July 2025

ADULT CARE HOME ACCREDITATION PILOT PROGRAM
Session Law 2021-180
Senate Bill 105

Final Report: Evaluation of Quality Outcome Measures

Prepared for

North Carolina Joint Legislative Oversight Committee on Health and Human Services
North Carolina Department of Health and Human Services

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EXECUTIVE SUMMARY

This Evaluation of Quality Outcome Measures report provides data from a three-year evaluation of a pilot project studying the effectiveness of an accreditation process for adult care homes/assisted living communities across the state of North Carolina. The Cecil G. Sheps Center for Health Services Research at the University of North Carolina at Chapel Hill conducted data collection and analyses. Accreditation efforts were overseen by the Accreditation Commission for Health Care (ACHC), and a Stakeholder Advisory Group provided recommendations.

Initially, 146 communities diverse in location and quality based on the state-assigned Star rating were recruited and randomly assigned to either an “accreditation arm” to pursue ACHC accreditation (a designation indicating that a standard of care is met) or a “control arm.” A total of 113 communities participated and provided data for 31 quality indicators in five categories: resident outcomes and care coordination/transitions (health care related); resident outcomes and care coordination/transitions (psychosocial related); person-centered care; medication management; and workforce.

Of the 58 communities in the accreditation arm, 25 became accredited. Comparisons were made between study arms, and between communities in the accreditation arm that became accredited and those that had not become accredited (referred to respectively as the accredited and not accredited condition).

- Of the 31 outcome indicators, four showed statistically significant differences across arms or conditions in two categories (medication management and workforce), three (75%) of which favored communities in the accreditation arm or communities that became accredited: medication administration errors, turnover of care aides, and turnover of administrators. The outcome that did not evidence favorable change was staffing sufficiency of administrators in special care units.
- Of the 31 outcome indicators, 22 were not statistically significantly different but are notable due to the magnitude of their odds ratios or percent change -- 16 (73%) of which favored accreditation in four categories: resident outcomes and care coordination/transitions (both health care related and psychosocial related), medication management, and workforce.
- In total, 23 different outcomes were statistically significantly different or notably different.

Because communities received regular state/county surveys throughout the project, findings reflect the potential “value added” of accreditation within the existing regulatory framework, rather than the value of accreditation itself. Other contextual factors, including low incidence rates of certain indicators, baseline differences between study arms despite randomization, modest accreditation uptake, workforce challenges, and the selection of outcome indicators, may have further attenuated the potential impact of accreditation.

In sum, the fact that the preponderance of significant and notable outcomes favored accreditation is striking, and that so few reached the level of statistical significance may in part relate to the small sample size, choice of outcomes to study, low event rates, and the ongoing state/county survey process that limited the amount of potential change. Thus, there may be more benefit from accreditation than was able to be determined through formal hypothesis testing that relies on sufficiently large sample size and context. Nonetheless, despite promising indicators, there is limited evidence that accreditation improves or worsens outcomes, due in part to the study context. Further, the study was not designed to determine whether accreditation independently maintains outcomes. Therefore, rigorous evaluation should be an integral component if accreditation is incorporated into future legislation.

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1. GOAL

The goal of this three-year pilot project was to evaluate the effectiveness of an accreditation process for adult care homes (also referred to as assisted living [AL]) across the state of North Carolina. This project studied the effectiveness of accreditation through an evaluation of quality outcome measures and compliance with licensure requirements to determine whether accreditation improves or maintains quality of care compared to a control group. The Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill conducted data collection and analyses. Accreditation was overseen by the Accreditation Commission for Health Care (ACHC), and a Community Stakeholder Advisory Group provided guidance.

Methodologically, the goal of the project was to engage a maximum of 150 diverse AL communities, randomize one-half to an accreditation arm and one-half to a control arm, and obtain data on change in care and resident outcomes quarterly for 2½ years (7/1/22 through 12/31/24), and change in compliance with licensure requirements for slightly less than four years using secondary data available from 11/1/21 through 8/31/25. It was intended that the number of communities in both arms be equivalent, and that diversity be reflected in payor source, Star (quality) rating, and related characteristics. Care and outcomes were evaluated in five categories: resident outcomes and care coordination/transitions (health care related), resident outcomes and care coordination/transitions (psychosocial related), person-centered care, medication management, and workforce. Compliance with licensure requirements was evaluated by adherence to mandatory staffing levels (a measure of workforce) and the identification of deficiencies by the North Carolina Department of Health and Human Services (NC DHHS) Division of Health Service Regulation and county Departments of Social Services.

This final report of the Evaluation of Quality Outcome Measures details the methods (including recruitment, enrollment, participation, and statistical analyses) and quality outcome data and results. The subsequent Evaluation of Effectiveness Report, available October 2025, will provide details related to the accreditation process and further evaluation of the effectiveness of accreditation (including post-hoc power analysis and non-inferiority analysis) and data related to compliance with licensure requirements.

2. ACCREDITATION

The Accreditation Commission for Health Care (ACHC) offered communities that were randomized to the accreditation arm the opportunity to obtain a nationally recognized validation of excellence in delivering care and services in a residential community setting. Through a comprehensive and objective survey process, ACHC evaluated adherence to established care practices, safety protocols, and compliance with laws and regulations. The process included a thorough review of communities and compliance with Life Safety Codes.

Before beginning the survey process, ACHC provided each community the accreditation standards, which are inclusive of the rules and statutes set forth by the NC DHHS. In addition, ACHC recorded a webinar for Survey Preparedness made available to each community to

introduce administrators and staff to accreditation and ACHC's survey process. ACHC also developed a series of ten provider education webinars that reflected the five categories for which the communities were collecting and reporting data (i.e., resident outcomes and care coordination/transitions [health care related], resident outcomes and care coordination/ transitions [psychosocial related], person-centered care, medication management, and workforce). The intention of the webinars was to provide tips for implementing a quality Performance Improvement (PI) Program to measure, report, and compare outcomes to improve residents' care/services, satisfaction, quality of life, operational efficiencies, and staff satisfaction. The goal for communities that were successful in achieving accreditation was that they use ACHC resources to improve practices and promote better resident outcomes. All webinars were sent via an email link to download the presentation and provide a print version to AL employees and/or as in-service training to display on a screen. The webinars were recorded allowing administrators to provide the educational content at their own pace.

ACHC's standards extend beyond NC DHHS rules and statutes to include a section on Quality Outcomes and PI. They apply to the planning and implementation of a PI program, which must include who is responsible for the program; the activities being monitored; the process of data compilation; and corrective measures developed based on the data and outcomes. Also, ACHC requires the creation and implementation of a written Policy and Procedure document for many daily activities/tasks that may be considered common practice; this process minimizes the risk of misunderstanding a process, task, or order of events, as having a written policy and/or procedure leaves little room for misinterpretation. Examples of such processes are:

- Orientation process that describes in detail what the orientation covers and requires for each employee as per their job description;
- Competency assessment program for the care/services provided by direct care personnel, completed initially and ongoing for any new task and documented annually;
- Education plan that defines the content and frequency of evaluations and amount of in-service training for each classification of personnel;
- Performance evaluations for all personnel based on job descriptions and job performance, including follow-up on issues or need for further education/training; and
- Assurance that personnel who transport residents have the appropriate license to drive the vehicle being operated, which is evaluated initially and then at least annually.

3. METHODS

Sample. The sampling frame for the project included 564 AL communities identified from the directory of the NC DHHS that were operating and assigned a Star rating as of May 2022. To include a broad and representative sample, sampling was stratified based on both geographic region and state-assigned quality Star rating.[1] First, the proportion of all communities as per their representation in the three adult care licensure branches was determined. The branches are shown in **Exhibit 1**.

[1] NC Division of Health Service Regulation Adult Care Licensure Section. Star Rating Program. https://info.ncdhhs.gov/dhsr/acls/star/index.html

Exhibit 1. Adult Care Licensure Branches

Second, within each region, AL communities were stratified based on two groups of Star ratings: 0-2 (lower quality) and 3-4 (higher quality), resulting in six strata. Then, up to 150 communities were randomly selected for participation proportionate to (a) the number of communities represented by the branch, and (b) the number of communities represented by Star rating stratum within the branch. (Note: the maximum/target number to be recruited was 150; as described later in the document, 146 were recruited during the recruitment period).

Exhibit 2 provides the number and proportion of communities in the state across branches and by Star rating, as well as the related target number of communities within each branch and stratum. For example, the western region included 34% of all communities, and of those, 18% were of lower quality and 82% were of higher quality. Therefore, the study sought to enroll 51 communities from the western region (i.e., 34% of 150), 9 of lower quality (i.e., 18% of 51) and 42 of higher quality (i.e., 82% of 51). Recognizing the low representation of communities with 0-2 stars across the entire sample (N=35), recruitment allowed that the target number for those communities be met or exceeded in the three related strata.

Exhibit 2. North Carolina Assisted Living Communities, by Branch and Star Rating (N=564)[a]

Branch	Number and Percent of Communities, by Branch	Star Rating Stratum	Number and Percent of Communities Within Branch, by Stratum	Target Number of Communities (Overall N=150)	
				Target by Branch N (%)	Stratum Target N (%)
Western	192 (34.0%)	**Star 0-2**	34 (17.7%)	51 (34.0%)	9 (17.6%)
		Star 3-4	158 (82.3%)		42 (82.4%)
Central	157 (27.8%)	**Star 0-2**	28 (17.8%)	42 (27.8%)	7 (16.7%)
		Star 3-4	129 (82.2%)		35 (83.3%)
Eastern	215 (38.1%)	**Star 0-2**	72 (33.5%)	57 (38.1%)	19 (33.3%)
		Star 3-4	143 (66.5%)		38 (66.7%)

[a] Number of communities as of May 2022.

<u>Eligibility</u>. To be eligible for participation, an AL community had to be licensed by the state of North Carolina and have a Star rating as of May 2022. Communities were not eligible for participation if they planned to close (or had already closed) at the time of recruitment, were currently accredited or were already participating in an accreditation program, were considering pursing accreditation through an alternative accrediting body during the three-year period of study, or did not agree to be randomized into the control or accreditation arm.

<u>Recruitment</u>. The North Carolina Senior Living Association (NCSLA) and the North Carolina Assisted Living Association (NCALA) distributed materials to their membership about the project, encouraging participation if communities were invited to participate; other stakeholder organizations and individuals did the same. Informational material included a one-page overview of the project, a more detailed two-page description, and a website that included a video presentation. It was also made clear that communities would be provided $500/quarter in recognition of the time and effort to compile information for the evaluation.

Project analysts randomly numbered AL communities within each stratum to determine the order in which to solicit participation; once selected, a mailing was sent via postal mail, followed by a telephone call from a research team member approximately five business days later. Within the ensuing four weeks, team members placed up to eight follow-up contacts by telephone and email (no more than three contacts per week) to discuss the project and solicit participation.

Communities within each stratum were recruited on a rolling basis, allowing for an initial 50% refusal rate. Based on the observed rates, additional invitations were sent to 25% of the remaining communities per stratum (excepting communities in the eastern branch, which were already reaching target numbers of participation). Once the target number of communities within a stratum was reached, active outreach was discontinued and an offer was made to non-responding communities to be included on a waitlist in the event any communities withdrew. In total, 368 of the 564 communities across the state were invited to participate in the project (65%). Details of participation by stratum are provided in the Results section. After communities were recruited, they were randomly assigned to either the control or accreditation arm.

<u>Measures</u>. The outcomes of interest were prescribed in the state legislation and relate to five categories: resident outcomes and care coordination/transitions (health care related); resident outcomes and care coordination/ transitions (psychosocial related); person-centered care; medication management; and workforce.

<u>Measurement tools</u>. Measures to assess the outcomes were drawn from two types of sources.

- *Measures used to monitor quality in long-term care*, such as defining falls and emergency department visits consistent with definitions used in nursing home quality monitoring; deriving categories of staffing and medication errors consistent with NC licensing regulations; and measuring satisfaction and staff turnover using the measure developed by the American Health Care Association/National Center for Assisted Living (AHCA/NCAL)
- *Measures used in research to assess long-term care and outcomes*, such as direct care worker job satisfaction, burnout, social activity, and person-centered care

Data source and frequency. Depending on the item, the data were obtained from the most appropriate data source -- resident chart/record review, observation, administrative records, or questionnaires -- and were obtained either quarterly or twice a year. AL staff compiled the information from charts and records, conducted the observations, and distributed the questionnaires; they were reimbursed $500/quarter for their time and effort in Quarters 1-8 and $1000/quarter in Quarters 9 and 10, in recognition of their ongoing commitment. The text below summarizes the items based on frequency of data collection and source; **Exhibit 3** (next page) provides details about all items.

Data collected quarterly:

- *Resident chart/record review*: Resident charts/records were reviewed quarterly in relation to falls with major injury, emergency department visits, unplanned hospital admissions, rehospitalization within 30 days, advance care planning discussions (for new residents), and discharge due to behaviors for residents with dementia.
- *Observation*: An observation of medication administration for five residents randomly selected by the research team was conducted quarterly.

Data collected twice a year:

- *Administrative records*: Administrative records were reviewed twice a year in relation to consistent assignment, staffing levels, and six-month staff turnover.
- *Questionnaires*: Every six months, all direct care staff (including registered and licensed nurses) and 15 residents randomly selected by the research team (or a family member, if the resident was unable to reply) were invited to complete a questionnaire related to satisfaction and stress (staff), and satisfaction, psychosocial well-being, preferences, and person-centered care (residents/families). Administrators were asked to distribute a printed questionnaire or hyperlink/QR (Quick Response) code for electronic access to the questionnaires, encouraging electronic completion and submission for staff and families.

Data collection and cleaning. A dedicated research team member was assigned to each community for all communication related to data collection. At the launch of the project and every quarter, the team member emailed each AL administrator a customized manual that included instructions and data collection forms. Administrators were asked to see that completed forms were returned within eight weeks of the end of the quarter, by either postal mail, fax, or electronically (including completion of Qualtrics forms). Throughout that time, research staff had multiple contacts with administrators by telephone and email to provide reminders and respond to questions.

Because the staff, resident, and family questionnaire data were of a confidential nature, respondents were asked to provide the information directly to the research office via Qualtrics (confidential online survey software), or to deposit the questionnaire in a sealed envelope to be sent to the research office by the AL administrator. Completion of forms by Qualtrics was strongly encouraged, and if this procedure was not followed, research team members stressed it for future quarters. An analysis was undertaken to determine if these occurrences affected data quality (see *Protocol Violation Data Submission Analysis* section below).

Exhibit 3. Measures, by Category and Indicator, Data Source/Frequency, and Item/Tool/Source

Category and Indicator	Data Source, Frequency	Items/Tool/Source
Resident Outcomes and Care Coordination/Transitions: Healthcare Related		
Falls with Major Injury	Chart/record review; quarterly	Number of residents who had a fall that resulted in major injury during the quarter (bone fractures, joint dislocations, closed head injuries with altered consciousness, subdural hematoma) *(derived from Skilled Nursing Facility Quality Reporting Program Measure Calculations and Reporting User's Manual 3.0)*
Emergency Department Visits		Number of residents having an emergency department visit that did not result in an outpatient observation stay or inpatient hospital stay during the quarter *(derived from Nursing Home Compare and AHCA/NCAL)*
Unplanned Hospital Admissions		Number of residents who spent one or more nights in a hospital for either admitted or observation stays during the quarter *(derived from AHCA/NCAL)*
Hospital Readmissions within 30 Days		Number of residents sent back to the hospital within 30 days of admission/return to the community directly from the hospital in the last quarter; includes observation and admissions for any reason *(derived from AHCA/NCAL)*
Advance Care Planning Discussions		Number of new admissions for whom an advance care planning discussion was held regarding health care decisions during the quarter
Discharges due to Behaviors		Residents with dementia discharged due to behaviors during the last quarter
Preparation for Care Transitions	Resident/family questionnaire for 15 residents; twice/year	Care Transitions Measure (3-item scale) assessing preferences and understanding during transitions for residents who had an emergency department visit or hospitalization *(endorsed by National Quality Forum; Coleman et al. Med Care 2005;43:246-255)*
Resident Outcomes and Care Coordination/Transitions: Psychosocial Related		
Social Engagement	Resident/family questionnaire for 15 residents; twice/year	Assisted Living Social Activity Scale (11-item scale of activities in last week; sample item "playing cards, bingo, games") and two items related to days visiting or talking on the telephone with family and friends *(Zimmerman et al. Soc Work Res, 2003;27:6-18)*
Satisfaction		COREQ Satisfaction (3-item scale for families and residents; sample item "overall, how do you rate the staff") *(AHCA/NCAL tool,* endorsed by *National Quality Forum)*
Person-Centered Care		
Well-Being and Belonging, Individual Care and Services, Social Connectedness, Homelike Atmosphere	Resident/family questionnaire for 15 residents; twice/year	Person-Centered Climate Questionnaire (17-item scale; sample item "staff takes notice of what I say") *(Yoon et al. Arch Gerontol Geriatr 2015;61:81-87)*

Exhibit 3. Continued

Category and Indicator	Data Source, Frequency	Items/Tool/Source
Medication Management		
Medication Review/ Errors	Observation of 5 residents; quarterly	Errors related to confirming resident identity; medication omission; error related to medication name, form/route, dose, time; significant error (based on resident condition, drug category, and frequency of error) *(derived from North Carolina Licensing of Adult Care Home Regulations 10A NCAC 13G.1004 (a(13F.1001)*
Workforce		
Consistent Assignment	Administrative records; twice/year	Number of direct care workers a resident had in a specified week, including personal care aides, nursing assistants, and similar titles who work full shifts, partial shifts, have numerous care responsibilities, or provide select care such as bathing or at mealtime; licensed staff are included only if they are working in the capacity of an aide/assistant *(based on Advancing Excellence Consistent Assignment Tracking Tool)*
Staffing Levels		Number of hours worked per shift within staffing categories on a specified day, separated as to whether onsite, within 500 feet of building and immediately available, or on call but not within 500 feet of building (*derived from North Carolina Licensing of Adult Care Home Regulations 10A NCAC 13F)*
Turnover		Number of full- and part-time staff within staffing categories employed at any time during a six-month period minus the number employed the entire period compared to the number employed on the last day of the period (*derived from AHCA/NCAL LTC TrendTracker)*
Satisfaction	Questionnaire; twice/year	Direct Care Worker Job Satisfaction Scale (16-item scale; sample item “satisfaction with the attention paid to suggestions you make”) *(Farida et al. Gerontologist 2008;48:60-70)*
Stress/Burnout		Burnout (single item with five responses, ranging from “I enjoy my work; I have no symptoms of burnout” to “I feel completely burned out and often wonder if I can go on”) *(Dolan et al. J Gen. Intern Med 2015;30:582-587)*

As data were submitted, the research team reviewed them for accuracy using a data cleaning protocol developed by the investigative team. If inaccuracies were detected (e.g., a value that was implausible, missing, or out of range), the research team conferred with the administrator and obtained updated information. An additional cycle of data cleaning was conducted before data entry, and at that point revisions were requested from administrators if necessary. Data (other than those submitted via Qualtrics) were double entered prior to analysis. All methods and materials were approved by the University of North Carolina Institutional Review Board.

Analyses. Of the target number of 150 communities, 146 communities were randomized to either the control or accreditation arm, and as detailed in the results section, 55 of 73 in the control arm and 58 of 73 in the accreditation arm submitted data for at least one quarter of the

study (113 participating communities in total). Of these, 53 control arm and 55 accreditation arm communities provided information about baseline organizational characteristics (e.g., licensed beds, resident case mix, staffing ratios). Descriptive tables and figures reflect the 113 communities that ever participated (i.e., provided data) rather than the number of communities initially randomized, and present the mean and standard deviation (SD) for continuous variables, and number (N) and percent of categorical variables.

Comparison of recruited/randomized communities per arm. There were no statistically significant differences between the 146 recruited/randomized communities that were allocated to arms based on randomization variables (Star rating and region) or chain affiliation.

Treatment of missing data. All available data were analyzed and missing data were not imputed. Although every effort was made to encourage communities to provide data each quarter, communities were included in analysis even if they had submitted data for only one quarter, and/or subsequently dropped out before the end of the study. When deriving scale scores, if more than 25% of items were missing, the scale score was treated as missing; if fewer than 25% of the items were missing, the score was calculated as the mean of the non-missing items.

Attribution of "accredited condition". Within the accreditation arm, accreditation status or condition (accredited versus not accredited) was evaluated on a quarter-by-quarter basis. If a community was accredited for at least 45 days during the quarter, it was considered to be accredited as of that quarter and all subsequent quarters (as no accredited communities lost their accreditation). To allow comparison not only by arm (control arm versus accreditation arm, in an intent-to-treat analysis), comparisons also were made within the accreditation arm, of communities that had become accredited to communities that had not yet become accredited (i.e., accredited condition versus not accredited condition; per protocol analysis). Because no communities were accredited before Quarter 4, descriptive tables indicate Not Applicable (NA) in relation to "accredited condition" for Quarters 1-3. Five communities began but did not complete the accreditation process. In all analyses and in all quarters these communities are considered to be in the accreditation arm, not accredited condition.

Quality outcome analyses. The data tables in Appendix II display both descriptive statistics and results from longitudinal models for all outcomes. All descriptive tables show results by quarter (1-10 for some outcomes, and odd quarters for outcomes with twice yearly reporting), study arm (control or accreditation), and condition within arm for the accreditation arm. For descriptive statistics with only one community providing observations in a given quarter by arm/condition, confidence intervals (CI) for means and proportions are not generated given the need for CIs to be constructed using variances that adjust for between-community variability.

For data provided by residents and families, 15 randomly selected residents (or their family members if the resident was unable to provide data), were invited to respond. In the few cases in which more than 15 questionnaires were returned by a community in a given quarter, resident questionnaires were prioritized, and family questionnaires were then randomly

selected from the total submitted until a total of 15 combined questionnaires was reached. In the very few instances in which more than 15 resident forms were submitted, questionnaires were randomly selected until a total of 15 questionnaires was reached. Resident and family questionnaire tables display the number of residents and family members who submitted data, and the number of communities with residents and family members who submitted data.

Detailed information regarding variable construction and descriptive table display for each of the categories is provided below.

Resident Outcomes and Care Coordination/Transitions: Health Care Related. Resident record review tables include a column showing the numerator (number of residents for which the outcome occurred) and the denominator (the total number of residents for which the outcome could have occurred) for each arm/condition. The ratio is also displayed as a percent, with the 95% CI. The preparation for care transitions measure is an average of three items. For each respondent, the numeric responses are summed [1 (strongly disagree), 2 (disagree), 3 (agree), 4 (strongly agree)] and divided by the number of items that were answered; means and 95% CIs are reported by quarter and arm/condition.

