ORIGINAL ARTICLE

J Korean Acad Community Health Nurs (지역사회간호학회지)

ISSN 1225-9594 (Print) / ISSN 2288-4203 (Online)
Vol. 30 No. 4, 400-413, December 2019
https://doi.org/10.12799/jkachn.2019.30.4.400

A Systematic Review of Studies Using Video-recording to Capture Interactions between Staff and Persons with Dementia in Long-term Care Facilities

Kim, Da Eun[1] · Sagong, Hae[2] · Kim, Eunjoo[2] · Jang, Ah Ram[2] · Yoon, Ju Young[3]

[1]Visiting Scholar, School of Nursing, University of Wisconsin-Madison, Madison, WI, USA
[2]Doctoral Student, College of Nursing, Seoul National University, Seoul
[3]Associate Professor, College of Nursing · Research Institute of Nursing Science, Seoul National University, Seoul, Korea

Purpose: The use of video-recording offers important advantages in observing and assessing the relationship between specific behaviors in health care settings. The purpose of this systematic review is to investigate and synthesize the methodological characteristics of studies using video-technology for measuring interactions with the older persons with dementia and staff in long-term care facilities. **Methods:** We searched Medline, Embase and CINHAL databases for published articles in English using a video-recording method for both staff and the residents with dementia. Quantitative research design studies (e.g., descriptive or experimental studies) were included. **Results:** Among 5,605 searched papers, a total of 20 studies were selected for this review. Situations of video-recording were providing personal care (n=12), mealtime (n=6), and conversation (n=3). Concepts measured by video-recording were classified into two groups: 1) Staff [care practice by staff (n=13) and communication by staff (n=11)] and 2) residents [communication by resident (n=4), activities of daily life function of resident (n=8), and behavioral and psychological symptoms of dementia (n=10)]. **Conclusion:** This review demonstrates that video technologies are actively used to evaluate the relationship between quality of care and health outcomes of the elderly with dementia in many international nursing studies. This study provides the foundation for a future research using video-recording technologies to examine the interactions and relationships between staff and the residents in Korean long-term care settings.

Key Words: Video recording; Nursing homes; Dementia; Interpersonal relations; Review

INTRODUCTION

1. Background

Since most long-term care residents have some level of dependency in the functional activities of daily living, the quality of care provided by staff, including helping older people to perform these daily activities, has a major impact on resident quality of life [1]. In particular, person-centered care for long-term care residents with dementia has a significant effect on decreasing behavioral and psychological symptoms such as agitation and negative affect [2]. Although the effects that interactions between staff and residents in long-term care facilities have on health outcomes is a major research topic, it is difficult to measure resident health outcomes using surveys or interviews since residents with dementia have difficulty clearly communicating their health status [3]. Therefore, it is necessary to explore research methodologies that can improve the validity of assessment results.

Video-recording is a measurement method that enables accurate observation of the duration, intensity, and pattern of a behavior [4]. While proxy reporting, which is most commonly used for people with limitations in their

Corresponding author: Yoon, Ju Young
College of Nursing, Seoul National University, 103 Daehak-ro, Jongno-gu, Seoul 03080, Korea.
Tel: +82-2-740-8817, Fax: +82-2-766-1852, E-mail: yoon26@snu.ac.kr

- This research was supported by the Basic Science Research Program through the National Research Foundation of Korea funded by the Ministry of Science, ICT & Future Planning(Grant No. 2017R1C1B1002872)

Received: Jun 11, 2019 / Revised: Aug 13, 2019 / Accepted: Aug 16, 2019

communication, may rely on inaccurate recall or reflect the subjectivity of the proxy, video-recording enables researchers to immediately capture emotional expressions or behaviors and directly measure them [5]. In addition, if long-term care staff respond as proxy to questions about resident health outcomes, response bias can result from relationships between staff and residents or the stress level of the staff [6]. Compared to direct observation, video observation allows data to be repeatedly reproduced and rated by multiple observers, ultimately increasing the objectivity and accuracy of assessment.

Video-recording enables researchers to measure multiple complex behaviors occurring simultaneously and to investigate the relationships among behaviors that occur in close temporal proximity [5,7]. Gilmore-Bykovskyi et al. [8] consecutively captured mealtimes using video-recording in long-term care facilities and coded the video data utilizing a coding scheme, a type of assessment instrument used for quantifying data. They assessed the relative frequencies and durations of person-centered and task-centered actions of staff, as well as resident behavioral symptoms. They then calculated conditional probabilities and odds ratios regarding whether the staff engaged in person-centered or task-centered care practices 10~60 seconds before people with dementia showed behavioral symptoms [8]. The study found a significant sequential relationship between staff person-centered care practices and resident behavioral symptoms [8]. Herman & Williams [6] took videos of personal care situations such as bathing or dressing from the beginning of a conversation between a resident and a staff member to the completion of the care activities. They coded the presence of staff elderspeak and resident resistiveness to care second-by-second. Afterwards, they examined the association between elderspeak and resistive behavior, specifically focusing on the occurrence of resistive behavior within 7 seconds of staff elderspeak [6].

Video-recording may help to both address the limitations of existing studies of people with dementia in relation to the difficulty in collecting objective data, and allow researchers to examine the relationships between care quality and health outcomes for people with dementia [9]. Because it is difficult to conduct long-term experimental studies such as randomized controlled trials in long-term care facilities, video-recording may be particularly useful for examining causal relationships between staff care practices or attitudes and resident health outcomes [8]. For this reason, studies using video-recording to measure the interactions between people with dementia and staff in long-term care facilities have been actively conducted. However, in Korea, there is a lack of studies conducting video observation and comprehensively examining the methodology of video-recording. Therefore, we conducted a systematic review of the literature to examine the methodological characteristics of studies using video-recording to assess interactions between people with dementia and staff in long-term care facilities and to verify the applicability of this method in Korea. In this regard, it should be noted that because this systematic review was focused on the methodological aspects of research, the research questions of this study were different from those used in the systematic review studies focused on analysis of research outcomes.

2. Purpose

This study aimed to conduct a systematic review of studies using video-recording of residents and staff in long-term care facilities in order to investigate and synthesize the methodological characteristics such as measurement methods, measured variables, and analysis methods.

METHODS

1. Study Design

This study is a systematic review comprehensively examining the methodological characteristics of studies using video-recording to measure interactions between people with dementia and staff in long-term care facilities. This study employed both the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines for systematic reviews [10] and the systematic review guidelines of the National Evidence-based Healthcare Collaborating Agency (NECA) [11].

2. Data Collection

On February 2, 2018, we conducted literature searches through MEDLINE (Ovid) and EMBASE (Elsevier), the core databases of the COSI (Core, Standard, Ideal) model presented by the US National Library of Medicine, as well as the CINAHL (EBSCO) database, a database specific to nursing and allied health literature [11].

