

The Influence of Long-Term Care Insurance on the Likelihood of Nursing Home Admission

Tanya R. Gure, MD,^{*†‡} Mohammed U. Kabeto, MS,[§] and Kenneth M. Langa, MD, PhD^{*§}

OBJECTIVES: To determine the effect of long-term care (LTC) insurance on nursing home use.

DESIGN: Longitudinal analysis, 1998 to 2006 waves of the Health Retirement Study.

SETTING: Community-dwelling nationally representative sample.

PARTICIPANTS: Nineteen thousand one hundred seventy adults aged 50 and older, 1998 wave.

METHODS: Two groups of respondents were created at baseline: those with and without an LTC insurance policy. Respondents admitted to the nursing home from 1998 to 2006 were identified. Propensity scores were used to control for known predictors of LTC insurance possession. A Cox proportional hazards model was used to compare the probability of nursing home admission over 8 years of follow-up for respondents possessing LTC insurance and those without a policy.

RESULTS: Of the 19,170 respondents aged 50 and older in 1998, 1,767 (9.2%) possessed LTC insurance. A total of 1,778 (8.5%) were admitted to a nursing home during the 8-year period: 149 (8.7%) of those with LTC insurance and 1,629 (8.4%) of those without LTC insurance. The hazard ratio, adjusted for propensity score, for those with LTC insurance entering a nursing home compared with those without was 1.07 (95% confidence interval = 0.83–1.38). Likelihood of nursing home admission was relatively low because the low-risk population included in the study, limiting the power to detect small differences in risk of nursing home utilization between groups.

CONCLUSION: There was no difference in nursing home utilization between low-risk older adults who did and did

not possess an LTC insurance policy. *J Am Geriatr Soc* 57:1862–1867, 2009.

Key words: long-term care insurance; long-term care; nursing home utilization

Nursing home care has become an essential component of chronic care delivery to older adults; 43% of older adults will use nursing home care at some point in their lives.¹ Nursing home care is the most expensive type of long-term care (LTC) service and accounts for approximately 70% of total LTC expenditures.² The Congressional Budget Office projects that expenditures for nursing home services will grow rapidly in the next 10 years.³ These growing expenditures will create further financial pressures on individuals, families, and public programs such as Medicaid and Medicare.

The goal of this study was to better understand the effect of LTC insurance on nursing home use in a nationally representative sample of older Americans. A longitudinal analysis of nursing home use over an 8-year time period was performed in individuals aged 50 and older who did and did not have LTC insurance. The lack of an increase in nursing home utilization among LTC insurance policyholders compared to nonpolicyholders may suggest that expansion of LTC insurance ownership would not increase the total costs for long-term care.

It was hypothesized that LTC insurance policyholders would use nursing homes more than those who did not possess an LTC insurance policy primarily because of the principles of moral hazard and adverse selection. Moral hazard refers to the observation that insured individuals are more likely to increase utilization or spending because of the lower user price for covered LTC services. LTC insurance policyholders may be more likely to use nursing home care if they have insurance coverage for such a service. Moreover, economists have observed that individuals who have a private knowledge that they are at high risk for an insurable event tend to buy insurance more than low-risk

From the ^{*}Center for Practice Management and Outcomes Research, Department of Veterans Affairs Ann Arbor Healthcare System, Ann Arbor, Michigan; and [†]RWJ Clinical Scholars Program and Divisions of [‡]Geriatric Medicine, and [§]General Internal Medicine, University of Michigan, Ann Arbor, Michigan.

Earlier versions of this work were presented at the American Geriatrics Society 2007 National Meeting and the RWJ Clinical Scholars 2006 Annual Meeting.

Address correspondence to Tanya Ruff Gure, Division of Geriatric Medicine, 300 North Ingalls Bldg, Rm 900, Ann Arbor, MI 48109.

E-mail: tanruff@med.umich.edu

DOI: 10.1111/j.1532-5415.2009.02433.x

individuals.⁴ In the LTC insurance market, this adverse selection would lead to a higher rate of LTC insurance purchase by those more likely to enter a nursing home. The goal of the analysis was to determine whether owning an LTC insurance policy was associated with greater likelihood of using nursing home services.

