Title:
Rapid decrease in length of stay in institutional care for older people in Sweden between 2006 and 2012: results from a population-based study.

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Acknowledgements
Pär Schön gratefully acknowledges financial support from the Swedish Research Council for Health, Working Life and Welfare: grant 2012-1283.

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RE: Manuscript HSCC-OA-14-0155

Abstract
There is limited knowledge about older people's length of stay (time until death) in institutional care and how it has changed over time.
The aim of this study was to analyse changes in the length of stay for older people in institutional care between 2006 and 2012.
Sample: All persons 65+ living in Kungsholmen (an urban area of Stockholm), who moved to an institution between 2006 and 2012 were included (n=1103). Data source: The care system part of the longitudinal database the Swedish National Study of Aging and Care (SNAC). The average length of stay was analysed using Laplace regression for the 10^{th} to the 50^{th} percentile for the years 2006 to 2012.
The regressions showed that in 2006 it took an average of 764 days before 50 percent of those who had moved in to institutional care had died. The corresponding figure for 2012 was 595 days, which amounts to a 22.1 percent decrease over the period studied (p=0.078). For the lower percentiles the decrease was even more rapid, e.g., for the 30^{th} percentile the length of stay reduced from 335 days in 2006 to 119 days in 2012, a decrease of 64.3 percent (p<0.001). The most rapid increase was found in the proportion that moved to an institution and died within a short time period. In 2006 the first 10 percent had on average died after 85 days, in 2012 after only 8 days, a decrease in the length of stay of 90.5 percent (p=0.002).
In general, there was a significant decrease in the length of stay in institutional care between 2006 and 2012. The most dramatic change over the period studied was an increase in the proportion of people that moved in to an institution and died shortly afterwards.
Keywords: Institutional care, Residential homes, Length of stay, Older people

What is known about this topic

- Many older people will move into institutional care but little is known about how long they will actually live there before dying.
- There is limited knowledge on how the length of stay in institutions has changed over time.
- Most previous studies have used cross-sectional analyses and these tend to under-represent shorter lengths of stay.

What this paper adds

- Detailed analyses regarding the length of stay in institutional care using data from the SNAC-study.
- Insight into the complex demands being placed on institutional care by the observed decreases in the length of stay.
- An understanding of the dynamic nature of eldercare provision over time and the subsequent policy implications for future planning.

Introduction

The Swedish welfare system belongs to the Scandinavian welfare state tradition, that is characterized as a 'universal citizenship-based model with a high level of generosity' (Greve 2004: 158). Within the Swedish welfare state the guiding principle of eldercare policy is to provide publicly subsidized, widely available services that can be used by everyone in need, regardless of economic means and family resources (Sipilä 1997). This principle of equal access for equal need is supported in the legislation (Social Services Act SFS 2001:453).

Compared to many other countries, Sweden has a comprehensive eldercare system with two main forms of public eldercare: home help services and institutional care. Home help provides two types of service: assistance with household tasks (e.g. shopping, cleaning house, meals on wheels or cooking, doing laundry), and help with personal care (e.g. bathing/showering, toileting, dressing, eating). Home help services can be complemented by health care services provided by the district nursing team and together these services can be offered around the clock.

During recent decades Swedish eldercare provision has changed dramatically, for example in the number of persons receiving public eldercare; the amount and type of intervention provided; as well as the numbers of people receiving home-based or institutional care respectively. The 1960s and 1970s witnessed the expansion of public eldercare service provision with the likelihood of receiving eldercare peaking around 1980. This period of expansion was followed by a substantial decrease of public eldercare services from the 1980s onwards. Between 1980 and 2012, the proportion of persons 80 years or older receiving public eldercare decreased from 62 to 37 percent (e.g., Szebehely & Ulmanen 2012, National Board of Health and Welfare 2013b), even though the number of persons aged 80 years or older increased from 263,000 in 1980 to almost 500,000 in 2012 (Statistics Sweden 2012). Thus, the provision of public eldercare has not kept pace with the population growth in the oldest sector of the population.

