Moving in and out of public old age care among the very old in Sweden

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Abstract In this paper, we present empirical results for the very old (75+) concerning transitions between independent living in ordinary home without public support, independent living in ordinary home or special accommodations with home help and home health care, and living in around the clock care. We investigate the role of age and gender, dependency in activities of daily living (ADL) and the informal support from a partner. We also study mortality conditional on the above-mentioned variables and on the mode of old age care. The results show that the propensity to move to a more intensive mode of care is less for males, higher with more limitations in personal ADL and increasing with age. There is also a stabilizing effect of the availability of informal care support, as measured by marriage or cohabitation, as it makes it less likely to move from the current care mode. In the case of mortality, the observed relations pointed in the expected directions—mortality increasing with increasing PADL-limitations and age and being higher for men than for women. The age relation, however, does not hold in the same way in around the clock care. The estimated relationships are used as input in a micro-simulation model intended for analysis of the effect of population aging on the needs and resource requirements for old age care in Sweden.

Keywords Old age care · Transfers · Mortality

Introduction

General

On-going demographic changes in the Western societies has focused public interest on the problems of providing care and services for an increasing number of older persons. It is estimated that in the coming decades public expenditures for care and services in the welfare states will grow very rapidly. At the same time slow economic growth makes it extremely important that scarce public resources are used in an optimal way (Thorslund and Bergmark 2002). Part of this problem concerns the possibilities to prevent or delay needs by public health measures. The need for care and services is obviously related to age. Among the very old a large proportion need help in their daily life. However, there are large differences between individuals and between different socio-economic groups in society with respect to needs of support (Thorslund and Lundberg 1994). Successful aging means maintaining independence in activities of daily living (ADL) as long as possible. Societal ambitions thus should focus on increasing the possibilities of maintaining this independence, which among others means supporting continued independent living in the community through different measures such as home adaptations, home help and home health care (Birch 2002).

A key feature of aging and the development of needs is that it is a dynamic process shaped by the interplay between incidence and progression of disease and disability on one hand and mortality on the other. Also the different means of support take on a dynamic character

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with initially predominantly instrumental services like help with cleaning and doing the laundry in one's own home, changing into more personal care including help with bathing and toilet, etc. and finally in many cases very extensive around the clock care in special accommodations. This dynamic feature of aging and needs for care calls for longitudinal studies and dynamic analysis in order to understand the interplay between the different processes involved. Modern tools of analysis are making this increasingly possible.

The Swedish municipalities are responsible for providing long-term care and services in the form of home help for those that live in ordinary housing and in special forms of housing accommodation for those in need of extensive care. These special accommodations can either provide home help in the same way as for people in ordinary housing or around the clock care. In the former case, the main difference with ordinary living is the access to certain common facilities for therapy and recreation. The county councils are responsible for medical treatment and health care until the medical treatment is considered completed, at which point the responsibility for the long-term care and services is transferred to the municipalities. Home nursing care and rehabilitation are provided by municipalities in some parts of Sweden and by the county councils in others.

In this paper, we present an analysis concerning the interplay among the very old aged 75+ between the development of dependency in ADL, informal support from a partner, mode of old age care and mortality. Regarding mode of care, we distinguish in the study between three states: independent living in ordinary home without public support (state 0), independent living in ordinary home or special accommodations with public home help and home health care (state 1), and institutional care, i.e., special accommodations with care around the clock (state 2). Data are from Kungsholmen, which is a part of the inner city of Stockholm. The Kungsholmen study started in 1987 as a longitudinal population-based study with the aim of following a large number of older persons and study incidence and prevalence of disability with a special focus on dementia (Fratiglioni et al. 1992).

The rest of the paper is organized as follows. First, we give a brief background of relevant research. In “[Material and methods](#)”, we describe our empirical methodology and present our data. The results are presented in the following section. A discussion of our findings and conclusions closes the paper.

