

Predicting needs for nursing home admission – does sense of coherence delay nursing home admission in care dependent older people? A longitudinal study

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Objectives. This study examined predisposing, enabling and need variables (Andersen's Behavioral Model) influencing the need for nursing home admission (NHA) in older people receiving home nursing care. In particular, the potential role of coping ability, measured as 'sense of coherence' (SOC), was studied.

Design, sample, and measurements. A survey with baseline- and follow-up data after a 2-year period was undertaken with 208 patients aged 75+. The measures used were: gender, education, age, social visits, SOC, social provision scale (SPS), self-rated health (SRH), general health questionnaire (GHQ), clinical dementia rating (CDR), Barthel activities of daily living (ADL) index, and registered illnesses (RI). A Cox proportional model was used to examine factors that could explain risk of NHA.

Results. Measures with predictive properties were Barthel ADL index, SPS, SRH, and gender. SOC, along with subjective health complaints, general health questionnaire, RI and social visits did not predict NHA.

Conclusions. It is concluded that the patients' subjective evaluations of both their health and perceived social support were important predictors of future NHA needs, and should be seriously taken into consideration, along with the more commonly used objective measures of ADL and CDR.

Key words: Andersen's behavioral model, predicting nursing home admission, sense of coherence

Introduction

Many severely disabled older persons prefer to remain in their own homes instead of being cared for in a nursing home (Keysor *et al.*, 1999). Public health care providers also support this attitude because the costs associated with long-term institutional care are very high and are estimated to rise substantially in the years to come. Therefore, it is important to determine, what factors influence the risk of nursing home admission (NHA) for care dependent older persons.

The Andersen Behavioural Model has been the dominant model used to predict the use of health care services (Andersen, 1995). According to this framework, health services utilization is influenced by predisposing, enabling and need factors. Predisposing characteristics include demographic factors and health beliefs; enabling factors are personal, family and community resources; and need factors are identified as perceived or real health characteristics that predict health care use.

Several studies have investigated risk factors related to NHA based on the Andersen Behaviour Model. In these studies, Anderson's terminology has not been consistently operationalized or measured. This means that somewhat different variables have been studied in the different investigations. The demographic factors of 'higher age' and 'living alone' are often reported as significant predictors, while the influence of gender and economic status is still unclear (Mustard *et al.*, 1999; Miller & Weissert, 2000). The influence of social support on NHA is also complex, and it appears to vary depending on the type of support measured (Newman *et al.*, 1990; Jette *et al.*, 1995; Penning, 1995). Some research findings suggest that social support is relatively unimportant when it comes to service use (Friedman *et al.*, 2006). Others suggest that social support can both enhance and reduce reliance on formal services (Russell *et al.*, 1997; Miller & Weissert, 2000). With regard to need factors, increasingly poor performance of activities of daily living (ADL) (Miller & Weissert, 2000), poor self-rated health (SRH) (Weinberger *et al.*, 1986), high levels of psychological distress (Frojdth *et al.*, 2003; Harris & Cooper, 2006) and dementia/cognitive impairment (Nygaard & Albrektsen, 1992; Aguero-Torres *et al.*, 2001) consistently predict nursing home placement.

In this study, based on Andersen's Model, the predisposing factors were operationalized as: gender, age, education and sense of coherence (SOC). The enabling factors were

operationalized as: economic status, household composition, social network and perceived social support (SPS). Need factors were operationalized as: subjective health complaints (SHC), SRH, psychological distress (GHQ), clinical dementia rating (CDR), ADL, and reported illnesses (RI). The current study operationalizes the predisposing factor in Andersen's model by including presumed stress-buffering effects of a person's coping capacity as defined by Antonovsky. Antonovsky (1987) coined the term 'sense of coherence'. SOC is a general coping resource influencing how a person will cope with stressful events and environmental threats. A high level of SOC consists of the following components: comprehensibility (life makes sense); manageability (problems will be bearable); and meaningfulness (life is viewed as a challenge) (Antonovsky, 1987). A person possessing a strong SOC will be motivated to cope, will consider problems as challenges that are understandable and manageable, and will tend to perceive that he/she has resources available for solving problems. Therefore, it is reasonable to assume that persons with a high SOC will be motivated to continue to live in their own homes for a longer period than persons with a low SOC. In accordance with Antonovsky's theory, SOC has been found to be strongly related to perceived health, especially mental health (Eriksson & Lindstrom, 2006). In addition, it has been reported to predict future health outcomes, although these findings are not fully consistent (Eriksson & Lindstrom, 2005, 2006). Only a few studies have addressed the potential of SOC to predict health outcomes in care dependent older persons (Johansson *et al.*, 1994, 1998; Larsson *et al.*, 1995), and also these results were in accordance with the theory. No studies appear to have investigated whether SOC is a potential predictor of NHA among older people.

