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# Effect of the Bathing Without a Battle Training Intervention on Bathing-Associated Physical and Verbal Outcomes in Nursing Home Residents with Dementia: A Randomized Crossover Diffusion Study

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## Abstract

**OBJECTIVES—**To evaluate the effectiveness of the Bathing Without a Battle intervention in reducing physical and verbal aggressive behaviors for nursing home residents with dementia.

**DESIGN—**A randomized crossover diffusion study, with one group receiving the intervention after one round of baseline observations and a delayed intervention group receiving the intervention after two rounds of baseline observations.

**SETTING—**Six nursing home facilities in the state of New York.

**PARTICIPANTS—**Nursing home residents with dementia (N = 240).

**INTERVENTION—**The Bathing Without a Battle educational program, designed for direct-care staff members responsible for bathing residents diagnosed with dementia and implemented through a train-the-trainer model.

**MEASUREMENTS—**Rates of verbal and physical aggressive and agitated behaviors were measured using the Care Recipient Behavior Assessment; secondary measures of effect included bath duration, bath modality, and antipsychotic medication use.

**RESULTS—**In spite of implementation obstacles (consent delays and change in leadership at one facility), a significant change was observed in how residents were bathed that translated into a significant reduction in the rate of aggressive and agitated behaviors, particularly verbal, during residents' baths. The use of in-bed baths increased 17%, and average bath duration decreased significantly (average 1.5 minutes less) in the postintervention period, particularly for in-bed

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baths. Verbal behaviors declined 17.8% ($P = .008$), combined verbal and physical behaviors declined 18.6% ($P = .004$), and antipsychotic use declined 30% ($P = .002$) after the intervention.

**CONCLUSION—**The Bathing Without a Battle educational program, delivered through a train-the-trainer format, is an effective means of improving the bathing experience of residents with dementia in nursing homes. This research supports broadly adopting this intervention, especially for nursing homes serving many residents with dementia.

### Keywords

Alzheimer's; dementia; bathing; aggressive behaviors

Bathing is an important part of quality of life and quality of care in long-term care settings. Most nursing home residents have cognitive impairment and frequently display behavioral expressions of distress during personal care.[1–3] Bathing is the personal care task most commonly associated with such behavior, with 20% to 40% of residents with dementia manifesting aggressive or agitated behaviors such as hitting, kicking, and screaming while bathing.[4–6] Moreover, many residents remain upset for hours after the bath.[7]

In response to such situations, physical restraints or antipsychotic medication may be used, resulting in risk of harm to residents and little benefit.[8–10] In addition, staff are often disinclined to bathe such residents because of fear of bodily harm,[4,11] in part because direct-care staff members often do not understand what triggers residents with dementia to display aggressive or agitated behaviors or how to prevent or otherwise manage these behaviors.[12] Thus, bathing can induce battles between staff and residents with dementia, exacerbating agitation.

A decade ago, an educational program was developed and tested called Bathing Without a Battle: Creating a Better Bathing Experience for Persons with Alzheimer's Disease and Related Disorders, designed for direct-care staff charged with bathing agitated residents with dementia.[5,7,13–16] The program trains nursing assistants in noncoercive, individualized, person-centered bathing techniques such as in-bed towel baths.[17,18] In a controlled study of 15 facilities, it was found that aggressive behaviors decreased 53% in the person-centered shower group ($P < .001$) and 60% in the towel-bath group ($P < .001$).[19] The control group displayed only a 7%, nonsignificant, decrease in aggressive behaviors. Unfortunately, widespread implementation of Bathing Without a Battle (BWAB) has not been systematically studied to determine whether the results obtained under controlled circumstances can be replicated. To address this question, under a dissemination and quality improvement initiative by the state of New York, a multisite, randomized, train-the-trainer diffusion study of the BWAB program was conducted in six skilled nursing facilities.

## METHODS

A randomized crossover diffusion study with two groups observed at three points in time, with crossover between the two groups, was conducted in six nursing homes from 2009 to 2011.

## Participating Facilities

Six New York state facilities, three not-for-profit and three governmental, participated in the study (range 65–566 beds, mean 238 ± 191 beds). Study facilities were selected to be representative of New York state facilities and pair-matched according to size, geographic location, having a dementia special care unit, and resident racial composition. Facilities in each pair were randomly assigned to Group 1 (intervention) or 2 (delayed intervention). Group 1 facilities received the intervention first, and those in Group 2 received the intervention after resident outcomes were measured in Group 1 facilities. The unit of intervention was the facility, and the unit of analysis was the resident.