Research background

Transfer between modes of care in a system of care for the older population has been studied by many authors—both

regarding utilization of home help and transfer to institutional care. Recent studies on predictions on the use of old age care include Geerlings et al. (2005) and Larsson et al. (2006). In the Geerlings study, a division is made between predisposing, enabling and need predictive factors. Need factors such as functional limitations and chronic disease were found to be important predictors of most transitions in care, but predisposing factors like age and education and enabling factors, as partner status and income, were also found to play a role.

The most important predictor of use of home help seems to be dependence in activities for daily living—instrumental (IADL) and personal (PADL) (Thorslund et al. 1991; Larsson and Thorslund 2002; Meinow et al. 2005).

The impact of dementia and depression has been studied by Larsson using the same data from the Kungsholmen study as the present project (Larsson et al. 2004). Also other studies using different data have confirmed the observation that demented persons are more likely to receive home help (Livingston et al. 1997; Stoddart et al. 2002). Others factors identified as associated with the use of home help are difficulties in moving outdoors (Sakari-Rantala et al. 1995) and general health (Stoddart et al. 2002).

Findings concerning the impact of gender are mixed. Controlling for the fact that women tend to outlive their spouses and consequently lack support from a partner at old age, gender does not seem to affect the use of formal home help (Larsson and Thorslund 2002). Generally speaking, access to informal care and having children has been shown repeatedly to reduce the likelihood of receiving formal support for community-living persons (Stoller and Cutler 1993; Szebehely 1998). In the Geerlings study, evidence were found for both ‘compensatory processes’, i.e., informal care substituting professional care, and ‘bridging processes’, i.e., informal care facilitating professional care (Geerlings et al. 2005). For a view of the importance of the informal care given by an adult child in different European contexts, see also e.g., Börsch-Supan et al. (2005).

Also when it comes to transfer to institutional care, ADL-limitations and cognitive impairment stand out as the most important predictors (Willcocks et al. 1987; Kelman and Thomas 1990; Brown et al. 1990; Agüero-Torres et al. 2001; Larsson et al. 2006). Studies also confirm that access to informal care seems to influence the probability to move to an institution (Tennstedt et al. 1990; Pearlman and Crown 1992; Larsson and Thorslund 2002). Similar results were found by Thorslund (2003) arguing that adult children often act as advocates for their parents and urge them to move. Connected to this is also the question of care giver burden and “burn-out”, which may prompt a decision to transfer (Brown et al. 1990). Other predictive factors that

have been discussed in this context are education and income, which at least in Sweden do not appear to influence the propensity to move to institutional care (Palme et al. 2003). In other countries, however, the situation may be different (Mustard et al. 1999).

The studies quoted above have mainly been concerned with identifying factors that predict transfers between modes of care. The current study is unique from the respect that it also includes mortality and thus provides data for a dynamic analysis of the aged care system illustrating the interplay between incidence, prevalence and mortality on the needs development. The research question addressed by the study is then to fully describe the dynamic properties of the long-term care system including identifying the different factors of importance, when it comes to predicting transfer between modes of care and mortality in the different modes.

Materials and methods

Data

The Kungsholmen study followed older persons by the choice of old age care from age 75 until the person deceased. In total, 2,368 persons living in the parish of Kungsholmen and born in 1913 or earlier (aged 75 years or more) were included (Fratiglioni 1992). Persons living in the community as well as in institutions were included. In the initial examination in 1987–1988 1,810 persons participated. These persons were re-examined in four waves with intervals of 2–3 years until year the 2000, given that they were still alive.

Non-response rates were fairly good (Fratiglioni et al. 1991, Table 1). Of the 558 non-respondents (i.e., 2,368 – 1,810), 181 (7.6%) died before examination, 86 (3.6%) had moved from the area and 291 (12.3%) refused participation. The main source of attrition in subsequent waves was due to death. The non-participation rate among survivors was substantially lower than in the initial examination—around 4–5%. From the initial 1,810 persons who participated in the first wave, waves 2–5 included the following numbers of persons: 1,106 for wave 2, 685 for wave 3, 428 for wave 4, while 273 (15.1% out of the initial 1,810) completed wave 5.

