were minimal; the mean annual expenditure per diabetic and nondiabetic resident from Medicare was \$277 and \$225, respectively, and from private health insurance was \$101 and \$178.

Medicaid's \$1,226 higher contribution for nursing home expenditures of diabetic residents is probably related to the higher rate of Medicaid eligibility in the diabetic resident population. This observation has not been previously described, and the reason for the higher rate of eligibility is undetermined. Generally, persons qualify for Medicaid coverage when other financial resources, including private insurance, have been consumed. Although diabetic residents were

**Table 28.11**  
**Distribution of Annual Expenditures for Nursing Facility Care Per Resident by Source of Payment, Age ≥55 Years, U.S., 1987**

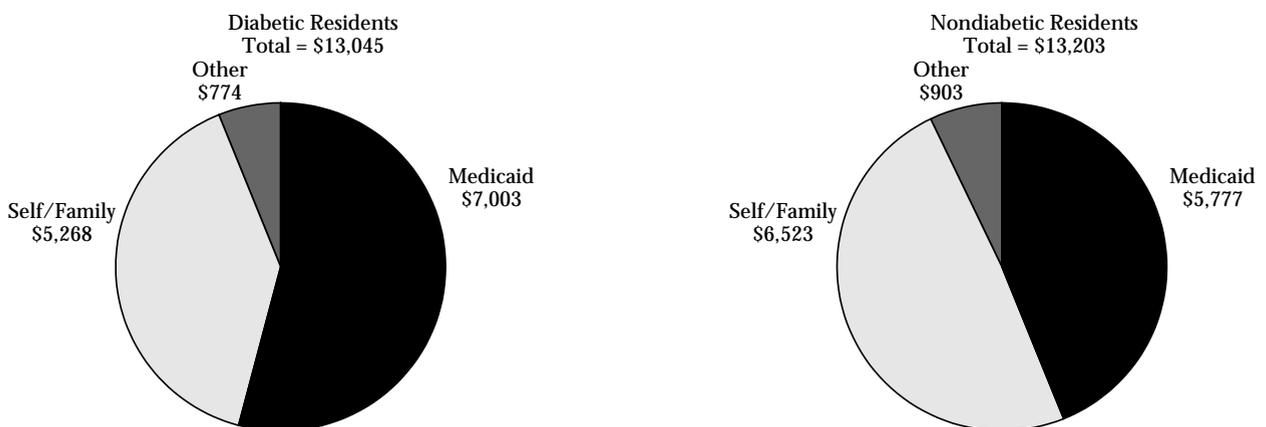
Distribution of payment	Diabetic persons (%)	Nondiabetic persons (%)
<b>Total payment</b>		
\$1-5,000	25.2	23.2
\$5,001-10,000	14.2	15.2
\$10,001-20,000	42.0	41.3
>\$20,000	18.7	20.3
<b>Medicaid</b>		
None	38.5	48.0†
\$1-5,000	15.7	13.2
\$5,001-10,000	13.5	13.0
\$10,001-20,000	25.4	20.8†
>\$20,000	6.9	5.1
<b>Self or family</b>		
None	16.5	13.0†
\$1-5,000	51.4	46.0†
\$5,001-10,000	15.2	17.8*
\$10,001-20,000	11.4	15.4†
>\$20,000	5.5	8.2†
<b>Total persons (thousands)</b>	<b>389</b>	<b>1,738</b>

\*significantly different from diabetic nursing home residents at the .05 level.  
 †significantly different from diabetic nursing home residents at the .01 level.

Source: 1987 National Medical Expenditure Survey, Institutional Population Component, Agency for Health Care Policy and Research, DHHS

more likely to be admitted from an acute-care hospital or other facility, where they might be more likely to receive assistance in applying for Medicaid coverage, this advantage would probably be quickly corrected by case workers in nursing facilities. Both diabetic and

**Figure 28.6**  
**Mean Annual Expenditures for Nursing Home Care by Source of Payment, U.S., 1987**



Other includes Medicare, Veterans Administration, life care, state, and other sources of coverage

Source: 1987 National Medical Expenditure Survey, Institutional Population Component, Agency for Health Care Policy and Research, DHHS

## CLINICAL IMPLICATIONS OF ADVANCED AGE

nondiabetic nursing home populations appeared equally poor and had been out of the community similar amounts of time (Table 28.9). There were no differences in the facility type, size, or ownership between the two nursing home populations. Further, the nondiabetic population was older and thus more likely to have exhausted any personal savings.

