

Exploring Home Care Interventions for Frail Older People in Belgium: A Comparative Effectiveness Study

Johanna de Almeida Mello, MS,* Anja Declercq, MS, PhD,* Sophie Cès, MS,†
Thérèse Van Durme, RN, MSPH,† Chantal Van Audenhove, MS, PhD,* and Jean Macq, MD, PhD†

OBJECTIVES: To examine the effects of home care interventions for frail older people in delaying permanent institutionalization during 6 months of follow-up.

DESIGN: Longitudinal quasi-experimental research study, part of a larger study called Protocol 3.

SETTING: Community care in Belgium.

PARTICIPANTS: Frail older adults who received interventions (n = 4,607) and a comparison group of older adults who did not (n = 3,633). Organizations delivering the interventions included participants provided they were aged 65 and older, frail, and at risk of institutionalization. A comparison group was established consisting of frail older adults not receiving any interventions.

INTERVENTION: Home care interventions were identified as single component (occupational therapy (OT), psychological support, night care, day care) or multicomponent. The latter included case management (CM) in combination with OT and psychological support or physiotherapy, with rehabilitation services, or with OT alone.

MEASUREMENTS: The interRAI Home Care (HC) was completed at baseline and every 6 months. Data from a national database were used to establish a comparison group. Relative risks of institutionalization and death were calculated using Poisson regression for each type of intervention.

RESULTS: A subgroup analysis revealed that 1,999 older people had mild impairment, and 2,608 had moderate to severe impairment. Interventions providing only OT and interventions providing CM with rehabilitation services were effective in both subpopulations.

CONCLUSION: This research broadens the understanding of the effects of different types of community care interventions on the delay of institutionalization of frail

older people. This information can help policy-makers to plan interventions to avoid early institutionalization. *J Am Geriatr Soc* 2016.

Key words: community care; intervention; interRAI Home Care

Community care can be a valuable alternative to institutional care for frail older people. Because of the high costs of residential care, policy-makers are keen to foster such initiatives. In addition, most older people prefer to remain at home as long as possible because it allows them to maintain their social networks and live in a familiar environment.^{1,2} Several studies have shown that institutionalization may have adverse outcomes such as depression, loneliness, decreased quality of life, increased use of medication, and greater mortality.³⁻⁸

Literature reviews about the determinants of institutionalization identify dementia as one of the strongest predictors.⁹⁻¹¹ Other predictors are aggressive behavior, depression, and incontinence.^{12,13} Older age, comorbidity, and a large number of prescribed drugs also increase the risk of placement in a nursing home. Other factors are absence of a suitable informal caregiver and high informal caregiver burden.^{14,15}

Most interventions designed to delay institutionalization of frail older people are a combination of various interventions, called multicomponent interventions.¹⁶ Delaying institutionalization is not the only goal. It is also necessary to ensure that quality of life is satisfactory and that informal caregiver burden is sustainable. Many authors recommend the development of interventions in the community that address these issues so that older people can stay at home longer.¹⁷⁻²⁰ A closer look at such interventions reveals the following effective components: comprehensive geriatric assessment, integrated care plan, care provider identified as case manager, systematic follow-up, day-to-day support services, and educational support.²¹⁻²³

From the *LUCAS, KU Leuven, Leuven; and †Institute of Public Health, Université Catholique de Louvain, Institut de Recherche Santé et Société, Woluwe-Saint-Lambert, Belgium.

Address correspondence to Johanna de Almeida Mello, LUCAS, KULeuven, Minderbroedersstraat 8, 3000 Leuven, Belgium. E-mail: johanna.mello@kuleuven.be

DOI: 10.1111/jgs.14410

To enable and encourage older people to stay at home, countries implement programs specifically designed for them.^{24–27} Through the National Institute for Health and Disability Insurance (NIHDI), the Belgian federal government has started funding bottom-up initiatives targeting frail older people living at home. These innovative interventions aim to reduce the risk of institutionalization while maintaining the quality of life of the people concerned and keeping informal caregiver burden low. A consortium of universities has evaluated the effectiveness of these interventions. The study described in this article is part of this evaluation.²⁸ The larger study (Protocol 3) uses a mixed-methods approach, combining qualitative methods to understand the content and the implementation process of the interventions and quantitative methods to assess changes in outcome and cost. The objective of this article is to examine the effects of home care interventions for frail older people on delaying permanent institutionalization during the first 6 months of follow-up.

