Accepted Manuscript

Title: Organizational home care models across Europe: A cross sectional study

Authors: Liza Van Eenoo, Henriëtte van der Roest, Graziano Onder, Harriet Finne-Soveri, Vjenka Garms-Homolova, Palmi V. Jonsson, Stasja Draisma, Hein van Hout, Anja Declercq

PII: S0020-7489(17)30220-1
DOI: <http://dx.doi.org/10.1016/j.ijnurstu.2017.09.013>
Reference: NS 3023

To appear in:

Received date: 6-3-2017
Revised date: 14-9-2017
Accepted date: 19-9-2017

Please cite this article as: Van Eenoo, Liza, van der Roest, Henriëtte, Onder, Graziano, Finne-Soveri, Harriet, Garms-Homolova, Vjenka, Jonsson, Palmi V., Draisma, Stasja, van Hout, Hein, Declercq, Anja, Organizational home care models across Europe: A cross sectional study. *International Journal of Nursing Studies* <http://dx.doi.org/10.1016/j.ijnurstu.2017.09.013>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Title

Organizational home care models across Europe: a cross sectional study.

Authors

Liza Van Eenoo^a, Henriëtte van der Roest^b, Graziano Onder^c, Harriet Finne-Soveri^d, Vjenka Garms-Homolova^e, Palmi V. Jonsson^f, Stasja Draisma^g, Hein van Hout^b and Anja Declercq^a

^a LUCAS, KU Leuven, Minderbroedersstraat 8 - bus 5310, 3000 Leuven, Belgium.
Liza.vaneenoo@kuleuven.be; Anja.Declercq@kuleuven.be

^b Department of General Practice and Elderly Care Medicine, VU University Medical Center, Van der Boechorststraat 7, 1081 BT Amsterdam, The Netherlands.
hg.vanderroest@vumc.nl; hpj.vanhout@vumc.nl

^c Centro Medicina dell'Invecchiamento, Università Cattolica Sacro Cuore, Largo Francesco Vito 1, 00168, Rome, Italy.
graziano.onder@unicatt.it

^d Department of Wellbeing, National Institute for Health and Welfare, P.O. Box 30, FI-00271 Helsinki, Finland.
harriet.finne-soveri@thl.fi

^e Department III, Economy and Law, Hochschule für Technik und Wirtschaft Berlin, Hönowstr 34, D-10318 Berlin, Germany.
garmsho@htw-berlin.de

^f Icelandic Gerontological Research Institute, Landspítali University Hospital, Reykjavik, Iceland and Faculty of Medicine, University of Iceland, Landakot, 101, Reykjavik, Iceland.
palmivj@landspitali.is

^g GGZ inGeest and Department of Psychiatry, Amsterdam Public Health research Institute, VU University Medical Center, A.J. Ernststraat 1187, Postbus 74077, 1070 BB Amsterdam, The Netherlands.
S.draisma@ggzingeest.nl

Corresponding author

Anja Declercq
KU Leuven – University of Leuven, LUCAS, Centre for care Research and Consultancy
Minderbroedersstraat 8 - bus 5310
B-3000 Leuven
Belgium
Tel +32 16 37 34 10
Anja.declercq@kuleuven.be

Abstract

Background: Decision makers are searching for models to redesign home care and to organize health care in a more sustainable way.

Objectives: The aim of this study is to identify and characterize home care models within and across European countries by means of structural characteristics and care processes at the policy and the organization level.

Data sources: At the policy level, variables that reflected variation in health care policy were included based on a literature review on the home care policy for older persons in six European countries: Belgium, Finland, Germany, Iceland, Italy, and the Netherlands. At the organizational level, data on the structural characteristics and the care processes were collected from 36 home care organizations by means of a survey. Data were collected between 2013 and 2015 during the IBenC project.

Study design: An observational, cross sectional, quantitative design was used. The analyses consisted of a principal component analysis followed by a hierarchical cluster analysis.

Results: Fifteen variables at organizational level, spread across three components, explained 75.4% of the total variance. The three components made it possible to distribute home care organizations into six care models that differ on the level of patient-centered care delivery, the availability of specialized care professionals, and the level of monitoring care performance. Policy level variables did not contribute to distinguishing between home care models.