Explanatory variables

The examination included among others estimation of dependence in instrumental and personal Activities of Daily Living (IADL, PADL). IADL stands for Instrumental Activities of Daily Living and means that a person has difficulties to clean, cook, go shopping, etc. PADL stands

Table 1 Transition rates in the Kungholmen study, percentages

Entrance state	Exit state				Obs.
	0 (%)	1 (%)	2 (%)	Death	
Age group 75–84: observations 2,146					
0	60.0	9.1	3.2	27.7	1,644
1	15.4	31.3	8.7	44.5	402
2	2.0	0.0	32.0	66.0	100
Age group 85+: observations 1,904					
0	40.0	15.0	6.7	38.3	882
1	4.9	30.8	13.7	50.6	652
2	0.8	1.1	29.7	68.4	370

Entrance/exit state is denoted (0) independent living in ordinary home without public support, (1) independent living in ordinary home or special accommodations with home help and home health care, (2) living in special accommodations with around the clock care

for Personal Activities of Daily Living and means that a person has difficulties to handle her personal hygiene, and must have help with washing, dressing, getting out of bed, etc. Since it was partially missing in waves 1 and 2, the incidence of IADL was imputed.¹

As explanatory variables we consider, first, the degree of ADL-limitations (IADL and PADL) constructed in four levels (ADL score), (0) no ADL-limitations, (1) only IADL-limitations but no PADL-limitations, (2) not so severe PADL-limitations (1–2 PADL), and (3) severe PADL-limitations (3–6 PADL). Second, one expects the informal support and help that an older person is receiving to affect the transition between modes of formal care. For instance, a spouse, partner, or ones children should make individuals demand less outside home help. In our data there exist some aspects of this information. Thus, we have possibility to control for living with a partner (cohabitant). This might, however, not catch all the effects of informal help considering that, an adult child might be giving more informal help than the partner. Unfortunately data on support from children were not available in the Kungsholmen database.² Third, we also consider gender (male) and age group (in dummies age 75–79, age 80–84, ..., age 90+) as covariates in the model. Fourth, the spell length (in years) is included as covariate in the model to control for differences in time length between data collection dates.

¹ 1,217 observations and 1,071 observations contain imputed values on IADL in the first and second waves, respectively. The imputation was based on the estimated relation between nonmissing values of IADL and age group, gender, PADL, and a random term.

² We tried to use another variable by coding, as a proxy for the distance to a relative, the telephone area code number to the nearest of kin reported in data. In a preliminary analysis this variable turned out significant but was, unfortunately, missing for a substantial part of the sample (around 65.1% in wave 1 was missing).

Methodology

We have chosen to perform two separate analyses; one analysis concerning transitions between states of care and another one concerning the transition to death. The reason is that while the exact date of death is known, durations to transfer to the other modes are interval-censored in data, as they do not contain the exact transition date. In case of transfer to another state of care, all that is known is that it occurred some time between two data collection dates. In the first analysis, we model the change from the current (entrance) state to one of the three exit states (i.e., independent living in ordinary home without public support, independent living in ordinary home or special accommodations with home help and home health care, and institutional care) as a multinomial logit model (McFadden 1973). The elapsed time between data collection dates is included as a covariate in this model to account for the fact that there may be duration dependence. One can note, however, that these spell lengths exaggerate the true duration since all we know is that the transition (if any) occurred some time before the data collection date. Therefore, we will underestimate the effect of durations on transition probability. It is also possible that an individual changed states more than once between data collection points. This is not known to us and can thus not be handled in the analysis. We estimate the exit state conditional on current (entrance) state. Thus we estimate states measured in two consecutive waves, where the first state measured in the first of these waves in our terminology is the entrance state and the state measured in the second of these waves is the exit state.