METHODS

Data

Data were used from the 1998, 2000, 2002, 2004, and 2006 waves of the Health and Retirement Study (HRS), a biennial longitudinal survey of a nationally representative cohort of the U.S. population aged 50 and older. Of the 21,384 respondents who participated in the 1998 interview, 20,138 community-dwelling respondents were aged 50 and older at the 1998 interview. Proxy respondents completed surveys in some cases when participants were unable to respond (1,544 (7.3%) in the 1998 wave). Of the 20,138 respondents, 520 (2.6%) did not participate in any of the four interviews after the 1998 interview or were not known to have died; these individuals were excluded from the analysis.

Respondents were classified as nursing home residents if they entered a nursing home before death or last participation date. In addition to the indicator variable for nursing home admission, the number of days between the 1998 interview date and the nursing home admission date was calculated. For respondents who were not admitted to a nursing home by the 2006 interview, the number of days between the 1998 and 2006 interview date was calculated. The number of months to nursing home admission was calculated by dividing the number of days by 30.4. For individuals who left the study or died before they were admitted to a nursing home, the number of months was calculated between the 1998 interview date and the last interview date or time of death. Two hundred forty-four respondents were further excluded, because the total number of months was negative, 0, or missing. Those who died within 1 week of entering a nursing home were also excluded. Two hundred four individuals who were missing one or more predictor variables were further excluded, leaving 19,170 individuals. This sample was representative of 64.8 million community-dwelling Americans aged 50 and older in 1998. The calculated minimum detectable hazard ratio was 1.66, based on an assumption of 80% power and a two-sided alpha significance of .05.

Event (Nursing Home Admission) Variables

The sample was restricted to people who were living in the community during the baseline 1998 interview. Respondents were considered to have entered a nursing home if they answered “yes” to the following question at any of the follow-up waves: “In the last 2 years, have you been a patient overnight in a nursing home, convalescent home, or other long-term healthcare facility?” Although multiple transitions in and out of a nursing home are possible, for the purpose of this analysis, only a respondent’s first admission to a nursing home during the follow-up period was considered. Respondents were classified into two groups: those who entered a nursing home during the course of study and those who did not.

Classification of LTC Insurance

All respondents were asked at the baseline interview, “Not including government programs, do you now have any insurance which specifically covers any part of personal or medical care in your home or in a nursing home for a year or more?” This question was used to classify a respondent as currently owning LTC insurance. Information was not available on the type of coverage available within each respondent’s LTC insurance policy.

Independent Variables

The sociodemographic variables included in the analysis as independent variables were age (50–59, 60–69, 70–79, ≥80), race, sex, income, living arrangement (married, unmarried living with others, and unmarried living alone), net worth, and level of education. Self-reported comorbid illnesses included were hypertension, lung disease (asthma or chronic obstructive pulmonary disorder), stroke, cancer, diabetes mellitus, and psychiatric problem. Because there is no clear distinction between whether respondents received subacute or LTC services, self-reported hospital length of stay just before nursing home admission, categorized as short and long, was included as an additional variable that might influence the type of nursing home care that a respondent receives. A hospital length of stay of less than 7 days was defined as short; 7 days or longer was long. Geriatric conditions such as urinary incontinence and injury by fall were also self-reported. Additionally, cognitive impairment consistent with dementia was defined based on poor performance on a cognitive screening test for self-respondents or a report of “fair or poor memory” as assessed by a proxy respondent.⁵

A respondent was considered to have a disability in an activity of daily living (ADL: bathing, dressing, eating, toileting, and walking) if they reported having difficulty with ADLs or requiring assistance. Disability in an instrumental activity of daily living (IADL: grocery shopping, preparing meals, taking medication, managing money, and making phone calls) was defined as having difficulty performing the IADL without help or not doing an IADL because of a health problem.

Respondents were classified as receiving informal care if they reported that a relative (paid or not) or unpaid non-relative with no organizational affiliation had provided in-home care in the previous month. Formal care was identified for those reporting in-home care performed in the previous month by a paid nonrelative or someone with an organizational affiliation.⁶

Analytical Framework

Conventional Multivariable Regression Model

Bivariate analyses were performed to determine the association between the baseline variables and LTC insurance possession. Also, a Cox proportional hazards model was used for multivariate analyses to determine the risk of nursing home admission according to LTC insurance status over the 8-year follow-up period. Estimated survival probabilities were computed using a product limit formula based on the Kaplan-Meier method.⁷ All analyses were weighted and adjusted for the complex sampling design of the HRS using STATA 9.1 (StataCorp., College Station, TX) and