METHODS

Design

Protocol 3 is a longitudinal intervention study based on a quasi-experimental design;²⁹ its protocol has been published previously.²⁸ The study compares outcomes of frail older people receiving home care interventions with those of a group not receiving any intervention (comparison group). The study took place in Belgium between 2010 and 2014, and subjects were followed for 3.5 years. This article reports the initial findings of the evaluation of these interventions.

Setting

The study was conducted in the community, and private nonprofit, private for-profit, and public agencies delivered interventions. The Belgian health insurance system funded the interventions. The main aim of these interventions was to delay institutionalization of frail older people.

Sample Selection

Organizations delivering the interventions were allowed to include participants provided they were aged 65 and older, frail, and at risk of institutionalization. Frailty was assessed using the Edmonton Frail Scale or the Katz Scale (Belgian version)³⁰ or was determined according to a dementia diagnosis. Organizations selected older people in the community based on referrals from their physicians, social services, or nurses providing hands-on nursing care at home. Other referrals came from hospitals or home care organizations. Older people (and their family members) were free to choose which organizations provided the services they needed. A comparison group was created consisting of frail older people not receiving any interventions.

Instruments

Professional caregivers such as nurses, occupational therapists, physiotherapists, psychologists, and social workers

delivered the interventions. They completed the interRAI Home Care (HC) instrument, an internationally validated comprehensive geriatric assessment³¹ that maps several aspects of a frail older person's situation, such as cognitive functioning, activity of daily living (ADL) and instrumental ADL status, social and psychological well-being, health status, informal care support, and service use, for each participant after a 2.5-day training program. InterRAI HC assessments were completed at the start of the intervention (when the frail older person was first enrolled—baseline) and at several specified time points during the Protocol 3 study. Only the baseline data were used for this article. Frail older people were able to participate in the program as long as necessary and to exit the program at any time. Researchers monitored the interventions for 3.5 years.

The study used additional data from a national registry database: the National Health Insurance database (CIN-IMA), an official database of the Belgian government that contains all administrative information about reimbursed healthcare consumption (doctors' visits, hospitalization, nursing home admissions, use of prescribed medication, nursing, physiotherapy, speech therapy). The main outcome variable for the study population was permanent institutionalization, which was defined as a stay of 90 consecutive days or more in a nursing home. A secondary outcome variable was death. Both variables were provided in the CIN-IMA database. For privacy reasons (to prevent identification of subjects), only month and year of admission to a nursing home and month and year of death were recorded for the study. Data from the CIN-IMA database were available for all older people included in the analysis, whether or not they received an intervention.

Intervention Group

The intervention group consisted of frail older people living at home who met the inclusion criteria. Because of their diversity in degree of impairment and because some interventions target particular types of older people, the study sample was stratified based on cognitive and functional status using a subgroup analysis. Stratification helps improve the accuracy and robustness of the statistical analysis. Two strata were created: older people with mild impairment and older people with moderate to severe impairment. The classification was based on the interRAI Hierarchical Activities of Daily Living scale (ADLH) and the Cognitive Performance Scale 2 (CPS2). These two interRAI scales have scores that range from 0 to 6 and have been previously validated.^{32,33} A subgroup analysis based on validated cutoff points from the interRAI scales resulted in the following strata: mild impairment (score <3 on the ADL scale and <3 on the CPS2 scale) and moderate to severe impairment (score ≥3 on the ADL scale or ≥3 on the CPS2 scale). In both subgroups, frail older people with symptoms of depression were also identified (validated cutoff score on the interRAI scale Depression Scale (DRS) ≥3), which allowed for a better evaluation of psychosocial interventions.

Comparison Group

Everyone selected for the comparison group was aged 65 and older, lived at home, and was not receiving any of the

interventions evaluated in this study. The comparison group was selected from the CIN-IMA database and consisted of frail older people with a similar risk of institutionalization and similar health care, so the group receiving the intervention and the group not receiving the intervention were comparable. Two subgroups were also identified in the comparison group: older people with mild impairment (comparison group 1) and older people with moderate to severe impairment (comparison group 2). Given the absence of a variable directly measuring health status in the CIN-IMA database, use of certain drugs or services was used as a proxy. Extensive analyses were performed, and several scenarios were calculated to find the most suitable variables for matching. These scenarios were based on an analysis with the intervention group using the interRAI scales matched with their health proxy variables in the CIN-IMA database. The following variables were tested: age, level of nursing care, medication use (to identify some diagnoses such as Parkinson's disease, dementia, chronic obstructive pulmonary disease, diabetes mellitus), resource utilization costs (nursing, physiotherapy, speech therapy), presence or absence of an informal caregiver, financial situation, and living arrangements (living alone or with a partner or family member). The best strategy to match the population from both groups proved to be a combination of four variables from the CIN-IMA database: combined cost of nursing, physiotherapy, and speech therapy at home; individual's age; type of nursing care; use of drugs for dementia.

