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Review

Special Care Units and Traditional Care in Dementia: Relationship with Behavior, Cognition, Functional Status and Quality of Life – A Review

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Key Words

Dementia · Nursing home · Special care units · Behavior · Cognition · Functional status · Quality of life

Abstract

Background: Special care facilities for patients with dementia gain increasing attention. However, an overview of studies examining the differences between care facilities with respect to their effects on behavior, cognition, functional status and quality of life is lacking. ***Results:*** Our literature search resulted in 32 studies published until October 2012. Overall, patients with dementia who lived at special care units (SCUs) showed a significantly more challenging behavior, more agitation/aggression, more depression and anxiety, more cases of global cognitive impairment and a better psychosocial functioning. There was a tendency towards a better functional status in specialized care facilities, and a better quality of life was found in favor of the SCU group compared to the traditional nursing home (n-SCU) group. Longitudinal studies showed an increased number of neuropsychiatric cases, more patients displaying deteriorating behavior and resistance to care as well as less decline in activities of daily living (ADL) in the SCU group compared to the n-SCU group. Patients in small-scale, homelike SCUs showed more agitation and less ADL decline compared to SCU patients. ***Conclusion:*** This review shows that the patient characteristics in SCU and n-SCU settings and, to a minor extent, in SCU and small-scale, homelike SCU settings are different. Over time, there are differences between n-SCU, SCU and small-scale, homelike SCU facilities for some variables.

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Introduction

There are different types of care facilities for elderly subjects suffering from dementia. There is a general view that special care units (SCUs) with trained personnel are the most appropriate environment to enhance the quality of care for subjects who suffer from dementia [1, 2]. In the Netherlands, SCUs or small-scale, homelike SCUs are currently the most common types of living environments for patients with dementia who cannot live on their own anymore [3]. SCUs have arisen with the development of dementia care in addition to the more traditional medical approach. Traditionally, patients with dementia reside in institutions that follow a medical-somatic approach without specialization of dementia care [4, 5]. However, there is no final definition for SCUs. They are especially designed for patients with dementia, implying resident security and safety through locking systems, signposts and communal living areas [6]. The staff is specially trained to deal with behavioral and psychological symptoms of dementia (BPSD), a heterogeneous collection of behaviors and noncognitive symptoms occurring in the course of dementia [7]. This specialization results in a better organized care offered by SCUs [8] compared to traditional nursing homes (n-SCUs) and in more family involvement [9]. Besides SCUs with large wards, also small-scale, homelike SCUs with 8–12 patients in one unit are offered to patients with dementia. Care providers in these units follow a vision of long-term care by emphasizing normalization of daily life [10–15].

The general purpose of SCUs is a non-drug treatment of dementia symptoms [16, 17], that is to reduce the behavioral and psychological problems associated with dementia [18–22]. An SCU unit can further be divided into separate sections, e.g. for patients with severe agitation and disruptive behavior and for those with mild BPSD [7].

The physical environment has been recognized as an influential element in the care of dementia patients [23]. For example, it has been demonstrated that dementia patients with more privacy express less anxiety and aggression [19]. In another study, patients of a large, n-SCU showed higher levels of aggression than those living in the less institutionalized settings of SCUs [21].

An n-SCU is mostly defined as a care facility that follows a traditional medical model and does not provide special facilities for dementia patients or specific training for the personnel. The differences between SCUs and n-SCUs are not always obvious. The most evident difference is that training on the job takes place more often at SCUs than at n-SCUs [24]. In a study in which the settings were different but the quality of care was similar, it was demonstrated that patients in SCUs showed different outcome characteristics, namely a greater decline in functional status, expressive language skills and social skills than those in n-SCUs [25]. However, emotional behavior at baseline seemed to influence all outcomes except functional status. Better affect positively influenced the outcome characteristics regardless of the type of setting [25]. Furthermore, it seems that the patient characteristics between SCUs and n-SCUs can be distinct due to differences in patient allocation [26].

There is no international overview comparing care facilities for patients with dementia in consideration of the variables behavior (BPSD), cognition, functional status and quality of life. An analysis of these variables can help clinicians and policy makers to improve the care for patients with dementia in the future. Based on the above-mentioned studies, the present review addresses the question whether the characteristics of dementia patients living in small-scale, homelike SCUs or SCUs are different from those of patients living in SCUs or n-SCUs.

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Methods

Search Procedure

The search focussed on studies published in English from January 1990 until October 2012. All studies providing data on n-SCUs in comparison with SCUs or small-scale, homelike SCUs and SCUs in comparison with small-scale, homelike SCUs for patients with dementia were included in the review.

All combinations of the key words small-scale living, homelike living, group size, traditional nursing home, neuropsychiatric symptoms, behavio(u)r, dementia, cognition and special care unit(s) were entered in four databases Pubmed, SocINDEX, PsychINFO and Ovid. Because of the large amount of articles found after the first search, we present only the relevant ones.