Table 1. Respondent Characteristics at Baseline in 1998 Survey Wave, According to Possession of Long-Term Care (LTC) Insurance, Before and After Adjusting for Propensity Score (PS)

Characteristic	No LTC Insurance (N = 17,403)	LTC Insurance (N = 1,767)	P- Value	P-Value After PS Matching
Proxy respondents	1,456 (7.5)	88 (4.6)	<.001	
Nursing home stay before baseline	223 (1.1)	23 (1.3)	.7	>.3
Informal care received in prior month	2,156 (11.2)	129 (6.7)	<.001	>.3
Formal care received in prior month	388 (2.0)	25 (1.4)	.1	>.3
Age			.02	>.3
50–59	5,321 (38.4)	470 (34.1)		
60–69	5,789 (27.8)	615 (28.9)		
70–79	4,191 (23.4)	497 (27.7)		
≥80	2,102 (10.4)	185 (9.3)		
Sex			.1	>.3
Male	7,539 (44.9)	752 (43.2)		
Female	9,864 (55.1)	1,015 (56.8)		
Race			<.001	>.3
White	14,296 (87.0)	1,561 (92.0)		
Black	2,483 (9.4)	175 (6.1)		
Other	624 (3.6)	31 (1.9)		
Education, years			<.001	>.3
<12	5,510 (27.7)	262 (13.3)		
12	5,845 (34.1)	605 (32.9)		
>12	6,048 (38.2)	900 (53.8)		
Living arrangement			<.001	>.3
Married	11,368 (63.4)	1,260 (69.0)		
Unmarried living with other	2,194 (13.1)	136 (8.0)		
Unmarried living alone	3,841 (23.6)	371 (23.0)		
Net worth, \$			<.001	.07
≤41,000	4,733 (25.7)	190 (10.8)		
41,001–127,600	4,467 (25.2)	369 (20.1)		
127,601–317,300	4,267 (25.4)	471 (26.2)		
≥317,301	3,936 (23.8)	737 (42.9)		
Chronic conditions				
Blood pressure	8,235 (44.8)	793 (42.3)	.08	>.3
Diabetes mellitus	2,526 (13.2)	225 (11.7)	.1	>.3
Lung disease	1,622 (8.8)	127 (6.7)	.008	>.3
Heart disease	3,580 (19.3)	334 (16.9)	.007	>.3
Cancer	1,908 (10.5)	206 (11.2)	.5	>.3
Stroke	1,190 (6.4)	92 (4.5)	.001	>.3
Psychiatric problem	2,395 (13.6)	192 (11.0)	.01	>.3
Urinary incontinence	2,751 (15.2)	321 (18.3)	.004	>.3
Arthritis	9,313 (50.5)	927 (49.7)	.7	>.3
Injury by fall	931 (5.0)	76 (4.1)	.1	>.3
Cognitive impairment	1,737 (8.4)	79 (3.8)	<.001	>.3
Number of activity of daily living impairments			<.001	>.3
0	13,964 (81.7)	1,517 (87.3)		
1–3	2,716 (14.5)	208 (10.9)		
4–6	723 (3.8)	42 (1.8)		
Number of instrumental activity of daily living impairments			<.001	>.3
0	14,973 (87.2)	1,608 (91.4)		
1–3	2,058 (11.0)	139 (7.7)		
4–5	372 (1.8)	20 (0.9)		

Table 2. Association Between Long-Term Care (LTC) Insurance Possession and Nursing Home Admission, According to Propensity Score (PS) Quintile Subclassification, Adjusted for PS Alone and PS and Net Worth

Quintile of Propensity Score	LTC Insurance n (%)	Hazard Ratio (95% Confidence Interval)	
		Adjusted for PS	Adjusted for PS and Net Worth
1	105 (2.6)	1.08 (0.64–1.84)	1.09 (0.64–1.88)
2	240 (6.5)	0.70 (0.41–1.19)	0.70 (0.41–1.18)
3	339 (8.9)	1.21 (0.76–1.93)	1.17 (0.73–1.88)
4	414 (10.2)	1.24 (0.84–1.83)	1.24 (0.84–1.81)
5	669 (17.5)	1.10 (0.71–1.72)	1.16 (0.76–1.77)
Entire sample	1,767 (9.3)	1.07 (0.83–1.38)	1.08 (0.84–1.39)

SUDAAN 9.0 (Research Triangle Institute, Research Triangle Park, NC).