Resident Outcomes and Care Coordination/Transitions: Psychosocial Related. For the *Social Activity Scale*, for each respondent the raw score is the total number of "yes" responses to the 11 items that ask for a "yes" or "no" response. This number is divided by the number of items that were answered to determine the percent of "yes" responses. Means of these percents and 95% CIs are reported by quarter and arm/condition. The *number of days the resident had a visitor* and *spoke with family or friends on the telephone* in the past two weeks are continuous variables with range 0 to 14 days; means and 95% CIs are reported by quarter and arm/condition. For the *satisfaction* questionnaire (the COREQ), the participant score is the average of three questions, ranging from 1 (poor) to 5 (excellent). The mean and 95% CIs are for all residents in a given quarter by arm/condition.

Person-Centered Care. The *person-centered care* measure has 17 items with six ordinal categories: 1 (disagree completely), 2 (disagree), 3 (partly disagree), 4 (partly agree), 5 (agree), 6 (agree completely). For each respondent, the numeric responses are summed and divided by the number of items that were answered. The means and 95% CIs are reported by quarter and arm/condition.

Medication Management. Medication management tables include a column showing a numerator and a denominator for each arm/condition. Their ratio is also displayed as a percent, with the 95% CI. For three of the tables the numerator is the number of residents for which the outcome occurred and the denominator is the total number of residents for which the outcome could have occurred. For the table "*Percent of medications administered with any errors*," the numerator is the number of medications for which errors occurred and the denominator is the number of medications for which errors could have occurred.

Workforce. Among the workforce tables, the *Consistent assignment* table shows the mean and 95% CI for the number of caregivers per resident per week by quarter and arm/ condition. Communities were asked how many residents had 3 caregivers per week, how many had 4 per week, and so on with the final option being 31 or more caregivers (treated as 31 when calculating the mean). The number of communities and residents for whom data were reported each quarter and by arm/condition are represented in this table.

For *staffing levels*, the outcome was the proportion of shifts with staffing regulations met for each staff type (care aides, supervisors, administrators, and care coordinators) and setting (traditional units and special care units) on the Monday of the last week of the quarter. Descriptive percentages were estimated over all communities for each quarter and treatment arm (and separately, for time-varying accredited and not accredited conditions within the accreditation arm), with the number of possible shifts for each community ranging from 0 to 3. *Staff turnover* tables show the mean and 95% CI of six-month staff turnover by (odd-numbered) quarter and arm/condition, reported for five types of employees: care aides, medication aides, nurses, administrators, and directors/care coordinators. It was calculated as the number of those employed at any time during a period minus the number of those employed for the entire period divided by the number of those employed on the last day of the period, with the result multiplied by 100 to obtain a percentage that can take values in excess of 100 (higher values indicating more turnover). The number of communities submitting data with and without that staff type by quarter and arm/condition is also presented. *Staff satisfaction* is measured using a 16-item validated scale, each item rated on a 4-point Likert scale from "very dissatisfied" (1) to "very satisfied" (4); the mean of all items was computed, yielding a score between 1.0 and 4.0 and treated as a continuous variable. Descriptive tables display the mean and 95% CI of the mean for each quarter and arm/condition, where the mean of staff means is derived. *Staff burnout* is a single item rated on a 5-point scale, with each response describing a different level of burnout. Consistent with the validated measure, responses are dichotomized as 3 to 5 indicating burnout, and 1 or 2 indicating no burnout. For purposes of descriptive statistics, the mean and 95% CI of the raw score by quarter and arm/condition are calculated; tables display the mean and 95% CI of the mean for each quarter and arm/condition, where the mean of means is derived.

<u>Longitudinal models</u>. Outcomes aggregated at the community and quarter level are compared over time between arms and conditions using longitudinal models, specifically, logistic regression for binomial outcomes (i.e., dichotomous outcomes at the individual level), loglinear Poisson regression for count outcomes, and linear regression models for continuous outcomes. For each model with a categorical outcome, aggregated outcomes consist of a numerator and a denominator. For binomial outcomes, the numerator is the number of individuals with an event and the denominator is the number who could have had the event. For count outcomes, the numerator is a count of individuals with an event and the denominator is the number of exposure units that were often a count of individuals. For outcomes measured on a continuous scale, the aggregate outcome is the mean of individual scores that were often scales (themselves, a mean of items) with the number of respondents in the community and quarter as an analysis weight. For most statistical analyses, large sample estimation methods were used

(generalized estimating equations) for population average models that accounted for the repeated measures of community-aggregated outcomes over time. For sparsely distributed binomial outcomes, in which events almost always occurred or almost never occurred, exact inferential methods were needed to obtain reliable estimates of odds ratios and their CIs; these instances are indicated in results tables.

Owing in part to the diminishing number of communities in the study over time and to accommodate both quarterly and twice yearly data, the 10 quarters of follow-up data collection were divided into three periods. Period 1 includes data from quarter one, a true baseline data collection period as the data related to the quarter before randomization of communities was complete. Period 2 includes data from quarters 2 and 3, when communities in the accreditation arm were able to begin the accreditation process, but none had completed it. Period 3 includes data collected from quarters 4-10, the period when accreditation arm communities that completed the accreditation process became accredited. The models include the main effects of period as a categorical variable (so as to adjust for baseline in the first quarter), treatment arm, and their interaction. A caveat is how the interaction is handled in period 3. In particular, the interaction term includes an indicator variable for condition within the accreditation arm, to distinguish quarterly outcome data between communities that are not accredited from communities that are accredited (as well to distinguish those quarters for a community when not accredited from the quarters when the same community had become accredited).

Determination of adjustment variables. When performing comparative longitudinal analyses between arms and conditions, adjustments were made for the design variables -- region and baseline Star rating -- in the primary model. Adjusting for design (i.e., stratification) variables generally reduces variability of the estimates from longitudinal models. Beyond that, it is advisable to adjust for characteristics that differ between arms at baseline. To identify those characteristics, descriptive data obtained at baseline for participating communities (Appendix I; Table i) were examined to determine any that varied ≥ 15% and had an absolute value ≥ 2 (or 2%). One variable met that criterion: *percent of residents with dementia*, which varied between arms by exactly 15 percent. *Community size* was chosen as an additional adjustment variable; although it did not meet the criteria above, it is commonly used to reflect other unmeasured sources of variation (e.g., type and variety of staff and services).

For most outcomes, there were sufficient data in each period and arm/condition to fit models for two degrees of adjustment for explanatory variables. The “primary model” adjusts for only the design variables, region (eastern, central, western) and baseline Star rating (low or high), which were the variables used for balanced randomization. Adjusting for these design variables generally improves precision and lowers variability of estimates. It also provides some adjustment for imbalances due to dropout. The “adjusted model” additionally adjusts for the size of the community and percentage of residents with dementia (both continuous variables). Unless otherwise noted, models made the working assumption that the correlation for outcomes within an AL community were similar across all pairs of time points within a community; nonetheless, the analysis approach (generalized estimating equations with “robust” standard errors) provides valid results even if this assumption does not hold.

Detailed information regarding longitudinal analyses for each category of data is provided below.

Resident Outcomes and Care Coordination/Transitions: Health Care Related. For the six resident record review outcomes, multivariable logistic regression models were fitted to binomial-like repeated measures data consisting of one record per community per quarter using “events/trials” syntax with numerator ‘events’ and denominator ‘trials’ calculated separately for residents (in aggregate) in communities and quarters such that the data structure for analysis is at the community level in each quarter. Tables show odds ratios and 95% CIs for the odds ratios for the contrasts described below (at the beginning of the section titled _Methodologic analyses_) as well as associated p-values. (See next section for analyses related to preparation for care transitions.)

Resident Outcomes and Care Coordination/Transitions: Psychosocial Related and **Person-Centered Care**. For outcomes related to resident- and family-reported *social activities*, *telephone calls and visits*, *satisfaction*, *person-centered care*, and *preparation for care transitions* (a health care related indicator), multiple linear regression models were fitted to repeated measures data consisting of one record per community per quarter with the mean response averaged over respondents within a community for each quarter and with number of respondents as analysis weight. Tables display model-estimated differences in means and associated 95% CIs and p-values.

Medication Management. Exact logistic regression with “events/trials” syntax was used for medication data because event counts were extremely small (generally fewer than 5 per quarter and arm/condition). Odds ratios are reported with 95% CIs and p-values. Due to the sparseness of the data, adjustment variables (i.e., region and star rating) were unable to be included in models, and periods 2 and 3 were combined, resulting in a comparison between the accreditation arm and control arm in period 2-3, controlling for baseline (quarter 1). An additional model estimated the differences between the not accredited condition and accredited condition in period 2-3, controlling for baseline. These are unstratified models for longitudinal data that did not adjust for community effects given the extremely small event counts.

Workforce. *Consistent assignment* -- the average number of caregivers per resident in a given week -- was modeled as counts of caregivers and used Poisson regression to estimate rate ratios defined as the ratio of the mean number of caregivers per resident between two groups. An offset term for the log of the total number of residents was included to account for differences in resident population size across sites and time periods. Rate ratios were adjusted for baseline caregiver rates by including interaction terms between intervention status and time period. For *staffing levels*, multivariable longitudinal logistic regression was run for the outcome that was the proportion of shifts with staffing regulations met for each staff type: care aides, supervisors, administrators, and care coordinators. Due to different legislative requirements for traditional units and special care units, models were run separately for each. Generalized estimating equations (described above in the _Longitudinal_

models section) were used to fit logistic regression to "primary" and "adjusted" models for all outcomes, with one exception due to sparse data: a single unadjusted model estimated with exact inferential methods was used for supervisors as they always met staff regulations at baseline, and almost always met regulations at follow-up quarters.

Data for *staff turnover* were modeled longitudinally as a rate ratio using Poisson regression. The numerator for the rate was the number of staff working at any time in the six-month period minus the number of staff working for the full six-month period, within a community. The denominator was the number of that type of staff employed at the end of the six-month period, using 0.5 as the denominator if the actual value was zero. For the linear models estimating differences in mean *staff satisfaction*, the mean score within each community-quarter was calculated, and the sample size was used a weight. For the logistic models estimating odds ratios of *burnout*, the numerator (number of staff burned out) and denominator (total number of staff) for each community-quarter was calculated.

Methodologic analyses. Three considerations were used to identify potentially important outcomes in the assessment of statistical differences in the longitudinal model analysis. Two additional methodologic analyses examined data quality to broaden the overall evaluation of the study and better understand the robust nature of the results.

1. Considerations of statistical differences based on longitudinal model analyses. For each outcome, four contrasts are reported for the relevant statistic (odds ratios, rate ratio, or difference in means, corresponding to dichotomous, count and continuous outcomes, respectively): (i) between the accreditation arm versus the control arm in period 3 (the intent-to-treat comparison); (ii) between the accredited condition versus the control arm in period 3 (omitting quarters from accreditation arm communities when they were in the not accredited condition); (iii) between the not accredited condition versus the control arm in period 3; and (iv) between the accredited condition versus the not accredited condition in period 3 (the per protocol comparison). The 95% CI for those statistics and a p-value are additionally reported. Three complementary strategies are used to ascertain important outcomes for contrasts (i) and (iv), which are referred, respectively, as the *Intent-to-treat* and *per* p*rotocol* comparisons:

   - *Statistically significant results*. In all models (and for all four contrasts), a statistical difference in study arms or conditions is identified for a contrast with p-value < 0.05.
   - *Other results*. In an exploratory manner, intent-to-treat and per protocol results are flagged as "notable" based on their estimated effect size, irrespective of their statistical significance. From logistic and Poisson models, an odds ratio (rate ratio) greater than 1.25 or less than 0.8 is declared "notable," which are equivalent in magnitude in that one is the inverse of the other. In linear models, an estimated effect is considered "notable" when the estimated difference between arms or conditions exceeds 10% of the possible range of the scale in absolute value.
   - *False discovery rate (FDR) analysis*. Contrasts (i) and (iv) were produced from longitudinal models fitted for 31 outcomes, thus prompting consideration for multiple

comparison adjustments in the determination of statistical significance. That is, given such a large number of outcomes, some p-values < 0.05 may be expected by chance alone. The FDR methodology as discussed by Benjamini & Hochberg[2] was used with overall *alpha* = 0.20 to determine which contrasts would be considered significant; here *alpha* is defined as the probability of falsely rejecting the null hypothesis of no group differences for an outcome. Specifically, the FDR methodology was applied to the intent-to-treat and per protocol results (comparing the accredited condition versus the not accredited condition) using the p-values from the primary model because as described above, in a few instances models had too small a sample to include the additional covariates. Result: Upon application of the FDR procedure, no new contrasts were identified as significant, nor was having performed multiple comparisons found to have inflated the number of significant p-values relative to the FDR results.

2. Data validation analysis. Because many of the outcome data were provided by the community administrator, a validation analysis was conducted of select data by the research team. Specifically, members of the research team visited 12 communities after Quarter 5 and abstracted chart data for six of the Resident Outcomes and Care Coordination/Transitions (Health Care Related) indicators: falls with major injury, emergency department visits, unplanned hospital admissions, hospital readmissions within 30 days, advance care planning discussions (new residents), and discharges due to behavior. These data were then compared to the Quarter 5 data provided by the administrator. The correlation between the provided and the validation data was positive in all cases except percent of residents with emergency department visits (Pearson r=-0.23, Spearman r=-0.21). The research team noted that their dependence on charts may have missed knowledge that the administrators had that was not documented in charts (resulting in undercounting) or may not have known details of an event (such as if a hospitalization was planned), resulting in overcounting.

The research team also interviewed residents to collect data on two of the Resident Outcomes and Care Coordination/Transitions (Psychosocial Related) indicators (satisfaction and participation in social activities) as well as person-centered care. Because the individuals they interviewed were not necessarily those who provided data during Quarter 5, comparative analyses were conducted at the level of the community using data from all quarters to maximize the sample size. Analyses indicated that the overall mean scores were consistently higher in the data provided by the community compared to the validation data; for example, data provided by the community indicated an average person-centered care score of 4.9 compared to the validation score of 4.6. Further, the CIs did not overlap, indicating a potential difference between the sources. The correlations between the two sources were positive for satisfaction (Pearson r=0.35) and person-centered care (r=0.49), but negative for social activity participation (r=-0.35). The lack of agreement could be due to different data collection methods (i.e., interview by a research data collector), small sample sizes, or having interviewed a different sample altogether. Result: Validation analyses found that the data provided by the

[2] Benjamini Y, Hochberg, Y. Controlling the false discovery rate: A practical and powerful approach to multiple testing. J R Stat Soc Series B Stat Methodol. 1995;57(1):289–300.

administrators could be validated/substantiated in the broad sense of five of six variables having positive correlations. However, data provided by potentially different residents at two different points of time could not be substantiated.

3. Protocol violation data submission analysis. In Quarters 3 and 5 of the project, between one-third to more than two-thirds of the staff questionnaire data and resident and family data were not submitted according to the protocol for confidentiality -- that being to place completed forms in a sealed envelope and mail them to the research office or by completing a confidential Qualtrics survey. Instead, administrators faxed or emailed many of the forms to the research office or mailed them in batch. Analyses were conducted to determine whether resident and family responses to questions related to participation in social activities, telephone calls and visits, satisfaction, preparation for care transitions, and person-centered care, and staff responses to satisfaction and burnout, differed between communities with and without protocol violations. If a community had any violations for a form in a given quarter, it was considered to be a "violation" community in this analysis; however, there were often a mix of forms submitted with and without violations from the same community.

Means and standard deviations were calculated for each outcome, comparing communities that did not and did have a protocol violation, and also comparing outliers. Result: Overall, protocol violation status was not associated with outcomes. Only three of the resident and family outcomes showed statistically significant differences, two of them being in the opposite direction from what one would expect if communities had tampered with the data to appear more favorable: less participation in social activities and worse person-centered care was reported in violation communities. Few outliers were identified, and they were fairly balanced across groups. For staff outcomes, there was more evidence that outliers were most likely to be from the non-violation communities, but the group means were not significantly different.

4. RESULTS

The results section addresses recruitment of AL communities, enrollment and participation of communities, characteristics of participating communities, information about the communities in the accreditation arm that did and did not become accredited, and results related to the outcomes under study.

Recruitment. Recruitment was conducted 6/20/22- 9/12/22. Toward the aim of enrolling up to 150 AL communities, 368 of the 564 communities across the state were invited to participate (65%). Of these, 13 (4%) were ineligible: 11 had closed or planned to close, and 2 were already accredited or participating in an accreditation program.

During recruitment, 146 of 355 eligible communities agreed to participate before the recruitment period closed (41% of those solicited, 97% of the number desired). Of the 209 eligible communities that did not agree to participate, 24 (11%) refused (largely due to time demands), 48 (23%) were no longer needed due to stratum quotas being filled, and 137 (66%) remained pending at the end of enrollment (i.e., had not agreed nor refused to participate). Per

stratum, the percent of communities initially recruited as per the targeted number ranged from 79% (stratum 5, eastern region, 0-2 stars, in which 15 of 19 targeted communities were enrolled) to 133% (stratum 1, western region, 0-2 stars, in which 12 of 9 targeted communities were enrolled, reflecting willingness to exceed targeted numbers in strata with lower stars); see **Exhibit 4**.

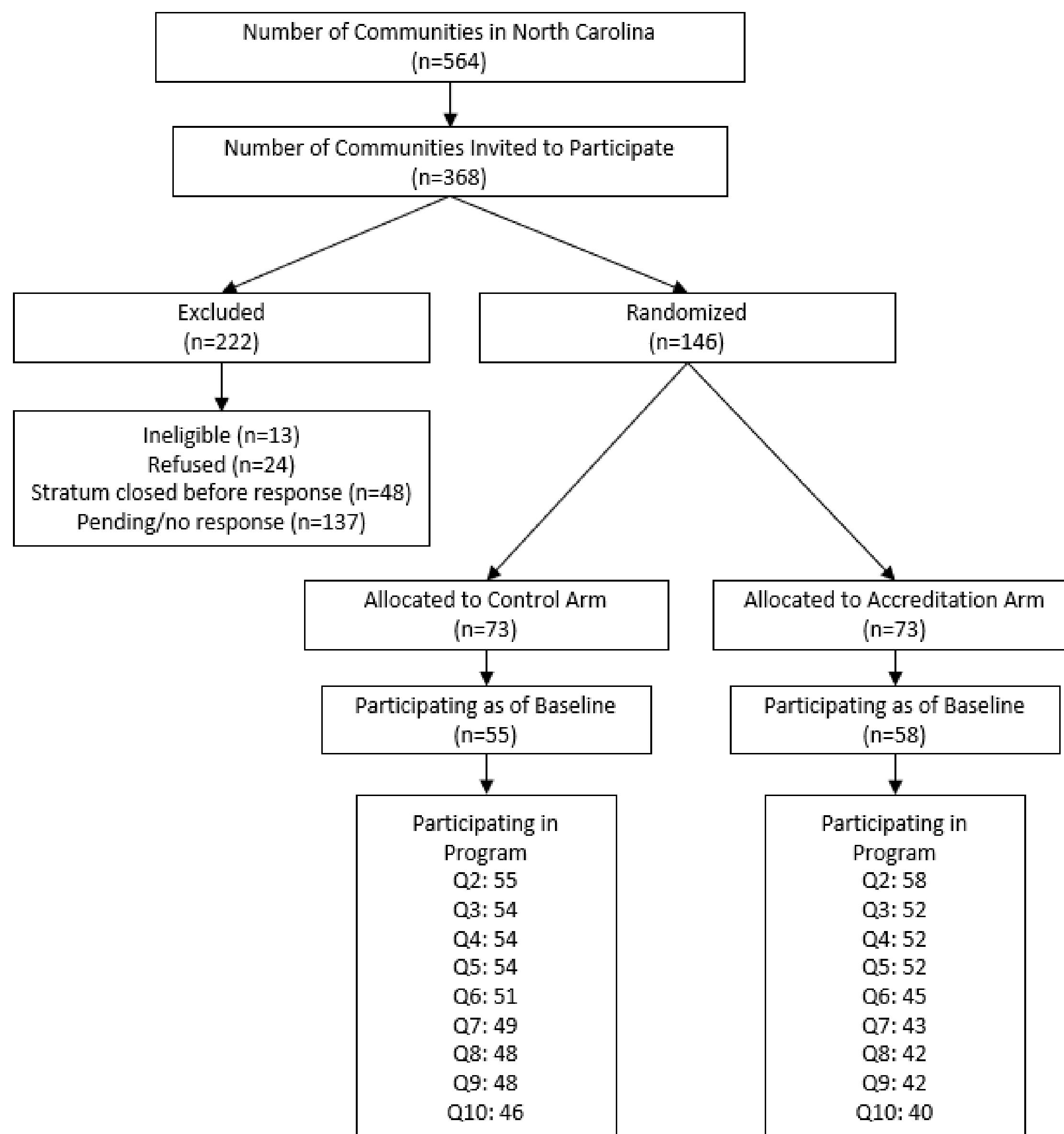
Exhibit 4. Assisted Living Community Recruitment Target and Number (% of Target) Recruited, by Stratum

Branch[a]	Stratum[a]	Target Number[b]	Number (%) Recruited[c]
Western	1 (0-2 Stars)	9	12 (133%)
	2 (3-4 Stars)	42	38 (90%)
Central	3 (0-2 Stars)	7	6 (86%)
	4 (3-4 Stars)	35	43 (123%)
Eastern	5 (0-2 Stars)	19	15 (79%)
	6 (3-4 Stars)	38	32 (84%)
	Total	150	146 (97%)

[a] Branch refers to the adult care licensure branch; stratum is based on the North Carolina Star rating scale.
[b]Targeted number per branch was proportionate to representation across the state and within branch by Star rating.
[c]Number that agreed to participate in the project at the time of original recruitment.

Enrollment and participation. After recruitment, the 146 recruited communities were evenly randomized to the control and accreditation arms. Of the 73 communities randomized to each arm, those that actually enrolled (i.e., participated -- meaning they provided data in at least one of the ten quarters of data collection) included 55 in the control arm (75% of those randomized) and 58 in the accreditation arm (79% of those randomized). Some enrolled communities dropped out of the project before the completion of the tenth quarter of data collection. Drop out included communities asking to discontinue their participation, as well as those administratively withdrawn by the research team if they had not provided data for four consecutive quarters. Based on these criteria, the number of communities remaining in the project by the tenth quarter were 46 in the control arm and 40 in the accreditation arm (84% and 69% of those enrolled at baseline, respectively). See **Exhibit 5** for an illustration of recruitment, enrollment, and participation at each quarter of data collection.