First, titles and abstracts were searched for comparisons between different living situations of patients with dementia. The full text was retrieved when it might be relevant. Twenty-three articles met the inclusion criteria. Subsequently, the reference lists of retrieved studies were searched for additional articles. A selection was made among these possibly relevant studies, and the abstracts were browsed in an electronic database as described above. This strategy yielded 6 additional papers. Finally, a further 3 studies [25, 27, 28] well-known to the authors were also added to the review.

In total, 32 studies were included in the review. Seventeen of these were cross-sectional studies and 15 longitudinal ones. For the longitudinal studies, the baseline scores were also used to calculate the effect sizes to explore the differences in patient characteristics between the populations studied. All baseline scores in the longitudinal studies were not matched and therefore useful as cross-sectional information for the review.

The majority of the studies (25 of 32) were n-SCU/SCU comparisons. Furthermore, 3 n-SCU/small-scale, homelike SCU [14, 15, 29] and 4 SCU/small-scale, homelike SCU [10–13] comparisons were reviewed. These differences are specified later in the text. Only research publications were included in the literature search.

Selection Criteria

Publications were included when they compared an n-SCU with an SCU or small-scale, homelike SCU, or an SCU with a small-scale, homelike SCU for patients with dementia. The second criterion was that p values, effect sizes and/or numbers of participants, mean scores and standard deviations had to be available for at least one of the following variables: behavior, cognition, functional status or quality of life. Studies that did not meet these criteria were excluded from the review.

Data Analysis

The scores on behavior, cognition, functional status and quality of life of patients with dementia in two different care situations were collected. The effect sizes (Cohen's d) were calculated based on the numbers of participants, mean scores and standard deviations. First, the pooled standard deviation was calculated followed by Cohen's d. The baseline data were used to calculate the effect sizes for the longitudinal studies in order to compare them with the cross-sectional research papers. (For an overview of the research design of the included studies and the p values available from the reviewed articles, see tables 1–4.)

None of the papers relevant in substance was excluded because of missing data, and only studies already published were used for the review. In line with Cohen [30], we considered an effect size of 0.0–0.1 to be nil, one of 0.11–0.2 to be very small, one of 0.21–0.5 to be small, one of 0.51–0.8 to be moderate and one of ≥0.81 to be large.

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Results

The studies are summarized in four tables, presenting consecutively the variables BPSD (table 1), cognition (table 2), functional status/activities of daily living (ADL) (table 3) and quality of life (table 4) in descending order of the year of publication. The tables present the type of study, the numbers of participants, the specific variables, the assessment scales used, p values and effect sizes. In the first part of the Results section, the baseline data are presented, followed by the results of the longitudinal data. The studies comparing n-SCUs or SCUs with small-scale, homelike SCUs are denoted in the text and tables.

Cross-Sectional Information: Behavioral and Psychological Symptoms of Dementia

BPSD were divided into global behavior, agitation and aggression, social functioning, depression and anxiety and other behavioral aspects.

Global Behavior

In total, 18 studies with cross-sectional information about behavioral functioning in the two settings were available (table 1). A global behavioral score at baseline, mostly labelled as 'neuropsychiatry' or 'behavioral problems', was given in 8 studies. In 3 of them [12, 31, 32], the calculated effect sizes were nil.

In 5 studies, large [33], moderate [9, 34, 35] and small [20, 36] effect sizes with a more challenging behavior in SCUs as compared to n-SCUs were found.

Agitation and Aggression

In 3 studies, the effect sizes were nil [12, 21, 37], and in 1 paper, no significant p value was found [14] for agitation/aggression between SCUs and n-SCUs at baseline.

In 2 surveys [31, 34], a small effect size was calculated, reflecting more agitation in the SCU group. However, in 1 of these studies [31], after matching the patients according to gender, mobility and noncognitive symptoms, the difference in agitation between both groups was not significant anymore. In another study, a significant p value indicating more agitation/aggression in the SCU group was found [26]. One study showed more aggression in the n-SCU group, with a small effect size [28].

Social Functioning

Aspects of social functioning were examined in 5 studies. In 1 of them, the calculated effect size at baseline was nil for social activities such as going to the barber and social withdrawal [32], and in another paper, no significant p value was found for participation in pleasant events and social withdrawal [14]. Two studies showed large [38] or small [20] effect sizes, implying that patients living in the SCU showed a better psychosocial function compared to n-SCU patients. One study [15] showed a moderate effect size, indicating a distinct psychosocial behavior in a small patient population from a small-scale, homelike SCU compared to patients from an n-SCU.

Depression and Anxiety

Depressive behavior was investigated in 7 studies. In 4 of them, a nil effect size [32, 38] or a significant p value [26, 39] were found. Three studies showed a large [34] and a small [20, 28] effect size, suggesting more depressive symptoms in the SCU population at baseline.

In 4 studies, anxiety was assessed. In 2 studies, no significant p value was found between an n-SCU and a small-scale, homelike SCU [14] and between an n-SCU and an SCU [39]. In 2 other studies, a small effect size [34] and a significant p value were found [26], indicating more anxiety in the SCU group compared to the n-SCU group.