Other possible explanations for the higher rate of Medicaid coverage for diabetic nursing facility expenditures may exist in differences in age, race, sex, duration of disease, and degree of disability between the two groups of nursing home residents. It is also possible that the complications of diabetes deplete earning capacity earlier and increase out-of-pocket medical care payments compared with persons with other conditions. The income of the general population (Table 28.2) was significantly lower for the diabetic population, compared with the nondiabetic population. Further exploration of this observation is warranted because of the important policy and public financing implications.

## HOME HEALTH CARE

Home health care agencies provide formal long-term care for an increasing number of persons with diabetes. For many persons with financial coverage, home health care provides an attractive alternative (or substitute) for the nursing facility. Recent changes to Medicare and Medicaid reimbursement policies have made home health care the fastest growing segment of the health care system. In 1991, expenditures for home health care increased 20% over those of 1990<sup>19</sup>. Unfortunately, the number of home health care recipients with diabetes in the 1987 NMES-2 was too small to provide reliable estimates. The 1992 National Home Health and Hospice Care Survey, conducted by the National Center for Health Statistics (NCHS), was designed to provide reliable demographic, health status, and use estimates of recipients of home health care<sup>20</sup>. This survey sampled 14,000 patients receiving home health and hospice care during 1992. An estimated 1,237,100 patients were enrolled in home health care programs on any given day during the survey. Three-quarters of the recipients were age  $\geq 65$  years, and 8% of all persons receiving home health care had a first-listed diagnosis of diabetes<sup>21</sup>. The National Home Health and Hospice Care Survey, which is not yet available for public analysis, should provide a wealth of information on the demographics, health status, health care use, expenditures, and financing of this important source of long-term care.

Almost all persons with diabetes in nursing homes are age  $\geq 55$  years. The normal physiology of elderly persons has important implications for both the diagnosis of diabetes and the recognition of diabetic complications.

The altered physiology normally seen in the elderly person has caused some to question the validity of diabetes diagnosis in the elderly<sup>22</sup>. Although fasting glucose levels increase slightly with age at a rate of 1-2 mg/dl per decade after the age of 30-40 years, 1- to 2-hour postprandial plasma glucose increases at 8-20 mg/dl per decade after the age of 30-40 years<sup>23,24</sup>. This increased hyperglycemia associated with advancing age is associated with age-related changes in insulin secretion and action, altered glucose metabolism, diet changes, and decreased physical activity. The glucose intolerance ranges from mild hyperglycemia to classic NIDDM. More than 90% of elderly persons with diabetes have NIDDM; <10% of the elderly have insulin-dependent diabetes mellitus (IDDM)<sup>12</sup>.

Many believe that diabetes in the elderly person is a benign condition<sup>6</sup>. They assume that the elderly diabetic person will die from something else before developing the chronic complications of diabetes, which usually take 10-15 years to develop. These beliefs foster an indifferent attitude toward diagnosing and treating diabetes in the elderly person. One study of hospitalized persons age  $\geq 75$  years found that elevated blood glucose occurred in 33% of patients, but the results were ignored by the physician in half the patients<sup>25</sup>. Another study of nursing facilities found that half of all significantly abnormal laboratory findings were ignored<sup>9</sup>.

Epidemiologic data, however, do not support the belief that hyperglycemia and diabetes is a benign condition in the elderly. Elderly persons with hyperglycemia experience increased rates of acute and chronic complications and mortality, compared with those who do not have diabetes or hyperglycemia<sup>26-28</sup>. In particular, cardiovascular disease, stroke, renal disease, and amputation occur more frequently in the diabetic elderly, compared with those without diabetes. Diabetic nursing home residents are twice as likely as nondiabetic residents to be admitted to an acute-care hospital for ketoacidosis<sup>29,30</sup>, hyperosmolar hyperglycemia, and amputation<sup>31</sup>. Nursing home residents with diabetes also use more hospital days for these acute and chronic complications of diabetes<sup>31</sup>.

Elderly persons with diabetes are also more severely affected by the acute and chronic complications of diabetes, compared with younger diabetic persons. The severe metabolic derangements of hyperglycemic hyperosmolar nonketotic coma and lactic acidosis are not only more common in the elderly but are associated with a higher mortality rate<sup>32,33</sup>. Elderly diabetic persons who undergo amputation suffer higher rates of perioperative mortality and lower rates of successful rehabilitation compared with younger diabetic persons<sup>34,35</sup>.

