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Medical Care

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Volume 37(1)

January 1999

pp 27-32

Health Utilities in Alzheimer's Disease: A Cross-Sectional Study of Patients and Caregivers

[Original Articles]

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Financial support provided by Pfizer, Inc.

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Received February 24, 1998; initial review completed March 31, 1998; accepted May 27, 1998.

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Abstract

Objectives. Although the broad impacts of Alzheimer's disease (AD) are increasingly recognized, little work has focused on the overall health-related quality of life experienced by Alzheimer's disease patients and their caregivers. The study had two main objectives: (1) to test the feasibility of measuring health utilities in Alzheimer's disease with a generic preference-weighted instrument using proxy respondents and (2) to assess the utility scores of Alzheimer's disease patients (and their caregivers) in different disease stages and care setting.

Methods. A cross-sectional study of 679 Alzheimer's disease patient/caregiver pairs was conducted at 13 sites in the United States: four academic medical centers, four managed care plans, two assisted living facilities, and three nursing homes. The Health Utilities Index Mark II (HUI:2) questionnaire was administered to caregivers of patients who responded both as proxies for patients and for themselves. Responses to the questionnaire were converted into a global utility score, between 0 and 1, using the HUI:2 multi-attribute utility function.

Results. Global utility scores varied considerably across patients' Alzheimer's disease stage: for the six stages assessed (questionable, mild, moderate, severe, profound, and terminal), mean utility scores were 0.73, 0.69, 0.53, 0.38, 0.27, and 0.14, respectively. In multiple regression analyses, Alzheimer's disease stage was a negative and significant predictor of utility scores for patients; setting did not exert an independent effect. Utility scores for the caregivers were insensitive to patients' Alzheimer's disease stage and setting.

Conclusions. Patients' Alzheimer's disease stage had a substantial influence on health utilities, as measured by the HUI:2. More research is needed to assess the validity of using proxy respondents.

Despite the growing prevalence of Alzheimer's disease (AD) in the United States and the high costs associated with the illness, little is known about the overall health-related quality of life (HRQL) experienced by AD patients and their families.^{1,2} Previous studies of HRQL in AD have focused on patients' cognitive, behavioral, and functional impairments or on caregiver stress and burden.^{3,4} At the time of this study, to our knowledge, no one had studied the HRQL of AD patients or their caregivers using preference-weighted instruments, which incorporate values or utilities for health outcomes and can be used in cost-effectiveness analyses to aid resource allocation decisions.^{5,6}

In this study, we evaluated health utilities associated with AD using the Health Utilities Index Mark II (HUI:2).⁷ The objectives were: (1) to test the feasibility of measuring health utilities in AD with a generic preference-weighted instrument using proxy respondents in telephone interviews and (2) to assess the health utilities of AD patients (and their caregivers) in different disease stages and care settings.

Methods

We conducted a cross-sectional study of AD patient/caregiver pairs at 13 sites in 9 states in the United States: four academic medical centers, four managed care organizations, two assisted living facilities, and three nursing homes. Data collection, which occurred between July 1996 and February 1997, was completed on 679 pairs ([Table 1](#)). All patients met the criteria of the National Institute of Neurological and Communicative Disorders and Stroke-Alzheimer's Disease and Related Disorders Association (NINCDS-ARDA) for probable AD.⁸ Patients were required to have a caregiver willing to be interviewed by telephone.

	Questionable CDR = 0.5 (n = 52)	Mild CDR = 1 (n = 194)	Moderate CDR = 2 (n = 230)	Severe CDR = 3 (n = 140)	Profound CDR = 4 (n = 50)	Terminal CDR = 5 (n = 13)
Patients						
Age, mean (SD)	77 (9)	78 (8)	82 (9)	83 (9)	84 (9)	82 (10)
% Female	44%	59%	70%	76%	74%	100%
% Married	60%	60%	40%	35%	38%	23%
% Finished high school	94%	79%	68%	69%	67%	73%
Setting						
Academic medical center	24	90	61	24	5	0
Managed care organization	20	57	47	13	9	4
Assisted living facility	7	38	55	49	11	1
Nursing home	1	9	67	54	25	8
Total	52	194	230	140	50	13
Caregivers						
Age, mean/(SD)	62 (15)	65 (13)	62 (14)	61 (14)	63 (13)	64 (12)
% Female	81%	66%	65%	60%	62%	39%
% Married	83%	81%	74%	80%	72%	92%
% Finished high school	90%	89%	93%	95%	88%	100%
Household income						
% Less than \$25,000	22%	29%	26%	19%	18%	25%
% \$25,000 to \$75,000	57%	49%	51%	52%	49%	75%
% Greater than \$75,000	22%	22%	24%	29%	33%	0%
Relationship to subject						
% Spouse	52%	55%	34%	26%	30%	23%
% Child	35%	36%	53%	59%	58%	62%
% Other	13%	9%	13%	16%	12%	15%

Table 1. Characteristics of Patients and Caregivers by Alzheimer's Disease Stage

Patients' AD stage was determined by clinicians using the Clinical Dementia Rating (CDR) scale, a global measure of memory, orientation, judgment, problem-solving, functioning in community affairs and hobbies, and personal care.⁹ The CDR classifies AD into one of six categories: questionable (CDR = 0.5), mild (CDR = 1), moderate (CDR = 2), severe (CDR = 3), profound (CDR = 4), or terminal (CDR = 5).