Conclusions: Six home care models were identified and characterized. These models can be used to describe best practices.

Contribution of the paper

What is already known about this topic?

- Principals of innovative models of care development are described.
- Innovative models of primary care delivery to meet the challenges of future health services are described.
- Based on a service delivery integration index of home care, several models of services delivery integration have been identified such as a medico-social model, a medical model and a fragmented model.

What this paper adds?

- An evidenced based approach to identify and characterize organizational care models across Europe, based on structural characteristics and care processes of home care organizations.
- Home care models differed on three core elements: level of patient-centered care delivery, availability of specialized care professionals, and the level of monitoring care performance.

Introduction

Both in Europe and the U.S., decision makers are searching for models to redesign home care and to organize health care in a more sustainable way (European Commission, 2013; Kringos et al., 2015; Landers et al., 2016). There is a sense of urgency since growing numbers of care dependent older persons with chronic conditions are served in the community, along with a shortage in the primary care workforce, and reductions or changes in public health care expenditures (Bienkowska-Gibbs et al., 2015; Kringos et al., 2015; Landers et al., 2016; Rodrigues et al., 2012).

American as well as European literature indicate that the home health care of the future needs to be more patient and person centered; more integrated and coordinated across settings, services and care professionals; providing high quality care for example by offering specialized care; and technology supported (Bienkowska-Gibbs et al., 2015; Kringos et al., 2015; Landers et al., 2016). There however is no 'one size fits all' model (Bienkowska-Gibbs et al., 2015; Kringos et al., 2015; Landers et al., 2016). The economic situation, the national political landscape, the structure of the health care system, and prevailing attitudes and beliefs among the populations forces each country to put different accents while improving health and home care in their country (Kringos et al., 2015). However, in order to improve the efficiency of health and home care, policymakers need information on which type of home care delivery or which home care model provides the best outcomes in their country.

The Queensland Health (2000) defines a care model as a multifaceted concept, which broadly describes the way health services are delivered. The World Health Organization Chronic Care Framework (World Health Organization, 2002) illustrates that new care models have to include both organizational-level and policy-level building blocks. At the home care policy or macro level, overall values, principles, and strategies for home care delivery are developed, and decisions concerning resource allocation are taken (World Health Organization, 2002). At the organizational level or meso level, home care organizations manage and coordinate care delivery (World Health Organization, 2002).

Donabedian's framework for assessing the quality of care suggests that structural characteristics, care processes, and outcomes are related with one another (Donabedian, 1997). Structural characteristics are defined as the physical and organizational characteristics of the settings in which care occurs. This includes aspects of material resources (such as facilities, equipment and money), of human resources (such as the number and qualification of staff), and of organizational structures (such as involvement of medical staff, methods of quality monitoring, and system of reimbursement). The care processes denote what is actually done while giving and receiving care (Donabedian, 1997).

The aim of this study is to benchmark home care models within and across European countries by identifying and characterizing structural characteristics and care processes of home care at the policy and the organization level.

Methods

This study was part of the IBenC project (Identifying best practices for care-dependent elderly by Benchmarking Costs and outcomes of community care, EU FP7, grant no. , grant no. 305912), which was conducted between January 2013 and December 2016. Since the IBenC project aims to collect data of European community-dwelling older people by means of the interRAI instruments, European countries with care organizations where the interRAI Home Care (HC) instrument is known to be implemented were asked to participate. The six countries participating were Belgium (Flanders), Finland, Germany, Iceland, Italy, and the Netherlands. Medical ethical clearance for the study was provided by appropriate legal Ethical Boards in each of the participating countries.

Sample selection

The study focused on home care, defined as ‘care provided at home by social and health care professionals’ (www.ibenc.eu). A home care organization was defined as a professional care organization that offers nursing care (activities of nurses that are of technical, supportive, or rehabilitative nature), personal care (assistance with activities of daily living (ADL) such as dressing upper and lower body, eating, personal hygiene, toilet use, and bed mobility), and/or domestic care (help with instrumental activities of daily living (IADL), such as shopping, meal preparation, ordinary housework, transportation, managing medications, and managing money) in the community (www.ibenc.eu).

