Monitoring Quality of Care for Nursing Home Residents With Behavioral and Psychological Symptoms Related to Dementia

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Background: Behavioral and psychological symptoms associated with dementia are common in nursing home residents. Quality indicators (QI) assessing quality of care for these residents are minimally risk adjusted and can provide inaccurate information regarding the quality of care provided by the facility.

Objective: Evaluate the performance of a new QI for the incidence of worsening behaviors in nursing home residents with behavioral and psychological symptoms association with dementia.

Design: Retrospective cohort study.

Setting: A total of 381 Minnesota nursing homes with 26,165 residents.

Data Sources: Minimum Data Set records for the first 2 calendar quarters of 2008.

Measurements: We calculated incidence of worsening behaviors QI by comparing items from the “behavior” section of the Minimum Data Set records from 2 consecutive quarters and reported the incidence rates by both the residents’ level of cognitive impairment and the presence or absence of special care unit for dementia (SCU).

Results: The incidence rates of the worsening behavior QI in SCU ranged from 14% in residents with very severe cognitive impairment (a cognitive performance score = 6) to 30% in those with moderate cognitive impairment (a cognitive performance score = 3). The incidence QI rates among residents residing in conventional unit ranged from 15% among those with very severe cognitive impairment to 20% among those with moderate cognitive impairment. These differences in QI rates between the 2 units were statistically significant with a P value = .001. After risk adjustment for level of cognitive impairment, number of facilities with SCUs that flagged for problem behaviors dropped from 18.4% to 12.4% and the number of conventional units in the low-risk category from 16.8% to 4.7%.

Conclusion: Resident cognitive function and the facility utility of SCU are associated with worsening behavior QI and should be adjusted for in any nursing home quality reporting measure. (J Am Med Dir Assoc 2011; 12: 660–667)

Keywords: Nursing home; behavioral and psychological symptoms associated with dementia; quality indicators; risk adjustments; specialized care unit

Dementia is highly prevalent in nursing home (NH) residents. Most of these patients exhibit behavioral and psychological symptoms of dementia (BPSDs).1 BPSDs are a significant burden in NH as they lead to rapid cognitive decline in the patient;2 BPSDs are a source of family and friend embarrassment leading to decrease in their visits to the NH;3 and BPSDs contribute to staff burnout and turnover.4 Risk factors for BPSDs include high staff stress levels,5 insufficient staff training, resident level of pain, depression, and cognitive impairment.1 Unfortunately, BPSD management remains suboptimal. Antipsychotics are commonly used regardless of warnings of higher mortality from the Food and Drug Administration,6 whereas the recommended behavioral approaches are infrequently used.7 The bulk of care for persons with BPSD is provided by
the paraprofessional staff who have limited training and high turnover rates.8 The advent of dementia specialized care units (SCUs) in the early 1980s raised hope of improved quality of care for patients with BPSD but so far their benefit has been unconvincing.9

Measuring the quality of care provided to NH residents continues to be a concern for consumers and policy makers.10 The Minimum data Set (MDS)-derived Quality Indicators (QI) and Quality Measures offer tools for gauging and improving quality11 but their validity and relevance for dementia residents has received limited attention.12

MDS-based QIs have been put forth by the Centers for Medicare and Medicaid Services and are nationally used for measuring, comparing, and improving quality of nursing home care for dementia patients with BPSD. Minnesota has been at the forefront of states applying QIs through its Nursing Home Report Card and performance-based incentive system for improving nursing home care.13 To support these efforts, Minnesota has developed QIs that are unique to the state. One indicator “Incidence of worsening behaviors” is calculated by comparing behavior item scores from 2 consecutive MDS assessments.14 It indicates an increasing frequency of 1 or more of 4 BPSD behaviors—verbally abusive, physically abusive, socially inappropriate, and wandering—taken from the MDS 2.0.

This and a few other QI scores along with reports from recent surveys and staffing data, help establish the “5-Star” rating and a statewide rank for a facility. This information is publicly reported on Minnesota’s Department of Health Web site (http://www.health.state.mn.us/nhreportcard) with the intent to inform the consumers about quality of care offered by facilities and provide data to facilities for promoting QI efforts. Facilities participating in Performance-Based Incentive Payment Program projects in Minnesota13 rely on the QIs as outcome measures, including the worsening behavior QI.