Within the overall trend towards a decrease in the number of people receiving public eldercare services there are differences in the provision of the two types of services received by elderly people. The number of persons receiving home help services increased considerably from the 1960s up until the beginning of the 1980s. It then successively decreased with a slight increase during recent years. The number of persons in institutional care increased until the middle of the 1990s, becoming relatively stable during the second half of the 1990s, thereafter decreasing from 2000 onwards. Between 2001 and 2012, the number of institutional beds decreased by almost 28,900 (National Board of Health and Welfare 2014).

In addition, there have also been changes in county council health care provision. The average length of hospital stay has become shorter and the number of hospital beds has decreased drastically in recent decades. This development has had important consequences for eldercare services. The National Board of Health and Welfare point out that hospital based care has suffered from financial cutbacks and that there is increasing pressure especially on emergency departments that has resulted in problems admitting and accommodating many older people appropriately within the hospital system. The decrease in the number of hospital beds, combined with the increasing number of very old persons in the population, has led to seriously ill and disabled persons being discharged from hospital to their own homes needing significant home help services, home health care, and rehabilitation (National Board of Health and Welfare 2005b).

In summary, a shift has taken place from the previously generous allocation of public eldercare services to a more restrictive approach. Studies have shown that this development has particularly affected persons who need less help such as younger old persons and cohabiting persons. The available resources have been concentrated on the frailest elderly persons with multiple health problems and severe and complex care needs. As a consequence of this those who receive eldercare

today receive more extensive help than previously (Larsson & Szebehely 2006, National Board of Health and Welfare 2009).

The substantial decreases in the provision of home help and institutional care services since the 1980s are not due to legislative changes at the national level or to changes in the official policy of allocating eldercare services according to need (Szebehely & Trydegård 2012). Nor can the reduction be explained by improvements in the health and functional ability among the oldest old (Fors et al. 2013, Larsson 2006). Rather the cutbacks can be seen largely as an effect of financial restrictions, imposed following the economic recession experienced in Sweden during the early 1990s. This led to tighter budgets, more restrictive guidelines and a subsequent raising of the thresholds for public services, especially regarding the likelihood of being entitled to a place in an institution. This raised threshold has almost certainly led to an increased care burden among those living in institutions (Lagergren 2002, National Board of Health and Welfare 2009, Szebehely & Trydegård 2012).

'Ageing in place', the idea that older people should be able to live in their own homes and receive home help for as long as possible, has long been the guiding principle of the eldercare system in Sweden and indeed in many other countries. In spite of this many people will end their lives in an institution. The total cost of the institutional care in Sweden for 2010 was 60 billion SEK, nearly two-thirds of the total budget for eldercare provision.

It is generally accepted that by the time an elderly person is admitted to an institution they are in need of more care than can be provided in the home situation and staying at home is untenable. The person's length of stay in the institution can thus be said to be the time they live there before they die. However knowledge about the actual length of stay in institutional care, and how the length of stay has changed over time is limited. There is a lack of detailed information about the type of housing elderly people have and what sort of care and services they receive at any one time. Most of the information about the provision of care services to frail elderly persons, both in Sweden and elsewhere, is based on cross-sectional group statistics, which provide snapshots in time and do not allow one to follow possible changes over time. Thus, there is a lack of longitudinal individual-based data regarding the length of stay in institutional care (Lagergren et al. 2004, Steventon & Roberts 2012).

Previous studies carried out in this area have revealed different results. Some studies show that some people, but not the majority, live in an institution for a relatively short time before they die, while other studies show that people live considerably longer in institutions (National Board of Health and Welfare 2005a). It is likely that most of the differences between countries in the length of stay can be explained by variations in the care systems. Another reason for the diverging results, and the somewhat confused debate regarding length of stay in institutional care, may well stem from the fact that some studies show the mean time while other studies show the median time, which can differ quite considerably (median times are shorter than mean times). The median time spent in an institution does not take account of the (relatively small) number of persons who have a very long stay. Also, the choice of method of analysis - cross-sectional or longitudinal - affects the results. Cross-sectional analysis tends to under-represent shorter lengths of stay, thus there is a bias in the findings towards longer stays (Bebbington et al. 2001, Steventon & Roberts 2012).

Until recently there have been few possibilities for carrying out individual-based population based studies of older persons' length of stay in institutional care. Using the SNAC study, comprising all persons in an urban district who have moved into an institution between 2006 and 2012, we can now analyse whether the length of stay in institutions has changed in recent years.