Exhibit 5. Assisted Living Communities Recruited, Enrolled, and Participating throughout Project



However, not every enrolled community submitted data every quarter; for example, some communities asked to “skip” a quarter due to extenuating circumstances (e.g., a COVID-19 outbreak or administrator absence). **Exhibit 6** displays the number and proportion of participating communities that submitted data in each quarter of the project. In the first eight quarters, participation rates proportionate to the number of communities remaining in the project in each arm ranged from 66.7% to 98.2%, with most quarters exceeding 80%. Participation rates were lower in the last two quarters of the project (approximately 50%), perhaps because those two quarters were an extension to the project based on updated legislation.

Exhibit 6. Participating and Providing Data during Each Project Quarter, Overall and by Arm

Project Quarter	All Participating Communities	Control Arm Participating Communities			Accreditation Arm Participating Communities		
		Number	Percent of All Communities	Percent of Those in Arm	Number	Percent of All Communities	Percent of Those in Arm
1	104	49	47.1	89.1	55	52.9	94.8
2	106	54	50.9	98.2	52	49.1	89.7
3	89	44	49.4	81.5	45	50.6	86.5
4	89	45	50.6	83.3	44	49.4	84.6
5	84	42	50	77.8	42	50	80.8
6	66	36	54.5	70.6	30	45.5	66.7
7	80	43	53.8	87.8	37	46.2	86.0
8	63	33	52.4	68.8	30	47.6	71.4
9	45	24	53.3	50	21	46.7	50.0
10	41	21	51.2	45.7	20	48.8	50.0

Characteristics of participating communities. At baseline, communities were asked to submit detailed information about organizational, resident, and staffing characteristics. Organizational characteristics included items such as number of licensed beds, for-profit status, and number of years licensed; resident characteristics included age, race/ethnicity, and percent of residents with dementia, among others; and staffing characteristics included information about nurse staffing and care aide shift and staffing ratios, among others. Select characteristics are displayed overall and by control and accreditation arm in **Exhibit 7**; Table i in Appendix I displays a complete list of these characteristics. Of note, the complete list of characteristics indicates those used to compare the similarity of the participating communities, including determining the variables used in the "adjusted model" and the representativeness of the communities that successfully became accredited.

Exhibit 7. Select Community Characteristics at Initiation of Project, Overall and by Arm

Characteristic	All Communities (N=108)	Control Arm (N=53)	Accreditation Arm (N=55)
	N (%) or Mean (SD)		
Community Characteristics			
For profit	104 (96.3%)	50 (94.3%)	54 (98.2%)
Affiliated with another AL community	81 (75.0%)	36 (67.9%)	45 (81.8%)
Provide some memory care	57 (53.3%)	26 (49.1%)	31 (57.4%)
Contract with a LTC pharmacy or consultant pharmacist	107 (100%)	53 (100%)	54 (100%)
Electronic medical records	94 (87.0%)	45 (84.9%)	49 (89.1%)
Number of licensed beds	68.8 (29.1)	67.5 (30.6)	69.9 (27.9)

Characteristic	All Communities (N=108)	Control Arm (N=53)	Accreditation Arm (N=55)
	N (%) or Mean (SD)		
Staffing Characteristics			
Registered nurse on site	84 (77.8%)	40 (75.5%)	44 (80.0%)
Licensed practical nurse on site	12 (11.1%)	8 (15.1%)	4 (7.3%)
Mean care aide staffing ratio, morning	10.1 (3.3)	10.5 (3.7)	9.6 (2.8)
Mean care aide staffing ratio, evening	11.0 (4.0)	11.8 (4.8)	10.2 (2.9)
Mean care aide staffing ratio, night	13.9 (5.1)	14.7 (5.4)	13.1 (4.6)
Resident Characteristics			
Percent age 85 and older	33.2 (20.7)	31.0 (18.8)	35.3 (22.3)
Percent female	64.4 (18.4)	64.4 (16.5)	64.5 (20.3)
Percent White	76.9 (24.2)	77.4 (23.4)	76.5 (25.2)
Percent diagnosed with dementia	44.9 (35.7)	48.3 (37.8)	41.6 (33.5)
Percent with mental illness diagnosis	25.2 (22.0)	27.0 (23.5)	23.4 (20.6)
Percent receiving state financial assistance or Medicaid	51.9 (31.0)	55.1 (31.6)	48.9 (30.4)
Percent receiving medical care on site	95 (88.8%)	46 (88.5%)	49 (89.1%)

Notes: Of the 113 participating communities, 108 submitted baseline characteristic data; percent missing ranged from 0-6 across items. LTC: long-term care

Accreditation. During the course of the project, 30 communities received a survey from ACHC (41% of the 73 randomized communities and 54% of the 55 participating communities). Of those 30 communities, 25 completed the accreditation process by returning a plan of correction and becoming accredited (34% of the randomized communities and 45% of the participating communities). Analyses compared baseline community characteristics to determine whether the 25 communities that became accredited (i.e., were in the accredited condition) differed from communities in the control arm (N=53) and communities randomized to the accreditation arm but that did not become accredited (i.e., not accredited condition; N=30).

There were few statistically significant differences between communities in the accredited condition and others: of the 33 variables compared, only four were significantly different, two between the control arm and the accredited condition, and two between the accredited condition and not accredited condition.

- Accredited communities were less likely than those in the control arm to have a licensed practical nurse (LPN) on site or on call (0% versus 15-20%; $p<.05$).
- Accredited communities were less likely than those in the not accredited condition to have a registered nurse (RN) on call (76% vs, 100%; $p=.01$) and more likely to be larger (80 beds versus 62 beds; $p=.02$).

Statistically significant results are presented **in Exhibit 8**; all comparisons are displayed in Table ii in Appendix I. Notably, no adjustment variables (i.e., geographic region, star rating, percent of residents with dementia) were significantly different in either of the two analyses.

Exhibit 8. Comparisons of Baseline Community Characteristics between Communities that Ever Became Accredited and Control Arm Communities, and between Accreditation Arm Communities that Ever and Never Became Accredited (Statistically Significant Results Only)

Characteristic	Ever Became Accredited (N=25)	Control Arm (N=53)	Comparison of Ever Became Accredited vs. Control Arm	Never Became Accredited (N=30)	Comparison of Accreditation Arm Communities that Ever vs. Never Became Accredited
	N (%) or Mean (SD)		p-value	N (%) or Mean (SD)	p-value
Licensed practical nurse on site	0 (0%)	8 (15.1%)	.049	4 (13.3%)	.12
Licensed practical nurse on call	0 (0%)	10 (19.6%)	.03	3 (10%)	.24
Number of licensed beds	79.7 (28.2)	67.5 (30.6)	.09	61.8 (25.3)	.02
Registered nurse on call	19 (76%)	48 (94.1%)	.052	30 (100%)	.01

Outcomes. Outcome data were collected in five categories and included 31 quality indicators:

- **Resident outcomes and care coordination/transitions: health care related**
  - Falls with major injury
  - Emergency department visits
  - Unplanned hospital admissions
  - Hospital readmissions within 30 days
  - Advance care planning discussions (new residents)
  - Discharges due to behavior (residents with dementia)
  - Preparation for care transitions
- **Resident outcomes and care coordination/transitions: psychosocial related**
  - Participation in social activities
  - Days spoke on telephone with family or friends (not in the community)
  - Days had a visitor
  - Resident/family satisfaction (family if fewer than 15 residents responded)
- **Person-centered care (one measure)**
  - Well-being and belonging, individual care and services, social connectedness, homelike atmosphere
- **Medication management**
  - Lack of confirmation of resident identity
  - Medications not administered
  - Medication administration errors
  - Residents with significant medication administration errors
- **Workforce**
  - Consistent assignment
  - Staffing levels (for seven types of staff)
  - Turnover (for five types of staff)
  - Satisfaction
  - Burnout

This section presents the key results for each category and indicator. First, baseline data are presented for all communities and separately for those in the control and accreditation arm. Next, results related to whether outcomes differed are presented, first comparing the communities in the accreditation arm to the control arm (intent-to-treat comparison), then comparing the communities in the accreditation arm that became accredited (accredited condition) to those in the accreditation arm that did not become accredited (not accredited condition; per protocol comparison). All comparisons from the primary analytic model that are statistically significant are noted ($p < 0.05$) as well as those that evidenced differences that were not statistically significant but are worth noting; complete and detailed results are provided in Appendix II.

Resident Outcomes and Care Coordination/Transitions: Health Care Related

Baseline. Baseline values of all seven health care related indicators are shown in **Exhibit 9**. For example, during the first quarter of the project, 3.7% of residents across all communities experienced a fall with major injury; the rates in the control and accreditation arm were 2.9% and 4.3%, respectively, representing the largest relative difference between arms (i.e., the rate of falls with major injury was 48% higher in the accreditation arm). The largest absolute difference between arms at baseline was the percent of new residents who had advance care planning discussions; overall, 56% had discussions, 52% in the control arm and 59% in the accreditation arm, with the relative difference of advance care planning discussions being 13% higher in the accreditation arm. Data for all quarters as well as outcomes over time comparing the control arm to the accreditation arm, and the accredited condition to the not accredited condition, are shown in Appendix II, Tables A1-A7.

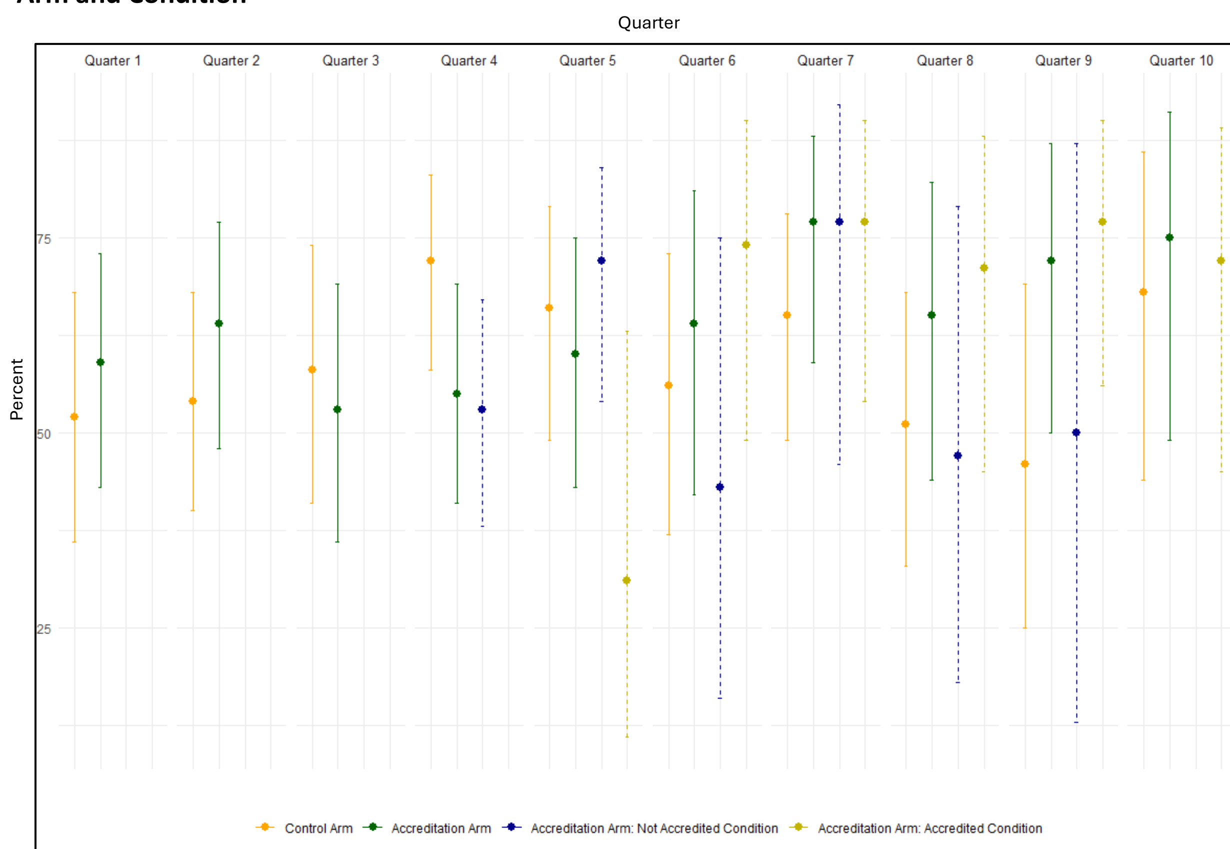
Exhibit 9. Baseline Values of Resident Outcomes and Care/Coordination/Transitions, Health Care Related, Overall and by Arm

Indicator	All Communities (N=113)[a] Mean (95% CI)	Control Arm (N=55)[a] Mean (95% CI)	Accreditation Arm (N=58)[a] Mean (95% CI)
Falls with major injury, mean %	3.7 (2.8, 4.9)	2.9 (1.9, 4.4)	4.3 (3.0, 6.3)
Emergency department visits, mean %	16 (14, 19)	16 (13, 20)	17 (13, 21)
Unplanned hospital admissions, mean %	11 (9.5, 13)	11 (8.1, 15)	12 (9.6, 14)
Hospital readmissions within 30 days, mean %	26 (20, 32)	24 (17, 32)	28 (20, 37)
Advance care planning discussions, mean %	56 (44, 67)	52 (36, 68)	59 (43, 73)
Discharges due to behavior, mean %	6.0 (3.3, 11)	6.3 (2.7, 14)	5.7 (2.3, 13)
Care transition preparation, mean (range 1-4)[b]	3.5 (3.4, 3.6)	3.5 (3.4, 3.7)	3.5 (3.4, 3.6)

[a] Of the 113 communities that provided any data during the project, 100 provided baseline data for the first six indicators, 48 in the control arm and 52 in the accreditation arm; and 58 provided baseline data for the final indicator, 29 in the control arm and 29 in the accreditation arm.
[b] Mean score of 3 items; higher scores are favorable.

Outcomes, Statistically Significant. Comparing change from baseline values over ten quarters, no comparisons were significantly different ($p < 0.05$), whether comparing accreditation arm versus control arm, or accredited condition versus not accredited condition. **Figure 1** illustrates why the results were not statistically significant, using advance care planning discussions as an example. All quarters display the mean percent (dot) and 95% confidence interval (CI; solid line) for the control arm (orange) and accreditation arm (green); quarters 4-10 additionally include the mean percent and 95% CI for the not accredited condition (blue dotted line) and the accredited condition (olive dotted line) when at least three communities contributed data. In all cases, the 95% CIs (lines) include the mean of the other arm/condition, indicating that the differences are not statistically significant. (Also see Appendix II, Table A5).

Figure 1. Percent (95% CI) of New Residents Having an Advance Care Planning Discussion, by Study Arm and Condition



Outcomes, Otherwise Notable. Some observed differences that did not meet statistical significance are worth noting. Comparing the two arms (intent to treat), the odds of emergency department visits and unplanned hospital admissions were higher (less favorable) in the accreditation arm than the control arm (odds ratio [OR] 1.26 and 1.38, respectively), but the odds of hospital readmissions within 30 days were lower (favorable) in the accreditation arm (OR 0.76). Comparing the two accreditation conditions (per protocol), all differences favored the accredited condition compared to the not accredited condition: the odds of hospital readmissions within 30 days and discharge due to behavior were lower (OR 0.71 and 0.39,

respectively), and the odds of advance care planning discussions with new residents were higher (OR 1.75). (Also see Appendix II, Tables A2-A6).

Resident Outcomes and Care Coordination/Transitions: Psychosocial Related

Baseline. Baseline values of all four psychosocial related indicators are shown in **Exhibit 10**. For example, during the first quarter of the project, residents participated in roughly 41.5% of 11 social activities; the percents in the control and accreditation arm were 42.7% and 40.2%, respectively. However, residents in the accreditation arm spoke on the telephone with family or friends more often than those in the control arm (on 6.5 of 14 days versus 5.0 of 14 days), but rated satisfaction virtually the same: the three satisfaction items related to likelihood to recommend the community to family and friends, satisfaction with staff, and care received were scored 3.9 in the control arm and 4.1 in the accreditation arm on a scale of 1-5. Data for all quarters as well as outcomes over time comparing the control arm to the accreditation arm, and the accredited condition to the not accredited condition, are shown in Appendix II, Tables A8-A11.

Exhibit 10. Baseline Values of Resident Outcomes and Care/Coordination/Transitions, Psychosocial Related, Overall and by Arm

Indicator	All Communities (N=113)[a] Mean (95% CI)	Control Arm (N=55)[a] Mean (95% CI)	Accreditation Arm (N=58)[a] Mean (95% CI)
Participation in social activities (% of 11)	41.5 (37.8, 45.3)	42.7 (37.1, 48.2)	40.2 (35.7, 44.6)
Days spoke on telephone with family/friends (of 14)	5.7 (5.0, 6.4)	5.0 (4.1, 5.9)	6.5 (5.5, 7.5)
Days had a visitor (of 14)	3.3 (2.8, 3.7)	3.2 (2.6, 3.8)	3.4 (2.6, 4.1)
Resident/family satisfaction (range 1-5)[b]	4.0 (3.7, 4.2)	3.9 (3.7, 4.2)	4.1 (3.9, 4.2)

[a] Of the 113 communities that provided any data during the project, 67 provided baseline data for these indicators; 34 in the control arm and 33 in the accreditation arm.
[b] Mean score of 3 items; higher scores are favorable.

Outcomes, Statistically Significant. Comparing change from baseline values over five quarters (Quarters 1, 3, 5, 7, 9), no comparisons were significantly different ($p < 0.05$), whether comparing accreditation arm versus control arm, or accredited condition versus not accredited condition. In all cases (and similar to as shown in Figure 1), the 95% CIs include the mean of the other comparisons, indicating that the differences are not statistically significant.

Outcomes, Otherwise Notable. One observed difference that did not meet statistical significance is worth noting. Residents in communities in the accreditation arm (versus the control arm) and in communities in the accredited condition (versus the not accredited condition) were more engaged in social activities; specifically, the difference in mean participation was 12% higher in the intent-to-treat comparison and 35% higher in the per protocol comparison.

Person-Centered Care

Baseline. One 17-item measure, scored 1-6, captured person-centered care. As shown in **Exhibit 11**, during the first quarter of the project, the mean score was virtually identical in the two arms: 5.1 in the control arm, and 5.0 in the accreditation arm. Data for all quarters as well as outcomes over time comparing the control arm to the accreditation arm, and the accredited condition to the not accredited condition, are shown in Appendix II, Table B1.

Exhibit 11. Baseline Value of Person-Centered Care Score, Overall and by Arm

Indicator	All Communities (N=113)[a] Mean (95% CI)	Control Arm (N=55)[a] Mean (95% CI)	Accreditation Arm (N=58)[a] Mean (95% CI)
Person-centered care score (range 1-6)[b]	5.1 (4.9, 5.2)	5.1 (4.9, 5.2)	5.0 (4.9, 5.2)

[a] Of the 113 communities that provided any data during the project, 67 provided baseline data for these indicators; 34 in the control arm and 33 in the accreditation arm.
[b] Mean score of 17 items; higher scores are favorable.

Outcomes, Statistically Significant. Comparing change from baseline values over five quarters (Quarters 1, 3, 5, 7, 9), no comparisons were significantly different ($p < 0.05$), whether comparing accreditation arm versus control arm, or accredited condition versus not accredited condition. In all cases, the 95% CIs include the mean of the other comparisons, indicating that the differences are not statistically significant. (Also see Appendix II, Table B1).

Outcomes, Otherwise Notable. The person-centered care results did not meet criteria to constitute a notable result.

Medication Management

Baseline. Baseline values of all four medication management indicators are shown in **Exhibit 12** (next page). During the first quarter of the project, fewer than 1% of residents did not have their identity confirmed when medications were administered (0.4% in the control arm versus 0.8% in the accreditation arm). Medication administration errors were low: medication administrations with errors ranged from 0.4% to 2.0%, and the percent of residents with significant administration errors had a similar range (0.8% to 2.0%). Data for all quarters as well as outcomes over time comparing the control arm to the accreditation arm, and the accredited condition to the not accredited condition, are shown in Appendix II, Tables C1-C4.

Outcomes, Statistically Significant. Comparing change from baseline over ten quarters in the two arms (intent to treat), the odds of medication administration errors were lower (favorable) in the accreditation arm than the control arm (OR 0.27; $p < 0.0001$). When comparing the aggregate medication administrator error rate over quarters 4-10 to the baseline rate, the 95% CIs of the accreditation arm do not overlap those of the control arm. (Also see Appendix II, Table C3).

Exhibit 12. Baseline Values of Medication Administration Indicators, Overall and by Arm

Indicator	All Communities (N=113)[a] Mean Percent (95% CI)	Control Arm (N=55)[a] Mean Percent (95% CI)	Accreditation Arm (N=58)[a] Mean Percent (95% CI)
Residents with identify not confirmed	0.6 (0.1, 2.5)	0.4 (0.1, 2.8)	0.8 (0.1, 5.2)
Residents with medications not administered	4.2 (2.1, 8.3)	2.0 (0.6, 6.3)	6.2 (2.6, 14.0)
Medication administrations with errors	1.2 (0.6, 2.5)	2.0 (0.8, 4.7)	0.4 (0.2, 1.1)
Residents with significant administration errors	1.4 (0.3, 5.8)	0.8 (0.2, 3.1)	2.0 (0.3, 12.6)

[a] Of the 113 communities that provided any data during the project, 100 provided baseline data for these indicators; 49 in the control arm and 51 in the accreditation arm.

Outcomes, Otherwise Notable. Six observed differences did not meet statistical significance but are worth noting, all but one of which favored the accreditation arm or accredited condition. Specifically, and similar to the finding above, medication administration errors were lower under the accredited condition in the per protocol comparison (OR 0.39), as were medications not administered and residents with significant medication errors (OR 0.70 and 0.35, respectively) – although in the intent-to treat analysis comparing the arms, residents with significant medication errors were more common in the accreditation arm (OR 2.15). However, the two other notable intent-to-treat analyses favored the accreditation arm, as communities in this arm were less likely to not confirm residents' identity (OR 0.46) or not administer a medication (OR 0.78). (Also see Appendix II, Tables C1-C4). Caution should be used interpreting these results considering the low number of events as shown in "total" row on these tables.

Workforce

Two types of data were collected related to the workforce: staffing indicators based on administrator report (i.e., consistent assignment measured as the number of different caregivers a resident had per week, staffing levels for various staff types, and staff turnover for various staff types), and staff satisfaction and burnout indicators, based on staff questionnaires. Each type is presented separately below.

