

Factors Associated With Long-term Institutionalization of Older People With Dementia: Data From the Canadian Study of Health and Aging

Réjean Hébert,¹ Marie-France Dubois,¹ Christina Wolfson,² Larry Chambers,³ and Carole Cohen⁴

¹Gerontology and Geriatrics Research Centre, Sherbrooke, Quebec, Canada.

²McGill University, Montreal, Quebec, Canada.

³McMaster University, Hamilton, Ontario, Canada.

⁴University of Toronto, Toronto, Ontario, Canada.

Background. In Canada, half the people with dementia live in institutions. Factors associated with institutionalization should be identified with the goal of implementing strategies not only to permit those with dementia to stay in their homes as long as is feasible but also to ensure that steps are taken for timely institutionalization when appropriate.

Methods. Informal caregivers of 326 individuals with dementia living in the community were identified and interviewed as part of the Canadian Study of Health and Aging (CSHA). These subjects were contacted again 2.5 and 5 years after the baseline interview to collect information on the status of their care recipients. Survival analyses using clinical data for the individuals with dementia and data from the interviews with their informal caregivers were carried out using Cox proportional hazard modeling to estimate the hazard ratio (HR).

Results. Over the 5-year period, 166 individuals with dementia (50.9%) were institutionalized and the median time to admission was 41 months. From the multivariate analysis, the factors significantly associated with institutionalization were: type of dementia (Alzheimer's disease: HR = 1.83), severity of disability (mild: 1.51; moderate: 2.34; total impairment: 4.02), caregiver's age over 60 (1.83), caregiver not a spouse or child (1.55), and severe caregiver burden (1.71). Caregiver's burden was associated with the care-receiver's behavioral disturbance (partial $r = .55$) and the caregiver's depressive mood ($r = .55$).

Conclusions. Screening caregivers for burden and depression and designing interventions to decrease the consequences of behavioral disturbance on caregivers would be relevant avenues to explore to decrease institutionalization of people with dementia.

MORE than 8% of people over the age of 65 suffer from Alzheimer's disease or other dementing illnesses (1). The prevalence climbs to more than 34% for those over 85 years of age. With the aging of the population and the baby boom cohort in Canada, the absolute number of individuals with dementia will increase dramatically, challenging health care systems. Dementia is associated with substantial costs (2), primarily due to institutionalization that will occur sooner or later during the course of the disease for the majority of sufferers. Whenever possible, however, it is preferable for these patients to remain in their homes, not only for economic reasons, but also because in doing so they are able to maintain the integrity of their social network, preserve environmental landmarks, and enjoy a better quality of life. Caring for these patients at home, however, is associated with a burden on the caregivers that jeopardizes the viability of continued home care. It is unclear at what point institutionalization becomes inevitable, and it is thus important to identify those factors associated with long-term institutionalization in order to design health and social strategies not only to permit those with dementia to stay in their homes as long as is feasible but also to ensure that steps are taken for timely institutionalization when appropriate.

Many factors have been identified as being associated with the institutionalization of elderly people with dementia (3,4). Some are related to the characteristics of the patient: i.e., severity of dementia, severity of disabilities, and behavior problems; while others are associated with characteristics of the caregivers: i.e., the burden of caregiving, physical health, and use of services. However, most studies carried out to date suffer from important limitations. All were carried out using samples of subjects with dementia either recruited from specialized clinics or Alzheimer's organizations or on a voluntary basis. Such convenience samples are likely to result in selection bias (varying by type of sample) and not be representative of the general population of dementia sufferers. Furthermore, a number of studies had relatively small sample sizes and/or followed subjects for a limited length of time, limiting the statistical power of the study. Yet others considered only a few potential factors related to patient or caregiver characteristics. The Canadian Study of Health and Aging (CSHA) is a population-based study that generated a large population-based sample of individuals with dementia living at home (1). Both the patients and their caregivers were assessed at baseline using a battery of standardized instruments and followed for 5 years. The objective of this article is to identify the factors leading

to long-term institutionalization for elderly people with dementia.

METHODS

The study methods used in the CSHA are described in detail elsewhere (1,5). In summary, the study sampled 9008 community-dwelling elderly people in 36 urban and surrounding rural areas across Canada from 1991 to 1992. Roughly 60% of Canadians 65 and over lived in the sample area. Subjects screened with a score below 78 (out of 100) on the Modified Mini-Mental State (3MS; 6,7) were referred for a complete clinical and neuropsychological examination. Dementia was then diagnosed and classified as mild, moderate, or severe according to the *Diagnostic and Statistical Manual of Mental Disorders, Revised Third Edition* (8). The diagnosis of specific types of dementia was made using the National Institute of Neurological and Communicative Disorders–Alzheimer's Disease and Related Disorders Association criteria (9) for Alzheimer's disease and *International Statistical Classification of Diseases, 10th Revision* (10) for vascular dementia.