Caregivers assessed patients' HRQL as proxy respondents and also assessed their own HRQL. (Caregivers also were administered questionnaires about patients' and their own health status and health care utilization, caregiving time, and caregiving burden as part of a larger study.)¹⁰ Interviews were conducted by telephone by professional interviewers. Caregivers were defined as primary family members or friends who were actively providing day-to-day care or were knowledgeable about the patient's condition. For residents of assisted living facilities or nursing homes, paid caregivers in charge of day-to-day care provided information on patients' HRQL.

Health utilities were assessed with the HUI:2, a generic multi-attribute, preference-based system.⁷ The HUI:2 health-state classification system consists of seven health dimensions—sensation, mobility, emotion, cognition, self-care, pain, and fertility—with four to five levels of severity within each dimension. (Fertility was assumed to be unaffected in this study.) We used the HUI:2 because it provides a means of obtaining community-based preference weights, consistent with recommendations of the Panel on Cost-Effectiveness in Health and Medicine for

reference case analyses.¹¹ (Preference measurements for the HUI:2 were collected from a population sample in Hamilton, Ontario.) Health-state classification systems like the HUI:2 provide an indirect means of obtaining preference weights: patients and caregivers are assigned an HUI:2 classification based on responses to the questionnaire, and the prespecified preference weights then are applied. An advantage of the HUI:2 is that it is based on the standard gamble, which in turn is based on the axioms of von Neumann-Morgenstern utility theory.⁵ Thus, it produces utility scores. Also, unlike other preference-weighted, health-status classification systems (eg, Quality of Well-Being Scale, EuroQol), it contains cognition as a separate attribute, which may make it more sensitive to changes in AD stage.^{12,13}

Caregiver responses to the HUI:2 questionnaire for both patients and themselves were converted into a "global" utility score, measured between 0 and 1, using the HUI:2 multi-attribute utility function.⁷ We also calculated single-attribute utility scores, reflecting the relative desirability-on a scale of 0 to 1-for levels of function within each attribute.¹⁴ To examine the relation between AD stage and utility scores, we conducted ordinary least squares regression analyses using global utility scores as the dependent variable. We controlled for sociodemographic characteristics ([Table 1](#)) and several health status domains as measured by the Short-Form-36 scales, hypothesized to be potentially unrelated to AD (eg, physical functioning).¹⁵ We also tested logit forms of the model because they limit the predictions to the unit interval.

Results

[Table 2](#) presents the utility scores for patients and caregivers. Global utility scores for patients varied considerably across disease stage, from 0.73 in questionable AD to 0.14 in terminal AD. Single-attribute utility scores declined most dramatically with advancing AD for the cognition and self-care attributes and also decreased substantially for the sensation and mobility attributes. The global utility scores for caregivers were generally insensitive to AD stage, though they appeared slightly higher at the most severe end of the spectrum. Single-attribute utility scores for caregivers did not vary with disease stage.

	Questionable CDR = 0.5 (n = 52)	Mild CDR = 1 (n = 194)	Moderate CDR = 2 (n = 230)	Severe CDR = 3 (n = 140)	Profound CDR = 4 (n = 50)	Terminal CDR = 5 (n = 13)
Patients						
Global utility score	0.73	0.69	0.53	0.38	0.27	0.14
Single attribute utility scores						
Sensation	0.79	0.80	0.74	0.64	0.48	0.33
Mobility	0.93	0.94	0.84	0.79	0.59	0.24
Emotion	0.87	0.88	0.85	0.84	0.74	0.73
Cognition	0.75	0.66	0.44	0.18	0.08	0.00
Self-care	0.97	0.88	0.52	0.14	0.04	0.00
Pain	0.96	0.95	0.94	0.96	0.94	0.75
Caregivers						
Global utility score	0.88	0.87	0.87	0.86	0.90	0.93
Single attribute utility scores						
Sensation	0.90	0.89	0.90	0.88	0.90	0.90
Mobility	0.98	0.99	0.99	0.97	1.00	1.00
Emotion	0.93	0.93	0.92	0.93	0.94	0.97
Cognition	0.97	0.96	0.96	0.96	0.97	0.98
Self-care	1.00	0.99	0.99	0.99	1.00	1.00
Pain	0.95	0.94	0.96	0.95	0.97	0.99

Table 2. Health Utilities by AD Stage for Patients and Caregivers

In multiple linear regressions, AD stage was a negative and significant predictor of global utility scores for patients. Compared with mild AD, each successive unit increment in CDR score was associated with a decline of approximately 0.1 in utility score. (In general, logit forms of the model yielded similar predictions.) Setting did not exert an independent effect. In terms of global utility scores for caregivers, neither patients' CDR stage nor setting exerted an independent effect, though scores were slightly higher for caregivers of patients in the terminal AD stage ($P = 0.07$), relative to the mild stage.