Since this study is a systematic review regarding the methodologies of studies using video-recording in long-term care facilities, P (population) and M (method or measurement) were set instead of using the PICO format, a basic format for research questions. Different types of search terms were used according to the databases: MeSH terms were used in MEDLINE, EMTREE terms in EMBASE, and

CINAHL Headings in CINAHL [11]. A pilot search was conducted for each database. Two investigators reviewed 4,000 abstracts and supplemented the search query by adding synonyms. The final search query selected through the process was [(assisted living facility) OR (nursing home) OR (residential home) OR (long term care) OR (skilled nursing facility) OR (intermediate care facility) OR (group home) OR (residential facility) OR (dementia)] AND [(video)]. Boolean operators, truncations and wild cards were used to increase the sensitivity of the search [11]. Only human subjects researches written in English were included in data collection.

3. Data Selection

1) Inclusion and exclusion criteria

Eligible studies for this systematic review included both descriptive and experimental studies using video-recording to measure interactions between residents with dementia and staff in long-term care facilities, regardless of the types of outcome variables measured. Studies not using quantitative research design, such as systematic review, protocol study, review article, and qualitative research, were excluded. In addition, studies which did not include both people with dementia (or cognitive impairment) and staff as participants were excluded. Studies conducted in the community or hospitals or mixed settings were also excluded. In order to increase agreement among the researchers on the exclusion criteria, four investigators were divided into two teams, with each team independently evaluating 50 studies using the exclusion criteria. They conducted reevaluation until exclusion results coincided. Logs about the reasons for differences in exclusion results and the results of discussions among the investigators were written for future reference.

2) Selection of Studies

A total of 5,605 studies were retrieved from the MED LINE, EMBASE, and CINAHL databases. After removing duplicates using EndNote, the studies were checked for duplicates manually. Consequently, 1,103 studies were excluded (Figure 1). Using the remaining 4,502 studies, in-

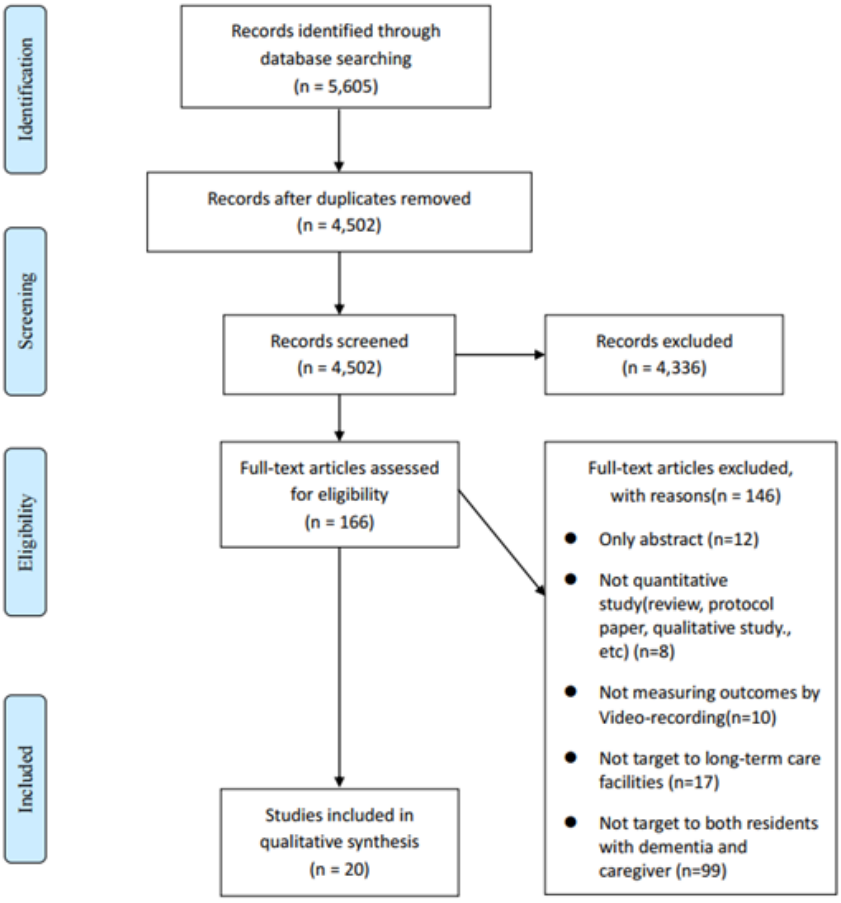

Figure 1. Flow diagram for study selection (PRISMA).

itial screening was performed by reviewing the titles and abstracts. As a result, 4,336 studies were excluded. When it was unclear whether or not to select a study by reviewing its title and abstract, we included the study. In the second screening, the full text of each study was reviewed and the final decision was made. Finally, a total of 20 studies were selected for analysis.

4. The Risk of Bias Assessment

Among the 20 studies selected, risk of bias assessment was performed for those having an experimental research design. The Cochrane Risk of Bias (RoB) tool was applied to randomized controlled trials and the Risk of Bias for Non-randomized Studies (RoBANS) was used for quasi-experimental studies [11]. Risk of bias assessment was conducted by two investigators independently. When there was a domain where assessment results were not consistent, consensus was reached through sufficient discussion. The overall results for each domain of the risk of bias assessment were reviewed using the RevMan 5.3 program.

5. Data Extraction

Data about general characteristics, video-recording related characteristics, video-recording variables, and analysis characteristics for the included studies were extracted. Specifically, year of publication, country, study design, and sample size were extracted to identify the general characteristics of the studies. For video-recording related characteristics, situation, location, and technique of video-recording, number of video recordings, average recording time per video, and the index for inter-coder agreement were extracted. Measured concepts, coding scheme, type of coding, and analysis methods were extracted to identify video-recording variables and analysis characteristics.

