DEPARTMENT OF HUMAN SERVICES

Legislative Report

Nursing Facility Payment Reform Recommendations

Nursing Facility Rates and Policy Division

March 2021

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II. Introduction

In 2015, the Minnesota legislature enacted major reforms to Medicaid nursing facility reimbursement. This new payment system, commonly referred to as Value-Based Reimbursement (VBR), was implemented on January 1, 2016. VBR calculates daily payment rates based on costs reported by facilities, and uses a quality score to set care-related spending limits.

Two main goals of VBR are to:

- **Provide increased Medicaid reimbursement** targeted to direct care and care-related services.

- **Incentivize better quality of care** through the Medicaid rate setting process.

A team from Purdue University and the University of Minnesota (Evaluators) conducted an independent evaluation of VBR through a contract from the Minnesota Department of Human Services (DHS). DHS and the evaluation team agreed to the following set of research goals prior to commencing the work.

- Conduct a thorough search of published research literature on nursing facility quality measurement and the relationship between quality and costs in the context of nursing facility value-based reimbursement.
- Examine trends in nursing facility utilization, expenditures and quality in periods before and after implementation of VBR. Describe trends in nursing facility utilization, revenue and spending patterns, nursing and other care-related staffing, and facility quality measures.
- Examine ways different types of facilities responded to VBR. Compare trends in expenditures and care quality according to facility characteristics and prior cost and reimbursement patterns.
- Conduct an in-depth quantitative analysis of quality measures and scoring methods for the composite VBR quality score, combined with qualitative data on expert opinions from directors of nursing, other quality specialists, and administrators.

At the conclusion of this evaluation the evaluators prepared a written report presenting detailed results examining the impact of VBR on facility spending and quality, for the average facility in Minnesota and by different facility characteristics of interest. See the Appendix V for the full report. The report also has links to nine in-depth technical papers on topical areas discussed in the full report.

Key evaluation findings

Similarly to the legislative report submitted in February 2019, the evaluation found VBR has had mixed impact on its intended goals. The average facility increased spending on salaries and benefits of direct care staff, the largest care-related cost item. After the initial large increase spending on salaries seen in 2016 upon implementation of VBR, hourly wages of direct care workers have increased at the same annual percentage increases seen prior to VBR. Spending on health benefits has sustained a high growth rate during the VBR period (8-12% annual increase from 2017-2019) and have more than doubled since 2013 on a per resident day basis. Administrative management fees saw an unusually large jump (double the usual percentage increase) in 2018 while the cluster of facilities with lower quality measures had the highest central office and general administrative other costs per resident day.

Care related spending differs greatly by ownership type and location. Hospital attached facilities have the highest spending. Among free-standing facilities, the metro facilities had the highest average costs per resident day as compared to non-metro facilities. However, when comparing other operating costs such as housekeeping, laundry and dietary costs; geographic location had less of an impact. Care related costs also differed by ownership type; government owned and non-profit facilities had higher spending patterns than for-profit facilities. These patterns are consistent to pre-VBR years analyzed.

There was wide variation of care related spending between facilities, with some facilities having small increases in spending and others very large increases. The most substantial factor in predicting spending on care related costs during the VBR implementation is care related spending prior to VBR. Although the gap between higher and lower spending facilities has decreased over the period, some facilities likely still struggle to take on the cost risk associated with the lag between when costs are paid for and when they are realized in the reimbursement rate.

Change in ownership of facilities has increased during the VBR period. Facilities that experienced a change in ownership since 2014 are characterized by generally lower quality metrics than their peers, partially due to a selection effect (worse performing facilities were more likely to be sold) and partially due to a decline in performance following the change in ownership.

The evaluation found no evidence that VBR's quality incentives led to higher facility quality. A stronger threshold is needed for the VBR reimbursement system that would have more impact on facilities. As it is currently designed, the impact is very minimal on most facilities. The evaluators make several recommendations on how to improve the construct of the quality measurement system, but in general, the VBR composite score should be simpler and more understandable. They predict that few facilities are likely to meet the spending limit in the future, regardless of their quality.

