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Citation for published version (APA):

de Boer, B., Hamers, J. P. H., Zwakhalen, S. M. G., Tan, F. E. S., Beerens, H. C., & Verbeek, H. (2017). Green Care Farms as Innovative Nursing Homes, Promoting Activities and Social Interaction for People With Dementia. *Journal of the American Medical Directors Association*, 18(1), 40-46.
<https://doi.org/10.1016/j.jamda.2016.10.013>

Document status and date:

Published: 01/01/2017

DOI:

[10.1016/j.jamda.2016.10.013](https://doi.org/10.1016/j.jamda.2016.10.013)

Document Version:

Publisher's PDF, also known as Version of record

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Original Study

Green Care Farms as Innovative Nursing Homes, Promoting Activities and Social Interaction for People With Dementia

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A B S T R A C T

Keywords:
Dementia
nursing home
green care farm
daily life
activities
social interaction

Objectives: Innovative care environments are developed for people with dementia to encourage person-centered care. This study aims to investigate whether residents of green care farms that provide 24-hour nursing care participate more in (physical) activities and social interaction compared with residents of other nursing homes.

Design: Longitudinal observation study.

Setting: Nursing homes in the Netherlands (green care farms, traditional nursing homes, and regular small-scale living facilities).

Participants: A total of 115 nursing home residents at baseline, 100 at follow-up.

Measurements: Ecological momentary assessments ($n = 16,860$) were conducted using the Maastricht Electronic Daily Life Observation Tool. Residents living at green care farms were compared with residents living in traditional nursing homes and regular small-scale living facilities. The following aspects were collected for this study: the activity performed by the participant or occurring in his or her vicinity, the engagement in the activity, the level of physical activity during the activity, the physical environment (location where the activity occurred), and the level of social interaction during the activity.

Results: In total, 9660 baseline observations and 7200 follow-up observations were conducted. Analyses showed that residents of green care farms significantly more often participated in domestic activities ($P = .004$, $SE = 1.6$) and outdoor/nature-related activities ($P = .003$, $SE = 0.9$), and significantly less often engaged in passive/purposeless activities ($P < .001$, $SE = 1.7$) compared with residents of traditional nursing homes. Furthermore, residents of green care farms had significantly more active engagement ($P = .014$, $SE = 0.9$), more social interaction ($P = .006$, $SE = 1.1$), and came outside significantly more ($P = .010$, $SE = 1.1$) than residents of traditional nursing homes. Residents of green care farms were significantly more physically active ($P = .013$, $SE = 0.8$) than were residents of regular small-scale living facilities. No other significant differences were found.

Conclusion: Green care farms can be a valuable alternative to traditional nursing homes. They provide an attractive, homelike environment and activities that positively influence engagement and social interaction. Research is needed to study how successful elements of green care farms can be implemented in existing nursing homes.

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The authors declare no conflicts of interest.

This study was funded by the Netherlands Organisation for Health Research and Development (ZonMW): 728010002. They had no role in study design, analyses, interpretation of the data, writing the article or in the decision to submit the article for publication.

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<http://dx.doi.org/10.1016/j.jamda.2016.10.013>

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Green care farms that provide 24-hour nursing care for people with dementia are a new phenomenon within the geriatric landscape in the Netherlands. The development is part of a larger worldwide movement toward small-scale, homelike care environments that aim to provide person-centered care.^{1,2}

This radical redesign is believed to be necessary to solve the ongoing struggle in nursing homes against passivity and related negative outcomes, such as boredom, loneliness, isolation, and social

exclusion.^{3,4} Residents in traditional nursing homes spend a substantial part of their days doing little or nothing while remaining in a lying or sitting position, without social interaction, and they are rarely engaged in meaningful activities.^{5–7}

To tackle these problems, various alternative facilities are developing across the world.⁸ Examples are small-scale living facilities on the terrain of larger nursing homes, stand-alone units in the neighborhood, and recently, green care farms that provide 24-hour nursing care for people with dementia.⁹ Traditional institutional care settings are being redesigned into smaller group homes that provide a more homelike and familiar atmosphere for people with dementia.¹⁰ These new facilities are aimed at allowing people to continue the life they had before admission for as long as possible and reaching or maintaining a good quality of life.¹¹ They try to achieve this by focusing on engaging residents in activities, giving them feelings of meaning in life, and allowing them to express themselves and interact with other people. A recent review on the impact of homelike residential care

models showed that the current evidence on the effectiveness of these models is limited and that more comparative research is needed to provide a stronger evidence base to justify the uptake of more homelike residential care models, such as green care farms.¹²