Administrator Report

Baseline. Baseline values of all 13 workforce staffing indicators are shown in **Exhibit 13**. For example, during the first quarter, the average number of different caregivers/resident/week across all communities was 9.7, ranging from 8.6 in the control arm to 10.8 in the accreditation arm. In terms of staffing levels, using care aides in traditional units as the example, staffing requirements for care aides were met for 74.0% of shifts (70.1% of shifts in the control arm and 77.3% of shifts in the accreditation arm). Six-month care aide turnover averaged 114.7% (103% in the control and 125.7% in the accreditation arm). Data for all quarters as well as outcomes over time comparing the control arm to the accreditation arm, and the accredited condition to the not accredited condition, are shown in Appendix II, Tables D1-D13.

Exhibit 13. Baseline Values of Workforce Staffing Indicators, Overall and by Arm

Indicator	All Communities (N=113)[a] Mean (95% CI)	Control Arm (N=55)[a] Mean (95% CI)	Accreditation Arm (N=58)[a] Mean (95% CI)
Number of different caregivers/resident/week	9.7 (8.6, 10.8)	8.6 (7.0, 10.2)	10.8 (9.4, 12.2)
Shifts with staffing requirements met, mean %			
Care aides, traditional unit	74.0 (66.1,80.7)	70.1 (58.0, 79.9)	77.3 (66.3, 85.5)
Supervisors, traditional unit	100.0 (NA)	100.0 (N/A)	100.0 (N/A)
Administrators, traditional unit	82.2 (74.4, 88.0)	77.8 (66.1, 86.3)	85.8 (74.4, 92.7)
Care aides, special care unit	38.0 (27.9, 49.2)	36.4 (23.4, 51.7)	39.3 (25.3, 55.3)
Supervisors, special care unit	100.0 (NA)	100.0 (N/A)	100.0 (N/A)
Administrators, special care unit	82.7 (73.3, 89.2)	69.7 (54.4, 81.6)	92.9 (82.1, 97.3)
Care coordinators, special care unit	85.3 (79.1, 89.9)	81.8 (62.4, 93.5)	92.9 (79.0, 98.5)
Six month turnover, mean %			
Care aides	114.7 (99.0, 130.5)	103.0 (82.2, 123.9)	125.7 (102.3, 149.2)
Medication aides	71.5 (56.8, 86.2)	63.4 (46.1, 80.7)	78.8 (55.4, 102.2)
Nurses (RN, LPN)	14.9 (6.9, 23.0)	17.5 (5.6, 29.4)	12.7 (0.0, 23.8)
Administrators	31.7 (19.7, 43.7)	25.0 (8.0, 42.0)	37.7 (20.6, 54.8)
Directors/Care Coordinators	38.7 (24.3,53.2)	34.4 (15.3, 53.6)	42.5 (20.9, 64.1)

[a] Of the 113 communities that provided any data during the project, 99 provided baseline data for the first indicator (48 in the control arm and 51 in the accreditation arm); 101 for shifts with staffing requirements met indicators (48 in the control arm and 53 in the accreditation arm); and 102 for six month turnover indicators (49 in the control arm and 53 in the accreditation arm).

Outcomes, Statistically Significant. Comparing change from baseline values over five quarters (Quarters 1, 3, 5, 7, 9), in the intent-to-treat analyses, the odds of staffing requirements being met for administrators in special care units was lower (less favorable) in the accreditation arm than the control arm (OR 0.22; p=.01), but the odds of care aide turnover was lower (favorable) in the accreditation arm than in the control arm (OR 0.74; p=.02). In the per protocol analysis, administrator turnover was lower (favorable) in the accredited condition than in the not accredited condition (OR 0.32; p=.001). (Also see Appendix II, Table D7, D9, and D12).

Outcomes, Otherwise Notable. Sixteen staffing and staff turnover observed differences did not meet statistical significance but are worth noting.

- Related to staffing sufficiency, communities in the accreditation arm were less favorable than those in the control arm for administrator staffing in traditional units and supervisor and care coordinator staffing in special care units (OR 0.56, 0.33, and 0.24, respectively). Similarly, per protocol comparisons were less favorable for communities in the accredited condition compared to those in the not accredited condition in relation to care aide and supervisor staffing in traditional units and care coordinator staffing in special care units (OR 0.61, 0.24, 0.70, respectively); however, they were favorable in terms of administrator

staffing in traditional units and care aide and supervisor staffing in special care units (OR 1.42, 1.45, and 1.52, respectively). (Also see Appendix II, Tables D2-D8.)

- Differences in relation to staff turnover were less mixed, with all five per protocol comparisons favoring the accredited condition (i.e., for care aides, medication aides, nurses, director/care coordinator, and administrators; OR 0.77, 0.76, 0.76, 0.66, and 0.32) with the p-value for administrators being statistically significant as noted above. For the intent-to-treat comparisons, the accreditation arm had lower turnover for three staff types (administrator, director/care coordinator, and care aide; OR 0.47, 0.66, and 0.74) -- with statistical significance for care aides -- and higher turnover for nurses (OR 1.55) than the control arm. (Also see Appendix II, Tables D2-D6 and D8-D13).

Staff Questionnaires

Baseline. Baseline values of staff satisfaction and burnout indicators are shown in **Exhibit 14**. The overall mean staff satisfaction score was 3.05 on a scale of 1-4, indicating “satisfied;” the scores for the control and accreditation arms were 2.97 and 3.13, respectively. The mean burnout score was 1.87 on a scale of 1-5, indicating “occasionally under stress, but not feeling burned out;” the scores for the control and accreditation arms were 1.95 and 1.80, respectively. Data for all quarters as well as outcomes over time comparing the control arm to the accreditation arm, and the accredited condition to the not accredited condition, are shown in Appendix II, Tables D14-D15.

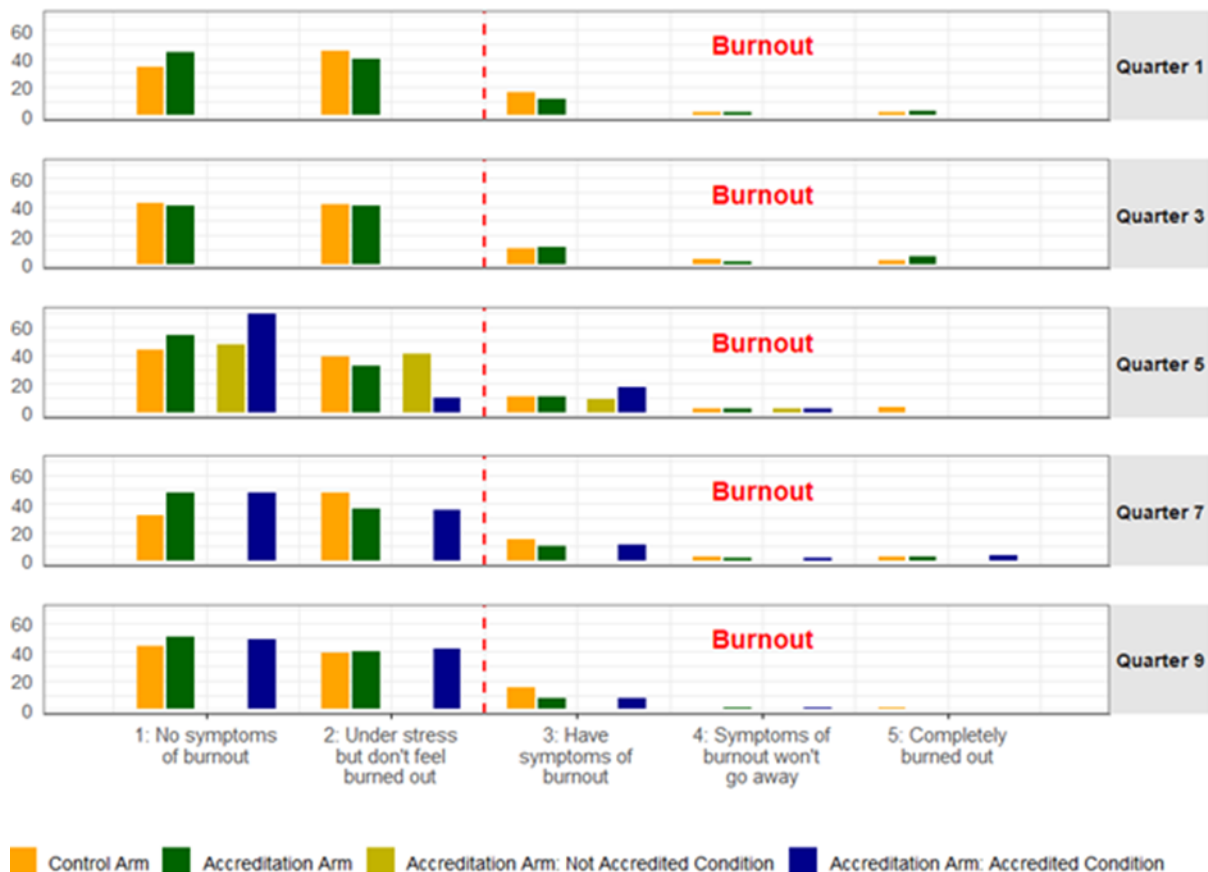
Exhibit 14. Baseline Value of Satisfaction and Burnout, Overall and by Arm

Indicator	All Communities (N=113)[a] Mean (95% CI)	Control Arm (N=55)[a] Mean (95% CI)	Accreditation Arm (N=58)[a] Mean (95% CI)
Staff satisfaction (range 1-4)[b]	3.05 (2.94, 3.16)	2.97 (2.80, 3.14)	3.13 (3.00, 3.26)
Staff burnout score (range 1-5)[c]	1.87 (1.74, 1.99)	1.95 (1.78, 2.11)	1.80 (1.62, 1.98)

[a] Of the 113 communities that provided any data during the project, 68 provided baseline data for these indicators; 30 in the control arm and 38 in the accreditation arm.
[b] Mean score of 16 items; higher scores are favorable.
[c] Mean score of one item; lower scores are favorable.

On the burnout indicator, a score ≥ 3 indicates burnout. As shown in **Exhibit 15**, proportionately few staff reported feeling burned out.

Exhibit 15. Staff Burnout, by Arm and Condition Per Quarter



Outcomes, Statistically Significant. Comparing change from baseline values over five quarters (Quarters 1, 3, 5, 7, 9), no comparisons were significantly different ($p < 0.05$), whether comparing accreditation arm versus control arm, or accredited condition versus not accredited condition. In all cases, the 95% CIs include the mean of the other comparisons, indicating that the differences are not statistically significant.

Outcomes, Otherwise Notable. One observed difference did not meet statistical significance but is worth noting. In the per protocol analyses, the odds of staff burnout were higher in the accredited condition compared to the not accredited condition (OR 1.37). (See Table D13).

5. DISCUSSION

This project gathered and analyzed data from 113 diverse AL communities across the state of North Carolina to evaluate the effectiveness of accreditation in adult care homes/AL communities. Communities were diverse and stratified based on region of the state and Star rating, and randomly assigned to a control arm or accreditation arm; those in the accreditation arm were offered the opportunity to become accredited by the Accreditation Commission for Health Care (ACHC).

Quality outcome data were collected over ten quarters (July 2022 - December 2024) using 31 indicators in five categories: resident outcomes and care coordination/transitions (health care related), resident outcomes and care coordination/transitions (psychosocial related), person-centered care, medication management, and workforce. AL administrators compiled the data for some indicators; for others, they asked staff and residents to complete questionnaires (or residents' families if residents were unable). Analyses compared rates of change between communities in the control arm versus those in the accreditation arm (intent-to-treat), and between communities in the accreditation arm that became accredited (accredited condition) and did not become accredited (not accredited condition; per protocol analysis).

Accreditation uptake. Of the 58 communities randomized and participating in the accreditation arm at baseline, fewer than half (n=25; 43%) became accredited. Given that an initial eligibility criterion was that administrators were asked to agree to be randomized to either arm, and that the cost charged by the accrediting organization was borne by the study, some project partners and members of the Stakeholder Advisory Group anticipated more uptake. During the study, five communities withdrew their participation due to accreditation-related issues: three were concerned that they might be asked to pay a fee to ACHC if they cancelled or chose not to complete their survey once ACHC staff were onsite, and two withdrew after ACHC completed their survey due to concerns about implementing plans of correction. Important to the evaluation of accreditation conducted in this project, and as noted in the results section, communities that became accredited did not differ statistically from other communities in characteristics typically used to describe these communities, other than that they were larger and were less likely to have LPNs on site and on call and RNs on call. Community size was controlled in adjusted analyses, thereby attenuating its potential effect on study outcomes.

Study context. Throughout data collection, all communities received standard state and county inspections. NC Division of Health Services Regulation inspections are designed to "ensure the provider is operating in compliance with applicable laws and regulations, in a manner that protects the health and safety of their residents."[3] While legally and ethically necessary, these ongoing inspections -- and the potential for deficiencies to be identified and then corrected -- introduced an extraneous variable preventing the evaluation of the effect of accreditation on quality outcomes in isolation. As a result, study findings reflect the potential "value added" of accreditation within an existing regulatory framework. Similarly, the potential benefit from accreditation was likely lessened due to ongoing oversight from the state and county.

Outcomes of accreditation. Across all 31 indicators in five categories, **Exhibit 16** presents the four indicators that were statistically significant. The items relate to medication administration and to workforce; no items related to resident outcomes and care coordination/transitions (either health care or psychosocial related), or to person-centered care were statistically significantly different.

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[3] NC Division of Health Service Regulation, Adult Care Licensure Section.
https://info.ncdhhs.gov/dhsr/acls/star/search.asp

Favorable change was observed for three of the four quality outcomes (75%) -- medication administration errors and turnover of care aides and administrators; and unfavorable change was observed in the percent of work shifts meeting staffing requirements for administrators in special care units.

Exhibit 16. Summary of Statistically Significant Outcomes and Whether they Favored Accreditation

Category, Indicator	Relationship to Accreditation
Medication Management	
Any medication administration errors	Favorable[a]
Workforce	
Administrator staffing, special care units	Not favorable[a]
Care aide turnover	Favorable[a]
Administrator turnover	Favorable[b]

[a] In intent-to-treat analysis that compares assisted living communities randomized to the accreditation process versus usual care (control).
[b] In per protocol analysis of assisted living communities assigned to the accreditation process, that compares assisted living communities that became accredited versus not becoming accredited.

Similarly, across all 31 indicators in five categories, **Exhibit 17** (next page) presents the 22 indicators and comparisons that were not statistically significant but worth noting. The items related to resident outcomes and care coordination/ transitions (health care and psychosocial related), medication administration, and workforce; no items related to person-centered care.

Favorable change was observed for sixteen quality outcomes (73%) – hospital readmissions within 30 days; advance care planning discussion with new residents; discharge due to behavior; participation in social activities; resident identity regarding medications not confirmed; medications ordered but not administered; any medication administration errors; residents with significant medication administration errors; the percent of shifts with staffing requirements met for administrators in traditional units, care aides in special care units, and supervisors in special care units; and turnover of care aides, medication aides, nurses, administrators, and care coordinators. Unfavorable change was observed in six quality outcomes (27%): emergency department visits; unplanned hospital admissions; the percent of shifts with staffing requirements met for care aides and supervisors in traditional units, and for care coordinators in special care units; and staff burnout.

Exhibit 17. Summary of Other (Not Statistically Significant) Outcomes Worth Noting and Whether They Favored Accreditation

Category, Indicator	Relationship to Accreditation
Resident outcomes and care coordination/transitions (health care related)	
Emergency department visits	Not favorable[a]
Unplanned hospital admissions	Not favorable[a]
Hospital readmissions within 30 days	Favorable[c]
Advance care planning discussions	Favorable[b]
Discharge due to behavior	Favorable[b]
Resident outcomes and care coordination/transitions (psychosocial related)	
Social activities	Favorable[c]
Medication Management	
Identity not confirmed	Favorable[a]
Medications not administered	Favorable[c]
Any medication administration errors	Favorable[b]*
Residents with significant medication errors	Favorable[d]
Workforce	
Care aide staffing requirements, traditional units	Not favorable[b]
Supervisor staffing, traditional units	Not favorable[b]
Administrator staffing, traditional units	Favorable[d]
Care aide staffing, special care units	Favorable[b]
Supervisor staffing, special care units	Favorable[d]
Care coordinator staffing, special care units	Not favorable[c]
Care aide turnover	Favorable[b]*
Medication aide turnover	Favorable[b]
Nurse turnover	Favorable[d]
Administrator turnover	Favorable[a]*
Director/care coordinator turnover	Favorable[c]
Staff burnout	Not favorable[b]

[a] In intent-to-treat analysis that compares assisted living communities randomized to the accreditation process versus usual care (control).
[b] In per protocol analysis of assisted living communities assigned to the accreditation process, that compares assisted living communities that became accredited versus not becoming accredited.
[c] In both intent-to-treat and per protocol analysis.
[d] Indicates outcomes where communities randomized to the accreditation process were not favorable versus usual care (control; intent-to-treat analysis), but assisted living communities that became accredited were favorable versus not becoming accredited (per protocol analysis); in such instances, accreditation is deemed to have an overall favorable effect.
*Outcome was also statistically significant (see **Exhibit 16**).

Considering all findings together, the fact that no statistically significant differences were found regarding psychosocial outcomes including satisfaction and person-centered care is consistent with studies of accreditation in other healthcare settings that report mixed or minimal evidence linking accreditation with overall patient satisfaction.[4] Within congregate settings, complex outcomes such as well-being, satisfaction, and social connection depend on a coalescence of a wide array of factors, including room and food quality, relationships with persons outside of the

[4] Hussein M, Pavlova M, Ghalwash M, Groot W. The impact of hospital accreditation on the quality of healthcare: A systematic literature review. BMC Health Serv Res. 2022 Oct;21(1):1057

care community, individual perceptions, and other considerations.[5] Although accreditation -- through its focus on processes and policies -- may eventually impact overall well-being, meaningful change in psychosocial well-being may lag behind the uptake of new policies and procedures. Instead, the policy-driven focus of accreditation on quality improvement may more immediately impact outcomes related to care and documentation practices, as evidenced by this project's findings related to the relationship of accreditation to medication administration, hospital readmission within 30 days, advance care planning, and discharge due to behaviors.

In fact, the favorable change regarding advance care planning provides an example of accreditation as a value added to current regulations. As confirmed by community partners and the Stakeholder Advisory Group, state regulations do not incorporate advance care planning documentation and processes to the same depth as the standards set by the accrediting body. In this way, accreditation supplemented existing regulatory processes and seemingly provided impetus for communities to improve upon this quality outcome.

The project's findings regarding staffing sufficiency were mixed, but those regarding turnover were consistent; both findings make intuitive sense. Regarding sufficiency, even if accreditation were to bolster knowledge regarding staffing requirements, ongoing workforce shortages challenge the ability to rectify insufficient staff numbers. On the other hand, accreditation broadly favored staff turnover for five types of staff -- care aides, medication aides, nurses, administrators, and care coordinators – perhaps because quality improvement initiatives promote staff commitment and retention. Of course, it must be acknowledged that intercorrelations among turnover for various staff may in part be operative in the uniform nature of this finding. Interestingly, despite improvement in staff turnover, change associated with staff burnout was less favorable in communities that became accredited. Although the reason for this apparent contradiction is unknown, and may be related to extraneous considerations, it is conceivable that the accreditation process itself created increased workload demands and stress. Perceptions of job stress and workload are known to impact burnout,[6] and studies of accreditation in hospital and other healthcare settings have similarly found negative impacts of the process on factors related to staff burnout.[7,8]

Impact of study context on interpretation of quality outcome results. In addition to the effects of ongoing state and county surveys noted earlier, the research team, community partners, and the Stakeholder Advisory Group identified several contextual factors that did or had the potential to influence study findings and interpretation.

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[5] Li X, Mpofu E, Collins S, Yin C, Shaw T. Resident satisfaction indicators in long term care settings in the United State: A scoping review. Aging and Health Research. 2023 Dec;3(4): Article 100164

[6] Harrad R, Sulla F. Factors associated with and impact of burnout in nursing and residential home care workers for the elderly. Acta Biomed. 2018 Dec 7;89(7-S):60-69.

[7] Alshamsi AI, Thomson L, Santos A. What impact does accreditation have on workplaces? A qualitative study to explore the perceptions of healthcare professionals about the process of accreditation. Front Psychol. 2020 Jul 10;11:1614.

[8] Hussein M, Pavlova M, Ghalwash M, Groot W. The impact of hospital accreditation on the quality of healthcare: A systematic literature review. BMC Health Serv Res. 2022 Oct;21(1):1057.

Event/incidence rates. Overall event, or incidence, rates for six outcomes were low – all four medication management outcomes as well as supervisor staffing. Particularly for medication management, event rates were low, generally remaining below 2% throughout the study. At the other extreme, rates for meeting supervisory staffing requirements were generally at or near 100 percent. Rates at either extreme, and lack of variability among participants, reduced the ability to detect statistically significant and clinically meaningful differences. In addition, high performance at baseline and throughout the study limited the potential impact of accreditation, as communities reporting high performance had little room for improvement.

Differences at baseline. Baseline differences between study arms -- while controlled for in the analyses to the extent possible -- were notable for some indicators. For example, the unfavorable association between accreditation and meeting staffing requirements for administrators in special care may be less explained by accreditation than by being attributable to large initial differences: at baseline, 93% of accreditation arm communities met requirements versus 70% of control arm communities. Thus, accreditation arm communities had potential to improve 7% while control arm communities had 30% room for improvement. In the last study quarter, both arms achieved high compliance (100% accreditation, 92% control), with the control arm outpacing improvement due to a notably lower baseline.

Accreditation uptake. As noted earlier, only 25 communities became accredited, limiting the number of communities available for comparison. Further, accreditation was largely achieved in quarter 6 or later (and no communities became accredited before quarter 4), meaning that data assessing potential change due to accreditation was limited, lessening the ability to detect statistically significant effects. In addition, the true impact of accreditation on quality outcomes may have potentially been affected by a lack of organizational commitment. Such commitment, typically championed by a strong leader, is necessary to drive quality improvement.[9] In this study, rates of administrator turnover across both the control arm (ranging from 25-47%) and accreditation arm (ranging from 24-51%), alongside capacity issues related to staffing, may have limited communities' ability to fully commit to sustained quality improvement.