Purpose of this report

The evaluators make several recommendations to strengthen the relationship between facility expenditures and care quality. The full report and associated technical papers provide additional details

and in-depth recommendations. The following key themes capture those general recommendations at a summary level:

- *Explore strategies of reducing cost investment risk for facilities that are lagging in quality metrics and are constrained by initial pre-VBR spending.*
- *Better understand motivation behind for-profit facility care related spending decisions under VBR.*
- *Implement strategies to hold new owners accountable for expenditures and care quality after a change of ownership.*
- *Utilize incentive and evaluation strategies that differentiate facilities in terms of role in the long term care system, e.g. short-stay vs long stay, larger facilities vs. small facilities.*
- *Consider modifications to MN based quality measures that allow for simplification and increased focus on topics that can influence care quality.*
- *Explore in greater depth the relationship between proportions of minority residents within a facility and care-related expenditures and care quality.*

DHS agrees with these recommendations. Historically there have been wide variations among reimbursement rates between facilities throughout the state regardless of the various reimbursement models adopted over time. Rate variances most notably exist between metro, rural and hospital-attached facilities. These rate variances existed prior to VBR and interestingly the variability between rates has not significantly changed during the four years following implementation of VBR, a primarily cost based system without geographic or ownership type adjusters. Further exploration of the gap between reported expenditures on the annual cost report and the 18 to 24 month lag before those expenditures are realized in the payment rate is needed.

The evaluators noted the 2016 VBR implementation resulted in a substantial increase in daily payment rates and coincidentally during that same time period there was a substantial increase in change of ownership (CHOWs) of nursing facilities in the state. Most often purchasers and license holders who operate the facilities are from out of state and/or buyers with complex ownership structures. Historically, Minnesota has had a higher than average proportion of not-for-profit nursing facilities and with the uptick in CHOWs, there has been a gradual shift to for-profit organizations. This pattern is occurring in many states across the country and is drawing national attention resulting in a call for policy changes beginning at the federal level for more transparency and accountability of nursing facility ownership and financial operating arrangements.

For over 20 years, Minnesota has been a leader in long-term care pay for performance strategies. The state has developed a variety of nursing facility quality measures important to consumers, shares these with the public and consumers on the [Minnesota Nursing Home Report Card](#), and funds provider quality improvement programs. VBR builds on these efforts to offer more value to consumers and the state for services purchased, in the form of better resident quality of care and quality of life among other system improvements.   Early on in this evaluation cycle with input from our stakeholders, it was determined before we can strengthen and redesign the VBR quality incentive we need to first take an in-depth look at our existing quality measurement system and constructs of individual measures. The purpose was to determine if we are really measuring quality in an effective manner, are we focused on important and

relevant quality topics and can nursing facility providers effectively influence the measured quality outcomes.

III. Report recommendations

DHS acknowledges the extensive work of the research team from Purdue University and the University of Minnesota. The in-depth view of cost and quality trends provides a basis for extensive engagement of stakeholders and work to improve the overall design of VBR. It is important to note the evaluation had two arms: first a quantitative analysis of nursing facility quality and expenditures. For the quantitative analysis the evaluators relied on a pre/post design where trends were examined in major indicators and outcomes, before (2013-2015) and after (2016-2019) implementation of VBR. All analysis periods occurred prior to the COVID-19 pandemic. Secondly, a series of surveys and group interviews were conducted with providers to capture their views of care quality, cost and VBR. This qualitative data collection occurred during the COVID-19 pandemic. Due to providers priority focus on COVID-19 response efforts, it was difficult to obtain a significant level of engagement in the study. It should be acknowledged that the small sample size significantly limits the generalizability of these findings. Similarly, it is likely that those who volunteered to participate in the study, given the low response rate, do not fully represent the population of MN nursing facility providers in regards to knowledge and expertise.

The longevity and severity of the pandemic greatly complicates a short-term response to the study team's recommendations. In the near term, the complexity of sorting out the interactions of emergency expedited reimbursement of COVID-19 related expenses, the distribution of federal CARES Act funds to nursing facilities and the impact of these on future rates and the providers financial operations must be understood. It is anticipated that the pandemic response will interrupt expected expenditure trends that would have otherwise occurred.