The aim of this study was to analyse changes in the length of stay for older people in institutional care between 2006 and 2012.

Methods

Study sample

The present study was based on the Swedish National Study on Aging and Care (SNAC), the care system part from the Kungsholmen location of SNAC (for a description of the study design, see Lagergren et al. 2004). Kungsholmen is a large urban district of Stockholm. The care system part of SNAC is based on all residents aged 65 and older who have had been deemed by a municipal needs' assessor to be eligible for institutional care or home-help services. All public services granted under the Social Services Act and the Health Care Act are recorded - including home help services, home health care, home rehabilitation and different forms of institutional care. SNAC is a systematic, longitudinal, individually-based collection of data that provides information on the provision of care and services to those people in the municipality aged 65 years or older who receive public eldercare services. The data collection is carried out by the municipal needs' assessors. The registration in the care system part of the database is taken care of by a member of the municipal care team (nurse) and includes all changes in the provision of care and services. Each record includes data on age, gender, date of moving in to an institution and date of death. It is extremely rare that a person who moves into institutional care ever moves back to their own home again. This only applied to three people in this sample and they were excluded from the analysis. If required (if the date of death is missing), we have linked the SNAC data to the Swedish cause of death registry.

The present study included those who had moved to an institution (n=1103) between January 2006 and December 2012, and they were then followed until March 2013. The non-response was less than 5 percent (persons who did not agree to participate). The gender distribution in the sample was 72.3 percent women (n=797) and 27.7 percent men (n=306), but this varied over the period of the study - in 2006 the proportion of women was 74.1 percent and in 2012 it was 70.3 percent (range 66.0% - 81.6%). The average age when moving in to institutional care was 87.1 years (standard deviation 7.4) for the whole sample; for women it was 88.2 years (standard deviation 6.8) and for men 84.4 years (standard deviation 8.1). The average age of those moving in to institutional care also varied, in 2006 it was 86.9 years (standard deviation 7.8) and in 2012 it was 86.1 years (standard deviation 8.2) (range 86.1 - 88.6 years).

Ethical permission for the study was obtained from the ethical committee of the Karolinska Institutet (KI dnr 00-446).

Analysis

The length of stay (time until death) was analysed using Laplace regression (Bottai & Zhang 2010) for the 10^{th} to the 50^{th} percentile for the period 2006 to 2012. The Laplace regression assumes that the error term follows a type of asymmetric Laplace distribution. This regression model allows censored variables even when censoring depends on covariates. This means the model takes censoring into account in a way that corresponds to hazard regressions. Laplace regressions and hazard regressions are considered equally appropriate for this kind of data which includes censoring (Bottai & Zhang 2010). The main reason for choosing Laplace regressions was that the results are more informative and easier to interpret. (The command 'laplace' for STATA is available online. The command was programmed by Matteo Bottai and Nicola Orsini.) The outcome is the number of days until a specific event, here death, has occurred for specific percentiles. The results show how many days it takes until the first 10%, 20%, 30%, 40%, and 50% of people have died. In our analyses the main independent variables are the years from 2006 to 2012. The years are given linear representation, which means that the coefficient shows the average change in survival time over the whole time period. The coefficient (-169) for the 50^{th} percentile (median survival) from the model shows that, on average, it took 169 days less in 2012 as compared to 2006 before 50 percent of those admitted had died. By means of longitudinal data from the SNAC care system part, and the Laplace regression

model, it will be possible to draw conclusions about trends developing over time in the length of stay in institutional care. One should, however, be cautious when interpreting the results and focus on how the trends develop rather than the absolute number of days as the results are based on a regression model.
To further refine the analysis of those who moved into an institution, and died shortly afterwards, we ran logistic regressions on those who died within 15, 30 and 60 days after admission during the period 2006 to 2012, both with and without controlling for age and sex. The years are given a linear representation, in the same way as described in the Laplace regression.
The analyses were carried out using STATA IC 11.2.