Green care farms combine agricultural with care activities and are a new type of small-scale living facility (Figure 1 and <https://www.academischewerkplaatsouderenzorg.nl/node/10802>).¹³ Within day care, green care farms are a widely adopted way of providing care for different client groups. Norway, the Netherlands, and France are the leading countries with each approximately 1000 green care farms providing day care.¹⁴ It is suggested that nursing staff require explicit competencies for working in these new small-scale facilities because of the integrated tasks they have.^{15,16} The rationale of green care farms is that people should be able to participate in daily activities as much as possible. Furthermore, the physical environment offers many opportunities to incorporate these activities into normal daily care practices and offers residents to move more freely than in existing

Fig. 1. Impression of green care farms.

nursing homes. The environment involves the presence of animals, plants, and other natural aspects. Residents have the opportunity to participate in outdoor, domestic, work-related, and other types of activities incorporated into normal daily life. Some of these green care farms are actual farms that have agricultural production, whereas for others, care is the main source of income. Green care farms that provide 24-hour nursing care are expected to have benefits regarding the way residents spend their days when compared with regular nursing homes, which can influence well-being. However, available research on the effects of green care farms only focuses on day care practices. Here, findings indicate a positive effect of day care at green care farms, such as more involvement in activities and more physical effort needed during the day compared with regular day care services.^{17,18}

Evidence is lacking on the effects of green care farms on the daily lives of residents in comparison with other existing nursing homes for people with dementia. Therefore, this study investigates whether residents of green care farms are more engaged in (physical) activities and social interaction than are residents of other nursing homes. This is examined by comparing green care farms with traditional nursing homes and with regular small-scale living facilities. The largest differences are expected between green care farms and traditional nursing homes.

Methods

Design

A longitudinal observational design was used, including a baseline measurement and 6-month follow-up.⁹ Ecological momentary assessments (EMA)¹⁹ of residents' living in different types of nursing home facilities were conducted. These repeated assessments allow researchers to assess affect, behavior, and environmental factors (both socially and physically) close in time to the actual experience.^{19,20} Residents were observed at a baseline measurement and a 6-month follow-up.

Setting/Sample

The experimental group consisted of 5 homes on green care farms; these are a type of stand-alone small-scale facility providing nursing care for people with dementia; both care and agricultural activities are important and approximately 8 residents live together in a house on the farm. The control groups consisted of traditional nursing homes and regular small-scale living facilities. The traditional nursing homes had at least 20 residents on the ward; caregivers here have differentiated tasks and daily life is mainly determined by routines and rules of the organization.¹ Regular small-scale living facilities had a maximum of 8 residents, making it a joint household with cooking in the home; the steady stream of caregivers here have integrated tasks. In the small-scale living facilities, daily living is mainly determined by the residents and informal caregivers and the physical environment approaches a homelike situation as much as possible.¹ To increase comparability between residents in terms of cognitive and functional status, a matching procedure was conducted 2 weeks before the baseline measurement.⁹ Residents of all participating locations were screened and residents of the traditional nursing homes were selected based on their screening scores to match with residents of green care farms and small-scale living facilities.

In total, 158 residents living in 18 nursing homes were eligible for inclusion in the study. Residents were eligible if they had a formal diagnosis of dementia according to their medical record. Residents included in the study were all admitted to nonprofit, collectively funded nursing homes in the southern part of the Netherlands.

Measures

Daily lives

Table 1 clarifies the operationalization of the outcomes related to the daily lives of the residents. The Maastricht Electronic Daily Life Observation tool (MEDLO-tool) was used to assess the primary outcomes of this study.²¹ The MEDLO-tool is a tablet-based observational tool that assesses the residents' activity, their physical environment, and their social interactions. It was demonstrated to be valid, feasible, and reliable with, on average, 86% absolute agreement between observers and Kappa values between 0.5 and 1.0 (depending on the aspect of daily life measured).¹⁸ The following aspects were collected for this study: (1A) the activity performed by the participant or occurring in his or her vicinity (eg, eating/drinking, playing a game, having a chat, walking, music, dancing, sitting/lying down), (1B) the engagement in the activity, (1C) the level of physical activity during the activity, (2) the physical environment (location where the activity occurred), and (3) the level of social interaction during the activity.