In this part of the analysis a few simplifications are made. First, individuals usually contribute with more than one transition, so observations may not necessarily be independent within observations from the same individual (they may well however be independent across individuals). We have, for simplicity, settled for an estimator that assumes independence. However, we use a robust variance-covariance estimator that allows for this type of observation clustering on individuals.³ Second, although an ordered choice specification is conceivable for these data we have settled for a multinomial one.⁴ The multinomial logit model is used since this is a more flexible specification. Third, we condition on state-history from the previous data collection point. It would of course be possible to include also states before that, if we think it is likely that

these would matter for the current transition (in other words, that the process is not characterized as a “Markov-chain”). The determining factor for not doing this is that there is only a rather limited sample that contributed with more than one transition (see “Data”). A fourth simplification involved the ignorance of minor questionnaire changes. A transition matrix of the health variable (not shown) showed unexpectedly that there was some substantial recovery rate among those with ADL score 2, mainly between waves 1 and 2 in the study. In subsequent waves the rates were what could be expected. One explanation for this is that the questionnaire changed from wave 3 and onwards and the imputations on IADL made in wave 1 and 2 (see above). A careful check of these differences revealed, however, that we unfortunately have no reasonable possibility to correct for this problem.

The second analysis concerns the mortality risk, again conditional on current (entrance) state. Here, a simple Cox regression model is used.⁵

It turned out that most exits from living in special accommodations with around the clock care were to death. Hence, it seems unfeasible to model the transition for individuals in this mode of care as a multinomial choice. These are instead handled in the mortality analysis.

Results

Data description

Table 1 presents transition rates (percent) for the data. The typical pattern, not unexpectedly, seems to be that individuals went from having less care to more, although some move in the opposite direction. One can note that very few moved from having 24-h care (state 2) to less care (state 0 or 1). From living in special accommodations with around the clock care, most exit to death. Another result is, not unexpectedly, that the mortality risk increases with higher mode of care. One can also note a substantial increase in mortality as well as higher transition rates to higher modes of care for 85+ (bottom panel) when compared with 75–84 year olds.

Descriptive statistics are presented in Table 2, broken down by entrance and exit states. There are fewer males in higher care modes. We also note that individuals are more ADL-dependent, are less likely to have partner and are

³ The standard errors allow for intragroup correlation, that is, the observations are assumed independent across individuals (clusters) but not necessarily within clusters.

⁴ Simulation of multinomial logit and ordered logit shows very small differences in outcome, even though it matters some for the sign and the level of significance of the marginal effect whether we treat choices as ordered or unordered.

⁵ The Cox model assumes absence of unobserved heterogeneity, which potentially could represent a particular complication in duration models. Using a piece-wise constant hazard (PWCH) model with a gamma-frailty assumption we did find support for unobserved heterogeneity (estimates are available upon request from the authors). However, the change in estimates and inference were, however, not too dramatic compared to the Cox model. We will therefore discuss only the estimates from the latter model.

Table 2 Mean values of covariates, by entrance and exit state

	Given exit to 0, 1, 2			Given exit is to 3		
	Entrance state = 0	Entrance state = 1	Entrance state = 2	Entrance state = 0	Entrance state = 1	Entrance state = 2
Male	0.240	0.133	0.070	0.353	0.169	0.155
ADL score						
0	0.418	0.146	0.058	0.361	0.123	0.025
1	0.463	0.535	0.186	0.471	0.338	0.068
2	0.113	0.280	0.198	0.136	0.390	0.168
3	0.006	0.039	0.558	0.032	0.148	0.739
Total	1.000	1.000	1.000	1.000	1.000	1.000
Cohabitant	0.305	0.136	0.000	0.369	0.113	0.025
Age						
75–79	0.293	0.121	0.000	0.220	0.098	0.019
80–84	0.390	0.286	0.081	0.336	0.246	0.118
85–89	0.255	0.383	0.488	0.279	0.317	0.286
90+	0.062	0.209	0.430	0.165	0.338	0.578
Total	1.000	1.000	1.000	1.000	1.000	1.000
Spell length (years)	3.191	3.031	2.337	3.112	2.266	1.117
Observations	1,707	535	86	678	479	161

Entrance/exit state is denoted (0) independent living in ordinary home without public support, (1) independent living in ordinary home or special accommodations with home help and home health care, (2) living in special accommodations with around the clock care, and (3) death

older if they receive care in a higher mode compared to a lower one. Also spell lengths were somewhat shorter on average in higher care modes.

