HHS Public Access

Author manuscript

*Geriatr Nurs*. Author manuscript; available in PMC 2016 March 14.

Published in final edited form as:

*Geriatr Nurs*. 2015 ; 36(2 0): S10–S15. doi:10.1016/j.gerinurse.2015.02.018.

# Caregiver Person-Centeredness and Behavioral Symptoms during Mealtime Interactions: Development and Feasibility of a Coding Scheme

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## Abstract

Mealtime behavioral symptoms are distressing and frequently interrupt eating for the individual experiencing them and others in the environment. In order to enable identification of potential antecedents to mealtime behavioral symptoms, a computer-assisted coding scheme was developed to measure caregiver person-centeredness and behavioral symptoms for nursing home residents with dementia during mealtime interactions. The purpose of this pilot study was to determine the acceptability and feasibility of procedures for video-capturing naturally-occurring mealtime interactions between caregivers and residents with dementia, to assess the feasibility, ease of use, and inter-observer reliability of the coding scheme, and to explore the clinical utility of the coding scheme. Trained observers coded 22 observations. Data collection procedures were feasible and acceptable to caregivers, residents and their legally authorized representatives. Overall, the coding scheme proved to be feasible, easy to execute and yielded good to very good inter-observer agreement following observer re-training. The coding scheme captured clinically relevant, modifiable antecedents to mealtime behavioral symptoms, but would be enhanced by the inclusion of measures for resident engagement and consolidation of items for measuring caregiver person-centeredness that co-occurred and were difficult for observers to distinguish.

## Introduction

In the nursing home (NH) setting, mealtime can represent a challenging time for caregivers and residents, nearly half of whom have some form of cognitive impairment.[1] Cognitive losses experienced by persons with dementia eventually lead to partial or complete loss of the ability to initiate or sustain attention to complex feeding tasks such as locating food,



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This work was presented at the Gerontological Society of America's 2014 Annual Scientific Meeting in Washington, D.C.

chewing and swallowing.[2] Persons with dementia also regularly experience behavioral symptoms, such as agitation, which occur more commonly during mealtimes and contribute to frequent disruptions in eating.[3,4] The various cognitive, functional and behavioral barriers to achieving positive mealtime experiences for persons with dementia are often referred to as mealtime difficulties.[5,6] Persons with dementia who experience sustained mealtime difficulties are at increased risk for a variety of poor outcomes including inadequate nutritional intake, unintentional weight loss, malnutrition and dehydration, which ultimately contribute to diminished physical health and quality of life.[7] Reducing mealtime difficulties, such as behavioral symptoms, may result in more eating time, which in turn could lead to better nutrition.

Past research suggests that the quality of interactions between direct care staff and the person with dementia can influence nutritional intake, but it is not known what specific types of interactions most effectively reduce behavioral symptoms during mealtimes.[8–10] Person-centered interactions with caregivers have been found to be effective at reducing behavioral symptoms during other care processes, such as bathing, but little is known about what specific types of person-centered interactions that might effectively reduce mealtime behavioral symptoms.[11–13]

Past studies on caregiver-resident interactions during mealtimes have explored the overall positive/negative nature of caregiver statements during a particular meal, but have not examined caregiver person-centeredness.[10,14] Past research has also relied largely on static observational methods to examining interactions.[7] Static observation precludes an understanding of the dynamic, time-sensitive nature of interactions that take place between caregivers and persons with dementia and the temporal link between caregiver actions and behavioral changes in the person with dementia. Additionally, static observational methods do not provide for an understanding of the complex subtleties of non-verbal communication and cues that take place during mealtimes and their temporal link to changes in the behavior of the person with dementia.

Sequential analysis methods facilitate the examination of temporal associations and patterns during complex interactions[15] and are particularly well-suited to explore dynamic caregiver-resident interactions in NHs.[11,16,17] In order to describe and quantify complex interactions that occur during mealtimes and identify their temporal relationship to changes in behavior, the development of procedures for collecting, coding and analyzing sequential data in the context of mealtimes are needed.