This study was conducted within the context of a 'Scandinavian welfare model', which implies that health care services are either fully tax funded or partially funded with limited co-payments. In-home nursing services are free of charge, provided around the clock, and aim to enable people to continue living in their own homes. Nursing homes are financed by co-payments that are determined by the income, but not the assets, of the person in need of care. Thus, economic considerations rarely influence preferences for home nursing care. In 2005, of 354 000 people aged 75 years and older, 19.7% received home nursing care, whereas 10.2% were cared for in long-term care facilities (Statistics Norway, 2005).

The Norwegian community care services consists of home help services, home nursing care, day-care centre programs, sheltered housing facilities, and nursing homes that include special care units for people with dementia. Nursing home care is the most expensive service. Therefore, predicting NHA is the focus of this study. Apart from one study (Nygaard & Albrektsen, 1992), that underlines the importance of cognitive impairment as a major risk factor, there are no other Norwegian studies dedicated to exploring risk factors for NHA in older people.

In the course of the last two decades, home nursing care has been the area with the largest growth within community care services. All patients participating in this study received regularly home nursing services. The nursing care mainly consisted of help with household tasks, personal hygiene, dressing, administration of medication, help with eating/drinking, change of bandages and wound dressings and general attention. Several of the participants also received home help services doing core home duties.

Cognitive impairment has been shown to be an extremely important risk factor influencing NHA, meaning that it is easy to predict NHA when a person has dementia (Heyman *et al.*, 1987, 1997). This study is unique in the sense that it concerns an older population that was cognitively intact at baseline, but in a situation of dependency on health care services. The objective of the study reported here was to examine how predisposing, enabling, and need factors influence the need for NHA in home care-dependent older persons; and in particular, to examine whether SOC is a predisposing factor influencing NHA.

Method

This study forms part of 'The European Union's fifth research program: Care for the aged at risk of marginalization (CARMA), Key action six: The ageing population and disabilities'. The study is a survey with baseline and follow-up data after a 2-year period.

Description of the sample

Persons were eligible for inclusion if they were aged 75 years or older, community dwelling, receiving home nursing care, able to understand the purpose of the investigation and able to give their informed consent. The only exclusion criterion was difficulties in conversing with the research assistant. This implied that persons with obvious cognitive impairments were excluded.

The actual population comprised of 348 individuals, all Caucasian, Lutheranian Protestants. In all, 78 (22.4%)

refused to participate, nine died, and nine were permanently institutionalized before data collecting took place. In 10 patients, data collection was not completed because of fatigue in the respondents, resulting in a baseline sample of 242. During the follow-up period, it was not possible to gather information from seven participants. In addition, all participants with missing data were excluded from the analysis, leaving a total sample of 208 persons (144 women and 65 men).

Sampling procedures

The setting for this study was seven municipalities in southern Norway. Random composition of participating municipalities was based on a stratified distribution according to representative classifications regarding industrial link, population density and centrality (Standard Classifications of Municipalities, 1994). Both rural and urban municipalities were included. In the populous municipalities, extraction of participants was done randomly, while in five rural communities, because of few patients, all were included.

The unit nursing officer (responsible for allocation of nursing care service) in each of the participating offices was asked to identify patients who fulfilled the inclusion criteria. Data collection took place in the participants' homes and was done by research assistants, all Registered Nurses and college staff members with no previous relations to the patients. Data collection was done by an interview. The research assistants filled in the participant's answers in the questionnaire forms. The collecting of data lasted about 90 minutes. Some data collection was completed over two or more sessions because of fatigue in the participants. Baseline data were collected during the period 1998–2001 and follow-up data 2 years later.