Background characteristics

Cognitive functioning was assessed using the Standardized Mini-Mental State Examination (S-MMSE).²² The scores on this assessment range from 0 to 30, with higher scores indicating better cognition. Dependence in activities of daily living (ADLs) was assessed using the Barthel index.²³ The total scores of the Barthel index range from 0 to 20, with higher scores indicating less ADL dependence. The Global Deterioration Scale (GDS)²⁴ was used to measure the severity of

Table 1

Operationalization of Activity, Engagement, Physical Activity, Physical Environment, and Social Interaction

1A. Activity taking place during the observation minute (one of the listed activities can be chosen as an activity that took place) 0 = activity did not take place 1 = activity took place	
Activity	Example
Activities related to care	Visit (para)medical personnel; (self-) care activities
Social/communication-related activities	Talking groups; speaking with others/ having a chat; making a telephone call; sensory stimulation; helping others
Eating/drinking	Eating/drinking
Outdoor/nature-related activities	Walking outside; outing with family or others outside facility; gardening and caring for plants; excursion or shopping; pets
Domestic activities	Household chores; cooking
Recreational activities	Sports; dancing; walking, spiritual activity; crafts/arts; music/singing; playing a game/puzzles; reading/ writing; watching television
Passive/purposeless activities	Sitting/lying; resting or sleeping purposefully; purposeless (repetitive) behavior
Other	Other activities that did not match any of the categories
Not observable	Not observable
1B. Engagement in main activity that was chosen in step 1A 0 = no, not engaged: sleeping, staring, not engaged in main activity 1 = yes, engaged: active participation in activity or a focus on activity	
1C. Physical activity 0 = none/minimal physical activity: lying or sitting quietly 1 = yes, physically active: light-to-moderate sitting activity, standing activity, walking around, cycling, whole-body movements	
2. Physical environment: location where the activity is occurring 0 = inside 1 = outside	
3. Social interaction during activity 0 = no social interaction, attempted interaction without response 1 = yes, social interaction with one or more persons	

the dementia, ranging from 1 (normal) to 7 (highly severe dementia). Demographic information was collected through the medical records of the residents.

Procedure

At baseline and follow-up, residents were observed over a period of 2 weeks, including 2 mornings (07:00–11:30), 2 afternoons (11:30–16:00), 2 evenings (16:00–20:30), and 1 Saturday afternoon (11:30–16:00; only at baseline), with a half-hour break each day.

Every 20 minutes, a maximum of 8 residents were observed for 1 minute in a random sequence. This led to 12 observations per resident each observation day and 156 observations per resident in total. Residents were observed for 1 minute, after which the observer scored (1) the activity that the resident was performing or that occurred in the immediate environment, (2) the place of the activity, (3) the resident's engagement in the activity, (4) degree of physical activity that was needed during the activity, and (5) the level of social interaction.

Analyses

First, differences at baseline among the 3 types of nursing homes (green care farm, traditional nursing home, and regular small-scale living) on sociodemographic characteristics were assessed with a 1-way analysis of variance (ANOVA) (Table 2). Second, descriptive analyses on the aspects of daily life were conducted. For each aspect, the percentage of “yes” (1) responses was calculated per resident for the baseline and follow-up. A “yes” response indicated whether a resident was participating in a certain type of activity, and whether he or she was actively engaged, was physically active, was outside, and had social interaction. An overall score per resident (average of baseline and follow-up) was calculated, providing the most reliable and valid estimate of the daily lives, as it takes into account seasonal influences (eg, weather conditions). In case of dropout before follow-up, only the baseline scores were used. Third, differences among the types of nursing homes on the dependent variables “activity,” “the engagement in the activity,” “physical activity during the activity,” “the location of the activity,” and “social interaction during the activity” were tested. To test the effect of nursing home type, a multilevel regression analysis on the overall scores was conducted, controlling for age, gender, cognition (S-MMSE), and independence in ADLs (Barthel index). The residents (level 1) were nested in nursing homes (level 2). All variables were entered into the model simultaneously (forced entry method). The Holm method²⁵ for correcting for multiple testing was used. Effect sizes were calculated, indicating a small ($d > 0.2$), medium ($d > 0.5$), or large ($d > 0.8$) effect size.²⁶

Ethics

The medical ethics committee of the Maastricht University Medical Centre declared that the study was noninvasive for people with dementia. Legal representatives of the residents provided written informed consent. Furthermore, verbal consent was given by the residents.

