

Oral Care in Long-Term Care Residents with Dementia

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A Master's Paper submitted to the faculty of
the University of North Carolina at Chapel Hill
in partial fulfillment of the requirements for
the degree of Master of Public Health in
the Public Health Leadership Program.

Chapel Hill

2011

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Manuscript Abstract

Introduction: Poor oral health can lead to a number of health concerns, including pain, loss of teeth, and increased risk for pneumonia and heart disease. These issues are particularly salient for residents of long-term care facilities with a dementia diagnosis. Residents with dementia often require assistance with personal care, including oral hygiene, but may demonstrate agitated or resistive behaviors when care assistants attempt to provide care. Prior work on the related care activity of bathing has been done using person-centered care approaches and been found to effectively reduce levels of agitation and aggression. To determine whether an intervention is successful it is important to be able to reliably and validly measure components of care. The research design proposed herein proposes to characterize three measurements videotaped encounters of oral care provision in long-term care residents with dementia: a task completion form (TCF), caregiver behavior scale (CGBS), and a measure of resident behaviors during care (CAREBA-OC).

Instrument Development: The included measures will be completed by raters who undergo extensive training on how to behaviorally code videotaped encounters. The framework for the TCF, CGBS, and CAREBA-OC is from a prior bathing study, and we describe how the original bathing measurement forms were altered to adequately measure similar behaviors and task components observed during oral care.

Instrument Characterization: Each instrument will be evaluated for measures of reliability and validity. The TCF will undergo evaluation for face validity, inter-rater reliability, and within-rater reliability. The CGBS will under evaluation for face validity, inter-rater reliability, within-rater reliability, and internal consistency. The CAREBA-OC will be evaluated for face validity, concurrent criterion validity, inter-rater reliability, and within-rater reliability.

Discussion: The proposed psychometric characterization will provide evidence of the usefulness of the included forms. While it is not possible to know precisely what the proposed measures of reliability and validity will be when actual measurement occurs, knowing the characteristics of the related bathing forms provides us with some general idea of what to expect. Furthermore, we are prepared to alter the forms and training procedure if any psychometric properties do not meet our predefined standards.

Development and Characterization of Measures for Task Completion, Caregiver Behavior, and Resident Behavior during the Provision of Mouth Care in a Long-Term Care Setting

Introduction

Dental problems are a significant concern for older adults. Seven percent of adults age 65 years or older report having at least two episodes of tooth-related pain in the preceding 6 months. Additionally, 41% of older adults have periodontal disease (compared to only 6% of adults age 25-34). Between the years of 1988 and 1994, an estimated 33% of adults 65 years or older had untreated dental caries. These consequences of poor oral health lead to tooth loss, pain, and reduced quality of life.¹

In addition to these negative outcomes of poor oral health, deficiency in oral care can also negatively affect systemic health. A lack of oral care can lead to an increase in mouth colonization by respiratory pathogens.² One study of Japanese nursing homes found that the relative risk (RR) for pneumonia was 1.67 (95% CI = 1.01 – 2.75, $p < 0.05$) when comparing residents who received no oral care with those receiving staff-directed oral care after each meal and once weekly professional dental cleaning.³ Further, although somewhat controversial, there is some evidence that poor oral hygiene can directly affect cardiovascular health. An increase in risk has been found in persons with periodontal disease for both myocardial infarction (RR = 2.7)⁴ and overall coronary heart disease (RR = 1.19, 95% CI = 1.08 - 1.32).⁵ Additionally, loss of as few as four to five teeth is associated with reduced intake of important dietary items such as polyunsaturated fats, fruits, vegetables, vitamin B12, and dietary fiber.^{6,7} The provision of adequate oral care may be especially problematic for older persons unable to provide their own care, such as for individuals living in long-term care settings.

Currently, 2.5 million⁸ individuals live in long-term care settings in the United States. Placement in a long-term care facility is strongly predicted by the need for help with providing

daily care needs, including oral care.⁹ Unfortunately, research conducted in nursing home settings suggests that this daily oral care is not being adequately provided. One study found that fewer than 16% of nursing home residents received adequate oral care, with standards such as brushing for at least two minutes, flossing, and wearing clean gloves never being met.¹⁰ Another study found that only 15% of nursing home residents had 'excellent' or 'very good' oral health.¹¹

Providing quality and thorough oral care to long-term care residents is challenging due in part to the high rate of physical and cognitive impairment present in residents. Dementia is common among residents of long-term care facilities, with a prevalence estimated at greater than 60%.¹² Given the high resident:staff ratios and inadequate time allotted for daily care provision – including oral care – any task that is met with resistance is unfortunately one that is often omitted. In one study, only 16% of caregivers felt that they were able to manage resistive behaviors when they occurred during care provision.¹⁰ Fear of resident resistance has been shown to be one of the most prominent barriers to ensuring that oral care is provided.¹³ Caregiver behaviors may influence the level of agitation or resistance that residents display, and modifying those behaviors may have a beneficial effect on whether care is ultimately provided. Antecedents to resistive behaviors include approaching residents quickly and immediately starting the care process, which are potentially modifiable factors that have the potential to reduce resistive behaviors.¹⁰ Similar strategies have been used with bathing to reduce agitated and resistive behaviors, which in turn improved the care process.^{14,15}

While guidelines do exist for providing oral care in long-term care settings,^{16,17} much more work is needed to determine how to best bring about changes and actually improve the provision of oral care.¹³ Current literature on effective interventions targeted to oral care provision is limited, however useful insights can be acquired from the literature on other ADLs, such as bathing.¹⁵ One nonpharmacologic intervention that has been utilized in the past to

improve bathing procedures in the long-term care setting is termed person-centered care. In person-centered care the care providers are taught to focus less on the task they are providing and more on the person to whom they are providing care. To assess the efficacy of such an intervention at improving oral care a long-term care population with dementia, adequate measures of completeness of oral care and behaviors of both caregivers and residents will be required. To date, no such measures exist.

The goal of this manuscript is to describe the development, implementation, and analytic plan for three measures, one designed to rate the completeness of oral care, and the other two to rate the behaviors of caregivers and residents during oral care provision. A narrative discussion of the expected findings and a plan for future studies will also be provided.

Instrument Development

Three measurement instruments will be discussed: the Mouth Care Task Completion Form (TCF), Mouth Care Caregiver Behavior Rating Scale (CBRS), and Care Recipient Behavior Assessment During Oral Care (CAREBA-OC). These measurements were designed to be used to assess videotaped encounters of oral care provision in the long-term care setting.

Rater Training

In a study that utilizes videotaped encounters, the training and assessment of those who view and code behaviors seen in the videotapes is paramount to ensuring quality data. For this study, raters will undergo intensive training in how to reliably measure behaviors and extensive practice rating videotapes of individuals receiving mouth care. A pre-determined acceptable agreement level of 0.85 will be achieved before study videos are rated, and inter-rater reliability will be periodically assessed throughout the rating process.

Rating Procedure

After an acceptable level of reliability is reached on training videos, raters will be randomly assigned a set of videos to watch and rate using the three previously mentioned forms (TCF, CBRS, and CAREBA-OC). Some videos will be rated by more than one rater to assess inter-rater reliability during the study.

Each video will be rated in the following way. The first form completed will be the TCF, which contains information about the start and stop time for mouth care. To complete the TCF, the rater will watch the video two separate times. The first viewing serves to allow raters to record information in section I of the form about who provides care and whether the tongue was brushed, picking or flossing occurred, and mouthwash was used. Additionally, raters will determine whether any distress or positive symptoms are displayed. This serves as a screen for the later CAREBA form. If no symptoms of distress or positive emotional displays are witnessed, there is no need to complete the CAREBA. On the second viewing, after having familiarized themselves with the video, raters will complete sections II (location) and III (brushing/cleaning).

To complete the CGBS, raters watch the video a third time, focusing on the behaviors exhibited by the caregiver. A fourth and final viewing is then done using the *Noldus Observer XT* to complete the CAREBA, focusing on the behaviors of the resident.

TCF Development

The TCF form is designed to assess if and to what extent mouth care provision to determine whether mouth care was being adequately carried out during experimental conditions. As part of the proposed study that necessitated the existence of this form, a trained

geriatric dentist will evaluate the overall mouth health of residents using measures related to the simplified oral hygiene index (OHI), which contains both the debris index (DI-S) and calculus index (CI-S)¹⁸. These new measures, called the Plaque Index for Long-Term Care (Appendix 1) and the Gingival Index for Long-Term Care (Appendix 2) provided the standard on which oral health would be judged, and thus provided information about what areas of mouth care by which to judge caregivers. Furthermore, denture cleanliness was to be assessed using the Denture Plaque Index (Appendix 3), a modified measure from the work of Augsburger and Elahi.¹⁹

While the above measures describe the final analysis of oral health for this study, other aspects of oral care were considered important to measure as well. A literature review describing evidence-based dental practices indicates that good mouth care should include brushing or swabbing the teeth with chlorhexidine, inter-dental cleaning (i.e. flossing) or denture cleaning, and the use of high-fluoride paste post-brushing.¹³ Assessment of whether the caregivers engage in these practices was thus included in the TCF.

The starting point for the TCF development was a bathing completeness form (Appendix 4) used in previous work to improve the bathing process in long-term care residents with dementia. This form was modified to reflect proper mouth care as discussed above. The first iteration of the form is included as appendix 5. This form was presented to the group of raters to be used in practice rating sessions. Through initial practice sessions it became clear that this form had problems that would need to be addressed before the form was ready to use.

Many of the changes were driven by the difficulty of reliably coding when a mouth care act occurred. For instance, while the final dental assessment measures calculus and debris on inner and outer teeth surfaces, the distance and angle of videotaped encounters made reliable assessment of whether inner or outer surfaces were brushed difficult. It was determined that if raters were focused on determining whether inner or outer surfaces were brushed, information

that was more readily coded might be missed. Changes on the final TCF reflect the movement of inner and outer surface to a more option recording, with an added “don’t know” response.

Additionally, through the same iterative process flossing was changed from a thorough assessment of flossing by sector to flossing by just top or bottom. To make the form less cluttered and more user friendly, this was also moved to an upper part of the form. The final version of the TCF form can be seen as appendix 6.

The measure will be evaluated by calculating inter-rater reliability, within-rater reliability, and face validity.

CGBS Development

The change from a traditional model of long-term care to a more person-centered care approach has as a primary objective the alteration of caregiver behavior from a task-oriented to a person-oriented care approach. Thus, it is important to assess the extent to which a person-centered intervention effectively alters caregiver behavior. The measured behaviors are categorized into verbal communications by the caregiver, task presentation style, and nonverbal communication. Each of these domains are relevant to the goals of person-centered care. Behaviors such as speaking directly to the resident, using a calm voice, preparing the resident for the task they are getting ready to engage in, and being positioned on the same level of the resident are all part of focusing on the person receiving care as opposed to the task being performed.

A related form was used during a prior bathing experiment (Appendix 7). The bathing form contained some items that were determined to be unimportant for the oral care process, such as maintaining eye contact, working in close proximity to the resident, being flexible with the care routine, and encouraging independence. While these measures were removed, another item was added to the nonverbal communication domain that assesses how often the

caregiver positions themselves on the same level as the resident. The oral care routine often occurs with the resident either lying down or sitting, and it can be intimidating if the caregiver stands over the resident. It is thus considered more appropriate and to better meet the psychosocial needs of the resident if the caregiver positions themselves at eye level.