RESULTS

1. Risk of Bias Assessment Results

The risk of bias assessment of two randomized controlled trials and five quasi-experimental studies was performed using RoB and RoBANS respectively (Figure 2). The randomized controlled trials included one study with a high risk of bias in the domain of incomplete outcome data in RoB. The nonequivalent control group design studies included one or two studies with a high risk of bias in the domains of selection of participants, confounding variables, and incomplete outcome data in RoBANS. The

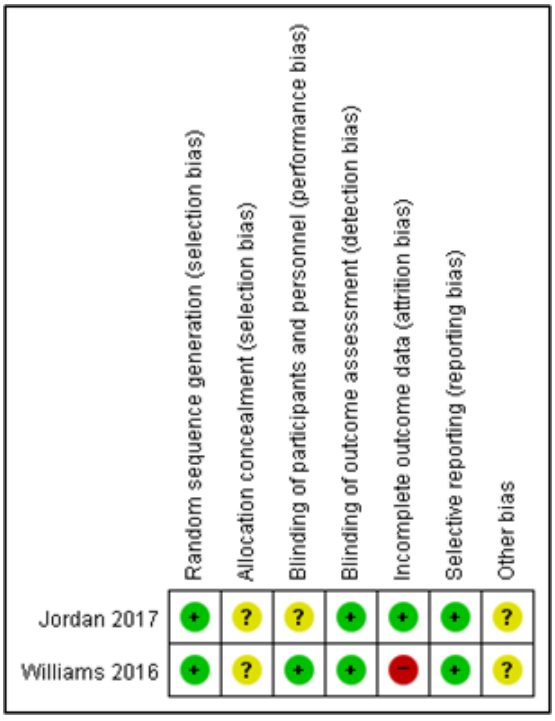

Figure 2-A. Risk of bias for randomized controlled trials (RoB)

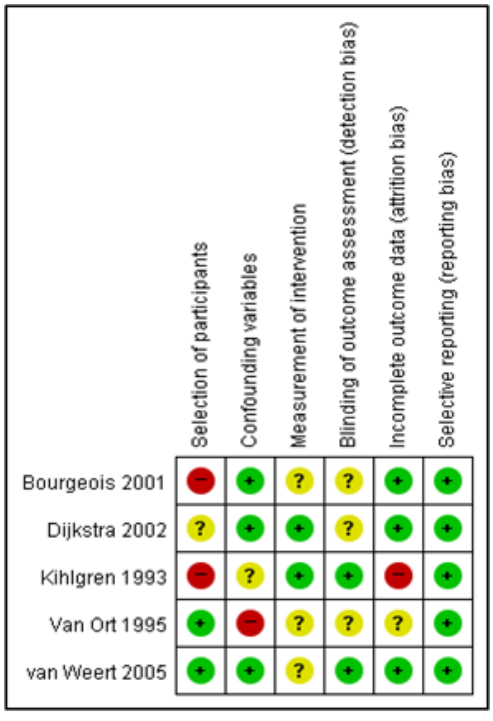

Figure 2-B. Risk of bias for nonrandomized studies (RoBANS)

Figure 2. Quality assessment of selected studies

two studies which were rated as having a high risk of bias in the domain of selection of participants in RoBANS were those that divided participants into experimental and control groups at the institutional level [12,13]. Since this systematic review was conducted to examine the methodological characteristics of studies using video-recording to assess people with dementia and staff in long-term care facilities, all of these studies were included in the analysis.

2. General Characteristics of Included Studies

The general characteristics of the 20 studies included in this systematic review are shown in Table 1. 3 studies (15.0%) were published in 1990~2000, 4 studies (20.0%) in 2001~2005, 4 studies (20.0%) in 2006~2010, and 9 studies (45.0%) in 2011 or later, showing that studies using video-recording as a measurement method have been continuously conducted since 1990. In terms of study design, there were 13 descriptive studies (65.0%) and 7 experimental studies, which included 2 randomized controlled trials (10.0%) and 5 non-equivalent control group design studies (25.0%). Regarding sample size, the most frequent number of participants was 11 to 30 for residents (10 studies, 50.0%) and 10 or less for staff (6 studies, 30.0%).

3. Characteristics of Video-recording Measurement Methods

Characteristics of the video-recording measurement methods used in the 20 selected studies are as follows (Table 2). The most frequently recorded situations were care for activities of daily living or personal care (12 studies, 60.0%), followed by mealtimes (6 studies, 30.0%) and conversation (3 studies, 15.0%). In terms of video-recording locations, videos were taken in the resident's room (8 studies, 40.0%), dining room (5 studies, 25.0%), bathroom (1 study, 5.0%), and hallway or public area (2 studies, 10.0%). Regarding the technique of video-recording, video cameras were placed in 5 studies (25.0%), while the investigator personally took videos using a hand-held camera in 3 studies (15.0%). Regarding the frequency of video-recording, measurements were most often made 2 to 5 times per resident (6 studies, 30.0%). However, the frequency of video-recording varied widely from 1 to 30 times among the selected studies. The total number of video-recordings for each study was 11 to 50 in 5 studies (25.0%) and 51 to 100 in 5 studies (25.0%). In addition, the total number of video-recordings was 1 to 10 in 2 studies (10.0%) and more than 100 in 2 studies (10.0%). The average recording time per video was less than 5 minutes in 6 studies (30.0%) and 20 to 30 minutes in 4 studies (20.0%). Most of the studies using video-recording included an inter-coder reliability test. In terms of index for agreement, the 'percentage agreement' was used in 15 studies (75.0%) and 'Cohen's Kappa' was used in 8 studies (40.0%).

4. Video-recording Measurement Variables and Analysis Methods

The characteristics of the concepts measured, coding were analyzed by classifying into the groups of staff and residents (Table 3). Regarding the concepts of staff measurement, 13 studies (65.0%) measured care practice and 11 studies (55.0%) measured communication style. As for the concepts of resident measurement, behavioral and psychological symptoms were most frequently measured and they were assessed in 10 studies (50.0%). The ability to perform activities of daily living and communication were measured in 8 studies (40.0%) and 4 studies (20.0%) respectively.

In studies using video-recording, a coding which quantifies video data according to a specific algorithm is required for quantitative analysis. An instrument used for coding is called a coding scheme. Depending on the research, a new coding scheme developed by the researcher or an existing one developed in a prior study can be used [3]. A coding scheme developed by the investigator was used in 13 studies (65.0%) for staff measurement and 8 studies (40.0%) for resident measurement. A modified version of an existing coding scheme was developed and used in 7 studies (35.0%) for staff measurement and 7 studies (35.0%) for resident measurement. Original versions of previously developed coding schemes were used in 5 studies (25.0%) for staff measurement and 6 studies (30.0 %) for resident measurement.

Type of coding behavior can be classified into frequency, duration, and intensity. Of the 20 selected studies, 15 studies (75.0%) coded frequency as count (the number of occurrences) for staff measurement and 13 studies (65.0%) for resident measurement. As for duration coding, 8 studies (40.0%) coded duration of staff's behavior and 9 studies (45.0%) coded duration of resident's behavior. In terms of methods used to analyze relationships between the behaviors of people with dementia and those of staff, 5 studies (25.0%) used sequential analysis and 5 studies (25.0%) used correlation analysis. In addition, 3 studies (15.0%) conducted regression analysis or hierarchical modeling, but 6 studies (30.0%) performed only descriptive statistical analysis.