Table 1. BPSD, effect sizes and p values

First author	Design	SCU vs. n-SCU, n	Results	Assessment instrument	p value	Cohen's d (baseline)
De Rooij [10]	quasi-experimental, longitudinal[d]	51 vs. 51	– social engagement	NPI [62]	<0.01[a]	not available
			– depression		n.s.[a]	
			– behavioral problems		n.s.[a]	
		30 vs. 47	– social engagement		n.s.[a]	
			– depression		<0.10[a]	
			– behavioral problems		n.s.[a]	
Abrahamson [39]	interviews, random, cross-sectional	665 vs. 12,442	– depression	MDS [63]	0.743	not available
			– anxiety		0.029	
Nazir [42]	cohort study	2,843 vs. 23,322	– worsening behavior	MDS	<0.001[a]	not available
			– more verbally abusive		0.399[a]	
			– more physically abusive		0.049[a]	
			– more socially inappropriate		0.063[a]	
					<0.001[a]	
			– growing resistance to care			
Verbeek [12]	quasi-experimental, longitudinal, controlled[d]	124 vs. 135	– neuropsychiatry	NPI	n.s.[a]	0.04
			– agitation	CMAI-D [64]	0.035[a]	–0.02
Weyerer [31]	cross-sectional, randomly selected, matched	594 vs. 573	– neuropsychiatry	NPI	n.s.	0.07
			– agitation	CMAI [65]	<0.001	0.38
Te Boekhorst [13]	quasi-experimental, longitudinal, matched, controlled[d]	67 vs. 97	– depression	RMBPC [66]	n.s.[a]	not available
			– behavior		n.s.[a]	
			– neuropsychiatry	NPI	n.s.[a]	
			– social engagement	RISE [67]	<0.05[a]	
Selbaek [26]	cross-sectional	313 vs. 762	– delusions	NPI	≤0.001	not available
			– hallucination		≤0.001	
			– depression		n.s.	
			– anxiety		≤0.01	
			– euphoria		≤0.001	
			– agression/agitation		≤0.001	
			– apathy		n.s.	
			– disinhibition		n.s.	
			– aberrant motor behavior		≤0.01	
Nobili [9]	longitudinal comparative	72 vs. 72	– neuropsychiatry	NPI	0.0001[a]	–0.74
Pekkarinen [33]	cross-sectional	390 vs. 587	– behavioral problems	LRAI [68]	<0.001	1.16
Morgan [37]	experimental, cross-sectional	186 vs. 169	– exposure to disruptive behavior	EDB [69]	<0.01	–0.028
			– exposure to aggression	EAC [69]	<0.05	–0.027
Sloane [32]	cross-sectional, random	773 vs. 479	– behavioral problems	CMAI	n.s.	–0.001
			– depressive symptom	Cornell [70]	0.001	0.007
			– social functioning	no standardized	0.001	0.012
			– social withdrawal	instrument[b]	0.001	–0.015
				MOSES [71]		
Reimer [14]	matched groups[e]	62 vs. 59	– agitation	CMAI	n.s.	not available
			– social withdrawal	MOSES	n.s.	
			– affect (anxiety)	AARS [72]	n.s.	
			– socially appropriate behavior	Pleasant Events scale [73]	n.s.	
Warren [38]	longitudinal, controlled	44 vs. 36	– depression	Cornell	not available	–0.06
			– psychosocial functioning	MOSES		1.82
Chappel [25]	experimental, longitudinal, controlled	total: 323	– agitation	CMAI	n.s.[a]	not available
			– social skills	MAS-R [74]	<0.05[a]	
			– affect	FTQ	n.s.[a]	
Leon [21]	experimental field study	432 vs. 164	– aggressive behavior	CMAI	n.s.	0.05
			– disruptive behavior	MDS	<0.01	0.24

Table 1 (continued)

First author	Design	SCU vs. n-SCU, n	Results	Assessment instrument	p value	Cohen's d (baseline)
Frisoni [34]	longitudinal, controlled	31 vs. 35	– delusions	NPI	not available	0.33
			– hallucinations			0.44
			– agitation			0.46
			– anxiety			0.27
			– euphoria/elation			–0.07
			– disinhibition			0.12
			– irritability/lability			0.42
			– abberant motor behavior			0.18
			– sleep			0.20
			– total neuropsychiatry			0.64
			– agitation	CMAI		0.49
			– depression	Cornell		1.05
Saxton [15]	longitudinal, matched, controlled[e]	26 vs. 19	– social/cognitive	NHBPS [75]	n.s.[a]	0.56
Kovach [36]	behavioral observations	23 vs. 14	– functional behavior	no standardized instrument[c]	not available	–0.50
Swanson [35]	quasi-experimental, longitudinal	13 vs. 9	– noncognitive behavior	ADAS [76]	n.s.[a]	0.65
Lindesay [28]	cross-sectional[f]	27 vs. 29	– depression	DSS [77]	not available	0.11
			– activity disturbance	ABRS [78]		0.28
			– aggressivity			–0.21
Chafetz [46]	quasi-experimental, longitudinal	12 vs. 8	– behavior	BRF [79]	n.s.[a]	not available
Holmes [20]	quasi-experimental, longitudinal	49 vs. 44	– disturbing behavior total score	INCARE [80]	n.s.[b]	0.47
			– depression		n.s.[b]	0.36
			– social activities		0.01[b]	–0.36