Raters will grade the caregivers behaviors on a Likert scale (never, almost never, occasionally, often, almost always, always, and not applicable). A manual was provided to raters that operationalized both the frequency criteria and behaviors for the CGBS. This manual is included in appendix 8. The final iteration of the CGBS is included as appendix 9.

The measure will be evaluated by calculating inter-rater reliability, within-rater reliability, internal consistency, and face validity.

CAREBA-OC Development

Past studies have identified a decrease in agitation and aggression as evidence of the “person-centeredness” of care.²⁰ A recent study that utilized a person-centered care approach for bathing included a measurement, the CAREBA, that was found to be both valid and reliable for assessing resident behaviors relevant to person-centered care. The CAREBA-OC is closely related to the CAREBA described in Sloane et al.¹⁵ Both mouth care¹⁰ and bathing²¹ have been shown to be tasks that often elicit symptoms of agitation and aggression in residents. Mouth care, like bathing, brings caregivers in close proximity to residents, thus making some of the same expressions of agitation and aggression (e.g. hitting, biting, spitting, threatening, screaming) pertinent in both bathing and mouth care. The CAREBA-OC is strikingly similar to the CAREBA for these reasons. Some items, such as kicking, were removed because the angle of the videotaped encounters did not permit assessment of lower-body actions.

Similarly to the CGBS, the behaviors rated in the CAREBA-OC were operationalized to assist with reliable identification of behaviors. These operational definitions of behaviors helped

to clarify what did and did not constitute a behavior to be rated. For instance, the physical symptom of “grabbing caregiver” is defined as: “grabs onto caregiver. Do not rate if resident is holding on to the caregiver for safety reasons. If it is unclear, do not rate.” The CAREBA-OC definitions are provided as appendix 10.

The measure will be evaluated by calculating inter-rater reliability, within-rater reliability, internal consistency, face validity, and concurrent criterion validity.

Inter-rater reliability

Three independent raters will be trained as described above and will then be tasked to score 30 of the same care sessions. The ratings for these 30 videos will be compared and an appropriate statistic will be computed for each measure. The TCF will use a weighted Cohen’s kappa statistic to compare interrater reliability. The CGBS will use an interclass correlation (ICC) to compare the two subscale items and a weighted Cohen’s kappa for the included items that are not part of a subscale. The CAREBA-OC will use either a rho or kappa statistic as computed by the rating software. In this study, a kappa of 0.60 will be considered acceptable.

Within-rater reliability

To ensure agreement within one rater over time, these coders will also rate 10 of the same video clips at two points in time. Although this type of reliability is subject to criticism because the second rating is necessarily contaminated by the first, this form of reliability testing is useful as a training exercise. Once the raters have coded 10 videos twice, the ratings will be correlated, and the raters retrained as needed, until a within-rater reliability of 0.80 is achieved.

Internal Consistency

A measure of internal consistency can be determined for the CGBS. Internal consistency measures the extent to which certain subscale items that should be correlated

actually are. A Cronbach's alpha will be computed to determine the internal consistency of two subscales in the CGBS: the gentleness and verbal support scales.

Face validity

An assessment of face validity will be done by asking a panel of geriatric dentists, nurses, nursing aids, and research assistants to provide expert opinion about whether or not the TCF form captures the completeness of desired mouth care. By asking these groups of relevant experts and potential users of this measurement, we will be able to determine whether the measurement both contains pertinent content and that the form is user-friendly. If these two criteria are not met the form is unlikely to gain acceptance and use, regardless of any other psychometric properties.²²

Concurrent Criterion Validity

A measure of concurrent criterion validity will be applied to the CAREBA-OC only. To do this, we will assess the correlation between the baseline CMAI score and baseline CAREBA-OC score. The CMAI is a well-studied reliable and valid measure of agitation that assesses the level of resident agitation during the week prior to form completion. Residents who are more agitated during mouth care should receive higher scores on the CMAI.

Instrument Characteristics

TCF

Inter-rater reliability

The form and training procedure for this study resembles that of a previous bathing study.¹⁵ However, the mouth care TCF is likely more difficult to reliably complete than the

bathing TCF due to increased complexity. The nature of mouth care videos make accurate coding more difficult, thus the inter-rater reliability, as measured by the ICC, is expected to be between 0.75 and 0.90. The related bathing study demonstrated an inter-rater reliability of 0.84 and 0.94, but the scale of the observations was substantially larger for bathing (e.g. was the dorsum of the foot washed) than for mouth care (e.g. was the inside upper right section of teeth brushed).

There are a number of items to be rated on the TCF, and individual items will be evaluated for agreement (Table 1).

Within-rater reliability

The ability of raters to reliably rate the same videotapes reliably over time is important, especially as a training exercise. Though some contamination is unavoidable due to multiple viewings, it is helpful to determine how able raters are to arrive at the same results on a video over time. We expect agreement between attempts 1 and 2 to reach an average percent agreement of greater than 0.90 for the TCF. If any one item is below 70% agreement, training will be reevaluated and revised to address this item until agreement is at least 70% (Table 1).

Face validity

It is anticipated that the face validity will be favorable for the TCF in all groups assessed. Because this measure was designed with valid dental assessments in mind, the TCF should meet the standards of geriatric dental experts. Additionally, this form should be met with favorable consideration from those who will use the form to rate videotapes because of the iterative process through which the final version was developed.

CGBS

Inter-rater reliability

The CGBS closely resembles a measure used in a previous experiment on bathing. The process of rating the behaviors of caregivers during care is not anticipated to differ considerably with respect to difficulty between the care activities of bathing and oral care. In the bathing experiment, inter-rater reliability was found to be 0.86 for gentleness and 0.85 for verbal support. Absent data, this is a reasonable level of agreement to expect for a similar task. Table 2 will present data on the percent agreement and ICC. Because this measurement is scored on a Likert-scale, the percent agreement may be misleading. It is possible for the exact agreement (e.g. one rater scores “always” and another scores “almost always”) to be low with an acceptable ICC.

Within-rater reliability

The ability of raters to reliably rate the same videotapes reliably overtime is important, especially as a training exercise. Though contamination is unavoidable due to multiple viewings, it is helpful to determine how able raters are to arrive at the same results on a video over time. We expect agreement between attempts 1 and 2 to reach a level of greater than 0.90 for the CGBS (Table 2).

Internal consistency

Similar measures have shown internal consistency in previous studies. In a bathing study, a similar scale found $\alpha = 0.84$ for gentleness and $\alpha = 0.74$ for verbal support.¹⁴ The

related oral care CGBS measures behaviors that do not differ substantially from those in the bathing study. Thus, it is expected that the CGBS will demonstrate similar measures of internal consistency.

Face validity

It is anticipated that the face validity will be favorable for the CGBS in all groups assessed. The measurement of similar behaviors has been used in assessment of other care performance associated with ADL provision.¹⁴ Additionally, this form should be met with favorable consideration from those who will use the form to rate videotapes because of the iterative process through which the final version was developed.

CAREBA-OC

Inter-rater reliability

The inter-rater reliability of the CAREBA, a measure closely related to the CAREBA-OC, ranged between 0.30 and 0.97, with the lowest being 0.30 in the nonaggressive physical agitation (avoiding/leaving) category and 0.97 in the incidence of complaints, threats, or swearing category.

It is clear that for a majority of the rated behaviors, raters were able to reliably report what occurred. These levels may be similar to those found for oral care behaviors, though the symptoms of agitation may differ substantially. Bathing, unlike mouth care, requires the removal of clothes, which may provoke a different type of reaction. It remains to be seen the frequency of behaviors reported, but a very low number of some behaviors could affect the reliability with which they can be rated.

To assess whether this is the case, we will examine the reported frequency of behaviors. This information will be presented in table 3. Data pertaining to percent agreement and inter-rater reliability will be reported in table 4.

Within-rater reliability

The ability of raters to reliably rate the same videotapes reliably overtime is important, especially as a training exercise. Though contamination is unavoidable due to multiple viewings, it is helpful to determine how able raters are to arrive at the same results on a video over time. We expect agreement between attempts 1 and 2 to reach a level of greater than 0.90 for the CAREBA-OC (table 4)

Face validity

It is anticipated that the face validity will be favorable for the CAREBA-OC in all groups assessed. The measurement of similar resident behaviors has been used in assessment of other person-centered care in bathing.¹⁵ Additionally, this form should be met with favorable consideration from those who will use the form to rate videotapes because of the iterative process through which the final version was developed.

Concurrent criterion validity

The Cohen-Mansfield Agitation Inventory is a well-studied questionnaire, to be completed by a nurse who has observed the person with dementia's behavior, designed to measure agitation over a preceding period of time. The CMAI contains 29 agitated behaviors and is rated on frequency of occurrence, ranging from one (never) to seven (an average of several times per hour). The CMAI includes all of the behaviors present on the CAREBA and CAREBA-OC. Initial studies on the CMAI found that inter-rater reliability ranged from 0.88 to 0.92.²³

It is thus expected that the correlation between the baseline CAREBA-OC and the baseline CMAI should be good. For this study, we will consider a correlation of greater than or equal to 0.60 adequate.

Discussion

This paper set out to describe the need, design, and future characterization of instruments for the measurement of how well mouth care is performed (TCF), the behavior of those providing mouth care (CGBS), and the behavior of residents in long-term care with dementia whom are receiving assistance with mouth care (CAREBA-OC). These three instruments were developed based on prior work on person-centered care in bathing. The determination of the reliability and validity of these forms described above will provide support for their use in a research setting.

Given that the actual determination of the psychometric properties of these forms has not occurred, it remains a possibility that the forms will not meet the standards we currently propose. While we find this possibility unlikely due to the strong foundation of previous, similar measurements, it is prudent to discuss what measures would be taken if such an outcome were to occur.

Each form will be assessed for face validity by presentation to a panel of relevant experts. For instance, the TCF will be assessed by both geriatric dental experts as well as behavioral raters who will use the form. This will ensure that the form meets both expected content from a technical perspective as well as usability. When the form is assessed in this way, feedback can and will be elicited to determine if something is missing (or erroneously included) that interferes with the forms face validity.

The training process that raters undergo is extensive and is intended to ensure that raters meet a certain level of reliability before they start rating actual videos. It is possible that

mouth care will present unique challenges to rating task completeness or behaviors reliably; however, these issues should be caught during the training process, thus giving ample time to address any problems.

