

The Prevalence of Dementia in a Statewide Sample of New Nursing Home Admissions Aged 65 and Older: Diagnosis by Expert Panel

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This study estimated the prevalence of dementia in 2,285 new admissions age 65+ to a statewide sample of 59 nursing homes in Maryland, 1992-1995. Dementia was ascertained according to DSM-III-R criteria by an expert panel of geriatric psychiatrists, neurologists, and a geriatrician using detailed information collected by trained lay evaluators from residents, family, staff, and medical records. Admissions to Maryland nursing homes are similar to admissions to nursing homes elsewhere in the United States. The prevalence of dementia was 48.2% (CI: 43.6-52.8) with an upper bound estimated at 54.5% (CI: 49.9-59.1). Prevalence is highest in facilities with <50 beds versus 200+ beds (65.5% vs 39.6%) and those in urban versus rural areas (50.0% vs 39.1%). Those who are non-White, married, and with fewer years of education are more likely to be demented. Prevalence is highest among those with 4+ physical impairments versus 0-1 (60.3% vs 27.7%) and lowest in those with 4+ comorbidities versus 0-1 (44.8% vs 52.0%). There was considerable overlap in the comorbid status of demented and nondemented admissions, and both groups contained members with only a few functional

limitations. Results suggest that the level of medical supervision provided in nursing homes may not be required for some residents with dementia.

Key Words: Aged, Long-term care, Mental morbidity

Since the mid-1970s, between 4 and 5 percent of those 65 years and older have resided in nursing homes (Current Population Reports & Special Studies, 1996; Strahan, 1997), and an estimated 25%-50% of those 65 years and older today will enter a nursing home during their lifetime (Kemper & Murtaugh, 1991; McConnel, 1985; Murtaugh, Kemper, & Spillman, 1990). Given the anticipated increase in the population over age 65, the number of persons entering nursing homes is expected to increase dramatically through the first half of this century, with national expenditures for nursing home care expected to exceed \$100 billion annually by the year 2050 (Schneider & Guralnik, 1990). With the passage of the Community Mental Health Act of 1965 and the closing of large numbers of state psychiatric hospitals, the nursing home has taken on a prominent role as a caresetting for older persons with mental morbidities, most notably those with dementia. The implications of having large numbers of persons with dementia in nursing homes are far reaching in terms of the nature of the nursing home, policy and reimbursement concerns, and the quality of life of nursing home residents with and without dementia.

Surprisingly little is known about the prevalence of dementia among nursing home residents, and even less is known about their unique health characteristics and care needs. This may be due largely to lack of a reliable and valid method for ascertaining dementia in large and diverse populations of nursing home residents. Previous work on dementia prevalence in nursing homes suggests that from 25%-74% of all residents have dementia (Garrard et al., 1993; Rovner, Kafonek, & Flipp, 1986), with rates for new admissions as high as 67% (German, Rovner, Burton,

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Brant, & Clark, 1992; Rovner et al., 1990). Methods used to ascertain dementia and estimate prevalence range from review of diagnoses available in medical records, an approach commonly used in large national studies (Hing, Sekscenski, & Strahan, 1989; Lair & Lefkowitz, 1990), to direct examination of patients by neurologists and psychiatrists, a strategy that is more frequently used in studies within a single facility or geographically-restricted group of facilities (German et al., 1992; Rovner et al., 1986, 1990; Tee-ter, Garetz, Miller, & Heiland, 1976). The former method has the advantage of being able to obtain information about a diverse array of residents in facilities spread over a large area, but at the expense of a diagnostic standard that is essential for research. Direct evaluation has the potential to overcome this limitation but, due to cost considerations, cannot be used readily to evaluate large numbers of residents dispersed over a wide area. Several studies relying on cognitive testing to characterize residents are instructive and have been successfully used in heterogeneous and geographically dispersed populations (Chandler & Gerndt, 1988; Engle & Graney, 1993; Hartmaier et al., 1995; Morris et al., 1994). They are of questionable value for identifying residents with dementia, however, because cognitive status is only part of a dementia diagnosis and not all residents can be evaluated using this method.

The present study grew out of a need to estimate the prevalence of dementia and understand the distinct care needs of persons with dementia in a large, representative sample of new admissions to nursing homes. These issues are being examined in a study of 2,285 first-time admissions to a stratified, random sample of 59 nursing homes in Maryland. In this report, the study design and method for ascertaining dementia using clinical experts and DSM-III-R diagnostic criteria (American Psychiatric Association, 1987) are described, and estimates of dementia prevalence and variations in prevalence by selected facility and resident characteristics are provided.