COVID-19 has also had a significant impact on quality indicator trends and anticipated consumer survey responses. DHS is committed to immediately begin stakeholder engagement related to modifications to the MN quality measurement system, much of which would not require legislative action. However, we acknowledge the COVID-19 experience will introduce another set of concerns which must be in taken into consideration as we move forward with stakeholder engagement and implementing revisions to the current measurement system.

IV. Future recommendations

DHS in collaboration with the MN Department of Health (MDH) has undertaken a number of steps to address issues related to CHOWS. A revised application to operate a nursing facility in MN has been completed and is ready for implementation. The revised application collects additional ownership and controlling party information, and, aligns with the federal application requirements and the new assisted living license application to be implemented later this year in MN.

Secondly, DHS and MDH are collaborating on strategies to strengthen oversight of owner/operators of MN licensed nursing facilities. Any changes related to ownership requirements will require legislative action.

The evaluator's report offered several recommended actions pertaining to measuring care quality, clinical quality indicators; relationships between quality measures; long stay resident quality of life survey; and VBR quality scoring.   The Nursing Facility Rate and Policy (NFRP) Division plans to engage key stakeholders from the nursing facility industry, consumer and advocacy groups, and regulators from the Minnesota Department of Health to review these recommendations. NFRP will obtain their input in evaluating the VBR quality scoring and in determining adjustments to components that are part of the overall VBR composite score, and the weights assigned to the VBR scoring components.

DHS will continue to evaluate the impact of VBR and will consider future recommendations to VBR to make it more sustainable and to ensure its intended focus on improving the quality of long-term care.

V. Appendix

Evaluation of the NF Payment Reform Legislation
2021 Report to the Legislature

Prepared for: Minnesota Department of Human Services

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Executive Summary

Nursing Facility Reform Initiative

In 2015, the Minnesota legislature enacted major reforms to Medicaid nursing facility reimbursement. This new system is commonly referred to as "Value-Based Reimbursement" (VBR) was implemented on January 1, 2016. Goals of VBR were to:

- Align Medicaid reimbursement rates more closely with the cost of caring for residents.

- Incentivize better care quality through the Medicaid rate setting process.

- Provide increased Medicaid reimbursement earmarked for direct care and care-related services.

- Improve efficiencies through other technical changes to Medicaid rate setting and payment.

Features of the VBR system include the application of a quality incentive payment for care-related services and a fixed price for other operating expenses. Nursing facility services are bundled into a comprehensive package of room, board and nursing services. Payment for this package of services is a daily per diem rate. The daily per diem rate can be further broken down into rate components of a care-related payment rate, other operating payment rate, external fixed costs payment rate, and a property rate.

Under VBR, care-related costs such as nurse wages and supplies, activities and social services are reimbursed at actual cost subject to a quality-based limit. Other operating costs such as housekeeping, laundry and property insurance are reimbursed using a pricing model, meaning the rate for these costs will be the same for all NFs in the state. The external fixed rate component is also established based on actual costs but is not subject to a limit. The property rate is determined through a historic facility-specific formula and was not addressed as part of the VBR reform package.

The quality incentive is applied in setting the care-related component of the facility's reimbursement rate. The higher a facility's composite quality of care score, the more likely the facility will have its care-related costs fully covered in the Medicaid reimbursement rate. The composite score encompasses multiple dimensions of care quality. The score is derived from Minnesota-specific quality measures: clinical quality indicators from routine MDS resident assessments conducted by nursing facility staff (nursing home QIs), survey of resident quality of life (QOL) and satisfaction with care for short and long-stay residents; survey of family satisfaction with care; findings from nursing facility regulatory inspections; and rates of hospitalizations and community discharges of nursing facility residents.