The ultimate goal for development of the measures described in this paper is use in a study of person-centered care on improving mouth care in long-term care residents with dementia. Thus, if the characteristics are favorable, as expected, this will provide a stronger foundation for the intervention study. The importance of improving mouth care in this setting is important, as it is an often-overlooked personal care item,^{10,11} and poor oral hygiene poses a significant threat to health and well-being.^{1,2,4,5}

Table 1. Rater reliability of the Task Completion Form (TCF) by item			
	Inter-rater		Within-rater
	% agreement	Kappa	% agreement
Non-sector specific tasks			
Provider of Care			
Self-care			
Tongue Brushing			
Picking or Flossing			
Rinsing			
Brushing/Cleaning			
Upper			
Dentition			
Right			
Middle			
Left			
Lower			
Dentition			
Right			
Middle			
Left			
Swabbing/Wiping the teeth or gums after brushing/cleaning			
Upper			
Right			
Middle			
Left			
Lower			
Right			
Middle			
Left			

Table 2. Shell table for inter-rater reliability by item for the CGBS			
	Inter-rater		Within-rater
	% agreement	ICC	% agreement
Verbal Communication			
Praises or Compliments the Resident			
Uses a Calm Voice			
Speaks Respectfully			
Expresses Concern/Interest			
Speaks Directly to Resident			
Task Presentation Style			
Prepares Resident for the Task			
Hurries Through Mouth Care			
Nonverbal Communication			
Gently Touches Resident			
Positioned on Same Level as Resident			

Table 3. Number of resident behavior occurrences.				
		By Resident		
	Overall number	Mean	SD	Range
Physical Symptoms				
Hitting, pushing, scratching, pinching, kicking				
Hitting, pushing, scratching, etc. ATTEMPT				
Biting				
Biting ATTEMPT				
Grabbing caregiver				
Throwing things				
Spitting at caregiver				
Clear sign of pain or discomfort				
Resistance to care				
smiling/laughing				
Verbal Symptoms				
Statement of pain				
Other vocal expressions of pain or discomfort				
Call for help/Resistance to care/Protest				
Swearing				
Threats of Other aggressive language				
Screams/Yells				
Makes positive comments				

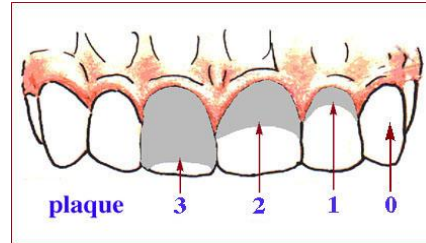
Table 4. Number of resident behavior occurrences.			
	Inter-rater		Within-Rater
	% Agreement	ICC	% Agreement
Physical Symptoms			
Hitting, pushing, scratching, pinching, kicking			
Hitting, pushing, scratching, etc. ATTEMPT			
Biting			
Biting ATTEMPT			
Grabbing caregiver			
Throwing things			
Spitting at caregiver			
Clear sign of pain or discomfort			
Resistance to care			
smiling/laughing			
Verbal Symptoms			
Statement of pain			
Other vocal expressions of pain or discomfort			
Call for help/Resistance to care/Protest			
Swearing			
Threats of Other aggressive language			
Screams/Yells			
Makes positive comments			

Appendix 1

Plaque Index for Long-term Care

Instructions. Using observation and clinical judgment, identify the **buccal** tooth surface within each sextant that has the most plaque. Once identified, scratch on the buccal tooth surface to better determine an accurate score. If it is not possible to scratch the surface, then assign a score based only on the observation. Use the scoring guidelines below to assign the worst score in each sextant.

Score	Plaque Score Description
0	No plaque or stain present
1	Soft plaque covering not more than one third of the tooth surface, or presence of extrinsic stains without other plaque regardless of surface area covered
2	Soft plaque covering more than one third, but not more than two thirds, of the exposed tooth surface
3	Soft plaque covering more than two thirds of the exposed tooth surface



Sextant	99 = No teeth in this sextant ↓	88 = Unable to assess ↓	Scratching performed ↓		Buccal Plaque Score			
			Yes	No	0 = No Plaque ↓	1 = Plaque covers ≤1/3 surface ↓	2 = Plaque covers >1/3 but ≤2/3 surface ↓	3 = Plaque covers >2/3 surface ↓
Upper Sextants (Buccal surface)								
Upper Right	99	88	<input type="checkbox"/> 1 Yes	<input type="checkbox"/> 0 No	0	1	2	3
Upper Front	99	88	<input type="checkbox"/> 1 Yes	<input type="checkbox"/> 0 No	0	1	2	3
Upper Left	99	88	<input type="checkbox"/> 1 Yes	<input type="checkbox"/> 0 No	0	1	2	3
Lower Sextants (Buccal surface)								
Lower Left	99	88	<input type="checkbox"/> 1 Yes	<input type="checkbox"/> 0 No	0	1	2	3
Lower Front	99	88	<input type="checkbox"/> 1 Yes	<input type="checkbox"/> 0 No	0	1	2	3
Lower Right	99	88	<input type="checkbox"/> 1 Yes	<input type="checkbox"/> 0 No	0	1	2	3

Sextant	99 = No teeth in this sextant ↓	88 = Unable to assess ↓	Scratching performed ↓		Lingual Plaque Score			
			Yes	No	0 = No Plaque ↓	1 = Plaque covers ≤1/3 surface ↓	2 = Plaque covers >1/3 but ≤2/3 surface ↓	3 = Plaque covers >2/3 surface ↓
Upper Sextants (Lingual surface)								
Upper Right	99	88	<input type="checkbox"/> 1 Yes	<input type="checkbox"/> 0 No	0	1	2	3
Upper Front	99	88	<input type="checkbox"/> 1 Yes	<input type="checkbox"/> 0 No	0	1	2	3
Upper Left	99	88	<input type="checkbox"/> 1 Yes	<input type="checkbox"/> 0 No	0	1	2	3
Lower Sextants (Lingual surface)								
Lower Left	99	88	<input type="checkbox"/> 1 Yes	<input type="checkbox"/> 0 No	0	1	2	3
Lower Front	99	88	<input type="checkbox"/> 1 Yes	<input type="checkbox"/> 0 No	0	1	2	3
Lower Right	99	88	<input type="checkbox"/> 1 Yes	<input type="checkbox"/> 0 No	0	1	2	3

Appendix 2

Gingival Index for Long-term Care

Instructions. Using observation and clinical judgment identify the most inflamed buccal surface within each sextant. Once identified, sweep the gingival area to better determine an accurate score. If it is not possible to sweep the surface, then assign a score based only on the observation. Use the scoring guidelines below to assign the worst score in each sextant.

Score	Description
0	No inflammation
1	Mild inflammation; slight change in color; little change in texture
2	Moderate inflammation; glazing, redness, edema, and/or hypertrophy; Bleeding on pressure
3	Severe inflammation; marked redness, edema and/or hypertrophy of the marginal or papillary gingival unit; spontaneous bleeding; congestion, or ulceration

Sextant	Included Teeth
Upper Right	1-5
Upper Front	6-11
Upper Left	12-16
Lower Left	17-21
Lower Front	22-27
Lower Right	28-32

Sextant	99 = No teeth in this sextant ↓	88 = Unable to assess ↓	Sweeping performed ↓		Buccal Surface Score			
			Yes	No	0 = No inflammation ↓	1 = Mild, inflammation ↓	2 = Moderate, inflammation ↓	3 = Severe inflammation ↓
Upper Sextants (Buccal surface)								
Upper Right	99	88	<input type="checkbox"/> _i Yes	<input type="checkbox"/> _o No	0	1	2	3
Upper Front	99	88	<input type="checkbox"/> _i Yes	<input type="checkbox"/> _o No	0	1	2	3
Upper Left	99	88	<input type="checkbox"/> _i Yes	<input type="checkbox"/> _o No	0	1	2	3
Lower Sextants (Buccal surface)								
Lower Left	99	88	<input type="checkbox"/> _i Yes	<input type="checkbox"/> _o No	0	1	2	3
Lower Front	99	88	<input type="checkbox"/> _i Yes	<input type="checkbox"/> _o No	0	1	2	3
Lower Right	99	88	<input type="checkbox"/> _i Yes	<input type="checkbox"/> _o No	0	1	2	3

Instructions. If possible, repeat the assessment for the **lingual** tooth surface. Check here to denote lingual surface was assessed:

Sextant	99 = No teeth in this sextant ↓	88 = Unable to assess ↓	Sweeping performed ↓		Lingual Surface Score			
			Yes	No	0 = No inflammation ↓	1 = Mild, inflammation ↓	2 = Moderate, inflammation ↓	3 = Severe inflammation ↓
Upper Sextants (Lingual surface)								
Upper Right	99	88	<input type="checkbox"/> _i Yes	<input type="checkbox"/> _o No	0	1	2	3
Upper Front	99	88	<input type="checkbox"/> _i Yes	<input type="checkbox"/> _o No	0	1	2	3
Upper Left	99	88	<input type="checkbox"/> _i Yes	<input type="checkbox"/> _o No	0	1	2	3
Lower Sextants (Lingual surface)								
Lower Left	99	88	<input type="checkbox"/> _i Yes	<input type="checkbox"/> _o No	0	1	2	3
Lower Front	99	88	<input type="checkbox"/> _i Yes	<input type="checkbox"/> _o No	0	1	2	3
Lower Right	99	88	<input type="checkbox"/> _i Yes	<input type="checkbox"/> _o No	0	1	2	3

Appendix 3

Denture Plaque Index (Augsburger & Elahi, 1982)

Instructions. In accordance with clinical practice – and modified based on subject need – remove the dentures and immerse into disclosing solution for 30 seconds. Gently rinse off excess dye in warm tap water for 15 seconds. Then, for each surface area, assign a dental plaque index score according to the scoring guidelines provided.

Facial Surface Quadrant

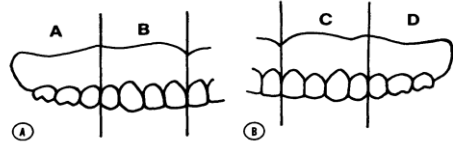


Fig. 1. Facial surface quadrant outline for scoring plaque and stain deposits. A, Right side, and B, left side.

Basal Tissue Contact Surfaces

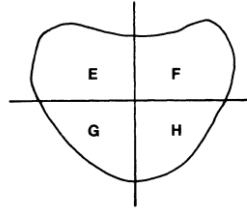


Fig. 2. Basal tissue contact surface quadrants for scoring plaque and stain deposits.