Table 1. ExtractionTable of Selected Studies

No	Author (year, type of intervention)	Situation of recording	Location of recording	Number of recordings per resident	Total number of recordings	Average recording time per video	Sample size		Concept	Variable	Coding scheme	Type of coding	Analysis method
Descriptive study													
1	Belzil et al (2015)	ADL care (incontinence care, dressing, etc.)	Resident's room	30	240	11.7 min	S	43	Care practice, communication	1) Physical behavior 2) Verbal behavior	Grid for observation of physical and verbal behaviors of caregiver and resident†	Frequency (count), duration	Sequential analysis
							R	8	BPSD				
2	Cohen-Mansfield et al (2006)	ADL care (dressing)	Resident's room, bathroom	1	20	N/D	S	20	Care practice, communication	1) Dressing process 2) Interaction	1) Degree of difficulty, etc.† 2) Type of communication, etc.†	1) Degree 2) Frequency (count)	Correlation analysis (Spearman)
							R	20	ADL	Dressing process	Involvement, degree of difficulty†	Degree	
3	Cunningham et al (2007)	Conversation, mealtime	Hallway, dining room	4	4	2.5 min	S	3	Communication	1) Elderspeak 2) Emotional tone	1) Elderspeak scale† 2) Emotional tone rating scale	1) Duration, intensity 2) Degree	Correlation analysis (Pearson's r)
							R	1	BPSD	Resistiveness to care	Resistiveness to care scale	Frequency (count), duration	
4	Gilmore-Bykovskyi (2015a)	Mealtime	Dining room	2	22	29 min	S	6	Care practice	Person-centeredness	PCBI, TCBI	Frequency (count), duration	Descriptive analysis
							R	9	BPSD	Behavioral symptoms	Pittsburgh agitation scale	Frequency (count), duration	
5	Gilmore-Bykovskyi et al (2015b)	Mealtime	Dining room	2	33	24.5 min	S	8	Care practice	Person-centeredness	PCBI, TCBI	Frequency (count), duration	Lag-based sequential analysis
							R	12	BPSD	Behavioral symptoms	Pittsburgh agitation scale	Frequency (count), duration	
6	Gilmore-Bykovskyi et al (2018)	Mealtime	Dining room	2	33	24.5 min	S	8	Care practice	Person-centeredness	PCBI, TCBI	Frequency (count), duration	Lag-based sequential analysis
							R	12	BPSD, ADL	1) Behavioral symptoms 2) Swallowing dysfunction	1) Pittsburgh agitation scale 2) Observable indicators of aspiration	Frequency (count), duration	

†New coding scheme developed by the researcher; ‡Randomized controlled trials; ADL=activities of daily living; ANOVA=analysis of variance; BPSD=behavioral and psychological symptoms of dementia; LoA=level of assistance; N/D=not described; PCBI=person-centered behavior inventory; R=resident; S=staff; TCBI=task-centered behavior inventory.

Table 1. ExtractionTable of Selected Studies (Continued)

No	Author (year, type of intervention)	Situation of recording	Location of recording	Number of recordings per resident	Total number of recordings	Average recording time per video	Sample size		Concept	Variable	Coding scheme	Type of coding	Analysis method
Descriptive study													
7	Herman et al (2009)	ADL care (bathing, dressing, etc.)	Resident's room	N/D	80	4.6 min	S	52	Communication	Elderspeak	Communication state†	Frequency (count)	Lag-based sequential analysis
							R	20	BPSD	Resistiveness to care	Resistiveness to care scale	Frequency (count)	
8	Lann-Wolcott et al (2011)	ADL care (bathing, dressing, etc.)	N/D	N/D	70	4.6 min	S	54	Care practice	Person-centeredness	1) PCBI, TCBI 2) Global behavior scale	1) Frequency (Binary) 2) Degree	Correlation analysis (Pearson's r), multiple regression analysis
							R	20	BPSD	Resistiveness to care	Resistiveness to care scale	Duration, intensity	
9	Phillips et al (1993)	Mealtime	Dining room	8	8	23.1~24.1 min	S	N/D	Care practice	Behaviors by the feeder	Feeding traceline technique†	Frequency (count)	Descriptive analysis
							R	6	ADL	Feeding behavior			
10	Somboontanont et al (2004)	ADL care (bathing)	N/D	2~3	27	8.2 min	S	N/D	Care practice	Caregiver behaviors	Caregiver bathing behavior observation inventory†	Frequency (count)	Lag-based sequential analysis
							R	18	BPSD	Assaultive behavior	Assaultive behavior†	Frequency (count)	
11	Thunborg et al (2015)	ADL care (transfering)	N/D	N/D	N/D	N/D	S	9	Care practice	Facilitative actions	Dyadic interaction in dementia transfer assessment scale†	Frequency (scale)	Descriptive analysis
							R	8	ADL	Transfer-related actions			
12	Williams et al (2009)	ADL care (bathing, dressing, etc.)	Resident's room	N/D	80	4.6 min	S	52	Communication	Elderspeak	1) Elderspeak metrics† 2) Communication state†	1, 2) Frequency (count)	Bayesian binomial hierarchical model
							R	20	BPSD	Resistiveness to care	1) Resistiveness to care scale 2) Resistive to care or cooperative†	1) Duration, intensity 2) Frequency (binary)	
13	Wilson et al (2012)	ADL care (handwashing)	N/D	6	72	2.2 min	S	12	Care practice, communi-cation	1) Step engagement, completion 2) Communication strategies	1) Six handwashing steps 2) Task-focused communication strategies†	1) Frequency (binary) 2) Frequency (count)	Correlation analysis (Pearson's r)
							R	12	ADL	Task success (handwashing)	Six handwashing steps	Frequency (binary)	

† New coding scheme developed by the researcher; ‡ Randomized controlled trials; ADL=activities of daily living; ANOVA=analysis of variance; BPSD=behavioral and psychological symptoms of dementia; LoA=level of assistance; N/D=not described; PCBI=person-centered behavior inventory; R=resident; S=staff; TCBI=task-centered behavior inventory.

Table 1. ExtractionTable of Selected Studies (Continued)