Methods

Selection and Recruitment of Sample

A statewide sample of 2,285 new admissions to 59 Maryland nursing homes was identified and recruited between 1992 and 1995 using a two-stage process in which a statewide sample of nursing homes was recruited and all new admissions meeting eligibility criteria were asked to participate. The protocol was approved by the Institutional Review Board of the University of Maryland, Baltimore.

Nursing Home Recruitment.—Subjects were recruited from a stratified random sample of 59 nursing homes in Maryland. The 221 licensed long-term care facilities in Maryland in 1992 were classified into five geographic regions and further divided into three bed-size strata (<50; 50–150; >150). Homes were randomly selected and recruited within each of the

15 strata defined by region and bed size such that the proportion of beds represented for each stratum was approximately the same as that stratum's proportion of all beds statewide. A total of 64 facilities were contacted; 4 (6%) refused to participate; one agreeing to participate had no new admissions.

Selection of Nursing Home Residents.—All new admissions age 65 years and older who had not resided in any nursing home or chronic care facility for 8 or more days in the previous year were eligible. Admissions were identified by facilities from September 1992 through March 1995; eligibility was determined and consent obtained by project personnel. Nondemented and able subjects provided their own consent; significant others provided consent for their own participation and for residents not able to provide it due to cognitive or other limitations.

Facilities identified 3,851 eligible subjects; for 568 cases (15%), names were received too long after admission for data collection, or data were collected out of the interview timeframe. Of the 3,283 remaining eligible subjects, 2,285 (70%) agreed to enroll. Comparison of the age and sex distributions for enrolled and nonenrolled eligible cases indicated that those enrolled were slightly older (81.5 years vs 80.6 years; $p < .001$) and more often female (71.6% vs 68.6%; $p < .05$).

Sources of Information

Data were collected from interviews with residents, nursing staff, and significant others, and medical records which included Minimum Data Set (MDS) evaluations (Morris et al., 1990) and hospital discharge summaries. Nurse and resident interviews were conducted 21 days or more after admission to lessen the effect of relocation stress on assessments. Evaluations for residents with fever or acute medical illness were delayed until their condition was resolved. For residents discharged prior to interviewer contact, nursing staff and resident interviews were conducted in the current care setting, and information that would have come from nursing staff was obtained from current care providers. Data for deceased ($n = 213$) and comatose ($n = 6$) patients came from nursing staff, family, and medical records. Data were obtained on average 31–40 days post-admission (depending upon source); no data were collected more than 65 days following admission. Data were available from two sources for 97% of residents; 83% had data from three to four sources, and 56% had data from all sources. Medical chart information containing admitting notes, medications, nursing notes, and physician orders for the first 21 days of residence was available for 99% of residents.

Diagnosing Dementia

The determination of dementia was made in accordance with DSM-III-R criteria (American Psychiatric Association, 1987) by an expert panel of geriatric psychiatrists, neurologists, and a geriatrician using

detailed information collected from the above mentioned sources by trained lay evaluators. A detailed description of the dementia ascertainment methodology may be found elsewhere (Magaziner et al., 1996). Briefly, two panelists rendered independent diagnoses of three possibilities: dementia, no dementia, or indeterminate. The indeterminate designation (which is not recognized in the DSM-III-R) was used when available evidence was inadequate for rendering a diagnostic decision. A larger panel was convened to render a diagnosis if the two panelists disagreed. DSM-III-R criteria for dementia require loss of intellectual abilities of sufficient severity to interfere with social or occupational function, short- and long-term memory impairment, impairment in abstract thinking or judgment or disturbance of higher cortical functioning, and that these cognitive impairments not occur exclusively in the course of delirium. In addition, there must be no evidence of other medical or psychiatric conditions that would render a determination of dementia difficult.

Information used for diagnosis included a history of cognitive and functional decline and current cognitive and functional status, in addition to demographic characteristics, and information about affective, social, and behavioral status. A detailed listing of measures used and data sources appear in the Appendix.