Score	Dental Plaque Index Score
0	No plaque
1	Light plaque; 1% to 25% of area covered
2	Moderate plaque; 26% to 50% of area covered
3	Heavy plaque; 51% to 75% of area covered
4	Very heavy plaque; 76% to 100% of area covered

The resident has: a. Upper Denture No ₀ Yes ₁
 b. Lower Denture No ₀ Yes ₁

Area	99 = Quadrant is missing ↓	Dental Plaque Index Score				
		0 = No Plaque ↓	1 = Light Plaque, 1% -25% surface covered ↓	2 = Moderate plaque, 26%-50% surface covered ↓	3 = Heavy Plaque, 51%-75% surface covered ↓	4 = Very heavy plaque, 76%-100% surface covered ↓
UPPER DENTURE						
Facial surface quadrant – upper						
A	99	0	1	2	3	4
B	99	0	1	2	3	4
C	99	0	1	2	3	4
D	99	0	1	2	3	4
Basal tissue contact surface – upper						
E	99	0	1	2	3	4
F	99	0	1	2	3	4
G	99	0	1	2	3	4
H	99	0	1	2	3	4
LOWER DENTURE						
Facial surface quadrant – lower						
A	99	0	1	2	3	4
B	99	0	1	2	3	4
C	99	0	1	2	3	4
D	99	0	1	2	3	4
Basal tissue contact surface – lower						
E	99	0	1	2	3	4
F	99	0	1	2	3	4
G	99	0	1	2	3	4
H	99	0	1	2	3	4

Appendix 4

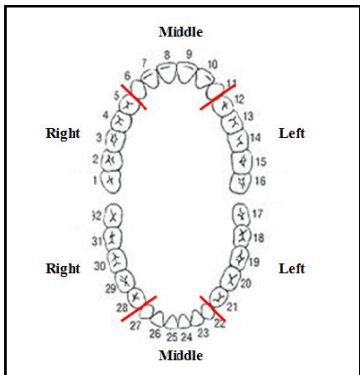
Bathing Task Completion Form

	WASHING TASK COMPLETION		DRYING	Task related comments	
BATHING TASK	a. Washing was : 1 = Complete 2 = Incomplete 3 = Not seen 4 = Not done	→ a1. INCOMPLETE Circle <u>ALL</u> that apply 1 = Did not wash entire area 2 = Did not soap <i>armpits, genitals, anal area or hair</i>	b. Drying was: 1 = Complete 2 = Incomplete 3 = Not seen 4 = Not done		
	1. FACE	1 2 3 4	1 ζ	1 2 3 4	
	2. NECK	1 2 3 4	1 ζ	1 2 3 4	
	3. CHEST	1 2 3 4	1 ζ	1 2 3 4	
	4. ARMS	1 2 3 4	1 ζ	1 2 3 4	
	5. ARMPITS	1 2 3 4	1 2	1 2 3 4	
	6. LEGS	1 2 3 4	1 ζ	1 2 3 4	
	7. FEET	1 2 3 4	1 ζ	1 2 3 4	
	8. GENITALS	1 2 3 4	1 2	1 2 3 4	
	9. ANAL AREA	1 2 3 4	1 2	1 2 3 4	
10. HAIR	1 2 3 4	1 2	1 2 3 4		

Appendix 5

Mouth Care Task Completion Form

I. Location			II. Brushing/Cleaning				III. Floss or Pick Between Teeth				IV. Post-Brushing/Cleaning Rinse (with anything) or Paste				
Jaw	Tooth Surface	Sector	None	Partial	Full	Not Seen	No	Yes	Not Seen	NA	No	Yes	Not Seen	NA	
Upper <input type="checkbox"/> 0 No Teeth <input type="checkbox"/> 1 Natural Teeth <input type="checkbox"/> 2 Dentures <input type="checkbox"/> 3 Both	Outside	Right	0	1	2	7	0	1	7	9	0	1	7	9	
		Middle	0	1	2	7	0	1	7	9	0	1	7	9	
		Left	0	1	2	7	0	1	7	9	0	1	7	9	
	Inside	Right	0	1	2	7						0	1	7	9
		Middle	0	1	2	7						0	1	7	9
		Left	0	1	2	7						0	1	7	9
Lower <input type="checkbox"/> 0 No Teeth <input type="checkbox"/> 1 Natural Teeth <input type="checkbox"/> 2 Dentures <input type="checkbox"/> 3 Both	Outside	Right	0	1	2	7	0	1	7	9	0	1	7	9	
		Middle	0	1	2	7	0	1	7	9	0	1	7	9	
		Left	0	1	2	7	0	1	7	9	0	1	7	9	
	Inside	Right	0	1	2	7						0	1	7	9
		Middle	0	1	2	7						0	1	7	9
		Left	0	1	2	7						0	1	7	9
Tongue			0	1	2	7									



V. OTHER

Who Brushes?

- 1 Resident
- 2 Caregiver
- 3 Both

Degree of Self-Care?

- 1 None
- 2 A Little
- 3 Some
- 4 A Lot

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																
No behavior	No verbal distress	No positive verbal	No physical distress	No positive physical	DE1															
					Rater ID	M	M	D	D	Y	Y									

Appendix 6

Mouth Care Task Completion Form

Start Time : :

End Time : :

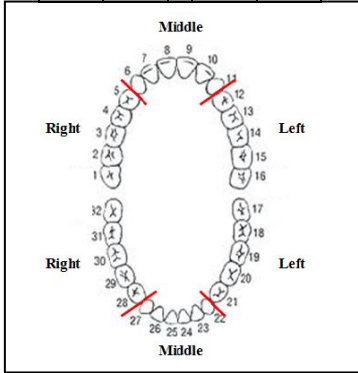
CAREBA:

Physical distress

Physical positive

Verbal distress

Verbal positive



I. NON-SECTOR SPECIFIC TASKS

<p>1. Who Brushes?</p> <p><input type="checkbox"/> 1 Resident</p> <p><input type="checkbox"/> 2 Caregiver</p> <p><input type="checkbox"/> 3 Both</p>	<p>2. Degree of Self-Care?</p> <p><input type="checkbox"/> 1 None</p> <p><input type="checkbox"/> 2 A Little</p> <p><input type="checkbox"/> 3 Some</p> <p><input type="checkbox"/> 4 A Lot</p>	<p>3. Was the tongue brushed?</p> <p><input type="checkbox"/> 1 Yes</p> <p><input type="checkbox"/> 0 No</p> <p><input type="checkbox"/> 7 Not Seen</p>	<p>4. Was there picking/flossing?</p> <table style="width: 100%;"> <tr> <td style="width: 50%;">Upper:</td> <td style="width: 50%;">Lower:</td> </tr> <tr> <td><input type="checkbox"/> 1 Yes</td> <td><input type="checkbox"/> 1 Yes</td> </tr> <tr> <td><input type="checkbox"/> 0 No</td> <td><input type="checkbox"/> 0 No</td> </tr> <tr> <td><input type="checkbox"/> 7 Not Seen</td> <td><input type="checkbox"/> 7 Not Seen</td> </tr> </table>	Upper:	Lower:	<input type="checkbox"/> 1 Yes	<input type="checkbox"/> 1 Yes	<input type="checkbox"/> 0 No	<input type="checkbox"/> 0 No	<input type="checkbox"/> 7 Not Seen	<input type="checkbox"/> 7 Not Seen	<p>5. Did rinsing with water or mouthwash occur?</p> <p><input type="checkbox"/> 1 Yes</p> <p><input type="checkbox"/> 0 No</p>
Upper:	Lower:											
<input type="checkbox"/> 1 Yes	<input type="checkbox"/> 1 Yes											
<input type="checkbox"/> 0 No	<input type="checkbox"/> 0 No											
<input type="checkbox"/> 7 Not Seen	<input type="checkbox"/> 7 Not Seen											

II. LOCATION		III. BRUSHING/CLEANING <small>(rate extent of brushing/ cleaning with brush, swab, gauze pad, or other cleaning tool)</small>							IV. SWABBING/ WIPING THE TEETH OR GUMS AFTER BRUSHING/ CLEANING <small>(this may occur before cleaning/brushing for residents with dentures)</small>				COMMENTS	
Jaw	Sector (check if brushing/ cleaning was done)	Any	None	Not Seen	Surface:									
					Inside			Outside			Any	None		Not Seen
					YES	NO	DK	YES	NO	DK				
<p>Upper</p> <p><input type="checkbox"/> 0 No Teeth</p> <p><input type="checkbox"/> 1 Natural Teeth</p> <p><input type="checkbox"/> 2 Dentures</p> <p><input type="checkbox"/> 3 Both</p>	<p><input type="checkbox"/> Right</p> <p><input type="checkbox"/> Middle</p> <p><input type="checkbox"/> Left</p>	1	0	7	1	0	7	1	0	7	1	0	7	
<p>Lower</p> <p><input type="checkbox"/> 0 No Teeth</p> <p><input type="checkbox"/> 1 Natural Teeth</p> <p><input type="checkbox"/> 2 Dentures</p>	<p><input type="checkbox"/> Right</p> <p><input type="checkbox"/> Middle</p> <p><input type="checkbox"/> Left</p>	1	0	7	1	0	7	1	0	7	1	0	7	

Appendix 7

Caregiver Bathing Behavior Rating Scale

VERBAL COMMUNICATION	Never	Almost Never	Occasionally	Often	Almost Always	Always	Not Applicable
1. Addresses resident by name	1	2	3	4	5	6	ζ
2. Praises resident	1	2	3	4	5	6	ζ
3. Confronts resident	1	2	3	4	5	6	9
4. Uses a calm voice	1	2	3	4	5	6	ζ
5. Speaks respectfully	1	2	3	4	5	6	ζ
6. Expresses concern/interest	1	2	3	4	5	6	ζ
7. Speaks directly to resident	1	2	3	4	5	6	ζ
TASK PRESENTATION STYLE							
8. Prepares resident for the task	1	2	3	4	5	6	ζ
9. Hurries through the bath	1	2	3	4	5	6	ζ
NONVERBAL COMMUNICATION							
10. Gently touches resident	1	2	3	4	5	6	ζ
11. Is flexible with the bathing routine	1	2	3	4	5	6	9
12. Makes eye contact with the resident	1	2	3	4	5	6	ζ
13. Works in close proximity to resident	1	2	3	4	5	6	ζ
INDEPENDENCE							
14. Encourages independence	1	2	3	4	5	6	ζ

Appendix 8

Mouth Care: Caregiver Behavior Rating Scale

RATING SCALE.

- **NEVER:** The behavior never occurs (0%).
- **ALMOST NEVER:** The behavior occurs a few times (> 0% and < 25%).
- **OCCASIONALLY:** The behavior occurs less than half of the time (\geq 25% and <49%).
- **OFTEN:** The behavior occurs half or more than half the time (\geq 50% and \leq 75%).
- **ALMOST ALWAYS:** The behavior occurs all but a few times (>75% and <100%).
- **ALWAYS:** The behavior occurs all of the time (100%).

VERBAL COMMUNICATION The percentage is of the time that the caregiver is speaking.

1. Praises or Compliments the Resident: Rate this when the caregiver verbally acknowledges the resident's progress, achievement, or cooperation. Various forms of praise may include direct reinforcement ("Good job!"), encouragement ("That's right."), or compliments ("You look so nice."). Also count when the caregiver encourages the resident ("You can do it!"). Each time the caregiver praises the resident put a hatch mark “|” in the Not Applicable column. At the end of the video, count the hatch marks and enter the total on the form.

2. Uses a Calm Voice: A calm voice is slow, smooth, soothing, and the words flow, although it is not necessarily soft, and may be lower in pitch than the caregiver's usual tone. It is possible to speak loudly (so that the resident can hear) and calmly. A tense voice is agitated, angry, short and strained.

3. Speaks Respectfully: Respectful statements and/or tone of voice imply a position of equality between the resident and caregiver, and relay a sense to the resident that they are valued and well thought of. The resident is not made to feel inferior to the caregiver. A disrespectful manner of speaking is when the caregiver is unnecessarily authoritative, impolite, or discourteous. This includes the use of commands (i.e.: "Sit down!" vs. "Take a seat"). A disrespectful speaking manner endangers the resident's self-worth and dignity. Examples of disrespectful manner include "talking down" to the resident as if he or she was a child, making derogatory comments to/about the resident, and making fun of or mocking the resident. Sugary, sweet speech should not be rated as disrespectful.

4. Expresses Concern/Interest: This item is rated when the caregiver expresses concern or interest about the residents feelings. An interested caregiver is concerned with the resident's immediate well-being and shows a genuine caring attitude toward the resident's immediate feelings and condition. For example, the caregiver may ask the resident about his or her comfort or readiness. A caregiver who is uninterested does not ask about how the resident is feeling and never addresses these issues in a verbal manner. Each time the caregiver expresses concern or interest put a hatch mark "|" in the Not Applicable column. At the end of the video, count the hatch marks and enter the total on the form.