Workforce insufficiency. Data collection began in 2022. According to a 2023 report, during the outset of this project, many AL communities continued to face pandemic related recruitment challenges, staff burnout, and turnover.[10] Unsurprisingly, staffing shortages were evident in both study arms, particularly within special care units (with neither arm reporting more than 40% of shifts meeting requirements for care aides except in one instance). An intuitive and empirical relationship exists between staffing levels, job satisfaction and burnout,[11] and quality

[9] Desveaux L, Mitchell JI, Shaw J, Ivers NM. Understanding the impact of accreditation on quality in healthcare: A grounded theory approach. Int J Qual Health Care. 2017;29(7):941-947.
[10] North Health Workforce Sentinel Network, Findings Brief: LTC Spring 2023 https://tinyurl.com/43xmnn45
[11] Costello H, Walsh S, Cooper C, Livingston G. A systematic review and meta-analysis of the prevalence and associations of stress and burnout among staff in long-term care facilities for people with dementia. International Psychogeriatrics. Nov 2019;31(8):1203-1216.

of care outcomes.[12] It is therefore likely that staffing shortages may have constrained the potential of accreditation to translate to improvements in resident and staff quality outcomes.

Study outcomes. In conversations with community partners, experts stressed that accreditation focuses on processes rather than outcomes, with the intention to benefit resident and staff outcomes over time. The measures in this study focused on outcomes, and it is possible that follow-up was not sufficiently long to evidence the effects of accreditation. Had the focus been to evaluate practice change, more significantly favorable change may have been detected. Thus, it is possible that this evaluation understated the full benefit of accreditation.

Finally, the likelihood of measurement error and reporting bias must be considered, given that the data were largely provided to the research team by the AL administrators themselves. However, as noted in the data validation analysis (see *Methods* section), the data provided by administrators was broadly validated. Further, the fact that comparatively few significant findings favored accreditation tempers concern about the effect of potential reporting bias.

Conclusion and Recommendations

Of the 31 quality outcomes examined in this project, four exhibited statistically significant differences among communities in the accreditation arm or those that become accredited – three (75%) of which favored accreditation. Similarly, of those same outcomes, 22 were not statistically significantly different but were notable due to the magnitude of their odds ratios or percent change -- 16 (73%) of which favored accreditation. In total, 23 different outcomes were statistically significantly different or notably different. The fact that the preponderance of significant and notable outcomes favored accreditation is striking, and that so few reached the level of statistical significance may in part relate to the small sample size, low event rates, the choice of outcomes themselves, and the ongoing state/county survey process that limited the amount of potential change. Thus, there may be more benefit from accreditation than was able to be determined through formal hypothesis testing that relies on sample size and context.

Nonetheless, despite promising indicators, there is limited evidence that accreditation improves or worsens outcomes, due in part to the study context. Further, the study was not designed to determine whether accreditation independently maintains outcomes. Therefore, rigorous evaluation should be an integral component if accreditation is incorporated into future legislation.

A subsequent Evaluation of Effectiveness Report, available October 2025, will provide details related to the accreditation process and further evaluation of the effectiveness of accreditation, including data related to compliance with licensure requirements.

[12] Zimmerman S, Carder P, Schwartz L, et al. The imperative to reimagine assisted living. J Am Med Dir Assoc. 2022;23(2):225-234.

APPENDICES

Appendix I: Participation and Baseline Characteristics Tables

Community Characteristics (Tables i and ii) ***pages 36-38***

Table i. Community Characteristics at Initiation of Project, Overall and by Study Arm

Table ii. Comparisons of Baseline Community Characteristics between Communities that Ever Became Accredited and Control Arm Communities, and between Accreditation Arm Communities that Ever and Never Became Accredited

Appendix II: Data Tables

Resident Outcomes and Care Coordination/Transitions: Health Care Related (Tables A1-A7) ***pages 39-45***

Table A1. Percent (95% CI) of All Residents Who Had a Fall with Major Injury, by Study Arm and Condition

Table A2. Percent (95% CI) of Residents Who Had an Emergency Department Visit, by Study Arm and Condition

Table A3. Percent (95% CI) of Residents Who Experienced an Unplanned Hospital Admission, by Study Arm and Condition

Table A4. Percent (95% CI) of Hospital Readmissions within 30 Days, by Study Arm and Condition

Table A5. Percent (95% CI) of New Residents Having an Advance Care Planning Discussion, by Study Arm and Condition

Table A6. Percent (95% CI) of Residents with Dementia Discharged Due to Behavior, by Study Arm and Condition

Table A7. Mean (95% CI) Care Transition Preparation Score, by Study Arm and Condition

Resident Outcomes and Care Coordination/Transitions: Psychosocial Related (Tables A8-A11) ***pages 46-49***

Table A8. Mean (95% CI) of Percent of Social Activities in Which Resident Participated (11 items), by Study Arm and Condition

Table A9. Mean (95% CI) of Number of Days (of 14) Resident Spoke on Telephone with Family or Friends Not in the Community, by Study Arm and Condition

Table A10. Mean (95% CI) Number of Days (of 14) Resident Had a Visitor, by Study Arm and Condition

Table A11. Mean (95% CI) of Resident/Family Satisfaction Score, by Study Arm and Condition

Person-Centered Care (Table B1) ***page 50***

Table B1. Mean (95% CI) Percent-centered Care Scores, by Study Arm and Condition

Medication Management (Tables C1-C4) ***pages 51-54***

Table C1. Percent (95% CI) of Residents Whose Identity with Respect to Medications Was Not Confirmed by Staff, by Study Arm and Condition

Table C2. Percent (95% CI) of Residents Who Had Ordered Medications That Were Not Administered, by Study Arm and Condition

Table C3. Percent (95% CI) of Medications Administered with Any Errors, by Study Arm and Condition

Table C4. Percent (95% CI) of Residents for Whom Significant Medication Errors Occurred, by Study Arm and Condition

Workforce (Tables D1-D15) ***pages 55-69***

Table D1. Mean (95% CI) Number of Different Caregivers a Resident Had Over a Week, by Study Arm and Condition

Table D2. Percent (95% CI) Shifts with Staffing Requirements Met for *Care Aides in Traditional Units*, by Study Arm and Condition

Table D3. Percent (95% CI) of Shifts with Staffing Requirements Met for *Supervisors in Traditional Units*, by Study Arm and Condition

Table D4. Percent (95% CI) of Shifts with Staffing Requirements Met for *Administrators in Traditional Units*, by Study Arm and Condition

Table D5. Percent (95% CI) of Shifts with Staffing Requirements Met for *Care Aides in Special Care Units*, by Study Arm and Condition

Table D6. Percent (95% CI) of Shifts with Staffing Requirements Met for *Supervisors in Special Care Units*, by Study Arm and Condition

Table D7. Percent (95% CI) of Shifts with Staffing Requirements Met for *Administrators in Special Care Units*, by Study Arm and Condition

Table D8. Percent (95% CI) of Shifts with Staffing Requirements Met for *Care Coordinators in Special Care Units*, by Study Arm and Condition

Table D9. Mean (95% CI) Rate of Six-month *Care Aide Turnover*, by Study Arm and Condition

Table D10. Mean (95% CI) Rate of Six-month *Medication Aide Turnover*, by Study Arm and Condition

Table D11. Mean (95% CI) Rate of Six-month *Nurse Turnover*, by Study Arm and Condition

Table D12. Mean (95% CI) Rate of Six-month *Administrator Turnover*, by Study Arm and Condition

Table D13. Mean (95% CI) Rate of Six-month *Director/Care Coordinator Turnover*, by Study Arm and Condition

Table D14. Mean (95% CI) Staff Satisfaction Score, by Study Arm and Condition

Table D15. Mean (95% CI) Staff Burnout Score, by Study Arm and Condition

APPENDIX I: Participation and Baseline Characteristics Tables

Community Characteristics (Tables i and ii)

Table i. All Community Characteristics at Initiation of Project, Overall and by Study Arm

Characteristic	All Communities (N=108)	Control Arm (N=53)	Accreditation Arm (N=55)
	N (%) or Mean (SD)		
Community Characteristics			
For profit	104 (96.3%)	50 (94.3%)	54 (98.2%)
Community owned or operated in association with:			
A continuing care retirement community	2 (1.9%)	2 (3.8%)	0
A hospital	0	0	0
A nursing home	3 (2.8%)	2 (3.8%)	1 (1.8%)
Another assisted living community	81 (75.0%)	36 (67.9%)	45 (81.8%)
Affiliated with a religious organization	0	0	0
Is a chain	75 (69.4%)	35 (66.0%)	40 (72.7%)
Memory care			
Dedicated to memory care	21 (19.6%)	13 (24.5%)	8 (14.8%)
Provide some memory care	36 (33.6%)	13 (24.5%)	23 (42.6%)
No memory care	50 (46.7%)	27 (50.9%)	23 (42.6%)
Contract with a long-term care pharmacy or consultant pharmacist	107 (100%)	53 (100%)	54 (100%)
Electronic medical records	94 (87.0%)	45 (84.9%)	49 (89.1%)
Electronic prescribing	25 (23.6%)	10 (18.9%)	15 (28.3%)
Number of years licensed	16.1 (11.7)	15.2 (11.5)	16.9 (11.8)
Number of licensed beds	68.8 (29.1)	67.5 (30.6)	69.9 (27.9)
Number of licensed memory care beds	38.7 (16.5)	40.6 (21.3)	37.5 (13.2)
Average monthly private pay base rate			
Non-memory care	2652 (1580)	2380 (1633)	2920 (1492)
Memory care	2445 (2409)	2241 (2454)	2641 (2372)
Staffing Characteristics			
Registered nurse on site			
On site 24/7	1 (0.9%)	1 (1.9%)	0
Full time	19 (17.6%)	8 (15.1%)	11 (20.0%)
Part time	64 (59.3%)	31 (58.5%)	33 (60.0%)
No registered nurse	24 (22.2%)	13 (24.5%)	11 (20.0%)
Registered nurse on call	97 (91.5%)	48 (94.1%)	49 (89.1%)
Licensed practical nurse on site			
On site 24/7	1 (0.9%)	1 (1.9%)	0
Full time	10 (9.3%)	7 (13.2%)	3 (5.5%)
Part time	1 (0.9%)	0	1 (1.8%)
No licensed practical nurse	96 (88.9%)	45 (84.9%)	51 (92.7%)
Licensed practical nurse on call	13 (12.3%)	10 (19.6%)	3 (5.5%)
Neither registered nor licensed practical nurse on site	20 (18.5%)	10 (18.9%)	10 (18.2%)
Personal care assistant work shift			
8-hour shifts	76 (71.0%)	36 (67.9%)	40 (74.1%)
12-hour shifts	23 (21.5%)	13 (24.5%)	10 (18.5%)
Both 8- and 12-hour shifts	8 (7.5%)	4 (7.5%)	4 (7.4%)
Mean care aide staffing ratio, day	10.1 (3.3)	10.5 (3.7)	9.6 (2.8)
Mean care aide staffing ratio, evening	11.0 (4.0)	11.8 (4.8)	10.2 (2.9)
Mean care aide staffing ratio, night	13.9 (5.1)	14.7 (5.4)	13.1 (4.6)

Characteristic	All Communities (N=108)	Control Arm (N=53)	Accreditation Arm (N=55)
	N (%) or Mean (SD)		
Resident Characteristics			
Percent age 85 and older	33.2 (20.7)	31.0 (18.8)	35.3 (22.3)
Percent age 75-84	29.4 (11.1)	30.1 (11.2)	28.9 (11.1)
Percent age 65-74	22.9 (14.1)	24.1 (14.2)	21.8 (14.1)
Percent younger than age 65	14.4 (17.0)	14.8 (17.4)	14.0 (16.6)
Percent female	64.4 (18.4)	64.4 (16.5)	64.5 (20.3)
Percent White	76.9 (24.2)	77.4 (23.4)	76.5 (25.2)
Percent Black	19.1 (20.1)	19.0 (19.9)	19.1 (20.4)
Percent other race	3.0 (6.7)	2.4 (5.2)	3.6 (7.9)
Percent Hispanic/Latino/a	0.6 (1.5)	0.7 (1.8)	0.5 (1.2)
Percent diagnosed with dementia	44.9 (35.7)	48.3 (37.8)	41.6 (33.5)
Percent with mental illness diagnosis	25.2 (22.0)	27.0 (23.5)	23.4 (20.6)
Percent receiving state financial assistance or Medicaid	51.9 (31.0)	55.1 (31.6)	48.9 (30.4)
Percent receiving medical care on site	95 (88.8%)	46 (88.5%)	49 (89.1%)

Note: Of the 113 participating communities, 108 submitted baseline characteristic data; percent missing ranged from 0-6 across items.

Table ii. Comparisons of Baseline Community Characteristics between Communities that Ever Became Accredited and Control Arm Communities, and between Accreditation Arm Communities that Ever and Never Became Accredited

Characteristic	Ever Became Accredited (N=25)	Control Arm (N=53)	Comparison of Ever Became Accredited vs. Control Arm	Never Became Accredited (N=30)	Comparison of Accreditation Arm Communities that Ever vs. Never Became Accredited
	N (%) or Mean (SD)		p-value	N (%) or Mean (SD)	p-value
Community Characteristics					
For profit	24 (96%)	50 (94.3%)	1.00	30 (100%)	.45
Branch					
Western	9 (36%)	14 (26.4%)	.52	10 (33.3%)	.40
Central	6 (24%)	19 (35.8%)		12 (40%)	
Eastern	10 (40%)	20 (37.7%)		8 (26.7%)	
Star Rating					
Low Star Rating (0-2)	5 (20%)	12 (22.6%)	.79	6 (20%)	1.00
High Star Rating (3-4)	20 (80%)	41 (77.4%)		24 (80%)	
Is a chain	15 (60%)	35 (66%)	.60	25 (83.3%)	.053
Provide some or all memory care	15 (62.5%)	26 (49.1%)	.27	16 (53.3%)	.50
Electronic medical records	21 (84%)	45 (84.9%)	1.00	28 (93.3%)	.39
Electronic prescribing	4 (16.7%)	10 (18.9%)	1.00	11 (37.9%)	.13
Number of years licensed	17 (12.3)	15.2 (11.5)	.54	16.9 (11.7)	.96
Number of licensed beds	79.7 (28.2)	67.5 (30.6)	.09	61.8 (25.3)	.02
Number of licensed memory care beds	36.2 (10.4)	40.6 (21.4)	.52	38.9 (16)	.64
Average monthly private pay base rate					
Non-memory care	2808.8 (1367.3)	2380.1 (1633.2)	.24	3011.2 (1606.7)	.62
Memory care	3205.2 (2364.7)	2241.2 (2454.3)	.13	2197.2 (2323.3)	.14
Staffing Characteristics					
Registered nurse on site	20 (80%)	40 (75.5%)	.66	24 (80%)	1.00
Registered nurse on call	19 (76%)	48 (94.1%)	.052	30 (100%)	.01
Licensed practical nurse on site	0 (0%)	8 (15.1%)	.049	4 (13.3%)	.12
Licensed practical nurse on call	0 (0%)	10 (19.6%)	.03	3 (10%)	.24
Personal care assistant work shift					
8-hour shifts	22 (88%)	36 (67.9%)	.17	18 (62.1%)	.07
12-hour shifts	3 (12%)	13 (24.5%)		7 (24.1%)	
Both 8- and 12-hour shifts	0 (0%)	4 (7.5%)		4 (13.8%)	
Mean care aide staffing ratio, day	9.9 (3)	10.5 (3.7)	.43	9.3 (2.6)	.45
Mean care aide staffing ratio, evening	10.6 (2.9)	11.8 (4.8)	.18	9.9 (2.8)	.34
Mean care aide staffing ratio, night	13.5 (5.2)	14.7 (5.4)	.34	12.7 (4.2)	.56
Resident Characteristics					
Percent age 85 and older	32.5 (18.2)	31 (18.8)	.73	37.7 (25.2)	.38
Percent age 75-84	30.7 (7.7)	30.1 (11.2)	.76	27.3 (13.3)	.24
Percent age 65-74	24.3 (13.6)	24.1 (14.2)	.95	19.8 (14.4)	.24
Percent younger than age 65	12.5 (8.4)	14.8 (17.4)	.42	15.3 (21.3)	.51
Percent female	63.9 (10.3)	64.4 (16.6)	.87	65 (26)	.83
Percent White	74.1 (23.8)	77.4 (23.4)	.57	78.5 (26.6)	.52
Percent Black	22.4 (20.5)	19 (19.9)	.49	16.3 (20.2)	.27
Percent other race	3.3 (6.6)	2.4 (5.2)	.57	3.9 (8.9)	.79
Percent Hispanic/Latino/a	0.8 (1.2)	0.7 (1.8)	.92	0.4 (1.3)	.23
Percent diagnosed with dementia	43.1 (34.4)	48.3 (37.8)	.55	40.4 (33.3)	.77
Percent with mental illness diagnosis	19.3 (17)	27 (23.5)	.10	26.8 (22.9)	.17
Percent receiving state financial assistance or Medicaid	55.4 (26.1)	55.1 (31.9)	.96	43.5 (33.1)	.14
Percent receiving medical care on site	90.4 (19.3)	86.5 (20.8)	.42	76.7 (31.3)	.052

APPENDIX II: DATA TABLES

Resident Outcomes and Care Coordination/Transitions: Health Care Related (Tables A1-A7)

Table A1. Percent (95% CI) of All Residents Who Had a Fall with Major Injury, by Study Arm and Condition

Quarter	Control Arm		Accreditation Arm		Accreditation Arm: Not Accredited Condition		Accreditation Arm: Accredited Condition	
	Number of Residents	Percent (95% CI)	Number of Residents	Percent (95% CI)	Number of Residents	Percent (95% CI)	Number of Residents	Percent (95% CI)
1	61/2088	2.9 (1.9, 4.4)	111/2554	4.3 (3, 6.3)	111/2554	4.3 (3, 6.3)	NA	NA
2	108/2378	4.5 (2.8, 7.2)	108/2578	4.2 (3.3, 5.3)	108/2578	4.2 (3.3, 5.3)	NA	NA
3	85/1989	4.3 (3.2, 5.7)	87/2424	3.6 (2.7, 4.8)	87/2424	3.6 (2.7, 4.8)	NA	NA
4	92/2088	4.4 (3.2, 6.1)	138/2324	5.9 (4.1, 8.6)	136/2222	6.1 (4.2, 8.8)	2/102	2.0 (0.2, 17)
5	82/2041	4.0 (2.7, 5.9)	86/2281	3.8 (2.9, 4.9)	70/1815	3.9 (2.9, 5.1)	16/466	3.4 (1.8, 6.5)
6	62/1500	4.1 (2.5, 6.8)	62/1709	3.6 (2.3, 5.7)	18/526	3.4 (1.9, 6.1)	44/1183	3.7 (2.1, 6.7)
7	84/2018	4.2 (2.4, 7.2)	104/2072	5.0 (3, 8.2)	48/707	6.8 (2.5, 17)	56/1365	4.1 (2.7, 6.2)
8	57/1468	3.9 (2.5, 5.9)	83/1603	5.2 (3.3, 8.1)	17/367	4.6 (2.3, 8.9)	66/1236	5.3 (3.1, 9.1)
9	39/969	4 (2.3, 7)	131/1274	10 (4.8, 21)	51/144	35 (11, 72)	80/1130	7.1 (2.7, 17)
10	18/843	2.1 (1, 4.4)	87/1219	7.1 (3.3, 15)	0/106	0 (NA)	87/1113	7.8 (3.6, 16)

Multivariable Logistic Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multivariable Regression	Primary Model[a]			Adjusted Model[b]		
	Odds Ratio	**95% CI**	**p-value**	**Odds Ratio**	**95% CI**	**p-value**
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	1.00	(0.55, 1.8)	1.00	1.00	(0.55, 1.8)	0.99
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	0.96	(0.45, 2.1)	0.93	0.96	(0.45, 2.0)	0.91
Not Accredited Condition versus Control Arm in Period 3	1.02	(0.55, 1.9)	0.96	1.02	(0.55, 1.9)	0.95
Accredited Condition versus Not Accredited Condition in Period 3	0.95	(0.53, 1.7)	0.86	0.94	(0.52, 1.7)	0.82

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 4 through 10 (see text for explanation).

Table A2. Percent (95% CI) of Residents Who Had an Emergency Department Visit, by Study Arm and Condition								
Quarter	**Control Arm**		**Accreditation Arm**		**Accreditation Arm: Not Accredited Condition**		**Accreditation Arm: Accredited Condition**	
	Number of Residents	Percent (95% CI)	Number of Residents	Percent (95% CI)	Number of Residents	Percent (95% CI)	Number of Residents	Percent (95% CI)
1	334/2088	16 (13, 20)	423/2554	17 (13, 21)	423/2554	17 (13, 21)	NA	NA
2	348/2378	15 (11, 19)	544/2578	21 (16, 27)	544/2578	21 (16, 27)	NA	NA
3	318/1989	16 (12, 21)	466/2424	19 (15, 25)	466/2424	19 (15, 25)	NA	NA
4	357/2088	17 (13, 23)	452/2324	19 (15, 25)	418/2222	19 (15, 24)	34/102	33 (29, 38)
5	303/2041	15 (10, 22)	453/2281	20 (15, 27)	364/1815	20 (14, 27)	89/466	19 (8, 38)
6	233/1500	16 (11, 22)	351/1709	21 (16, 26)	101/526	19 (12, 29)	250/1183	21 (16, 28)
7	278/2018	14 (10, 19)	394/2072	19 (13, 26)	156/707	22 (10, 41)	238/1365	17 (13, 23)
8	257/1468	18 (13, 24)	303/1603	19 (15, 24)	59/367	16 (8.4, 29)	244/1236	20 (15, 25)
9	148/969	15 (11, 21)	291/1274	23 (17, 30)	53/144	37 (13, 69)	238/1130	21 (16, 28)
10	118/843	14 (9.2, 21)	223/1219	18 (14, 23)	14/106	13 (3.9, 36)	209/1113	19 (15, 24)

Multivariable Logistic Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multivariable Regression	**Primary Model[a]**			**Adjusted Model[b]**		
	Odds Ratio	**95% CI**	**p-value**	**Odds Ratio**	**95% CI**	**p-value**
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	1.26	(0.82, 1.9)	0.29	1.26	(0.82, 1.9)	0.28
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	1.20	(0.78, 1.9)	0.40	1.20	(0.78, 1.9)	0.41
Not Accredited Condition versus Control Arm in Period 3	1.29	(0.81, 2.0)	0.28	1.29	(0.82, 2.0)	0.27
Accredited Condition versus Not Accredited Condition in Period 3	0.93	(0.69, 1.3)	0.67	0.93	(0.68, 1.3)	0.64

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 4 through 10 (see text for explanation).