Outcome variable

The dependent variable was the time (in months) of continued community dwelling (living at home) ($n = 129$), measured from baseline to the date of death or permanent institutionalization in a nursing home ($n = 80$). Nursing home placement and death are competing risk processes. Therefore this analysis focuses on the first transition from living in the community.

Explanatory variables

Predisposing variables

Dummy variables were recorded for *gender* (men = 1, women = 2), and *education* (less than/or elementary school or continuation school = 1, and further education = 2).

Sense of coherence (Antonovsky, 1987) is a scale measuring coping resources and inner strength. Here, the 13-item version of the SOC questionnaire was used. SOC contains three sections: comprehensibility (five items), manageability (four items), and meaningfulness (four items). Antonovsky emphasized that the three components are dynamically interrelated; therefore the scale was developed to measure a global orientation and the components should not be measured as distinct constructs (Antonovsky, 1993). Each question is rated on a Likert scale ranging from 1 (lowest) to 7 (highest) level of coping resources, giving total scores from 13 (poor coping) to 91 (excellent coping). The SOC scale appears to be a reliable, valid, and cross-culturally applicable instrument (Eriksson & Lindstrom, 2005; Feldt *et al.*, 2007). Cronbach's alpha in the present study was 0.80.

Enabling variables

The participant's *economic status* was recorded by the question 'In general, do you have so much money that now and then you can buy something extra?' The answer categories were no (1) and yes (2). *Household composition* recorded if the patient was living with someone (1) or not (0). The social network variables were *Seeing children* and *Seeing friends*, both investigated by the question 'How often are you together with ...?' Answer categories for both questions were: irrelevant/never (0), practically never (1), once or a few times a year (2), 1–3 times a month (3), once a week (4), several times a week (5), or daily (6).

The Revised Social Provisions Scale (Cutrona *et al.*, 1986; Cutrona & Russell, 1987), was used to assess social support. The SPS is based on Weiss's theoretical model of the provisions of social relationships (Weiss, 1974). It consisted originally of six subscales; attachment, social integration, nurturance, reassurance of worth, reliable alliance, and guidance. According to Weiss, the provisions will have different meaning at various stages in life. The first four are of most importance to the oldest old and are therefore used in this study, as recommended by Cutrona and Russell (1987) and Bondevik and Skogstad (1998). Four statements assess each social provision. The total score for the complete 16-item version was used to assess the level of social support, and it ranged from 16 (low social support) to 64 (high social support). The internal consistency of the scale has proved to be good (Cutrona & Russell, 1987) and in the present study the standardized item alpha was 0.81.

Need variables

Subjective Health Complaints (Eriksen *et al.*, 1999) is a 30 item scale that registers subjective somatic and psychological complaints experienced during the past 30 days. The SHC

instrument measures subjective experience, occurrence, intensity, and duration of health complaints in five categories: musculoskeletal pain, pseudoneurology, gastrointestinal problems, allergy and influenza symptoms, but without reference to specific diagnostic categories (Eriksen *et al.*, 1999). Questions in the influenza and allergy categories were excluded as recommended by Eriksen and Ursin (1999), giving a total of 22 questions. The scores range from 0 to 3, giving a total score on the measurement from 0 (excellent) to 66 (poor). The questionnaire has satisfactory validity and reliability (Eriksen *et al.*, 1999). In the study reported here, the Cronbach's alpha was 0.84.

Self-rated health (Mossey & Shapiro, 1982) was measured by the question 'How is your health now?' The answer categories were 1 = poor, 2 = not very good, 3 = good, and 4 = very good. SRH is a good predictor of future health status as measured by mortality and morbidity (Idler & Benyamini, 1997; Benyamini & Idler, 1999).

The General Health Questionnaire (Goldberg, 1972; Goldberg & Williams, 1988; Malt *et al.*, 1989), a standard 12-item measure designed for use in population studies was used to measure psychological distress. GHQ is a screening instrument measuring symptoms of depressed mood, anxiety, social inadequacy and hypochondriasis. The GHQ is especially concerned with the interface between psychological sickness and psychological health, and is found to be a valid instrument for assessing mental health, also in people with mild cognitive impairment (Papassotiropoulos *et al.*, 1997; Cheung, 2002). Each question is scored using a Likert scale of 0–3, giving a total range of 0–36. A low score indicates absence of psychological distress. Cronbach's alpha in the present study was 0.82.