For each individual with dementia, a primary informal caregiver was identified after discussion with the subject and his or her family. The primary informal caregiver was defined as the unpaid person perceived by the subject with dementia or the family as ordinarily being most responsible for the day-to-day decision making and provision of care to the individual with dementia. Caregivers who did not understand English or French were excluded.

Caregivers were interviewed by trained interviewers, typically in the caregiver's home. Sociodemographic data including age, sex, marital status, living arrangements, kinship tie to the person with dementia, number of health problems, and employment status were collected. The need of the person with dementia for assistance in activities of daily living (ADL) was assessed with the 14-item scale developed for the Older Americans Resources and Services project (11). A weighted four-category scale indicating the amount of assistance required (no impairment, mild, moderate/severe, total impairment) was constructed (11). Behavior problems experienced by the subject with dementia were assessed with the Dementia Behavior Disturbance (DBD) scale (12). Each item on this 28-item scale represents a behavior that the caregiver is invited to score according to its frequency over the previous week on a scale from 0 (never) to 4 (all the time). A total score out of 112 is calculated. The caregiver's depression was assessed by the Center for Epidemiologic Studies Depression scale (CES-D; 13,14). This scale rates the frequency of 20 depressive symptoms during the previous week on a 4-point scale (0 to 3). The health problems experienced by the caregiver were also recorded. Caregiver burden was evaluated using the Zarit Burden Interview (ZBI; 15), a 22-item questionnaire. Each item represents a feeling for which the subject is invited to score the frequency of occurrence on a 5-point scale ranging from 0 (never) to 4 (nearly always). A total score out of 88 can be calculated. From the CSHA data, Hébert and colleagues (16) showed that scores 18 and over represent severe burden (third quartile) and scores over 32 represent extreme burden (fourth quartile). The caregiver's desire to institutionalize was first explored with a general question, "Have you ever

thought of placing your relative in an institution?" Answers were scored on a 4-point scale from "not at all" to "seriously." Caregivers were then asked if they had discussed institutionalization with someone, visited an institution, or applied for placement (yes or no). This generated a 3-point scale: 1, never thought (or did not think seriously) about it; 2, thought seriously or very seriously about it, discussed it with someone, or visited an institution; and 3, applied for placement.

The subjects with dementia or their caregivers were contacted by phone 2.5 years after the baseline assessment. Surviving subjects and their caregivers were reassessed again 5 years after the initial assessment. For those study subjects who had died since the baseline assessment, an interview was conducted with the caregivers of decedents. During these two contacts, information was collected on dates of death or dates of admission to a long-term institution. When the exact dates were missing, a standardized procedure for imputation was applied using the middle of the range of plausible dates for the occurrence of the event (17). An institution was defined as a dwelling that offers some form of formal supervision. The definition includes nursing homes, homes for the aged, hospital stays longer than 3 months, chronic care beds, and psychiatric institutions. Temporary admission for convalescence or rehabilitation was not considered institutionalization.

Analysis

Bivariate analyses were first performed to investigate the prognostic value of each variable related to the subjects with dementia and those gathered from the caregivers. Survival analyses using Cox proportional hazard regression were carried out to identify factors associated with the time to institutionalization. Time to event was measured in months from the date of the baseline assessment to either the date of admission to an institution, the date of death (without prior institutionalization), or the date of the last contact. Subjects who died at home as well as subjects still at home after 5 years or lost to follow-up were treated as censored observations. Recognizing that death is a competing risk (18), we used the baseline ADL rating as a control variable in all analyses making the assumption that, conditional on the ADL rating, censoring was noninformative. Variables with p values $< .15$ were included in the multivariate analysis. A backward elimination procedure, controlled by the investigator and based on the likelihood ratio test, was applied to delete variables that ceased to be statistically significant ($p > .05$) in the presence of others. Graphical displays and diagnostic statistics were examined to check for violation of the proportionality assumption and detect the presence of influential observations (19). Suspecting from previous analyses (16) that burden and desire to institutionalize were intermediate variables, supplementary analyses were performed to describe their correlates and complete the model. For burden, a linear multivariate regression analysis was carried out, and for desire to institutionalize, a logistic multivariate regression analysis was carried out contrasting those who never thought seriously of placing their relative (score = 1) and those who had thought or had done something about it (scores = 2 and 3). All reported p values are two-sided. Data

analysis was performed with the SAS System (SAS Institute, Cary, NC) for Windows, version 6.12.