5. Speaks Directly to Resident: Indicate how often the caregiver talks directly to the resident regardless of the topic.

TASK PRESENTATION STYLE The percentage is of the entire episode.

1. Prepares Resident for the Task: Preparing the resident for a task occurs when the caregiver tells the resident about the next task that the he or she is about to perform before it is initiated (e.g., "I'm going to brush your teeth now.", "Are you ready for me to floss?"). This does not include the times the caregiver asks the resident to perform a task (e.g., "Open your mouth."). If the resident performs all mouth care tasks, rate as "9", NA.

2. Hurries Through Mouth Care: Hurried mouth care is characterized by the rapid introduction and implementation of each step in the process. The hurried caregiver may ignore or dismiss the resident's expressions of pain. If the resident performs all mouth care tasks, rate as "9", NA.

NONVERBAL COMMUNICATION The percentage is of the entire episode.

1. Gently Touches Resident: A gentle touch is light, physical contact with the resident. An example of intermediate touch is firm, sustained contact (e.g., holding resident's arm) used in order to guide resident. Rough touch is abrasive and involves unnecessary, hard pressure (e.g., forcefully holding resident down, roughly removing clothes). Rough touch may also be relatively speedy and vigorous (e.g., 'scrubbing' resident). If the resident performs all mouth care tasks, rate as "9", NA.

2. Positioned on Same Level as the Resident: The caregiver positions him/herself next to, in front of, or beside, and at the same level as the resident during mouth care tasks. Note: do not rate when the caregiver must momentarily leave the resident's side in order to get supplies or to complete denture cleaning. If the resident performs all mouth care tasks, rate as "9", NA.

Appendix 9

Mouth Care Caregiver Behavior Rating Scale

	Never	Almost Never	Occasionally	Often	Almost Always	Always	Not Applicable
I. VERBAL COMMUNICATION BY CAREGIVER							
1. Praises / compliments resident [count:_____]	1	2	3	4	5	6	
2. Uses a calm voice	1	2	3	4	5	6	
3. Speaks respectfully	1	2	3	4	5	6	
4. Expresses concern / interest [count:_____]	1	2	3	4	5	6	9
5. Speaks directly to resident	1	2	3	4	5	6	
II. TASK PRESENTATION STYLE							
1. Prepares resident for the task [count:_____]	1	2	3	4	5	6	9
2. Hurries through the mouth care	1	2	3	4	5	6	9
III. NONVERBAL COMMUNICATION							
1. Gently touches resident	1	2	3	4	5	6	9
2. Positioned on same level as resident	1	2	3	4	5	6	9

Literature Review Abstract

Objective: To conduct a brief review of the literature on nonpharmacologic strategies for reducing agitation and aggression during ADL provision in a long-term care setting in persons with dementia.

Data Sources: PubMed and CINAHL were searched for English-language articles and papers published between 1990 and 2010. Bibliographies from articles identified through the included search strategies were then hand-searched to identify additional articles for inclusion.

Data Selection: All original research designs, with the exception of case studies, were included due to the low number of clinical trials. Articles were selected for inclusion if they were original research; published in a peer-reviewed publication; targeted persons with dementia living in long-term or residential care facilities; addressed interventions to reduce agitation, aggression, and/or resistance to care during the provision of activities of daily living; and involved nonpharmacologic methods

Results: A total of 6 articles were included which can be broadly categorized in three intervention types: the playing of preferred music, abilities-focused interventions which draw on occupational therapy techniques, and psychosocial/person-centered approaches. The heterogeneity of measurement, overall poor methods of selection, and lack of control for important confounding factors resulted in an overall limited quality of evidence for most approaches. The one exception to this trend was an article that which employed a person-centered approach to care provision, and was found to have low potentials for selection and measurement bias, and a medium potential for selection bias.

Conclusions: While the quality of the research into nonpharmacologic research to improve agitation in long-term care residents with dementia was found to be lacking in a majority of included articles, it is possible to address these deficiencies and improve the state of knowledge in this area. Areas for improvement are discussed, including improving the description of participant selection, reducing heterogeneity of measurement, and employing more robust research methodologies. The process of providing care for agitated persons with dementia is discussed in relation to the need-driven behaviors framework. This theoretical framework of understanding behaviors provides a strong foundation for psychosocial and person-centered care initiatives, which were the most numerous of the included intervention types.

Nonpharmacologic Interventions for Reducing Agitation and Aggression in Long-Term Care Residents with Dementia: a Systematic Review

Introduction

Functional decline is inevitable in the course of Alzheimer's disease and related dementias.²⁴ The first sign of functional decline often appears as disability in so-called instrumental activities of daily living (IADLs), such as food preparation, housekeeping, and ability to handle finances. As dementia progresses, persons with dementia will eventually have difficulties with more basic activities that are critical to self-care. These basic activities of daily living (ADLs) include activities such as personal hygiene, feeding oneself, and ambulation.²⁴

While cognitive decline is the *sine qua non* of dementia, it is the functional decline and loss of ability to care for oneself that may be most distressing for persons with dementia as well as their caregivers.^{24,25} Furthermore, the loss of the ability to perform three or more ADLs is the strongest predictor of nursing home placement⁹, which underscores the fact that assistance with ADLs is one of the primary functions of these facilities.

As nursing home staff assist with ADL provision, certain behavioral characteristics of nursing home residents can make this task difficult. Resistance to care is common in persons with dementia, and can include such behaviors as agitation and aggression. Episodes of agitation and aggression are reported to occur at least once a week in up to 93% of residents.^{23,26,27} A majority of aggressive behaviors occurs during touching and invasion of personal space, such as during personal care.²⁶ The presence of such behavioral symptoms during personal care activities, such as bathing, can be distressing to professional caregivers.²⁸ In fact, poor quality staff-resident interactions, such as when the resident displays aggressive behaviors, are a strong predictor of staff burnout.^{29,30}

Because of the high frequency of behavioral symptoms in persons with dementia, optimal personal care provision necessitates strategies to prevent and reduce these behaviors,

thereby helping ensure quality of life for persons with dementia and staff who care for them. One strategy for the management of agitation in dementia is the use of pharmacological agents. Sedatives³¹, neuroleptics³² and atypical antipsychotic agents³³ have been used to treat agitation and aggression. However, current clinical evidence does not support the routine use of these agents for the treatment of agitation due to lack of a clearly efficacious response coupled with clear evidence of harm. Such harms include an increased risk of falls,³⁴ extrapyramidal symptoms,^{32,33} and cardiovascular events ranging from hypotension³² to vascular collapse³² and stroke.³³ Meta-analyses have shown an increased risk of death in elderly patients with dementia taking atypical antipsychotic medications.³³ Despite their lack of efficacy and their potential for causing significant harm, pharmacologic agents are still used in clinical practice to treat agitation and aggression in elderly residents with dementia.^{35,36}

More recently valproate preparations, an anticonvulsant medication, have been used to treat agitation, even though a recent Cochrane review suggests there is insufficient evidence to support this use.³⁷ Furthermore, valproate preparations have been found to increase the risk of falls, infections, and gastrointestinal disturbances.³⁷ Memantine,³⁸ a NMDA antagonist, and donepezil,³⁹ a cholinesterase inhibitor, are both been found ineffective as a treatment for agitation. Antidepressants have been proposed as an agent to treat agitation and aggression in patients with dementia, but the current state of the evidence is inconclusive.⁴⁰ Pharmacologic treatment of agitation in this population has been difficult, especially given the propensity for polypharmacy and adverse side effects of medication.

Because of the limited effectiveness and significant adverse effects of drug treatment for agitation and aggression in dementia, nonpharmacologic techniques are often recommended as the preferred method of preventing and treating these behavioral symptoms.⁴¹ There remains considerable skepticism about the effectiveness of nonpharmacologic methods of behavior management, especially among clinicians and long-term care facility staff. Furthermore, selection of the most appropriate method from the large variety of available nonpharmacologic

techniques is often difficult. Therefore, the aim of this review is to evaluate the effectiveness of nonpharmacologic strategies for reducing agitation and aggression during ADL provision in a long-term care setting in persons with dementia.

Methods

Search Strategy

An electronic search of PubMed and CINAHL was performed using the following key-terms: activities of daily living, personal care, dressing, clothing, bathing, hygiene, oral hygiene, nonpharmacologic, behavior therapy/methods, dementia, Alzheimer's disease, long-term care, nursing home, residential facility, and assisted living. A total of eight independent search strategies were used to try and capture all relevant literature. These search strategies are shown in Appendix 1. The search was limited to English-language articles and papers published between 1990 and 2010. The reference lists from articles identified through the initial search were hand-searched for additional potentially relevant articles that may have been missed with our database search strategy.

Article Inclusion

Articles were selected for inclusion if they were original research; published in a peer-reviewed publication; targeted persons with dementia living in long-term or residential care facilities; addressed interventions to reduce agitation, aggression, and/or resistance to care during the provision of activities of daily living; and involved nonpharmacologic methods. We expected a low number of randomized controlled trials, and thus included pre-post and case series, as long as they were original research. Article titles were first reviewed for relevance. Potentially relevant titles were reviewed at the abstract level, and those not excluded at abstract

level underwent full text review (Figure 1). A single author (JB) performed the assessment of articles for inclusion.

Data Extraction

Once an article was selected for full review, data were extracted into an evidence table by a single author (JB). Characteristics of interest included study design, intervention type, and results.

Quality Assessment

Each article selected for full review was evaluated for internal and external validity and graded using criteria for critical appraisal with a standard template by the author (JB). For internal validity, each article was assessed based on the potential for selection bias, measurement bias, and confounding. Each of these are graded from one (low potential for bias) to three (high potential for bias), and the overall score for internal validity is a sum, ranging from three to nine. Each article was also graded for the potential threat to external validity on a scale from 1 (low) to 3 (high).

Results

Search Results

A total of 589 titles were initially identified. Based on a review of title alone, 516 articles were excluded, leaving 73 abstracts to review. Of these, 33 were duplicate titles, leaving 40 unique abstracts for review. After abstract review, 23 articles were excluded for the following reasons: wrong setting (1), wrong outcome (3), no intervention (7), not original research (1), and agitation not examined during ADL provision (11), leaving 17 articles to undergo full text review. Upon full review, 12 articles were excluded for failure to objectively measure agitation (3), no intervention (2), case study design (2), not original research (1), and no measurement of agitation during ADL provision (4). A hand search of the reference list of the remaining five

articles yielded one further article²¹ for inclusion, resulting in a total of six articles^{15,21,42-45} for final inclusion (Figure 2).

Included Studies

The included studies (Table 1) employed three broad types of interventions: the playing of preferred music,⁴³ abilities-focused and rehabilitative methods,^{44,45} and interventions that focus on the psychosocial well-being of individuals or those that employed person-centered care.^{15,21,42}

Music

Clark et al⁴³ examined the use of preferred music versus no music at reducing aggressive behaviors during bathing of persons with dementia. In this study, aggressive behaviors were defined as: hitting, biting, yelling or screaming, crying, abusive language, wandering away, spitting, verbal and physical refusals to cooperate, pinching, scratching, gouging, kicking, throwing of objects, and grabbing. A crossover design was employed where participants were assigned to receive either preferred music or no music for ten days during bathing, then conditions were switched on day 11. Preferred music was found to significantly decrease total observed behaviors and hitting during bathing. The mean total observed aggressive behaviors was found to be 121.56 (sd = 119.23) for the no music condition and 65.56 (sd = 58.02) for the music condition. This measurement counts behaviors from all participants in a given condition. While this might appear to be a large effect, the variation within the groups was large. There was a trend towards quicker bathing in the music condition, which could be either a desirable or undesirable results. A quicker bath could mean that either less resistive behaviors resulted in a more positive bathing experience, or it might have been due to task-focused work on the part of the caregiver.