Clinical Dementia Rating Scale assesses severity of cognitive impairment (Hughes *et al.*, 1982). It consists of a global score derived from six domains of cognitive and functional performance: memory, orientation, judgment and problem solving, community affairs, home and hobbies, and personal care. Sum (of boxes) score was given according to instructions given in Morris (1993). The instrument is validated in several studies (Engedal & Haugen, 1993; Morris, 1997). Cronbach's alpha in the present study was 0.79.

The Barthel ADL-index (ADL) (Mahoney & Barthel, 1965) was used to measure functional impairment in ADL, and scored as recommended by Wade and Collin (1988). The instrument includes 10 basic functions: bowel and bladder functioning, feeding, grooming, dressing, transfer from bed to chair, toilet use, mobility, walking stairs and bathing. The total score ranges from 0 (dependent in all functions) to 20 (independent in all functions). The Barthel ADL-index is a

widely used and a standard measure of ADL functioning (Collin *et al.*, 1988; Wade & Collin, 1988). The reliability of the index has been well documented for stroke patients, but still there remain uncertainties when used with older people (Sainsbury *et al.*, 2005). In the study reported here, the Cronbach's alpha was 0.82.

Reported illness is an eight-item checklist covering common physical diseases affecting older people: angina pectoris, congestive heart failure, hypertension, thyroid disease, diabetes, cancer, osteoarthritis and osteoporosis, giving a total score between 0 (no disorders) and 8.

Statistical analyses

SPSS 14.1 for Windows (SPSS Inc. 1989–2002) was used for statistical analyses. Bivariate correlations were tested with Pearson correlation coefficient; all tests were two-tailed, listwise deletion. Tests of internal consistency were done using Cronbach's alpha. Means were compared using an independent samples *t*-test. Chi-squared tests were used to test differences in nominal level variables. Cox's proportional hazard model was used to investigate the relationship between health and coping factors and risk of institutionalization. A blockwise entry into the model was applied.

Ethical considerations

Each participant received oral and written information and gave their written informed consent before data collection

was carried out. The study followed the guidelines for community medicine research and was approved by the Regional Ethics Committee for Medical Research in Western Norway and by The Norwegian Data Inspectorate.

Results

The response rate was 78%, which is reasonably high in this vulnerable population. In the sample of 208 participants, mean age was 84.5 years (range 75–98 years); for women 84.7 years (range 75–96), and for men 84.2 years (range 75–98). Fifty-nine per cent of the participants had completed elementary school or less, 33% intermediate school, and 8% grammar school or higher education. One-third of the men and 22% of the women lived with a spouse or others in the household.

Two years after the baseline interviews 128 (61.5%) participants were still community dwelling, while 80 (38.5%) had died ($n = 61$) or were institutionalized ($n = 19$).

Baseline measures for the two groups are presented in Tables 1 and 2. Participants who continued to live in the community perceived a higher level of social support, rated their health as better, had lower CDR score, and were more independent in ADL at baseline than those who were later permanently institutionalized or died. Women lived longer in their home than men.

Bivariate correlations (Table 3) showed that the strongest correlations were between SOC and GHQ (-0.463 , $P < 0.001$), SRH and SHC (-0.446 , $P < 0.001$), and

	End of observation period: still community dwelling			End of observation period: permanently institutionalized or died			<i>t</i> -test
	<i>n</i>	Mean	SD	<i>n</i>	Mean	SD	
Age	128	84.33	5.065	80	85.03	5.082	-0.964
SOC	128	70.13	8.954	80	69.00	9.393	0.871
Economic status	128	1.82	0.385	80	1.86	0.347	-0.798
Seeing children	128	3.64	2.065	80	3.26	2.097	1.277
Seeing friends	128	2.80	1.437	80	2.44	1.339	1.870
SPS	128	54.14	5.858	80	50.45	7.814	3.879**
SHC	128	9.43	7.541	80	8.66	6.360	0.757
SRH	128	2.45	0.686	80	2.11	0.763	3.336*
GHQ12	128	9.95	2.618	80	10.65	3.361	-1.690
CDR	128	0.13	0.416	80	0.43	0.725	-3.369*
ADL	128	18.36	1.999	80	16.96	3.777	3.480*
RI	128	1.40	1.166	80	1.50	1.378	-0.569