Prior Reports

An evaluation team from the University of Minnesota and Purdue University has been conducting an ongoing external evaluation of VBR through a contract from the Minnesota Department of Human Services. In January 2019 the evaluation team prepared a major report, Evaluation of the NF Payment Reform Legislation: Background for the 2019 Report to the Legislature. The team prepared a subsequent report in June 2019, Evaluation of the Value-Based Reimbursement System (VBR) Report 2 (See Reports – Nursing Facility Related Issues webpage

on DHS website) that identified major issues remaining to be addressed from the 2019 Legislative report. As a lead-up to the current report, the team prepared a July 2020 report, Nursing Facility Quality of Care and Costs: Literature Review and Findings from a Special Analysis (See Reports – Nursing Facility Related Issues webpage on DHS website).

Conclusions from the 2019 Report to the Legislature

The VBR system appeared to achieve one of its main goals – increased reimbursement and resulting facility expenditures for direct care and other care-related services. Facility average expenditures for salaries and benefits of direct care staff, the largest care-related cost item, rose substantially after the introduction of VBR. Nearly all facilities experienced an increase in Medicaid payment rates, and the vast majority increased their direct care expenditures. However, there was wide variation between facilities in the size of rate increases and care-related costs, some facilities having only small increases and others very large increases.

An improvement in care quality, the second major goal of VBR, did not appear to be achieved. None of the VBR quality measures – VBR composite quality score, clinical quality indicator score, MDH inspection, or resident quality of life – rose significantly on average with the introduction of VBR in 2016. In addition, neither nursing hours nor staff retention rates rose on average with VBR. As with rates and costs, facilities varied widely in their quality scores. About half of facilities had small increases in scores between 2015 and 2016, and the other half had declines in scores.

We can point to several reasons for the failure of care quality measures to improve significantly with VBR. First, improving on care quality is arguably a more difficult and time-consuming process than changing expenditure patterns. The two year time period after VBR's introduction may not be sufficient to translate increased care resources into better care quality. Second, as we discuss throughout the report, the quality measures may not effectively capture "true" quality of care. Like any empirical measures, they are vulnerable to measurement error and bias.

Third, and most importantly from a policy perspective, the design of VBR does not offer a strong incentive for quality improvement. The VBR quality score threshold is intended to place a more stringent limit on Medicaid payment rates for low quality facilities than for high quality facilities. However, the threshold was set in such a way that all but a handful of facilities have not been affected. Moreover, with the current design, few facilities will be affected in the foreseeable future.

Aims of the Current Evaluation

The current report had a comprehensive set of aims intended to provide useful information for DHS and stakeholders about the effects of Value-Based Reimbursement (VBR) System and other policy initiatives of the Minnesota Nursing Facility Reform Legislation.

Aim 1. Conduct a thorough search of the research literature on nursing facility care quality measurement and the relationship between quality and costs in the context of nursing home value-based reimbursement.

Aim 2. Examine trends in nursing facility utilization, expenditures and quality in periods before and after the VBR and other initiatives were introduced. Describe trends in nursing facility

utilization, revenue and spending patterns, nurse and other care-related staffing, and facility quality measures

Aim 3. Examine the ways that different types of facilities responded to the VBR and other initiatives. Compare trends in expenditures and care quality according to facility characteristics and prior cost and reimbursement patterns.

Aim 4. Conduct an in-depth quantitative analysis of quality measures and scoring methods for the composite VBR quality score, combined with qualitative data on expert opinions from directors of nursing, other quality specialists, and administrators.

Evaluation Methods

The evaluation had two arms: a quantitative analysis of nursing facility quality and expenditures and group interviews and a survey of nursing facility quality specialists and administrators. For the quantitative analysis we relied on a pre/post design where we examined trends in major indicators and outcomes, before (2013-2015) and after (2016-2019) implementation of VBR. In order to respond to evaluation questions, considerable attention will be given to comparisons between different outcomes and subgroups in the facility and resident populations. The sample consisted of 340 facilities with a full seven years of data. Major variables included facility annual and per resident day (PRD) revenue and costs, nursing hours salaries and hours per resident day, and measures of care quality. Much of the data came from Medicaid cost reports and other administrative files. Quality measures came from the Minnesota Nursing Home Report Card. Results are presented from descriptive analyses and statistical modeling.