Despite the positive results, this study contained significant threats to its internal validity. Although 18 subjects were included in the study, there is no description of how many were approached. Due to this, it is unclear if they had any refusals, or if they did what the refusal rate was. There is also no description of how participants were randomized to receive music or no music first, nor is demographic data provided for the groups by order of intervention. The authors do not report any drop outs or loss to follow up, but given the lack of transparency in the selection process it is unclear whether none occurred or whether none was reported. Because of these issues, this study was judged to have a high potential for selection bias (Table 2).

An apparently unvalidated checklist was used to assess frequency of aggressive behaviors, which included crying and wandering in addition to behaviors judged to fit the usual criteria for aggressive behavior, such as pinching, scratching, or hitting. Interestingly, both crying and wandering were not analyzed because researchers claimed they did not fit with criteria for aggression. It is unclear why they were included, if they were known to be unrelated to aggression. The lack of masking also introduces the potential for measurement bias, because those assessing aggression are aware of what condition the patient was assigned to. Overall, a high potential for measurement bias exists in this study.

Medication status is not discussed in this paper, and introduces a significant potential for confounding. It is possible that psychotropic medications were used during the intervention period, and as this is not discussed, it is not possible to determine whether this had an effect on the outcomes of this study.

Abilities-focused and Rehabilitation Modalities

A quasi-experimental, repeated measures study to improve morning care for residents with dementia examined an educational program on delivering abilities-focused morning care to improve resident function and behaviors.⁴⁵ This study was conducted in four cognitive support

units of a nursing home affiliated with an academic medical center. One unit was randomly assigned to receive an intervention that focused on enabling residents to use their retained abilities to care for themselves. This abilities-focused intervention consisted of five educational sessions in which caregivers educated on specific interventions to manage the effects of dementia on both social (giving and receiving attention, social accessibility, and engaging in conversation) and care-related abilities (spatial orientation, voluntary movements, and purposeful movements). Reinforcement sessions for the caregivers occurred every two weeks for three months. The remaining three units served as the source of control participants, which were matched to those in the experimental unit based on demographic information. In total, the experimental unit contained half ($n = 20$) of the included participants. Two measures of agitation were reported: the Pittsburgh Agitation Scale (PAS) and the agitation subscale of the Modified Interaction Behavior Measure (MIBM). A repeated measures ANOVA (rmANOVA) was conducted, which found a significant group by time effect for the MIBM agitation subscale ($p = 0.021$) and the PAS ($p = 0.019$).

The experimental and control groups were comparable on the reported measures, but no description of medication status was provided. Consent rate was 78.7%, and loss to follow-up was 28.5%. Loss to follow-up was balanced between experimental and control groups. Overall, this study is judged to have a medium potential for selection bias.

The two relevant measures of agitation used in this study are reported to be reliable. The MIBM demonstrated a Cronbach's $\alpha = 0.74 - 0.88$ for the subscales, with the agitation subscale performing the poorest at 0.74. The interrater reliability was reported to be greater than 0.70. The PAS had an $\alpha = 0.75$, and interrater reliability of greater than 0.70. There is no discussion of the validity of these measurements, and while they appear to measure relevant behaviors, a frank discussion of validity would be beneficial. Overall, the potential for measurement bias was judged to be medium.

Medication status is not discussed in this paper, and introduces a significant potential for confounding. It is possible that psychotropic medications were used at different rates during this study. This is not controlled for nor is it reported and thus we are unable to account for any effects this may have had on the outcomes of this study.

Another study⁴⁴ used a pre-post design and assessed a rehabilitation intervention for improving morning care assistance. The rehabilitation intervention consisted of five days of skill elicitation during which a research therapist used graded assists and occupational therapy techniques, followed by 15 weeks of habit training, during which the research therapist continued to apply the same techniques as during the five weeks of skill elicitation, except only skills found to be effective during that period are continued. Much like the focused-abilities study⁴⁵ described above, the purpose of this intervention was to increase the ability of residents to perform activities of daily living for themselves. This study examined performance of dressing as a lone category, and all other ADLs as a single unit (i.e. bathing, toileting, oral hygiene, and grooming were combined into one group for analysis). Additionally, subjects were assessed during inactivity. The relevant measure of agitation used to assess agitation and aggression during ADL provision was a computer-assisted data collection procedure in which researchers could record the occurrence of disruptive behaviors (e.g. foot stomping, punching, kicking, biting). Due to the focus of this paper being self-reliance, the only measure of disruptive behaviors indicated that the baseline frequency of disruptive behaviors was 0.05 (SD = 0.11) incidents per minute, which decreased to 0.02 (SD = 0.06) incidents per minute during skill elicitation ($p = 0.06$). During habit training the rate increased slightly to 0.03 (SD = 0.07) incidents per minute.

The potential for selection bias was high, due primarily to the lack of clarity in how participants were selected for the study. While the paper clearly states that 58 women and 26

men were included, this does not discuss how many were approached for consent, nor is it clear whether any loss to follow-up occurred.

The computer-assisted measurement of disruptive behaviors was formally assessed for inter-rater reliability, demonstrating a Kappa coefficient of 0.74. No formal validity assessment was included for this measure, but the items included are consistent with the items included on more standard measures of validity, including the Cohen-Mansfield Agitation Inventory (CMAI).²³ It was unclear whether raters were masked as to study condition. This study was thus judged to have a medium potential for measurement bias.

As with the above studies, medication status is not discussed and thus contributes to the high potential for confounding with this study.

Psychosocial and Person-centered Care Interventions

Beck et al⁴² conducted a randomized controlled trial to examine the efficacy of an intervention designed to address the basic psychosocial needs (e.g. communication, autonomy, self-esteem) of long-term care residents with dementia and thereby reduce disruptive behaviors and improve affect. The intervention is based on work previously implemented to improve residents ability to dress themselves.⁴⁶

There were three treatment arms (ADL, psychosocial activity (PSA), or both) and two control arms. The ADL intervention consisted of a trained project nursing assistant (PNA) going into the nursing home for twelve weeks and performing bathing, grooming, dressing, and noon meal activities. The PNAs tried to address psychosocial needs and respect the cognitive and physical abilities of the individual patient. It is not clear from the intervention description precisely how psychosocial needs were addressed. The PSA intervention included 25 standardized modules that addressed five areas of psychosocial content, including expression of feelings, expression of thoughts, memory/recall, recreation, and education. Additionally, each

module was designed to engage all five sensory modalities. The combined intervention included both the ADL and PSA intervention. The controls used were a placebo control (the PNA interacted with the resident for 30 minutes each day during a resident chosen activity) and no intervention control, which consisted of usual care by the nursing home caregiver.

Measures used that are pertinent to this review were the Disruptive Behavior Scale (DBS), Observable Displays of Affect Scale (ODAS), and Apparent Affect Rating Scale (AARS). The DBS is a 45-item measure of behavioral symptom occurrence and severity during the course of the day. It was completed every hour by the nursing assistant on duty. Content validity is reported to have been established by 29 gerontological care experts and the interrater reliability is reported as 0.80. The ODAS was designed to be used to rate videotaped resident encounters on the frequency of 41 behaviors divided into six subscales (positive and negative facial expressions, vocalizations, and body movements/posture). As with the DBS, gerontological experts established content validity. The interrater reliability is unclear, as the authors state that the interrater reliability is both 0.68-1.00 and 0.97-1.00. The AARS is a scale for direct observation of residents that contains six affective states (pleasure, anger, anxiety/fear, sadness, interest, and contentment) to be measured. Each of these states is described by a noninclusive list of behaviors that could indicate the resident is currently in the relevant affective state. There is no reported reliability or validity measures of the AARS.

There were no significant differences between any of the conditions for the DBS. Measurements of affect from the ODAS and AARS found some improvements in the treatment groups. Namely, residents in the treatment groups showed increased frequency of positive facial expressions ($p < 0.001$) and body postures ($p < 0.001$), as well as higher scores for contentment ($p = 0.037$) and interest ($p = 0.028$). The treatment groups also had a shorter duration of sad behaviors ($p = 0.007$).

There is no discussion of how facilities were chosen, nor is demographic data provided for the included facilities. It is unclear precisely how the 179 residents originally in the study were chosen. There is no discussion of the recruitment rate that was required to achieve this number of participants. Loss to follow-up was not evenly distributed between groups (36 of 179 did not finish the study, with most participants in the no intervention control group). This left 149 subjects, but an additional 16 subjects were dropped due to incomplete data. The baseline data for groups also shows that the two control groups were, on average, several years older than the intervention groups. Overall, this study had a high potential for selection bias.

The measurements used to assess resident behaviors were reported to be reliable and valid, with the exception of the AARS. The authors provide neither assurance of validity nor reliability for this instrument. While randomization occurred, there is no description of how patients were randomized to treatment. Overall, the potential for measurement bias is judged to be medium.

The lack of medication status verification contributes significantly to the potential for confounding in this study.

A pilot study²¹ using a pre-post design to assess the feasibility and potential impact of implementing a person-centered care intervention on nursing home residents with agitation and aggression during bathing was also included. This study utilized a revised version of the Ryden Aggression Scale (RAS), a well-validated measure of aggression, as their primary outcome. In this study, a trained geropsychiatric clinical nursing specialist worked with nursing home CNA's to develop a bathing plan for residents after observing the normal bathing routine. The result was an individualized care plan for each of the 10 residents. This person-centered care intervention showed statistically significant reductions in the mean number of physically (pre-intervention: mean = 1.90, sd = 1.07; post-intervention: mean = 0.45, sd = 0.72) and verbally

aggressive (pre-intervention: mean = 0.50, sd = 0.57; post-intervention: mean = 0.18, sd = 0.55) behaviors, as well as a reduction (pre-intervention: mean = 1.70, sd = 0.64; post-intervention: mean = 0.58, sd = 0.61) in “being upset.” For “being upset,” caregivers scored residents from 0 (not upset at all) to 3 (very upset).

The limitations of this study are inherent in the design of a pilot study. The small sample size, lack of demographic description and blinding introduces a large potential for bias. However, this study was not designed to show that a model of person-centered care definitively reduced aggression in a nursing home setting. Importantly, however, this study provides the foundation for another included study.¹⁵

The final study¹⁵ included in this review was a clustered randomized controlled trial of person-centered care compared to usual care to improve the bathing process. Two treatment groups, person-centered showering and towel bath, were included. A measure of agitation and aggression called the Care Recipient Behavior Assessment (CAREBA) was developed and used, which allowed for rating of behaviors from videotaped care sessions.