Table 1 Characteristics of participants at end of observation period by vital or residential status. *t*-tests for equality of means

SOC, sense of coherence; SPS, social provisions scale; SHC, subjective health complaints; SRH, self-rated health; GHQ12, general health questionnaire; CDR, clinical dementia rating; ADL, activities of daily living; RI, reported illness.

* $P < 0.01$; ** $P < 0.001$.

Table 2 Characteristics of participants at end of observation period by vital or residential status pearson chi-square test for differences in nominal variables ($n = 208$)

Variable	End of observation period: still dwelling (%)	End of observation period: permanently institutionalized or died (%)	Comparisons test statistics
Gender			
Male	32 (25.0)	33 (41.3)	$\chi^2 = 6.051^*$
Female	96 (75.0)	47 (58.8)	
Education			
Elementary school or less	80 (62.5)	43 (53.8)	ns
Intermediate school or higher	48 (37.5)	37 (46.3)	
Living together			
Living alone	93 (72.7)	63 (78.8)	ns
Living together	35 (27.3)	17 (21.2)	

* $P < 0.05$.

SHC and RI (0.431, $P < 0.001$). Thus, the explanatory variables were treated as independent variables in the further analysis.

A *Cox proportional hazard model* was used to examine which of the explanatory factors that could explain risk of NHA during 2 years of follow-up (Table 4). Variables were included according to Andersen's Behavioural Model, selecting variables that previously had been shown to influence the need for nursing home care. The potentially explanatory variables were first tested by a series of univariate analyses. Only variables with a P -value equal to or lower than 0.20 were pursued further (Table 4).

The *multivariate model* was built blockwise and differences in effect size were tested by interaction terms, one at a time, and with main effects included in the multiple regression model. In the multivariate model, SOC had no influence on the risk of institutionalization. Being female, perceiving a high level of social support (SPS) and SRH delayed the time of institutionalization or death. Having cognitive impairments (CDR) and low functioning on ADL shortened the time to NHA or death, as shown in Table 4.

No interactions between SOC and any of the other independent variables in the equation were found.

Discussion

According to Andersen's model predisposing, enabling, and need variables influence the need for NHA in care dependent older persons.

Gender was the only *predisposing factor* that predicted NHA; men had a greater risk than women. The reason for this may be the traditional male gender role which can result in men being less competent in daily chores. This study confirmed that the *need factors*: Cognitive impairments (CDR) and physical disabilities affecting ADL, predicted

NHA, a conclusion shared with several other studies (Laukkanen *et al.*, 2000; Bharucha *et al.*, 2004; Selbæk *et al.*, 2007). Yet, these findings primarily refer to impairments and disabilities deficits observed by others. In this study also subjective evaluations played a major role.

The subjective evaluation of personal health (SRH) predicted NHA better than registered illnesses (RI). Also other studies show that SRH is a better predictor of future health status and use of health services than more objective measures of diagnosed diseases (Weinberger *et al.*, 1986; Idler & Benyamini, 1997; Benyamini & Idler, 1999; Menec & Chipperfield, 2001). There may be several reasons for this finding. Chronic diseases may not necessarily cause substantial restrictions in daily life (Guralnik, 1996), and are therefore equivocal predictors of nursing needs. In contrast, self-rating of health (SRH) involves an overall evaluation, based both on medical information about ones health, experienced impairments and subjective assumptions regarding ones health status (Idler & Benyamini, 1997; Benyamini & Idler, 1999; Pinquart, 2001).

Somewhat surprisingly SHC did not influence the risk of NHA. Actually, the prevalence of SHC is very high in the normal population (Eriksen & Ihlebaek, 2002). A majority of these complaints are considered minor, 'normal', and therefore tolerated and not regarded as a genuine health problem (Eriksen & Ihlebaek, 2002). The same evaluation seems to have taken place here. In this population, the complaints measured by SHC were insignificant as predictors for institutionalization compared to the more experienced problems reflected in measures of ADL and SRH.