Table A3. Percent (95% CI) of Residents Who Experienced an Unplanned Hospital Admission, by Study Arm and Condition								
Quarter	**Control Arm**		**Accreditation Arm**		**Accreditation Arm: Not Accredited Condition**		**Accreditation Arm: Accredited Condition**	
	Number of Residents	Percent (95% CI)	Number of Residents	Percent (95% CI)	Number of Residents	Percent (95% CI)	Number of Residents	Percent (95% CI)
1	229/2088	11 (8.1, 15)	293/2554	12 (9.6, 14)	293/2554	12 (9.6, 14)	NA	NA
2	233/2378	9.8 (7.9, 12)	331/2578	13 (10, 16)	331/2578	13 (10, 16)	NA	NA
3	221/1989	11 (8.9, 14)	323/2424	13 (11, 17)	323/2424	13 (11, 17)	NA	NA
4	203/2088	9.7 (7.4, 13)	287/2324	12 (9.8, 16)	275/2222	12 (9.7, 16)	12/102	12 (12, 12)
5	154/2041	7.5 (5.6, 10)	296/2281	13 (10, 16)	225/1815	12 (9.7, 16)	71/466	15 (9.2, 24)
6	195/1500	13 (10, 17)	224/1709	13 (11, 16)	84/526	16 (11, 23)	140/1183	12 (9.9, 14)
7	172/2018	8.5 (6.2, 12)	293/2072	14 (11, 18)	110/707	16 (9.8, 24)	183/1365	13 (9.9, 18)
8	173/1468	12 (8.6, 16)	227/1603	14 (11, 18)	66/367	18 (11, 27)	161/1236	13 (10, 17)
9	83/969	8.6 (5.7, 13)	201/1274	16 (11, 22)	69/144	48 (29, 68)	132/1130	12 (9.3, 15)
10	89/843	11 (6.8, 16)	155/1219	13 (9.8, 16)	7/106	6.6 (2, 20)	148/1113	13 (10, 17)

Multivariable Logistic Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multivariable Regression	**Primary Model[a]**			**Adjusted Model[b]**		
	Odds Ratio	**95% CI**	**p-value**	**Odds Ratio**	**95% CI**	**p-value**
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	1.38	(0.88, 2.1)	0.16	1.37	(0.88, 2.1)	0.16
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	1.25	(0.80, 2.0)	0.33	1.24	(0.79, 1.9)	0.35
Not Accredited Condition versus Control Arm in Period 3	1.45	(0.92, 2.3)	0.11	1.45	(0.92, 2.3)	0.11
Accredited Condition versus Not Accredited Condition in Period 3	0.86	(0.71, 1.1)	0.15	0.85	(0.70, 1.0)	0.11

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 4 through 10 (see text for explanation).

Table A4. Percent (95% CI) of Hospital Readmissions within 30 Days, by Study Arm and Condition								
Quarter	**Control Arm**		**Accreditation Arm**		**Accreditation Arm: Not Accredited Condition**		**Accreditation Arm: Accredited Condition**	
	Number of Residents	Percent (95% CI)	Number of Residents	Percent (95% CI)	Number of Residents	Percent (95% CI)	Number of Residents	Percent (95% CI)
1	52/221	24 (17, 32)	80/290	28 (20, 37)	80/290	28 (20, 37)	NA	NA
2	51/227	23 (15, 32)	68/326	21 (15, 28)	68/326	21 (15, 28)	NA	NA
3	46/220	21 (13, 32)	84/323	26 (17, 37)	84/323	26 (17, 37)	NA	NA
4	54/203	27 (17, 39)	73/287	25 (18, 36)	67/275	24 (16, 35)	6/12	50 (50, 50)
5	38/154	25 (14, 39)	64/296	22 (14, 32)	45/225	20 (13, 30)	19/71	27 (9.8, 55)
6	29/195	15 (10, 21)	36/224	16 (11, 22)	15/84	18 (11, 28)	21/140	15 (9.3, 23)
7	58/172	34 (15, 59)	46/293	16 (11, 23)	17/110	16 (6.4, 33)	29/183	16 (11, 23)
8	28/173	16 (11, 23)	67/227	30 (17, 46)	25/66	38 (16, 67)	42/161	26 (13, 45)
9	19/83	23 (12, 39)	70/201	35 (17, 59)	35/69	51 (12, 89)	35/132	27 (14, 44)
10	14/89	16 (9.2, 26)	16/155	10 (5.4, 19)	0/7	0 (NA)	16/148	11 (5.7, 20)

Multivariable Logistic Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multivariable Regression	**Primary Model[a]**			**Adjusted Model[b]**		
	Odds Ratio	**95% CI**	**p-value**	**Odds Ratio**	**95% CI**	**p-value**
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	0.76	(0.38, 1.5)	0.44	0.76	(0.38, 1.5)	0.44
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	0.61	(0.30, 1.2)	0.16	0.61	(0.30, 1.2)	0.18
Not Accredited Condition versus Control Arm in Period 3	0.86	(0.41, 1.8)	0.69	0.85	(0.41, 1.8)	0.68
Accredited Condition versus Not Accredited Condition in Period 3	0.71	(0.45, 1.1)	0.13	0.72	(0.47, 1.1)	0.13

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 4 through 10 (see text for explanation).

Table A5. Percent (95% CI) of New Residents Having an Advance Care Planning Discussion, by Study Arm and Condition								
Quarter	**Control Arm**		**Accreditation Arm**		**Accreditation Arm: Not Accredited Condition**		**Accreditation Arm: Accredited Condition**	
	Number of Residents	Percent (95% CI)	Number of Residents	Percent (95% CI)	Number of Residents	Percent (95% CI)	Number of Residents	Percent (95% CI)
1	124/237	52 (36, 68)	175/299	59 (43, 73)	175/299	59 (43, 73)	NA	NA
2	142/261	54 (40, 68)	193/303	64 (48, 77)	193/303	64 (48, 77)	NA	NA
3	173/297	58 (41, 74)	197/375	53 (36, 69)	197/375	53 (36, 69)	NA	NA
4	162/225	72 (58, 83)	144/261	55 (41, 69)	130/247	53 (38, 67)	14/14	100
5	156/238	66 (49, 79)	168/278	60 (43, 75)	144/201	72 (54, 84)	24/77	31 (11, 63)
6	85/153	56 (37, 73)	128/200	64 (42, 81)	29/67	43 (16, 75)	99/133	74 (49, 90)
7	195/301	65 (49, 78)	238/311	77 (59, 88)	91/119	77 (46, 92)	147/192	77 (54, 90)
8	77/152	51 (33, 68)	139/213	65 (44, 82)	25/53	47 (18, 79)	114/160	71 (45, 88)
9	47/102	46 (25, 69)	106/147	72 (50, 87)	14/28	50 (13, 87)	92/119	77 (56, 90)
10	75/110	68 (44, 86)	92/122	75 (49, 91)	14/14	100 (NA)	78/108	72 (45, 89)

Multivariable Logistic Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multivariable Regression	**Primary Model**[a]			**Adjusted Model**[b]		
	Odds Ratio	**95% CI**	**p-value**	**Odds Ratio**	**95% CI**	**p-value**
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	1.13	(0.44, 2.9)	0.79	1.16	(0.44, 3.0)	0.77
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	1.63	(0.60, 4.5)	0.34	1.64	(0.58, 4.6)	0.35
Not Accredited Condition versus Control Arm in Period 3	0.93	(0.36, 2.4)	0.89	0.96	(0.36, 2.6)	0.93
Accredited Condition versus Not Accredited Condition in Period 3	1.75	(1.00, 3.1)	0.05	1.71	(0.96, 3.1)	0.07

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 4 through 10 (see text for explanation).

Table A6. Percent (95% CI) of Residents with Dementia Discharged Due to Behavior, by Study Arm and Condition								
Quarter	Control Arm		Accreditation Arm		Accreditation Arm: Not Accredited Condition		Accreditation Arm: Accredited Condition	
	Number of Residents	Percent (95% CI)	Number of Residents	Percent (95% CI)	Number of Residents	Percent (95% CI)	Number of Residents	Percent (95% CI)
1	11/174	6.3 (2.7, 14)	9/157	5.7 (2.3, 13)	9/157	5.7 (2.3, 13)	NA	NA
2	14/289	4.8 (2.6, 8.9)	7/202	3.5 (1.3, 8.7)	7/202	3.5 (1.3, 8.7)	NA	NA
3	21/155	14 (7.3, 24)	12/122	9.8 (4.5, 20)	12/122	9.8 (4.5, 20)	NA	NA
4	8/113	7.1 (3.1, 15)	14/174	8 (4.5, 14)	13/139	9.4 (5, 17)	1/35	2.9 (1.9, 4.2)
5	5/177	2.8 (1.3, 6)	5/254	2 (0.7, 5.4)	3/164	1.8 (0.4, 7.4)	2/90	2.2 (0.5, 9.3)
6	7/111	6.3 (3.2, 12)	5/119	4.2 (1.3, 13)	3/42	7.1 (1.4, 29)	2/77	2.6 (0.5, 13)
7	8/120	6.7 (3, 14)	8/174	4.6 (1.8, 12)	5/97	5.2 (1.5, 17)	3/77	3.9 (0.9, 16)
8	6/109	5.5 (1.8, 16)	9/119	7.6 (2.4, 21)	5/24	21 (5.1, 56)	4/95	4.2 (0.9, 17)
9	5/64	7.8 (2.6, 21)	9/117	7.7 (2.6, 21)	5/14	36 (12, 70)	4/103	3.9 (1.1, 13)
10	3/32	9.4 (2.1, 34)	10/130	7.7 (1.9, 26)	5/5	100 (NA)	5/125	4.0 (1.1, 14)

Multivariable Logistic Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multivariable Regression	Primary Model[a]			Adjusted Model[b]		
	Odds Ratio	**95% CI**	**p-value**	**Odds Ratio**	**95% CI**	**p-value**
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	1.22	(0.34, 4.4)	0.76	1.02	(0.27, 3.8)	0.98
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	0.67	(0.14, 3.2)	0.61	0.55	(0.11, 2.7)	0.47
Not Accredited Condition versus Control Arm in Period 3	1.69	(0.48, 6.0)	0.42	1.42	(0.38, 5.3)	0.60
Accredited Condition versus Not Accredited Condition in Period 3	0.39	(0.14, 1.1)	0.09	0.39	(0.13, 1.2)	0.09

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 4 through 10 (see text for explanation).

[d] The outcome was modeled assuming no correlation over time within a community.

Table A7. Mean (95% CI) Care Transition Preparation Score, by Study Arm and Condition
(Note: Mean score of 3 items ranging from 1/strongly disagree to 4/strongly agree; higher scores are favorable)

Quarter	Control Arm		Accreditation Arm		Accreditation Arm: Not Accredited Condition		Accreditation Arm: Accredited Condition	
	Number of Communities; Number of Residents	Mean (95% CI)	Number of Communities; Number of Residents	Mean (95% CI)	Number of Communities; Number of Residents	Mean (95% CI)	Number of Communities, Number of Residents	Mean (95% CI)
1	29; 92	3.5 (3.4, 3.7)	29; 83	3.5 (3.4, 3.6)	29; 83	3.5 (3.4, 3.6)	NA	NA
3	18; 58	3.5 (3.3, 3.8)	21; 59	3.6 (3.4, 3.7)	21; 59	3.6 (3.4, 3.7)	NA	NA
5	12; 27	3.4 (3.0, 3.7)	11; 29	3.5 (3.3, 3.8)	8; 23	3.6 (3.2, 3.9)	3; 6	3.5 (3.1, 3.9)
7	11; 44	3.4 (3.3, 3.6)	12; 31	3.7 (3.5, 3.9)	1; 7	3.8 (3.8, 3.8)	11; 24	3.7 (3.4, 4.0)
9	12; 28	3.7 (3.5, 3.8)	8; 21	3.6 (3.5, 3.8)	2; 5	3.4 (3.1, 3.7)	6; 16	3.7 (3.6, 3.8)

Longitudinal Multiple Linear Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multiple Linear Regression	Primary Model[a]			Adjusted Model[b]		
	Difference in Means	95% CI	p-value	Difference in Means	95% CI	p-value
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	0.15	(-0.14, 0.44)	0.31	0.15	(-0.15, 0.45)	0.33
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	0.17	(-0.12, 0.45)	0.25	0.17	(-0.11, 0.46)	0.24
Not Accredited Condition versus Control Arm in Period 3	0.14	(-0.19, 0.47)	0.41	0.14	(-0.21, 0.48)	0.44
Accredited Condition versus Not Accredited Condition in Period 3	0.02	(-0.24, 0.29)	0.86	0.04	(-0.23, 0.31)	0.79

[a] Primary model adjusts for study design variables (region and star rating).
[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).
[c] Period 3 represents data from Quarters 5 through 9 (see text for explanation).

Resident Outcomes and Care Coordination/Transitions: Psychosocial Related (Tables A8-A11)

Table A8. Mean (95% CI) of Percent of Social Activities in Which Resident Participated (11 items), by Study Arm and Condition

Quarter	Control Arm		Accreditation Arm		Accreditation Arm: Not Accredited Condition		Accreditation Arm: Accredited Condition	
	Number of Communities; Number of Residents	Mean (95% CI)	Number of Communities; Number of Residents	Mean (95% CI)	Number of Communities; Number of Residents	Mean (95% CI)	Number of Communities, Number of Residents	Mean (95% CI)
1	34; 297	42.7 (37.1, 48.2)	33; 253	40.2 (35.7, 44.6)	33; 253	40.2 (35.7, 44.6)	NA	NA
3	26; 217	47.6 (39.7, 55.5)	31; 221	52.0 (45.5, 58.5)	31; 221	52.0 (45.5, 58.5)	NA	NA
5	19; 164	41.0 (33.0, 49.0)	17; 169	42.5 (33.7, 51.3)	13; 127	39.8 (29.3, 50.3)	4; 42	50.4 (39.2, 61.7)
7	22; 164	53.8 (47.3, 60.3)	16; 112	54.8 (41.9, 67.8)	2; 17	79.1 (63.7, 94.6)	14; 95	50.5 (38.7, 62.3)
9	13; 89	53.2 (41.5, 64.8)	11; 74	51.5 (37.3, 65.8)	1; 1	100 (NA)	10; 73	50.9 (36.4, 65.4)

Longitudinal Multiple Linear Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multiple Linear Regression	Primary Model[a]			Adjusted Model[b]		
	Difference in Means	95% CI	p-value	Difference in Means	95% CI	p-value
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	1.32	(-9.9, 12.6)	0.82	1.26	(-10.0, 12.6)	0.83
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	3.80	(-7.0, 14.6)	0.49	3.63	(-7.2, 14.5)	0.51
Not Accredited Condition versus Control Arm in Period 3	-0.01	(-12.7, 12.6)	1.00	-0.02	(-12.7, 12.6)	1.00
Accredited Condition versus Not Accredited Condition in Period 3	3.81	(-5.1, 12.7)	0.40	3.65	(-5.1, 12.4)	0.41

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 5 through 9 (see text for explanation).

Table A9. Mean (95% CI) of Number of Days (of 14) Resident Spoke on Telephone with Family or Friends Not in the Community, by Study Arm and Condition								
Quarter	Control Arm		Accreditation Arm		Accreditation Arm: Not Accredited Condition		Accreditation Arm: Accredited Condition	
	Number of Communities; Number of Residents	Mean (95% CI)	Number of Communities; Number of Residents	Mean (95% CI)	Number of Communities; Number of Residents	Mean (95% CI)	Number of Communities, Number of Residents	Mean (95% CI)
1	34; 294	5.0 (4.1, 5.9)	33; 248	6.5 (5.5, 7.5)	33; 248	6.5 (5.5, 7.5)	NA	NA
3	27; 217	4.4 (3.5, 5.4)	31; 219	6.5 (5.2, 7.8)	31; 219	6.5 (5.2, 7.8)	NA	NA
5	19; 158	3.9 (2.9, 5.0)	17; 166	4.8 (3.5, 6.2)	13; 123	5.1 (3.4, 6.8)	4; 43	4.2 (2.5, 5.9)
7	22; 183	4.3 (2.8, 5.8)	16; 108	4.8 (3.4, 6.2)	2; 16	2.8 (0, 6.7)	14; 92	5.1 (4.0, 6.3)
9	13; 88	4.6 (2.3, 6.9)	11; 75	4.3 (2.5, 6.2)	1; 1	10.0 (NA)	10; 74	4.3 (2.4, 6.1)

Longitudinal Multiple Linear Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multiple Linear Regression	Primary Model[a]			Adjusted Model[b]		
	Difference in Means	95% CI	p-value	Difference in Means	95% CI	p-value
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	-0.28	(-2.02, 1.45)	0.75	-0.47	(-2.20, 1.25)	0.59
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	-0.21	(-1.77, 1.36)	0.79	-0.49	(-2.13, 1.14)	0.56
Not Accredited Condition versus Control Arm in Period 3	-0.32	(-2.38, 1.74)	0.76	-0.46	(-2.46, 1.53)	0.65
Accredited Condition versus Not Accredited Condition in Period 3	0.11	(-1.52, 1.75)	0.89	-0.03	(-1.57, 1.51)	0.97

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 5 through 9 (see text for explanation).

Table A10. Mean (95% CI) Number of Days (of 14) Resident Had a Visitor, by Study Arm and Condition								
Quarter	Control Arm		Accreditation Arm		Accreditation Arm: Not Accredited Condition		Accreditation Arm: Accredited Condition	
	Number of Communities; Number of Residents	Mean (95% CI)	Number of Communities; Number of Residents	Mean (95% CI)	Number of Communities; Number of Residents	Mean (95% CI)	Number of Communities, Number of Residents	Mean (95% CI)
1	34; 299	3.2 (2.6, 3.8)	33; 251	3.4 (2.6, 4.1)	33; 251	3.4 (2.6, 4.1)	NA	NA
3	27; 217	3.2 (2.4, 4.1)	31; 217	4.3 (3.2, 5.4)	31; 217	4.3 (3.2, 5.4)	NA	NA
5	18; 157	3.2 (2.4, 3.9)	17; 167	3.3 (2.4, 4.2)	13; 125	3.5 (2.4, 4.6)	4; 42	2.8 (1.4, 4.3)
7	22; 183	3.2 (1.9, 4.5)	16; 108	2.8 (2.0, 3.7)	2; 16	1.2 (1.1, 1.3)	14; 92	3.1 (2.2, 4.0)
9	13; 87	3.3 (1.9, 4.6)	11; 75	2.3 (1.7, 2.8)	1; 1	3.0 (NA)	10; 74	2.3 (1.7, 2.8)

Longitudinal Multiple Linear Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multiple Linear Regression	Primary Model[a]			Adjusted Model[b]		
	Difference in Means	95% CI	p-value	Difference in Means	95% CI	p-value
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	-0.08	(-1.36, 1.19)	0.90	-0.11	(-1.40, 1.18)	0.87
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	-0.30	(-1.45, 0.85)	0.61	-0.33	(-1.51, 0.85)	0.58
Not Accredited Condition versus Control Arm in Period 3	0.03	(-1.44, 1.50)	0.97	0.01	(-1.47, 1.48)	0.99
Accredited Condition versus Not Accredited Condition in Period 3	-0.33	(-1.36, 0.70)	0.53	-0.34	(-1.37, 0.69)	0.52

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 5 through 9 (see text for explanation).

Table A11. Mean (95% CI) of Resident/Family Satisfaction Score, by Study Arm and Condition
(Note: mean score of 3 items ranging from 1/poor to 5/excellent; higher scores are favorable)

Quarter	Control Arm		Accreditation Arm		Accreditation Arm: Not Accredited Condition		Accreditation Arm: Accredited Condition	
	Number of Communities; Number of Residents	Mean (95% CI)	Number of Communities; Number of Residents	Mean (95% CI)	Number of Communities; Number of Residents	Mean (95% CI)	Number of Communities, Number of Residents	Mean (95% CI)
1	34; 308	3.9 (3.7, 4.2)	33; 261	4.1 (3.9, 4.2)	33; 261	4.1 (3.9, 4.2)	NA	NA
3	27; 221	3.9 (3.7, 4.1)	31; 227	4.1 (3.9, 4.2)	31; 227	4.1 (3.9, 4.2)	NA	NA
5	19; 169	3.9 (3.7, 4.2)	17; 172	3.9 (3.7, 4.1)	13; 129	3.8 (3.7, 4.0)	4; 43	4.0 (3.4, 4.7)
7	22; 188	4.0 (3.7, 4.2)	16; 114	3.8 (3.4, 4.2)	2; 17	4.3 (4.2, 4.3)	14; 97	3.7 (3.3, 4.2)
9	13; 89	4.1 (3.9, 4.3)	11; 78	3.8 (3.4, 4.2)	1; 1	3.7 (NA)	10; 77	3.8 (3.4, 4.2)

Longitudinal Multiple Linear Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multiple Linear Regression	Primary Model[a]			Adjusted Model[b]		
	Difference in Means	95% CI	p-value	Difference in Means	95% CI	p-value
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	-0.07	(-0.39, 0.24)	0.64	-0.06	(-0.37, 0.25)	0.70
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	-0.19	(-0.61, 0.22)	0.36	-0.17	(-0.58, 0.25)	0.43
Not Accredited Condition versus Control Arm in Period 3	-0.01	(-0.33, 0.31)	0.95	0.00	(-0.32, 0.31)	0.98
Accredited Condition versus Not Accredited Condition in Period 3	-0.18	(-0.53, 0.17)	0.31	-0.16	(-0.51, 0.19)	0.36

[a] Primary model adjusts for study design variables (region and star rating).
[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).
[c] Period 3 represents data from Quarters 5 through 9 (see text for explanation).