The purpose of this study was to develop procedures for collecting and coding sequential data from naturally-occurring caregiver-resident mealtime interactions. Specific objectives were to 1) determine the acceptability and feasibility of these procedures; 2) assess the feasibility, ease of use and inter-rater reliability of the developed coding scheme; and 3) explore the clinical utility of the coding scheme for informing improvements in behavioral symptom management during mealtimes for NH residents with dementia.

## Methods

### Study Design

This study was a video-recorded, descriptive, observational study of mealtime care interactions between NH staff and residents with dementia. Observations were conducted between January, 2014 and February, 2014.

### Setting and Sample

Participants included NH staff and residents with dementia from memory care units in two NHs in the Midwest (one government-owned 120 bed urban facility; one 81 bed private-owned urban facility). Inclusion criteria for NH staff included: 1) being a certified nursing assistant (CNAs); 2) working primarily on the memory care unit; and 3) providing informed consent and agreeing to provide mealtime care to participating residents during observations.

Inclusion criteria for NH residents included: 1) having a documented diagnosis of dementia in their medical record; 2) requiring moderate to significant mealtime assistance; and 3) having a legally authorized representative who provided informed consent for participation. Exclusion criteria for NH residents included: 1) requiring little to no assistance during mealtimes; 2) currently being treated for acute major depression; or 3) having both severe hearing and vision impairment.

### Development of Computer-Assisted Coding Scheme

To enable sequential analysis of mealtime interactions, a computer-assisted coding scheme was developed to facilitate coding of both the frequency and duration (timed-event) of the person-centeredness of caregiver behaviors and resident behavioral symptoms. Items for measuring person-centeredness and behavioral symptoms were identified from previously developed observational tools that have been both content validated in nursing home populations and have demonstrated satisfactory inter-rater reliability (Table 1). All items were adapted for use with Noldus Observer® XT software to facilitate computer-assisted coding.

Data from one observational session was used to trial the protocols for data management and the coding scheme, which resulted in revisions to the study manuals. Revisions included clarifications for how the beginning and end of the mealtime was defined and when to indicate certain caregiver codes, modifications to a ‘lack of interaction’ code, and addition of two items to measure task-centered behavior.

A code to specify periods without interaction was modified to specify lack of interaction as an instance when the caregiver was in close proximity with the resident but did not interact with them for more than two minutes, or when they were in close proximity and spent more than three minutes interacting with other staff and not engaging the resident. Two caregiver behaviors that were observed in the practice observation but not represented in the initial scheme were ‘controlling voice quality’ and ‘outpacing’ (i.e. speaking or providing care at a

rate faster than the person with dementia can tolerate). Because these actions are considered to be task-centered, they were added to the coding scheme.

Prior to coding remaining observations, all video and audio data were cleaned. Data cleaning involved integrating audio files with video files, adjusting background noise of videos as necessary, and removing identifiable features of individuals captured on the video that did not provide informed consent using video-editing software.

## Procedures

**Recruitment—**Following approval of the study by a University-based Institutional Review Board, direct care staff were invited to participate during staff meetings or individually by the Principal Investigator (PI). Direct care staff who expressed interest in participating completed written informed consent. Using the study inclusion and exclusion criteria, the nurse manager on the memory unit determined which residents were potentially eligible to participate in the study. The PI approached residents to ascertain assent/dissent to participation in the study after written informed consent was provided by their legally authorized representative. Throughout the study related observations, residents were observed intermittently by the PI (at least every 10 minutes) to assess for verbal or non-verbal indications of dissent and responsiveness to the recording equipment.