RESULTS

Of the 9008 community-dwelling subjects recruited in CSHA, 402 were diagnosed as having dementia. Of those, 5 subjects were institutionalized before we performed an interview with the caregiver and we were unable to perform an interview with the caregiver for 40 subjects because we were unable to identify or contact a caregiver or because he or she refused to participate. Twenty-two caregivers were, in fact, formal caregivers (paid) and these subjects were excluded, leaving 326 dementia sufferers for whom an informal caregiver agreed to be interviewed. Figure 1 summarizes the flow of the subjects. Of the 326 subjects, 166 (50.9%) were institutionalized over the 5-year follow-up period. The month of death or admission to an institution was missing for 1 and 36 subjects, respectively, and was thus imputed. Figure 2 presents the Kaplan Meier survival curve showing that the median time from the interview to institutionalization was 41 months (95% confidence interval 36–46).

Table 1 presents the relative risk (hazard ratio: HR) for each variable for both the bivariate and multivariate analyses. From statistical analyses, the factors found to be significantly associated with a shorter time to institutionalization were: disability in ADL (mild: adjusted HR = 1.51; moderate: 2.34; total: 4.02), probable or possible Alzheimer's disease (1.83), living in Quebec, the Prairies, or British Columbia (1.58), caregiver not a spouse or child (1.55), caregiver's age 60 and over (1.83), and severe caregiver burden (1.71). During the first year only, if the caregiver presented more than four health problems, the HR for institutionalization was 2.60. During the first 18 months, the desire to institutionalize was also significantly associated with shorter time to institutionalization (considered placement:

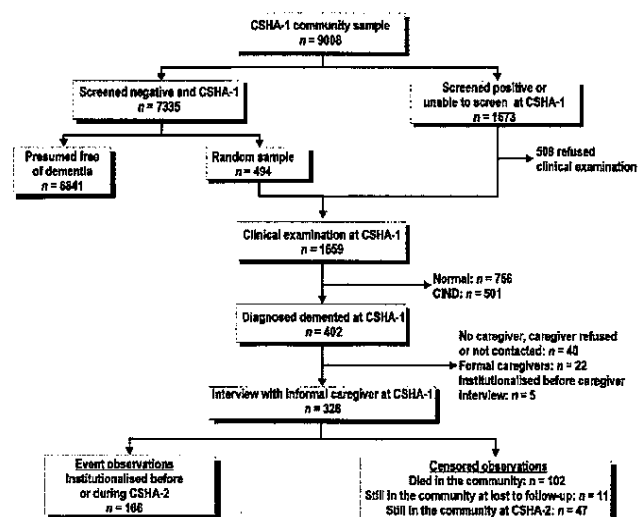


Figure 1. Flow of subjects in the study (Canadian Study of Health and Aging, 1991–1996). CSHA = Canadian Study of Health and Aging; CIND = cognitive impairment, no dementia. CSHA-1 refers to phase 1 of the CSHA study (baseline) and CSHA-2 refers to phase 2 (follow-up).

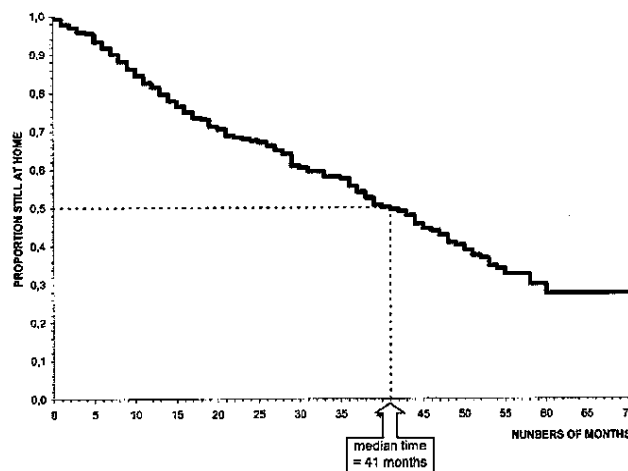


Figure 2. Kaplan-Meier survival curve of the time to admission to an institution (adjusted for activities of daily living rating) Canadian Study of Health and Aging, 1991–1996.

1.98; applied for placement: 4.74). After 18 months, this association was less apparent.