## Study Subjects

Because all potential study subjects had a diagnosis of dementia and were to be observed by research staff, consent was required and had to be obtained from a responsible party, generally a family member. Facility administrators wrote to family members or individuals with power of attorney describing the study and requesting their written consent. Written consent was also obtained from the certified nursing assistants (CNAs) because their resident care interactions were observed. Consent policies received approval from the Brown University institutional review board.

The six nursing facilities gave study data collectors a list of residents with a diagnosis of dementia or Alzheimer's disease for whom consent had been signed. In the few instances in which residents signed their own consent form, the data collectors reviewed their charts to validate the presence of a diagnosis of dementia or Alzheimer's disease. Inclusion criteria included a Cognitive Performance Scale (CPS) score of 2 or greater and having been a nursing home resident for 90 days or longer (considered as being a long-term resident). The CPS is a validated measure of resident cognition categorized from 0 (intact) to 6 (very severe impairment). A CPS score of 2 corresponds to a mean Mini-Mental State Examination score of 19.2 (mild impairment). [20] CPS staging was used to focus on residents in more-advanced stages of dementia, when behavioral symptoms of distress are more likely to occur.

In contrast to the original efficacy trial, severely cognitively impaired residents with a history of demonstrated physically aggressive behavior and residents with moderate cognitive impairment were included to test the intervention's generalizability to a broader class of nursing home residents with dementia. Residents with a feeding tube or delirium; those enrolled in hospice; those who were unconscious, comatose, or diagnosed with Huntington's disease; and those with acquired immunodeficiency syndrome, alcohol-related dementia, or with a psychotic disorder as their primary diagnosis were excluded.

## Study Intervention

The core of the BWAB intervention involves different techniques designed to make showering, tub bathing, in-room bathing, and hair washing safe and comfortable for the persons receiving and giving care. This strategy employs communication techniques appropriate for the resident's impairment level, views behavioral symptoms as expressions

of unmet need, respects the preferences of the resident, and regulates the physical environment with the goal of maximizing resident comfort.[7,19]

The implementation of the modified BWAB intervention relied on a train-the-trainer model[21] conducted in two stages. In Stage 1, each participating facility selected three to five staff members including at least one registered nurse and two to three experienced CNAs (some facilities included a licensed practical nurse) charged with training other CNAs after they had been trained. Trainers in each facility group attended a 2-day joint training session conducted by one of the original designers of the program. The trainers' training consisted of a detailed discussion of behavioral expressions of distress of nursing home residents during their baths and approaches for preventing or otherwise managing such distress. Tools used during the training included video examples followed by practice (role-playing) and a discussion with video illustrations of how to match the intervention to different stages of dementia and to resident preferences in order to make bathing safe and comfortable for the persons receiving and giving care. In Stage 2, at the time designated by the study protocol as the end of the preintervention period for each facility group, the trainers used a copy of the BWAB training CD ROM and DVD materials with which they had been trained to train all CNAs working with residents with dementia at their respective facilities, including new CNAs hired during the study years. The slowest facility took approximately 2 months to train all their CNAs who interacted with residents with dementia.

## Study Data Collection Procedures

Three rounds of bath outcome observations were collected (Figure 1). A first (preintervention or baseline) round of observations was conducted for study-eligible residents in all facilities before CNAs were exposed to the intervention. Trainers in Group 1 received their training at that time to have them ready to train their CNAs at the end of the baseline observations. Because of delays between the initial trainer session given to Group 1 and the end of the baseline observation (because of the need to expand the number of consented residents and accommodate a change in leadership at one facility), Group 1 trainers were given a refresher training session after the baseline observation. Approximately 3 months later, once the research staff confirmed that trainers in Group 1 facilities had trained all CNAs in their facilities, all study facilities underwent an observational protocol (Round 2). Shortly after completion of Round 2, trainers in Group 2 were trained, and upon returning to their facilities, they trained CNAs at their Group 2 facilities. Upon verification that all Group 2 CNAs were trained, the third and final round of bath observations was conducted for all facilities. The duration of each round of observations was 2 to 4 months, depending upon facility size.