Similarly, with regard to *enabling factors*, the subjectively perceived social support (SPS) was a better predictor for NHA than frequency of visits. Lack of associations between frequency of visits and NHA is also reported by Friedman *et al.* (2006). Here, low levels of SPS predicted NHA, as also

Table 3 Correlations between independent variables. Pearson's *r*

	Sex	Age	Education	SOC	Economy	Living together	Seeing children	Seeing friends	SPS	SHC	SRH	GHQ	CDR	ADL
Age	0.055													
Education	-0.115	-0.079												
SOC	-0.086	0.177*	0.125											
Economy	-0.046	0.078	0.182**	0.128										
Living together	-0.114	-0.123	-0.028	-0.065	0.015									
Seeing children	0.176*	-0.014	-0.081	0.079	-0.064	0.167*								
Seeing friends	0.036	0.115	-0.060	0.140*	0.079	-0.146*	-0.043							
SPS	0.131	0.045	-0.091	0.277***	0.078	0.023	0.191**	0.199**						
SHC	0.164*	-0.211**	-0.146*	-0.359***	-0.118	0.116	0.072	-0.040	-0.020					
SRH	-0.058	0.239**	-0.018	0.277***	0.088	-0.133	0.034	0.063	0.104	-0.446***				
GHQ	0.064	-0.165*	0.115	-0.463***	-0.016	-0.062	-0.060	-0.134	-0.123	0.332***	-0.239**			
CDR	-0.188**	-0.084	-0.059	-0.183**	-0.019	0.107	-0.133*	-0.139*	-0.251***	0.037	-0.116	0.089		
ADL	-0.085	0.132	0.021	0.146*	0.004	-0.061	0.026	-0.047*	0.257***	-0.143*	0.203**	-0.127	-0.140*	
RI	0.262***	-0.178*	-0.111	-0.118	-0.012	0.073	0.152*	0.007	0.055	0.431***	-0.302***	0.135	-0.013	0.027

SOC, sense of coherence; SPS, social provisions scale; SHC, subjective health complaints; SRH, self-rated health; GHQ12, general health questionnaire; CDR, clinical dementia rating; ADL, activities of daily living; RI, reported illness.

P* < 0.05; ** *P* < 0.01; * *P* < 0.001.

reported previously (Russell *et al.*, 1997). With increased age, more distant personal relationships take over when people begin to lose their closest significant others, but these relationships cannot provide the same kind of proximity and security (Tiikkainen *et al.*, 2004). Evidently, the qualitative aspects of social support, not the quantitative, were predictors of NHA. Another reason may be that the social network plays a dual role. It can lead to decreased needs for nursing, but informal caregivers also negotiate the health services received and play a role in applying for NHA (Penning, 1995).

Psychological distress (GHQ) did not predict NHA, contrasting earlier reports (Frojd *et al.*, 2003; Harris & Cooper, 2006). The level of psychological distress was surprisingly low in the present sample, only 3% of participants reported a high level of psychological distress (results not presented) according to a recommended cut off point (Papassotiropoulos *et al.*, 1997). There may be several reasons for this finding. The selection procedure of participants excluded persons with severe cognitive incapacities; persons with severe psychological distress may have rejected participation; and finally, psychological distress might be underreported because socially desirable responding is more likely in in-person data-collecting than in self-administered modes (Moum, 1998). Because of these limitations, psychological distress can not be ruled out as a possible factor contributing to institutionalization.