The goal of the interviews and surveys was to explore contextual influences on facility decision making and perceptions of VBR. Data collection involved targeted discussions with two state quality council groups; two focus group interviews comprised of quality specialists and facility administrators; a survey of nursing home clinical leaders from the nursing home industry; and a targeted survey of quality experts.

General Trends

Some key trends of interest are highlighted here for convenience; greater detail can be found later in this report and in the Trend Analysis Technical Report. Hourly wages of direct care workers have continued to trend upwards during the VBR period at about the same annual percentage increases seen prior to VBR after the large increase seen in 2016 associated with the implementation of the policy. Spending on health benefits has sustained a high growth rate during the VBR period (8-12% annual increase from 2017-2019) and have more than doubled since 2013 on a per resident day basis. Administrative management fees saw an unusually large jump (double the usual percentage increase) in 2018, these fees tended to be the highest for the cluster of facilities with the highest overall costs located in the Twin City metro area (see the Cost and Quality Trajectory Clustering Technical Report). In the same analysis, the cluster of facilities with the lower quality measures had the highest central office and general administrative other costs per resident day.

Care related spending differs greatly by ownership type and location. Hospital attached facilities have the highest spending. Among free-standing facilities, Twin City metro MSA facilities had the highest mean (~$156 PRD in 2019), followed by other metro and micro MSAs (~$147 PRD), and facilities in small towns and rural areas (~$133 PRD). This pattern predates the VBR policy.

Location did not have a strong relationship to other operating costs, with the exception of hospital attached facilities which had substantively higher operating costs. Care related costs also differed by ownership type: government owned and not for profit facilities had higher costs (~$153-155 PRD 2019) than for profit facilities (~$138 PRD). This pattern predates the VBR policy. A similar gap exists between the two groups for other operating costs.

Change in ownership of facilities has increased during the VBR period. Facilities that experienced a change in ownership since 2014 are characterized by generally lower quality metrics than their peers, partially due to a selection effect (worse performing facilities were more likely to be sold) and partially due to a decline in performance following the change in ownership. Compared to other facilities with consistent ownership, facilities with ownership changes appear to have reduced spending on laundry and dental benefits while growing spending more slowly on medical and scholarship benefits and increasing administrative management fees at a higher rate. More detail can be found in the Change of Ownership Technical Report.

Recommendations

Strengthening VBR - Facility Expenditures and Care Quality

There is a wealth of information summarized in the trend analysis section which sits atop three technical reports, each with additional details and results. In order to coalesce many of the details into a more digestible form, potential actions are presented here in the form of recommendations.

Recommended Action: Explore the possibility of reducing cost investment risk for facilities that are lagging in quality metrics and are constrained by initial pre-VBR spending.

The most substantial factor in predicting spending on care related costs during the VBR implementation is care related spending prior to VBR. As much as half of this relationship is a function of cost reimbursement with the rest explainable through other factors. Although the gap between higher and lower spending facilities has decreased over the period, some facilities likely still struggle to take on the cost risk associated with the lag between when costs are paid for and when they are realized in the reimbursement rate.

Recommended Action: Better understand motivation behind for-profit facility care related spending decisions under VBR.

The gap between for-profit facility care related spending and non-profit spending has increased during the VBR period and remains significant when accounting for other factors, as does a small gap in Quality of Life scores. It appears that for-profit facilities are not reacting as intended to the VBR framework, whether this is a misunderstanding of the system, miss-alignment of incentives, or difficulty in transitioning due to lower pre-VBR spending is not clear.

Recommended Action: Implement strategies to hold new owners accountable for expenditures and care quality after a change of ownership.

The increased reimbursement rates appear to have made Minnesota Nursing Homes more attractive to buyers, some of whom are operators from other states. Facilities that change ownership are generally lower performing facilities, particularly on inspection scores, and new ownership appears to be looking for cost cutting measures (e.g. laundry and benefits) while also increasing administrative costs. This group should be encouraged to make prudent financial

decisions that improve nursing home quality through, for example, careful monitoring of expenditures and care quality.

Recommended Action: Utilize incentive and evaluation strategies that differentiate facilities in terms of role in the long term care system.