Discussion [+](#)

The findings of this study illustrate opportunities and challenges in measuring health utilities in AD. On the one hand, caregivers seemed willing and able to complete the HUI:2 questionnaires by proxy and by telephone. Moreover, the HUI:2 discriminated well among AD stages. The results reveal the extensive consequences of AD on patients. Even patients in the questionable and mild categories (with mean utilities of 0.73 and 0.69, respectively) had notable decrements in utility scores compared with age-adjusted averages.^{16,17} Patients in the more advanced stages had much lower scores. As a basis for comparison, researchers have reported HUI:2 utility scores of 0.78 for adult brain tumor patients and 0.59 for profoundly deaf individuals, compared with the scores of 0.38, 0.27, and 0.14 for severe, profound, and terminal AD stages, respectively.^{18,19} The results could be used potentially in cost-effectiveness analyses of pharmacologic and nonpharmacologic interventions in AD.^{20,21}

On the other hand, we did not detect any independent effect of setting of care on utility scores for patients. Also, scores for caregivers did not vary with patient disease stage or care setting, despite numerous reports that link caregivers' mental and physical health to their burden of care.^{22,23} Overall, global utility scores for caregivers were similar to age-adjusted population

norms.^{16,17} These results simply could reflect the inability of the HUI:2 to detect subtle but important changes. The data suggest that utility scores for caregivers may improve slightly as patients enter the profound and terminal states.

There are a number of limitations to note. First, this was a cross-sectional study: one-time assessments in AD can be influenced by the vagaries of assessment conditions on a particular day.³ Future researchers might conduct longitudinal assessments to monitor changes in patients' and caregivers' utility scores and to test the ability of the measures to predict health service utilization and mortality.²⁴ Studies of other conditions have shown that worsening utilities are associated with higher service utilization and mortality.²⁴

There also may be questions about the representativeness of the sample population, because patients were drawn from selected sites and all had active caregivers.

The use of proxy respondents, although perhaps unavoidable given patients' cognitive and behavioral impairments, is also potentially problematic.^{3,25,26} For one, as in this study, proxies are often elderly themselves, and many are chronically ill.²⁵ Proxy respondents have been used successfully with the HUI previously—Mathias²⁷ recently reported moderate to high agreement on HUI scores in stroke patients and their family caregivers, for example—although more research on this practice is needed.

In general, proxies tend to rate disability higher than do patients.^{26,28} Less is known about proxies' ability to rate subjective information such as emotional health.^{25,26,28} In this study, we had limited knowledge about caregivers' ability to assess patients' physical or emotional health or the care with which they made assessments, factors that may affect the validity of ratings.³ Interestingly, the single-attribute utility scores least sensitive to AD stage were emotion and pain, perhaps the two attributes requiring the most subjectivity in proxy ratings. The use of paid versus unpaid caregivers to complete the HUI:2 questionnaire as proxy respondents also requires further investigation.

Another issue is that we did not consider direct utility assessments (eg, standard gamble, time tradeoff, or rating scale approaches) of respondents, which tend to yield higher scores than assessments with generic instruments such as the Quality of Well-Being Scale or HUI.^{29,30} Though they do not meet recommendations for reference case analyses, direct utility assessments could shed light on heterogeneity in respondents' sensitivities to particular aspects of AD.

Finally, researchers in the future should also consider using the HUI:3, which modifies the definitions of health attributes and allows for greater flexibility for health states worse than death (Feeny D. Personal communication. December 5, 1997).

Acknowledgments

The authors acknowledge the contributions of the site investigators and their staff at participating facilities: academic medical centers: Deborah Marin, MD, Mt. Sinai Medical Center, New York, NY; Murali Doraiswamy, MD, Duke University Medical Center, Durham, NC; Jeffrey Cummings, MD, University of California at Los Angeles School of Medicine, Los Angeles, CA; Andrew Satlin, MD, McLean Hospital, Belmont, MA; managed care plans: Joseph Seab, MD, The Kaiser Permanente Medical Center, Hayward, CA; Jeffrey Burl, MD, Fallon Clinic, Worcester, MA; Dale Schurle, MD, Health Partners, Bloomington, MN; Gregory Gorman, MD, Lovelace Medical Center, Albuquerque, NM; assisted living centers: Norma

Brownell, RN, Health Care Group, Oceanside, CA; Delores Moyer, RN, RNP, MSN, Elder Haus Concepts, Madison, WI; nursing homes: Richard Neufield, MD, Jewish Home and Hospital for the Aged, New York, NY; Jo Huey, BA, NHA, Evergreen Terrace Care Center, Lakewood, CO; Susan Gilster, RN, BGS, NHA, Alois Alzheimer's Center, Cincinnati, OH. The authors thank David Feeny, PhD, and Tom Kniesner, PhD for helpful comments.

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Key words: Alzheimer's disease; health-related quality of life; health utilities

Version: rel4.1.1, SourceID: 1.4582.1.679