The developer of the original protocol[19] and his team trained four expert data collectors, relying on an extensive data collector manual modified to match the study that covered the purpose of the study, the approach to validating resident eligibility, when and how resident baths were to be observed, and how the data collected were to be entered and transferred electronically. The original data collection protocol was modified to make it less intrusive to residents and more economically viable. Rather than videotaping baths for later rating as in the original study, nonparticipant data collectors directly observed the baths and used a

personal data assistant (PDA) to document their observations while the bath took place. A unique and consistent data collector observed participating residents and staff throughout the study; weekly group teleconferences between data collectors and the principal investigator served to review and clarify how observed behaviors should be recorded and to maintain consistency. Data collectors were blinded to the group assignment of their facility and to the content of the BWAB intervention.

## Measures

The two primary dependent variables were the rate of physical aggressive behaviors and the rate of verbal aggressive or agitated behaviors during bathing. Secondary outcomes included bath duration, bath modality, and antipsychotic medication use.

The rate of aggressive and agitated behaviors was measured using a modified version of the Care Recipient Behavior Assessment (CAREBA).[19] The CAREBA, originally developed to score videotaped interactions, was modified so that it could be scored in real time, during direct observations of a bath using a PDA. Data collectors were instructed to observe resident and aide interactions in 30-second intervals during each bath. In every 30-second period, the following items were scored as dichotomous variables based on whether they occurred during the observational interval: physically aggressive behaviors (grabbing, hitting, kicking, biting, throwing objects, spitting), verbally aggressive behaviors (swearing, threats, other hostile language), and verbally agitated behaviors (calling for help, protesting, yelling, screaming). In the case of hitting, kicking, and biting, a three-level category scale was used: actual, attempted, or none. Interrater reliability of the modified CAREBA ratings (weighted kappa coefficient) during the initial data collector training was 0.75 for the occurrence of any physically agitated or aggressive behaviors and 0.56 for the occurrence of any verbally agitated or aggressive behaviors. The lowest interrater reliability of individual items occurred for rare events such as kicking (0.32), biting (0.38), and calling for help or protesting (0.27), with differences in perception of volume making some raters classify it as yelling (the combined kappa for calling for help or protesting and yelling was 0.50). The highest kappa was 0.85, for grabbing the caregiver, which is less open to misinterpretation.

Analyses of the outcomes were performed at the resident level, and sensitivity analyses were performed at the facility level. In the case of hitting, kicking, and biting, binary (any vs none) measures were created by combining the values of actual and attempted aggressive behaviors. For analyses, the outcome measures collected every 30 seconds were summarized per bath using percentage of time during the bath when the person displayed a given behavior, calculated as the sum of 30-second time intervals during which any such behavior took place divided by the total number of 30-second time intervals observed during the bath, as had been done in the earlier study.[19] This approach standardized the measure for bath length, which varied substantially. In addition to examining individual physical and verbal measures, summary measures were also examined: the presence of any of the six physically aggressive behaviors, the presence of any of the three verbally aggressive behaviors, and the combined presence of any physically or verbally aggressive behavior. In addition to the behavioral outcomes observed during bathing episodes, the nature of the bath (shower, tub, in-bed towel bath, commode or toilet towel bath, other) was also documented. Two bath

observations for each resident were scheduled per data collection round, ideally in the same week. Occasionally, three observations were possible, and in a few cases, one or no observations were obtained during a given round. Multiple attempts were made to observe baths, but nevertheless some missing data occurred. Reasons for missing bath observations included refusal of the resident to be observed at the scheduled observation time and miscommunication between facility staff and data collectors (e.g., data collector arriving at the facility after the scheduled residents had been bathed).

Copies of the medication records during the month(s) when the resident's baths were observed were collected. From these, a binary measure of antipsychotic use was constructed. One Group 2 facility did not provide the necessary drug information for their postintervention period, precluding inclusion in these analyses.

### Data Management and Analysis

The PDAs used to collect the data were programmed using Pendragon Forms, version 5.1 (Pendragon Software, www.pendragonsoftware.com). Data were uploaded regularly to a dedicated secure server by synchronizing the PDAs to the server. The effect of the intervention on the main behavioral outcomes was estimated using a resident fixed-effects regression model in which changes in the preintervention outcome measures of each resident are compared with their own postintervention measures. By comparing outcomes over time within each resident, the residents' observations during the preintervention period serve as controls for observations in the postintervention period, allowing many unobserved person-level confounders to be controlled for. This approach also helps control for unobserved differences in individual characteristics, making it preferable to regression methods that compare between—rather than within—residents and therefore require many risk-adjustment factors to be used.