Annual resident admissions per bed was significantly correlated with higher care related and other operating spending, higher community discharge rates within 30 days, and lower staff retention rates. Taking care of the short stay population appears to cost more, but naturally boosts community discharge rates. Interestingly, direct care staff retention is lower in these facilities, possibly due to increased burden from transitioning through residents, as there is likely an effort cost to learning new care needs and resident preferences. Larger facilities tend to have lower PRD other operating costs (likely due to efficiencies of scale), but also lower of Quality of Life scores (perhaps due to perceptions of getting lost in the shuffle). The most recent version of the VBR Quality Score takes into account resident mix between short and long stay. This approach represents a strategy of trying to account for facility role and such approaches are more likely to yield a fairer measure of quality of care across the industry.

Recommended Action: Consider risk adjustment of the hospitalization measure for lower risk residents, or those with stays greater than 30 days.

Currently, hospitalization rates for residents within 30 days of admission to the nursing facility are adjusted for resident acuity, i.e., medical conditions and functional dependency. Hospitalization rates for residents who have stayed in the facility more than 30 days are considered low risk and their rates are not adjusted. However, we found evidence that that the measure for the longer stay residents is being influenced by differences in resident populations rather than differences in quality of care.

Correlational findings (Chapter 6) also suggest that more licensed nurse and social worker hours is positively correlated with higher hospitalization rate for 30+ days per 1000 resident days. One possible reason for this unexpected relationship is that the hospitalization rate does not adjust for the acuity of residents in the facility. Facilities with higher resident acuity may have more licensed nurses and more residents at risk of entering the hospital. We recommend to adjust the 30 days or more hospitalization rate by case mix acuity in the same manner as the acuity adjustment is applied to rates of hospitalization for short-stay residents (less than 30 days).

Recommended Action: Explore in greater depth the relationship between percentage of minority group residents and care-related expenditures and care quality

Higher percentages of minority resident days is correlated with lower QOL and MDH scores, worse community discharge rates and worse hospitalization rates during the first 30 days of a resident's stay. Care-related and other operating costs have also grown more slowly for these facilities, while community discharge and hospitalization rates have worsened during the period. This analysis was done at the facility level, and so this correlation does not imply that minority resident outcomes are better or worse than majority residents, but the generally lower quality metric for those facilities serving the minority residents is troubling and should be further investigated. Some of this relationship overlaps with other factors such as change of ownership, but a substantive amount is unique to serving the minority resident population. This issue should receive further study. The DHS should consider strategies targeted to minority-serving facilities to aid them in improving quality for a diverse resident population.

Provider Views of Care Quality, Cost, and VBR

A number of themes are intertwined throughout the group interviews and surveys. The recommended actions are based upon commonalities within the integrated findings from this component of the VBR evaluation. Findings from the quantitative portion of the evaluation are considered within these recommendations as well. It must be acknowledged that the small sample size, likely due to the COVID-19 pandemic response efforts, significantly limits the generalizability of these findings. Similarly, it is likely that those who volunteered to participate in the study, given the low response rate, do not fully represent the population of MN nursing home providers in regards to knowledge and expertise. The survey findings indicate that respondents perceived a very high level of knowledge regarding QI measurement, the MN quality report card, and VBR, and quality council discussions as well as the expert panel survey were specifically aimed at those with a high level of understanding. However, despite these limitations the reported findings are informative given the expertise of the respondents, and can be viewed as the perspectives of experts with in the population of MN nursing home providers.

Recommended Action: Reduce the number of QI's included in the VBR quality measurement.

Participants in the quality council discussion groups and focus group interviews described QI's that they felt were not useful, unnecessary and/or did not reflect care quality. This is consistent with the findings of the quantitative component of the VBR evaluation (described in Chapter 5), which noted floor effects (inability to achieve improvements in score due to current high performance), lack of variability between some measures such that the measures do not discriminate between facilities in regards to quality, and groups of measures that may be measuring the same underlying construct and therefore could be eliminated to reduce complexity. The findings from the qualitative component have been incorporated in the recommendations of the Clinical Quality Indicator section.