The CAREBA contained six variables: overall agitation and aggression, physically aggressive behaviors (e.g biting, attempted biting, hitting, kicking), nonaggressive physical agitation (resistiveness and attempts to exit during the bath), negative verbal events (complaints, threats, swearing), and verbal agitated states (e.g. weeping, crying, moaning, and screaming). The reported interrater reliabilities are: 0.94 for percentage of time spent in agitated or aggressive behavior, 0.82 for incidence of any physical agitation or aggression, 0.72 for physical aggression, 0.30 for nonaggressive physical agitation, 0.97 for incidence of complaints, threats, or swearing, and 0.84 for percentage of time in agitated verbal states. There is no discussion of validity, however the CAREBA was designed using the behavioral definitions of the CMAI.

A measure of discomfort, a modified form of the discomfort scale for dementia of the Alzheimer type, was also included. This scale included six items (negative vocalization, content facial expression, sad facial expression, relaxed body language, tense body language, and fidgeting body language). The interrater reliability was found to range from 0.75 to 0.95. The internal consistency was found to be 0.51.

Both treatment arms (person-centered showering and towel bath) showed a significant reduction in all measures of agitation and aggression. Aggressive behaviors were reduced by 53% in the person-centered shower group and 60% in the towel-bath group ($p < 0.001$ for both findings). While there was a trend in towel bath subjects displaying less aggression, this finding did not reach significance. Discomfort scores were significantly lower in both the person-centered shower (13.7% reduction) and towel bath groups (25.6% reduction). Here, there was a significant difference between the towel bath and person-centered shower groups ($p = 0.003$).

This study received the highest overall quality rating of the included studies. The recruitment rate of subjects was low (62%), but once consented and included, 84% completed the study. It is clear precisely how subjects were enrolled and included in the study. The initial comparability of subjects is reasonable, though psychotropic medication use is higher in the control arm. No mention of randomization procedure is mentioned, just that facilities were randomized to either intervention or control arms.

The potential for measurement bias is low, given the use of both valid and reliable measures. Raters were blinded to both the study aims and hypothesis, which increases confidence that measurement was conducted equally across groups. Given the baseline differences in medication use between control and intervention groups some potential for confounding exists, but it is unlikely to explain the large differences between intervention and control groups.

Discussion

The purpose of this review was to determine what interventions showed evidence of efficacy for reducing agitation, aggression, and resistance to care during the provision of personal care in long-term care residents with dementia. Only six^{15,21,42-45} articles could be found that met our inclusion criteria that specifically addressed this question. The interventions employed fell into three categories: one study⁴³ used preferred music, two^{44,45} used behavioral rehabilitation techniques from the occupational therapy literature, and three^{15,21,42} used a psychosocial/person-centered care approach. With the exception of one psychosocial intervention,⁴² all of the included studies found a decrease from baseline or control conditions for their included measures of agitation, aggression, or resistance to care.

The most recent study included in this review was published in 2004. The lack of more recent investigation of nonpharmacologic interventions when no intervention is clearly shown to work, let alone exhibit cost-effectiveness or true effectiveness when employed on a wide scale, may be due to the relative lack of funding relative to research for pharmacologic interventions. A current query of clinicaltrials.gov returns 232 results for the search term 'pharmacologic AND agitation' and only a single result for 'nonpharmacologic AND agitation.' While far from exhaustive, this is exemplary of the state of research and funding into nonpharmacologic interventions. Without adequate funding to conduct well-controlled trials, the state of knowledge surrounding nonpharmacologic interventions for residents with agitation and aggression will remain uncertain.

Implications for Research

The overall low quality of the included studies highlights current deficiencies in the literature. Investigation of residents of long-term care facilities with dementia will pose certain inherent difficulties that are unavoidable, such as loss to follow-up due to general medical

deterioration and difficulty recruiting residents. However, while some problems are unavoidable, research practices can be improved to help bolster the internal validity of the studies.

It is not possible to judge whether selection bias is factually present without a detailed description of how subjects were selected. Due to this, many of the included studies were judged to have a high potential for selection bias, because we are not provided sufficient information. Of the included studies, only one¹⁵ provided a full description of how facilities and residents were selected and ultimately included in the study, including a CONSORT-style flow diagram.

Another problem that should be addressed is the heterogeneity of measurement in nonpharmacologic studies. No two included studies measured agitation, aggression, or resistance to care the same way. A variety of scales were used, ranging from an informal checklist of behavior frequency⁴³ to validated and reliable measures such as the Ryden Agitation Scale²¹ or Pittsburgh Agitation Scale.⁴⁵

Measurement bias could further be reduced if adequate masking procedures were more often used. The methodology used in many nonpharmacologic studies has relied on using the same participants as controls by using a pre-post design. While this design is more financially feasible, it is difficult to assess whether the intervention is truly the reason for improvement. A randomized controlled trial where those who assess the outcomes are masked to study hypotheses and study arm would provide the most convincing evidence.

Implications for Care

Agitated and aggressive behaviors exhibited by long-term care residents present a challenge in providing good care. Multiple strategies have been suggested, including both pharmacologic and nonpharmacologic, but no clearly superior strategy has thus far been identified.

An important theoretical framework in which to understand disruptive behaviors is the need-driven behaviors model⁴⁷ which posits that background factors (e.g. cognitive state, overall state of health) interact with proximal factors (e.g. psychological states, physical and social needs) to produce behaviors such as physically aggressive behaviors. While background factors are less modifiable, the proximal factors can be altered. Within this framework, the disruptive behaviors of agitation and aggression are considered to be expressions of an unmet need related to a proximal factor. Consistent with this framework, the included psychosocial interventions^{15,21,42} aim to address the proposed underlying causes of the behaviors. This approach has been shown to improve the care process and outcomes in other ADLs, such as bathing,^{14,15} and addresses care in a humane and personal way.

Conclusions

The following conclusions can be drawn from this literature review. The literature on nonpharmacologic interventions to reduce agitation and aggression in residents with dementia in long-term care settings is lacking. Included studies, with one exception,¹⁵ were judged to have medium to high potential threats to internal validity. The included work is older, with the most recent study having been published in 2004.¹⁵ The lack of funding relative to pharmacologic interventions may affect both the quality and number of studies into these modalities. Lastly, the need-driven behaviors framework provides a strong foundation for psychosocial interventions, which are the most numerous of the included studies. Further investigation into psychosocial and person-centered interventions should be addressed in well-controlled trials for other activities of daily living.

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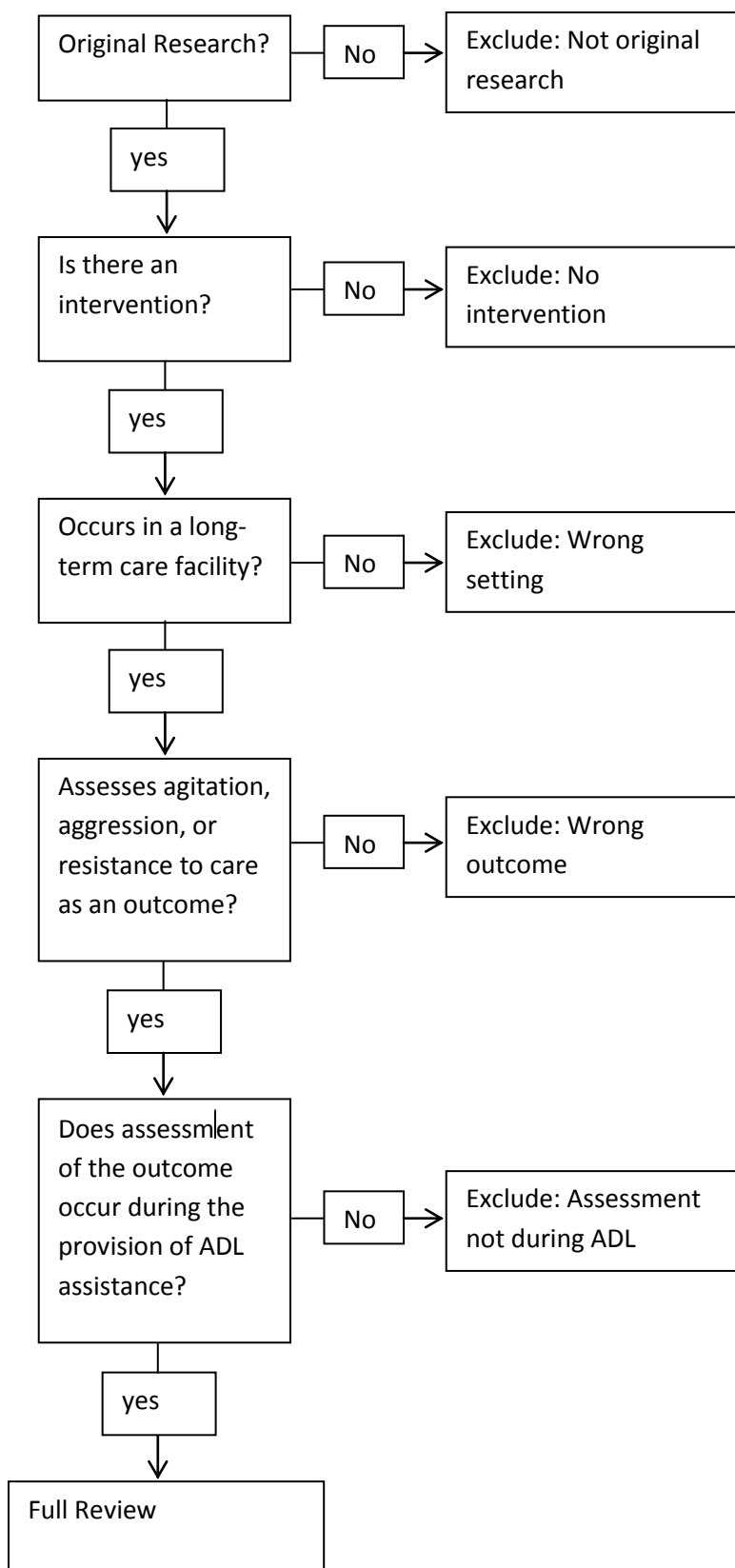