Results

Consent was obtained from 115 (73%) of 158 eligible residents. At follow-up, 100 residents still participated in the study. This resulted in 9660 baseline observations and 7200 follow-up observations.

Sample Characteristics

Table 2 provides the characteristics of the residents at baseline. Except for gender, $F(2, 112) = 3.75$, $P < .05$, the 1-way ANOVA did not reveal any significant group differences in baseline characteristics. Pairwise comparisons revealed significantly more female residents at regular small-scale living facilities compared with traditional nursing homes.

Daily Life at Green Care Farms

Overall, residents at green care farms participated almost half the time (50%) in social/communication-related activities, eating/drinking, or recreational activities (see Table 3). Domestic activities, outdoor/nature-related activities, and care-related activities occurred less often (almost 20%). Residents of green care farms spent 27% of their time in passive/purposeless activities or doing other activities. When residents were doing an activity, they were mostly showing signs of engagement (74%). Residents were physically active during 12% of the observations and came outside during 8% of the observations.

Green Care Farms Compared With Traditional Nursing Homes Wards

The results of the multilevel regression analyses are shown in Table 4. Residents of green care farms were significantly less involved in passive activities compared with residents in traditional nursing homes (27% vs 44%, $P < .001$, $SE = 1.7$). Furthermore, residents of green care farms were significantly more often participating in domestic activities ($P = .004$, $SE = 1.6$) and in outdoor/nature-related activities ($P = .003$, $SE = 0.9$) than were residents of traditional nursing homes. In addition, residents of green care farms had significantly more active engagement in activities ($P = .014$, $SE = 0.9$), more social interaction ($P = .006$, $SE = 1.1$), and came outside significantly more often ($P = .010$, $SE = 1.1$) compared with residents of traditional nursing homes.

Green Care Farms Compared With Regular Small-Scale Living Facilities

Residents of green care farms were significantly more physically active during the observations ($P = .013$, $SE = 0.3$) than were residents of regular small-scale living facilities (see Table 4). No statistically significant differences were found between residents of green care

Table 2
Sample Characteristics

	Total, N1 = 18		Green Care Farms, N1 = 5		Traditional Nursing Homes, N1 = 4		Regular Small-Scale Living Facilities, N1 = 9	
	Baseline, N2 = 115	Follow-up, N2 = 100	Baseline, N2 = 34	Follow-up, N2 = 30	Baseline, N2 = 29	Follow-up, N2 = 26	Baseline, N2 = 52	Follow-up, N2 = 44
Age, mean (SD)	84 (7.8)	84 (7.8)	82 (8.5)	83 (8.7)	83 (8.3)	83 (8.5)	85 (6.8)	85 (6.7)
Gender, % women	75	76	68	70	62*	62	87*	89
S-MMSE, mean (SD)	8 (6.9)	8 (7.2)	8 (6.7)	7 (6.6)	8 (7)	7 (7.6)	9 (6.9)	8 (7.6)
Barthel index, mean (SD)	10 (5.9)	9 (6.1)	9 (5.7)	9 (5.8)	9 (6.6)	9 (6.9)	10 (5.7)	9 (6)
GDS, mean (SD)	5 (1.3)	5 (1.4)	5 (1.4)	5 (1.4)	5 (1.3)	5 (1.3)	5 (1.3)	5 (1.3)

N1, number of nursing home care units; N2, number of participants.

*Significant difference ($P < .05$).