Evaluation of Dementia Determination Methodology.—Based on the 2,285 initial psychiatrist–neurologist paired assessments, between- and within-rater reliability was ascertained for clinicians involved in the diagnostic process. Using a two-category diagnostic scheme in which the nondemented and indeterminate cases were combined, the between-rater kappa was 0.70. To determine a within-rater kappa, each rater was assigned a 10% sample of reassessments to do along with the new cases they were given. For each repeated case, the first assessment was compared with the second; the within-rater kappa was 0.77 for psychiatrists and 0.77 for neurologists. As described elsewhere (Magaziner et al., 1996), 100 cases were reviewed by the dementia ascertainment procedures outlined above and examined directly by a geriatrician trained in the assessment of dementia who was not involved in the panel process. Agreement between the assessment made by this procedure and that made by the geriatrician was 83% (kappa = .66) when the no dementia and indeterminate groups were combined to represent a single category of no dementia. Regrouping to include the indeterminate cases with the dementia group also produced an 83% agreement rate.

Other Measures

Each nursing home was characterized by the urbanicity of the county in which it was located using a scale based on Department of Agriculture criteria (Cohen, Braden, & Ward, 1993; Coward, Netzer, & Mullens, 1996). Individual homes also were classi-

fied by bed size, ownership (private, nonprofit, public), and whether they were part of a chain. Information on medical comorbidities was obtained from informant (significant other) interviews at admission, except for information on body mass index (BMI) and hypertension, which was abstracted from charts. The 12 chronic conditions tallied included presence on admission of: coronary heart disease (CHD), congestive heart failure (CHF), cerebrovascular disease, chronic obstructive pulmonary disease (COPD), liver disease, peripheral vascular disease, seizure disorder, peptic ulcers, arthritis, cancer, low BMI (≤ 20), and uncontrolled hypertension (systolic > 160 or diastolic ≥ 90). A modified Katz Activities of Daily Living Scale (Katz, Ford, Moskowitz, Jackson, & Jaffe, 1963) was derived from adaptations to 14 items in the Psychogeriatric Dependency Rating Scale (PGDRS; Wilkinson & Graham-White, 1980) on six domains: bathing, dressing, toileting, transfer, continence, and feeding. Each Katz domain was scored dichotomously as dependent versus fully independent; a summary measure was computed by summing the number of domains on which residents were dependent. Selected information from the MDS was used to compare characteristics of residents in the 59 study nursing homes with new admissions to nursing homes in the five states participating in the Nursing Home and Quality Demonstration reporting to the Health Care Financing Administration (Health Care Financing Administration, 1995).

Statistical Methods

The standard error of the dementia prevalence rate was corrected for cluster sampling (nursing homes rather than individuals) using the intracluster correlation as described by Kish (1965). The association between a given facility or resident characteristic and dementia was determined from odds ratios that were derived from a logistic regression model. The dependent variable was based on the dichotomy of demented versus nondemented or indeterminate. To adjust the association for age, the resident's age at admission was included in the model. Confidence intervals on the odds ratios were derived from the standard errors of the logistic regression coefficients, corrected for cluster sampling (Liang & Zeger, 1986).

Results

Demographic, health, and functional characteristics of new admissions to the 59 study facilities, 1992–1995, and new admissions to 1,367 facilities from the five states in the Nursing Home and Quality Demonstration reporting MDS information to the Health Care Financing Administration (HCFA) in 1995 are shown in Table 1. In the Maryland sample, the average age of residents was 81.4 years, 70.4% were female, and 83% were White. The most common physical disabilities reported on admitting MDS forms were in bathing (94.3%), dressing (84.9%), toileting (76.9%), and transferring (70.9%); the most prevalent comorbid conditions were hypertension

Table 1. Demographic, Health, and Functional Characteristics of New Admissions to 59 Maryland Nursing Homes, 1992–1995 and New Admissions to 1,367 Facilities in Five States, 1995^a