For comparison group 1 (older people with mild impairment), people were selected from the CIN-IMA database who scored between the 35th and 65th percentiles for costs of nursing, physiotherapy, and speech therapy. These were people aged 79 and older with low nursing, physiotherapy, and speech therapy costs. Comparison group 2 (older people with moderate to severe impairment) consisted of people aged 79 and older receiving a high level of nursing care (meaning that they were receiving nursing support at home and also required help for several ADLs) or taking drugs for dementia.

Classification of Interventions

To ensure that interventions could be tracked, a qualitative investigation based on a normative approach was conducted in the larger study.³⁴ This study used annual questionnaires, interviews, and case studies. Researchers tracked features of the interventions, such as frequency of the delivered services, skills of personnel, turnover, use of best practices, tailored service design, and connections with other organizations in the community. The costs of the intervention were also assessed. Based on this study, interventions were also grouped into single- and multicomponent interventions according to the services provided. Only types of interventions delivered on a permanent basis by an organization were retained. The classification yielded the following types of interventions.

Single interventions: occupational therapy (OT; home adaptations and advice about assistive devices), psychological support, day care, night care (offered exclusively to one frail older person with full supervision or to several frail older people, each with partial supervision)

Multicomponent interventions: case management (CM) with psychological support and OT, CM with OT and physiotherapy, CM with several rehabilitation services (OT, physiotherapy, psychotherapy, night support) in a short-term residential setting, CM with OT at home for older people with visual impairment.

Frail older people who met the study inclusion criteria were allowed to take part in the intervention even if they did not receive any nursing care at home. OT (or any other type of intervention) was offered to the person concerned continuously, and the effects of the intervention were evaluated.

Although nurses who coordinated the services for the frail older people they cared for often provided CM, hands-on nursing care was not part of the intervention. In Belgium, daily hands-on care is considered part of regular care. The CM intervention consisted of the coordination itself. Social workers who were trained as case managers also provided some CM.

Nursing care at home during the night was considered to be a night care intervention. Occupational therapists and psychologists delivered OT and psychological support at home. Quite often, frail older people with mild impairment did not receive hands-on nursing care but received OT. This could enable them to live in their own house longer once it was adapted to their needs.

Ethics

The Belgian Privacy Commission and the ethics committee of the Belgian Universities (Université Catholique de Louvain and KU Leuven; B40320108337) approved this study. A formal procedure was implemented so that professional caregivers could complete the questionnaires using a secure website. The older people involved in the study all signed an informed consent form.

Analysis

First, descriptive statistics for age and sex were calculated for the subgroups in the intervention and comparison groups. Second, Poisson regression models for calculation of relative risk (RR) of permanent institutionalization and death were constructed. The multivariable models built for the calculation of the RR of institutionalization and death were based on a risk period of 6 months. The risks for both population strata for each type of intervention over this time span were subsequently measured and compared with that of the group not receiving any interventions. A robust form of Poisson regression was used in the analysis to obtain robust standard errors for the parameter estimates, as recommended previously.³⁵ The analysis was performed using Stata version 11.2 (Stata Corp., College Station, TX).

RESULTS

This study used data from 4,607 frail older people receiving interventions and 3,633 frail older people in the comparison group. A subgroup analysis based on validated cutoff points from the interRAI scales resulted in the following strata: a group of frail older people with mild

Table 1. Demographic Characteristics of Sample and Intervention Group According to Type of Intervention Received and Comparison Group