The correlates of caregiver burden are summarized in Table 2. In the multivariate analysis, only the behavior disturbance and the caregiver's depressive mood were significantly associated with caregiver burden as measured by the ZBI with similar partial correlation coefficients of 0.55. Together, these variables explained 60% of the variance in the burden.

The factors associated with the desire to institutionalize are presented in Table 3. In the multivariate analysis, the following variables were independently associated with an increased risk: moderate or severe dementia (adjusted odds ratio: 2.24), subject cannot be left alone (2.13), caregiver living with the subject (7.11), two or more services used (2.27), and caregiver burden (moderate: 1.64; severe: 3.12; extreme: 8.44).

DISCUSSION

Compared to previous studies, this study has many strengths. The data come from a population-based survey generating a representative sample of community-dwelling elderly people with dementia and their caregivers. Both patients and their caregivers were assessed using standardized instruments, leading to precise measurement of many variables thought to be associated with institutionalization. The power of the analyses was relatively high because the number of institutionalized subjects (166) allowed for detection ($\alpha = 0.05$) of an HR over 1.5 to 2.0, with a power of 80% depending on the proportion of subjects exposed to each factor. It must be acknowledged, however, that this study was carried out in Canada in the context of a public and universal health care system that includes coverage for long-term care institutions. Thus the generalizability of the results to other health care systems is not guaranteed.

In this study, the median time to institutionalization was 41 months, which is very similar to that of previous studies by Heyman and colleagues (20; around 42 months), Drachman and colleagues (21; 39 months) and O'Donnell and

Table 1. Risk Factors for Time to Institutionalization of Elderly People With Dementia (Canadian Study of Health and Aging, 1991–1996)

	Controlling for ADL Rating Only (<i>n</i> = 293)		Controlling for All the Other Variables in the Model (<i>n</i> = 293)	
	Hazard Ratio	95% Confidence Interval	Hazard Ratio	95% Confidence Interval
Subject's ADL rating:				
Excellent/good	1	Reference	1	Reference
Mild impairment	1.89	0.76–4.69	1.51	0.56–4.06
Moderate/severe impairment	2.99	1.30–6.86	2.34	0.93–5.86
Total impairment	4.69	2.00–11.00	4.02	1.53–10.57
Subject suffers from probable or possible AD	1.66	1.17–2.35	1.83	1.25–2.70
Quebec, Prairies, or British Columbia (vs Atlantic or Ontario)	1.77	1.28–2.45	1.58	1.10–2.26
Caregiver not spouse or child	1.40	0.99–1.98	1.55	1.06–2.28
Caregiver 60 years old or over	1.38	1.01–1.89	1.83	1.30–2.58
Severe or extreme caregiver's burden (ZBI score of 18 or over)	1.77	1.28–2.44	1.71	1.17–2.50
Caregiver has more than 4 health problems				
First year	2.78	1.57–4.95	2.60	1.39–4.87
After one year	0.77	0.41–1.44	0.74	0.37–1.47
Caregiver's desire to institutionalize				
First 18 months				
Hasn't thought about it seriously	1	Reference	1	Reference
Considered placement†	2.39	1.41–4.05	1.98	1.13–3.49
Applied for placement	4.70	2.55–8.67	4.74	2.52–8.94
After 18 months				
Hasn't thought about it seriously	1	Reference	1	Reference
Considered placement	1.91	1.19–3.05	1.67	1.00–2.80
Applied for placement	1.53	0.71–3.30	1.50	0.67–3.35
Subject suffers from moderate or severe dementia	1.59	1.13–2.23		NS‡
Subject's behavioral disturbance (DBD score)	1.02	1.01–1.03		NS
Caregiver lives with subject	1.38	1.00–1.91		NS
Caregiver's depressive mood (CES-D score)				NS
First year	1.04	1.01–1.07		
After one year	0.99	0.97–1.01		
Subject is incontinent (urinary)	1.07	0.74–1.54		Not included§
Subject's cognitive impairment (3MS score)	1.00	0.99–1.01		Not included
Subject cannot be left alone	0.92	0.60–1.39		Not included

Notes: ADL = activities of daily living; AD = Alzheimer's disease; ZBI = Zarit Burden Interview scale; DBD = Dementia Behavior Disturbance scale; CES-D = Center for Epidemiologic Studies–Depression scale; 3MS = Modified Mini-Mental State; NS = not significant.

†Has thought about it somewhat seriously, has discussed it with someone, or has visited an institution.

‡*p* > .05 in the multivariate analysis.

