

Is ageing-in-place an alternative for nursing home admission?

A comparison of the survival, days in care and
costs of older individuals

France Portrait, Xander Koolman

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Abstract

Background & objectives

Long-term care (LTC) expenses for older individuals are rising rapidly in almost all high-income countries. In an attempt to slow the growth of LTC costs, governmental policy focusses increasingly on ageing-in-place to prevent expensive nursing home admissions. Ageing-in-place is often what individuals prefer. Following this trend, the “complete in-home package” (VPT) became available in 2015 in the Netherlands. This package allows clients to receive nursing home care within their own environment. This study compares the survival, days in care and costs of older individuals who use VPT-care or institutional care.

Methods

Data from two healthcare providers covering the period between January 2016 and August 2020 were used. The study sample included 2,136 clients, of whom 559 received VPT care. Information on survival, days in care, costs as well as other individual (health) characteristics was available. Survival analyses techniques were used.

Results

After correction for differences in individual (health) characteristics across the care groups, our study shows that VPT clients on average live longer than those in institutions and that especially clients with lower LTC entitlement benefit from VPT care. VPT clients were observed to spend 366 days longer in care and the average daily costs of VPT care was €58 lower than those of institutional care.

Discussion/Conclusion

Our study provides preliminary results on longer survival outcomes and lower costs for VPT clients compared to those in institutions. In the absence of random allocation, future research should investigate differences in quality of life and include additional health-related factors in the analyses on mortality. Finally, to investigate the LTC costs more in depth, an elaborate economic evaluation is recommended. If VPT care turns out to be an appropriate alternative for institutional care based on a combination of costs, health and QoL outcomes, it should be offered in the future on a larger scale.

Introduction

Expenditure on long-term care (LTC) is considerable in all Organization for Economic Cooperation and Development (OECD) countries and has been rising steadily for several decades (OECD, 2019). LTC is defined by the OECD as “a range of services needed for persons who are dependent on help with basic activities of daily living”, and can be divided into three main types: institutional care (care received in an institution), formal home care (professional care received at home) and informal care (care provided by caregivers within the social network of the client) (OECD, 2019; Duell et al., 2017). In an attempt to slow the growth of LTC costs, many countries are currently reforming their LTC health systems. These reforms often focus on increasing private funding and on redefining the public funding arrangements (Gori et al., 2016). Ageing in place initiatives are also gaining popularity as an alternative for expensive nursing home care as such care is often cheaper while access to the care needed is still maintained. In addition, ageing in place is often what people prefer as most people want to remain living in their own home for as long as possible or at least in a homelike environment (Kendig et al., 2017; Bradshaw, Playford & Riazi, 2012).

An admission into an institutional care facility can strongly impact (mental) health and quality of life (QoL) of clients. On the one hand, a qualitative study found a variety of negative effects associated with institutional relocation including loss of occupation, isolation from family, loneliness, loss of privacy and ability to make decisions concerning oneself (O’Dwyer, 2013). Residents also often report frustration around their lack of influence and independence (Theurer, 2015). Likewise, a systematic review of qualitative studies reports that people in institutional care experience a lack of autonomy and difficulties with social relationships, associated with lower QoL (Bradshaw, Playford & Riazi, 2012). Furthermore, Swedish people, who were ageing-in-place, reported significantly higher QoL. However, the main reason for this was decreased level of care needs (Corneliusson et al., 2019). On the other hand, severely disabled individuals without many social connections may feel less isolated or may find companionship in institutional care facilities. These facilities also offer 24-hours care and a protective environment, which may positively impact their residents’ health and QoL. In this regard, a systematic review by Young et al. concludes that it is uncertain whether home care improves happiness or general satisfaction when compared to institutional care (Young et al., 2017).