Figure 1. Abstract inclusion/exclusion criteria

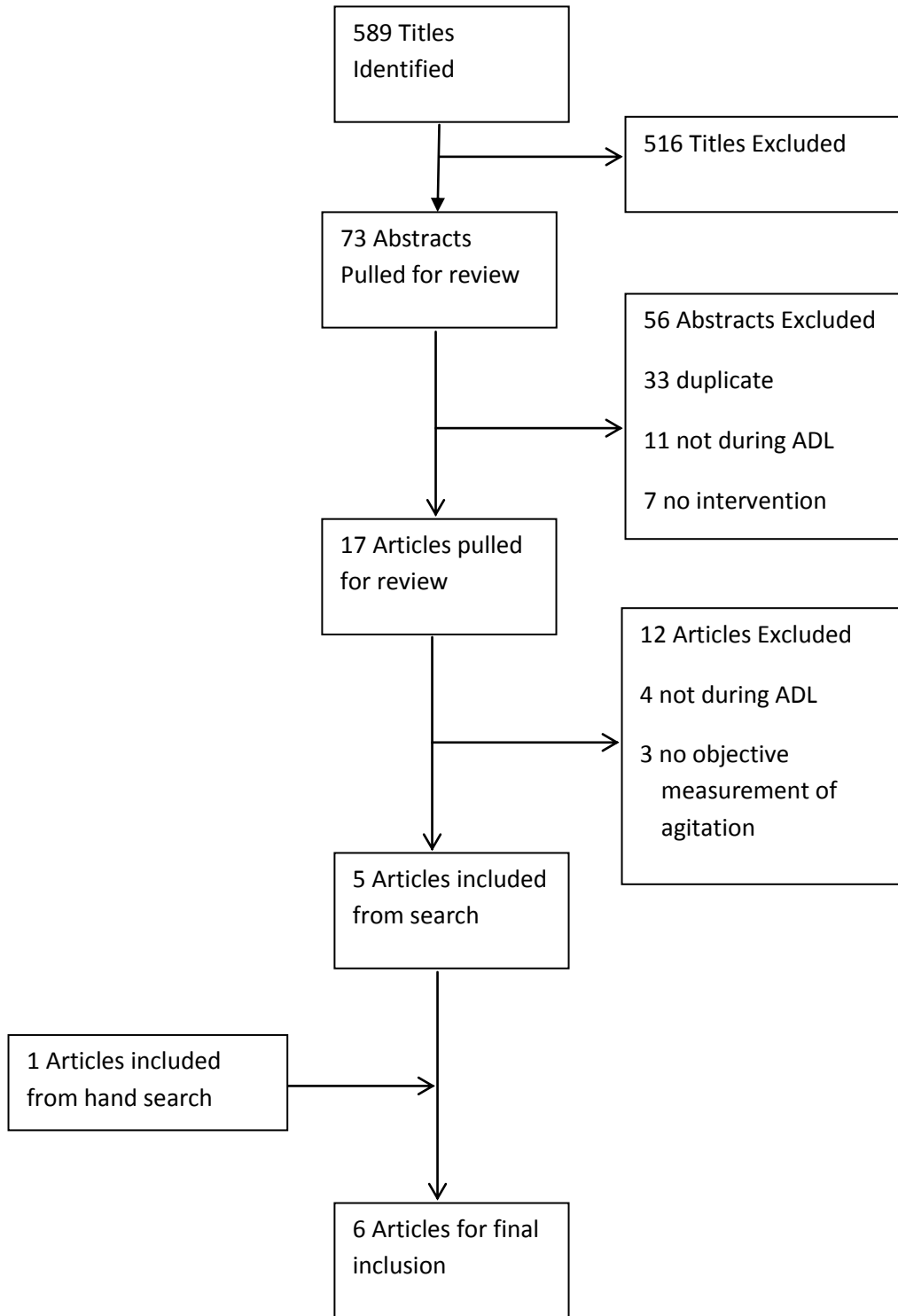


Figure 2. Flowchart of study.

Table 1. Summary of Included Articles			
Study	Design	Intervention	Results
Clark et al. 1998	crossover	preferred music	The frequency of all observed aggressive behaviors was 121.56 (119.23) for the no music condition and 65.56 (58.02) for the music condition ($t = 2.50, p < 0.05$). The only individual behavior to reach significance was hitting ($x = 20.00, sd = 31.32$ for no music; $x = 14.61, sd = 27.39$ for music; $t = 2.30, p < 0.05$)
Wells et al. 2000	quasi-experimental	abilities-focused program	At six months post-intervention residents showed a lower level of agitation on both the MIBM ($x = 4.11, sd = 1.48$ for control; $x = 5.02, sd = 1.21$ for experimental) and the PAS ($x = 0.33, sd = 0.38$ for control; $x = 0.17, sd = 0.24$ for experimental)
Rogers et al. 1999	pre-post	behavioral rehabilitation	Disruptive behaviors occurred 0.05 (0.11) times per minute during usual care, decreasing significantly to 0.02 (0.06) times per minute during skill elicitation, but increasing slightly to 0.03 (0.07) times per minute during habit training.
Beck et al. 2002	RCT	psychosocial intervention	No differences in disruptive behaviors noted in any of the three experimental conditions.
Hoeffler et al. 1997	pre-post	person-centered care	Physical aggression, verbal aggression, and being upset were all less in the post-intervention period.
Sloane et al. 2004	cRCT	person-centered care	Both patients in the shower ($p = 0.02$) and towel bath ($p = 0.01$) group displayed lower overall agitation and aggression than control. There was no difference between shower and towel groups ($p = 0.43$)

Abbreviations: MIBM, modified interaction behavior scale ; PAS, Pittsburgh agitation scale ; RCT, randomized-controlled trial; cRCT, clustered randomized-controlled trial

Table 2. Critical Appraisal and SORT Grade					
	Potential for Selection bias	Potential for Measurement Bias	Potential for Confounding	Potential Threat to Internal Validity	External Validity
Clark et al. 1998	3	3	3	9	Poor
Wells et al. 2000	2	2	3	7	Fair
Rogers et al. 1999	3	2	3	8	Poor
Beck et al. 2002	3	2	3	8	Fair
Hoefffer et al. 1997	3	3	3	9	Poor
Sloane et al. 2004	1	1	2	4	Fair

For all categories, 1 = low, 2 = medium, 3 = high.

Potential threat to internal validity is the summation of potential for selection bias, measurement bias, and confounding.

Appendix 1: Search Strategies and Results

Search Strategy 1

(activities of daily living[MeSH Terms] OR "activities of daily living"[All Fields] OR ("baths"[MeSH Terms] OR "baths"[All Fields] OR "bath"[All Fields]) OR ("baths"[MeSH Terms] OR "baths"[All Fields] OR "bathing"[All Fields]) OR ("grooming"[MeSH Terms] OR "grooming"[All Fields]) OR ("hygiene"[MeSH Terms] OR "hygiene"[All Fields]) OR "oral hygiene"[MeSH Terms] OR "oral hygiene"[All Fields] OR ("dressing"[All Fields] NOT ("bandages"[MeSH Terms] OR "bandages"[All Fields]) OR ("bandages"[MeSH Terms] OR "bandages"[All Fields] OR "bandage"[All Fields])) OR undressing[All Fields] OR feeding[All Fields] OR ("walking"[MeSH Terms] OR "walking"[All Fields] OR "ambulation"[All Fields]) OR (elimination[All Fields] NOT ("urinary tract"[MeSH Terms] OR ("urinary"[All Fields] AND "tract"[All Fields]) OR "urinary tract"[All Fields] OR "urinary"[All Fields])) OR (functional[All Fields] AND ("transfer (psychology)"[MeSH Terms] NOT ("transfer"[All Fields] AND "(psychology)"[All Fields]) NOT "transfer (psychology)"[All Fields] OR "transfer"[All Fields])) OR ("personal"[All Fields] AND "care"[All Fields]) OR "personal care"[All Fields]) AND (nonpharmacologic[All Fields] OR "behavior therapy/methods"[Mesh Terms] OR ("environment"[MeSH Terms] OR "environment"[All Fields] OR "environmental"[All Fields])) AND (("dementia"[MeSH Terms] OR "dementia"[All Fields]) OR ("alzheimer disease"[MeSH Terms] OR ("alzheimer"[All Fields] AND "disease"[All Fields]) OR "alzheimer disease"[All Fields] OR "alzheimer"[All Fields])) AND (("long-term care"[MeSH Terms] OR ("long-term"[All Fields] AND "care"[All Fields]) OR "long-term care"[All Fields] OR ("long"[All Fields] AND "term"[All Fields] AND "care"[All Fields]) OR "long term care"[All Fields]) OR ("nursing homes"[MeSH Terms] OR ("nursing"[All Fields] AND "homes"[All Fields]) OR "nursing homes"[All Fields] OR ("nursing"[All Fields] AND "home"[All Fields]) OR "nursing home"[All Fields]) OR ("residential facilities"[MeSH Terms] OR ("residential"[All Fields] AND "facilities"[All Fields]) OR "residential facilities"[All Fields] OR ("residential"[All Fields] AND "facility"[All Fields]) OR "residential facility"[All Fields]) OR (assisted[All Fields] AND ("life"[MeSH Terms] OR "life"[All Fields] OR "living"[All Fields])))

- PubMed
 - Returned 240 articles
 - 8 abstracts
 - Wrong setting: 1
 - No measurement during ADL: 2
 - Advance to full review: 5
- CINHALL
 - 0 returned

Search Strategy 2

(activities of daily living OR personal care OR bath OR bathing OR grooming OR (dressing AND clothes) OR ambulation OR oral hygiene OR hygiene) AND (nonpharmacologic OR behavior therapy/methods OR environmental OR environment) AND (dementia OR Alzheimer's disease) AND (long-term care OR nursing home OR residential facility OR assisted living) AND (aggression OR agitation OR resistance OR resistiveness)

- PubMed
 - Returned 36 articles
 - 10 abstracts
 - Not during ADLs: 3
 - Wrong outcome: 1
 - Previous search: 5
 - Full review: 1
- CINHAL
 - 16 returned
 - 0 abstracts
 - 1 dissertation, excluded

Search Strategy 3

(self care OR personal care OR "activities of daily living"[All Fields] OR "activities of daily living"[MeSH Terms]) AND dementia AND residential facilities AND (aggression OR agitation OR resistance OR resistiveness)

- PubMed
 - Returned 87 articles
 - 20 abstracts
 - No intervention: 3
 - Full review: 4
 - Not during ADL: 3
 - Previous search: 6
 - Wrong outcome: 3
 - Review: 1
- CINHAL
 - 0 returned

Search Strategy 4

(aggression/psychology OR psychomotor agitation/etiology OR psychomotor agitation/prevention AND control OR psychomotor agitation/psychology) AND (baths/methods OR baths/nursing OR activities of daily living OR hygiene OR oral hygiene OR grooming OR feeding OR meal) AND (dementia/nursing OR dementia/psychology) AND nursing homes

- PubMed
 - Returned 17 articles
 - 5 abstracts
 - Previous search: 3
 - No intervention: 1
 - Full review: 1
- CINHAL
 - 1 returned
 - Not unique

Search Strategy 5

occupational therapy AND dementia AND agitation

- PubMed
 - Returned 11 articles
 - 3 abstracts
 - Previous search: 1
 - Not during ADL: 1
 - Full review: 1
- CINHAL
 - 8 returned
 - 0 abstracts

Search Strategy 6

dementia AND agitation AND provision of care

- PubMed
 - Returned 8 articles
 - 2 abstracts

- Full review: 1
 - Previous search: 1
 - CINHAL
 - 3 results
 - 0 abstracts

Search Strategy 7

(dementia OR alzheimer's disease) AND (agitation OR aggression OR resistance to care OR resistiveness) AND (provision of care OR personal care OR activities of daily living OR hygiene OR grooming OR oral hygiene) AND (nonpharmacologic OR behavior therapy OR environmental)

- PubMed
 - Returned 95 articles
 - 12 abstracts
 - Previous search: 10
 - Not during ADL: 1
 - Full review: 1
- CINHAL
 - 13 returned
 - 0 abstracts

Search Strategy 8

(dementia OR alzheimer's disease) AND (provision of care OR personal care OR activities of daily living OR hygiene OR grooming OR oral hygiene OR bath OR bathing OR clothing) AND (nonpharmacologic OR nonpharmacological OR behavior therapy OR environmental) AND (long-term care OR nursing home OR residential facility OR assisted living) AND intervention

- PubMed
 - Returned 43 articles
 - 10 abstracts
 - Previous search: 7
 - Wrong outcome: 2
 - Not during ADL: 1
- CINHAL
 - 11 returned
 - 3 abstracts
 - Included these 3