§Not included in the multivariate model because *p* > .15 in the bivariate analysis.

colleagues (22; more than 36 months). The present study also confirms other results that institutionalization is related more to the severity of disabilities experienced by the subjects with dementia (20,23–30) than to the severity of de-

mentia or cognitive impairment. However, the association between Alzheimer's disease and risk for institutionalization has been previously reported only by Scott and colleagues (25) using a large sample of subjects (*N* = 786) fol-

Table 2. Correlates of Burden: ZBI Score (Canadian Study of Health and Aging, 1991–1996)

	Percentage of Explained Variation (<i>n</i> = 300)	Partial Percentage of Explained Variation in the Multivariate Model (<i>n</i> = 300)
Subject's behavioral disturbance (DBD score)	0.40	0.30
Caregiver's depressive mood (CES-D score)	0.38	0.30
Caregiver's health problems (number)	0.17	NS†
Severity of subject's dementia (mild, moderate, or severe)	0.10	NS
Subject's functional impairment (none, mild, moderate, severe, or total)	0.09	NS
Subject's cognitive impairment (3MS score)	0.04	NS
Subject cannot be left alone (yes or no)	0.03	NS
Caregiver's relationship with subject (spouse, child, or other)	0.03	NS
Caregiver lives with subject (yes or no)	0.01	NS
Subject's type of dementia (probable AD, possible AD, VaD, or other)	0.01	Not included‡
Caregiver's age (in years)	0.002	Not included

Notes: ZBI = Zarit Burden Interview scale; DBD = Dementia Behavior Disturbance scale; CES-D = Center for Epidemiologic Studies–Depression scale; 3MS = Modified Mini-Mental State; AD = Alzheimer's disease; VaD = vascular dementia; NS = not significant.

†*p* > .05 in the multivariate analysis.

‡Not included in the multivariate model because *p* > .15 in the bivariate analysis.

Table 3. Correlates of Desire to Institutionalize: No Thought vs Consideration or Application for Placement (Canadian Study of Health and Aging, 1991–1996)

	Bivariate Association		Association in the Multivariate Model (<i>n</i> = 304)	
	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval
Subject suffers from moderate or severe dementia	3.41	2.15–5.49	2.24	1.23–4.12
Subject cannot be left alone	1.93	1.14–3.31	2.13	1.05–4.40
Caregiver lives with subject	3.57	2.24–5.77	7.11	3.75–14.06
Two or more services used (e.g., help for bathing, counselling)	3.97	2.46–6.49	2.27	1.27–4.08
Caregiver burden (ZBI score)				
low (1st quartile: 0–8)	1	Reference	1	Reference
moderate (2nd quartile: 9–17)	2.81	1.34–6.16	1.64	0.69–3.99
severe (3rd quartile: 18–32)	3.79	1.84–8.21	3.12	1.34–7.59
extreme (4th quartile: 33–88)	9.51	4.51–21.27	8.44	3.44–22.04
Subject's behavioral disturbance (DBD score)	1.06	1.04–1.08	NS [†]	
Caregiver's depressive mood (CES-D score)	1.03	1.01–1.06	NS	
Subject's ADL rating				
Excellent/good	1	Reference	NS	
Mild impairment	1.40	0.44–4.99		
Moderate/severe impairment	2.50	0.91–8.03		
Total impairment	3.12	1.10–10.29		
Subject's cognitive impairment (3MS score)	0.98	0.97–1.00	NS	
Subject is incontinent (urinary)	1.68	1.02–2.79	NS	
Caregiver's age (y)	0.98	0.96–0.99	NS	
Subject suffers from probable or possible AD	1.15	0.72–1.85	Not included [‡]	
Caregiver not a spouse or child	1.25	0.75–2.10	Not included	
Caregiver has more than 4 health problems	1.45	0.79–2.66	Not included	

Note: ZBI = Zarit Burden Interview scale; DBD = Dementia Behavior Disturbance scale; CES-D = Center for Epidemiologic Studies Depression scale; ADL = activities of daily living; 3MS = Modified Mini-Mental State; AD = Alzheimer's disease; NS = not significant.

[†]*p* > .05 in the multivariate analysis.

[‡]Not included in the multivariate model because *p* > .15 in the bivariate analysis.

lowed for 19 months. This is surprising given that Alzheimer's disease is associated with longer survival than vascular dementia and that there are well-structured support organizations dedicated to subjects with Alzheimer's disease and their caregivers as opposed to other types of dementia.