Table 3
Frequency Distributions of Scoring Categories for the Whole Sample and Within Each Type of Living Facility Separately

Aspect of Daily Life	Category	Total			Green Care Farms			Traditional Nursing Homes			Regular Small-Scale Living Facilities		
		% Baseline	% Follow-up	% Overall	% Baseline	% Follow-up	% Overall	% Baseline	% Follow-up	% Overall	% Baseline	% Follow-up	% Overall
Activity	Passive/purposeless activities	29	33	31	25	28	27	41	48	44	24	28	26
	Recreational activities	20	20	19	16	16	16	17	15	16	23	25	24
	Social/communication-related activities	15	14	14	17	15	16	12	10	11	15	16	15
	Eating/drinking	14	14	14	16	16	16	13	11	12	14	15	14
	Domestic activities	6	3	5	8	6	7	3	2	2	6	3	5
	Activities related to care	5	5	5	5	6	5	4	5	4	6	6	6
	Outdoor/nature-related activities	4	2	3	6	3	5	2	1	2	4	2	3
	Other	3	2	3	3	3	3	4	3	3	2	1	2
	Not observable	5	6	5	4	7	5	5	6	6	5	4	5
	Engaged in an activity	73	71	72	74	73	74	66	61	63	76	75	76
Engagement	Physically active	10	8	10	14	10	12	11	10	10	8	6	7
	Physical	8	2	5	12	3	8	4	1	3	7	3	5
	Physical environment												
Level of social interaction	Social interaction	33	27	30	38	28	33	23	20	21	36	30	33

farms and regular small-scale living facilities regarding the different types of activities.

Discussion

The current study shows that green care farms are a valuable addition to the nursing home spectrum. Residents living at green care farms are more active than are residents of traditional nursing homes. Furthermore, when activities are carried out, residents are more often engaged, have more social interaction, and come outside more often at green care farms. Compared with residents of regular small-scale living facilities, residents of green care farms were more physically active during their days. In this study, residents' cognitive and functional performances were equal across settings.

Possible factors explaining the more active and engaged daily life of residents living at green care farms lie the physical environment and the focus on providing (meaningful) activities incorporated into normal daily care practices.²⁷ Unique features of green care farms include the presence of animals, stables, gardens, and other outdoor areas. Green care farms provide residents with an environment that allows them to initiate activities and go outside whenever they want.

Being engaged in (physical) activities and having social interaction is important for nursing home residents, as these can influence their quality of life. Engagement in active, expressive, and social activities has been associated with a higher quality of life compared with passive activities.²⁸ A lack of engagement can lead to more behavioral problems²⁹ and a lower quality of life.³⁰ This emphasizes the importance of a nursing care environment that facilitates the engagement of residents in activities and social interaction.

Another finding was that residents of green care farms come outside more often than did residents of the existing traditional nursing homes. Several reviews indicate that nature, outdoor access, and/or spending time outside are of great importance to nursing home residents.^{31,32} They showed that factors such as sunlight and provision of outdoor areas can influence residents' perceived stress, physical effort, and agitation in a positive manner. This indicates the importance for nursing homes to expedite the possibilities for residents to go outside.

We found that residents of green care farms were more physically active during their days than were residents of regular small-scale living facilities. Physical inactivity in nursing homes has been reported by previous studies and is associated with negative outcomes for residents, such as a higher care dependency and decreased physical fitness.^{5,6,33} It is worth mentioning that the difference found in physical activity was largest with stand-alone small-scale living facilities. This is a type of small-scale living within the neighborhood means that there are no facilities present that might invite residents to be physically active (eg, restaurant, activity rooms, long interactive corridors). The largest differences were expected between green care farms and traditional nursing homes. Nevertheless, although regular small-scale facilities provide nursing home care according to a similar care vision as green care farms (eg, integrating daily activities into care practices, forming a household), it could be argued that green care farms add some unique characteristics to this in the form of the physical environment and the opportunities this provides. However, only adding a certain physical environment to a nursing home is not enough. Nursing staff is important in implementing this physical environment and using it to its full potential. More research is needed on effective strategies enabling nursing staff of green care farms to do this.