Propensity Score Methods

Multivariate Cox proportional hazards regression models are useful for controlling for confounders and predicting an outcome but do not ensure that the study groups are well matched in the probability of LTC insurance possession. The propensity score (PS) for LTC insurance possession was estimated using logistic regression. The PS model includes all baseline characteristics represented in Table 1. The model discriminated fairly well (area under the receiver operating characteristic curve = 0.67). The PS for each respondent represents the probability of possessing an LTC insurance policy. PS analysis allows a ready assessment of comparability of the two groups. The influence of LTC insurance on nursing home admission was analyzed using the Cox proportional hazards regression model within each quintile of propensity scores and the entire sample, controlling for the PS alone and then PS and net worth.^{8,9} Kaplan-Meier curves were plotted for the respondents with and without LTC insurance and with and without adjusting for the propensity score.

RESULTS

Sample Characteristics

Of the 19,170 respondents aged 50 and older in 1998, 1,767 possessed LTC insurance, and 17,403 did not. A total of 1,778 (8.5%) were admitted to a nursing home during the 8-year period: 149 (8.7%) of those with LTC insurance and 1,629 (8.4%) of those without.

Table 1 presents the baseline characteristics according to LTC insurance status. LTC insurance policyholders tended to be aged 60 to 79 and white, have more than 12 years of education, be married, and have higher net worth ($P < .05$). In addition, LTC insurance policyholders were less likely to have received informal care in the month before the baseline interview. Baseline formal care utilization was not significantly different between the two groups. Both groups had a similar likelihood of nursing home admission in the prior 2 years. In addition, respondents with LTC insurance were less likely to have an ADL or IADL limitation than those without.

With adjustment according to propensity score, all covariates were balanced within each stratum except net worth (Table 1). Table 2 describes the Cox proportional hazards outcome models predicting the risk of nursing

home admission within each quintile of propensity scores and then the entire sample. With the exception of the second quintile, respondents with LTC insurance were more likely to be admitted to a nursing home over the 8-year period, but this was not found to be statistically significant. A similar finding resulted when examining the entire sample (hazard ratio (HR) = 1.07, 95% confidence interval (CI) = 0.83–1.38). Because net worth was still unequally balanced between respondents with and without LTC insurance despite quintile subclassification according to propensity score, net worth was controlled for within each quintile of the Cox models, and similar HRs were observed (Table 2). No significant difference in nursing home admission was found in the group at highest risk for nursing home admission, the 5th quintile of the propensity-matched analysis.

One hundred forty-nine respondents (8.7%) with LTC insurance and 1,629 (8.4%) without entered a nursing home over the 8-year period. The times to first nursing home admission were compared by plotting the corresponding estimates of the survivor function on the same axes. The Kaplan-Meier estimates of the survivor function for the two groups of survival time were not adjusted for the propensity score (Figure 1). The figure shows that respondents without LTC insurance were slightly more likely to enter a nursing home than respondents with LTC insurance, but this was not statistically significant. In the adjusted analysis (not shown), respondents with and without LTC

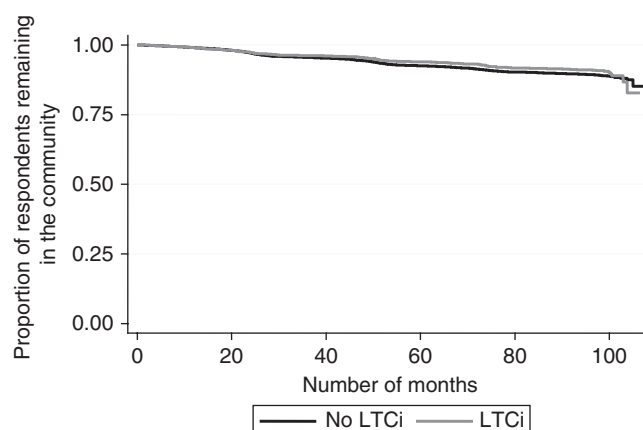


Figure 1. Kaplan-Meier survival estimates, according to long-term care insurance (LTCi) possession, unadjusted.

insurance had nearly the same risk for nursing home admission during the follow-up period.

Receipt of Formal In-Home Caregiving

The unadjusted receipt of formal in-home caregiving over the 8-year study period was further examined to determine whether respondents with LTC insurance were using more formal in-home care to offset the need for nursing home care. During the 8-year study period, 9.3% of those without LTC insurance reported using formal in-home care services at least once after the 1998 interview, compared with 7.1% of respondents with LTC insurance.