MDS = Minimum data set 2.0 section E4; NPI = Neuropsychiatric Inventory; CMAI(-D) = Cohen-Mansfield Agitation Inventory (-Dutch version); RMBPC = Revised Memory and Behaviour Problems Checklist; RISE = Revised Index of Social Engagement from the Resident Assessment Instrument (RAI); LRAI = Long-Term Care Resident Assessment Instrument; EDB = Exposure to Disruptive Behaviours subscale; EAC = Exposure to Aggression during Caregiving subscale; Cornell = Cornell Scale for Depression in Dementia; MOSES = Multidimensional Observation Scale for Elderly Subjects; AARS = Apparent Affect Rating Scale; MAS-R = Multifocus Assessment Scale-Revised; FTQ = Feeling Tone Questionnaire (no statistics available on research initiation); NHBPS = Nursing Home Behavioral Problem Scale; ADAS = Alzheimer's Disease Assessment Scale; DSS = Depressive Signs Scale; ABRS = Adaptive Behaviour Rating Scale; BRF = Behaviour Rating Form; INCARE = Institutional Comprehensive Assessment and Referral Evaluation; n.s. = not significant.

[a] Over time; [b] 17 items of participation in social activities; [c] checklist for behavioural mapping in long-term care facilities; [d] small-scale, homelike SCU/SCU comparison; [e] small-scale, homelike SCU/n-SCU comparison; [f] SCU/n-SCU with mixed-sex population.

Other Behavioral Aspects

Deviant behavior such as delusions, hallucinations, euphoria, apathy, disinhibition and aberrant motor behavior were significantly more prevalent in the SCU group compared to the n-SCU group [26]. One study found more delusions, hallucinations and irritability/lability with small effect sizes and more disinhibition, aberrant motor behavior and sleep disturbances with very small effect sizes in the SCU group compared to the n-SCU group [34]. In this study, no differences were found for euphoria. Activity disturbance with a small effect size was more common in another study [28]. Yet another study showed a nil effect size between both groups in disruptive behavior directed at the nursing staff [18].

Taken together, SCU patients generally showed a more challenging and deviant behavior, more agitation/aggression, more depression and possibly more anxiety. On the other hand, patients in SCUs also showed better psychosocial function compared to those in n-SCUs. Little evidence was found for a distinct psychosocial behavior in the small-scale, homelike SCU compared to the n-SCU.

Cognition

Baseline data on differences between SCU and n-SCU patients that were obtained either with the Mini-Mental State Examination (MMSE) or with a related global cognitive measure were collected by 20 studies (table 2). In 5 studies, a nil effect size [12, 15, 32, 40, 41] was calculated, indicating that both investigated groups were equally cognitively impaired at baseline.

A greater global cognitive impairment in the SCU group was found in 10 studies with large [33, 38, 39, 42], moderate [20, 28, 36] and small effect sizes [21, 34] or significant p values [43]. In contrast, 1 study showed an increased cognitive impairment with a large effect size in a limited number of participants [35], and 1 study showed a moderate effect size in a younger n-SCU patient group [9]. A large effect size for better communication and recognition and a small effect size for better orientation in the SCU group compared to the n-SCU group were also found [28]. In other studies, the nil effect size [41] was calculated for speech abilities in the n-SCU/SCU groups, or memory loss was assessed [34].

Better cognitive performances were found in favor of a small-scale, homelike SCU compared to a SCU with a large effect size [11]. Another study [10] showed small but reverse effect sizes in two small-scale, homelike SCU/SCU group comparisons.

Taken together, a more severe global cognitive impairment and better communication in SCUs compared to n-SCUs were found at baseline. Some evidence for better cognitive performances in small-scale SCUs was found as well.

Functional Status

ADL or functional ability at baseline was measured in 19 studies (table 3). In 4 studies, a nil effect size [21, 32, 41] or no significant p value [39] was found for ADL functioning between SCU and n-SCU residents.

Better functional abilities in the SCU group at baseline compared to the n-SCU group were found in 6 studies with large [8], moderate [9] and small [27, 34, 35] effect sizes or significant p values [44]. More specifically, 1 study [28] showed a large effect size for better washing, a moderate effect size for better dressing and small effect sizes for better feeding, toileting and mobility for the SCU group compared to the n-SCU group.

Two studies showed a large [15] effect size in a small patient group, and a significant p value [14] in favor of the small-scale SCU compared to the n-SCU. Three studies showed better ADL function with large [11], moderate [10] and very small [12] effect sizes in favor of the small-scale SCUs compared to the SCUs.

Five studies showed better ADL or functional abilities, e.g. self-care, for the n-SCU group with large [38], small [33] and very small [20, 31] effect sizes or p values [43].

In sum, with regard to functional status and ADL, there is a tendency towards better outcomes in functional status/ADL for the SCUs and small-scale, homelike SCUs compared to less specialized care.