	Maryland ^b (Percent)	Five-State Sample ^c (Percent)
Age		
65–74	19.9	18.4
75–84	42.8	41.5
85+	37.3	40.1
Sex		
Female	70.4	69.1
Male	29.6	30.9
Race/Ethnicity		
White	83.0	86.6
African American	18.8	8.4
Hispanic	0.2	1.9
Other	1.0	3.1
Physical Functioning (% dependent beyond supervision)		
Bathing	94.3	87.3
Dressing	84.9	83.9
Toileting	76.9	79.2
Transfer	70.9	75.0
Bladder incontinence (two or more times per week)	45.6	40.3
Bowel incontinence (two or more times per week)	39.8	33.9
Feeding	32.3	31.7
Medical Comorbidities ^d		
Hypertension	40.6	40.9
Low BMI (<20)	34.9	37.6
Cerebrovascular accident (stroke)	24.7	21.2
Heart conditions		
Congestive heart failure	19.8	21.3
Arteriosclerotic heart disease	13.5	20.5
Cardiac dysrhythmia	9.9	13.3
Sensory deficits		
Vision difficulties	37.5	38.9
Hearing difficulties	28.8	33.6
Arthritis	18.8	21.0
Emphysema/asthma/COPD	14.9	14.6
Cancer	13.3	11.9
Peripheral vascular disease	8.3	7.9
Dementia		
Alzheimer's disease	10.1	9.3
Other dementia	26.0	26.3

^aThe five states include those participating in the Health Care Financing Administration Nursing Home and Case Mix Quality Demonstration: Kansas, Maine, Mississippi, New York, South Dakota (Health Care Financing Administration, 1995). Of the 1,501 facilities in these states in 1995, 1,367 reported Minimum Data Set information.

^bMaximum number of subjects for any distribution is 2,072. Numbers fluctuate because of missing data on individual items.

^cMaximum number of subjects for any distribution is 86,094. Numbers fluctuate because of missing data on individual items.

^dSource of medical comorbidities is admitting Minimum Data Set records.

(40.6%), vision difficulties (37.5%), and low BMI (34.9%).

Compared to new admissions in the five states reporting MDS data to HCFA, those admitted to study facilities had a very similar age and sex distribution, and a similar proportion of White admissions. Non-White admissions were distributed differently, with a greater proportion of African Americans in Maryland. The proportion of residents admitted with dependen-

cies in physical functioning was similar in the two groups, as was the proportion admitted with most major comorbid conditions. Exceptions to this were noted for atherosclerotic heart disease and cardiac dysrhythmia, with lower proportions of both in Maryland. It is notable that the proportion with an MDS-recorded diagnosis of Alzheimer's disease is comparable in those admitted to study facilities and in those admitted to facilities in the five-state Nursing Home and Quality Demonstration (10.1% in Maryland and 9.3% in the five state sample) as is the indication of other dementia diagnoses (26.0% and 26.3%). When contrasted with nursing homes in the United States (Strahan, 1997), there was a larger proportion of homes in the Maryland sample with 200+ beds (15.3% vs 7.5%) that were not affiliated with a chain (64.4% vs 45.5%), and that were in metropolitan statistical areas (89.8% vs 61.5%).

Prevalence of Dementia

A diagnosis of dementia was made by the expert panel for 48.2% of new nursing home admissions (Table 2). Nondemented residents accounted for 31.5% of new admissions, and 20.3% of cases could not be assigned a diagnosis and were designated as indeterminate. Indeterminate designations were made due to: missing information from resident, significant other, or nurse ($n = 353$; 76% of their group), mild severity indicated by uncertainty about whether there was "loss of intellectual abilities of sufficient severity to interfere with social or occupational function" (American Psychiatric Association, 1987; $n = 278$; 60%), and the presence of delirium or other confounding medical conditions (e.g., stroke, cardiovascular disease; $n = 394$; 85%). Of the 464 cases designated as indeterminate, 144 had been designated as demented by at least one of the two initial expert reviewers. Adding these cases to the 1,011 cases of dementia designated by the panel review suggests an upper bound for the prevalence of dementia of 54.5%.

By Selected Characteristics of Nursing Homes.—

The prevalence of dementia is higher in small facilities, and in facilities located in metropolitan statistical areas (Table 3). Although not statistically significant ($p > .05$), public facilities had a slightly larger proportion of new admissions with dementia, and homes that were part of a chain had a slightly smaller proportion.

By Demographic, Health, and Functional Characteristics.—

The prevalence of dementia increases with age (Table 3). Non-Whites (81% of whom are African American), those who are married, and those with 8 or fewer years of education also are more likely to be diagnosed with dementia. In addition, while the prevalence of dementia is highest in those with more dependencies in physical ADLs, the prevalence tends to decrease with an increasing number of comorbid

Table 2. Prevalence of Dementia in New Admissions to 59 Maryland Nursing Homes, 1992–1995

	Dementia	Nondementia	Indeterminate
Final Panel Determination			
Percent	48.2	31.5	20.3
95% confidence interval	(43.6–52.8)	(27.2–35.8)	(16.6–24.0)
n	1,101	720	464
Upper Bound (at least one panelist rated indeterminate as demented)			
Percent	54.5	31.5	14.0
95% confidence interval	(49.9–59.1)	(27.2–35.8)	(10.8–17.2)
n	1,245	720	320

conditions. None of the associations in Table 3 are altered substantially by age adjustment.