According to Antonovsky's theory, a person with a high level of SOC is expected to have strong resilience (Antonovsky, 1987). Therefore, an association between SOC and continued community dwelling was expected. Such a connection was not found in this population. This was a surprising finding despite the fact that research on SOC has been found to give some inconsistent results as a predictor of future health outcomes and primary health care use (Eriksson & Lindstrom, 2005, 2006). Few studies have been done regarding SOC on populations of older people. Yet, at least in three studies on older populations the findings have been in accordance with the theoretical assumption that a high SOC has positive effects. A high SOC was connected to returning home instead of being permanently institutionalized after a shorter hospital admittance (Johansson *et al.*, 1994, 1998; Larsson *et al.*, 1995); and a high SOC was related to little use of the primary health care services (Bergh *et al.*, 2006). Possibly, the different findings regarding SOC and health care needs are due to the type of health service utilization being measured. Clearly, there are different processes underlying the decisions of visiting one's general practitioner compared to moving permanently to a nursing home. Despite the resilience connected to a high SOC, particularly in older

Table 4 Risk of institutionalization or death, in a period of 2 years after baseline interview

	Bivariate	Model 1	Model 2	Model 3	Model 4
	Hazard ratio				
Sex	0.528**	0.542**	0.526**	0.584*	0.569*
Education	1.336	1.256	1.293	1.207	1.139
SOC	0.989		0.984	1.000	1.027
Seeing friends	0.844*			0.906	0.863
SPS	0.934***			0.944**	0.959*
SRH	0.586**				0.684*
GHQ12	1.082*				1.070
CDR	1.972***				1.475*
ADL	0.867***				0.899**

Univariate analysis of each independent variable at baseline interview, and multivariate effects controlled for all independent variables. (Dependent events = patient died or was permanently institutionalized in the period). Cox regressions, block-wise hierarchical model. Bivariate and controlled hazard ratios.

SOC, sense of coherence; SPS, social provisions scale, SRH, self-rated health; GHQ12, general health questionnaire; CDR, clinical dementia rating; ADL, activities of daily living.

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

persons, it is reasonable to assume that the effects of biological changes, diseases, and accidents might overrule even a high general coping capacity. Therefore, one inference from the present findings could be that a high SOC, indicating good coping capacities, does not delay NHA. Contrastingly, to realize consequences of major negative health changes in old age, and that NHA may represent an alternative to living in ones own home, can also be considered as an outcome of good coping. This paradoxical conclusion regarding the effects of SOC indicates that 'coping' is difficult to evaluate by its outcome alone.

Limitations

This study has the following limitations: information about changes in the variables during the period between baseline and follow-up was not collected. However, this study evaluated the effect of a person's status at baseline on the hazard of entry into a nursing home 2 years later. The allocation of community health services is based on such information, and is therefore relevant for planning purposes. The time to nursing home placement was based on the baseline starting point, and not on the actual time the participant has been receiving home-nursing care. Left-censoring is a common problem in hazard analyses, and may also influence this study. The refusal rate was 22%, and may limit the generalization of our findings. However; a response on 78% is high in this vulnerable population. Finally, no information was available about differences between participants and those who were lost to follow up due to ethical reasons.

Conclusion

Cognitive impairment is an established factor predicting NHA. Less is known about contributing factors in the relatively cognitively intact older persons. This study shed some light on this. Andersen's model was confirmed with the present operationalisation of predisposing, enabling, and need factors. SOC, SHC, GHQ, RI, and number of visits from the social network were not found to delay NHA. Measures with predictive properties were ADL, CDR, SPS, SRH, and gender. Disappointingly, the coping recourses, as measured by SOC did not function as a predisposing factor delaying NHA. The picture seems more complicated. Apparently, a high SOC can realize itself both in the ability to continue community dwelling, and to admit the need for nursing home facilities. Interestingly, the patients' subjective evaluation of their health (SRH) was a better predictor than the objective registration of illnesses (RI). A general conclusion to be drawn from this study is that the patients' *subjective* evaluations of both their health and social support were important predictors of future NHA needs, and should be seriously taken into consideration, along with the more commonly used objective measures of ADL and CDR.

Implications for nursing

The use of objective measures such as Barthel-ADL and CDR scale and subjective measures of SRH and SPS can be recommended for nurses in order to predict future NHA of patients receiving home nursing care. It is important to notice that SRH and SPS are standardized measures, but reflect the

patient's *subjective* perception of their life situation. The importance of these subjective perceptions in predicting future NHA indicates that nurses do well in paying attention to the patients' spontaneous statements regarding their life situation. This can contribute in the prediction of future care needs, and hopefully, through the home nursing services in the prevention of the development of such needs through considerate nursing. Good home nursing care is in itself a factor that can prevent and delay NHA.

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