Person-Centered Care (Table B1)

Table B1. Mean (95% CI) Percent-centered Care Scores, by Study Arm and Condition
(Note: mean score of 17 items ranging from 1/disagree completely to 6/agree completely)

Quarter	Control Arm		Accreditation Arm		Accreditation Arm: Not Accredited Condition		Accreditation Arm: Accredited Condition	
	Number of Communities; Number of Residents	Mean (95% CI)	Number of Communities; Number of Residents	Mean (95% CI)	Number of Communities; Number of Residents	Mean (95% CI)	Number of Communities, Number of Residents	Mean (95% CI)
1	34; 308	5.1 (4.9, 5.2)	33; 265	5.0 (4.9, 5.2)	33; 265	5.0 (4.9, 5.2)	NA	NA
3	27; 222	5.0 (4.9, 5.2)	30; 225	5.1 (5.0, 5.2)	30; 225	5.1 (5.0, 5.2)	NA	NA
5	19; 163	4.9 (4.7, 5.1)	17; 173	4.8 (4.6, 5.1)	13; 128	4.8 (4.6, 5.0)	4; 45	5.0 (4.2, 5.8)
7	22; 187	4.9 (4.7, 5.2)	16; 112	4.9 (4.6, 5.2)	2; 17	5.2 (5.0, 5.3)	14; 95	4.8 (4.5, 5.2)
9	13; 88	5.1 (4.9, 5.4)	12; 87	4.9 (4.6, 5.2)	2; 11	4.8 (4.8, 4.8)	10; 76	4.9 (4.6, 5.2)

Longitudinal Multiple Linear Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multiple Linear Regression	Primary Model[a]			Adjusted Model[b]		
	Difference in Means	95% CI	p-value	Difference in Means	95% CI	p-value
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	0.01	(-0.28, 0.29)	0.95	0.02	(-0.26, 0.30)	0.91
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	-0.02	(-0.35, 0.32)	0.92	0.00	(-0.33, 0.33)	1.00
Not Accredited Condition versus Control Arm in Period 3	0.02	(-0.28, 0.33)	0.88	0.03	(-0.28, 0.33)	0.87
Accredited Condition versus Not Accredited Condition in Period 3	-0.04	(-0.32, 0.25)	0.79	-0.03	(-0.31, 0.26)	0.85

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 5 through 9 (see text for explanation).

Medication Management (Tables C1-C4)

Table C1. Percent (95% CI) of Residents Whose Identity with Respect to Medications Was Not Confirmed by Staff, by Study Arm and Condition

Quarter	Control Arm		Accreditation Arm		Accreditation Arm: Not Accredited Condition		Accreditation Arm: Accredited Condition	
	Number of Events/Number of Medication Administration	Percent (95% CI)	Number of Events/Number of Medication Administrations	Percent (95% CI)	Number of Events/Number of Medication Administrations	Percent (95% CI)	Number of Events/Number of Medication Administrations	Percent (95% CI)
1	1/245	0.4 (0.1, 2.8)	2/259	0.8 (0.1, 5.2)	2/259	0.8 (0.1, 5.2)	NA	NA
2	0/269	0 (NA)	2/260	0.8 (0.2, 3.0)	2/260	0.8 (0.2, 3.0)	NA	NA
3	0/215	0 (NA)	0/219	0 (NA)	0/219	0 (NA)	NA	NA
4	6/225	2.7 (0.5, 12.9)	0/219	0 (NA)	0/209	0 (NA)	0/10	0 (NA)
5	1/210	0.5 (0.1, 3.2)	0/210	0 (NA)	0/165	0 (NA)	0/45	0 (NA)
6	0/180	0 (NA)	1/145	0.7 (0.1, 4.6)	0/45	0 (NA)	1/100	1.0 (0.1, 6.5)
7	0/215	0 (NA)	0/185	0 (NA)	0/70	0 (NA)	0/115	0 (NA)
8	0/165	0 (NA)	0/144	0 (NA)	0/39	0 (NA)	0/105	0 (NA)
9	0/120	0 (NA)	0/105	0 (NA)	0/15	0 (NA)	0/90	0 (NA)
10	0/105	0 (NA)	0/100	0 (NA)	0/10	0 (NA)	0/90	0 (NA)
Total	8/1949	0.4 (0.1, 1.4)	5/1846	0.3 (0.1, 0.7)	4/1291	0.3 (0.1, 1.0)	1/555	0.2 (0.0, 1.2)

Multivariable Logistic Regression Results Using Exact Inference for Sparsely Distributed Counts (Reference Category is Quarter 1)

Comparisons Adjusted for Baseline	Analytic Model[a]		
	Odds Ratio	95% CI	p-value
Intent-to-treat Comparisons[b]			
Accreditation Arm versus Control Arm in Period 2-3	0.46	(0.08, 2.02)	0.40
Per Protocol Comparisons[b]			
Accredited Condition versus Not Accredited Condition in Period 2-3	0.93	(0.02, 17.9)	1

[a] No adjustment variables are included in the analytic model due to the low number of events.

[b] Period 2 represents data from Quarters 2 and 3; Period 3 represents data from Quarters 4 through 10 (see text for explanation).

Table C2. Percent (95% CI) of Residents Who Had Ordered Medications That Were Not Administered, by Study Arm and Condition

Quarter	Control Arm		Accreditation Arm		Accreditation Arm: Not Accredited Condition		Accreditation Arm: Accredited Condition	
	Number of Events/Number of Residents	Percent (95% CI)	Number of Events/Number of Residents	Percent (95% CI)	Number of Events/Number of Residents	Percent (95% CI)	Number of Events/Number of Residents	Percent (95% CI)
1	5/245	2.0 (0.6, 6.3)	16/257	6.2 (2.6, 14.0)	16/257	6.2 (2.6, 14.0)	NA	NA
2	3/270	1.1 (0.3, 4.6)	4/260	1.5 (0.5, 4.9)	4/260	1.5 (0.5, 4.9)	NA	NA
3	2/215	0.9 (0.2, 3.5)	1/219	0.5 (0.1, 3.1)	1/219	0.5 (0.1, 3.1)	NA	NA
4	5/225	2.2 (0.8, 5.9)	0/219	0 (NA)	0/209	0 (NA)	0/10	0 (NA)
5	0/210	0 (NA)	0/210	0 (NA)	0/165	0 (NA)	0/45	0 (NA)
6	3/180	1.7 (0.4, 6.7)	1/145	0.7 (0.1, 4.6)	0/45	0 (NA)	1/100	1.0 (0.1, 6.5)
7	2/215	0.9 (0.2, 3.5)	3/185	1.6 (0.5, 4.7)	1/70	1.4 (0.2, 9.0)	2/115	1.7 (0.5, 6.4)
8	0/160	0 (NA)	0/144	0 (NA)	0/39	0 (NA)	0/105	0 (NA)
9	0/120	0 (NA)	1/105	1.0 (0.1, 6.2)	1/15	6.7 (1.3, 28.4)	0/90	0 (NA)
10	0/105	0 (NA)	1/100	1.0 (0.1, 6.5)	1/10	10.0 (2.3, 34.1)	0/90	0 (NA)
Total	20/1945	1.0 (0.5, 2.2)	27/1844	1.5 (0.7, 3.1)	24/1289	1.9 (0.9, 4.0)	3/555	0.5 (0.2, 1.6)

Multivariable Logistic Regression Results Using Exact Inference for Sparsely Distributed Counts (Reference Category is Quarter 1)

Comparisons Adjusted for Baseline	Analytic Model[a]		
	Odds Ratio	**95% CI**	**p-value**
Intent-to-treat Comparisons[b]			
Accreditation Arm versus Control Arm in Period 2-3	0.78	(0.33, 1.83)	0.68
Per Protocol Comparisons[b]			
Accredited Condition versus Not Accredited Condition in Period 2-3	0.70	(0.12, 2.91)	0.85

[a] No adjustment variables are included in the analytic model due to the low number of events.

[b] Period 2 represents data from Quarters 2 and 3; Period 3 represents data from Quarters 4 through 10 (see text for explanation).

Table C3. Percent (95% CI) of Medications Administered with Any Errors, by Study Arm and Condition								
Quarter	Control Arm		Accreditation Arm		Accreditation Arm: Not Accredited Condition		Accreditation Arm: Accredited Condition	
	Number of Events/Number of Medication Administrations	Percent (95% CI)	Number of Events/Number of Medication Administrations	Percent (95% CI)	Number of Events/Number of Medication Administrations	Percent (95% CI)	Number of Events/Number of Medication Administrations	Percent (95% CI)
1	41/2036	2.0 (0.8, 4.7)	8/1971	0.4 (0.2, 1.1)	8/1971	0.4 (0.2, 1.1)	NA	NA
2	23/2180	1.1 (0.2, 4.4)	2/2278	0.1 (0.0, 0.6)	2/2278	0.1 (0.0, 0.6)	NA	NA
3	10/1639	0.6 (0.2, 1.8)	3/1852	0.2 (0.0, 0.7)	3/1852	0.2 (0.0, 0.7)	NA	NA
4	25/1979	1.3 (0.4, 4.4)	8/1906	0.4 (0.4, 4.6)	8/1829	0.4 (0.1, 1.7)	0/77	0
5	6/1633	0.4 (0.1, 1.5)	0/1675	0 (NA)	0/1309	0 (NA)	0/366	0
6	4/1299	0.3 (0.1, 1.0)	1/1069	0.1 (0.0, 0.6)	0/380	0 (NA)	1/689	0.1 (0.0, 1.0)
7	7/1768	0.4 (0.1, 1.4)	4/1461	0.3 (0.1, 1.3)	1/634	0.2 (0.0, 1.1)	3/827	0.4 (0.1, 2.5)
8	5/1244	0.4 (0.1, 2.0)	0/1087	0 (NA)	0/257	0 (NA)	0/830	0 (NA)
9	14/822	1.7 (0.2, 11.5)	1/824	0.1 (0.0, 0.8)	1/87	1.1 (0.3, 3.8)	0/737	0 (NA)
10	1/787	0.1 (0, 0.9)	6/759	0.8 (0.1, 5.0)	6/73	8.2 (4.6, 14.3)	0/686	0 (NA)
Total	136/15387	0.9 (0.4, 2.1)	33/14882	0.2 (0.1, 0.5)	29/10670	0.3 (0.1, 0.6)	4/4212	0.1 (0, 0.4)

Multivariable Logistic Regression Results Using Exact Inference for Sparsely Distributed Counts (Reference Category is Quarter 1)

Comparisons Adjusted for Baseline	Analytic Model[a]		
	Odds Ratio	95% CI	p-value
***Intent-to-treat Comparisons*[b]**			
Accreditation Arm versus Control Arm in Period 2-3	0.27	(0.17, 0.43)	<.0001
***Per Protocol Comparisons*[b]**			
Accredited Condition versus Not Accredited Condition in Period 2-3	0.39	(0.10, 1.17)	0.11

[a] No adjustment variables are included in the analytic model due to the low number of events.

[b] Period 2 represents data from Quarters 2 and 3; Period 3 represents data from Quarters 4 through 10 (see text for explanation).

Table C4. Percent (95% CI) of Residents for Whom Significant Medication Errors Occurred, by Study Arm and Condition								
Quarter	Control Arm		Accreditation Arm		Accreditation Arm: Not Accredited Condition		Accreditation Arm: Accredited Condition	
	Number of Events/Number of Residents	Percent (95% CI)	Number of Events/Number of Residents	Percent (95% CI)	Number of Events/Number of Residents	Percent (95% CI)	Number of Events/Number of Residents	Percent (95% CI)
1	2/245	0.8 (0.2, 3.1)	5/255	2.0 (0.3, 12.6)	5/255	2.0 (0.3, 12.6)	NA	NA
2	0/270	0 (NA)	0/260	0 (NA)	0/260	0 (NA)	NA	NA
3	0/214	0 (NA)	1/219	0.5 (0.1, 3.1)	1/219	0.5 (0.1, 3.1)	NA	NA
4	1/225	0.4 (0.1, 3.0)	0/219	0 (NA)	0/209	0 (NA)	0/10	0 (NA)
5	1/209	0.5 (0.1, 3.3)	0/210	0 (NA)	0/165	0 (NA)	0/45	0 (NA)
6	0/180	0 (NA)	0/145	0 (NA)	0/45	0 (NA)	0/100	0 (NA)
7	0/215	0 (NA)	0/185	0 (NA)	0/70	0 (NA)	0/115	0 (NA)
8	0/165	0 (NA)	0/144	0 (NA)	0/39	0 (NA)	0/105	0 (NA)
9	0/119	0 (NA)	1/105	1.0 (0.1, 6.2)	1/15	6.7 (1.3, 28.4)	0/90	0 (NA)
10	0/105	0 (NA)	2/100	2.0 (0.3, 12.5)	2/10	20.0 (4.2, 58.6)	0/90	0 (NA)
Total	4/1947	0.2 (0.1, 2.7)	9/1842	0.5 (0.1, 2.7)	9/1287	0.7 (0.1, 3.7)	0/555	0 (NA)

Multivariable Logistic Regression Results Using Exact Inference for Sparsely Distributed Counts (Reference Category is Quarter 1)

Comparisons Adjusted for Baseline	Analytic Model[a]		
	Odds Ratio	**95% CI**	**p-value**
Intent-to-treat Comparisons[b]			
Accreditation Arm versus Control Arm in Period 2-3	2.15	(0.31, 23.8)	0.62
Per Protocol Comparisons[b]			
Accredited Condition versus Not Accredited Condition in Period 2-3	0.35[b]	(0,2.07)	0.18

[a] No adjustment variables are included in the analytic model due to the low number of events.

[b] Period 2 represents data from Quarters 2 and 3; Period 3 represents data from Quarters 4 through 10 (see text for explanation).

Workforce (Tables D1-D15)

Table D1. Mean (95% CI) Number of Different Caregivers a Resident Had Over a Week, by Study Arm and Condition

Quarter	Control Arm		Accreditation Arm		Accreditation Arm: Not Accredited Condition		Accreditation Arm: Accredited Condition	
	Number of Communities; Number of Residents	Mean (95% CI)	Number of Communities; Number of Residents	Mean (95% CI)	Number of Communities; Number of Residents	Mean (95% CI)	Number of Communities; Number of Residents	Mean (95% CI)
1	48; 2079	8.6 (7.0, 10.2)	51; 2486	10.8 (9.4, 12.2)	51; 2486	10.8 (9.4, 12.2)	NA	NA
3	42; 1951	9.8 (8.4, 11.1)	42; 2249	11.4 (9.9, 13.0)	42; 2249	11.4 (9.9, 13.0)	NA	NA
5	42; 2032	8.8 (7.3, 10.3)	42; 2256	11.4 (9.5, 13.2)	33; 1791	11.8 (9.7, 14.0)	9; 465	9.7 (6.5, 12.8)
7	42; 1956	9.1 (7.9, 10.3)	37; 2060	11.8 (9.5, 14.1)	14; 702	10.1 (6.7, 13.5)	23; 1358	12.8 (9.9, 15.8)
9	22; 890	10.4 (7.9, 12.9)	21; 1240	14.6 (11.7, 17.5)	3; 116	16.0 (11.1, 20.9)	18; 1124	14.4 (11.2, 17.6)

Longitudinal Loglinear Poisson Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multivariable Loglinear Regression	Primary Model[a]			Adjusted Model[b]		
	Rate ratio	**95% CI**	**p-value**	**Rate ratio**	**95% CI**	**p-value**
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	0.97	(0.75,1.24)	0.80	0.97	(0.76,1.24)	0.80
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	1.03	(0.78,1.37)	0.83	1.02	(0.78,1.33)	0.88
Not Accredited Condition versus Control Arm in Period 3	0.93	(0.73,1.20)	0.59	0.94	(0.74,1.21)	0.64
Accredited Condition versus Not Accredited Condition in Period 3	1.10	(0.94,1.30)	0.23	1.08	(0.93,1.26)	0.30

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 5 through 9 (see text for explanation).

Table D2. Percent (95% CI) Shifts with Staffing Requirements Met for *Care Aides in Traditional Units*, by Study Arm and Condition

Quarter	Control Arm		Accreditation Arm		Accreditation Arm: Not Accredited Condition		Accreditation Arm: Accredited Condition	
	Number of Shifts	Percent (95% CI)	Number of Shifts	Percent (95% CI)	Number of Shifts	Percent (95% CI)	Number of Shifts	Percent (95% CI)
1	82/117	70.1 (58.0, 79.9)	109/141	77.3 (66.3, 85.5)	109/141	77.3 (66.3, 85.5)	NA	NA
3	65/108	60.2 (47.0, 72.0)	76/108	70.4 (56.6, 81.2)	76/108	70.4 (56.6, 81.2)	NA	NA
5	73/114	64.0 (50.9, 75.4)	75/108	69.4 (56.5, 79.9)	60/84	71.4 (56.3, 82.9)	15/24	62.5 (37.1, 82.5)
7	69/105	65.7 (52.4, 77.0)	69/93	74.2 (60.3, 84.5)	28/33	84.8 (55.2, 96.2)	41/60	68.3 (52.0, 81.2)
9	33/54	61.1 (42.5, 77.0)	26/42	61.9 (41.4, 78.9)	1/3	33.3 (NA)	25/39	64.1 (42.1, 81.4)

Multivariable Logistic Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multivariable Regression	Primary Model[a]			Adjusted Model[b]		
	Odds ratio	**95% CI**	**p-value**	**Odds ratio**	**95% CI**	**p-value**
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	1.02	(0.45, 2.31)	0.96	1.13	(0.49, 2.57)	0.78
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	0.74	(0.31, 1.76)	0.50	0.81	(0.34, 1.93)	0.63
Not Accredited Condition versus Control Arm in Period 3	1.21	(0.50, 2.92)	0.67	1.35	(0.55, 3.28)	0.51
Accredited Condition versus Not Accredited Condition in Period 3	0.61	(0.32, 1.16)	0.13	0.60	(0.31, 1.15)	0.12

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 5 through 9 (see text for explanation).

Table D3. Percent (95% CI) of Shifts with Staffing Requirements Met for *Supervisors in Traditional Units*, by Study Arm and Condition

Quarter	Control Arm		Accreditation Arm		Accreditation Arm: Not Accredited Condition		Accreditation Arm: Accredited Condition	
	Number of Shifts	Percent (95% CI)	Number of Shifts	Percent (95% CI)	Number of Shifts	Percent (95% CI)	Number of Shifts	Percent (95% CI)
1	81/81	100.0 (NA)	99/99	100.0 (NA)	99/99	100.0 (NA)	NA	NA
3	73/75	97.3 (90.3, 99.3)	85/87	97.7 (85.5, 99.7)	85/87	97.7 (85.5, 99.7)	NA	NA
5	82/84	97.6 (85.1, 99.7)	73/78	93.6 (77.3, 98.4)	57/57	100.0 (NA)	16/21	76.2 (39.7, 94.0)
7	72/75	96.0 (88.8, 98.6)	72/72	100.0 (NA)	24/24	100.0 (NA)	48/48	100.0 (NA)
9	27/27	100.0 (NA)	33/33	100.0 (NA)	0/0	NA (NA)	33/33	100.0 (NA)

Multivariable Logistic Regression Results Using Exact Inference for Sparsely Distributed Counts (Reference Category is Quarter 1)

Comparisons Adjusted for Baseline	Analytic Model[a]		
	Odds Ratio	95% CI	p-value
Intent-to-treat Comparisons[b]			
Accreditation Arm versus Control Arm in Period 2-3	1.04	(0.31, 3.51)	1.00
Per Protocol Comparisons[b]			
Accredited Condition versus Not Accredited Condition in Period 2-3	0.24	(0.02, 1.47)	0.15

[a] No adjustment variables are included in the analytic model due to the low number of shifts in which requirements were not met.

[b] Period 2 represents data from Quarter 3; Period 3 represents data from Quarters 5 through 9 (see text for explanation).

Table D4. Percent (95% CI) of Shifts with Staffing Requirements Met for *Administrators in Traditional Units*, by Study Arm and Condition								
Quarter	**Control Arm**		**Accreditation Arm**		**Accreditation Arm: Not Accredited Condition**		**Accreditation Arm: Accredited Condition**	
	Number of Shifts	Percent (95% CI)	Number of Shifts	Percent (95% CI)	Number of Shifts	Percent (95% CI)	Number of Shifts	Percent (95% CI)
1	91/117	77.8 (66.1, 86.3)	121/141	85.8 (74.4, 92.7)	121/141	85.8 (74.4, 92.7)	NA	NA
3	96/108	88.9 (77.2, 95.0)	99/108	91.7 (82.5, 96.3)	99/108	91.7 (82.5, 96.3)	NA	NA
5	103/114	90.4 (79.6, 95.7)	100/108	91.7 (79.8, 96.8)	77/84	91.7 (79.8, 96.8)	23/24	95.8 7 (7.2, 99.4)
7	100/105	95.2 (85.9, 98.5)	89/93	95.7 (87.0, 98.7)	32/33	97.0 (82.3, 99.5)	57/60	95.0 (81.4, 98.8)
9	51/54	94.4 (79.7, 98.7)	40/42	95.2 (83.9, 98.7)	3/3	100.0 (NA)	37/39	94.9 (82.8, 98.6)

Multivariable Logistic Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multivariable Regression	**Primary Model[a]**			**Adjusted Model[b]**		
	Odds ratio	**95% CI**	**p-value**	**Odds ratio**	**95% CI**	**p-value**
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	0.56	(0.18, 1.77)	0.32	0.54	(0.17, 1.71)	0.30
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	0.70	(0.22, 2.21)	0.54	0.69	(0.22, 2.17)	0.52
Not Accredited Condition versus Control Arm in Period 3	0.49	(0.14, 1.70)	0.26	0.48	(0.14, 1.63)	0.24
Accredited Condition versus Not Accredited Condition in Period 3	1.42	(0.67, 3.02)	0.36	1.45	(0.68, 3.10)	0.34

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 5 through 9 (see text for explanation).

Table D5. Percent (95% CI) of Shifts with Staffing Requirements Met for *Care Aides in Special Care Units*, by Study Arm and Condition								
Quarter	**Control Arm**		**Accreditation Arm**		**Accreditation Arm: Not Accredited Condition**		**Accreditation Arm: Accredited Condition**	
	Number of Shifts	Percent (95% CI)	Number of Shifts	Percent (95% CI)	Number of Shifts	Percent (95% CI)	Number of Shifts	Percent (95% CI)
1	24/66	36.4 (23.4, 51.7)	33/84	39.3 (25.3, 55.3)	33/84	39.3 (25.3, 55.3)	NA	NA
3	23/69	33.3 (20.7, 49.0)	22/75	29.3 (18.6, 43.1)	22/75	29.3 (18.6, 43.1)	NA	NA
5	18/63	28.6 (17.2, 43.6)	19/72	26.4 (14.9, 42.3)	12/57	21.1 (10.8, 36.9)	7/15	46.7 (15.1, 81.1)
7	16/69	23.2 (14.0, 35.8)	22/60	36.7 (22.1, 54.2)	5/15	33.3 (10.6, 67.9)	17/45	37.8 (21.0, 58.0)
9	18/39	46.2 (31.8, 61.2)	9/36	25.0 (10.0, 49.9)	3/6	50.0 (5.9, 94.1)	6/30	20.0 (7.1, 44.9)

Multivariable Logistic Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multivariable Regression	**Primary Model[a]**			**Adjusted Model[b]**		
	Odds ratio	**95% CI**	**p-value**	**Odds ratio**	**95% CI**	**p-value**
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	0.85	(0.28, 2.60)	0.78	0.89	(0.29, 2.71)	0.83
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	1.09	(0.33, 3.56)	0.89	1.13	(0.34, 3.70)	0.84
Not Accredited Condition versus Control Arm in Period 3	0.75	(0.23, 2.40)	0.63	0.78	(0.24, 2.51)	0.67
Accredited Condition versus Not Accredited Condition in Period 3	1.45	(0.68, 3.09)	0.33	1.45	(0.68, 3.10)	0.34

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 5 through 9 (see text for explanation).