Heterogeneity in Comorbidity and Physical Functioning.—Those with a diagnosis of dementia on admission are a heterogeneous group with respect to comorbid status and functioning (Table 4). Seven percent had no major comorbid conditions; 18.7% had only one comorbidity; 27.2% had two comorbid conditions; and 47% had three or more. Dependency status of those with dementia also varied considerably, with 10.8% having one or fewer areas of dependency and 72.8% dependent in four areas. When bathing and dressing dependencies are not considered (residents are frequently assisted with these regardless of their dependency status), 24.6% of those admitted with dementia had none or one dependency and 33.4% were dependent in all of the remaining four areas (toileting, transfer, continence, feeding). This compares with the combined nondemented and indeterminate groups where 43.6% had one or fewer dependencies (excluding bathing and dressing) and 20.6% were dependent in the remaining four tasks (96.4% of demented and 62.6% of nondemented and indeterminate cases received bathing assistance; 84.1% of demented and 49.2% of nondemented and indeterminate cases received assistance with dressing). In fact, 6.5% of those with dementia and 12.3% of those without dementia had no more than one comorbid condition and no more than one limitation in physical functioning, after bathing and dressing tasks were excluded. There also was considerable overlap in the comorbid status of demented and nondemented admissions, and although the demented were more impaired than the nondemented in functional dependency, neither group was homogeneous and both included persons with varying numbers of functional dependencies.

Discussion

This study indicates that the prevalence of dementia, ascertained by expert panel diagnosis and estimated from a sample of 2,285 first-time admissions to a representative sample of 59 nursing homes in Maryland, is approximately 50%. Previous studies of dementia prevalence in nursing homes provide esti-

mates ranging from 25% to 74% (see Table 5). The variability seen in these studies appears to be due, in large part, to whether the target group is a cohort of new admissions versus a cross-section of all residents, and the case ascertainment method used (e.g., diagnosis from medical record vs clinical examination). In general, studies of new admissions and those relying on diagnoses as they appear in medical records yield lower estimates of prevalence than those of cross-sections of residents and those relying on direct clinical evaluations. As seen in Table 5, among studies of cross-sections of nursing home residents, rates range from as low as 33% in a study relying on diagnosis in a medical record (Garrard et al., 1993) to as high as 74% in a study of residents in a single facility relying on direct clinical evaluation (Rovner et al., 1986). Prior studies of new admissions provide rates ranging from as low as 25% in a study using diagnoses from medical records to characterize 1,118 admissions to 30 nursing homes in eight states (Garrard et al., 1993) to as high as 67% in a study relying on direct clinical evaluation of 454 residents entering eight nursing homes in a single metropolitan area (German et al., 1992; Rovner et al., 1990).

The number of residents and facilities included in previous studies also varies, with larger national and regional studies relying on diagnoses in medical records (Burns, Larson, & Goldstron, 1988; Hing et al., 1989; Lair & Lefkowitz, 1990; Magaziner, Zimmerman, Fox, & Burns, 1998) and smaller studies and those in a single area relying on direct clinical evaluations (German et al., 1992; Rovner et al., 1986, 1990; Tariot, Podgorski, Blazina, & Leibovici, 1993). The present study attempted to minimize the tradeoff in these studies between the potential for being representative of a broad spectrum of nursing homes and residents versus an exact diagnosis based on clinical workup with established diagnostic criteria. The method used in the present study represents an effort to maximize both facility and resident variability and diagnostic accuracy. The expert panel has the advantage of clinician review of information for diagnosis following established criteria. By using this method, it was possible to provide an estimate of the prevalence of dementia for new admissions to a diverse set of facilities spread across a large geographic area. In addition, the residents included in this study were similar in demographic, health, and functional characteristics to older

Table 3. Prevalence of Dementia According to Facility and Resident Characteristics for 2,285 New Admissions to 59 Maryland Nursing Homes, 1992–1995