For the QIs to be beneficial, the calculated scores need to be valid and relevant. Unfortunately, concerns exist regarding the accuracy and effectiveness of the QI/Quality Measures.14 In particular, their relevance to patients with dementia remains unclear.12,15 For most Centers for Medicare and Medicaid Services Quality Measures, for example, a single QI rate is reported for each facility regardless of the level of cognitive impairment among its residents. Dementia residents are at greater risk for adverse outcomes such as falls, decline in activities of daily living, or worsening behavior problems. Facilities with a higher percentage of patients with dementia are likely to have poorer QI scores, putting them at a disadvantage by misguiding consumers and state surveyors about actual quality of care.

This study analyzes the MDS records for nursing homes in Minnesota with the objectives to (1) examine the relationship among the nursing facility QI, incidence of worsening behaviors, and resident cognitive impairment and location on a conventional or Alzheimer’s SCU; (2) risk-adjust this QI to take into account differences between facilities in their mix of dementia residents and whether or not they have an SCU; and (3) assess the effects of risk adjustment on facility QI scores, ranking, and likelihood of being flagged for poor-quality care. Our findings are being applied in the context of nursing home care in Minnesota.

METHODS

Study Population

Our study was approved by the University of Minnesota Institutional Review Board. We analyzed a sample of 26,165 nursing home residents from 381 Minnesota nursing facilities during the first calendar quarter of 2008. The sample included any resident with an MDS assessment during the quarter (current assessment) and a prior MDS assessment (prior assessment). Residents with missing assessments on the previous or current quarter and those who were comatose were excluded.

Worsening Behavior QI

We selected the following behavior items from the MDS 2.0 Section E4: verbally abusive, physically abusive, socially inappropriate, and resisting care. Each item is scored on a scale from 0 to 3 points based on the frequency of displaying the behavior over the previous 7 days (0, no problem behavior exhibited; 1, the problem behavior was displayed from 1 day to 3 days; 2, the problem behavior was exhibited from 4 to 6 days; and 3, the problem behavior was present on a daily basis). If the sum at the current assessment was greater than on the prior assessment, then the resident was flagged for worsening behavior.

The current Minnesota behavioral problem QI, patterned after the Center for Health Systems Research and Analysis QI, labeled the resident with worsening behavior if only a higher number of MDS 2.0 Section E4 items (verbally abusive, physically abusive, socially inappropriate, and wandering) scored higher than 0. It also includes wandering instead of resisting care. We substituted resisting care because it is a clinically important indicator that has implications for resource use. Wandering, on the other hand, is not necessarily a “problem” if the resident is sufficiently monitored and does not present a danger to him- or herself or others. Additionally, wandering can be influenced by the ambulation capacity of residents.

The Definition of Facility With Special Care Unit

For the purpose of this paper SCUs were defined in accordance with the Centers for Medicare and Medicaid Services’s Resident Assessment Instrument Version 2.0 Manual (available at https://www.cms.gov/NursingHomeQualityInits/20_NHQIMDS20.asp?TopOfPage) which describes the SCU as, “Any identifiable part of the nursing facility, such as an entire or a contiguous unit, wing, or floor where staffing patterns and resident care interventions are designed specifically for cognitively impaired residents who may or may not have a specific diagnosis of Alzheimer’s disease.”

The Severity of Cognitive Impairment

We defined the level of cognitive impairment by using the Cognitive Performance Scale (CPS).16 The CPS is commonly used to assign residents into easily understood
cognitive performance categories with a total score ranging from 0 to 6 points (0 = intact, 1 = borderline intact, 2 = mild impairment, 3 = moderate impairment, 4 = moderate to severe impairment, 5 = severe impairment, and 6 = very severe impairment). A CPS cutoff of higher than 1 was used to indicate the presence of dementia. The CPS uses multiple direct and indirect MDS measures of cognitive performance and provides a functional measure of cognition based on observed activities and performance. When the MDS is performed by trained nursing staff, the CPS correlates highly with independent, standardized, and well-accepted tests of cognitive status. Residents’ demographics (age, gender, race) and their comorbid conditions, including dementia, were collected from the MDS with no modifications in the definition of such variables.