Hyperglycemia also impairs the quality of life of the elderly person. If uncontrolled, hyperglycemia causes an osmotic diuresis, resulting in polyuria, aggravating incontinence, disturbing sleep, and contributing to dehydration. It contributes to poor vision, leading to falls, memory failure, cognitive impairment, and increased pain perception. Hyperglycemia is associated with an increased risk of myocardial infarction, worse outcome with cerebrovascular accident, poor wound healing, and susceptibility to severe infection.

The altered physiology normally seen in the elderly person also makes detection of diabetes and diabetic complications more difficult<sup>36</sup>. Symptoms of frequent urination, poor vision, and increased infections, which normally increase with age, may mask the early symptoms of hyperglycemia and thus delay the diagnosis of diabetes or recognition of an impending hyperosmolar hyperglycemic condition. The normal decrease in thirst awareness and taste sensation predispose the elderly person to dehydration, leading to hyperosmolar hyperglycemia and decreased food intake, which results in malnutrition. Decreased mental status, commonly seen in elderly persons, can disguise the early diagnosis of hypoglycemia, ketoacidosis, hyperosmolar hyperglycemia coma, and serious drug interactions.

#### CLINICAL IMPLICATIONS OF CHRONIC CONDITIONS AND DISABILITY

Diabetic residents of nursing homes are more likely to have other chronic medical conditions, particularly hypertension and cardiovascular and renal disease (Table 28.6), which complicate diabetes management<sup>24</sup>. Elderly persons with diabetes and cardiovascular disease are thought to be more likely to suffer an acute myocardial infarction if allowed to develop hypoglycemia. Renal impairment may affect the metabolism of drugs. Medications frequently used to treat hypertension, cardiovascular disease, and renal disease may complicate diabetes management. For exam-

ple, diuretic medications often used to treat hypertension and renal disease predispose the patient to dehydration and subsequent hyperosmolar hyperketotic acidosis. These chronic conditions usually require additional medications, which greatly increase the risk for serious drug side effects and drug interactions.

Almost all diabetic residents of nursing facilities suffer enormous physical and mental disabilities. Because of these disabilities, they depend on nursing staff to provide diabetes-related personal care necessary to achieve glycemic control and prevent complications. This diabetes-specific care differs from other routine nursing care in five specific areas: medication administration, monitoring of glycemic control, care of acute diabetic-related complications, dietary management, and foot care<sup>37,38</sup>.

Appropriate selection and administration of medication is challenging in the nursing home. Insulin and oral agents, used in one-fourth and one-half of elderly diabetic persons, respectively<sup>12</sup>, are more prone to cause hypoglycemia in the elderly person. First-generation oral hypoglycemic agents, such as chlorpropamide, are more likely to precipitate prolonged hypoglycemia and severe hyponatremia. In general, a moderate approach to management with relaxed goals of glycemic control provide reasonable benefit with the least risk<sup>36,39</sup>.

Glucose monitoring, performed by the resident or nursing staff, is fundamental to appropriate glycemic control and early recognition of hypoglycemia or hyperglycemia. The development of bedside glucose monitoring has made accurate, rapid assessment of glycemic status possible, replacing the inaccurate urine test. However, this simple technologic innovation has been slow to be implemented in nursing homes, due to misconceptions regarding its effectiveness and cost<sup>40</sup>.

Many facilities lack protocols to alert nursing staff to the significance of blood glucose concentration, conditions requiring blood glucose monitoring, and appropriate actions to take if levels are abnormal<sup>37</sup>. Patients should receive increased monitoring during periods of stress, such as an upper respiratory infection, to prevent hypo- or hyperglycemia and dehydration. These serious and costly outcomes are potentially preventable<sup>41</sup>. The implementation of protocols in target facilities is associated with a decrease in the number of hospital days for acute and chronic complications<sup>31</sup>. One study suggested that diabetic hyperosmolar state was an indicator of neglect in nursing home populations<sup>42</sup>.

Providing quality nutrition in the nursing facility is a major challenge. Elderly persons often experience a decrease in appetite and food intake due to the normal loss of taste sensation, chronic diseases such as renal and liver disease, and medications. One-third of residents have difficulty feeding themselves and >10% cannot feed themselves at all, increasing the risk of malnutrition and dehydration. Unfortunately, the quality of food served in nursing facilities is notoriously poor and a frequent source of resident complaints<sup>43</sup>. The dietary department is usually staffed by a food service supervisor who has completed a 2-3-week course in food service<sup>37,31</sup> and a nutritionist providing occasional consultation. However, the nutritionist may have little experience with elderly persons or with diabetes management, because <20% of American Dietetic Association-accredited programs include any geriatric curricula<sup>44</sup>. On average, dietitians spend 18 minutes per patient providing diet counseling at the time of admission<sup>45</sup>. Overzealous attempts to provide a rigidly controlled diet and caloric restriction may have the opposite effect and actually lead to malnutrition. In fact, strictly controlled diets appear to have no proven benefit in the nursing home environment<sup>46,47</sup>.