	<i>n</i>	% With Dementia	Odds Ratio	95% Confidence Interval	
				Lower	Upper
Facility Characteristic					
Bed size					
200+	444	39.6	1.00		
100–199	1,558	48.9	1.46	0.96	2.22
50–99	225	55.6	1.90	1.27	2.86
<50	58	65.5	2.89	1.82	4.61
Ownership					
Private	1,609	47.7	1.00		
Nonprofit	544	48.0	1.01	0.71	1.45
Public	132	54.5	1.31	0.76	2.27
Location					
Not MSA ^a	376	39.1	1.00		
MSA	1,909	50.0	1.56	1.04	2.33
Affiliation					
Chain	1,143	44.2	1.00		
Independent	1,142	52.2	1.38	0.97	1.96
Resident Characteristic					
Age					
65–74	450	34.9	1.00		
75–84	987	48.6	1.76	1.44	2.14
85+	845	54.8	2.25	1.79	2.83
Sex					
Female	1,621	47.3	1.00		
Male	664	50.5	1.14	0.96	1.35
Race/Ethnicity					
White	1,836	45.8	1.00		
Non-White	444	58.8	1.69	1.30	2.20
Marital Status					
Not married	1,737	46.1	1.00		
Married	547	54.7	1.41	1.18	1.68
Education (no. of years)					
13+	452	44.2	1.00		
9–12	841	45.4	1.05	0.81	1.36
0–8	644	54.7	1.52	1.13	2.04
Physical Functioning (no. of impairments)					
0–1	386	27.7	1.00		
2–3	351	45.9	2.21	1.54	3.17
4–6	1,192	60.3	3.96	2.91	5.39
Medical Comorbidities (no. with existing conditions)					
0–1	504	52.0	1.00		
2–3	1,027	49.2	0.89	0.70	1.14
4–12	565	44.8	0.75	0.60	0.94

^aMSA = metropolitan statistical area.

persons entering nursing homes elsewhere in the United States during the same time period.

Estimating the prevalence of dementia in a population using standardized criteria requiring evaluation by clinical experts is inherently difficult. Additional challenges added by studying a nursing home population include the difficulty of having residents travel to a central site for diagnosis and a high prevalence, which makes a multistage screening and clinical diagnosis process costly and hard to implement. An added problem in this study of new admissions was the need to evaluate residents shortly after admission. The use of an expert panel of neurologists, psychiatrists, and a geriatrician to review information varying in quantity and quality from medical records, resi-

dents, family members, and nursing staff proved feasible, reliable, and consistent with those of a clinician making a direct assessment using the same diagnostic criteria. The panel relied on DSM-III-R criteria for dementia. Had other criteria been used, the prevalence rates may have been different (Erkinjuntti, Ostbye, Steenhuis & Hachinski, 1997).

The prevalence of dementia in new admissions differs by facility size, location, ownership, and affiliation: Rates are higher in those admitted to nursing homes that are smaller, not part of a chain, in urban or suburban areas, and publicly owned. Although not evaluated in this study, these differences may reflect differences in case mix whereby larger facilities and those that are privately owned, part of a chain, and in

Table 4. Distribution of Comorbid Conditions and Physical Dependencies by Dementia Status in 2,285 New Admissions to 59 Maryland Nursing Homes, 1992–1995

	Dementia		Other ^a	
	<i>n</i>	Percent	<i>n</i>	Percent
Medical Comorbidities (existing conditions)				
0	71	7.0	47	4.4
1	191	18.7	195	18.1
2	277	27.2	280	26.0
3	228	22.4	242	22.5
4+	253	24.8	312	29.0
Physical Functioning (impairments)				
0	20	2.0	134	14.2
1	87	8.8	145	15.4
2	62	6.3	100	10.6
3	99	10.0	90	9.6
4+	719	72.8	473	50.2

^aOther includes nondemented and indeterminate cases.

urban areas are more likely to have a disproportionate number of admissions for rehabilitation care.