Quality of Life and Remaining Variables

Five studies presented data about aspects of quality of life at baseline (table 4). Two studies showed either a nil effect size [11] or no significant difference for quality of life between SCUs and small-scale, homelike SCUs [13]. In 1 study [29], a small effect size was calculated for the total quality of life in favor of the SCU group compared to the n-SCU patients, whereas the different subscales of the observation list in this study showed small to very small effect sizes in favor of the SCU group. Another study [39] also showed very small effect sizes for comfort and environmental adaption in favor of the SCU group, and no differences for the other quality of life variables.

Table 2. Cognition, effect sizes and p values

First author	Design	SCU vs. n-SCU, n	Results	Assessment instrument	p value	Cohen's d (baseline)
De Rooij [10]	quasi-experimental, longitudinal[c]	51 vs. 51 30 vs. 47	– cognition – cognition	MMSE [81]	not available	–0.45 0.31
Abrahamson [39]	random, cross-sectional	665 vs. 12,442	– cognitive impairment	CPS [82]	<0.001	1.02
Nazir [42]	cohort study	2,843 vs. 23,322	– cognitive impairment	CPS	<0.001[a]	0.96
Verbeek [12]	quasi-experimental, longitudinal, controlled[c]	124 vs. 135	– cognition	MMSE	n.s.	0.09
Verbeek [11]	cross-sectional	586 vs. 183	– cognition	CPS/MDS [82]	n.s.	11.76
Te Boekhorst [13]	quasi-experimental, longitudinal, matched, controlled[c]	67 vs. 97	– cognitive functioning – memory	MMSE RMBPC [66]	n.s.[a] n.s.[a]	not available
Nobili [9]	longitudinal, comparative	72 vs. 72	– cognitive performance	MMSE	n.s.[a]	0.72
Pekkarinen [33]	cross-sectional, selection by characteristics	390 vs. 587	– cognition	CPS	<0.001	1.24
Sloane [32]	cross-sectional, random	773 vs. 479	– cognitive status	MDS-COGS [82]	0.005	–0.007
Warren [38]	longitudinal, controlled	44 vs. 36	– cognitive status	MMSE	not available	–1.96
Chappel [25]	experimental	total: 323	– cognitive functioning – expressive language skills	MAS-R [74]	n.s.[a] <0.01[a]	0.009 0.156
Leon [21]	experimental field study	432 vs. 164	– cognitive limitations	MDS-COGS	<0.001	0.31
McAllister [40]	cross-sectional	59 vs. 34	– cognitive functioning	MMSE	not available	0.01
Frisoni [34]	controlled study	31 vs. 35	– cognitive status – memory loss	MMSE CDR [83]	n.s. n.s.	–0.20 0.03
Saxton [15]	longitudinal, matched, controlled[d]	26 vs. 19	– mental status	MMSE	n.s.[a]	–0.04
Kovach [36]	behavioral observations/tests	23 vs. 14	– mental status	MMSE	not available	0.52
Volicer [41]	prospective cohort study	50 vs. 112	– cognitive impairment – speech	MMSE BADE [84]	<0.05 n.s.	–0.10 0.05
Swanson [35]	quasi-experimental design, pre-/post-tests	13 vs. 9	– cognitive behavior	ADAS [76]	n.s.[a]	1.12
Lindesay [28]	cross-sectional[e]	27 vs. 29	– cognitive impairment – communication – recognition – orientation	OBS [85] ABRS [78]	not available	–0.67 0.93 1.33 0.29
Chafetz [46]	quasi-experimental, longitudinal	12 vs. 8	– cognitive ability	DRS [86]	n.s.[a]	not available
Holmes [20]	quasi-experimental	49 vs. 44	– dementia scale	K-GMSQ [87]	0.05[b]	0.52
Coleman [43]	experimental	47 vs. 36	– cognitive decline	RGDS [60]	<0.01	not available

CPS = Cognitive Performance Scale; RMBPC = Revised Memory and Behaviour Problems Checklist; MDS-COGS = Minimum Data Set Cognitive Performance Scale; MAS-R = Multifocus Assessment Scale-Revised; CDR = Clinical Dementia Rating Scale; BADE = Boston Aphasia Diagnostic Evaluation; ADAS = Alzheimer's Disease Assessment Scale; OBS = Organic Brain Syndrome scale; CARE = subscale of the Comprehensive Assessment and Referral Evaluation; ABRS = Adaptive Behaviour Rating Scale; DRS = Mattis Dementia Rating Scale; K-GMSQ = Kahn-Goldfarb Mental Status Questionnaire; RGDS = Reisberg Global Deterioration Scale; n.s. = not significant.

[a] Over time; [b] follow-up measurement; [c] small-scale, homelike SCU/SCU comparison; [d] small-scale, homelike SCU/n-SCU comparison; [e] SCU/n-SCU with mixed-sex population.