All analyses were conducted in Stata version 12 (Stata Corp LP, College Station, TX).

## RESULTS

### Characteristics of the Study Facilities and Subjects

Table 1 summarizes recruitment, retention, and attrition during data collection. Of the 326 residents for whom consent was obtained, 270 (83%) met study enrollment criteria. Of eligible residents, 30 died, were transferred to another facility, or refused to be observed at baseline; thus, 240 residents were observed in Round 1. Attrition between Rounds 1 and 2 was 41 residents and between Rounds 2 and 3 an additional 76. Of these 117 residents who dropped out during the study period, 53 were confirmed to have died, 15 transferred to different facilities, 14 refused to continue in the study, and the remainder were unresolved at the end of the study. Rates of attrition were comparable for Groups 1 and 2 ($P = .55$).

The baseline characteristics of the resident subjects in each facility are presented in Table 2. Residents differed in some characteristics; notably, residents at two facilities tended to be younger, were more likely to be male and nonwhite, and had fewer activity of daily living (ADL) impairments and problems with incontinence. Residents at facilities 3 and 4 had somewhat less-severe cognitive impairment as measured according to the CPS.

### Bath Type and Duration

After introduction of the intervention, significant changes were observed in the modality of bath methods most commonly used (Table 3). Consistent with the intervention training, showers declined more than 10%, and use of in-bed bathing increased 17%. In addition, bath duration significantly decreased (1.5 minutes, 15%, $P < .001$) per bath from baseline to the postintervention observation. Whether attrition influenced this was verified by examining bath duration in those present in all rounds of the study; a similar decrease was observed (1.3 minutes). The decrease was particularly large for in-bed baths (14.5 minutes at baseline vs 10.3 minutes after the intervention, $P < .001$), followed by tub baths (13.4 vs 10.5 minutes, $P < .001$), and chair and toilet towel baths (11.4 vs 8.6 minutes, $P = .56$), whereas the most widely used shower method experienced a more-modest duration decrease (7.2 vs 6.7 minutes, $P = .02$).

### Resident Behavioral Outcome Measures

Most study outcomes showed improvement, with fewer residents demonstrating aggressive or agitated behaviors after the intervention in both groups (Table 4). The most prevalent preintervention behaviors were agitated verbal behaviors, particularly calling for help (including protesting and objecting) and yelling. The intervention was found to be associated with a statistically significant 15.2% ($P = .04$) smaller percentage of time that residents were observed to be calling for help. Combining all physical and verbal individual behaviors into three summary indicator variables (labeled as any physical behavior, any verbal behavior, any physical or verbal behavior), statistically significant declines were found in any verbal behavior of 17.8% ($P = .008$) and in any physical or verbal behavior 18.6% ($P = .004$).

To overcome resident censoring, primarily due to death, a multivariate analysis was conducted with resident-level fixed effects, including only those 116 residents who were observed in all three rounds. The results showed a statistically insignificant decline in any physical behavior of 1.7% points (5.1% before vs 3.4% after, $P = .10$, a 33% reduction) and a statistically significant drop in any verbal behavior of 3.3% points (19.7% before vs 16.4% after, $P = .04$, a 17% reduction). There was also a reduction in any physical or verbal behavior of 3.9% points (21.2% before vs 17.3% after, $P = .01$), an 18.6% reduction.

### Antipsychotic Use

Antipsychotic use at the before and after observations closest to the intervention (Rounds 1–2 for Group 1 facilities; Rounds 2–3 for Group 2 facilities) was compared for the 101 residents for whom complete pre- and postintervention medication administration records were available. Of these, 29 residents (28.7%) used antipsychotics before the intervention, but only 20 (19.8%) did so after the intervention, a 9 percentage point reduction or a 30% relative reduction ($P = .002$).