Some methodological considerations should be taken into account. First, a strength of the current study is the method of data collection, including a matching procedure to increase comparability of residents regarding cognitive and functional status. However, although the matching procedure increased the comparability between groups in

Table 4
Random-Effects Regression Analysis on the Overall Scores on Activities, Location, Engagement, Social Interaction, and Physical Activity Controlling for Age, Gender, Cognition (S-MMSE), and Independence in ADLs (Barthel Index)

	ICC	B	SE B	95% CI	Variance (between)	P	Effect Size
Passive/purposeless activities	0.04						
Traditional nursing home		17.1	2.9	10.8	23.5	105.9	.000*
Regular small-scale living facility		1.1	2.6	−4.4	6.5	105.9	.687
Recreational activities	0.01						
Traditional nursing home		−0.74	3.0	−8.1	6.7	129.1	.812
Regular small-scale living facility		8.0	2.7	1.7	14.3	129.1	.019
Social/communication-related activities	0.23						
Traditional nursing home		−4.6	3.8	13.0	3.6	90.6	.242
Regular small-scale living facility		0.73	3.3	−6.3	7.8	90.6	.826
Eating/drinking	0.11						
Traditional nursing home		−4.0	1.4	−6.9	−1.0	17.3	.013
Regular small-scale living facility		−1.3	1.2	−3.8	1.3	17.3	.297
Domestic activities	0.38						
Traditional nursing home		−4.9	1.4	−8.0	−1.8	9.6	.004*
Regular small-scale living facility		−2.2	1.2	−4.8	−0.40	9.6	.091
Activities related to care	0.10						
Traditional nursing home		−0.90	0.81	−2.7	0.85	6.2	.284
Regular small-scale living facility		.88	0.70	−0.62	2.4	6.2	.230
Outdoor/nature-related activities	0						
Traditional nursing home		−3.2	0.83	−5.0	−1.4	11.3	.003*
Regular small-scale living facility		−1.8	0.75	−3.4	−0.15	11.3	.034
Other	0.01						
Traditional nursing home		0.0002	1.1	−2.3	2.3	16.6	.999
Regular small-scale living facility		−1.3	0.96	−3.3	0.76	16.6	.205
Engagement	0						
Traditional nursing home		−11.1	3.0	−18.8	−3.4	142.9	.014*
Regular small-scale living facility		0.30	2.7	−6.1	6.8	142.9	.913
More than sitting (physical activity)	0.11						
Traditional nursing home		−2.0	2.1	−6.6	2.5	40.8	.349
Regular small-scale living facility		−5.1	1.8	−9.0	−1.3	40.8	.013*
Outside	0.14						
Traditional nursing home		−5.2	1.7	−8.9	−1.5	24	.010*
Regular small-scale living facility		−2.1	1.5	−5.3	−1.0	24	.173
Social interaction	0.09						
Traditional nursing home		−11.8	3.5	−19.4	−4.1	124.6	.006*
Regular small-scale living facility		−2.5	3.1	−9.1	4.1	124.6	.429

CI, confidence interval; ICC, intraclass correlation coefficient.

*Significant at the appropriate α level (for the types of activities, the Holm method for correcting for multiple testing is used).

the study, it limits the generalizability of the findings, as the residents of traditional nursing homes included in this study might not represent a “normal” population of a traditional nursing home. Second, using the repeated ecological momentary assessments with the MEDLO-tool allows researchers to report on symptoms, affect, behavior, and environmental factors (both socially and physically) close in time to the experience, giving a more precise estimate compared with commonly used methods, such as single measurements or proxy reports. However, although the MEDLO-tool was found to have sufficient interrater reliability, validity of the tool should be investigated further. Third, only a few green care farms could be included in the study, as green care farms providing 24-hour nursing care for people with dementia are still rare.

Conclusion

In conclusion, green care farms have demonstrated that they are a valuable alternative to traditional nursing homes, as they provide residents with engagement in activities, social interaction, physical activity, and increased opportunities to go outside. These findings can be valuable for existing nursing home facilities, given the current focus on person-centered care for people with dementia in nursing homes, which emphasizes factors such as social interaction and participation in (meaningful) activities. Education should emphasize the existence of a wide range in types of nursing homes and the different care visions that underlie them. Nursing staff can learn from these facilities and apply this knowledge into daily practice. It is important that nursing staff knows what the successful factors of different types of nursing

home care are, because they are the ones providing the care. More research is needed to investigate which lessons can be learned from successful innovative nursing home facilities and on how to transfer successful elements of these facilities into existing nursing homes. Furthermore, more knowledge on the quality and costs of care and the experiences of (in)formal caregivers at green care farms is needed.

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