Table 3. Functional status/ADL, effect sizes and p values

Author	Design	SCU vs. n-SCU, n	Results	Assessment instrument	p value	Cohen's d (baseline)
Orfaly Cadigan [44]	longitudinal, controlled	141 vs. 31	– functional status	BANS-S [88]	0.0001	not available
De Rooij [10]	quasi-experimental, longitudinal[c]	51 vs. 51 30 vs. 47	– functional status	Barthel index [52]	not available	–0.58 –0.53
Abrahamson [39]	random, cross-sectional	665 vs. 12,442	– functional level	MDS ADL [82]	0.433	0.03
Verbeek [12]	quasi-experimental, longitudinal, controlled[c]	124 vs. 135	– ADL	ADL-H [82]	n.s.	–0.13
Verbeek [11]	cross-sectional	586 vs. 183	– functional status	MDS [82]	n.s.	10.72
Weyerer [31]	cross-sectional, randomly selected, matched	594 vs. 573	– ADL	Barthel index	<0.05	–0.12
Te Boekhorst [13]	quasi-experimental, longitudinal, controlled[c]	67 vs. 97	– ADL	IDDD [89]	<0.01[a]	not available
Nobili [9]	longitudinal, comparative	72 vs. 72	– functional status	Barthel index	0.0005[a]	0.56
Pekkarinen [33]	cross-sectional, selection by characteristics	390 vs. 587	– assistance in ADL	MDS ADL	0.05	0.46
Ashcraft [27]	cross-sectional	15 vs. 15	– ADL	MDS ADL	not available	–0.30
Sloane [32]	cross-sectional, random	773 vs. 479	– ADL impairment	MDS ADL	0.001	–0.021
Reimer [14]	matched groups design[d]	62 vs. 59	– functional status	FAST [90]	0.016	not available
Luo [8]	cross-sectional	750 vs. 3,667	– ADL	no standardized instrument[b]	>0.01	–5.70
Warren [38]	longitudinal, controlled	44 vs. 36	– physical status (ADL)	FAM + FIM [59]	not available	–2.30
Chappel [25]	experimental	total: 323	– physical functioning	MDS ADL	<0.01	0.176[c]
Leon [21]	experimental field study	432 vs. 164	– ADL limitations	MDS ADL	n.s.	0.07
Frisoni [34]	longitudinal, controlled	31 vs. 35	– function	Barthel index	not available	0.31
Saxton [15]	longitudinal, matched, controlled[d]	26 vs. 19	– total ADL – self-care	FIM	n.s.[a] <0.05[a]	5.5 0.11
Phillips [45]	longitudinal, matched, controlled	1,228 vs. 5,904 vs. 70,205	– ADL function	MDS ADL	n.s.[a]	not available
Volicer [41]	prospective cohort study	50 vs. 112	– ADL	Katz ADL index [91]	n.s.	0.01
Swanson [35]	quasi-experimental, pre-/post-tests	13 vs. 9	– functional ability I[b] – functional ability II[b]	FAC/ GRS [61]	n.s.* n.s.*	0.45 0.03
Lindesay [28]	cross-sectional[e]	27 vs. 29	– dressing – washing – feeding – toileting – mobility	ABRS [78]	not available	0.71 1.02 0.36 0.41 0.32
Chafetz [46]	quasi-experimental, longitudinal	12 vs. 8	– ADL	Katz ADL index	n.s.[a]	not available

Table 3 (continued)

Author	Design	SCU vs. n-SCU, n	Results	Assessment instrument	p value	Cohen's d (baseline)
Holmes [20]	quasi-experimental	49 vs. 44	– ADL	Katz ADL index	n.s.[b]	0.15
Coleman [43]	experimental	47 vs. 36	– ADL functional level	Katz ADL index	<0.01	not available

MDS ADL = Morris scale; IDDD = Interview for the Deterioration of Daily Living Activities in Dementia; ADL-H = MDS; FAC = Functional Ability Checklist; GRS = Assessment Functioning of Geriatric Patients; ABRS = Adaptive Behaviour Rating Scale; BANS-S = Bedford Alzheimer's Nursing Severity-Subscale; n.s. = not significant.

[a] Over time; [b] ADLs dependence was measured by the degree of dependence in five ADL (transferring, eating, toileting, dressing, bathing); [c] small-scale, homelike SCU/SCU comparison; [d] small-scale, homelike/n-SCU comparison; [e] SCU/n-SCU with mixed-sex population.

Table 4. Quality of life and remaining variables, effect sizes and p values

Author	Design	SCU vs. n-SCU, n	Results	Assessment instrument	p value	Cohen's d (baseline)
De Rooij [10]	quasi-experimental, longitudinal[c]	51 vs. 51	– positive affect	QUALIDEM [92]	<0.001[a]	not available
			– negative affect		n.s.[a]	
			– social relations		<0.001[a]	
			– social isolation		n.s.[a]	
			– restless behavior		n.s.[a]	
		30 vs. 47	– positive affect		n.s.[a]	
			– negative affect		<0.01[a]	
			– social relations		n.s.[a]	
			– social isolation		n.s.[a]	
			– restless behavior		n.s.[a]	
Abrahamson [39]	interviews, random, cross-sectional	665 vs. 12,442	– comfort	NHQL[b] [93]	0.007	0.11
			– activity		0.023	0.00
			– privacy		0.198	–0.06
			– environment		<0.001	0.18
			– individuality		0.495	–0.03
			– autonomy		0.033	0.09
			– relationship		0.312	–0.01
			– good mood		0.007	–0.15
Nakanishi [29]	experimental, randomized, cross-sectional[d]	616 vs. 750	– interacting with surroundings	QLDJ [94]	<0.001	0.28
					<0.001	0.26
			– expressing oneself		0.013	0.13
			– experiencing minimum negative behaviors		<0.001	0.34
			– total quality of life			
Verbeek [12]	quasi-experimental, cross-sectional, longitudinal[c]	124 vs. 135	– quality of life	QUALIDEM	0.076[a]	0.00
Te Boekhorst [13]	quasi-experimental, longitudinal, matched, cross-sectional[c]	67 vs. 97	– quality of life	DQoL [95]	n.s.[a]	not available
Morgan [18]	experimental, cross-sectional	8 vs. 8	– awareness and orientation	PEAP [96]	<0.05	0.22
					<0.01	0.24
			– regulation of stimulation		<0.05	0.49
			– continuity of the self			