Intervention	Mild Impairment			Moderate to Severe Impairment		
	n	Age, Average \pm SD	Female, % (95% CI)	n	Age, Average \pm SD	Female, % (95% CI)
Study group (receiving intervention)	1,999	80.9 \pm 6.8	71.3 (0.6–0.8)	2,608	81.6 \pm 7.1	66.6 (0.6–0.7)
Comparison group (no intervention)	1,871	82.9 \pm 4.5	58.8 (0.5–0.6)	1,762	84.9 \pm 5.4	68.5 (0.6–0.7)
Case management						
With psychological support and OT	249	76.9 \pm 7.2	65.8 (0.6–0.8)	187	78.5 \pm 6.3	63.8 (0.5–0.8)
With OT and physiotherapy	126	82.1 \pm 5.9	61.5 (0.5–0.7)	256	82.3 \pm 6.5	68.3 (0.6–0.7)
With rehabilitation	832	82.2 \pm 6.8	64.5 (0.6–0.7)	464	82.2 \pm 6.9	70.7 (0.7–0.8)
With OT for older persons with visual impairment	117	80.5 \pm 6.4	70.5 (0.6–0.8)			
With OT alone	302	80.9 \pm 6.2	63.2 (0.6–0.7)	426	82.9 \pm 6.7	69.0 (0.6–0.7)
OT alone	187	80.6 \pm 7.2	72.7 (0.7–0.8)	220	79.9 \pm 6.6	63.6 (0.6–0.7)
Psychological support alone	186	77.6 \pm 5.9	69.8 (0.6–0.8)	122	79.3 \pm 6.9	66.8 (0.6–0.7)
Day care				232	79.3 \pm 7.3	60.9 (0.5–0.7)
Night care at home						
With full supervision				473	83.1 \pm 7.5	59.8 (0.5–0.7)
Offered to several frail older persons				228	82.9 \pm 5.7	70.8 (0.6–0.8)

SD = standard deviation; CI = confidence interval; OT = occupational therapy.

impairment ($n = 1,999$) and a group of frail older people with moderate to severe impairment ($n = 2,608$).

Table 1 shows the age and sex distribution of the population according to type of intervention and to subgroup, including the comparison group.

For the subgroup with mild impairment, the RR of institutionalization at 6 months was much lower for the interventions providing CM with psychological support and OT (RR = 0.1), for CM and OT (RR = 0.2), for OT for people with visual impairment (RR = 0.1), and for CM in a residential setting with rehabilitation services (RR = 0.4) (Table 2). Interventions providing only OT also had a low RR (RR = 0.7), indicating that these interventions had a certain level of effectiveness at decreasing the probability of a frail older person being institutionalized. No type of intervention showed a significant effect on risk of death.

For the subgroup of people with moderate to severe impairment, the RR of institutionalization at 6 months was less than 1 for interventions providing CM in a residential setting with rehabilitation services (RR = 0.7) and for OT interventions (RR = 0.2). These interventions delayed institutionalization of older people with moderate to severe impairment, whereas frail older people receiving night support at home with full supervision had a higher risk of institutionalization than people in the comparison group (RR = 1.4). As for risk of death, only day care interventions seem to lower the risk for frail older people with moderate to severe impairment at home (RR = 0.3). Frail older people who received night care with full supervision had a higher RR of death than people in the comparison group (RR = 2.0).

DISCUSSION

This article reports the effects of home care interventions for frail older people in delaying permanent

institutionalization during 6 months of follow-up. OT interventions delayed institutionalization of older people with mild impairment and those with moderate to severe impairment. OT consisted mostly of adaptations to the home and recommendations about assistive devices. The goal was to enable older people to improve or maintain their ADLs to the best of their abilities. Intervention studies with OT have not focused on the prevention of institutionalization specifically. They have mostly analyzed other outcome variables such as improvement in functional performance and quality of life and reduction of informal caregiver burden and risk of falls, all arguably related to rate of institutionalization.^{36–38} The current study showed that OT interventions can prolong the time that frail older people remain at home, at least over a 6-month period.

Multicomponent interventions such as CM in combination with other interventions were effective for older people with mild impairment and those with moderate to severe impairment. This is consistent with the literature and shows the added value of CM to coordinate care for people with complex needs and to support informal caregivers, provided it is combined with other services. As demonstrated by a meta-analysis,³⁹ preventive home visits with no extra services had no effect on rates of institutionalization, as opposed to CM, which reduced admissions to nursing homes in some studies.^{40,41} Another meta-analysis⁴² showed significant positive effects in seven of 11 randomized controlled trials and two comparative studies. All programs in this meta-analysis were multicomponent and offered a range of specific, intensive supportive caregiving interventions that were specifically designed to meet the unique needs of frail older people and their caregivers. One of these studies showed no significant positive effects, but subgroup analyses revealed a significant positive effect in favor of people with moderate to severe cognitive decline. Similar results were reported in another meta-analysis in which only multicomponent interventions had a

Table 2. Relative Risk of Institutionalization and Death at 6 Months for Frail Older People in the Intervention and Comparison Groups