Although skin care is a major concern to nursing home staff, many do not realize the devastating potential of small lesions in the diabetic resident. Appropriate skin care by nursing staff, particularly the prevention of decubiti ulceration, coupled with increased vigilance for early detection of breaks in the cutaneous barrier, can decrease the risk of chronic ulceration, infection, gangrene, and amputation<sup>41</sup>. Podiatric consultation is often needed in the nursing facility.

## INTERVENTIONS TO IMPROVE CARE

Appropriate diabetes management in the nursing home environment can not only improve the quality of life but also decrease morbidity, mortality, and medical care costs<sup>36</sup>. Diabetic patients depend on nursing staff to provide diabetes-specific personal care. Unfortunately, most nursing staff receive little training in diabetes care. A 1981 survey of registered nurses working in nursing facilities reported a median of <1/2-hour of diabetes-related education in the previous 5 years, and 43% reported having no diabetes education at all during that time<sup>37</sup>. Nurses aides, who provide most bedside care, have had less training. In 1985, only 17 states required training for nurses aides, and none required continuing education<sup>48</sup>.

In the early 1980s, several organizations developed

programs to improve diabetic care in nursing homes. The American Diabetes Association and the American Association of Diabetes Educators jointly published guidelines for nursing facilities<sup>49</sup>. Several state diabetes control programs employed staff education, chart audits, team building<sup>50</sup>, and implementation of policies and procedures<sup>31</sup> to improve care. A Colorado program increased the mean number of policies and procedures in target nursing facilities from 40 to 63.5 in 2 years and found a 28% reduction in the length of stay of acute hospitalization for diabetic complications, while the length of stay remained stable in the rest of the state<sup>31</sup>. Similar efforts were undertaken in Rhode Island, Virginia, Michigan, Minnesota, and New York City. Intervention teams were pleased with the warm welcome they received from nursing home staff but were frustrated by chronic staff shortages and high staff turnover, which diluted their training efforts<sup>50</sup>.

The 1987 OBRA<sup>51</sup> mandated extensive changes in nursing facility regulation and operation. This legislation, based on recommendations of the Institute of Medicine's Committee on Nursing Home Regulation published in 1986<sup>48,51</sup>, shifted the emphasis of quality evaluation from the structural capacity for care to the actual provision of care and mandated a system of quality improvement in each facility. It dictated minimum staffing requirements and mandatory education for nurses aides, along with continuing education requirements for nurses. The act eliminated the cumbersome and illogical distinction between skilled nursing facilities and intermediate care facilities and mandated sweeping changes in patients' rights, including regulations on restraints and psychotropic medication.

Despite these regulatory changes and mandates for education, quality improvement in nursing homes faces many challenges. Although staff education is important and necessary, it alone will be insufficient to improve care in nursing facilities, because nursing facilities continue to be understaffed. In 1992, nursing homes hired an average of 37 FTE nurses aides, 9 FTE LPNs, and 6 FTE RNs for every 100 beds<sup>4</sup>, compared with 98 nurses per 100 patients in acute-care hospitals<sup>52</sup>. In addition, turnover of nursing staff remains high, with an annual turnover rate in 1992 of 46% for nurses aides and 21% for RNs and LPNs. Many believe the high turnover and chronic staff shortages are fostered by the significant wage discrepancy with hospital nursing wages<sup>53</sup>. In 1992, staff nurses in acute-care hospitals earned 17% more than staff nurses in nursing homes, nursing supervisors earned 31% more, and nursing administrators earned 42% more<sup>54</sup>. Public reimbursement policy, primarily

Medicaid, has a direct impact on the nursing wages, which in turn affects the supply, stability, and quality of nursing home staff.

Other changes need to be made in organizing and supervising nursing facility staff. Management changes to enhance the caring qualities of nursing home staff, increase personal rewards and satisfaction, and increase staff and patient involvement in quality improvement activities are among the many recommended changes<sup>55-58</sup>.