Results

With regard to the length of time people had been living in an institution before they died, figure 1 shows persons who died during the period 2006-2012 (n=767). The figure shows, in half-yearly intervals, how long people had been living in an institution before they died. One-third, of those who died, did so within six months. For the next period, six to twelve months, there was a sharp decrease in the proportion dying to 16.3 percent, which was followed by a more gradual decrease.
'Please insert Figure 1 about here'
Figure 2 is based on Laplace regression. The figure shows the length of stay in an institution (measured as number of days from moving in until death) for the 10th to the 50th percentile for each year between 2006 and 2012, adjusted for age and sex. The reason for only showing the length of stay up until the 50th percentile is that the statistical uncertainty thereafter increases due to the right censoring of data, based on Laplace regression (Bottai & Zhang 2010).
'Please insert Figure 2 about here'
The 50th percentile (i.e., the median), the top line in the figure, is a commonly used measure of the length of stay in institutions. According to the regression model in 2006 it was 764 days before 50 percent of those who had moved in that year had died, the corresponding figure for 2012 was 595 days (β for change from 2006 to 2012=-169 days, p=0.078), which amounts to a 22.1 percent decrease between 2006 and 2012. This means an average decline of 28.2 days (169/6) in the length of stay per year for each year between 2006 and 2012.
For the 40th and 30th percentiles the decline in the length of stay was steeper. For the 40th percentile the length of stay was 564 days in 2006 and 333 days in 2012 (β=-231 days, p=0.007), which amounts to a decrease of 40.9 percent for the period, or an average annual decrease of 38.5 days. For the 30th percentile it took 335 days from moving in to dying in 2006 and 119 days in 2012 (β=-216 days, p<0.001), a decrease of 64.3 percent for the period, or an average annual decrease of 36 days.
The length of stay declined most rapidly for those who moved into institutional care and then died shortly afterwards - the 20th and 10th percentiles. In 2006 it was 216 days before 20 percent had died and in 2012 it was only 27 days (β=-189 days, p<0.001), which amounts to a decrease in length of stay of 87.7 percent, or an average annual decrease of 31.5 days. For the 10th percentile the length of stay was 85 days in 2006, compared with 8 days in 2012 (β=-77 days, p=0.002), which is a decrease of 90.5 percent, or an average annual decrease of 12.8 days.
To further analyse those who moved in to an institution, and died shortly afterwards, we ran logistic regressions on those who died within 15, 30 and 60 days of admission, both with and without controlling for age and sex. The results are shown in table 1 and reveal that the odds of dying within 15 days of moving in to an institution increased by 23 percent for each year subsequent to 2006, both with and without controlling for age and sex. The corresponding figure for dying within 30 days was a 25 percent increase in the odds and 24 percent increase for each subsequent year, and of dying within 60 days a 23 percent increase. All increases were significant.
'Please insert Table 1 about here'

Discussion

This study explored changes in the length of stay for older people in institutional care between 2006 and 2012. We found a general decrease in the length of stay over the period studied. The most dramatic change was a rapid increase in the proportion of people that moved in to institutional care and died shortly afterwards. There was more than a tenfold decrease in the length of stay between 2006 and 2012 for the first 10% who died each year.

Even though the costs of institutional care constitute nearly two-thirds of the total budget for eldercare provision in Sweden, the length of stay has not been researched extensively. Xie and colleagues (2006) point out that knowledge about the patterns, and changes over time, in the length of stay in institutional care is crucial for the planning and management of eldercare. Residents' health status (both physical and mental) and their functional ability affect these patterns significantly. Our results have important implications for eldercare – for assessing the need for eldercare, its organisation, scope and content.

The increase in the number of people living for only a short time in institutional care has not been reported previously. This indicates that the turnover of residents in institutional care is increasing, which has implications for the planning and provision of institutional care in the future (Liu & Manton 1983, Steventon & Roberts 2012).

Despite the overall decreases in length of stay, there are still many persons who have quite long stays and who will spend the last years of life in an institution. For another group it is the place where they spend only the last few days of life. This changing situation places complex demands on institutional care as they try to meet the needs of these two groups of elderly people. Institutions need to be able to provide for a wide range of needs from social activities, mental stimulation, health care and rehabilitation services to the palliative care services needed towards the end of life.

Palliative care in Sweden has developed over recent years, and national guidelines and recommendations have been compiled. The aim is to provide good general and specialized palliative care to the entire population, irrespective of age or diagnosis (National Board of Health and Welfare 2013a). In Sweden hospices, that provides palliative care for terminally ill persons, are intended for younger people dying from cancer (i.e., younger than 65 years old), and dedicated hospices for older people are extremely rare.