DQoL = Dementia Quality of Life instrument; PEAP = Professional Environmental Assessment Protocol dimensions; QUALIDEM = Quality of Life Assessment instrument; QLDJ = Quality of Life instrument for Japanese elderly with dementia developed from the Alzheimer's Disease Health-Related Quality of Life (ADRQL); NHQL = Nursing Home Quality of Life scale; n.s. = not significant.

[a] Over time; [b] domains of the NHQL; [c] small-scale, homelike SCU/SCU comparison; [d] small-scale, homelike/n-SCU comparison.

One research paper also investigated various aspects of quality of life rather than one general outcome measure for quality of life [18]. The investigators studied variables that do not fit in the above-mentioned categories. Small effect sizes were found, implicating ratings on awareness and orientation, regulation of stimulation and continuity of the self that are more positive in SCU residents as compared to n-SCU patients.

Taken together, quality of life is hardly investigated in the field of special care for patients with dementia. Generally, better aspects of quality of life was/were found for the SCU group compared to the n-SCU group. There were no differences between small-scale SCUs and SCUs.

Longitudinal Results

In 11 studies [9, 10, 12, 13, 15, 20, 25, 35, 42, 45, 46], longitudinal results (p values) for the variables reviewed in this paper are presented. In the sections above, we used the baseline measurements of the studies to compute the effect sizes. However, it is worthwhile to take a closer look at studies with long-term data to address possible effects of staying in an n-SCU, SCU or small-scale, homelike SCU.

'Global behavior' and mood, e.g. depression, did not change significantly over time in 3 n-SCU/SCU studies [20, 35, 46] and 4 small-scale, homelike SCU/SCU studies [10, 12, 13, 15]. On the other hand, neuropsychiatry was much more prevalent in the SCU group compared to the n-SCU group after 18 months [9]. In particular, significantly more cases of deteriorating behavior and resistance to care were observed in the SCU group compared to the n-SCU group over 6 months [42].

More agitation in the SCU group compared to the small-scale, homelike SCU was observed over a period of 12 months [11]. More social engagement and depression were shown in 1 of the 2 investigated small-scale, homelike SCUs [10], while there were no differences in the other. The use of different informants at baseline and 6 months later for all behavioral aspects in a small-scale, homelike SCU/SCU study [13] as well as the baseline differences in an n-SCU/SCU study [9] complicate the interpretation of the findings of these 2 studies.

With respect to global cognitive functioning, no differences over time were shown in 4 n-SCU/SCU [9, 25, 35, 46] and 2 small-scale, homelike SCU/SCU studies [13, 15]. An increasing cognitive decline over 6 months in SCUs compared to n-SCUs was found in 1 study [42]. A comparable decline on a dementia rating scale for the SCU and n-SCU groups over the same period was also found in another study [20]. Concerning specific cognitive domains, expressive language skills appeared to decline more in the SCU group [25], whereas memory functions did not differ over time between the SCU and the small-scale, homelike SCU groups [13].

Although the majority of the studies showed no differences over time in ADL between SCUs and n-SCUs [20, 35, 45, 46], SCUs and small-scale SCUs [12] or n-SCU and small-scale, homelike SCUs [15], a greater decline in ADL was observed in the SCU group compared to the n-SCU group [25]. A smaller decline has been shown in favor of the SCU group compared to the n-SCU group [9], the small-scale, homelike SCU group compared to the n-SCU patients [15] and the small-scale, homelike SCU group compared to the SCU patients [13]. The latter study used different informants at baseline and 6 months later.

Concerning quality of life, no significant differences in aspects of quality of life could be observed between small-scale, homelike SCUs and SCUs over time [10, 12, 13]. Aspects of quality of life such as positive affect and social relations were more evident than negative affect in small-scale, homelike SCUs compared to SCUs [10].

Taken together, global behavior and mood did not differ between n-SCUs/SCUs or small-scale, homelike SCUs. Compared to n-SCUs, more neuropsychiatric problems, deteriorating behavior and resistance to care were shown in SCUs. Agitation was observed more in SCUs compared to small-scale, homelike SCUs. Most studies showed no differences in cognition or cognitive decline over time. There is little evidence of a greater decline of expressive language

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skills in SCUs compared to n-SCUs. ADL function was mostly not different between the groups studied, and some results were mixed. A smaller decline in ADL was found for SCU patients compared to n-SCU subjects as well as for small-scale, homelike SCU patients compared to SCU residents. For the variable 'quality of life', no differences were found over time. There is some evidence for more positive affect and more social relations in small-scale, homelike SCUs compared to SCUs.