Many of the differences in prevalence by resident characteristics were as expected: Rates were higher among those who were older, more poorly educated, and at lower levels of physical function. Although studies characterizing new admissions are few, these distinctions are consistent with studies of cross-sections of nursing home residents (Adolfsson, Gottfries, Nystrom, & Winblad, 1981; Burns et al., 1988; German et al., 1992; Holstein, Chatellier, Piette, & Moulis, 1994; Manton, Cornelius, & Woodbury, 1995; Rovner et al., 1990; Teeter et al., 1976). The lower rates of dementia in those with a greater number of comorbid conditions are consistent with cross-sectional studies of nursing home residents (Holstein et al., 1994; Magaziner et al., 1998). Rates also were higher among those who were non-White and married. Taken together, these results suggest that there are multiple reasons for entering a nursing home, with some entering for disease management and assistance with tasks of daily living, and others for care of other problems associated with dementia.

The similarities and differences in functional capabilities and comorbid conditions among those entering a nursing home with and without a dementia diagnosis are consistent with those observed in a national cross-section of nursing home residents (Magaziner et al., 1998). Three issues are particularly relevant and may have implications for choosing the most appropriate care settings for these groups. First, there is considerable overlap in the physical health and functional limitations of demented and nondemented new admissions, suggesting that they have many similar care requirements. Second, those with dementia on admission are a heterogeneous group, suggesting that those with dementia require a range of care. Third, there are subgroups of demented and nondemented new admissions with relatively few medical comorbidities and functional limitations, suggesting that the

level of care available in nursing homes may not be required for some residents.

Several residential options are currently available for persons with dementia; others are emerging. These include the traditional nursing home (the setting of the current study), special dementia care units in nursing homes, and other residential care settings such as board-and-care homes and assisted living facilities. Living arrangements continually change over a person's life cycle to conform to changing individual and family needs (Michelson, 1970). Long-term care residence is an important part of this ongoing process. The traditional nursing home is at one end of the long-term care continuum. Special care units in nursing homes may add care components to accommodate residents with dementia. Results of the present study suggest that designers of these units need to recognize the variability of demented residents so that this form of care does not remain uniform and the special elements of care can target those residents most likely to benefit. Other modes of residential long-term care have been proliferating (Brown & Hawes, 1994; Eckert & Murrey, 1984; Hawes, Wildfire, & Lux, 1993; Lawton, 1981; Mor, Sherwood, & Gutkin, 1986) and may be better suited to those not requiring the intensive array of services provided in nursing homes, a small but noticeable group in the present study of nursing home admissions.

The present study is of nursing home residents in a single state; although residents studied are similar to those admitted to nursing homes elsewhere in the United States, caution is required when attempting to generalize results beyond Maryland. Another potential limitation of this study is that some resident characteristics, such as comorbidity, may be reported differently for persons with dementia. While not eliminated, this source of bias is minimized by not obtaining data directly from any residents (with the exceptions of cognitive status and symptoms of depression) and relying on the same sources to obtain all study information.

The present study has many advantages that are important for broadening our understanding of older persons with dementia and the long-term care they require. The diagnostic strategy, while imperfect, is based on clinicians' evaluations of evidence using DSM-III-R criteria, a widely accepted diagnostic standard. One benefit of this approach is that it could be applied in a uniform manner to persons entering nursing homes across an entire state, permitting inclusion of nursing homes varying in size, location, and ownership, and containing a broad mix of residents. A potential limitation of this method is that residents were not followed for additional information to confirm diagnoses, and approximately one fifth could not be classified confidently as demented or nondemented. Consideration was given to "forcing" panelists to classify these "indeterminate" residents as either demented or nondemented as was done in other studies relying on expert panels (Breitner et al., 1995; Kukull et al., 1990; Solari et al., 1994). Instead, a more conservative strategy was chosen, allowing