The diabetes community could play an important role in improving the quality of care in the nursing home. The mandates for education of nurses and nurses aides provide unique opportunities for diabetes educators. Educational material must be suitable for the level of provider and, in the case of nurses aides, must reach an often illiterate, non-English-speaking audience. Innovative educational approaches must also take into consideration the exhausting patient care demands, lack of training time, and high turnover of these staff. The increasing presence of proprietary chains of nursing facilities should greatly facilitate the distribution and evaluation of educational material. However, successful integration of diabetes-specific care into the nursing facility requires a paradigm shift from the traditional focus on individual patient education and empowerment to a broader systems approach that includes nursing staff and administration. Appendix 28.3 provides a list of resource materials targeted for the nursing facility. Appendix 28.4 provides information on economic and legislative influences on long-term care.

## UNRESOLVED ISSUES

Our descriptive evaluation and review of the literature has highlighted a number of research and clinical care issues yet to be addressed. Our data suggest that diabetes prevalence in the nursing home is increasing but cannot determine whether this is a real increase or a reflection of better screening efforts. The true rate of diabetes in the nursing home is still unknown, since this survey ascertains only those who have been diagnosed. Prior literature suggests that ethnic minorities have less access to nursing homes. If true, what are the determinants of this difference, and what can be done to improve access to this form of care?

Our finding of an extra \$1,226 per year per diabetic resident paid by Medicaid raises many questions. Why

are persons with diabetes more likely to be eligible for and to use Medicaid for nursing home expenditures? What happens to the personal incomes of individuals with diabetes? Are persons with diabetes more costly to care for?

The clinical implications of these data suggest several other areas of inquiry. Most of the complications of diabetes also occur in individuals without diabetes: heart disease, stroke, renal failure, and amputation. What proportion of these chronic diseases in diabetes are attributable to diabetes? If diabetes were tightly controlled, what would be the implications for other chronic conditions? Is aggressive glucose management appropriate for the nursing home resident, and what are its real risks and benefits? What is the most effective and efficient means to improve the care of persons with diabetes in a nursing home population?

The explosive growth of reimbursement for and provision of home health care has provided a viable alternative to nursing home care for many people. At this time, little information is available on the patients who receive home health care; their medical conditions and disabilities; and the type, quality, and costs of services provided. More information would be useful not only for patients but for providers, payers, and public policy decision-makers.

Currently, one of every three persons in the United States will reside in a nursing facility sometime in his or her life<sup>2</sup>. While only 5% of persons age >65 years reside in nursing homes, 22% of those age >85 years do<sup>11</sup>. Although only 11% of our population is currently age >65 years, increased life expectancy and other demographic shifts will result in >20% of our population being age >65 years in the year 2020. Thus, both the proportion and number of persons who will need long-term care are expected to increase dramatically over the next several decades. When this population shift is coupled with the increasing prevalence of diabetes, diabetes care will assume an increasingly important role in the nursing facility.

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## Appendix 28.1

**NMES Description and Data Analysis****■ Data Sources**

The Institutional Population Component (IPC) of the 1987 National Medical Expenditure Survey (NMES-2), conducted by the Agency for Health Care Policy and Research, is used to provide a profile of demographics, health status, and expenditures for nursing facility care of diabetic and nondiabetic residents of nursing facilities<sup>59</sup>. Although similar to several previous surveys of the nursing facility population, the IPC is the first national survey to obtain full-year information on use and expenditures for persons in nursing facilities.

The IPC was based on a national two-stage probability design with facilities sampled in the first stage and persons sampled in the second stage. Eligible facilities were defined as licensed nursing or personal care homes (referred to in this chapter simply as nursing facilities or nursing homes) with three or more beds that routinely provided nursing or personal care services. The facilities could be free-standing or associated with a hospital, retirement center, or similar institution as long as the unit maintained separate patient records. Facilities included those certified by Medicare and Medicaid as skilled nursing facilities (SNF) and/or intermediate care facilities (ICF). The sample also included noncertified facilities but excluded those that provided only room and board or limited care for specific conditions (e.g., alcoholism)<sup>60</sup>.

All persons (other than facility staff) who spent one or more nights in a nursing home during 1987 were eligible for the survey. Two groups of residents were sampled: those resident on January 1, 1987, and those admitted during 1987 to a sampled facility. Use and expenditure data were collected from January 1 or the date of admission, until the time of death, discharge, or December 31, 1987, if still residing in an eligible facility. The analysis was restricted to those age  $\geq 55$  years and persons for whom data were available from at least one-third of their eligible period. After these restrictions, there were 3,009 January 1 residents and 1,777 newly admitted residents for this analysis. When combined and weighted appropriately, these persons represent all persons age  $\geq 55$  years in the United States who used a nursing or personal care home at any time during 1987<sup>61</sup>.