Home care organizations were invited to participate in the study. For the purpose of the IBenC project, care organizations preferably used the interRAI HC instruments in routine care practice. In order to fulfil the required number of clients per organization ($n=153$), each participating country was asked to include a maximum of three home care organizations (www.ibenc.eu; Van Eenoo et al., 2016). However, since it was not feasible in all countries to include large size organizations, smaller home care organizations could be included as well. To benchmark home care models, data heterogeneity was required and therefore organizations were not selected based on representativeness, but on variation in organizational structures and practices.

In Belgium, home care organizations from the Dutch speaking part of Belgium, Flanders, were selected. Typical for Flanders is that home nursing and other home care services such as social care are provided by different organizations (Van Eenoo et al., 2015). In 2013, 193 nursing home care organizations and 116 social care organizations operated in Flanders (Agency Care and Health Flanders, 2016). For this study, a large umbrella care organization providing mainly nursing care, was contacted and 18 home care agencies, spread over the five Flemish provinces, were selected.

Finland consists of 320 municipalities and has 641 home care provider units and 356 home care organizations (in 2013). All these units and organizations provide mixed social and nursing care. For this study, three care organizations were selected in two regions of Finland: one organization in a small town and two organizations in a region with two small municipalities.

Germany consists of 16 federal states and has 12.700 predominantly small home care organizations. Most of the organizations are private (63%), 36% are run by welfare services, and 1% belongs to a public body (Van Eenoo et al., 2015). For this study, 11 private organizations in three states were selected: five in Saxony, four in Berlin and two in Baden Württemberg. All selected organizations provide mixed social and nursing care.

In Iceland, one care organization was recruited in Reykjavik. Reykjavik is the capital city of Iceland and covers half of the Icelandic population. Reykjavik only has one home care organization with integrated social and nursing care. This organization contributed participants to the IBenC study. The included organization is thus fully representative for Reykjavik.

Italy consists of 20 regions and had 145 home care organizations in 2013. For this study, four mixed social and nursing home care organizations were invited in Umbria, a central region of Italy. Two of these however refused to participate because they were not allowed to share data due to privacy issues.

In the Netherlands, 418 home care organizations were active in 2013. For this study, four care organizations were invited and all agreed to participate. One smaller organization in a provincial city dropped out because of their low client influx during the recruitment period. The other organizations operated in: 1) the city of Amsterdam, 2) the predominantly rural area of West Friesland and 3) in the

city of Utrecht and surrounding region. Two organizations provide mainly nursing care and one mixed social and nursing care. The organization in West Friesland was affiliated with general medical practices.

In summary, across the six countries 41 care organizations were invited to participate. Two of these refused participation and one dropped out.

Design

An observational, cross sectional, quantitative design was used. Data was collected at policy level and at organizational level.

Measures and variables

At the policy or macro level, a systematic comparison of macro indicators using meta-data complemented with data from multinational surveys was carried out to compare the home care policy of the participating countries (Van Eenoo et al., 2015). Data on the following dimensions were described and compared: population of the country, governmental expenditures on health, sources of community health services funding, governmental vision and regulation on community care, community care organizations and care professionals, eligibility criteria for and equity in receiving care, and the involvement of informal care. Detailed information on the methods and results of this review were published elsewhere (Van Eenoo et al., 2015).

For this study, nine variables that reflected variation in health care policy between the countries were included from the review (see appendix 1): the density of the population or the number of inhabitants per km², the old age dependency ratio defined as the ratio between the total number of older persons of an age when they are generally economically inactive (aged 65 and over) and the number of persons of working age (from 15 to 64), the governmental expenditures on long term care at home, the amount of informal care support from the government such as cash benefits, the needs assessment in order to receive nursing care, horizontal and vertical equity of access, and horizontal and vertical equity in levels and mix of services relative to needs. Horizontal equity requires the equal treatment of individuals who are alike, and vertical equity requires unequal, but fair assignment of treatment to individuals with different needs (Mot and Bíró, 2012).

To assess diversity at organizational or meso level, a survey on structural characteristics and care processes of the home care organizations was developed on evidence-based literature (see Van Eenoo et al., 2016 for detailed information). The survey mainly consists of multiple choice questions and was filled out by one manager per home care organization (Van Eenoo et al., 2016). To identify home care models, 54 variables were used on the organizational level: 14 variables on structural elements, 29 variables on care coordination, five variables on meetings, and six variables on accountability (see appendix 2).