No	Author (year, type of intervention)	Situation of recording	Location of recording	Number of recordings per resident	Total number of recordings	Average recording time per video	Sample size		Concept	Variable	Coding scheme	Type of coding	Analysis method
Experimental study													
14	Bourgeois et al (2001, Communication strategy)	Conversation	Resident's room	2	N/D	5 min	S	66	Communication	Conversation	1) Verbalization † 2) Positive and negative statements	1) Duration 2) Frequency (count)	Correlation analysis
							R	66	Communication				
15	Dijkstra et al (2002, Communication training)	Conversation (family, life, ect.)	N/D	N/D	N/D	N/D	S	40	Communication	Discourse characteristics	Discourse analysis schema	Frequency (count)	Descriptive analysis
							R	66	Communication				
16	Jordan et al (2017, Coaching training using LoA strategies) ‡	ADL care (dressing)	N/D	N/D	N/D	N/D	S	17	Care practice	Appropriateness LoA strategies	Appropriateness of LoA use tool	Frequency (scale)	Fisher's exact test, Mann–Whitney U test, etc.
							R	17	ADL	Level of independence	Beck dressing performance scale	Frequency (scale)	
17	Kihlgren et al (1993, Training in integrity promoting care)	ADL care (morning care)	Resident's room	20	100	N/D	S	10	Communication, care practice	1) Nonverbal communication 2) Verbal communication 3) Orientation 4) Opportunity to participate	1) Eye avoidance, etc. † 2) Praising patients, etc. † 3) Attempt to orientation † 4) Opportunity to participate ‡	1~3) Frequency (count, binary) 4) Frequency (scale)	Descriptive analysis
							R	10	Communication, ADL	1) Nonverbal communication 2) Verbal communication 3) Participation	1) Eye avoidance, etc. † 2) Strive for verbal contact, etc. † 3) Initiating, etc. †	1~3) Frequency (count, binary)	
18	Van ort et al (1995, Promoting self-feeding)	Mealtime	N/D	22	N/D	N/D	S	18	Care practice	1) Feeding related interpersonal contact 2) Level of assistance	1) Feeding traceline technique 2) Level of assistance indicators †	1) Frequency (count) 2) Degree	Repeated measures ANOVA
							R	7	ADL	Feeding related interpersonal contact	Feeding traceline technique	Frequency (count)	
19	van Weert et al (2005, Snoezelen training)	ADL care (morning care)	Resident's room	N/D	250	N/D	S	117	Communication	1) Nonverbal communication 2) Verbal communication	1) Eye contact, etc. † 2) Roter interaction analysis system	1) Duration, frequency (count) 2) Frequency (count)	Descriptive analysis
							R	117	Communication				
20	Williams et al (2016, Communication training) ‡	ADL care (morning care)	Resident's room, public area	N/D	N/D	N/D	S	29	Communication	Elderspeak	Communication state	Duration	Linear mixed modeling
							R	27	BPSD	Resistiveness to care	Resistive to care or cooperative	Duration	

† New coding scheme developed by the researcher; ‡ Randomized controlled trials; ADL=activities of daily living; ANOVA=analysis of variance; BPSD=behavioral and psychological symptoms of dementia; LoA=level of assistance; N/D=not described; PCBI=person-centered behavior inventory; R=resident; S=staff; TCBI=task-centered behavior inventory.

Table 2. Video-recording Related Characteristics of Selected Studies (*N*=20)

Variables	Categories	n (%)
Situation of video-recording†	ADL care (personal care)	12 (60.0)
	Mealtime	6 (30.0)
	Conversation	3 (15.0)
Location of video-recording†	Resident's room	8 (40.0)
	Dining room	5 (25.0)
	Bathroom	1 (5.0)
	Hallway or public area	2 (10.0)
	Not described	7 (35.0)
Technique of video-recording	Placed	5 (25.0)
	Hand-held	3 (15.0)
	Not described	12 (60.0)
Number of video-recordings per resident	1	1 (5.0)
	2~5	6 (30.0)
	6~10	2 (10.0)
	11~20	1 (5.0)
	21~30	2 (10.0)
	Not described	8 (40.0)
Total number of video-recordings	1~10	2 (10.0)
	11~50	5 (25.0)
	51~100	5 (25.0)
	≥101	2 (10.0)
	Not described	6 (30.0)
Average video-recording time per video	< 5 min	6 (30.0)
	5~ < 10 min	2 (10.0)
	10~ < 20 min	1 (5.0)
	20~ < 30 min	4 (20.0)
	Not described	7 (35.0)
Index for inter-coder agreement†	Cohen's kappa	8 (40.0)
	Percent agreement	15 (75.0)
	Others‡	3 (15.0)
	Not described	1 (5.0)

†Multiple counts; ‡Gwet's AC1, Brennan-Prediger, Intraclass correlation coefficient, Pearson's r; ADL=activities of daily living.

DISCUSSION

In this study, we conducted a systematic review of studies that used video-recording to measure interactions between staff and people with dementia in long-term care facilities. A total of 20 studies were included. In terms of study design, 13 studies (65.0%) were descriptive studies and 7 studies (35.0%) were experimental studies. The majority of the descriptive studies conducted sequential analysis of the data to investigate whether there were differences in the risk of certain health outcomes such as behavioral and psychological symptoms in people with dementia according to the care practices or communication of nursing home staff [6, 8]. If video-recording is applied, the sequential effects of staff behavior on the behavior of residents with dementia can be identified without a longitudinal study design. Thus, video-recording can be so used as a low-cost strategy to increase the feasibility of research [8]. In addition, the descriptive studies selected in this review also included studies to assess the correlation between staff care practices and resident involvement in care or communication [14,15]. Studies of the development of a coding scheme for analyzing video-recording data were also included [16,17]. In terms of experimental studies, the majority of the studies conducted staff education programs on care practices [18] and communication [19]. In some studies, a coding scheme to analyze video-recording data was developed or relationships between variables of interest were identified through descriptive research in the initial stage of the serial study [20,21]. Then, video-recording was used to measure outcome variables to evaluate the effects of interventions in subsequent intervention studies [19].

Video observation enables researchers to measure the health outcomes of people with dementia, outcomes that are exhibited as responses to the behaviors of nursing home staff. The concepts measured by video-recording for staff included care behaviors such as person-centered care, assistance with activities of daily living, and verbal and nonverbal communication. The measurement concepts for residents included the ability to perform activities of daily living such as feeding and transfer, behavioral and psychological symptoms such as resistiveness to care and agitation, and communication. For example, Williams et al. [19] used a multi-level model to analyze the effects of elderspeak, infantilizing speech used by staff, upon resistiveness to care in persons with dementia. Somboontanont et al.[22] conducted a sequential analysis regarding whether nursing home staff showed care behaviors such as confrontational communication, invalidation, or the use of physical restraints five seconds before the occurrence of assaultive behavior by residents with dementia in the situation of taking a shower. They found an association between the assaultive behaviors of people with dementia and care behaviors of the staff [22]. As described above, observational methods using video-recording have the advantage of enabling researchers to measure interactions between nursing home staff and people with dementia by observing the caregiver's behavior and the response of a person with dementia as a pair of behaviors.