In order to be a relevant alternative for institutional care and reduce the increasing LTC costs, home care should be associated with lower or similar costs. Empirical research is scarce and shows contrasting results. A Canadian study compared costs of residential care with home care in two cities, and concluded that residential care was significantly more costly than home care, even when informal caregiver time was valued at replacement wage (Miller et al., 2011). Similarly, Kok et al. (2013) showed that institutional care was more expensive than home care. Contrastingly, a Korean study reported small differences in costs between home care and facility care, but clients receiving facility care had significantly lower medical expenditures as compared to clients using home care (Kim & Lim, 2014). Also, a study on older individuals with comparable health care needs in a rural area in Japan found that home care costs were on average higher than institutional care costs (Naomi, 2012). In the Netherlands, the difference in costs between nursing home admissions and home care also

seems to be limited, mainly due to extensive home care provision in the Netherlands (Bakx et al., 2018). Finally, differences in costs between institutional care and home care are mainly related to the level of disability: if clients have multiple or more severe disabilities, home care costs can even exceed institutional care costs (Bakx et al., 2018; Kim & Lim 2014).

During the last decade, the Dutch LTC policy has also been focusing more and more on self-dependency and participation of older individuals, and has aimed at reducing the use of institutional care (Wetten.nl). In 2015, the Dutch LTC system was profoundly reformed and the Chronic Care Act (CCA) came into force. The CCA covers intensive forms of care for vulnerable people or people with severe mental or physical disabilities. Entitlements for access to CCA care are provided by the Care Needs Assessment Center (CNAC), which is an independent, semi-governmental organization. Applications for CCA care are granted or rejected based on detailed, nationwide criteria. Subsequently, regional care administration offices are responsible for providing the entitled care. Following the trend in ageing in place, clients with a CCA entitlement can currently choose between receiving institutional care or continuing living at home and getting all the support and care they need there. CCA care at home can be provided in three ways. First, patients can opt for a “Full home care package” (in Dutch: Volledig Pakket Thuis or VPT). Care is then provided by one single provider. Second, patients may choose for a “Modular home care package” (in Dutch: Modulair Pakket Thuis or MPT). In that case, care is provided by different providers. Third, the client can opt for a “Personal Budget” (in Dutch: PersoonsGebonden Budget or PGB) with which he or she can make his or her own care arrangements. The “Full home care package” offers the same care clients would receive if they would be living in an institution. Most importantly, it includes nursing care and non-medical services like meal preparations, transportation, household chores, and sometimes respite care (Zorginstituut Nederland, 2019).

This study focusses on differences between institutional care and VPT since VPT is the most complete substitute for institutional care available in the Netherlands (Zorginstituut Nederland, 2019). More specifically, this research compares clients older than 65, with the same healthcare entitlement (set by the CNAC) and focusses mainly on two outcomes. As our dataset does not include direct measurements of quality of life, we focus on survival and care trajectories of individuals, as both aspects are important dimensions of QoL of older individuals. We also provide limited information on the differences in costs between the care groups. Individual (health) characteristics could clearly affect the choice between institutional care and VPT, as those who choose to stay at home may be in better health than those who decide to move to a nursing home. It is therefore important to thoroughly control for differences in individual (health) characteristics in the statistical analyses. Our data allows to do so. VPT is currently provided on a relatively small scale. If VPT appears to be a good substitute for institutional care, it could be offered by care providers on a larger scale. This would not only be beneficial for clients but also for the society as a whole.

Methods

Dataset and study sample

Dataset We had access to data from two Dutch healthcare providers, “De Vierstroom” situated in Gouda and “Meandergroep” situated in Heerlen, offering both institutional and VPT care.