Discussion

The primary goal of this review was to describe studies that examine possible differences in behavior, cognition, functional status and quality of life of patients either living in a SCU or in an n-SCU. The findings are discussed in more detail below.

The more globally defined behavioral variables showed differences between the investigated groups, with a general tendency toward a more challenging behavior, agitation, depression and anxiety for SCU patients at baseline compared to n-SCU residents. Over time, the differences were not consistent. Dementia patients with more pronounced behavioral problems were most likely to be placed in SCUs [20, 21, 37]. Indeed, several authors indicated that the allocation of patients prior to the investigation might have caused this difference over time [9, 13, 15]. There is evidence of the positive effects of environmental aspects on the challenging behavior in dementia [47].

The variable 'social functioning' is in favor of the SCU patients at baseline measurements. This discrepancy was not related to differences in cognition at enrolment of the study. The most plausible explanation for this finding is the higher involvement in social activities at SCUs [48].

Specific interventions, e.g. aromatherapy or providing preferred music for nursing home residents with dementia, can produce small to moderate effects on agitated behavior during a short period of time [49, 50]. These types of interventions occur mostly in SCU facilities because of the specially trained staff [51].

Comparisons of the differences in cognitive functioning between SCU and n-SCU patients show a global tendency towards a greater cognitive impairment in the SCU group at baseline and no differences over time. This does not apply to expressive language skills, which show a greater decline over time in the SCU group [13, 42], indicating differences in the allocation of patients. It has been argued that the course of specific cognitive aspects in dementia can be influenced by different care settings [25].

No clear direction of differences in ADL was found between the groups at baseline and over time. A possible explanation is that the studies looked at different functional abilities, e.g. transferring, eating, toileting, dressing and bathing [8] or levels of disability [38]. Consequently, the investigators used various assessment lists measuring different abilities, e.g. the Barthel index [31, 52] or an ADL hierarchy scale [33, 53].

Somewhat surprisingly, quality of life has gained minimal attention in the various studies reviewed here. Although it is reasonable to assume that environmental adjustment is only one aspect of the care and treatment of dementia patients, it might have a considerable effect on the subjectively experienced quality of life [54, 55]. Qualitative research suggests that the quality of life of dementia patients increases in specifically created environments such as SCUs: agitation decreases over time and, according to the staff and relatives, the patients feel free [56]. Furthermore, social interactions between patients show a substantial improvement [57]. However, in this review, not all studies showed a positive effect on quality of life.

Taken together, there seems to be a tendency to assign different patient groups to different care facilities. This holds true particularly for patients living in n-SCUs and SCUs. The

benefit of small-scale SCUs is not convincing compared to 'regular' SCU care. As a whole, this review justifies distinguishing between patients with and without dementia based on different behavioral, cognitive and functional variables prior to their allocation to a care facility.

Limitations

A limitation of this review is that the effect sizes could not be calculated for all studies because of missing data. Furthermore, the SCU characteristics [58] as well as the patient groups differed between the reviewed studies. In most of the studies, all patients were suffering from dementia. However, in 2 studies, only 60 and 75% of the subjects, respectively, suffered from dementia, while the other patients were not cognitively impaired [26, 33]. Eighty-six percent of the studies included patients with different types of dementia, but the remaining 14% investigated only patients with Alzheimer's disease [35, 38, 41].

The SCU characteristics were often different in the studies reviewed. However, in all studies, the investigators compared different living situations for patients with dementia, one of which was adjusted to their specific needs. A standardization of SCU characteristics will enhance comparability across studies and help to identify specific factors that influence different symptoms of dementia, be it positively or negatively.

Furthermore, the measures and scales (tables 1–4) used to assess behavior, cognition, functional status and quality of life obviously differed between the studies, making the comparison of the effects of living in an SCU or an n-SCU even more challenging. Furthermore, the validity of the measurement scales [59–61] and the sources of the data (patient, e.g. S-MMSE [9]; family, e.g. Neuropsychiatric Inventory [13]; personnel, e.g. ADL [39]) sometimes differed.

Finally, the characteristics of the different SCUs and n-SCUs reviewed are not always similar. The group size, type of training for the personnel and structure of the buildings can differ between the studies reviewed.

The most appropriate research design to study possible relationships between care facilities and the course of dementia and related clinical symptoms would be longitudinal intervention studies. We propose a design in which one group of dementia patients can be assessed before and after moving to an SCU or small-scale, homelike SCU, whereas the other (comparable) group should be assessed during the stay in an SCU or an n-SCU. The use of more specific variables instead of global measurements can provide a better insight into the benefits of specialized care. The development of more sensitive assessment tools is needed due to the bottom effects of conventional assessment instruments in patients with advanced dementia.

As there is no cure for dementia, further studies examining the quality of life of dementia patients, their families and the professional caregivers are needed.

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