**Data Collection—**Residents were observed for 1 to 5 observations (average 2). All observations were recorded by the PI and took place at either breakfast or lunch due to availability of participating direct care staff. Video-observations were recorded using GoPro HERO3 cameras, which are approximately 2 by 1 inch in size. In order to ensure adequate audio, back-up audio-recorders were used. To facilitate participant sensitization to the recording situation, the cameras were placed and turned on prior to residents being seated at the table and all residents were observed in their routine dining location.

## Observer Training

Four research assistants (RA) were trained to clean video-data and complete the coding scheme using Observer® XT. All RAs had some prior experience interacting with persons with dementia and participated in a training session that covered a basic introduction to the core features of dementia including behavioral and psychological symptoms, and features of person-centered and task-centered interaction. RAs also had 1 day of hands-on training with data cleaning and coding.

All data collection, cleaning and coding procedures were outlined in study protocols and coding manuals. Coding manuals included directions for when to select certain codes along with examples of accurate coding decisions. RAs coded observations independently and the study team met at least weekly to discuss coding progress and areas of confusion within the coding scheme. These meetings were also used to facilitate retraining on items that were identified by RAs as challenging to code.

### Data Analysis

Feasibility of the coding scheme was examined by assessing stability of technology used for data coding and the time required to complete the coding scheme. Ease of use of the coding scheme was examined through feasibility logs that were completed weekly by RAs weekly and coding logs that were completed after every coding session. Inter-observer reliability of the coding scheme was assessed using percent agreements and time-event (2 second tolerance) agreement using Cohen's kappa, Gwet's AC1 and the Brennan-Prediger coefficient for a random sample of 20% of coded observations (n=5). Re-coding was completed by the RA with the most advanced clinical training who was considered the "gold standard."

The clinical utility of the scheme was examined by a review of comments in coding logs and through the use of weekly collaborative dialogue among study team members to explore the clinical applicability of the coding scheme to mealtime care and behavioral symptom management. Collaborative dialogue is a process for exploring the applicability of a method or approach through reflective and constructive conversation among the research team and relevant stakeholders to facilitate the discovery of feasibility, ethical, and practical issues that arose during the research process.[18]

## Results

Nine NH residents with dementia and six direct care staff participated in a total of 22 mealtime observations totaling 11.1 hours in length. Mealtime observations averaged 29 minutes in length (range 16 to 55 minutes) and the average number of codes used per observation was 76 (range 30 to 199).

The overall recruitment rate for eligible staff participants was 50%. The overall recruitment rate for NH residents who were determined to meet eligibility criteria was 76% (N=17). Of those whose legally authorized representatives provided informed consent for their participation, two residents died prior to being involved in data collection and six residents were later excluded by the PI as they did not require much mealtime assistance. Of the remaining nine residents, none indicated dissent from study procedures (verbally or nonverbally) over the course of the study.

### Caregiver Person-Centeredness

Ninety-five percent of caregiver behaviors were coded as being person-centered. Among person-centered behaviors, the most common were orientation (24%), showing interest (11%), giving choices (10%) and back-channeling (9%), adjusting to resident's pace (8%) and assessing comfort (8%). Among all task-centered behaviors, the most common were outpacing (31%), followed by physically controlling behaviors (19%) and inappropriate touch (17%). Only six occurrences of no interaction were documented when the caregiver was in close proximity (sitting next to) resident. However, these events took place for long periods of time (average duration 8.25 minutes, range 3.08 to 13.7 minutes).

### Behavioral Symptoms

The average number of behavioral symptoms noted during an observation was 2.6, ranging from 0 to 26. Ten of the 22 observations had no behavioral symptoms. The most common behavioral symptom was verbal gesture or refusal of care (45%), followed by minimally-disruptive aberrant vocalizations (28%) and pushing away/physical refusal of care (17%).

### Video-Recording Technology and Recording Procedures

The technology used to video-record observations produced satisfactory video/audio quality throughout the study period. Of the variety of approaches to camera placement that were trialed, placing the camera on the table that the dyad was seated at produced the best quality video-data.