Our findings suggest that a restructuring of the whole eldercare system, especially the role and function of institutional care, is required. Our results also suggest that the ageing in place policy is becoming a reality for more and more people, which has important implications, both for the individuals and the eldercare system itself. When older persons are eligible to move into an institution, they have to go through the usual procedure for moving house, i.e., signing a contract, moving home etc., which can be a demanding process, or even prove fatal, for frail older persons. As a higher proportion of persons die shortly after moving into institutional care, this means that more and more people are in the terminal phase of life when they move to institutional care. This suggests an increasing need for respite care, short-term care and hospice beds in institutional care for older people. More hospice oriented institutions, which have personnel with the competence to meet the needs of very frail older persons in their final stage of life are needed, and may be seen as a natural part of the ageing in place policy. This would improve the quality of life both for the person themselves and for their relatives. Thus, our results indicate that there is a need to rethink end of life care for older people.

Moving into institutional care in the terminal phase of life involves complicated ethical considerations. Is it ethical to move someone who is so close to dying? Should they have been moved sooner? Other concerns are, for example, the non-treatment of conditions that might allow the person to die. Such considerations also have implications for the competencies required by the staff.

Some strengths of this study are the use of detailed, reliable, longitudinal, individually-based care system data concerning the date of moving into institutional care and date of death with a low non-response rate (less than 5 percent). We consider data from the SNAC care system study to be highly reliable, as all the public care services provided and any changes made in the services (here institutional care) are recorded directly into the system by either the municipal needs' assessor (date of moving in) or a trained member of the municipal care team (change in services or death).
A weakness with this study is that the data are limited to a restricted geographical area, the district of Kungsholmen in Stockholm municipality, which might have an impact on how representative our findings are. Kungsholmen is a district in a large urban area. Urban areas differ from the rest of Sweden in several respects, for example, urban areas generally have a lower proportion of older people in the population (proportion of persons aged 80+ in Kungsholmen is 3.9% compared to 5.2% in Sweden as a whole). Kungsholmen has a higher proportion of women (69.2% among those aged 80 and over compared to 62.2% in the rest of Sweden). Furthermore, Kungsholmen is not a socioeconomically deprived area compared to some other suburbs of Stockholm, or Sweden in general. However, work initiated by the Stockholm municipal administration office (not published), has shown similar patterns in the length of stay in institutional care for older people for the whole of Stockholm municipality. Studies have also shown that there are substantial variations between municipalities in the provision of eldercare in Sweden. In spite of this diversity, there has been an obvious 'path dependency' over time within municipalities, whereby most municipalities have ended up following a similar route of developing their eldercare services so as to provide a level of service close to the average service provision found across the country (Trydegård & Thorslund 2010). Therefore, when interpreting the results of this study the focus should be on how the trends are developing rather than on the absolute number of days.
Explanations for the decrease in the average length of stay in an institution are not self-evident. It is most likely that there are many factors contributing to the situation. There are, however, several factors in the care system that have changed and are likely to have contributed to the observed decrease in the length of stay. Firstly, there has been a substantial decrease in the number of institutional beds. Secondly, there has been a decrease in the number of hospital beds, and thirdly, the average length of hospital stay has become shorter. Combined with the explicit ageing in place policy and practice, these structural changes in the care system might have contributed to the trend towards shorter lengths of stay (shorter time until death) in institutional care.
How eldercare is organized and how the caregiving is divided between the family, the state, the non-governmental sector, and the market varies greatly between countries. From an international perspective, it is most common for the family to provide care. Indeed, the ageing in place policy is heavily dependent on families taking on caregiving responsibilities for their elderly relatives. Providing adequate support to these families is therefore seen as one of the most important strategies for successful ageing in place (Colombo et al., 2011).
A number of strategies are now being developed to help adapt societies to the ageing population. Policies are often fuelled by anxieties about the economic implications of population ageing, and efforts and programs with a 'healthy, productive and active ageing' agenda are now promoted in most countries. Globally, eldercare policies are based on the principle of ageing in place and are characterized by a focus on the provision of community-based care and support and adaption of the older person's home environment. Technical assistance such as housing adaptions, assistive devices, security alarms, and interactive support now enable people with disabilities and impairments to live independently in their own homes.
Following up on the results from this study further research is needed to determine the factors that contribute to some persons dying shortly after admission to an institution while others have a longer stay in institutional care before dying.