The fact that the risk for institutionalization was significantly higher in three regions of Canada than in Ontario and the Atlantic provinces is striking. This can be related to the availability of home-care services and long-term care beds. With the exception of Prince Edward Island and Manitoba (which constituted less than 25% of the Atlantic and Prairies region samples, respectively), the percentage of public expenditure and the per capita funding for home care are higher in Ontario and the Atlantic provinces than in the rest of Canada (31). Also, the Atlantic provinces and Ontario showed a lower rate of institutionalized elderly people (6.0 to 6.7%) than the national rate of 7.3%, according to the 1996 Canadian census (32).

This study confirms that caregiver burden is a strong predictor of institutionalization (28,30,33–38). The ZBI used in this and other previous studies (30,33,34) appears to be a good screening instrument for clinicians to identify caregivers at risk of giving up the home care of their family members with dementia. The shorter 12-item version proposed previously (16) showed the same HR (1.71) as the original version for scores associated with severe burden (more than 8 out of 48). Older caregivers were more at risk for giving up home care as previously reported by Nygaard (36). The fact that having a spouse as caregiver is a protective factor from institutionalization was also found by Colerick and George

(39) and Scott (25) and is probably explained by the emotional link between the caregiver and the care-receiver. According to our data, the same is true for being a child as opposed to Scott's study that showed a significant risk for the parent (adjusted odds ratio: 4.8) associated with being a child compared to being a spouse. Poor physical health of the caregiver is also an important short-term risk factor and this confirms the findings of previous studies (33,34).

Caregiver burden was more strongly correlated with the depressive mood of the caregiver and the behavior problems of the subjects with dementia than to cognitive or functional impairments or the severity of the dementia. This is consistent with most previous studies (30,40–43) and with studies that have shown that the psychological problems of the caregivers are more strongly associated with behavior problems than with functional or cognitive impairments (44).

The intermediate role of the desire to institutionalize is consistent with many studies that showed that this variable is a short-term predictor of institutionalization (34,36,45) and other studies reporting that this variable is associated with the severity of cognitive impairment (46), the caregiver's burden (34,46), and the utilization of services (34).

When these three sets of analyses are considered together, we can propose the model summarized in Figure 3. That is, institutionalization is determined by the type of dementia (i.e., Alzheimer's disease), the severity of disability, the age and kinship (not a child or spouse) of the caregiver, together with health problems and the level of burden experienced by the caregiver. Burden itself is often the result of behavior problems and is associated with the caregiver's depressive mood. The desire to institutionalize is related to the

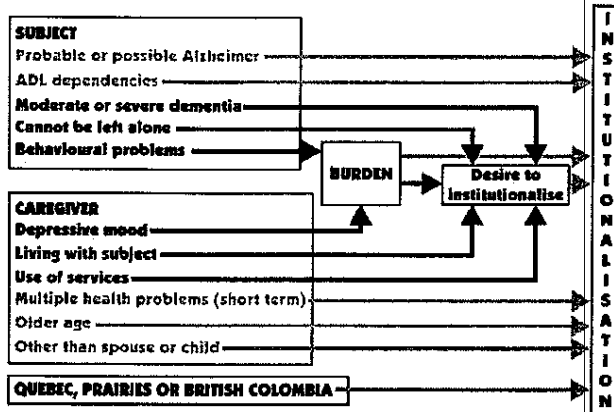


Figure 3. Proposed model of the risk factors associated with long-term institutionalization of older subjects with dementia. ADL = activities of daily living.

severity of dementia, the fact that the dementia sufferer cannot be left alone and that the caregiver lives with him or her, the caregiver burden, and the use of two or more home care services.

In conclusion, this study identified risk factors for institutionalization that should be considered in the assessment of patients with dementia, namely: severity of disabilities, Alzheimer's disease, old age of caregivers, no first-degree kinship of the caregiver with the patient, and poor health of the caregiver. The caregiver's burden, depressive mood, and desire to institutionalize should be assessed because they are strong predictors amenable to modification by specific interventions targeted especially toward managing the behavior problems of the dementia sufferers and treating the depressive mood of the caregivers (47).

ACKNOWLEDGMENTS

The data reported in this article were collected as part of the Canadian Study of Health and Aging. The core study was funded by the Seniors' Independence Research Program through the National Health Research and Development Program (NHRDP) of Health Canada (Project No. 6606-3954-MC[S]). Additional funding was provided by Pfizer Canada Inc. through the Medical Research Council/Pharmaceutical Manufacturers Association of Canada Health Activity Program, NHRPD (Project No. 6603-1417-302R), Bayer Inc., and the British Columbia Health Research Foundation (Projects No. 38 [93-2] and No. 34 [96-1]). The study was coordinated through the University of Ottawa and the Division of Aging and Seniors, Health Canada. The results reported in this article were presented at the Annual Meeting of the Canadian Association of Gerontology (Ottawa, November 1999).