Inclusion and exclusion criteria Since VPT was not available prior to 2015, and clients were not yet familiar with the VPT option in 2015, only clients who received CCA care from January 1st, 2016 onwards were included. Those clients were followed until August 21st, 2020. All clients younger than 65 at January 1st, 2016 were excluded. Clients were included based on their CCA entitlement. The CNAC provides entitlements using six main categories. In case of multiple disabilities, the CNAC chooses the entitlement which fits the dominant health problem the best. Only clients with an entitlement “VV4”, “VV5” and “VV6” were included in our study. “VV” refers to Nursing and Care. Clients who are granted a “VV” entitlement have serious psychogeriatric and/or somatic health problems and are in need of comprehensive 24-hour nursing care and support in a safe environment. The “VV” entitlement has nine disability subdivisions ranging from VV1 (mild disabilities) to VV9 (severe disabilities) (Centrum Indicatiestelling Zorg, 2017). Only those with a level 4, 5 or 6 were included, since they are most likely the ones who can choose between institutional care and VPT care. Finally, clients who did not receive VPT in their own home but in older people facilities, or clients who were temporarily admitted in a nursing home, were excluded as well. All this was decided in close collaboration with CNAC experts and the care providers.

Study sample After merging the datasets from both providers, the study sample included 2,136 clients: 1,577 clients in institutional care, 427 clients who received only VPT care during the follow-up period and 132 clients who received both types of care. Most clients receiving both types of care start with VPT care and move to a nursing home afterwards. All data was pseudonymized to meet privacy regulations as described in the General Data Protection Regulation.

Dependent variables

Survival status Survival status was computed as the difference between the date of birth (characterized by the month and year of birth) and the date of death (in case of VPT) or the date a client ended LTC (in institutional care) (using day, month and calendar year).

Use and costs of care The dependent variable “days in care” was measured as the number of days between the first and last day of healthcare delivery. The variable costs was measured as the invoiced costs per day per client in Euro.

Independent variables

The main independent variable took the value “1” when the client received only VPT care during the follow-up period and “0” otherwise.

Patient characteristics The following variables were included as case-mix variables in the

analyses: gender, age and CCA entitlement at the beginning of care, deterioration of health during the follow-up, dominant and secondary healthcare problems and healthcare provider. The variable "Gender" took the value "0" for males and the value "1" for females. The variable "Age at the beginning of care" was included as a linear and a quadratic term. The CCA entitlements was characterized using two dummies, the first one for "VV4", the second one for "VV5", "VV6" being the reference category. "Deterioration of health" was characterized by one dummy variable taking the value "1" when the client was given during the observation period an entitlement associated with higher disability levels, and the value "0" otherwise. The variables "dominant healthcare problem" and "secondary healthcare problem" were characterized using the following four dummies: (1) psychogeriatric disorder, (2) somatic disorder, (3) functional limitations and (4) has no secondary health care problem. The reference category was "others".

For part of the sample (those who received care in Vierstroom, Gouda), information on the household composition and postcode at the start of care was available. The household variable was divided into two categories: (0) living alone, (1) living with one or more persons. Information about neighborhood socio-economic status (nSES) was derived from the database of The Netherlands Institute for Social Research (SCP). The SCP computed the nSES indicator based on neighborhood information on education, income and labor market status (Sociaal en Cultureel Planbureau, 2018). The nSES indicator was merged to the study sample using the postcode of residence of the clients. The nSES variable takes values between "1" (most deprived neighborhood) to "4" (the most affluent neighborhood).

Statistical analysis

First, descriptive statistics were computed. Second, Kaplan-Meier survival curves were drawn to investigate possible differences in survival status and in days in care between the care groups. We did that for the whole population, per gender and per care entitlement. Log-rank tests were computed to test whether the survival curves were significantly different from each other. Third, Cox regression analyses were performed to correct for possible confounding. To correct for confounding, all case-mix variables described in the previous paragraph were included.

Sensitivity analyses

First, we re-ran the analyses using a slightly different main independent variable. This variable took the value "1" when the client received VPT care at some point in time during the follow-up period and "0" otherwise. Second, we re-ran the analyses in which we corrected for household composition and for the neighborhood socio-economic characteristics at the timing of application.

Null hypotheses were tested using a two-tailed significance level of 0.05. All analyses were performed using IBM SPSS statistics, version 24.