Table 3 shows a cross-tabulation of the ADL score variable and the entrance state of old age care. One can note that among individuals who are more dependent in terms of ADL, a larger proportion utilize a higher mode of care. The majority (73%) of the most dependent persons receive institutional care. Interestingly, there is also a group of individuals (7%) who were coded as very dependent (ADL score = 3), but did not receive any public care services. The probable reason is that these persons receive their care from the family or some other informal source. However, there might also be measurement errors in the ADL score.⁶

Transition between different states of old age care

Table 4 shows the estimated marginal effects from two multinomial logit models, with entrance states 0 and 1, respectively. Both allow 0, 1, and 2 as exit states (in other words, transition probabilities conditional on survival).

The results show some gender differences. Men are less likely than women to go from independent living without

Table 3 ADL score (in four levels) and entrance state of old age care in the Kungsholmen study, frequencies and percent (row totals)

ADL score	Entrance state			Total
	0	1	2	
0	1,024 (87.1%)	140 (11.9%)	12 (1.0%)	1,176 (100.0%)
1	1,213 (70.2%)	482 (27.9%)	32 (1.8%)	1,727 (100.0%)
2	301 (40.7%)	360 (48.7%)	78 (10.6%)	739 (100.0%)
3	35 (7.0%)	99 (19.7%)	368 (73.3%)	502 (100.0%)
Total	2,573 (62.1%)	1,081 (26.1%)	490 (11.8%)	4,144 (100.0%)

Entrance/exit state is denoted (0) independent living in ordinary home without public support, (1) independent living in ordinary home or special accommodations with home help and home health care, (2) living in special accommodations with around the clock care

home help to receiving home help, and also less likely than women to transfer from home help care (state 1) to institutional care (state 2). IADL-limitations only (ADL score = 1) do not seem to have any significant effect on transition probabilities. It is rather persons with PADL-limitations (either severe or not so severe) that have a significantly higher chance compared to those with no ADL-limitations of moving to a higher care state in the next period. These differences in ADL-limitations also lower the chance of transfer to a lower care state in the next period. We furthermore find, although we control for IADL- and PADL-limitations, that higher age increases the probability of transition to a higher care state.

⁶ There are more cases in Table 3 compared to the previous one. The reason that the sample size is reduced in Table 2 is because of partially missing observations (partial non-response) for some of the covariates used. In addition the figures in Table 3 do not condition on exit state.

Table 4 Marginal effects from a multinomial choice model of old age care mode (exit state), conditional on current care mode (entrance state), excluding exit state 3 (death), i.e., conditional on survival

	Given entrance state = 0		
	Exit state = 0	Exit state = 1	Exit state = 2
Female (ref)			
Male	0.045	−0.044*	−0.001
ADL score			
0 (ref)			
1	−0.018	0.012	0.006
2	−0.08*	0.026	0.054*
3	−0.605***	0.19	0.415*
Non-cohabitant (ref)			
Cohabitant	0.03	−0.027	−0.003
Age			
75–79 (ref)			
80–84	−0.159***	0.103***	0.056**
85–89	−0.331***	0.182***	0.149***
90+	−0.517***	0.247**	0.27**
Spell length (years)	−0.069***	0.03	0.039***
Observations	1,707		
Pseudo R^2	0.066		
	Given entrance state = 1		
	Exit state = 0	Exit state = 1	Exit state = 2
Female (ref)			
Male	0.001	0.088	−0.089
ADL score			
0 (ref)			
1	0.009	−0.016	0.007
2	−0.099**	−0.003	0.102
3	−0.103*	−0.107	0.211
Non-cohabitant (ref)			
Cohabitant	0.077	0.042	−0.119*
Age			
75–79 (ref)			
80–84	−0.084*	−0.12	0.204
85–89	−0.159***	−0.148	0.307**
90+	−0.201***	−0.092	0.292*
Spell length (years)	−0.02	−0.054	0.074*
Observations	535		
Pseudo R^2	0.082		