Type of Intervention	Institutionalization, n = 1,999				Death, n = 2,608			
	Mild Impairment		Moderate to Severe Impairment		Mild Impairment		Moderate to Severe Impairment	
	n	RR (95% CI)	n	RR (95% CI)	n	RR (95% CI)	n	RR (95% CI)
Case management								
With psychological support and OT	249	0.1 (0.1–0.7) ^a	187	1.1 (0.5–2.4)	249	No death occurred	187	1.0 (0.4–2.4)
With OT and physiotherapy	126	0.2 (0.1–1.2)	256	0.9 (0.4–1.8)	126	0.7 (0.2–2.0)	256	0.7 (0.4–1.2)
With rehabilitation	832	0.4 (0.2–0.7) ^a	464	0.7 (0.4–0.9) ^a	832	1.2 (0.9–1.8)	464	0.8 (0.5–1.2)
With OT for older persons with visual impairment	117	0.1 (0.1–0.5) ^a			117	0.7 (0.2–2.3)		
With OT	302	0.2 (0.1–0.7) ^a	426	0.9 (0.5–1.8)	302	0.9 (0.5–1.7)	426	0.9 (0.7–1.5)
OT alone	187	0.7 (0.1–0.9) ^a	220	0.2 (0.1–0.6) ^a	187	1.1 (0.5–2.3)	220	0.5 (0.2–1.1)
Psychological support		No institutionalization occurred	122	0.3 (0.1–1.0)	186	0.2 (0.1–1.3)	122	0.6 (0.2–1.7)
Day care			232	0.7 (0.4–1.2)		–	232	0.3 (0.1–0.7) ^a
Night care at home								
With full supervision			473	1.4 (1.1–1.9) ^a			473	2.0 (1.5–2.8) ^a
For several frail older persons			228	0.5 (0.2–1.1)			228	0.7 (0.4–1.4)

Controlled for age, gender, activity of daily living, Cognitive Performance Scale, and interRAI Depression Scale scores at baseline.

^a*P* < .001.

RR = relative risk; CI = confidence interval; OT = occupational therapy.

significant effect on delaying institutionalization of older people with dementia.⁴³

The current study results showed that older people with moderate to severe impairment who received night support at home with full supervision had a higher risk of institutionalization and death than people in the comparison group. This might be because of comorbidities, which could not be controlled for in the analysis. This intervention did not show an effect in delaying institutionalization, but it may have had an effect on decreasing the burden of informal caregivers by offering respite care during the night. More research is needed to confirm this.

Strengths

Clear strengths of the study included the use of a large population-based sample of older people living in the community, the longitudinal design of the research, and the availability of a comparison group from a reliable database suitable for stratification. In addition, the use of a comprehensive geriatric assessment such as the interRAI HC instrument had advantages, such as the possibility of using several outcome variables to evaluate interventions.⁴⁴ The interRAI HC instrument made it possible to stratify the population according to impairment levels.

LIMITATIONS

The fact that the study sample consisted of frail older people who had been selected to receive the intervention could be a limitation of the research. This selection was not random, so there may be a bias. Not all frail older people in Belgium participated in the interventions, and not all older people in the general population are as frail as the people

in the study. An attempt was made to address these concerns by having two strata in the study population (mild impairment and moderate to severe impairment) and by matching them with a comparison group of people with a similar health profile from the national health consumption database. Another limitation was the lack of data on diagnosis to control for comorbidities in the analysis.

CONCLUSION

This research broadens the understanding of the effects that different types of community care interventions have with regard to delaying institutionalization of frail older people. Multicomponent interventions involving CM and other services such as OT and rehabilitation and interventions based on OT services were effective in delaying institutionalization of frail older people. This information can help policy-makers to better plan community care interventions to prevent early institutionalization.

ACKNOWLEDGMENTS

The authors wish to thank the older people and their informal and professional caregivers for their contributions to this study.

Conflict of Interest: The editor in chief has reviewed the conflict of interest checklist provided by the authors and has determined that the authors have no financial or any other kind of personal conflicts with this paper. Prof. Anja Declercq is a board member of interRAI. We have declared this as a conflict of interest, but we do not believe this to have any influence on the study, even though the interRAI HC instrument was chosen to be used in the evaluation of the interventions.

This work was supported by the NIHDI. Funding of the research was independent and nonprofit (Moniteur Belge, 41009–41018). The NIHDI is a federal institution that organizes, manages, and supervises the correct application of the mandatory health insurance in Belgium and is supervised by the Belgian Ministry of Social Affairs.

Author Contributions: de Almeida Mello J., Van Durme T., Macq J., Cès S., Declercq A.: study concept and design, statistical methods. de Almeida Mello J., Van Durme T., Macq J., Cès S., Declercq A., Van Audenhove C.: critically interpretation of results, review of article. de Almeida Mello J.: drafting the manuscript. All authors read and approved the final manuscript.

Sponsor's Role: The NIHDI played no role in the design, execution, analysis, or interpretation of data; neither did it influence the writing of this article.

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