Acknowledgements
Pär Schön gratefully acknowledges financial support from the Swedish Research Council for Health, Working Life and Welfare: grant 2012-1283.

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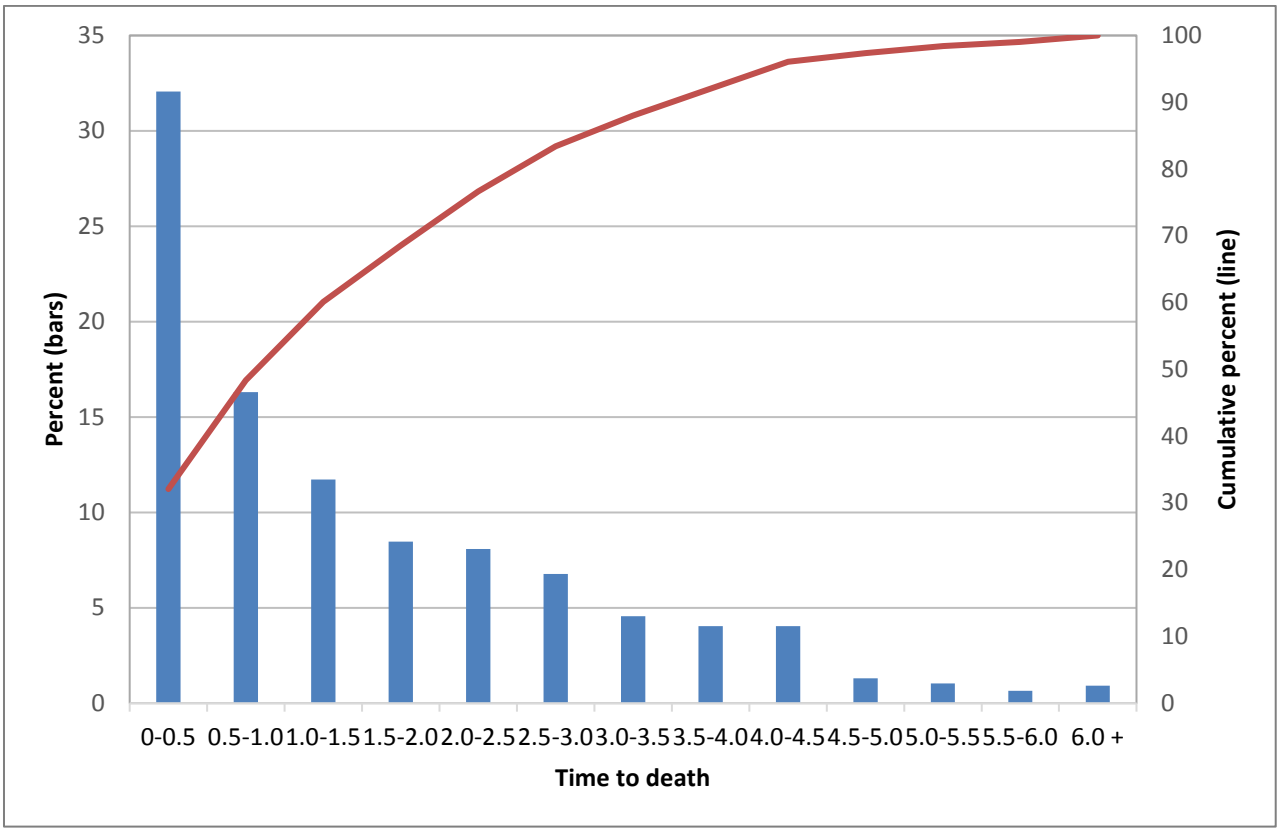

Figure 1. Time spent in institution before death. Proportion of people that died after moving to an institution between 2006 and 2012 (n=767), shown in half-yearly intervals.