Results

Descriptive statistics

Table 1 provides descriptive information on the clients included in the study. The dataset provided by the care facilities includes 2,136 clients, receiving care in two care organizations. 13% of the clients received care from Vierstroom and 87% from Meandergroep. Overall, 26.6% of the included clients received VPT care and the remaining 73.8% received institutional care only.

Table 1: Patient characteristics (total and per type care)

	VPT only	VPT & Institutional care	Institutional Care only	Total
Female (%)	68.0	73.0	70.0	70.0
Mean age at the beginning of care	83.2	83.0	83.4	83.8
Mean date begin care	25-dec-2018	3-apr-2018	26-feb-2018	30-apr-2018
VV4 (%)	27.4	25.5	15.9	18.2
VV5 (%)	61.4	65.4	63.1	62.9
VV6 (%)	11.2	9.7	20.9	18.9
Psychogeriatric health problems (%)	75.2	78.9	64.4	66.8
Somatic health problems (%)	17.3	17.9	29.1	26.6
Functional limitations (%)	7.5	5.0	6.5	6.6
% clients without second health pb	9.1	12.1	5.2	6.4
Deceased at 21/08/2020 (%)	15.7	37.9	52.6	44.8
Mean age of death	86.8	85.4	85.4	85.5
Mean days in care	532	680	642	622
Mean daily costs (in €)*	184	198	242	228
Vierstroom Gouda (%)	19	46	8	13
Meandergroep Heerlen (%)	81	54	92	87
Number (and %) of clients	427 (20.0)	132 (6.2)	1,577 (73.8)	2,136

* CCA tariffs 2020, including treatment and capital charges

The gender distribution and the mean age at the start of care do not differ strongly between the care groups. 70% of the clients are female and they are on average 83.8 years old when they start receiving CCA care.

Clients receiving institutional care have higher (and different) care needs than clients receiving VPT. The majority of all clients has a VV5-entitlement (62.9%). However, only 11.2% of the VPT clients have a VV6 care profile versus 20.9% for those in a care facility and 27.4% of those at home have a VV4 entitlement versus 15.9% for those receiving institutional care. The percentage of deceased clients receiving VPT care is much lower (15.7%) than in institutional care (37.9%-52.6%). VPT clients are more likely to have psychogeriatric problems (75.2% versus 64.4%) and less likely to have somatic health problems (17.35 versus 29.1%) and a second main health problem (90.8% versus 94.8%)

than those in nursing homes.

Although VPT clients live on average longer, they are observed to stay shorter in care than those in nursing homes. This is because the VPT clients started receiving care 10 months on average later than the clients in care facilities (25-dec-2018 versus 26-feb-2018). Interestingly, about 6% of our clients started with VPT care but were observed to move to a nursing home during the observation period. In other words, receiving VPT care delayed the admission to a nursing home. Finally, the daily tariff of VPT clients is €58 lower than the one of clients in nursing homes.

Survival time

Kaplan-Meier graphs for life expectancies (for the whole population (figure 1), per gender (figure 2), and per type entitlement (figure 3)) and Cox regression analysis were to examine the differences in survival time between VPT clients and clients receiving institutional care.