Another strength of the video-recording method is that it can be used to observe the pattern of the particular behavior of a participant in a certain situation [23]. The video-recording method enables researchers to assess a de-

Table 3. Video-recording Variables and Analysis Characteristics of Selected Studies (*N*=20)

Variables	Categories	Staff	Resident
		n (%)	n (%)
Concept †	Care practice by staff (ex. person-centeredness, level of assistance)	13 (65.0)	-
	Communication by staff (ex. elderspeak, emotional tone)	11 (55.0)	-
	Communication by resident (ex. positive statement, eye contact)	-	4 (20.0)
	ADL function of resident (ex. feeding, transfer, hand-washing)	-	8 (40.0)
	BPSD of resident (ex. resistiveness to care, agitation)	-	10 (50.0)
Coding scheme †	Existing coding scheme	5 (25.0)	6 (30.0)
	Modifying existing coding scheme	7 (35.0)	7 (35.0)
	New coding scheme developed by the researcher	13 (65.0)	8 (40.0)
Type of coding †	Frequency (count)	15 (75.0)	13 (65.0)
	Frequency (binary)	3 (15.0)	3 (15.0)
	Frequency (scale)	3 (15.0)	2 (10.0)
	Duration	8 (40.0)	9 (45.0)
	Intensity or degree	4 (20.0)	3 (15.0)
Analysis method †	Sequential analysis	5 (25.0)	
	Correlation analysis	5 (25.0)	
	Regression analysis or hierarchical model	3 (15.0)	
	Others (ex. ANOVA, Fisher's exact test, Mann-Whitney U test)	2 (10.0)	
	Descriptive analysis (no significance test)	6 (30.0)	

† Multiple counts; ADL=activities of daily living; ANOVA=analysis of variance; BPSD=behavioral and psychological symptoms of dementia.

tailed pattern of behavior when it is difficult to recruit a large number of participants. In this systematic review, 8 studies (40.0%) performed video-recording in a resident's room and 5 studies (25.0%) performed video-recording in a dining room. This result is attributed to the fact that taking videos in a resident's room or a dining room in a long-term care facility makes it easy to observe specific situations such as mealtimes and personal care for the study participants alone.

In observation studies using video-recording, it is essential to design strategies to improve the validity and reliability of coding. To this end, it is necessary to use coding schemes whose validity and reliability have already been demonstrated. When developing a coding scheme, its validity should be verified regarding whether the coding scheme is constructed with concepts that are appropriate for the behaviors to be observed. As careful consideration should be given to strategies for coder training to increase inter-coder reliability and coding accuracy, standardized coder training should be conducted until a certain level is reached according to protocols and reliability criteria [5]. As for an example of coder training, four observers with previous experience in communication with residents with dementia were trained for one day on the main research concepts such as behavioral and psychological symptoms, person-centered care, and task-centered care, as well as on data cleaning and coding [16]. Also, coding manuals included guidelines for accurate coding decisions [16]. The research team met at least once a week to discuss coding schemes that coders had difficulty understanding and to facilitate re-training [16]. In two studies, coder training was conducted until the inter-coder agreement reached 0.8 and 0.9 respectively [20,24]. A video observation study has high reproducibility because its data can be reproduced repeatedly. This gives it the advantage of higher objectivity compared to direct observation study. However, there is a possibility that coders' attitudes, values, and biases may be involved. Therefore, careful consideration should be taken in making a plan for systematic coder training during the research design process to minimize individual interpretations and increase the reliability of coding.

When designing a video observation study, it is important to note that video-recording itself may affect the behavior of the study participants, such as the Hawthorne effect [25]. For example, due to the presence of unfamiliar cameras, staff may show different behaviors from their usual ways of providing care or more behavioral and psychological symptoms may occur in people with dementia. To minimize the bias due to the participants' responsiveness, Herman & Williams [6] deleted the first 10 minutes of data from video-recordings and only coded the remaining data, considering that the participants may require time to adapt to the setting of video-recording. Williams et al. [20]

stayed in long-term care facilities for one day prior to taking videos in order to allow the participants to adapt to the presence of the camera and investigator. In addition, in one study, the research team took one more video than the required number of videos, and then removed the first recording and coded from the second video file [23].

In order to conduct research using video-recording with people with dementia, it should be the first priority to consider the protection of participants in terms of research ethics. With respect to the strategies used to protect participants in the included studies, the primary strategy was to receive informed consent from the study participants or their legally authorized representatives before beginning the study. Periodically over the course of the study, investigators checked as to whether or not participants expressed the intention or desire to withdraw from the study. In Gilmore-Bykovskyi [16], participants were observed every 10 minutes to assess whether the people with dementia expressed a verbal or non-verbal dissent to taking videos. Van Weert et al. [26] discontinued video-recording when the participant showed a negative response in the middle of video-recording. Moreover, the risk of the invasion of privacy should be minimized because unintended scenes may be captured due to the nature of video-recording. Belzil and Vézina [27] placed a video camera in the participant's room five minutes before providing hygienic care to minimize recording time. In one study, video-recording for capturing the situation of dressing started after residents put on their underwear to minimize the physical exposure of participants [14]. In addition, Williams et al. [20] did not take videos of behaviors with the door closed or with the bed curtains pulled down to protect the privacy of people with dementia. Researchers need to ensure that no residents other than the study participants are videotaped. Gilmore-Bykovskyi [16] used video editing software to delete the parts of video files including people other than study participants through data cleaning before the coding process. In addition, except for the studies which did not clearly describe the location of video-recording, most of the studies included in this systematic review performed video-recording in a resident's room in order to minimize the risk of unintentionally taking videos of other residents. Since there have been few studies using video-recording in long-term care settings in Korea, the results of this study can offer helpful strategies employed by previous studies to protect the privacy of participants.

This systematic review identified the methodological characteristics of video observation studies focusing on the interactions between people with dementia and staff in long-term care facilities. Based on the findings of this study, we intend to make some suggestions in relation to the applicability of video-recording in Korea and precautions for the use of this technique. First of all, in terms of observational situations, video-recording can be considered to apply to specific situations where one can observe the interactions between staff and people with dementia, such as mealtimes. Some previous studies conducted video-recording of activities such as dressing [14] and taking a shower in the bathroom [22]. However, in Korea, research using video-recording is still at a rudimentary stage in this field. So it will be easier to attempt to apply the method to situations with a low risk of the invasion of privacy, such as mealtimes, and take videos in locations such as the resident's room or the dining room [28]. Secondly, effective strategies for coder education should be established at the research design stage in order to increase the reliability of coding. It is also necessary to include an inter-coder reliability test using an index such as 'percent agreement' or 'Cohen's kappa'. In addition, coding schemes whose validity and reliability have been previously demonstrated should be used. If existing coding schemes are difficult to apply to the research concepts to be observed, it may be necessary to conduct research to develop a coding scheme. Third, in order to minimize the Hawthorne effect caused by the presence of video-recording, it is recommended to use strategies such as excluding the first video-recording data from analysis. Finally, to protect the study participants, it is necessary to obtain informed consent from participants and make a plan to collect data to minimize the risk of invasion of privacy.