Except for the variable spell length, the marginal effect is for discrete change of dummy variable from 0 to 1. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Entrance/exit state is denoted (0) independent living in ordinary home without public support, (1) independent living in ordinary home or special accommodations with home help and home health care, (2) living in special accommodations with around the clock care

As for informal help from a partner, the results indicate that having a partner makes it less likely to transfer to higher care states. Thus, we find that a partner reduces the

probability of moving from no care to home help, and from home help to institutional care. Only in the latter case the effect is significant, though. However, the data do not support that having a partner increases the chance of remaining in the same care state or transfer to a lower one in the next period compared to not having a partner. A set of preliminary estimates showed that the partner effect was the same for men and women as there was no significant effect, when cohabitant was interacted with gender.

Transition probabilities increase significantly with spell length as should be expected. Longer time intervals result in a lower probability that the individual will remain in the same state or transfer to a lower state. Longer spells increase the likelihood of transfer to a higher state.

Judging from the Pseudo R^2 measure presented in the table the predictive power of the models is limited.

Mortality analysis

Estimation results of the mortality risk, given as risk ratios, are given in Table 5. For the group with either no assistance or home help (entrance states 0 and 1), we find that the mortality is significantly higher among men than women, and among those with severe ADL-limitations than those with no ADL-limitations, and among persons older than 85 compared to those aged 75–79. Neither gender nor ADL-limitations seem to influence mortality for those in state 2. As for age there is a significant effect on mortality for this group among those older than 90, but also a higher risk ratio for those aged 80–84 (however not significant). We found no significant effects on mortality of having a partner. Since there are almost no co-habiting persons in state 2 the variable cohabitant has been omitted in the model for that group.

To study gender-specific effects, we have also tried to estimate the duration model separately for men and women. However, statistical tests showed that all interaction terms with gender were non-significant. Hence data did not show significant gender differences in mortality risk with respect to the variables studied here (ADL, cohabitant, and age), although there is, as pointed out above, an intercept difference with higher mortality among men than women.

As for the former multinomial logit estimates we again note that the Pseudo R^2 measure suggests that the predictive power of the Cox models is limited.

Discussion and conclusions

As pointed out in the Introduction there are many studies done, which have looked at factors predicting the use of formal old age care and to a certain extent also transfers or flows. Since systems of old age care differ appreciably

Table 5 Risk ratios from a proportional hazard duration model (Cox) of mortality risk, conditional on current care mode (entrance state)

Variable	Entrance state = 0	Entrance state = 1	Entrance state = 2
Female (ref)			
Male	1.540***	1.519**	1.320
ADL score			
0 (ref)			
1	1.027	0.822	0.735
2	1.328*	1.449*	1.084
3	4.039***	2.320***	1.693
Non-cohabitant (ref)			
Cohabitant	1.117	0.782	(excluded)
Age			
75–79 (ref)			
80–84	1.099	1.106	1.965
85–89	1.317*	1.258	1.586
90+	2.095***	1.562*	2.666**
Log likelihood	–4,135.968	–2,446.119	–1,150.37
Observations	2,396	1,016	445
Pseudo R^2	0.013	0.016	0.016

The estimates are displayed in exponentiated form. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Entrance/exit state is denoted (0) independent living in ordinary home without public support, (1) independent living in ordinary home or special accommodations with home help and home health care, (2) living in special accommodations with around the clock care

between countries concerning for example co-payments, accessibility of services, etc. it should not be expected beforehand that the same factors prevail in all countries. Likewise there are changes over time that are important to monitor. There is thus always a need to check whether findings from previous studies hold or not. In this study, there was also a special aim to look at all factors determining the dynamics of the old age care system at the same time—transfers between states of need, states of care, and mortality.