### Feasibility and Ease of Use of Coding Scheme

The average time required to clean and format videos for use with Observer® XT was 1.6 times the length of the video (range .5 to 4). The average time required to complete the coding scheme was 58 minutes (range 15 to 120 minutes) per observation. Time-intensiveness of the coding scheme was also evaluated by assessing the ratio between coding time and video length, and changes in coding time over the course of the study. The ratio of coding time to video length averaged 2.5 times the length of the video (range 1.3 to 4.6). This ratio decreased over the course of the study from an average of 2.7 for the first two weeks of coding to an average of 2.0 for the second two weeks of coding as RAs gained more experience coding.

RAs reported difficulty distinguishing between some caregiver codes, specifically: 1) greeting and orientation; 2) showing approval and showing interest; 3) physically controlling; and 4) inappropriate touch. RAs also reported difficulty distinguishing between various levels of intensity for behavioral symptom codes. Coders with more advanced clinical training reported less difficulty with these codes.

### Clinical Utility of Coding Scheme

The coding scheme was noted to identify several antecedents to mealtime behavioral symptoms that may be amenable to future intervention. Specifically these included agitation that appeared to be related to caregiver outpacing (i.e. offering food too frequently), physically or verbally controlling caregiver behaviors which then resulted in resistance to care, and caregivers ignoring the person with dementia which lead to agitation as well as reduced attention to eating.

RAs noted several factors that were relevant to the mealtime experience but not accounted for by the coding scheme. Engagement or sustained attention of the person with dementia during the mealtime process was noted on several occasions during observations that were described as “positive” and contained more person-centered behaviors. RAs also identified too much environmental noise, inadequate lighting and complaints about unpleasantness of food as relevant to the overall meal experience. Textual examples of RA comments from coding logs are represented in Table 2.

The value of the 'lack of interaction' code was unclear in this study. The study team noted that some interaction between staff seemed to serve the purpose of creating a comfortable social environment, even if the particular resident being observed wasn't involved in the interaction. The study team also noted that caregivers used a wide range of strategies to support residents with eating and that the effectiveness of feeding techniques (i.e. providing too much assistance or too little assistance) during a meal appeared to alter opportunities for person-centered interaction. More effective feeding techniques seemed to allow more opportunity for person-centered interaction during the meal. In instances where the caregiver was struggling to help the resident with basic feeding tasks, such as swallowing, the meal was dominated by instructions about feeding and included comparatively fewer person-centered behaviors.

### Inter-Observer Reliability

Initial assessment of inter-observer reliability revealed agreement with time-unit Cohen's Kappa (+/− 2 second tolerances and 80% overlap) ranging from 0.45 to 0.61 and percent agreement ranges from 85 to 88 percent. Time-unit kappa takes into account not only agreement on the occurrence of events but also on the start time, stop time, and extent of overlap within those events. Items with the most errors were: 1) duration coding of 'adjusting to resident pace,'; 2) giving choice and asking resident for help or cooperation; 3) greeting and orientation; and 4) showing interest and showing approval. Following this observation, intensified retraining was undertaken with 2 RAs who re-coded an additional 2 observations that were randomly selected from observations that neither had previously coded. Re-training included review of the video context underlying specific disagreements followed by discussion with by both RAs and the PI.

Following re-training and joint review of specific disagreements, time-unit Cohen's kappa (+/− 2 second tolerances, 80% overlap) ranged from 0.80 to 0.85 with percent agreements ranging from 86 to 90 percent. Gwet's AC1[19] and Brennan-Prediger coefficient[20] were also computed which indicated very good observer agreement and also demonstrated improved precision in the estimate of agreement (Table 3).