Analysis

We applied 2-sample \( t \) tests and chi-square tests to test for differences in CPS score between residents of SCUs and CUs. Having found significant differences (reported later in this article), we applied a statistical adjustment technique to estimate new behavioral problem QI rates that took into account both resident cognitive status and placement on an SCU. This QI risk adjustment method that we used for the cognitive status and placement in SCU or CU has been applied in prior research with the Minnesota QIs.17 We used a random effects logistic regression to model differences in resident-level behavioral outcomes across units and CPS scores. For these models, a random effect for facility was included in the model as well as fixed effects for CPS score and whether the resident was on an SCU. Finally, we calculated the Bayes empirical estimate of facility QI rates from the random effects logistic regression model. We ranked the facilities by their observed behavioral rates and their adjusted rates. We used 2 different methods to determine what effect risk adjusting for CPS score had on the analyses. The first method was based on percentile rank. Facilities whose QI rate ranked in the lowest 10th percentile were labeled good performance facilities and those ranking in the highest 10th percentile were labeled poor performance facilities. The second method was to calculate the 95% confidence interval around the rate of behavior problems at the facility. Facilities were labeled as good performers if the upper range of the confidence interval for their behavioral problem QI rate was lower than the overall mean QI rate for the facility population. They were defined as poor performers if the lower range of the confidence interval was higher than the overall mean QI score. For these two methods, the calculations were performed for the observed (unadjusted) and adjusted QI rates, with the results for each being compared. We used chi-square to test if the change in performance classification of SCUs/CUs was statistically significant.

RESULTS

Table 1 describes the resident and facility characteristics. As expected, the residents’ cognitive function was worse among those residing in an SCU (mean CPS 3.9 with an SD of 1.1) than those cared for at the CU (mean CPS 2.5 with an SD of 1.5). Of the residents on CUs, 49% carried a diagnosis of dementia compared with 87% of the SCU residents (\( P < .001 \)). We found various differences in facility characteristics between nursing homes with and without SCUs. The SCU facilities were larger in size (a mean SCU facility size 97.7 versus 54.5 for a facility with CUs; \( P < .001 \)), housed more residents with dementia (mean percentage of dementia resident 56.9% versus 49.2%; \( P < .001 \)), and their residents had worse cognitive function (mean CPS 2.8 versus 2.5; \( P < .001 \)).

Table 2 presents the incidence of the worsening behavior QIs in relation to the level of cognitive impairment and whether or not a resident was cared for in a CU or SCU. The incidence of worsening behaviors showed a statistically significant, nonlinear relationship with CPS scores for both CU and SCU residents. Worsening behavior incidence for CU residents was relatively low for persons who were intact (7.1), borderline intact (12.9), or only mildly impaired (12.1); it increased substantially for residents who had moderate (19.8), moderately severe (22.3), or severe impairment (22.3); then it declined for the very severely impaired (15.1). The SCU residents had high worsening behavior rates at all levels from the mildly impaired (21.8) through the severely impaired (25.9); only among the very severely impaired did incidence decline (14.4). The difference in incidence rates between CU and SCU residents was greatest for the mildly or moderately impaired and then dropped off among the more severely impaired (\( P < .001 \) for CPS X unit interaction). Individual items (verbally abusive, physically abusive, socially inappropriate, and resisting care) exhibited a similar pattern by cognitive impairment and unit type. For each item, the difference in incidence rates between CU and SCU residents was greatest for the mild and moderately impaired and then lessened among the more severely impaired. The overall incidence of worsening behaviors was significantly higher for residents on SCUs than for residents on CUs (Figure 1). Likewise, incidence for each worsening behavior item was significantly higher for SCU residents than CU residents. The differences in patterns between CUs and SCUs were significant for physically abusive behavior and resisting care.

Figures 2 and 3 display the adjusted worsening behavior QI rates for facilities without SCUs (CUs only) and facilities with SCUs. Facilities were ranked from low incidence of worsening behaviors (high-quality facility on this QI) to high incidence (low-quality facility) according to their risk-adjusted behavior QI rates. Risk adjusters were resident cognitive status (CPS score) and residing on either a CU or SCU. Each rate is enclosed by an upper and lower bounds of a 90% confidence interval. Table 3 shows the percentage of facilities meeting flagging criteria based on either observed (unadjusted) or adjusted rates for facilities having SCUs versus facilities without SCUs (CUs only). Most facilities, both with and without SCUs, had QI rates that were neither significantly above nor significantly below the overall facility population mean. Before adjusting, facilities without SCUs had a higher percentage of good-quality facilities (11.7%) than nursing homes with SCUs (6.4%). After adjusting, the SCU facilities had a higher percentage of facilities with
good quality (12.8%) than nursing homes without SCUs (8.6%). The overall change in facility ranks caused by risk adjustment was statistically significant for both confidence interval \((P < .001)\) and percentile method \((P < .005)\). We repeated the entire analysis for the current Minnesota QI by substituting wandering for resisting care. No significant differences were found in results between the two methods.