Figure 1: Survival time per type of care; p-value(log-rank) = .000

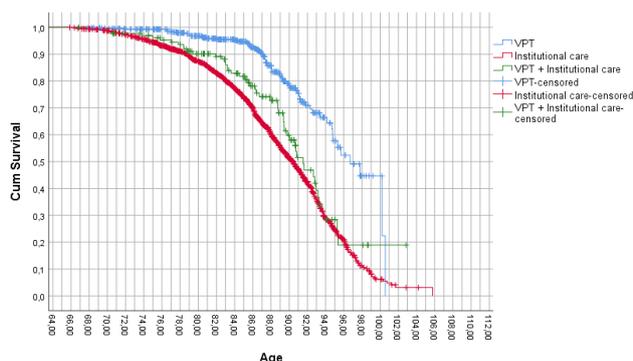


Figure 2: Survival time per type of care and gender; p-value(log-rank) = .000

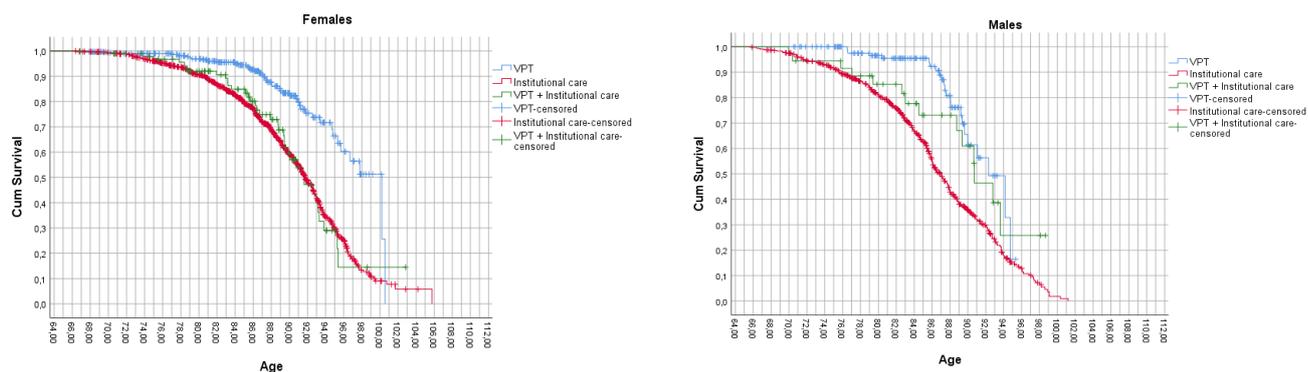


Figure 1 shows that VPT clients live on average longer than those in care facilities. For instance, at age 90, about 76% of the VPT clients are still alive compared to about 50% for the clients in care facilities. The mean survival time for VPT clients is 95.1 whereas the one of clients in facilities is 89.4. Figure 2 shows expected differences in survival between

genders (females live longer than males). Moreover, the differences between care types appear to be slightly more pronounced for males especially at younger ages (males until 86 years old seem to benefit even more from VPT than females). All differences between the survival curves were significant since the p-value of the log-rank tests were very small.

Figure 3: Survival time per type of care and entitlement; p-value(log-rank) = .000