## DISCUSSION

Person-centered bathing is one of the few behavioral interventions with strong empirical evidence of effectiveness in persons with dementia.[22] A randomized crossover diffusion study was implemented in six nursing homes, three of which were randomly assigned to

receive an educational intervention after baseline observations and three to receive the intervention later after a measurement period. The intervention was a standardized version of the originally tested BWAB intervention using a train-the-trainer approach to its implementation. In spite of implementation challenges, the staff training was associated with a significant shift in the types of baths used and a general decrease in bath duration, regardless of type. Along with the difference in bathing processes, statistically significant reductions were found in aggressive and agitated verbal and physical behaviors and in use of antipsychotic medications after the training of staff in how to administer person-centered bathing to residents with dementia. These findings confirm the benefits to residents with dementia of the BWAB program in a real-life setting and mirror the results of the original efficacy intervention.[19]

The BWAB approach is best implemented when it becomes part of a facility-wide culture change. Administrators and managers need to be informed of the benefits and implementation processes so that they support and encourage comprehensive revision of bathing procedures. This implementation of the BWAB intervention, based on the train-the-trainer model, had some strengths and weaknesses. Among the strengths, the train-the-trainer implementation model allows for a single trainer to train a small number of lead trainers from several facilities at a time. Using in-staff trainers also allows for customizing the training according to staff and resident needs, reducing the costs of training the rest of the CNAs, and training newly hired CNAs on demand to maintain continuity of the BWAB intervention. Having multiple trainers in the facility minimizes the risk of having to train a new trainer if one leaves the facility.

A limitation of the study was that a follow-up interview was not performed to verify whether the facilities continued using the BWAB intervention at the end of the study, although the low cost of maintaining the BWAB intervention as part of the basic CNA training, coupled with the shorter time that staff needs to spend bathing residents and the reduction in aggressive/and agitated residents' behaviors, suggest that the facilities are likely to have adopted BWAB. The lack of resources to conduct booster training sessions or reliability checks of the data collectors is also a limitation. Furthermore, the estimates of the percentage of time when residents displayed behaviors during bathing could overestimate the outcome if the behavior did not occur continuously or overlapped with the 30-second recording points. However, this bias is present in the pre- and postintervention periods, so this bias should not have affected the results—based on pre/post comparisons. In addition, the study was designed as a pragmatic randomized controlled trial to test the extent to which the intervention as originally designed can be implemented and achieve the same outcome in a much less controlled environment. In such trials, the extent of implementation (fidelity) is not documented, but rather the outcomes are examined.[23] Finally, comparing the two postintervention periods of Group 1, a continued reduction in aggressive and agitated behaviors was observed from that observed between the first postintervention period and baseline observations, although being based on only three facilities, the generalizability of these results is not clear. The results of the current study indicate that, despite real-life challenges that facilities implementing this intervention may face (e.g., administrator and care staff turnover that some facilities in the study experienced), train-the-trainer implementation can favorably alter CNA bathing behavior and residents' outcomes.

Implementation of the BWAB differed in two important ways from the original efficacy trial.[18] In contrast to the original study, the current study did not require residents to have a history of agitated or aggressive behavior during bath or other personal care times, and residents with moderate, not just severe, cognitive impairment were included. Second, direct observation replaced videotaping. These modifications allowed the size of the study to be increased and its broader generalizability to thereby be tested. As such, the results reflect what could be expected for conducting this intervention more generally for residents with dementia in nursing homes across the country.

Based on the Online Survey, Certification and Reporting available from the Centers for Medicare and Medicaid Services,[24] it was calculated that the prevalence of dementia in nursing homes residents increased from 44% in 2000 to 50% in 2012, and a majority of these individuals require assistance in bathing. The ability to detect a significant improvement in resident reactions to being bathed after CNAs had been trained in the BWAB educational program suggests that the bathing intervention should be widely adopted. Because many states now have mandatory aide training requirements, it would be desirable to adopt exactly this kind of evidence-based training because it is likely that some of the resident care insights that aides derive from this training may be generalized to other care tasks.

The participating facilities were relatively large non-profit and governmental institutions that are relatively common in New York State but less common elsewhere in the country. This might argue against the generalizability of the findings, although there is no reason to expect that aides in relatively large nonprofit facilities differ materially from experienced aides in all U.S. nursing homes. Therefore, the success of the train-the-trainer implementation model is one of the more important findings because it indicates that their peers can train aides around the country and that this training will positively alter aides' and residents' behavior. Of all challenges faced in this study, the main challenge that facilities may encounter when adopting the BWAB intervention more broadly would be leadership discontinuity. Other implementation challenges, such as delays in obtaining additional residents with consent, were a consequence of participating in a research study.