DISCUSSION

Older Americans, their families, and state and federal programs are bearing the ever-increasing cost of nursing home care. Although promotion of LTC insurance ownership, through private purchase or public programs, is far from a cure-all in solving the LTC financing dilemma, its potential to alleviate the financial strain facing middle-income older adults who require institutional care for basic care or chronic illness needs is appealing. Longitudinal analysis of a nationally representative sample was used to determine the effect that LTC insurance status has on nursing home admission. The findings suggest that LTC insurance was associated with a slight increase in likelihood of nursing home admission, but this difference was not statistically significant.

It was surprising to find that, despite similar probabilities of being admitted to a nursing home, LTC insurance policyholders used less formal care than nonpolicyholders. The LTC insurance population might have had fewer daily personal and skilled care requirements, because they were healthier than respondents without LTC insurance.^{10,11} Also, the similar likelihood of nursing home admission for those with and without LTC insurance suggests that home- and community-based services may be inadequate once an older adult's personal and medical care needs exceed what informal and formal caregivers can provide. This "tipping point," at which time nursing home care is necessary, may be similar for older adults irrespective of LTC insurance status.

Several factors may explain the lack of a significant relationship between possession of a LTC insurance policy and nursing home admission. First, the PS model had only fair predictive power, resulting in hidden bias that could not be fully adjusted. Second, the likelihood of nursing home admission was relatively low because of the generally low-risk population included in the study. Consequently, the study had insufficient power to detect such a relationship. Thus, these nonsignificant findings could be due to chance.

This study had a number of limitations that warrant comment. First, admission to nursing home during the 8-year study period was used as an indicator of future utilization, but total utilization could differ. It is possible that respondents with LTC insurance may have longer lengths of stay or more-frequent admissions over time. Information was not available on the type of coverage available within each respondent's LTC insurance policy. Comprehensive coverage has become increasingly popular since the late 1990s. In 1995, approximately 61% of LTC insurance policies allowed for benefits to be spent in a variety of settings, including nursing home, assisted living, and in-home care

services, whereas 33% of policies covered nursing home care alone, and 6% covered home health care alone. By 2005, comprehensive coverage of nursing home and home health care increased to 90%.^{12,13} Thus, the assumption that the majority of LTC insurance policies are mixed is likely to be accurate.

Patient self-report can be subject to error as a result of a variety of factors, including recall, social desirability, and patient health knowledge. Respondent knowledge of LTC insurance status was of particular concern. Prior work on the validity of related HRS survey questions regarding health insurance enrollment status showed that 7% to 11% of respondents in the 1996 to 2000 waves were reclassified as having some form of health insurance as a result of the validation question.¹⁴ Additionally, self-reported enrollment in Medicare Part B (89%) was lower than the enrollment figure reported by the Centers for Medicare and Medicaid Services (93%) in the 1993 to 1995 Asset and Health Dynamics Survey.¹⁵ Similar validity with the LTC insurance question is likely. Other sources of data suggest that the HRS question on LTC insurance provides a good estimate of policy possession in the population. It was estimated that 1,767 (9.2%) of older adults aged 50 and older in the baseline 1998 wave had an LTC insurance policy based on the HRS survey question. Estimates published between 2000 and 2002 by the U.S. Government Accountability Office document similar estimates, ranging from 9% to 10%.^{16,17}

Currently, there are multiple barriers to increasing the public's desire to purchase an LTC insurance policy that other investigators have described well.¹⁸⁻²¹ Additionally, state-sponsored LTC insurance policy ownership programs are controversial and have had a slow national uptake since their inception in the early 1990s. The continued development of state initiatives to promote LTC insurance ownership will ultimately rest on whether these programs can be cost neutral or cost saving to state governments. In this population of older adults at low risk for nursing home use, it was found that possessing an LTC insurance policy was associated with a slightly greater likelihood of nursing home care, but the study had limited power to detect small differences in risk. This finding suggests that expansion of LTC insurance ownership would not have a large effect on nursing home costs. Given the likely increase in demand for LTC services in the coming decades, future studies with greater power to detect differences are needed to better clarify the effect of LTC insurance ownership on service utilization and costs.

ACKNOWLEDGMENTS

Conflict of Interest: The editor in chief has reviewed the conflict of interest checklist provided by the authors and has determined that the authors have no financial or any other kind of personal conflicts with this paper.