In order to create an index with sum scores for the different organizations, only dichotomous nominal variables were used for both macro and meso data. To this end, some items of the questionnaire were converted into dichotomous variables. A score of one was assigned when the variable applied for a specific home care organization. When a variable did not apply to an organization, or no information was provided a zero score was given.

Analyses

In a preparatory step, all variables were described by means of descriptive analyses and subsequently checked by the principal investigators from the participating countries.

In a first step, a principal component analysis with varimax rotation was conducted in order to determine which components were meaningful to retain for further analyses. The following criteria were applied (Beaumont, 2012; Costello and Osborne, 2005):

- A component has an eigenvalue greater than 1.
- Each retained component has at least three variables with significant loadings of at least 0.50 and five variables with significant loadings of at least 0.45.
- The Kaiser-Meyer-Olkin Measure of Sampling Adequacy value is at least 0.60 and the Bartlett's test is significant ($p < 0.001$).
- No more than 10% of the variables load on different components.

Variables were dropped step by step in order to fulfill the conditions mentioned above. The PCA with varimax rotation was performed on the combined macro and meso level data first. However, this model proved to be unreliable since the sample was inadequate according to the KMO Measure of Sampling Adequacy test. Since the included home care organizations were not representative for the countries, the macro variables were excluded and the PCA was repeated with only the variables at the meso level.

In a second step, a hierarchical cluster analysis was carried out on the generated components to cluster the home care organizations (Norušis, 2012). Finally, the clusters of home care organizations were characterized by calculating of a mean score of all organizations that belong to a cluster per component. To this end, an index with sum scores for the different organizations was created by summing up the variables present per component.

Analyses were carried out with SPSS version 23. All results were subsequently checked again by the principal investigators of each country and/or by the managers of the organizations.

Results

Response

Thirty-six (95%) home care organizations filled out the questionnaire (Table 1). Two organizations did not fill out the questionnaire for reasons of reorganization and refusal.

For seven organizations, there were no missing data. Seventeen organizations had missing data on one to five variables: five organizations on one variable, three organizations on two variables, seven organizations on three variables and two organizations on four variables. Five organizations had missing data on six to 10 variables (one organization on respectively six, seven and nine variables, and two organizations on 10 variables). Finally, seven organizations had missing data on 10 to 15 variables: one organization on 11 variables and three organizations on respectively 14 and on 15 variables.

There were no missing data for the variables concerning the structural elements and the meetings. The variable that was missing most often concerning the accountability was 'Are the results of the quality of care assessment publicly available' ($n=8$). However, seven out of eight organizations filled out that the organization does not assess the quality of care, which made it possible to change this missing item into 'does not apply for the organization'. Most of the missing data concern variables on care coordination such as 'Is a general practitioner involved in the geriatric assessment' ($n=20$), 'Is a general practitioner involved in the care planning meetings' ($n=18$) and the variables on the availability of specialized care professionals in psychiatric care ($n=17$), palliative care ($n=13$) or dementia care ($n=12$). Replacing these missing data by 'do not apply for the organization' was possible for example if

the organization filled out that no geriatric assessment was used in the organization (n=5) or if no multidisciplinary team was present during the care planning meetings (n=9).

All organizations provided nursing care. The organizations in Belgium and two organizations in the Netherlands mainly provided only nursing care, while the other organizations provided mixed nursing and social care (Table 1). The organizations in Belgium, Germany and the Netherlands, were private organizations, mostly not for profit. The organizations in Italy, Iceland and Finland were owned by the government or by a municipality. Six of the German organizations and three of the Dutch organizations were administratively independent organizations. All other organizations were administratively embedded in a larger care organization (n=27).