Table 5. Studies of Dementia Prevalence in Nursing Home Residents

Study	Year(s)	Sample	Method of Case Ascertainment	Rate per 100
Cross-sections of Residents				
Burns et al., 1988	1984	526 residents of 112 nursing homes in 4 standardized metropolitan statistical areas	Medical record diagnosis	39
National Nursing Home Survey 1985 (NNHS-1985; Hing et al., 1989)	1985	Sample represents 1.3 million residents of 20,479 U.S. nursing homes	Medical record diagnosis	47
Magaziner et al., 1998 (reanalysis of NNHS-1985)	1985	Sample represents 1.3 million residents of 20,479 U.S. nursing homes	Medical record diagnosis or medical record report of senile dementia or chronic/organic brain syndrome	51
Rovner et al., 1986	1986	50 residents of 1 nursing home	Clinical examination of patient (incl. evaluation of cognitive performance), structured interview with staff and family	74
National Medical Expenditure Survey (Lair & Lefkowitz, 1990)	1987	Sample represents 1.5 million residents of U.S. nursing homes	Medical record diagnosis	42
Garrard et al., 1993	late 1980s	830 residents of 30 nursing homes in 8 states with at least 6-week stay	Medical record diagnosis	33
Class et al., 1996	1990s	106 African American residents of 6 nursing homes in Indianapolis, IN	Expert panel review of medical record, mental status testing, nurse interview, clinical examination	68
Tariot et al., 1993	1991	80 residents of 1 nursing home	Clinical examination of patient (incl. evaluation of cognitive performance), structured interview with staff and family	46
Canadian Study of Health and Aging Working Group, 1994	1991–1992	1,255 residents of Canadian nursing homes	Clinical examination of patient (incl. evaluation of memory, abstract thinking, judgment, aphasia)	57 37 (AD) 12 (Vascular)
Admission Cohorts				
Lewis et al., 1989	1984	569 first admissions and 368 readmissions to 45 nursing homes in southern California	Medical record diagnosis	38 (overall) 31 (first admit) 47 (readmit)
Rovner et al., 1990 German et al., 1992	1989	454 new admissions to 8 nursing homes in Baltimore, MD	Clinical examination of patient (incl. evaluation of cognitive performance), structured interview with staff and family	67
Garrard et al., 1993	late 1980s	1,118 admissions with at least 6-week stay to 30 nursing homes in Maryland	Medical record diagnosis	25
Engle & Graney, 1993	early 1990s	647 new admissions to 8 nursing homes in a mid-south city	Medical record diagnosis	39.7
Maryland Survey (present study)	1992–1995	2,285 new admissions to 59 nursing homes in Maryland	Expert panel review of medical record, mental status testing, family interview, staff interview	48–54

for greater confidence in the diagnoses that were made. To the extent that some dementia cases are included within the indeterminate group, our prevalence estimates are low. This has been accounted for,

in part, by estimating an upper bound for prevalence that includes interdeterminate cases where one panelist originally saw evidence of dementia. While the diagnostic strategy used in this study may not be ap-

appropriate for making individual treatment decisions, it is useful for estimating prevalence, monitoring the care of large groups of residents with dementia, and making planning and policy decisions. It also may be useful for identifying likely candidates for further clinical workup.

Identifying persons with dementia in a representative sample of new nursing home admissions represents an important first step in addressing the many issues in care required by this group, how this care differs from the care required by those without dementia, and the most appropriate setting in which to deliver this care to both groups. The present study indicates that approximately half of all persons 65 years and older entering a nursing home for the first time have dementia. Additional studies of health and health care sequelae of persons entering nursing homes and other long-term care settings are needed.

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Appendix

Information Used by Expert Panel to Diagnose Dementia^a

Area	Specific Measure	Source
Cognitive status	Mini-Mental State Examination (Folstein, Folstein, & McHugh, 1975)	Resident
	Blessed Dementia Scale (Blessed, Tomlinson, & Roth, 1968)	Family/Friend informant
Cognitive and functional decline	(Jorm & Korten, 1988; modified)	Family/Friend informant
Delirium	Confusion Assessment Method (Inouye, van Dyck, & Alessi, 1990)	Nurse informant
Physical functioning	Katz Activities of Daily Living Measure (Katz et al., 1963) (modified)	Nurse informant
Instrumental functioning	Older Americans Resources and Services Measure (Duke University Center for the Study of Aging and Human Development, 1978)	Family/Friend informant
Medical conditions	20 major comorbidities	Nursing home chart Nurse informant Family/Friend informant Nurse informant
Depression	Cornell Scale (Alexopoulos, Abrams, Young, & Shamoian, 1988a; 1988b, modified)	Resident
	Geriatric Depression Scale (Yesavage et al., 1983)	Family/Friend informant
Social network and contact	Study questionnaires	Nurse informant
Behavior (i.e., aggression, passive hostility, attention-seeking, wandering, restlessness, fearfulness)	Psychogeriatric Dependency Rating Scale (Wilkinson & Graham-White, 1980)	Nurse informant
Demographic characteristics	Study questionnaire and nursing home chart	Family/Friend informant Nurse informant
Additional medical, functional, and social information (as available)	Nursing home chart	Hospital discharge summary Nursing home chart

^aAll information not available for all residents. Further discussion of information available to expert panel may be found in Magaziner et al., 1996.