**DISCUSSION**

Our study found that the incidence of the worsening behavior QI is associated with the resident’s level of cognitive impairment and the presence of SCU in the facility. We also confirmed the presence of a nonlinear relationship between the incidence of worsening behavior and the level of cognitive impairment, which is in line with other studies that have investigated the incidence of behavioral symptoms in relation to dementia progression. Though a group of researchers failed to establish such a correlation,\(^{18,19}\) their studies were smaller in size and inappropriately powered to establish such a relationship. Most studies have concluded that increased cognitive impairment leads to more aggressive and aberrant motor behaviors\(^{20–22}\) and that these behaviors decline in the most severe stages of dementia.\(^{23}\) Lovheim et al\(^{24}\) confirmed this relationship in more than 3000 patients exhibiting various degrees of BPSD (aggression, wandering, restlessness, and verbally disruptive/attention-seeking behavior). The decrease in the incidence of BPSD with severe dementia may be explained partly because of residents’ reduced language and communication abilities (eg, in verbally disruptive/attention-seeking behavior) and to increasing difficulty on the part of the staff in interpreting symptoms of, for example, hallucinations. In later stages of dementia, motor functions become affected and this could contribute to the reduced prevalence of certain behaviors, such as wandering and restlessness.\(^{24}\)

Though several researchers have studied the course of BPSD in nursing homes with and without SCUs, ours is the first study that uses the MDS items for such research. We found that incidence of worsening behaviors was significantly higher in the facilities with SCUs when compared with conventional facilities. A similar study concluded that over time behaviors including resistance to care, wandering, and agitation were more frequent in SCUs.\(^{25}\) Other studies provided inconsistent results and the overall evidence regarding impact of SCUs on dementia and related behaviors is mixed.\(^{9}\)

With such significant differences in the incidence of worsening behaviors by unit type and cognitive impairment, we examined how adjustment for these factors would influence facility QI rates and rankings. We drew comparisons between facilities with and without SCUs (CUs only). The adjusted QI scores, as expected, produced significant shifts in facility rankings. Adjustment resulted in significantly more facilities with SCUs falling below the 10th percentile (highest quality) for this QI. Also adjustment significantly increased the number of facilities with SCUs having worsening behavior QI rates significantly below the mean, ie, being flagged as having better care. On the other hand, the proportion of facilities without SCUs falling below the 10th percentile dropped significantly after risk adjustment. Thus, facilities with SCUs are likely to fare better on Report Cards or other QI applications if their QI rates are adjusted for resident cognitive impairment of placement on SCUs. Conversely, facilities without SCUs and who have less cognitively impaired residents will fare less well compared with their SCU facility peers after

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**Table 1. Population Demographics and Facility Characteristics**

<table>
<thead>
<tr>
<th></th>
<th>Residents on CUs</th>
<th>Residents on SCUs</th>
<th>Total</th>
<th>(P) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of residents</td>
<td>23,322</td>
<td>2843</td>
<td>26,165</td>
<td></td>
</tr>
<tr>
<td>Females (percent)</td>
<td>16,538 (70.9%)</td>
<td>2114 (74.3%)</td>
<td>18,652 (71.3%)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>White (percent)</td>
<td>22,265 (96.2%)</td>
<td>2701 (95.6%)</td>
<td>24,966 (96.2%)</td>
<td>.068</td>
</tr>
<tr>
<td>Mean age, y (SD)</td>
<td>82.9 (12.0)</td>
<td>84.2 (8.9)</td>
<td>83 (11.7)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td><strong>CPS Score</strong></td>
<td></td>
<td></td>
<td></td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Intact 0</td>
<td>2953</td>
<td>0</td>
<td>2953</td>
<td></td>
</tr>
<tr>
<td>Borderline intact 1</td>
<td>3201</td>
<td>0</td>
<td>3201</td>
<td></td>
</tr>
<tr>
<td>Mildly impaired 2</td>
<td>4514</td>
<td>133</td>
<td>4647</td>
<td></td>
</tr>
<tr>
<td>Moderately impaired 3</td>
<td>8167</td>
<td>1220</td>
<td>9387</td>
<td></td>
</tr>
<tr>
<td>Moderately severely impaired 4</td>
<td>1612</td>
<td>423</td>
<td>2035</td>
<td></td>
</tr>
<tr>
<td>Severely impaired 5</td>
<td>1760</td>
<td>804</td>
<td>2564</td>
<td></td>
</tr>
<tr>
<td>Very severely impaired 6</td>
<td>1115</td>
<td>263</td>
<td>1378</td>
<td></td>
</tr>
<tr>
<td>Mean CPS</td>
<td>2.5 (1.5)</td>
<td>3.9 (1.1)</td>
<td></td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Dementia</td>
<td></td>
<td></td>
<td></td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Yes</td>
<td>11,489</td>
<td>2532</td>
<td>14,021</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>11,833</td>
<td>311</td>
<td>12,144</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Facilities with CUs Only</th>
<th>Facilities with SCU</th>
<th>(P) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of facilities</td>
<td>256</td>
<td>125</td>
</tr>
<tr>
<td>Mean no. of all residents (SD)</td>
<td>54.5 (23.8)</td>
<td>97.7 (51.0)</td>
</tr>
<tr>
<td>Mean no. of SCU residents (SD)</td>
<td>0.0 (0.0)</td>
<td>22.7 (14.3)</td>
</tr>
<tr>
<td>Mean CPS score (SD)</td>
<td>2.5 (0.5)</td>
<td>2.8 (0.4)</td>
</tr>
<tr>
<td>Mean % with Alzheimer’s or dementia diagnosis (SD)</td>
<td>49.2 (13.2)</td>
<td>56.9 (11.5)</td>
</tr>
</tbody>
</table>