Table 1: Characteristics of the home care organizations

	Total	Belgium	Finland	Germany	Iceland	Italy	Netherlands
Number of organizations (n)							
Included organizations	38	18	3	11	1	2	3
Organization filled out the questionnaire	36	18	3	9	1	2	3
Type of home care organization (n)							
Mainly nursing care	20	18					2
Mixed nursing and social care	16		3	9	1	2	1
Type of ownership (n)							
Public/governmental/federal/municipal	6		3		1	2	
Private, profit	5			4			1
Private, non for profit	25	18		5			2
Administratively the organization is...(n)							
Independent	9			6			3
Embedded in a larger care organization	27	18	3	3	1	2	

Principal component analyses

The principal component analysis resulted in a rotated matrix (Table 2) with three components, 15 variables, a Kaiser-Meyer-Olkin Measure of Sampling Adequacy value of 0.76 and a significant Bartlett's test ($p < 0.001$). The three rotated components accounted for 75.4% of the total variance. The first rotated component accounted for 28.9%, the second for 24.7%, and the third component for 21.8%.

Table 2: Rotated component matrix

	Component		
	1	2	3
Policy to involve the family actively in the care for the client	,888		
Digital clients file available	,873		
After a geriatric assessment, a meeting to discuss specific care planning is organized	,839		
Client file is available in the organization AND at clients home	,804		
Policy to discuss the care plan with client / family	,758		
General practitioner is involved in the geriatric assessment	,589		,562
Care professionals specialized in dementia care available in the organization		,853	
Care professionals specialized in palliative care available in the organization		,821	
Care professionals specialized in other care available in the organization		,804	
Specialized care professionals available in the organization		,777	
Care professionals on call available in the organization		,660	
Organize internal team organization meetings two up to six monthly			-,924
Organization measures quality of care			,824
Organization measures client satisfaction with a standardized form			,805
Organization measures quality of care with a standardized form			,775

Variables loading high on the first component related to organizations that emphasized care planning and involved clients and his/her informal carers in care planning. Furthermore, the availability of the clients' file at the organization and client's home, a digital client file, and the involvement of the general practitioner in the assessment of geriatric symptoms, highly loaded on this component. All these items were elements of patient-centered care (Davis et al., 2005; Institute for Patient- and Family-Centered Care, 2012). Accordingly, this first component was called '*Patient-centered care delivery*'.

Variables loading high on the second component related to the availability of care professionals on call and care professionals who provided specialized dementia care, palliative care or other types of care. This component was called '*Availability of specialized care professionals*'.

The third component consisted of variables concerning standardized monitoring of quality of care and the clients' satisfaction on care received from the organization. The variable 'the organization hold internal team meetings every two to six months' loaded negatively on the third component. This indicated that a standardized monitoring of the quality of care and the clients' satisfaction were associated with a higher than two-to-six monthly frequency of internal team meetings. An internal team organization meeting was defined as a meeting to inform and to discuss the overall operation of the organization with the staff. Also, the item 'the general practitioner is involved in the geriatric assessment' cross loaded on this component. The use of standardized assessments for measuring quality of care and client satisfaction, along with regular internal team meetings indicated that there was a focus on care performance, and performance monitoring. Accordingly, this third component was called '*Monitoring of care performance*'.

Hierarchical cluster analyses and characterizing the home care models

The hierarchical cluster analysis resulted in six clusters. Figure 1 shows the mean score of all organizations that belong to a cluster per component. Since the cross-loading item 'general practitioner is involved in the geriatric assessment' loaded the highest on the first component, this item was only used for calculating the total score of the first component.

Figure 1: Mean number of variables per component present in the home care organizations per cluster

In conclusion, the six clusters or home care models can be characterized as follows:

1. A (very) strong focus on patient-centered care delivery, a high availability of specialized care professionals, and a strong focus on monitoring of care performance. Fifteen home care organizations corresponded to this model: two from Italy, one from the Netherlands, nine from Belgium, one from Iceland and two from Finland.
2. A very strong focus on patient-centered care delivery, little or no availability of specialized care professionals, and a very strong focus on monitoring of care performance. Two Dutch and one Finnish home care organizations fell into this cluster.
3. A strong focus on patient-centered care and a high availability of specialized care professionals, but limited attention for monitoring care performance. Six Belgian home care organizations fitted into this model.
4. A very limited focus on patient-centered care delivery, no availability of specialized care professionals and a little focus on monitoring care performance. One Belgian home care organization corresponded to this model.
5. A strong focus on patient-centered care delivery, a low availability of specialized care professionals and a low focus on care delivery outcomes. One Belgian home care organization fitted within this model.
6. A very limited focus on patient-centered care delivery, little or no availability of specialized care professionals, and a strong focus on monitoring care performance. One Belgian and nine German home care organizations corresponded to this model.