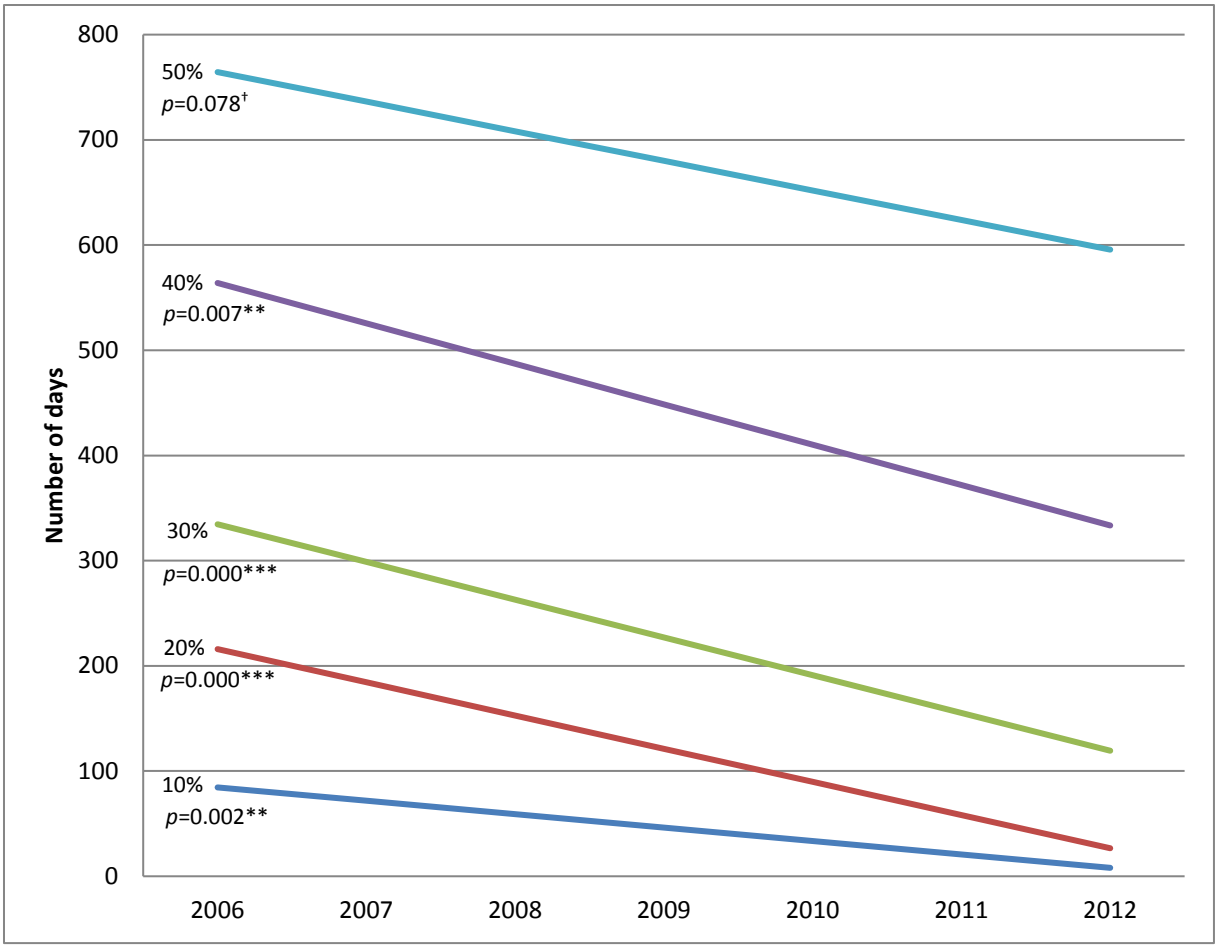

Figure 2. Length of stay in institutional care (based on Laplace regression), measured as number of days from moving in until death, for the 10th to the 50th percentile for each year between 2006 and 2012, adjusted for age and sex. †$p < .10$; $p < .01$; ***$p < .001$.

Table 1. The association between calendar year (2006 to 2012 given linear representation) and the odds of dying within 15, 30 and 60 days. Odds ratios from logistic regressions.

	Died within 15 days		Died within 30 days		Died within 60 days	
	Odds Ratio	P-value	Odds Ratio	P-value	Odds Ratio	P-value
No controls	1.23	0.013	1.25	<0.001	1.23	<0.001
Age & sex	1.23	0.013	1.24	0.001	1.23	<0.001
N=1103						