## Discussion

A computer-assisted coding scheme was developed to measure caregiver person-centeredness and resident behavioral symptoms of NH residents during mealtime cares using video-data. Overall, procedures for video-capturing mealtime interactions developed in this study were found to be acceptable to participants, feasible to carry out and indicated clinical applicability. Following adjustments including modifications to the intensity ratings for behavioral symptoms and re-training of observers on distinguishing between certain caregiver codes, the coding scheme demonstrated good to very good time-unit inter-observer reliability for a new instrument.[21]

Inter-observer reliability estimates were initially lower than expected, however, with additional review of specific discrepancies using the context of actual videos, reliability estimates increased markedly. More intensive training using actual video-data, and more frequent checks of observer agreement would likely facilitate improved agreement

throughout the course of a study. Using actual video-data in re-training sessions to discuss specific areas of disagreement and confusion is essential for identifying the source of disagreement in complex data situations and for informing subsequent observer re-training.

Because the initial kappa statistic was lower than expected provided the percent agreement, it is possible that asymmetrical distributions in the data may have contributed to a lowered kappa statistic.[22,23] Because the value of kappa is affected by the prevalence of the item under observation and may be unreliable in data situations with asymmetrical marginal,[24,25] as occurred in these data, additional agreement statistics were assessed which indicated similar agreement ratings. Identifying the appropriate time tolerance for computing inter-observer agreement statistics in sequential analysis of complex care interactions is also challenging. While a consistent time tolerance needs to be applied to overall agreement ratings, the accuracy of interim assessments for quality assurance could be enhanced by adapting the time tolerance based on the complexity of the interaction or number of codes relative to the length of the observation. A 2-second time tolerance may be a fair assessment of agreement for moderately intense interactions but may be too stringent for very intense interactions with many codes.

This study also offers important insights into the necessary observer expertise, training and quality assurance procedures for studies using video-coding to describe complex care interactions and physical symptoms in persons with dementia. RAs with more advanced clinical training (Masters level or higher) had less difficulty distinguishing between various levels of intensity of behavioral symptoms and co-occurring caregiver behaviors, suggesting that some level of clinical training or experience may be necessary to achieve satisfactory reliability.

Several items used to measure caregiver behaviors are similar and were challenging for RAs to distinguish. The efficiency and reliability of the coding scheme might be improved by creating composite categories for commonly overlapping codes. Codes that were particularly challenging included: 1) greeting and orientation; 2) showing approval and showing interest; and 3) physically controlling and inappropriate touch. Outside of these areas, questions that arose during coding were found to be easily resolved with referring to coding manuals. Past research using these instruments has not reported on observers' perceptions of the ease of use video-coding using these items.[16,26] Fewer categories to describe caregiver actions may also enhance the practical application of research findings using this coding scheme, as they would be more readily translated to direct care staff.

The coding scheme identified several components of caregiver behavior that may be related to mealtime behavioral symptoms and amenable to interventions. These included specific task-focused behaviors such as physically controlling the resident, inappropriate touch and outpacing the resident that appeared to result in behavioral symptoms or reduced attention to the meal. This finding is consistent with other research that has shown that certain task-centered caregiver behaviors, such as elder-speak precipitated resistance to care in persons with dementia.[27]

The appropriate timeframe used to define 'lack of interaction' remains unclear. Lack of social interaction and loneliness may contribute to behavioral symptoms[28] and therefore seems important to measure during mealtimes. Conversely, some periods without interaction may actually be beneficial during feeding related interactions and may improve overall food intake. Past research has demonstrated that approximately 50% of NH residents have no change in nutritional intake following increased attention and prompting during mealtime.[8] It is possible that the context surrounding the lack of interaction may be more relevant than the simple occurrence or duration of these events.

The coding scheme did not address resident's responsiveness to person-centered interaction. Specifically, engagement, positive affect and sustained attention to feeding tasks were identified as present during observations by RAs, but were not accounted for by the coding scheme. Recent literature exploring the concept of engagement in persons with dementia has supported the development of preliminary measures of engagement which, if modified, may be integrated into this and similar coding schemes.[29] Participants with dementia also contributed to the interaction with verbal statements and conversation, but these contributions to the mealtime interaction were not accounted for in the coding scheme. Other coding systems, such as the Roter Interaction Analysis System (RIAS),[30] a widely used medical interaction assessment that evaluates both patient and provider contributions to interactions may provide insights into verbal/non-verbal behaviors that residents provide during dining.