Data were collected from three sources: care-givers in the nursing facility (usually nursing staff who were familiar with the patient and had access to the medical records); financial records personnel (e.g., billing clerks in the nursing facility with access to the patient billing records); and the next-of-kin residing in the community. Information on demographics, medical conditions, and health status was collected from the care-givers and the next of kin. Information on nursing home use was collected from care-givers and the financial records personnel. Expenditures were obtained from the financial records personnel in each nursing facility that the person lived in during 1987<sup>59</sup>.

A companion survey, the Household Survey of the 1987 NMES-2, collected similar information from a sample of the U.S. civilian, noninstitutionalized population<sup>62</sup>. When weighted appropriately, this sample reflects the total population of civilian, noninstitutionalized individuals in the United States. Approximately 1% of the civilian, noninstitutionalized population entered a nursing facility during 1987. These individuals are included in the estimates for the general population. Estimates of the noninstitutionalized diabetic and nondiabetic population are provided for comparison when appropriate. The Household Survey used self-administered questionnaires to collect information on chronic conditions, health status, and health habits for all adults. Information on each family member's health care use and expenditures were obtained quarterly from a designated family member.

**■ Definition of Diabetes Status**

Ascertainment of diabetes differed between the two surveys. In the IPC, diabetes status was obtained from four different sources. Medical diagnoses were obtained from the medical chart on January 1, 1987, for persons residing in a nursing facility on that date, and on admission for those admitted during 1987. Diagnoses were obtained again at the time of admission to an acute-care hospital during that year or from the nursing facility medical records on December 31, 1987, if the person was still residing in the nursing facility. The diagnoses listed on the resident's medical record were recorded and coded using the International Classification of Diseases, 9th revision (ICD-9). In addition, the care-giver for the nursing facility was asked, "According to the pa-

*Appendix 28.1—Continued next page*

tient's medical record, (does/did) the (resident's name) have diabetes?" The next-of-kin was asked, "Did a doctor or other medical person ever say that (resident's name) had diabetes?" The resident was noted to have diabetes if any of these respondents replied affirmatively to the diabetes questions, or if a diagnosis of diabetes (ICD-9 code 250.xx) was noted in the nursing facility records during 1987. In the IPC nursing home population sample age  $\geq 55$  years, there were 877 persons who were designated by one or more of these criteria to have diabetes, and 3,909 persons who did not have diabetes designated by any of those criteria. Ascertainment of diabetes status in the Household Survey was based on an affirmative response to the self-administered question, "Has a doctor ever told you that you have diabetes (high blood sugar)?" In the U.S. noninstitutionalized civilian population sample age  $\geq 55$  years, there were 1,078 persons who reported a prior diagnosis of diabetes and 6,777 persons who did not. Checklists have been shown to provide more accurate ascertainment of chronic conditions compared with problem lists maintained in the medical records<sup>17</sup>.

### ■ Other Definitions

Spousal pair was defined as a husband-and-wife pair and was used for reporting income data. Income data were shown for the individual alone if there was no spouse. Information on functional status and difficulties with activities of daily living were obtained from a respondent using similar questionnaire wording in the two surveys. Data from the baseline questionnaire on January 1, 1987, or on admission are presented for the nursing facility residents and from the first round of questionnaires collected from the general population. Diagnoses other than diabetes were based on all diagnoses listed on the medical record on January 1, 1987, for persons residing in a nursing facility on that date, and upon admission for the sample admitted during 1987. The diagnostic categories and corresponding ICD-9 codes are included in Appendix 28.2.

The survey collected information on the last date the individual had been in the community. The time interval since the nursing home resident had been in the community was calculated differently for the two populations of nursing home residents. For January 1 residents, the time interval was calculated from the last date in the community to January 1, 1987. For residents admitted during 1987, the time interval was calculated from the last date in the community

to the date of the current admission.

### ■ Earlier Surveys of Nursing Homes

The NMES-2 IPC built on experience derived from several earlier national surveys of nursing homes. The National Nursing Home Survey (NNHS) was conducted by the National Center for Health Statistics (NCHS) in 1973-74, 1977, and 1985<sup>11</sup>. These three surveys were preceded by a series of surveys conducted during 1963-69 called the Resident Places Surveys. These surveys were designed to provide cross-sectional information on nursing home facilities and residents. None of these prior surveys obtained expenditure data collected over a defined time period and none was conducted in conjunction with a general population survey.