On the basis of the findings, the BWAB training program should be broadly adopted in nursing homes. At the same time, a better understanding of the most-efficient and -effective approaches to execution and of the potential "spillover" effects of this intervention to other interactions between nurse aides and residents from this program would make implementation more effective. As those who are studying quality improvement initiatives in nursing home settings are realizing, merely introducing a novel program is not likely to make a difference unless the program is incorporated into the standard operating procedure of the facility. BWAB is an example of an intervention that, if properly executed, could make a significant difference in the lives of numerous cognitively impaired nursing home residents and could be used as a prototype for studying effective diffusion of innovation in future research.

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**Conflict of Interest:** Dr. Sloane is co-principal of Generativity, LLC, which receives royalties for coordinating distribution of the Bathing Without a Battle training materials. He receives no related research funding, data, or consultation fees through Generativity. Dr. Mor is a founder and on the board of directors of PointRight, Inc., an information services company serving nursing homes on quality measurement and improvement. Dr. Mor receives no research funding, data or consultation on his research from PointRight.

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**Author Contributions:** All authors contributed to the study concept and design, acquisition of data, analysis and interpretation of data, and preparation of manuscript.

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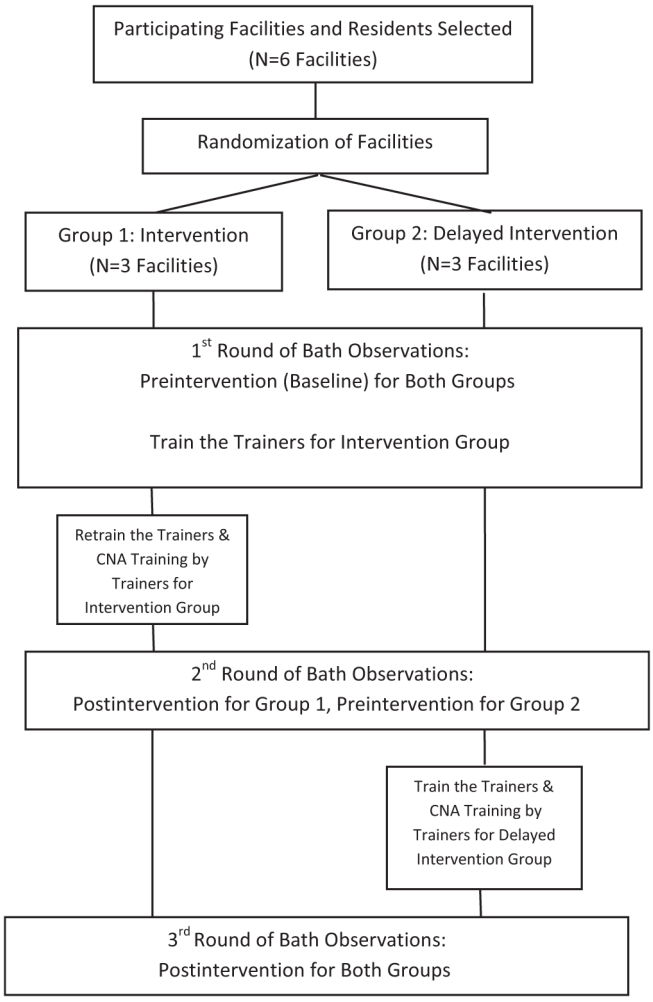


**Figure 1.**
Schematic representation of the study data collection process. CNA = certified nursing assistant.

**Table 1**

Eligibility, Participation, and Known Censoring Reasons According to Facility

| | | | Completing Data Collection | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Facility** | **Eligible** | **Died or Refused Before Study Started** | **Round 1** | **Round 2** | **Round 3[a]** | **Died During Study** | **Transferred During Study** | **Refused During Study** |
| 1 | 79 | 14 | 65 | 46 | 26 | 19 | 1 | 5 |
| 2 | 44 | 0 | 44 | 33 | 19 | 2 | 14 | 0 |
| 3 | 26 | 1 | 25 | 22 | 19 | 2 | 0 | 0 |
| 4 | 26 | 6 | 20 | 19 | 17 | 5 | 0 | 6 |
| 5 | 49 | 4 | 45 | 42 | 24 | 15 | 0 | 3 |
| 6 | 46 | 5 | 41 | 37 | 18 | 10 | 0 | 0 |
| Total | 270 | 30 | 240 | 199 | 123 | 53 | 15 | 14 |

[a] In Round 3, 35 individuals were not observed not because of death, transfer, or stated refusal but because of the inability of the data collectors to be present at the time they were bathed and no sufficient time for alternative dates because the study ended.