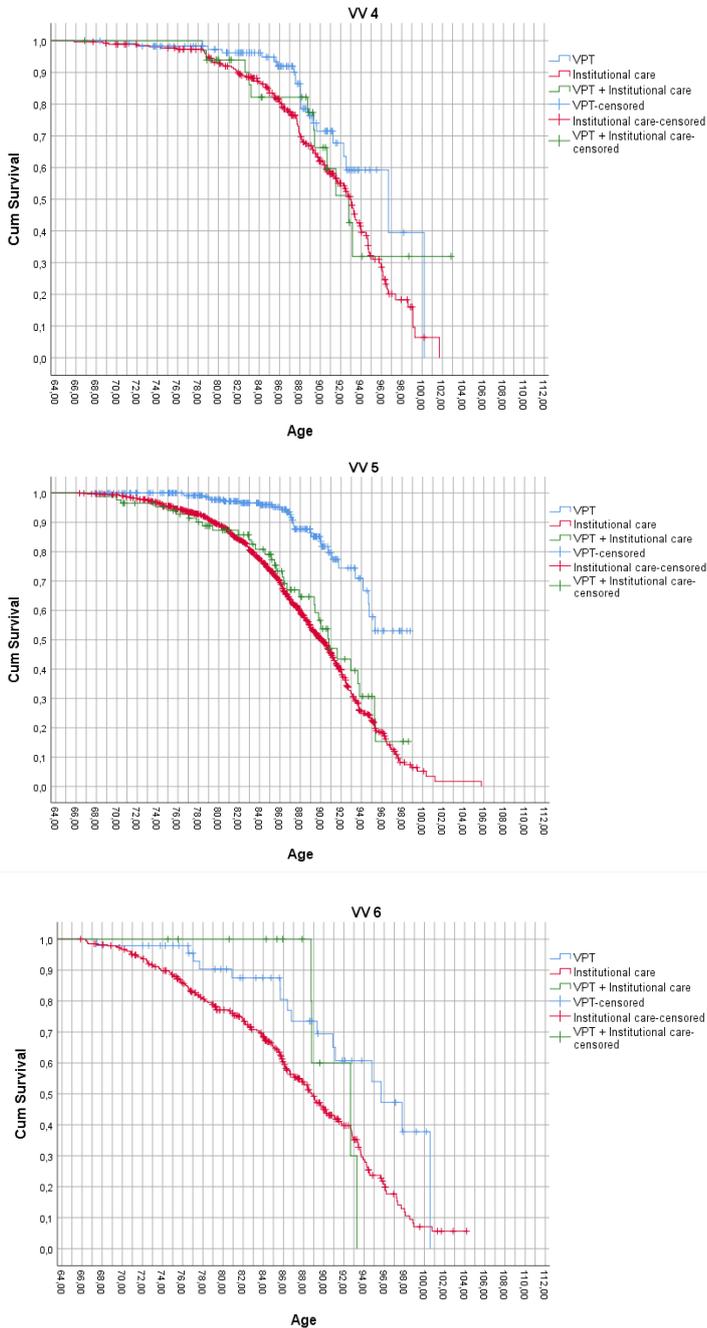


Figure 3 shows that especially clients with a VV5 and a VV6 entitlement benefit from VPT care. The difference in survival (though statistically significant) is smaller for VV4 clients than for others. However, as mentioned in the introduction, all above results could be explained by differences in individual (health) characteristics between the care groups. Because of that, we estimated Cox regression models in which we controlled for all potential confounders included in our dataset (see paragraph on independent variables). Based on the descriptive results above, we also included interaction effects between our main independent variable (VPT care) and the CCA entitlement at the start of care. Table 2 below reports the results of the Cox regression analyses.

Table 2: Results Cox regression analyses survival time

Variables	Adjusted analysis Without interaction effects		Adjusted analysis With interaction effects	
	Odds ratio	p-value	Odds ratio	p-value
VPT	0.432	0.000		
VPT * VV4			0.494	0.004
VPT * VV5			0.329	0.000
VPT * VV6			0.784	0.367
VV4 (reference category VV6)	0.858	0.232	0.861	0.256
VV5 (reference category VV6)	0.821	0.287	0.870	0.461
Female	0.554	0.000	0.551	0.000
Age beginning of care	0.374	0.374	0.378	0.378
Age beginning of care squared	1.002	0.152	1.002	0.152
<i>Main health problem:</i>				
Psychogeriatric health pb (ref. others)	1.460	0.081	1.461	0.081
Somatic health pb (ref. others)	1.339	0.115	1.361	0.115
<i>Secondary health problem:</i>				
Psychogeriatric health pb (ref. others)	1.086	0.534	1.124	0.385
Somatic health pb (ref. others)	1.002	0.985	1.005	0.969
No second health pb (ref. others)	0.991	0.955	0.975	0.875
Change of entitlement	0.374	0.003	0.687	0.005
Gouda (reference category Heerlen)	1.724	0.000	1.675	0.001
Number of clients	2,136		2,136	

Table 2 shows that clients who only received VPT care live on average longer than those in nursing homes, also after correction for individual (health) characteristics. The effect is only significant for clients with a VV4 and a VV5 entitlement. When we ran the analyses for those who have ever received VPT care during the observation period (thus including those who moved to a nursing homes during the observation period), the difference in survival is only significant for those with a VV4 entitlement (results not shown). After inclusion of the variables for household composition and neighborhood socioeconomic status, the results remain similar but are not statistically significant anymore (only at 10% for VV5).