CONCLUSION

In this study, we conducted a systematic review of studies that used video-recording to measure interactions between residents with dementia and staff in long-term care facilities. We investigated the research areas where the method of video-recording can be applied and the applicable methodological characteristics of video-recording. As a result, video-recording can be used to measure the care behaviors and communication of staff, as well as the communication, behavioral and psychological symptoms, and activities of daily living performance of people with dementia. In addition, it was shown that since this method has the advantage of enabling simultaneous and continuous information acquisition, video-recording has been actively applied to investigate the association of or the sequential relationships between the behaviors of staff and residents. Video observation has the advantage of enabl-

ing us to measure a certain behavior in a particular situation in the persons with dementia who are likely to be excluded from research because of limitations in their ability to participate in surveys or interviews. Considering a lack of research using video-recording in Korea, it is suggested that research be conducted to investigate whether the care practices of staff have sequential effects on health outcomes in older people with dementia based on the findings about methodological characteristics of video observation.

REFERENCES

1. Koren MJ. Person-centered care for nursing home residents: The culture-change movement. Health Affairs. 2010;29(2):312-317. https://doi.org/10.1377/hlthaff.2009.0966
2. Li J, Porock D. Resident outcomes of person-centered care in long-term care: A narrative review of interventional research. International Journal of Nursing Studies. 2014;51(10):1395-1415. https://doi.org/10.1016/j.ijnurstu.2014.04.003
3. Ellis-Smith C, Evans CJ, Bone AE, Henson LA, Dzingina M, Kane PM, et al. Measures to assess commonly experienced symptoms for people with dementia in long-term care settings: A systematic review. BMC Medicine. 2016;14(1):38. https://doi.org/10.1186/s12916-016-0582-x
4. Latvala E, Vuokila Oikkonen P, Janhonen S. Videotaped recording as a method of participant observation in psychiatric nursing research. Journal of Advanced Nursing. 2000;31(5): 1252-1257. https://doi.org/10.1046/j.1365-2648.2000.01383.x
5. Haidet KK, Tate J, Divirgilio Thomas D, Kolanowski A, Happ MB. Methods to improve reliability of video recorded behavioral data. Research in Nursing & Health. 2009;32(4):465-474. https://doi.org/10.1002/nur.2033
6. Herman RE, Williams KN. Elderspeak's influence on resistiveness to care: Focus on behavioral events. American Journal of Alzheimer's Disease & Other Dementias®. 2009;24(5):417-423. https://doi.org/10.1177/1533317509341949
7. Sloane PD, Miller LL, Mitchell CM, Rader J, Swafford K, Hiatt SO. Provision of morning care to nursing home residents with dementia: Opportunity for improvement? American Journal of Alzheimer's Disease & Other Dementias®. 2007;22(5):369-377. https://doi.org/10.1177/1533317507305593
8. Gilmore-Bykovskyi AL, Roberts TJ, Bowers BJ, Brown RL. Caregiver person-centeredness and behavioral symptoms in nursing home residents with dementia: A timed-event sequential analysis. The Gerontologist. 2015;55(Suppl_1):S61-S66. https://doi.org/10.1093/geront/gnu164
9. Cook A. Using video observation to include the experiences of people with dementia in research. In: Wilkinson H, editor. The perspectives of people with dementia: Research methods and motivations. London and Philadelphia: Jessica Kingsley Publishers; 2002. p. 209-222.
10. Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. Systematic Reviews. 2015;4(1):1. https://doi.org/10.1186/2046-4053-4-1
11. Kim SY, Park JE, Seo HJ, Lee YJ, Jang BH, Son HJ, et al. NECA's guidance for undertaking systematic reviews and meta-analyses for intervention [Internet]. Seoul: National Evidence-based Healthcare Collaborating Agency; c2011 [cited 2017 June 1]. Available from: https://www.neca.re.kr/lay1/bbs/S1T11C102/F/39/view.do?article_seq=5329&cpage=2&rows=10&condition=&keyword=&show=&cat=
12. Bourgeois M, Dijkstra K, Burgio L, Allen-Burge R. Memory aids as an augmentative and alternative communication strategy for nursing home residents with dementia. Augmentative and Alternative Communication. 2001;17(3):196-210. https://doi.org/10.1080/aac.17.3.196.210
13. Kihlgren M, Kuremyr D, Norberg A, Bråne G, Karlson I, Engström B, et al. Nurse-patient interaction after training in integrity promoting care at a long-term ward: Analysis of video-recorded morning care sessions. International Journal of Nursing Studies. 1993;30(1):1-13.
14. Cohen-Mansfield J, Creedon MA, Malone T, Parpura-Gill A, Dakheel-Ali M, Heasly C. Dressing of cognitively impaired nursing home residents: Description and analysis. The Gerontologist. 2006;46(1):89-96.
15. Wilson R, Rochon E, Mihailidis A, Leonard C. Examining success of communication strategies used by formal caregivers assisting individuals with Alzheimer's disease during an activity of daily living. Journal of Speech, Language, and Hearing Research. 2012;55(2):328-341. https://doi.org/10.1044/1092-4388(2011/10-0206)
16. Gilmore-Bykovskyi AL. Caregiver person-centeredness and behavioral symptoms during mealtime interactions: Development and feasibility of a coding scheme. Geriatric Nursing. 2015;36(2):S10-S15. https://doi.org/10.1016/j.gerinurse.2015.02.018
17. Thunborg C, von Heideken Wågert P, Götell E, Ivarsson A-B, Söderlund A. Development of a new assessment scale for measuring interaction during staff-assisted transfer of residents in dementia special care units. BMC geriatrics. 2015;15(1):6. https://doi.org/10.1186/s12877-015-0003-6
18. Jordan KJ, Tsai PF, Heo S, Bai S, Dailey D, Beck CK, et al. Pilot testing a coaching intervention to improve certified nursing assistants' dressing of nursing home residents. Research in Gerontological Nursing. 2017;10(6):267-276. https://doi.org/10.3928/19404921-20171013-04

19. Williams KN, Perkhounkova Y, Herman R, Bossen A. A communication intervention to reduce resistiveness in dementia care: A cluster randomized controlled trial. The Gerontologist. 2016;57(4):707-718. https://doi.org/10.1093/geront/gnw047
20. Williams KN, Herman R, Gajewski B, Wilson K. Elderspeak communication: Impact on dementia care. American Journal of Alzheimer's Disease & Other Dementias®. 2009;24(1):11-20. https://doi.org/10.1177/1533317508318472
21. Lann-Wolcott H, Medvene LJ, Williams K. Measuring the person-centeredness of caregivers working with nursing home residents with dementia. Behavior Therapy. 2011;42(1):89-99. https://doi.org/10.1016/j.beth.2010.02.005
22. Somboontanont W, Sloane PD, Floyd FJ, Holditch-Davis D, Hogue CC, Mitchell CM. Assaultive behavior in Alzheimer's disease: Identifying immediate antecedents during bathing. Journal of Gerontological Nursing. 2004;30(9):22-29.
23. Happ MB, Sereika S, Garrett K, Tate J. Use of the quasi-experimental sequential cohort design in the Study of Patient-Nurse Effectiveness with Assisted Communication Strategies (SPEACS). Contemporary Clinical Trials. 2008;29(5):801-808. https://doi.org/10.1016/j.cct.2008.05.010
24. Cunningham J, Williams KN. A case study of resistiveness to care and elderspeak. Research and Theory for Nursing Practice. 2007;21(1):45-56.
25. Caldwell K, Atwal A. Non-participant observation: Using video tapes to collect data in nursing research. Nurse Researcher. 2005;13(2):42-54.
26. van Weert JC, van Dulmen AM, Spreeuwenberg PM, Ribbe MW, Bensing JM. Effects of snoezelen, integrated in 24h dementia care, on nurse-patient communication during morning care. Patient Education and Counseling. 2005;58(3):312-326. https://doi.org/10.1016/j.pec.2004.07.013
27. Belzil G, Vézina J. Impact of caregivers' behaviors on resistiveness to care and collaboration in persons with dementia in the context of hygienic care: An interactional perspective. International Psychogeriatrics. 2015;27(11):1861-1873. https://doi.org/10.1017/S104161021500099X
28. Carpiac-Claver ML, Levy-Storms L. In a manner of speaking: Communication between nurse aides and older adults in long-term care settings. Health Communication. 2007;22(1):59-67. https://doi.org/10.1080/10410230701310307