**Table 2**

Baseline Characteristics of the Study Sample

| | Group 1 Facilities | | | Group 2 Facilities | | | |
|---|---|---|---|---|---|---|---|
| **Characteristic** | **1, n = 65** | **2, n = 44** | **3, n = 25** | **4, n = 20** | **5, n = 45** | **6, n = 41** | **Total, N = 240** |
| Age, mean ± SD | 90.1 ± 6.4 | 72.6 ± 13.2 | 82.4 ± 11.1 | 88.0 ± 10.1 | 84.1 ± 9.9 | 88.2 ± 7.1 | 84.7 ± 11.2 |
| Female, % | 84.6 | 31.8 | 44.0 | 80.0 | 55.6 | 90.2 | 65.8 |
| Race and ethnicity, % | | | | | | | |
| White | 95.4 | 38.6 | 32.0 | 90.0 | 91.1 | 97.6 | 77.5 |
| Black | 1.5 | 25.0 | 40.0 | 5.0 | 8.9 | 2.4 | 11.7 |
| Hispanic | 3.1 | 27.3 | 24.0 | 5.0 | 0.0 | 0.0 | 8.8 |
| Other | 0.0 | 9.1 | 4.0 | 0.0 | 0.0 | 0.0 | 2.1 |
| Medicaid, % | 52.3 | 59.0 | 76.0 | 95.0 | 75.7 | 65.9 | 66.1 |
| Activity of daily living score, mean ± SD[a] | | | | | | | |
| Bed mobility | 2.1 ± 1.4 | 0.7 ± 0.7 | 1.0 ± 1.3 | 3.6 ± 0.7 | 2.0 ± 1.7 | 3.1 ± 0.8 | 2.0 ± 1.5 |
| Transfer | 2.2 ± 1.4 | 1.1 ± 0.8 | 1.1 ± 1.4 | 3.5 ± 0.7 | 2.2 ± 1.6 | 3.1 ± 0.9 | 2.2 ± 1.5 |
| Locomotion | 2.5 ± 1.7 | 1.1 ± 0.8 | 1.2 ± 1.6 | 2.9 ± 1.7 | 2.1 ± 1.8 | 3.2 ± 1.1 | 2.2 ± 1.6 |
| Dressing | 2.9 ± 1.1 | 3.2 ± 0.8 | 2.6 ± 0.9 | 3.7 ± 0.5 | 3.2 ± 0.9 | 3.3 ± 0.6 | 3.1 ± 0.9 |
| Eating | 1.6 ± 1.4 | 2.2 ± 1.1 | 1.5 ± 1.5 | 1.8 ± 1.8 | 1.7 ± 1.5 | 2.3 ± 1.5 | 1.8 ± 1.5 |
| Toileting | 2.8 ± 1.2 | 2.8 ± 1.4 | 1.7 ± 1.9 | 3.7 ± 0.5 | 3.1 ± 1.2 | 3.3 ± 1.3 | 2.9 ± 1.3 |
| Hygiene | 2.8 ± 1.2 | 3.5 ± 0.8 | 2.7 ± 1.1 | 3.6 ± 0.7 | 3.2 ± 1.0 | 3.3 ± 1.0 | 3.1 ± 1.0 |
| Bathing | 3.2 ± 0.8 | 3.7 ± 0.5 | 2.8 ± 1.2 | 3.9 ± 0.4 | 3.5 ± 0.8 | 3.7 ± 0.5 | 3.4 ± 0.8 |
| Incontinent of bladder, % | 70.8 | 45.5 | 40.0 | 90.0 | 62.2 | 73.2 | 63.3 |

| Characteristic | Group 1 Facilities | | | Group 2 Facilities | | | Total, N = 240 |
|---|---|---|---|---|---|---|---|
| | 1, n = 65 | 2, n = 44 | 3, n = 25 | 4, n = 20 | 5, n = 45 | 6, n = 41 | |
| Incontinent of bowel, % | 44.6 | 47.7 | 40.0 | 95.0 | 57.8 | 80.5 | 57.5 |
| Any incontinence, % | 72.3 | 47.7 | 40.0 | 100.0 | 68.9 | 82.9 | 67.9 |
| Cognitive Performance Scale score, mean ± SD[b] | 4.4 ± 1.2 | 4.1 ± 1.2 | 3.7 ± 0.9 | 3.7 ± 1.5 | 4.1 ± 1.5 | 4.1 ± 1.2 | 4.1 ± 1.2 |

SD = standard deviation.