Care trajectories and costs of care

Days in care

A Kaplan-Meier graph for the days in care (figure 4) and Cox regression analysis were used to examine the differences in days in care between VPT clients and clients receiving institutional care.

Figure 4: Days in care; p-value(log-rank) = .000

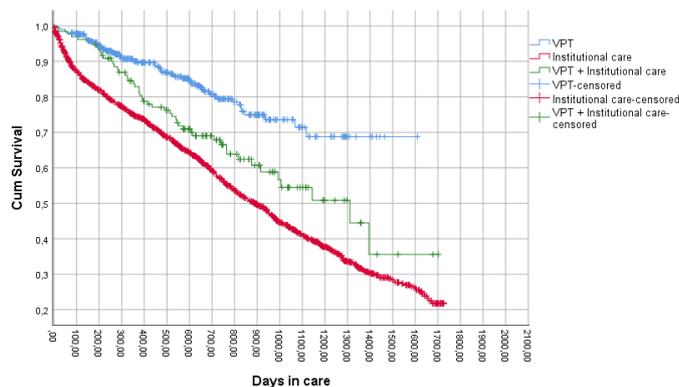


Figure 4 shows that the VPT clients stay on average longer in care than those in care facilities. For instance, after one year in care, about 25% of the clients in nursing homes have died compared to only about 10% of the VPT clients. We also observe a steep decrease during the first 100 days in institution. Those results are confirmed by the Cox-regression analyses: VPT clients with a VV4 or a VV5 entitlement stay longer in care than those in nursing homes. On average, clients who only received VPT care are observed to stay in care during 1,288 days, those who received both types of care 1,084 days and those in an institution during 922 days.

Table 3: Results Cox regression analyses days in care (excerpt)

Variables	Adjusted analysis Without interaction effects		Adjusted analysis With interaction effects	
	Odds ratio	p-value	Odds ratio	p-value
VPT	0.381	0.000		
VPT * VV4			0.455	0.001
VPT * VV5			0.281	0.000
VPT * VV6			0.728	0.728
Number of clients	2,136		2,136	

Costs of care

As mentioned, the daily tariff of VPT clients (€184) is €58 lower than the one of clients in institutions and VPT clients are observed to receive on average care during 1,288 days and those in an institution during 922 days. If we ignore those who switched care during the

observation period, the total costs of VPT clients (based on CCA tariffs of 2020) is only slightly higher than those of clients in institution (€236,992 versus €223,124).

Discussion and conclusion

This study aimed at comparing the survival times, days in care and costs of VPT clients and clients receiving institutional care, older than 65 and with a CCA entitlement VV4, VV5 or VV6. After correction for differences in individual (health) characteristics across the care groups, our study shows that VPT clients live on average longer than those in institutions and that especially clients with a VV4 or a VV5 entitlement benefit from VPT care. For instance, when it comes to individuals with a VV5 entitlement, 50% of those in institutions died before 90 years old whereas 50% of those receiving VPT care are still alive at age 96. VPT clients were observed to spend 366 days longer in care (again especially those with a VV4 or VV5 entitlement) and the daily costs of VPT care was €58 lower than those of institutional care.

Our results on mortality (and on days in care) are in line with the findings from a large study conducted by Pinzon et al. in Spain (2016). After correction for most importantly ADL-level, preferences, and clinical conditions, Pinzon et al. (2016) found that care setting has a strong impact on survival status and that older adults in residential care have higher mortality risks than those receiving home care. In contrast, Bakx and colleagues found no difference in mortality rates between Dutch clients who had their applications for CCA care either just rejected or just accepted. However, their study reported large effect heterogeneity and the clients whose application was rejected did receive home care, but not specifically VPT care (Bakx et al., 2018). Although the criteria used by the CNAC are detailed and nationwide, differences in individual (health) characteristics within groups of individuals with the *same* CCA entitlement may be expected: clients who opted for VPT care might have been on average healthier or less dependent than those who opted for nursing home care. It is therefore important to correct for casemix differences in the statistical analyses. We could include a relatively large number of (health) characteristics in our analyses. However, information on e.g. frailty, medication, prior use of health services or on personal issues (i.e. loneliness, autonomy) was not available, but might have been taken into account as they could affect the differences in survival and in days in care found in our study. This information is available in the CNAC dataset. However, we were not allowed to merge the datasets of the care providers with the CNAC dataset for privacy reasons.