Table D6. Percent (95% CI) Shifts with Staffing Requirements Met for *Supervisors in Special Care Units*, by Study Arm and Condition

Quarter	Control Arm		Accreditation Arm		Accreditation Arm: Not Accredited Condition		Accreditation Arm: Accredited Condition	
	Number of Shifts	Percent (95% CI)	Number of Shifts	Percent (95% CI)	Number of Shifts	Percent (95% CI)	Number of Shifts	Percent (95% CI)
1	21/21	100.0 (NA)	42/42	100.0 (NA)	42/42	100.0 (NA)	NA	NA
3	24/24	100.0 (NA)	33/36	91.7 (71.7, 98.0)	33/36	91.7 (71.7, 98.0)	NA	NA
5	20/21	95.2 (74.8, 99.3)	36/36	100.0 (NA)	33/33	100.0 (NA)	3/3	100.0 (NA)
7	30/30	100.0 (NA)	26/27	96.3 (79.2, 99.4)	3/3	100.0 (NA)	23/24	95.8 (77.2, 99.4)
9	12/12	100.0 (NA)	18/18	100.0 (NA)	6/6	100.0 (NA)	12/12	100.0 (NA)

Multivariable Logistic Regression Results Using Exact Inference for Sparsely Distributed Counts (Reference Category is Quarter 1)

Comparisons Adjusted for Baseline	Analytic Model[a]		
	Odds Ratio	**95% CI**	**p-value**
***Intent-to-treat Comparisons*[b]**			
Accreditation Arm versus Control Arm in Period 2-3	0.33	(0.01, 3.41)	0.58
***Per Protocol Comparisons*[b]**			
Accredited Condition versus Not Accredited Condition in Period 2-3	1.52	(0.12, 81.9)	1.00

[a] No adjustment variables are included in the analytic model due to the low number of shifts in which requirements were not met.

[b] Period 2 represents data from Quarter 3; Period 3 represents data from Quarters 5 through 9 (see text for explanation).

Table D7. Percent (95% CI) of Shifts with Staffing Requirements Met for *Administrators in Special Care Units*, by Study Arm and Condition								
Quarter	**Control Arm**		**Accreditation Arm**		**Accreditation Arm: Not Accredited Condition**		**Accreditation Arm: Accredited Condition**	
	Number of Shifts	Percent (95% CI)	Number of Shifts	Percent (95% CI)	Number of Shifts	Percent (95% CI)	Number of Shifts	Percent (95% CI)
1	24/39	69.7 (54.4, 81.6)	60/66	92.9 (82.1, 97.3)	60/66	92.9 (82.1, 97.3)	NA	NA
3	41/48	85.5 (71.7, 93.2)	51/54	94.7 (84.3, 98.3)	51/54	94.7 (84.3, 98.3)	NA	NA
5	44/51	87.3 (73.1, 94.6)	48/54	90.3 (78.6, 95.9)	37/42	89.5 (75.0, 96.0)	11/12	93.3 (68.2, 98.9)
7	40/45	92.8 (79.6, 97.7)	42/45	91.7 (77.0, 97.3)	12/12	100.0 (NA)	30/33	88.9 (70.8, 96.4)
9	19/21	92.3 (73.4, 98.1)	21/21	100.0 (NA)	3/3	100.0 (NA)	18/18	100.0 (NA)

Multivariable Logistic Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multivariable Regression	**Primary Model[a]**			**Adjusted Model[b]**		
	Odds ratio	**95% CI**	**p-value**	**Odds ratio**	**95% CI**	**p-value**
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	0.22	(0.07, 0.72)	0.01	0.22	(0.06, 0.73)	0.01
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	0.23	(0.06, 0.95)	0.04	0.24	(0.06, 0.98)	0.05
Not Accredited Condition versus Control Arm in Period 3	0.21	(0.07, 0.70)	0.01	0.20	(0.06, 0.69)	0.01
Accredited Condition versus Not Accredited Condition in Period 3	1.08	(0.43, 2.75)	0.87	1.18	(0.48, 2.94)	0.72

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 5 through 9 (see text for explanation).

Table D8. Percent (95% CI) of Shifts with Staffing Requirements Met for *Care Coordinators in Special Care Units*, by Study Arm and Condition								
Quarter	Control Arm		Accreditation Arm		Accreditation Arm: Not Accredited Condition		Accreditation Arm: Accredited Condition	
	Number of Communities	Percent (95% CI)	Number of Communities	Percent (95% CI)	Number of Communities	Percent (95% CI)	Number of Communities	Percent (95% CI)
1	18/22	81.8 (62.4, 93.5)	26/28	92.9 (79.0, 98.5)	26/28	92.9 (79.0, 98.5)	NA	NA
3	21/23	91.3 (74.9, 98.1)	22/25	88.0 (71.3, 96.5)	22/25	88.0 (71.3,96.5)	NA	NA
5	16/21	76.2 (55.4, 90.3)	19/24	79.2 (60.2, 91.6)	15/19	78.9 (57.4, 92.4)	4/5	80.0 (37.1, 97.7)
7	21/23	91.3 (74.9, 98.1)	17/20	85.0 (65.1, 95.6)	5/5	100.0 (NA)	12/15	80.0 (55.6, 94.0)
9	10/13	76.9 (50.3, 93.0)	9/12	75.0 (0.0, 92.4)	2/2	100.0 (NA)	7/10	70.0 (39.4, 90.7)

Multivariable Logistic Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multivariable Regression	Primary Model[a]			Adjusted Model[b]		
	Odds ratio	95% CI	p-value	Odds ratio	95% CI	p-value
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	0.24	(0.03, 2.22)	0.21	0.25	(0.03, 2.37)	0.23
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	0.19	(0.02, 1.75)	0.14	0.20	(0.02, 1.91)	0.16
Not Accredited Condition versus Control Arm in Period 3	0.27	(0.03, 2.93)	0.34	0.28	(0.03, 3.12)	0.30
Accredited Condition versus Not Accredited Condition in Period 3	0.70	(0.17, 2.80)	0.61	0.70	(0.16, 3.01)	0.64

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 5 through 9 (see text for explanation).

Table D9. Mean (95% CI) Rate of Six-month *Care Aide Turnover*, by Study Arm and Condition								
Quarter	Control Arm		Accreditation Arm		Accreditation Arm: Not Accredited Condition		Accreditation Arm: Accredited Condition	
	Number of Communities with PCAs; Number Reporting	Mean (95% CI)	Number of Communities with PCAs; Number Reporting	Mean (95% CI)	Number of Communities with PCAs; Number Reporting	Mean (95% CI)	Number of Communities with PCAs; Number Reporting	Mean (95% CI)
1	47; 49	103.0 (82.4, 123.7)	51; 53	125.7 (102.5, 149.0)	51; 53	125.7 (102.5, 149.0)	NA	NA
3	42; 43	105.5 (81.3, 129.8)	43; 43	112.8 (88.0, 137.5)	43; 43	112.8 (88.0, 137.5)	NA	NA
5	41; 42	105.2 (79.5, 131.0)	42; 42	101.6 (78.6, 124.6)	33; 33	99.6 (74.6, 124.6)	9; 9	108.9 (53.4,164.4)
7	41; 43	93.9 (73.6, 114.2)	37; 37	97.4 (75.9, 118.8)	13; 13	116.5 (82.9, 150.2)	24; 24	87.0 (60.8, 113.2)
9	35; 36	95.4 (73.5, 117.4)	35; 35	91.6 (74.0, 109.2)	12; 12	110.3 (81.3, 139.2)	23; 23	81.8 (60.8, 102.9)

Longitudinal Loglinear Poisson Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multivariable Loglinear Regression	Primary Model[a]			Adjusted Model[b]		
	Rate ratio	95% CI	p-value	Rate ratio	95% CI	p-value
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	0.74	(0.57,0.95)	0.020	0.73	(0.56,0.94)	0.014
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	0.62	(0.42,0.93)	0.019	0.62	(0.42,0.91)	0.015
Not Accredited Condition versus Control Arm in Period 3	0.81	(0.63,1.02)	0.07	0.80	(0.63,1.01)	0.06
Accredited Condition versus Not Accredited Condition in Period 3	0.77	(0.55,1.08)	0.13	0.77	(0.56,1.08)	0.13

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 5 through 9 (see text for explanation).

Table D10. Mean (95% CI) Rate of Six-month *Medication Aide Turnover*, by Study Arm and Condition

Quarter	Control Arm		Accreditation Arm		Accreditation Arm: Not Accredited Condition		Accreditation Arm: Accredited Condition	
	Number of Communities with Med Aides; Number Reporting	Mean (95% CI)	Number of Communities with Med Aides; Number Reporting	Mean (95% CI)	Number of Communities with Med Aides; Number Reporting	Mean (95% CI)	Number of Communities with Med Aides; Number Reporting	Mean (95% CI)
1	48; 49	63.4 (46.3, 80.5)	53; 53	78.8 (55.6, 102.0)	53; 53	78.8 (55.6, 102.0)	NA	NA
3	42; 43	68.7 (47.1, 90.2)	43; 43	89.8 (68.1, 111.5)	43; 43	89.8 (68.1, 111.5)	NA	NA
5	41; 42	74.4 (39.4, 109.3)	42; 42	78.6 (55.5, 101.7)	33; 33	78.7 (51.0, 106.4)	9; 9	78.1 (42.2, 113.9)
7	41; 43	59.8 (44.8, 74.7)	37; 37	70.7 (51.6, 89.8)	13; 13	105.6 (70.9, 140.4)	24; 24	51.8 (33.0, 70.6)
9	35; 36	55.0 (40.3, 69.6)	35; 35	45.8 (32.6, 58.9)	12; 12	63.8 (35.8, 91.8)	23; 23	36.3 (24.3, 48.4)

Longitudinal Loglinear Poisson Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multivariable Loglinear Regression	Primary Model[a]			Adjusted Model[b]		
	Rate ratio	95% CI	p-value	Rate ratio	95% CI	p-value
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	0.84	(0.53,1.35)	0.47	0.85	(0.54,1.33)	0.47
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	0.70	(0.44,1.12)	0.14	0.70	(0.45,1.09)	0.12
Not Accredited Condition versus Control Arm in Period 3	0.93	(0.55,1.56)	0.78	0.94	(0.57,1.54)	0.79
Accredited Condition versus Not Accredited Condition in Period 3	0.76	(0.53,1.09)	0.14	0.75	(0.53,1.06)	0.10

[a] Primary model adjusts for study design variables (region and star rating).
[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).
[c] Period 3 represents data from Quarters 5 through 9 (see text for explanation).

Table D11. Mean (95% CI) Rate of Six-month *Nurse Turnover*, by Study Arm and Condition								
Quarter	**Control Arm**		**Accreditation Arm**		**Accreditation Arm: Not Accredited Condition**		**Accreditation Arm: Accredited Condition**	
	Number of Communities with Nurses; Number Reporting	Mean (95% CI)	Number of Communities with Nurses; Number Reporting	Mean (95% CI)	Number of Communities with Nurses; Number Reporting	Mean (95% CI)	Number of Communities with Nurses; Number Reporting	Mean (95% CI)
1	41; 49	17.5 (5.7, 29.3)	46; 53	12.7 (1.7, 23.6)	46; 53	12.7 (1.7, 23.6)	NA	NA
3	38; 43	4.4 (0.0, 10.0)	38; 43	3.5 (0.0, 8.8)	38; 43	3.5 (0.0, 8.8)	NA	NA
5	32; 42	65.6 (40.2, 91.0)	32; 41	71.4 (50.1, 92.6)	28; 32	63.7 (41.5, 85.8)	4; 9	125.0 (76.0, 174.0)
7	23; 43	30.4 (10.7, 50.2)	18; 37	57.4 (22.7, 92.1)	5; 13	46.7 (0.0, 114.8)	13; 24	61.5 (21.4, 101.6)
9	32; 36	9.8 (0.0, 19.9)	32; 35	3.1 (0.0, 9.2)	12; 12	0.0 (NA)	20; 23	5.0 (0.0, 14.6)

Longitudinal Loglinear Poisson Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multivariable Loglinear Regression	**Primary Model[a]**			**Adjusted Model[b]**		
	Rate ratio	**95% CI**	**p-value**	**Rate ratio**	**95% CI**	**p-value**
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	1.55	(0.36,6.66)	0.55	1.49	(0.43,5.12)	0.53
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	1.29	(0.30,5.67)	0.73	1.24	(0.35,4.37)	0.74
Not Accredited Condition versus Control Arm in Period 3	1.71	(0.38,7.63)	0.48	1.64	(0.46,5.87)	0.45
Accredited Condition versus Not Accredited Condition in Period 3	0.76	(0.40,1.44)	0.40	0.76	(0.41,1.41)	0.38

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 5 through 9 (see text for explanation).

Table D12. Mean (95% CI) Rate of Six-month *Administrator Turnover*, by Study Arm and Condition								
Quarter	Control Arm		Accreditation Arm		Accreditation Arm: Not Accredited Condition		Accreditation Arm: Accredited Condition	
	Number of Communities with Administrators; Number Reporting	Mean (95% CI)	Number of Communities with Administrators; Number Reporting	Mean (95% CI)	Number of Communities with Administrators; Number Reporting	Mean (95% CI)	Number of Communities with Administrators; Number Reporting	Mean (95% CI)
1	48; 49	25.0 (8.2, 41.8)	53; 53	37.7 (20.8, 54.6)	53; 53	37.7 (20.8, 54.6)	NA	NA
3	43; 43	23.3 (5.2, 41.3)	43; 43	44.2 (18.2, 70.2)	43; 43	44.2 (18.2, 70.2)	NA	NA
5	42; 42	41.7 (22.4, 60.9)	42; 42	51.2 (28.2, 74.2)	33; 33	56.1 (28.3, 83.8)	9; 9	33.3 (2.5, 64.1)
7	41; 43	29.3 (11.1, 47.5)	37; 37	24.3 (7.3, 41.3)	13; 13	65.4 (26.4, 104.4	24; 24	2.1 (0.0, 6.1)
9	36; 36	47.2 (21.1, 73.3)	35; 35	37.1 (10.8, 63.5)	12; 12	91.7 (33.0, 150.4)	23; 23	8.7 (0.0, 25.4)

Longitudinal Loglinear Poisson Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multivariable Loglinear Regression	Primary Model[a]			Adjusted Model[b]		
	Rate ratio	95% CI	p-value	Rate ratio	95% CI	p-value
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	0.47	(0.20,1.11)	0.08	0.47	(0.21,1.08)	0.08
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	0.22	(0.08,0.59)	0.003	0.20	(0.08,0.54)	0.001
Not Accredited Condition versus Control Arm in Period 3	0.70	(0.29,1.70)	0.44	0.75	(0.32,1.74)	0.50
Accredited Condition versus Not Accredited Condition in Period 3	0.32	(0.16,0.62)	0.001	0.27	(0.13,0.55)	<0.001

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 5 through 9 (see text for explanation).

Table D13. Mean (95% CI) Rate of Six-month *Director/Care Coordinator Turnover*, by Study Arm and Condition								
Quarter	**Control Arm**		**Accreditation Arm**		**Accreditation Arm: Not Accredited Condition**		**Accreditation Arm: Accredited Condition**	
	Number of Communities with Care Coordinator; Number Reporting	Mean (95% CI)	Number of Communities with Care Coordinator; Number Reporting	Mean (95% CI)	Number of Communities with Care Coordinator; Number Reporting	Mean (95% CI)	Number of Communities with Care Coordinator; Number Reporting	Mean (95% CI)
1	45; 49	34.4 (15.5, 53.4)	51; 53	42.5 (21.1, 63.9)	51; 53	42.5 (21.1, 63.9)	NA	NA
3	42; 43	25.0 (8.1, 41.9)	42; 43	36.9 (17.4, 56.4)	42; 43	36.9 (17.4, 56.4)	NA	NA
5	39; 42	51.3 (24.1, 78.5)	39; 42	65.8 (40.9, 90.7)	30; 33	62.2 (33.9, 90.6)	9; 9	77.8 (26.4, 129.1)
7	41; 43	36.6 (18.1, 55.1)	36; 37	28.7 (10.9, 46.5)	12; 13	44.4 (3.6, 85.2)	24; 24	20.8 (4.6, 37.1)
9	34; 36	35.3 (14.7, 55.9)	35; 35	18.1 (4.4, 31.8)	12; 12	27.8 (6.6, 49.0)	23; 23	13.0 (0.0, 30.3)

Longitudinal Loglinear Poisson Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multivariable Loglinear Regression	**Primary Model[a]**			**Adjusted Model[b]**		
	Rate ratio	**95% CI**	**p-value**	**Rate ratio**	**95% CI**	**p-value**
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	0.66	(0.29,1.52)	0.33	0.68	(0.30,1.54)	0.36
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	0.51	(0.19,1.32)	0.16	0.51	(0.20,1.30)	0.16
Not Accredited Condition versus Control Arm in Period 3	0.76	(0.32,1.82)	0.54	0.79	(0.34,1.85)	0.59
Accredited Condition versus Not Accredited Condition in Period 3	0.66	(0.32,1.37)	0.27	0.65	(0.33,1.27)	0.21

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 5 through 9 (see text for explanation).

Table D14. Mean (95% CI) Staff Satisfaction Score, by Study Arm and Condition
(Note: Mean score of 16 items ranging from 1/very dissatisfied to 4/very satisfied)

Quarter	Control Arm		Accreditation Arm		Accreditation Arm: Not Accredited Condition		Accreditation Arm: Accredited Condition	
	Number of Communities; Number of Staff	Mean (95% CI)	Number of Communities; Number of Staff	Mean (95% CI)	Number of Communities; Number of Staff	Mean (95% CI)	Number of Communities; Number of Staff	Mean (95% CI)
1	30; 263	2.97 (2.80, 3.14)	38; 288	3.13 (3.00, 3.26)	38; 288	3.13 (3.00, 3.26)	NA	NA
3	24; 148	3.01 (2.87, 3.16)	28; 170	3.00 (2.67, 3.33)	28; 170	3.00 (2.67, 3.33)	NA	NA
5	21; 150	2.96 (2.85, 3.08)	17; 144	3.16 (2.99, 3.33)	12; 104	3.24 (3.05, 3.43)	5; 40	2.96 (2.61, 3.31)
7	22; 165	2.94 (2.74, 3.15)	17; 98	3.11 (2.87, 3.35)	2; 5	3.16 (2.34, 3.99)	15; 93	3.11 (2.85, 3.36)
9	14; 79	3.07 (2.81, 3.33)	14; 79	3.12 (2.87, 3.37)	1; 3	3.28 (NA)	13; 76	3.11 (2.85, 3.38)

Longitudinal Multiple Linear Regression Results (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multiple Linear Regression	Primary Model[a]			Adjusted Model[b]		
	Difference in Means	95% CI	p-value	Difference in Means	95% CI	p-value
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	0.04	(-0.15, 0.23)	0.70	0.07	(-0.13, 0.27)	0.49
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	-0.06	(-0.26, 0.15)	0.60	-0.02	(-0.23, 0.20)	0.88
Not Accredited Condition versus Control Arm in Period 3	0.09	(-0.12, 0.29)	0.40	0.12	(-0.10, 0.33)	0.28
Accredited Condition versus Not Accredited Condition in Period 3	-0.14	(-0.31, 0.02)	0.09	-0.13	(-0.30, 0.03)	0.11

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 5 through 9 (see text for explanation).

Table D15. Mean (95% CI) Staff Burnout Score, by Study Arm and Condition (a single item ranging from 1 to 5 with higher scores indicating more burnout)								
Quarter	**Control Arm**		**Accreditation Arm**		**Accreditation Arm: Not Accredited Condition**		**Accreditation Arm: Accredited Condition**	
	Number of Communities; Number of Staff	Mean (95% CI)	Number of Communities; Number of Staff	Mean (95% CI)	Number of Communities; Number of Staff	Mean (95% CI)	Number of Communities; Number of Staff	Mean (95% CI)
1	30; 256	1.95 (1.78, 2.11)	38; 280	1.80 (1.62, 1.98)	38; 280	1.80 (1.62, 1.98)	NA	NA
3	24; 150	1.80 (1.63, 1.96)	28; 166	1.89 (1.47, 2.32)	28; 166	1.89 (1.47, 2.32)	NA	NA
5	21; 142	1.83 (1.59, 2.08)	17; 142	1.63 (1.32, 1.95)	12; 103	1.67 (1.32, 2.02)	5; 39	1.54 (1.00, 2.56)
7	22; 164	1.97 (1.81, 2.14)	17; 95	1.76 (1.37, 2.16)	2; 5	1.60 (1.00, 3.63)	15; 90	1.77 (1.35, 2.19)
9	14; 73	1.74 (1.49, 1.99)	13; 77	1.60 (1.36, 1.84)	1; 3	1.00 (NA)	12; 74	1.62 (1.36, 1.88)

Multivariable Logistic Regression Results for Dichotomized Score of 3 to 5 Indicating Burnout (Reference Categories are Quarter 1, Western Branch, and Low Star Rating)

Comparisons from Multivariable Regression	**Primary Model[a]**			**Adjusted Model[b]**		
	Odds Ratio	**95% CI**	**p-value**	**Odds Ratio**	**95% CI**	**p-value**
Intent-to-treat Comparisons[c]						
Accreditation Arm versus Control Arm in Period 3	0.92	(0.50, 1.69)	0.79	0.88	(0.46, 1.66)	0.69
Per Protocol Comparisons[c]						
Accredited Condition versus Control Arm in Period 3	1.13	(0.64, 2.00)	0.68	1.12	(0.60, 2.08)	0.72
Not Accredited Condition versus Control Arm in Period 3	0.82	(0.40, 1.68)	0.59	0.77	(0.37, 1.62)	0.49
Accredited Condition versus Not Accredited Condition in Period 3	1.37	(0.78, 2.43)	0.27	1.45	(0.79, 2.69)	0.23

[a] Primary model adjusts for study design variables (region and star rating).

[b] Adjusted model additionally adjusts for community size and percent of residents with dementia (see text for explanation).

[c] Period 3 represents data from Quarters 5 through 9 (see text for explanation).