CPS, Cognitive Performance Scale; CU, conventional unit; SCU, specialized care unit; SD, standard deviation.
adjustment. Other researchers have also shown shifts in facility rankings and overall QI scores when they performed stricter risk adjustments for other nonbehavioral QIs.\textsuperscript{17,26,27}

These findings are important for various stakeholders who have a vested interest in accurate quality measurements in nursing home care. Nursing homes use the Nursing Home Compare information to improve quality of care and various states are planning to use this information to institute "pay for performance" systems for nursing homes. Although the final format is unclear; facilities in the top 10% to 20% may be rewarded.\textsuperscript{13}

In this context, accuracy of the scorecard becomes significantly important. Omission of important patient risk factors may result in erroneous measures of quality, incorrect ranking of providers, and inappropriate labeling of providers as high- or low-quality outliers. This may lead to deprivation of the reward money for facilities with a high number of dementia patients that could have helped to further enhance the quality of care for their residents with dementia. To minimize such potential bias, the list of risk factors should be as comprehensive as possible, including all characteristics deemed to be clinically associated with the outcome. Moreover, for consumers who seek high-quality facilities for their loved ones with BPSD, the current QI scores may be counterproductive. Without the proposed risk adjustments, by virtue of their "poor" scores consumers may avoid facilities that have more expertise and excel in caring for patients with BPSD.

We believe that our approach toward QI calculation, along with the added risk adjustments, provides fairer comparison among facilities taking care of patients with dementia. This will help to minimize the disincentives to avoid admission of patients with dementia and limiting access to nursing home care for those who need it the most. It will also prevent "cream skimming," ie, changing the type of patients they admit following the publication of the Nursing Home Compare\textsuperscript{28} and will "level the playing field" for providers who care for residents with dementia.

**LIMITATIONS**

Using the MDS data to study BPSD has limitations. Although it is a standardized data collection instrument,
facilities may measure outcomes differently or with varying sensitivity. Studies argue that the MDS behavioral items may be underreported and also question the validity of the behavioral data captured, as the documentation is largely provided by direct-care overburdened staff who have limited training in the recognition and documentation of such behaviors. As the SCU staff is more trained, they may be documenting behaviors more frequently and thoroughly, which could present the SCU population to be worsening more rapidly than the CU population.

The CPS has shown to have good inter-rater reliability and validity against the Mini-Mental Status Exam and other benchmarks. It still lacks convincing evidence comparing its accuracy to more rigorous diagnostic criteria, such as neuropsychological testing. Another potential limitation is that CPS and the behavioral QI are both based on

![Facility risk-adjusted behavior QI rate and confidence intervals for conventional facilities only.](image1)

![Facilities risk-adjusted behavior QI rate and confidence intervals for facilities with Alzheimer's special care units.](image2)
CONCLUSION

Although current NH QIs are not perfect, they will likely play an increasingly important role in consumers' choice for nursing homes, market-driven quality improvement, and in emerging pay-for-performance programs. Our study identifies 2 important factors that can be risk adjusted to provide a more robust quality indicator for patients with dementia: the resident’s level of cognitive impairment and the facility having SCUs.

REFERENCES