[a] Range 0–4; higher score indicating greater level of dependency.

[b] Range 2–6 in this sample of eligible persons.

## Table 3

Bathing Methods Used in Each Round

| Bathing Method | Preintervention Round 1 | Postintervention Round 3 | Difference (*P*-Value) |
|---|---|---|---|
| Shower | | | |
| n (%) | 328 (68.8) | 140 (56.9) | −11.7 (.001) |
| Duration, mean ± SD | 7.2 ± 3.1 | 6.7 ± 3.2 | −0.57 (.02) |
| In bed | | | |
| n (%) | 54 (11.3) | 70 (28.5) | 17.2 (<.001) |
| Duration, mean ± SD | 14.5 ± 6.2 | 10.3 ± 5.0 | −4.2 (<.001) |
| Tub | | | |
| n (%) | 57 (11.9) | 14 (5.7) | −6.2 (.007) |
| Duration, mean ± SD | 13.4 ± 3.6 | 10.5 ± 3.3 | −2.8 (<.001) |
| Toilet | | | |
| n (%) | 33 (6.9) | 12 (4.9) | −2.0 (.28) |
| Duration, mean ± SD | 11.4 ± 6.9 | 8.6 ± 4.5 | −2.8 (.06) |
| Other | | | |
| n (%) | 5 (1.1) | 10 (4.1) | 3.0 (.007) |
| Duration, mean ± SD | 8.1 ± 4.9 | 8.0 ± 3.4 | −0.1 (.96) |
| Total | | | |
| n | 477 | 246 | |
| Duration, mean ± SD | 9.4 ± 5.2 | 7.9 ± 4.1 | −1.5 (<.001) |

SD = standard deviation.

**Table 4**

Observed Behaviors for Group 1 and 2 Facilities According to Intervention Status: Percentage of Bath Time with Any Behavior

| | Before Intervention | | After Intervention | | |
|---|---|---|---|---|---|
| **Behavior** | **Group 1** | **Group 2** | **Group 1** | **Group 2** | ***P*-Value for Difference Between Before and After Intervention** |
| Baths, n | 263 | 403 | 329 | 115 | |
| Outcome (percentage of bath time with any), mean ± SD | | | | | |
| Any physically or verbally aggressive or agitated behavior | 22.6 ± 30.3 | 25.4 ± 32.9 | 19.6 ± 28.7 | 20.3 ± 32.1 | .004 |
| Any physically aggressive behavior | 6.2 ± 17.1 | 4.8 ± 15.6 | 4.9 ± 13.9 | 3.8 ± 15.2 | .39 |
| Grabbing caregiver | 4.7 ± 15.2 | 3.6 ± 12.8 | 3.3 ± 11.7 | 3.5 ± 14.9 | .15 |
| Hitting | 3.2 ± 11.7 | 1.8 ± 10.4 | 2.2 ± 7.6 | 1.0 ± 6.6 | .95 |
| Kicking | 0.3 ± 2.5 | 0.9 ± 8.1 | 0.3 ± 2.8 | 0.1 ± 1.2 | .28 |
| Biting | 0.1 ± 1.5 | 0.7 ± 7.6 | 0.1 ± 1.0 | 0.5 ± 5.4 | .39 |
| Throwing objects | 0.0 ± 0.0 | 0.6 ± 6.7 | 0.01 ± 1.3 | 0.0 ± 0.0 | >.99 |
| Spitting | 0.7 ± 2.2 | 0.3 ± 6.2 | 0.4 ± 4.8 | 0.8 ± 5.0 | .60 |
| Any verbally aggressive or agitated behavior | 20.9 ± 29.8 | 24.6 ± 32.8 | 18.8 ± 28.2 | 19.8 ± 31.6 | .008 |
| Aggressive language | 2.2 ± 11.1 | 1.8 ± 9.3 | 1.7 ± 9.1 | 2.2 ± 16.0 | .92 |
| Call for help or protesting | 19.5 ± 28.2 | 17.9 ± 28.1 | 17.4 ± 26.5 | 10.9 ± 22.1 | .04 |
| Yelling | 6.7 ± 21.5 | 10.3 ± 24.8 | 7.4 ± 21.4 | 10.8 ± 25.7 | .86 |

Group 1 facilities had one round of baths observed before the intervention and two rounds after. Group 2 facilities had two rounds of baths observed before the intervention and one round after.