In general, the six surveys used similar questionnaires that facilitate longitudinal comparisons. However, the ascertainment of diabetes status differed in the 1985 NNHS survey from the prior surveys. The 1985 NNHS used the medical diagnosis listed in the facility medical record. Prior NNHS and Resident Places surveys (1964 to 1977) used a checklist of selected conditions, including diabetes. To provide a comparison population from the 1987 NMES-2-IPC survey to these earlier surveys, the definition of diabetes was restricted to January 1 residents with an affirmative response to the checklist of conditions by the care-giver in the nursing facility.

### ■ Comparison of the NMES-2 with NHIS

The NMES-2 estimates of persons with diabetes in the general population are ~30% higher than estimates obtained from the National Health Interview Study (NHIS) for 1987<sup>63</sup>. The NMES-2 estimated 9,553,872 persons reported that they had diagnosed diabetes in 1987, while the 1987 NHIS estimated 6,641,000 persons had diagnosed diabetes. Both of these surveys are based on national samples, but used slightly different wording in the questionnaires. In the NHIS, the family respondent was asked, "During the past 12 months did anyone in the family {read names} have diabetes?", while the NMES-2 asked each person in a self-administered questionnaire, "Has a doctor ever told you that you have diabetes (high blood sugar)?" This latter inquiry could include persons who had a history of gestational diabetes or impaired glucose tolerance but had not been diagnosed with diabetes. This ascertainment problem, which provides a larger estimate of the prevalence of diabetic persons in the general

Appendix 28.1—Continued

population, introduces a conservative bias to comparisons made in Tables 28.1, 28.2, 28.6, and 28.8. If the definition of diabetes was restricted to anyone who had a medical care visit for a diabetes condition, the NMES-2 estimate of the diabetic population would be 7,681,967<sup>64</sup>.

**Data Analyses**

Simple descriptive statistics are provided by category for diabetic and nondiabetic nursing home residents and, when available, for the diabetic and nondiabetic general population. Tests of statistical significance compare the diabetic nursing home resident with the nondiabetic nursing home resident and with the diabetic general population. Large sample Z tests were conducted at the 0.05 and 0.01 levels of significance

and are indicated as such in the tables. While the statistics take into account the sampling weights provided by NMES-2 and adjusted for the complex survey design, the standard errors are not corrected for intra-household correlation. Therefore, the standard errors are likely to be downward biased for estimates of the U.S. noninstitutionalized civilian population. However, the magnitude of this bias is generally small and is likely to affect only those statistics whose Z-score (Z-values) are close to the associated critical value. No estimate is provided when the relative standard error of a statistic is >30%. Estimates for the nondiabetic general population are also provided when appropriate, but without comparison tests. Only statistically significant comparisons are addressed in the text. No statistical comparisons were made of the median times shown in Table 28.9.

Appendix 28.2

**Diagnosis Categories with Corresponding Codes of the International Classification of Diseases, 9th Revision (ICD-9)**

Diagnosis Category	ICD-9 Codes	Diagnosis Category	ICD-9 Codes
Infectious and parasitic diseases	001-139	Other heart disease	391-398, 402, 404, 415, 420-427, 428.1-429.9
Neoplasms—all	140-239	Cerebral vascular disease	430-436
Malignant neoplasms	140-208	Atherosclerosis	440
Endocrine, nutritional, metabolic, and immunity disorders	240-279	Disease of the respiratory system	460-519
Diabetes mellitus	250	Chronic obstructive pulmonary disease	490-496
Disease of the blood and blood-forming organs	280-289	Diseases of the digestive system	520-579
Mental disorders	290-319	Diseases of the genito-urinary system	580-629
Senile dementia and other organic psychotic conditions	290-294	Kidney failure	580
Other psychosis	295-299	Diseases of the skin	680-709
Organic brain damage	310	Diseases of the musculo-skeletal system	710-739
Diseases of the nervous system	320-389	Rheumatoid arthritis and osteoarthritis	714-715
Alzheimer's disease	331.0, 331.2, 331.9	Rheumatism	710-713, 716, 729.0
Parkinson's disease	332	Osteoporosis	733.0
Diseases of the circulatory system	390-459	Symptoms, signs, and ill-defined conditions	780-799
Essential hypertension	401	Senility without psychosis	797
Heart disease	391-392.0, 393-398, 402, 404, 410-429	Injury or poisoning	800-999
Coronary atherosclerosis	440	Fracture of the neck of femur	820
Other ischemic heart disease	410-414	Other fractures	800-819, 821-829
Congestive heart failure	428.0	Amputation of lower limb	895, 897
		Supplementary classifications	V01-V82