Address correspondence to Dr. Réjean Hébert, Sherbrooke Geriatric University Institute, 1036 Belvédère Sud, Sherbrooke, Québec J1H 4C4, Canada. E-mail: rheber@courrier.usherb.ca

REFERENCES

1. The Canadian Study of Health and Aging Working Group. Canadian Study of Health and Aging: study methods and prevalence of dementia. *Can Med Assoc J*. 1994;150:899-913.
2. Øtsbye T, Crosse E. Net economic costs of dementia in Canada. *Can Med Assoc J*. 1994;151:1457-1464.
3. Dunkin JJ, Anderson-Hanley C. Dementia caregiver burden: a review of the literature and guidelines for assessment and intervention. *Neurology*. 1998;51:S53-S60; discussion: S65-S67.
4. Alloul K, Sauriol L, Kennedy W, et al. Alzheimer's disease: a review of the disease, its epidemiology and economic impact. *Arch Gerontol Geriatr*. 1998;27:189-221.
5. The Canadian Study of Health and Aging Working Group. Patterns of caring for people with dementia in Canada. *Can J Aging*. 1994;13:470-487.
6. Hébert R, Bravo G, Girouard D. Validation de l'adaptation française du Modified Mini-Mental State (3MS). *Rev Geriatr*. 1992;17:443-450.
7. Teng EL, Chui HC. The Modified Mini-Mental State (3MS) examination. *J Clin Psychiatry*. 1987;48:314-318.
8. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 3rd rev. ed. Washington, DC: American Psychiatric Association; 1987.
9. McKhann G, Drachman D, Folstein M, Katzman R, Price D, Stadlan EM. Clinical diagnosis of Alzheimer's disease: report of the NINCDS-ADRDA Work Group under the auspices of Department of Health and Human Services Task Force on Alzheimer's Disease. *Neurology*. 1984;34:939-944.
10. World Health Organization. *International Classification of Diseases and Related Health Problems*. 10th rev ed. Geneva, Switzerland: World Health Organization; 1992.
11. Fillenbaum GG. *Multidimensional Functional Assessment of Older Adults: the Duke Older Americans Resources and Services Procedures*. Hillsdale, NJ: Lawrence Erlbaum Associates; 1988.
12. Baumgarten M, Becker R, Gauthier S. Validity and reliability of the Dementia Behavior Disturbance Scale. *J Am Geriatr Soc*. 1990;38:221-226.
13. Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. *Appl Psychol Meas*. 1977;1:385-401.
14. Radloff LS, Teri L. Use of the CES-D scale with older adults. In: Brink TL, ed. *Clinical Gerontology: A Guide to Assessment and Intervention*. New York: Haworth Press; 1986.
15. Zarit SH, Orr NK, Zarit JM. *The Hidden Victims of Alzheimer's Disease: Families Under Stress*. New York: New York University Press; 1985.
16. Hébert R, Bravo G, Prévaille M. Reliability, validity and reference values of the Zarit's Burden Interview for assessing informal caregivers of community-dwelling older persons with dementia. *Can J Aging*. 2000;19:494-507.
17. Dubois MF, Hébert R. The imputation of missing dates of death or institutionalization for time-to-event analysis in the Canadian Study of Health and Aging. *Int Psychogeriatr Suppl*. In press.
18. Kalbfleisch JD, Prentice RL. *The Statistical Analysis of Failure Time Data*. New York: John Wiley & Sons; 1980.
19. Collett D. *Modelling Survival Data in Medical Research*. London: Chapman & Hall; 1994.
20. Heyman A, Peterson B, Fillenbaum G, Pieper C. Predictors of time to institutionalization of patients with Alzheimer's disease: the CERAD experience. Part XVII. *Neurology*. 1997;48:1304-1309.
21. Drachman DA, O'Donnell BF, Lew RA, Swearer JM. The prognosis in Alzheimer's disease. 'How far' rather than 'how fast' best predicts the course. *Arch Neurol*. 1990;47:851-856.
22. O'Donnell BF, Drachman DA, Barnes HJ, Peterson KE, Swearer JM, Lew RA. Incontinence and troublesome behaviors predict institutionalization in dementia. *J Geriatr Psychiatry Neurol*. 1992;5:45-52.
23. Knopman DS, Berg JD, Thomas R, et al. Nursing home placement is related to dementia progression: experience from a clinical trial. *Neurology*. 1999;52:714-718.
24. Juva K, Makela M, Sulkava R, Erkinjuntti T. One-year risk of institutionalization in demented outpatients with caretaking relatives. *Int Psychogeriatr*. 1997;9:175-182.
25. Scott WK, Edwards KB, Davis DR, Cormman CB, Macera CA. Risk of institutionalization among community long-term care clients with dementia. *Gerontologist*. 1997;37:46-51.
26. Severson MA, Smith GE, Tangalos EG, et al. Patterns and predictors of institutionalization in community-based dementia patients. *J Am Geriatr Soc*. 1994;42:181-185.
27. Hogan DB, Thierer DE, Ebly EM, Parhad IM. Progression and outcome of patients in a Canadian dementia clinic. *Can J Neurol Sci*. 1994;21:331-338.
28. Aneshensel CS, Pearlin LI, Schuler RH. Stress, role captivity, and the cessation of caregiving. *J Health Soc Behav*. 1993;34:54-70.
29. Steele C, Rovner B, Chase GA, Folstein M. Psychiatric symptoms and