The National Institute on Aging (NIA) provided funding for the HRS (U01 AG09740), data from which were used for this analysis. The HRS is performed at the Institute for Social Research at the University of Michigan. Dr. Langa was supported by grants from the NIA (K08 AG19180 and R01 AG027010) and a Paul Beeson Physician Faculty Scholars in Aging Research award. Dr. Gure was supported by the Department of Veterans Affairs Center for Practice

Management and Outcomes Research, RWJ Clinical Scholars Program, John A. Hartford Foundation, and NIA Diversity Supplement award (R01 AG027010-02S1).

Author Contributions: Dr. Gure and Dr. Langa: study concept and design, analysis and interpretation of the data, and preparation of manuscript. Mr. Kabeto: study design and analysis and interpretation of the data.

Sponsor's Role: None.

REFERENCES

1. Kemper P, Murtaugh CM. Lifetime use of nursing home care. *N Engl J Med* 1991;324:595–600.
2. Older Americans 2004: Key Indicators of Well-Being. Federal Interagency Forum on Aging-Related Statistics. Washington, DC: US Government Printing Office, 2004.
3. The Cost and Financing of Long-Term Care Services. Washington, DC: Congressional Budget Office, 2005.
4. Finkelstein A, McGarry K. Multiple dimensions of private information: Evidence from the long-term insurance market. *Am Econ Rev* 2006;96:938–958.
5. Langa KM, Larson EB, Karlawish JH et al. Trends in prevalence and mortality of cognitive impairment in the United States: Is there evidence of a compression of cognitive morbidity? *Alzheimers Dement* 2008;4:133–144.
6. Norgard TM, Rodgers WL. Patterns of in-home care among elderly black and white Americans. *J Gerontol B Psychol Sci Soc Sci* 1997;52Spec No:93–101.
7. Kaplan EL, Meier P. Nonparametric estimation from incomplete observations. *J Am Statistical Assoc* 1958;53:363–390.
8. Rubin DB, Thomas N, Rubin DB et al. Matching using estimated propensity scores: Relating theory to practice. *Biometrics* 1996;52:249–264.
9. Sundararajan V, Mitra N, Jacobson JS et al. Survival associated with 5-fluorouracil-based adjuvant chemotherapy among elderly patients with node-positive colon cancer. *Ann Intern Med* 2002;136:349–357.
10. Cohen MA, Miller J, Weinrobe M. Patterns of informal and formal caregiving among elders with private long-term care insurance. *Gerontologist* 2001;41:180–187.
11. Cohen MA, Miller J. The Impact of Private Long-Term Care Insurance on Claimants: Formal and Informal Care in the Community: Center for Home Care Policy and Research, Visiting Nurse Service of New York; Spring 2002.
12. Who Buys Long-Term Care Insurance? A 15-Year Study of Buyers and Non-buyers 1990–2005. Washington, DC: America Health Insurance Association of America, 2007.
13. Cohen MA. Private long-term care insurance: A look ahead. *J Aging Health* 2003;15:74–98.
14. Baker DW, Sudano JJ, Durazo-Arvizu R et al. Health insurance coverage and the risk of decline in overall health and death among the near elderly, 1992–2002. *Med Care* 2006;44:277–282.
15. Wilson RT, Chase GA, Chrischilles EA et al. Hip fracture risk among community-dwelling elderly people in the United States: A prospective study of physical, cognitive, and socioeconomic indicators. *Am J Public Health* 2006;96:1210–1218.
16. Scanlon WJ. Long-Term Care Insurance: Better Information Critical to Prospective Buyers. Washington, DC: General Accounting Office, 2000.
17. Walker DM. Long-Term Care: Aging Baby Boom Generation Will Increase Demand and Burden on Federal and State Budgets. Washington, DC: General Accounting Office, 2002.
18. Cramer AT, Jensen GA. Why don't people buy long-term-care insurance? *J Gerontol B Psychol Sci Soc Sci* 2006;61B:S185–S193.
19. Wiener JM. Financing and organizational options for long-term-care reform: Background and issues. *Bull N Y Acad Med* 1986;62:75–86.
20. Wiener JM. Financing reform for long-term care: Strategies for public and private long-term care insurance. *J Aging Soc Policy* 1996;7:109–127.
21. Wiener JM, Hanley RJ. Long-term care financing: Problems and progress. *Annu Rev Public Health* 1991;12:67–84.