Source: Reference 65; adapted from the National Nursing Home Survey, Reference 11

Appendix 28.3

**Resources for Improving the Quality of Care in Long-Term Care**

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**Guidelines**

American Diabetes Association and American Association for Diabetes Educators: Guidelines for diabetes care in skilled nursing homes. In *Guidelines for Diabetes Care*. New York, NY, American Diabetes Association, 1982, p. 40-44

Minnesota Diabetes Steering Committee: *Guidelines for Diabetes Care in Long-term Care Facilities, 1992*. Available from Long Term Care, Chronomed Inc, P.O. Box 47945, Minneapolis, MN 55447-9727

**Audiovisual Material**

Home Diagnostics, Inc.: *Diabetes Management in Nursing Home Residents: A Working Protocol*. Approved for 2.0 contact hours of credit by the American Association of Diabetes Educators (AADE) for continuing education credit in nursing. Available from Home Diagnostics, Inc., 51 James Way, Eatontown, NJ 07724, 1-800-342-7226, 908-542-7788, Fax 908-542-6754

**Articles on Diabetes in the Elderly Person**

American Association of Diabetes Educators: Diabetes in the elderly. In *A Core Curriculum for Diabetes Education, 2nd Edition*. Peragall-Dittko V, Godley K, and Meyer J, eds. Chicago, IL, American Association of Diabetes Educators and the AADE Education and Research Foundation, 1993

Diabetes in the Elderly. *The Diabetes Educator*, Vol. 9, Special Issue, 1983

Froom J, ed: Diabetes mellitus in the elderly. *Clinics in Geriatric Medicine* 6:693-970, 1990

Halter JB, Christensen NJ: Diabetes mellitus in elderly people. *Diabetes Care* 13 (Suppl. 2):1-96, 1990

Lipson, L: Diabetes mellitus in the elderly. *American Journal of Medicine* 80 (Suppl. 5A):1-72, 1986

Appendix 28.4

**Economic and Legislative Influences on Long-Term Care**

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Economic and legislative changes in the past 25 years have had a significant impact on the provision of long-term care. The Medicaid program, instituted in the mid-1960s, provided funds for indigent persons who required care in a nursing facility. The availability of public financing, coupled with the rapid increase of the population age  $\geq 65$  years, stimulated a rapid increase in the number of nursing home facilities. The number of facilities increased 22% between the National Nursing Home Surveys conducted in 1973-74 and 1985<sup>11</sup>. Most of the increase occurred before 1977; only 200 facilities have been added since 1977<sup>1</sup>. This decline can be attributed to the success of regulations designed to slow the growth of nursing homes: state-mandated certificate of need, moratoria on construction, more stringent operational standards, and declining Medicaid reimbursement.

Nursing homes also took on the role of rehabilitation following acute hospitalization. When Medicare introduced the prospective payment system in 1984 for acute hospitalization reimbursement, hospital stays decreased and convalescent and rehabilitative care shifted from the hospital to the nursing home<sup>1</sup>.

In 1965, the Medicare program, which provides health care coverage for hospitalization and ambulatory medical care for persons age  $\geq 65$  years, was authorized to pay for certain home health services. According to the National Association for Home Care, the number of Medicare-certified home health agencies grew by 250% during 1967-92<sup>66</sup>. This coverage has allowed many persons who needed some assistance with personal care to remain in their own home rather than move into a nursing facility. Many believe this has also contributed to an observed shift of sicker patients in the nursing home<sup>13</sup>.

Despite all these changes in the supply of nursing home beds, the percentage of the elderly population residing in nursing homes has remained constant at ~5% of the population age  $\geq 65$  years<sup>11</sup>. The combination of a decline in growth rate of new nursing homes with the increase in population age  $\geq 65$  years has resulted in an increase in occupancy rates to nearly 95%. In absolute numbers, the number of residents in nursing homes grew from a little over 0.5 million in 1964 to 1.5 million in 1985<sup>67</sup>. Expenditures for long-term health care have increased even more dramatically, from \$4.2 billion<sup>68</sup> to \$33.7 billion during the same period<sup>19</sup>. Of those who die at age  $\geq 25$  years, 29% have at some time been residents in a nursing home, and almost half of those who entered a nursing home spent a cumulative total of at least 1 year there<sup>2</sup>.