- nursing home placement of patients with Alzheimer's disease. *Am J Psychiatry*. 1990;147:1049-1051.
30. Zarit SH, Todd PA, Zarit JM. Subjective burden of husbands and wives as caregivers: a longitudinal study. *Gerontologist*. 1986;26:260-266.
 31. Dumont-Lemasson M, Wylie M, Donovan C. *Provincial and Territorial Home-Care Programs: A Synthesis for Canada*. Ottawa, Ontario, Canada: Health Canada; 1999.
 32. Lindsay C. *A Portrait of Seniors in Canada*. 3rd ed. Ottawa, Ontario, Canada: Statistics Canada; 1999.
 33. Gold DP, Reis MF, Markiewicz D, Andres D. When home caregiving ends: a longitudinal study of outcomes for caregivers of relatives with dementia. *J Am Geriatr Soc*. 1995;43:10-16.
 34. Cohen CA, Gold DP, Shulman KI, Wortley JT, McDonald G, Wargon M. Factors determining the decision to institutionalize dementing individuals: a prospective study. *Gerontologist*. 1993;33:714-720.
 35. Jerrom B. MIRGPD: stress on relative caregivers of dementia sufferers and predictors of the breakdown of community care. *Int J Geriatr Psychiatry*. 1993;8:331-337.
 36. Nygaard HA. Who cares for the caregiver? Factors exerting influence on nursing home admissions of demented elderly. *Scand J Caring Sci*. 1991;5:157-162.
 37. Asada T. Analysis of breakdown in family care for patients with dementia [Japanese]. *Seishin Shinkeigaku Zasshi*. 1991;93:403-433.
 38. Lieberman MA, Kramer JH. Factors affecting decisions to institutionalize demented elderly. *Gerontologist*. 1991;31:371-374.
 39. Colerick EJ, George LK. Predictors of institutionalization among caregivers of patients with Alzheimer's disease. *J Am Geriatr Soc*. 1986;34:493-498.
 40. Baumgarten M, Battista RN, Infante-Rivard C, Hanley J, Becker R, Gauthier S. The psychological and physical health of family members caring for an elderly person with dementia. *J Clin Epidemiol*. 1992;45:61-70.
 41. Deimling GT, Bass DM. Symptoms of mental impairment among elderly adults and their effects on family caregivers. *J Gerontol*. 1986;41:778-784.
 42. Pearson J, Verma S, Nellett C. Elderly psychiatric patient status and caregiver perceptions as predictors of caregiver burden. *Gerontologist*. 1988;28:79-83.
 43. Pratt C, Schmall V, Wright S. Family caregivers and dementia. *Soc Casework*. 1986;67:119-124.
 44. Schulz R, O'Brien AT, Bookwala J, Fleissner K. Psychiatric and physical morbidity effects of dementia caregiving: prevalence, correlates, and causes. *Gerontologist*. 1995;35:771-791.
 45. Pruchno RA, Michaels JE, Potashnik SL. Predictors of institutionalization among Alzheimer disease victims with caregiving spouses. *J Gerontol*. 1990;45:S259-S266.
 46. Lund DA, Pett MA, Caserta MS. Institutionalizing dementia victims: some caregiver considerations. *J Gerontol Soc Work*. 1987;11:119-135.
 47. Mittelman MS, Ferris SH, Shulman E, et al. A comprehensive support program: effect on depression in spouse-caregivers of AD patients. *Gerontologist*. 1995;35:792-802.

Received October 23, 2000

Accepted October 25, 2000

Decision Editor: John E. Morley, MB, BCh