## Study Limitations

This study was limited by virtue of size and being done in a single study site. Future work should include a larger sample and different settings of care. In addition, future research should identify meaningful composites of similar and frequently overlapping caregiver codes as this will improve the ease of use of the scheme as well as its clinical applicability. Composites may also inform the refinement of the Person-Centered Behavior Inventory, Task-Centered Behavior Inventory[16] and other similar measures such as the Dementia Competent (DSI) and Culturally Competent (CSI) Interaction measures.[32,33] The construct validity of composite caregiver codes can be evaluated in future work by comparing items to measure person-centeredness from the DSI, PCBI and the Dementia Care Mapping tool and by review of refined items with experts in person-centered caregiving. In addition, in order to facilitate a comprehensive evaluation of mealtime interactions, measures of resident engagement or affect should be integrated into the coding scheme.

Despite the limitation, this study provides a potential coding scheme to assess the time-sensitive relationship between caregiver person-centeredness and behavioral symptoms during mealtime interactions. While this coding scheme was developed to examine mealtime cares, the procedures developed in this study and items in the coding scheme may be applied to other care processes with close caregiver-resident proximity, such as bathing or oral care. Further refinement of caregiver codes and psychometric evaluation would support wider utilization of this coding scheme in clinical research.

## Acknowledgements

This work was supported by the National Hartford Centers of Gerontological Nursing Excellence Patricia G. Archbold Scholar Program and Claire M. Fagin Postdoctoral Fellowship Program. This research was supported by the Virginia Stone Research Grant in Clinical Gerontology from the American Nurses Foundation, and in part by the Nurses Foundation of Wisconsin and University of Wisconsin-Madison School of Nursing Eckburg Research Award. Dr. Gilmore-Bykovskyi's time during preparation of this manuscript was also supported by the William S. Middleton Veterans Affairs Hospital in Madison, WI. This work is also supported, in part, by the Clinical and Translational Science Award program of the National Center for Research Resources, National Institutes of Health (1UL1RR025011).The content is solely the responsibility of the author and does not necessarily represent the official views of the NIH. The author would like to acknowledge Drs. Louis Medvene and Carissa Coleman for early consultation in planning this research.

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## Table 1

Coding Scheme for Measuring Mealtime Interactions and Behavioral Symptoms

| Caregiver Codes | | Resident Codes | |
|---|---|---|---|
| **Person Centered Behaviors**[a] | | | **Behavioral Symptoms**[b] |
| *Verbal Behavior* | *Non-Verbal Behavior* | | *Behavior Group* |
| ■ Greeting<br>■ Asking resident for help/cooperation<br>■ Giving choice<br>■ Assessing comfort or condition<br>■ Orientation<br>■ Empathy<br>■ Showing approval<br>■ Showing interest<br>■ Back-channel response<br>■ Positive voice quality | ■ Resident-directed eye gaze<br>■ Affirmative nodding<br>■ Appropriate use of affectionate touch<br>■ Assessing comfort<br>■ Adjusting to resident's pace<br>■ Proximity<br>■ Positive gestures/facial expressions | Aberrant Vocalizations | ■ Minimally disruptive: low volume/louder than conversational; redirectable<br>■ Loud, disruptive: moderately-severely disruptive; screaming/yelling |
| | | Motor Agitation | ■ Minimal: pacing/ moving about; mildly increased rate of movement; redirectable<br>■ Intense-rapid: moderately-severely disruptive; not redirectable |
| **Task-Centered Behaviors**[a] | | | |
| *Verbal Behaviors* | *Non-Verbal Behaviors* | | |
| ■ Verbal controlling<br>■ Interrupting/changing topic<br>■ Controlling voice quality | ■ Ignoring<br>■ Physically controlling<br>■ Inappropriate touch<br>■ Outpacing | Aggressiveness | ■ Verbal threats<br>■ Threatening gestures<br>■ Physical toward property<br>■ Physical toward self/ others |
| **Other Caregiver Codes** | | | |
| ■ Lack of interaction[c] | | Resisting Care | ■ Procrastination/ avoidance<br>■ Verbal/gesture of refusal<br>■ Pushing away to avoid tasks<br>■ Striking out at caregiver |