[it would be nice to have information on the life expectancy of clients in Gouda/ Heerlen with ZP VV4 vv5 and vv6 van before the reform, to provide some additional evidence that the availability of VPT care contributed to longer life expectancies?]

Our study suggests that the daily costs of VPT are lower than the ones of institutional care and the costs of care trajectories of VPT clients and institutional care clients do not differ much. This result should be interpreted with caution. The main reason for this is that our study only considers CCA-related costs. Clients receiving home care are much more likely to have higher medical costs (such as hospitalization costs, physiotherapy or GP visits) and costs related to home adjustments, informal care or social care (Fret et al., 2018). For instance, staffs in institutions can take over tasks of G.P.s and social careers and a protective

environment may reduce the numbers of falls and injuries, with in turn fewer hospital admissions or emergency care for those in institutions. Note, on the one hand, that clients in institutions can purchase care with or without “treatment included”. In this case, costs for paramedic care, medicines, and other medical care are paid by the care facility. The Dutch Healthcare Institute (DHI, in Dutch: ZIN) estimated that clients in nursing homes without treatment included have, on average, additional insured costs of more than €5000,- per year (van Dijk et al., 2016). However, the large majority of the VPT and institutional clients in our study purchased care “with treatment included”. Therefore those costs were included in our estimated daily costs. On the other hand, we had no information on costs regarding hospital care, social care and informal care. Nevertheless, a recent article compared costs associated with institutional care to home care in the Netherlands. The authors were able to include additional social and medical costs (but not informal care costs). They concluded that there was no significant difference in healthcare costs between clients receiving institutional care and home care (Bakx et al., 2018), but again this study did not focus on VPT clients only.

To the best of our knowledge, there is no scientific research available yet, that quantitatively compares outcomes of VPT care and institutional care. VPT care is the most complete alternative for institutional care available in the Netherlands and both types of care are essential care for frail, old individuals with high care needs. In addition, ageing-in-place initiatives are popular as they meet the preferences of the large majority of older individuals. Our study provides preliminary results on differences in survival outcomes and costs. We conclude that VPT care can be a suitable alternative for institutional care, mainly for clients assigned with lower care entitlements (VV4 & VV5). Furthermore, VPT care may be complementary to institutional care since VPT care can delay institutional care admission. We recommend for future research to also focus on differences in QoL as survival times and care trajectories do not cover all dimensions of QoL. Though there is ample evidence that ageing-in-place is in line with the preferences of most older individuals, the differences in QoL between VPT clients and clients in nursing homes still need to be investigated. Moreover, as already mentioned, when further investigating survival time, it is important that additional health-related factors are taken into account. Finally, to investigate the LTC costs more in depth, an elaborate economic evaluation (preferably from a societal perspective) is recommended.

If VPT-care turns out to be an appropriate alternative for institutional care based on a combination of costs, health and QoL outcomes, this might be of interest for healthcare providers, care offices and policymakers. Though the volume of provided VPT care increased with more than 140% between 2015 and 2017, CNAC data showed that only 4.7% of the clients with a CCA entitlement applied for VPT as the preferred type of healthcare delivery in 2016-2018. Considering the large share of clients willing to age-in-place, clients were maybe unaware of the possibility to choose for VPT-care. In the future, VPT care could be offered by care providers on a larger scale. This would not only be beneficial for clients but also for the society as a whole.

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