Discussion and conclusion

In order to improve the efficiency of health and home care, policymakers need information on which type of home care model provides the best outcomes. A first step in this, is to identify and characterize care models. The aim of this study was to benchmark home care models within and across European countries by identifying and characterizing home care models based on data of 36 care organizations across six European countries participating in the IBenC project. Based on a principal component analysis and a hierarchical cluster analyses, six home care models were identified. The models differ with regard to three core domains: level of focus on patient-centered care delivery (component 1), availability of specialized care professionals (component 2), and level of care performance monitoring (component 3).

Previous studies indicate that the home health care of the future needs to be more patient and person centered; more integrated and coordinated across settings, services and care professionals; providing high quality care for example by offering specialized care; and technology supported (Bienkowska-Gibbs et al., 2015; Kringos et al., 2015; Landers et al., 2016). Thus, it can be stated that the identified care models are relevant for further investigation since they also differ in the level of patient-centered care delivery, and in the availability of specialized care professionals.

Patient-centered care is an approach to plan, deliver, and evaluate health care that relies on a mutually beneficial partnership among health care providers, clients, and family (Patient- and Family-Centered Care, 2012). According to the Institute for Patient- and Family-Centered Care, the core concepts of patient and family-centered care are: (1) Dignity and respect: health care professionals listen to and respect the perspectives and the choices of the client and his family. Their knowledge, values, beliefs, and cultural background are incorporated into the planning and the delivery of care. (2) Information sharing: health care professionals communicate and share complete and unbiased information with clients and their family in an affirmative and useful way. Clients and their family receive timely,

complete, and accurate information in order to effectively participate in care and decision-making. (3) Participation: clients and their family are encouraged and supported to participate in care and decision making corresponding to their preferences. (4) Collaboration: clients and their family are involved in activities at the meso level. For example, health care managers collaborate with clients and families in policy and program development, and during implementation and evaluation, in health care facility design, in professional education, as well as in the delivery of care. Patient-centered care tends to lead to better health outcomes and better allocation of resources (Davis et al., 2005; Institute for Patient- and Family-Centered Care, 2012).

Specialized care become more important due to the increasing number of chronic conditions and the multi-morbidity in home care. Therefore, more and new skill-mixes are needed, in particular new roles for nurses (Kringos et al., 2015). Multi-morbidity and chronic conditions can be treated more effectively by close collaborating specialized care professionals such as in end-of-life or diabetic care. Some initiatives have been aimed at better integration with specialist care, which can lead to better health outcomes, higher patient satisfaction, and reduced costs (Bienkowska-Gibbs et al., 2015). In most cases, specialist care is narrowed down to the important role of a specialist physician such as a geriatrician. In this study, the term 'availability of specialized care professionals' had a broader meaning.

Additionally to patient centered care and availability of specialized care professionals, the identified care models also included a level of care performance monitoring. Kringos et al. (2015) conclude that availability of data on performance indicators in the European home care is poor. This points to a low priority of health services research and suggest inadequate development of evidence-based policy-making (Kringos et al., 2015). The poor availability of data on care performance also points out the lack of quality control. The unavailability of data on quality of care does not allow for reliable benchmarking. Relevant information for stakeholders as clients, policy makers and health care insurers is necessary to make informed choices, and to monitor the quality of care to keep this at a reasonable level.

The identified care models do not differentiate as to the level of integration and coordination across settings, services and care professionals, nor as to the level of technology supported. In order to measure the integration between health and social care, the service delivery was assessed by means of variables such as the provision of nursing care either or not combined with social care. However, these variables were dropped in the principal component analysis. The variable 'general practitioner is involved in the geriatric assessment' gives some indication on the integration and coordination across care professionals, and the variable 'digital clients file available' on the supported technology in the care organization. However, in this study, both variables belong to the domain of patient-centered care.