Variables examined for their predictive ability for mode of old age care and mortality were age, gender, limitations in ADL, and having a cohabitating partner (representing informal help or care). The results concerning transfer between modes of care seem consistent with research results obtained from similar studies. Thus, we find that the propensity to move to a more intensive mode of care is higher for women, for those with personal ADL-limitations and for the older old. As should be expected the probabilities also increase with time between interviews. There is also an effect of the availability of informal care support, as measured by cohabitation. Informal support from a cohabiting partner seems to reduce the propensity to transfer from current care mode.

However, the explanatory power of the chosen covariates was limited. The main reason for this seems to be the time interval between observation points. It is unlikely that introducing other variables as income, education, access to informal care other than spouse, etc., should have increased predictive power in a substantial way (cf. “[Research background](#)”). Many studies have shown that limitations in ADL is by far the main predictor regarding use of formal long-term care services—at least in welfare countries. With a three-year interval between observations a lot can happen—accidental falls, stroke, heart infarction, death of a spouse etc.—that will influence the step to become recipient of long-term care.

In order to get a comprehensive view of the dynamics of the old age care system we included an analysis of mortality in the study. Also in this case the observed relations pointed in the expected directions—mortality increasing with increasing personal ADL-limitations and age and being higher for men than for women. Gender-specific mortality estimates showed that the age-gradient and the effect of having a partner were about the same for both gender.

An important finding was that age does not seem to influence mortality in the same way for persons in around the clock care as for persons in community care. The reason for this is probably that younger old persons in around the clock care to a great extent suffer from life-threatening disease. Their biological age is in a sense higher than the chronological and their mortality is accordingly much higher than that of healthy persons of the same age. For the older old this difference is not pronounced in the same way.

There are, however, limitations in the data at our disposal. Above all we did not have access to exact dates for the transfers—except in the case of death—and the number of observations was fairly small and rather far apart in time. The data was furthermore from a fairly small part of the country—Kungsholmen, a district of the inner city of Stockholm. However, adjusting for differences in age composition among older persons, the provision of old age care in Kungsholmen is by and large equal to the Swedish average and a comparison with national data from the Swedish Household Income Survey (HINK/HEK) has shown that the transitions measured in the present study do not deviate too much from those of the entire country.

The problem with lack of exact transfer dates was addressed by using the elapsed time between observations as an independent variable in the transfer analysis. Of course, this does not give ideal estimates and efforts can be made to improve the database in these respects. Patterns of mortality could be studied with greater precision, since we in this case had access to the exact date of death. Tests showed—using a more sophisticated specification of the

duration model—that unobserved heterogeneity was present in mortality risk. However, the change in the estimates was not dramatic so our main conclusions from the Cox model are unaltered. However, the number of observations—especially in state 2—was maybe too small for valid conclusions on mortality in these cases.

Understanding the dynamics of old age care and having relevant data on transfers and mortality is very important for the planning and allocation of care resources. Data collected in this way are also crucial, when it comes to monitoring the outcome of care policy—for example, regarding criteria for allocating home help or transfer between modes of care. The old age care system might be characterized and analyzed in terms of the interplay between two flows—the flow between different states of need (including death) and the flow between modes of care. As a tool for understanding this complex interplay cross-sectional studies are obviously inadequate.

Modeling is a way to improve the insight into this dynamic system by putting the data in a context. The results presented in this article have been used as input in a micro-simulation model aiming among others at increasing the understanding of the effect of population aging on the needs and resource requirements for old age care in Sweden (Klevmarken and Lindgren, 2008). Further longitudinal data of higher quality are now being collected in the SNAC study—the Swedish National Study on Aging and Care (Lagergren et al. 2004). These data will be used for further analysis of different aspects of the care system dynamics.

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