[a] Items from the Person-Centered Behavior Inventory (PCBI) and Task-Centered Behavior Inventory (TCBI) were used to measure the person-centeredness of caregiver actions during mealtimes. Both scales have demonstrated inter-observer reliabilities averaging.82 (Coleman & Medvene, 2012; Hannah Lann-Wolcott et al., 2011) Outpacing was added using definitions provided in the Dementia Care Mapping tool, which has demonstrated test-retest reliability ratings >0.8. (D. J. Brooker & Surr, 2006; Fossey, Lee, & Ballard, 2002)

[b] Behavioral Symptoms were measured using the Pittsburgh Agitation Scale (PAS), which has demonstrated inter-observer reliabilities averaging 0.92 in NHs (J. Rosen et al., 1994; Jules Rosen et al., 1995). The intensity rating of 0 to 4 was modified for each behavior group to a rating of 1 to 2.

[c] Lack of interaction was coded when there was no interaction for more than 2 minutes (verbal or non-verbal) when the caregiver was in close proximity to the resident during the meal or for more than 3 minutes if the caregiver was interacting with another staff member without engaging the resident.

**Table 2**

Observer Comments about Clinical Application of Scheme

| Observation | Textual Example from Coding Log |
|---|---|
| **Controlling Behaviors**<br>Observed controlling behaviors resulting in resident agitation, which seemed to influence how caregiver treated resident for the duration of the meal. | "Care provider demonstrated outpacing, which resulted in resident agitation. This seemed to result in care provider frustration and appeared to decrease amount of person-centered interactions."<br>"Resident displayed grimacing and withdrawal from the provider due to physically controlling feeding from the provider at times, resident did not want to eat. This appeared to frustrate provider. More controlling behaviors led to more resistance from the resident"<br>"… The resident displayed motor agitation due to the CNA feeding too quickly." |
| **Engagement**<br>Resident is observed demonstrating positive affect or sustained attention to the mealtime. | "Interaction between the caregiver and resident was very positive… caregiver had lots of positive facial gestures and cues and even though resident did not talk, opened eyes and smiled several times."<br>"Resident in very good mood, smiling and hugging caregiver, made several positive comments about the food and the caregiver… really into meal" |
| **Feeding Support**<br>Observed that residents received various types of feeding support. When feeding support was not effective, less person-centered interaction took place. | "Provider also gives up on trying to feed the resident as the resident refused to cooperate and swallow food. Provider made statements of disappointment, the opposite of the Show Approval code."<br>"Caregiver gave the resident space to eat independently and stepped in only when needed, usually during drinking… seemed to be working this time" |

**Table 3**

Inter-observer Reliability Coefficients and Precision Estimates[a]

| Statistic | Coefficient | Standard Error | 95% Confidence Interval |
|---|---|---|---|
| **Cohen's Kappa** | 0.91 | 0.05 | 0.80 to 1 |
| **Gwet's AC1** | 0.92 | 0.05 | 0.82 to 1 |
| **Brennan-Prediger** | 0.91 | 0.05 | 0.82 to 1 |
| **Percent Agreement** | 0.92 | 0.04 | 0.83 to 1 |

[a]Estimates were computed using a +/− 2 second time tolerance and 80% overlap in identification of agreement.