The identification and characterization of the home care models was a first step for improving the efficiency of health and home care. In a second step, an analysis of outcomes associated with the home care models will be conducted. Therefore, the quality of the delivered care will be measured by assessing health outcomes of clients by means of the interRAI HC instruments. Since all included organizations provided nursing care, either or not combined with social care, these results will also have implications for nursing care. Nevertheless, if it appears that a particular care model leads to better care, care organizations should be encouraged to align their care with this care model.

Study strengths and limitations

This study has strengths and limitations. A first strength concerns the questionnaire on the home care organization characteristics. By carefully developing the questionnaire based upon evidence-based

literature (Van Eenoo et al., 2016), it was possible to collect data in a standardized way across six European countries. However, it is needed to pay attention on the variables *case management* and *disease management*. An exact definition of case or disease management was not provided in the questionnaire. It was left to the organizations to decide whether their service could provide case management or disease management. Consequently, an overestimation of the application of case management or disease management in the IBenC study sample was possible.

For analytic purposes, only dichotomous variables were included in the analyses. Variables at ratio measure level, such as the proportion of nursing staff or the proportion of home health aides, were not included. Therefore, it is possible that other variables at the meso or macro level that are important for categorizing organizations were not included. However, it should be noted that the components selected by this research explained a very high percentage of variance (75.4%).

Due to missing data, it is possible that the index score of the components was biased. However, the bias is kept as low as possible by involving academic experts in different stages of the study. As well in the preparing phase as at the end of the analyses, all variables and results were checked by the principal investigators of each participating country.

The organizational diversity of the home care organizations made it possible to identify six organizational home care models. Although the care organizations were recruited based on diversity, it is still possible that some types were missed due to the relative small number of included organizations. The analyses could be replicated on a larger sample in order to validate the results, and identify additional care models or subtypes within the models.

It is however a strength that the organizations were not necessarily clustered into the same care model if they were from the same country. The models thus are not merely country-specific and dependent on care policy. This enforces the meaningfulness and the international value of the models.

Conclusion

In summary, it was possible to differentiate six home care models based on three core domains: the level of patient-centered care, the availability of specialized care professionals and the level of monitoring care performance. Literature confirms that the three domains are important issues for organizing home care in the future. Home care organizations within and outside of Europe can be categorized into one of the six care models. A follow-up study will explore which of these models performs best on e.g. the quality of the delivered care by assessing health outcomes of the clients.

Acknowledgement

This study was conducted within the IBenC project (Identifying best practices for care-dependent elderly by Benchmarking Costs and outcomes of community care (FP7, grant no. 305912). The IBenC project was supported by the Seventh Framework Programme (CORDIS FP7) of the European Commission, 30 HEALTH (FP7-HEALTH-2012). The contents of this article reflect only the authors' views and the European Commission is not liable for any use that may be made of the information contained therein.