Appendix 1. List of Studies Included in a Systematic Review

1. Belzil G, Vézina J. Impact of caregivers' behaviors on resistiveness to care and collaboration in persons with dementia in the context of hygienic care: An interactional perspective. International Psychogeriatrics. 2015;27(11):1861-1873. https://doi.org/10.1017/S104161021500099X
2. Cohen-Mansfield J, Creedon MA, Malone T, Parpura-Gill A, Dakheel-Ali M, Heasly C. Dressing of cognitively impaired nursing home residents: Description and analysis. The Gerontologist. 2006;46(1):89-96. https://doi.org/10.1093/geront/46.1.89
3. Cunningham J, Williams KN. A case study of resistiveness to care and elderspeak. Research and Theory for Nursing Practice. 2007;21(1):45-56. https://doi.org/10.1891/rtnpij-v21i1a006
4. Gilmore-Bykovskyi AL. Caregiver person-centeredness and behavioral symptoms during mealtime interactions: Development and feasibility of a coding scheme. Geriatric Nursing. 2015;36(2):S10-S15. https://doi.org/10.1016/j.gerinurse.2015.02.018
5. Gilmore-Bykovskyi AL, Roberts TJ, Bowers BJ, Brown RL. Caregiver person-centeredness and behavioral symptoms in nursing home residents with dementia: A timed-event sequential analysis. The Gerontologist. 2015;55(Suppl_1):S61-S66. https://doi.org/10.1093/geront/gnu164
6. Gilmore-Bykovskyi AL, Rogus-Pulia N. Temporal associations between caregiving approach, behavioral symptoms and observable indicators of aspiration in nursing home residents with dementia. The Journal of Nutrition, Health & Aging. 2018;22(3):400-406. https://doi.org/10.1007/s12603-017-0943-y
7. Herman RE, Williams KN. Elderspeak's influence on resistiveness to care: Focus on behavioral events. American Journal of Alzheimer's Disease & Other Dementias®. 2009;24(5):417-423. https://doi.org/10.1177/1533317509341949
8. Lann-Wolcott H, Medvene LJ, Williams K. Measuring the person-centeredness of caregivers working with nursing home residents with dementia. Behavior Therapy. 2011;42(1):89-99. https://doi.org/10.1016/j.beth.2010.02.005
9. Phillips LR, Van Ort S. Measurement of mealtime interactions among persons with dementing disorders. Journal of Nursing Measurement. 1993;1(1):41-55.
10. Somboontanont W, Sloane PD, Floyd FJ, Holditch-Davis D, Hogue CC, Mitchell CM. Assaultive behavior in Alzheimer's disease: Identifying immediate antecedents during bathing. Journal of Gerontological Nursing. 2004;30(9):22-29. https://doi.org/10.3928/0098-9134-20040901-06
11. Thunborg C, von Heideken Wågert P, Götell E, Ivarsson A-B, Söderlund A. Development of a new assessment scale for measuring interaction during staff-assisted transfer of residents in dementia special care units. BMC Geriatrics. 2015;15(1):6. https://doi.org/10.1186/s12877-015-0003-6
12. Williams KN, Herman R, Gajewski B, Wilson K. Elderspeak communication: Impact on dementia care. American Journal of Alzheimer's Disease & Other Dementias®. 2009;24(1):11-20. https://doi.org/10.1177/1533317508318472
13. Wilson R, Rochon E, Mihailidis A, Leonard C. Examining success of communication strategies used by formal caregivers assisting individuals with Alzheimer's disease during an activity of daily living. Journal of Speech, Language, and Hearing Research. 2012;55(2):328-341. https://doi.org/10.1044/1092-4388(2011/10-0206)
14. Bourgeois M, Dijkstra K, Burgio L, Allen-Burge R. Memory aids as an augmentative and alternative communication strategy for nursing home residents with dementia. Augmentative and Alternative Communication. 2001;17(3):196-210. https://doi.org/10.1080/aac.17.3.196.210
15. Dijkstra K, Bourgeois M, Burgio L, Allen R. Effects of a communication intervention on the discourse of nursing home residents with dementia and their nursing assistants. Journal of Medical Speech-Language Pathology. 2002;10(2):143-158.
16. Jordan KJ, Tsai PF, Heo S, Bai S, Dailey D, Beck CK, et al. Pilot testing a coaching intervention to improve certified nursing assistants' dressing of nursing home residents. Research in Gerontological Nursing. 2017;10(6):267-276. https://doi.org/10.3928/19404921-20171013-04
17. Kihlgren M, Kuremyr D, Norberg A, Bråne G, Karlson I, Engström B, et al. Nurse-patient interaction after training in integrity promoting care at a long-term ward: Analysis of video-recorded morning care sessions. International Journal of Nursing Studies. 1993;30(1):1-13. https://doi.org/10.1016/0020-7489(93)90088-c
18. Van Ort S, Phillips LR. Nursing interventions to promote functional feeding. Journal of Gerontological Nursing. 1995;21(10):6-9. https://doi.org/10.3928/0098-9134-19951001-04
19. van Weert JC, van Dulmen AM, Spreeuwenberg PM, Ribbe MW, Bensing JM. Effects of snoezelen, integrated in 24h dementia care, on nurse-patient communication during morning care. Patient Education and Counseling. 2005;58(3):312-326. https://doi.org/10.1016/j.pec.2004.07.013
20. Williams KN, Perkhounkova Y, Herman R, Bossen A. A communication intervention to reduce resistiveness in dementia care: A cluster randomized controlled trial. The Gerontologist. 2016;57(4):707-718. https://doi.org/10.1093/geront/gnw047