References

- Agency Care and Health Flanders, 2016. Overview of home care services on March 11, 2016 for the Flemish Region and the Brussels-Capital Region. <https://www.zorg-en-gezondheid.be/overzicht-aanbod-thuiszorg> (accessed 8 September 2017).
- Beaumont, R., 2012. An introduction to Principal Component Analysis & Factor Analysis Using SPSS19 and R. <http://www.floppybunny.org/robin/web/virtualclassroom/stats/statistics2/pca1.pdf> (accessed 8 September 17).
- Bienkowska-Gibbs, T., King, S., Saunders, C.L., Henham, M.L., 2015. New organisational models of primary care to meet the future needs of the NHS: a brief overview of recent reports. RAND Europe, Cambridge.
https://www.rand.org/content/dam/rand/pubs/research_reports/RR1100/RR1181/RAND_RR1181.pdf (accessed 8 September 2017).
- Costello, A.B., Osborne, J.W., 2005. Best Practices in Exploratory Factor analysis: Four Recommendations for Getting the Most From Your Analysis. *Practical Assessment, Research & Evaluation*. 10(7), 1-10. ISSN 1531-7741.
- Davis, K., Schoenbaum, S.C., Audet, A.M., 2005. A 2020 Vision of Patient-Centered Primary Care. *J Gen Intern Med*. 20(10), 953–957. <http://doi.org/10.1111/j.1525-1497.2005.0178.x>.
- Donabedian, A., 1997. The quality of care: How can it be assessed? *Archives of Pathology & Laboratory Medicine Online*. 121, 1145-1150.
http://post.queensu.ca/~hh11/assets/applets/The_Quality_of_Care__How_Can_it_Be_Assessed_-_Donabedian.pdf (accessed 8 September 2017).
- European Commission, 2013. Available at: <http://ec.europa.eu/digital-agenda/futurium/en/content/sustainable-health-systems-visions-strategies-criticaluncertainties-and-scenarios>. (accessed 06 February 2015).
- IBenC Project: Identifying Best Practices for Care-dependent Elderly by Benchmarking Costs and Outcomes of Community Care. Funded by the Seventh Framework Programme (CORDIS FP7) of the European Commission, HEALTH (FP7-HEALTH-2012). [accessed 8 September 2017]. Available at: www.ibenc.eu.
- Institute for Patient- and Family-Centered Care, 2012. What is patient- and family- centered health care? What are the core concepts of patient and family-centered care?
<http://www.ipfcc.org/about/pfcc.html> (accessed 8 September 2017).
- Kringos, D.S., Boerma, W.G.W., Hutchinson, A., Saltman, R.B. (eds.), 2015. Building primary care in a changing Europe. European observatory on Health systems and Policies, United Kingdom. ISBN 978 92 890 50 319.
http://www.euro.who.int/__data/assets/pdf_file/0018/271170/BuildingPrimaryCareChangingEurope.pdf (accessed 8 September 2017).
- Landers, S., Madigan, E., Leff, B., Rosati, R. J., McCann, B. A., Hornbake, R., MacMillan, R., Jones, K., Bowles, K., Dowding, D., Lee, T., Moorhead, T., Rodriguez, S., Breese, E., 2016. The Future of Home Health Care: A Strategic Framework for Optimizing Value. *Home Health Care Manag Pract*. 28(4), 262–278. <http://doi.org/10.1177/1084822316666368>.

- Mot, E., Bíró, A., 2012. Assessing Needs of Care in European Nations (ANCIEN) Performance of Long-term Care Systems in Europe. European Network of Economic Policy Research Institutes. Report No.: FP7 HEALTH-2007-3.2-2, ENEPRI POLICY BRIEF NO. 13. <http://www.ancien-longtermcare.eu/sites/default/files/ENEPRI%20PB%20No%2013%20Performance%20of%20LTC%20systems%20in%20Europe.pdf> (accessed 8 September 2017).
- Norušis, M., 2012. Cluster Analysis, in: IBM® SPSS 19 Statistical Procedures Companion. Prentice Hall, New Jersey, pp. 375-404. ISBN-13: 978-0-321-74842-3. http://www.norusis.com/pdf/SPC_v19.pdf (accessed 8 September 2017).
- Queensland Health, 2008. Changing models of care framework 2000. https://www.health.qld.gov.au/__data/assets/pdf_file/0034/434878/care_framework.pdf (accessed 8 September 2017).
- Rodrigues, R., Huber, M., Lamura, G. (eds.), 2012. Facts and Figures on Healthy Ageing and Long-term Care. European Centre for Social Welfare Policy and Research, Vienna. http://www.euro.centre.org/data/LTC_Final.pdf (accessed 8 September 2017).
- Van Eenoo, L., Declercq A., Onder, G., Finne-Soveri, H., Garms-Homolová, V., Jónsson, P., Dix, O., Smit, J., van Hout, H., van der Roest, H., 2015. Substantial between-country differences in organising community care for older people in Europe—a review. *Eur J Public Health*. 26(2), 213-219. <https://doi.org/10.1093/eurpub/ckv152>.
- Van Eenoo, L., van der Roest, H., van Hout, H., Declercq, A., 2016. Quality of Care and Job Satisfaction in the European Home Care Setting: Research Protocol. *Int J Integr Care*. 16(3), 14. DOI: <http://dx.doi.org/10.5334/ijic.2519>.
- World Health Organization, 2002. Innovative Care for chronic conditions: Building Blocks for Action. World Health Organization, Geneva. <http://www.who.int/chp/knowledge/publications/icccglobalreport.pdf?ua=1> (accessed 8 September 2017).