Recommended Action: Focus on QI's that are responsive to improvements in the care provided.

Respondents from both interviews and surveys reported that QI's may accurately measure a reported outcome, but the outcome measured may not be reflective of care provided and/or may not be able to be influenced by caregiving staff. They voiced frustration and concern that their care efforts were not acknowledged by some outcomes, and that risk adjustment helped with the process but was often unclear or inadequate. Specific QI's noted as likely unresponsive include: incontinence (some incontinence is normal with aging and not a reflection of assistance provided with toileting); falls with injury (the amount of injury incurred is more an effect of resident frailty than staff supervision); pain (difficult to achieve no pain despite nursing efforts); behaviors (often occur despite staff intervention); and functional decline (may be unavoidable given the resident population). The findings from the qualitative component have been incorporated in the recommendations of the Clinical Quality Indicator section.

Recommended Action: Work toward a more comprehensive measure of quality.

Providers described a vision of quality within their facilities that went beyond individual QI's, and discussed feeling frustrated that the areas they used to guide their view of how well their facility is performing were not included in the quality measures. Providers described relationships within the facility and with family members, lack of complaints, staff who appear happy at work, efficient daily operations, and general demeanor of residents as examples. There was a perception voiced in interviews that the reliance upon MDS measures and thresholds did

not reflect the current focus of those in the industry who are forward thinking, and were based on the old, punitive way of thinking. Concerns regarding the QOL measure reflected some of the desire to measure quality of resident care more comprehensively. Additionally, the state-wide survey noted wide variance among respondents on whether QI's were person-centered, and interview findings noted a perception that the resident voice may be missing in some of the QI measures such as incontinence and mobility, contributing to the perception that a more comprehensive view of quality is needed. Although challenging, it is recommended to work toward a measurement process that captures a more global view of quality.

Recommended Action: Nursing facility staff would benefit from more knowledge and information regarding the inter-relationship between quality, spending, and VBR.

Respondents noted that there was a relationship between costs, quality and spending decisions within their facilities. However, consistent with the quantitative findings of this evaluation, survey findings and focus group respondents described this relationship as indirect and variable. Respondents noted that decisions surrounding resource allocation were often leadership-driven, but with strong influence from clinical staff within quality committees without consideration of costs, and perhaps without a clear understanding of the implications of those decisions on reimbursement. It was recommended by respondents that quality committees be provided with additional information regarding the use of purpose of QI data, the revenue implications of quality measurement and VBR, and particularly reasons for the time lags in reporting state data. Providing clinical care staff with information to better understand VBR program data and quality measurement encourages resource allocation decisions that incorporate the full universe of factors, including costs.

Recommended Action: The VBR threshold should be tightened to be meaningful to high functioning facilities.

Consistent with the findings from the quantitative component of the evaluation, the current VBR threshold does not appear to provide meaningful direction to facilities who are currently meeting the quality standard. Interview respondents reported feeling positively about the VBR program in terms of revenue, but not in terms of using VBR performance to guide decisions. This finding is supported by the state-wide survey, where respondents were almost evenly divided in their view of the usefulness of VBR for decision making.

Clinical Quality Indicators

The Minnesota Nursing Home Report Card provides two clinical quality indictor ratings: one focused on the quality of care during long-term stays (LS) with 19 indicators, and one focused on the quality of care during short-term stays (SS) with 2 indicators.

There are three problems identified in our quantitative analysis. First, the current domain structure was not supported by our analysis. Expert opinions were employed to group the 19 long-stay QIs into 10 different domains or aspects of care. However, the underlying patterns of facility QI rates, as determined by empirical factor analysis, support a different structure of domains. The structure from our analysis is described below.

Second, individual QIs vary widely in their contributions to the domain and total QI scores. When multiple QIs are grouped under a single domain, their contribution is diminished. Each of the 10 domains is assigned 10 points and within each domain the points are distributed equally. However, the number of QIs within each domain varies considerably, ranging from 1 to 5.

Consequently different weights are assigned to the individual QIs. For example, the "prevalence of pressure sores in high-risk residents" QI gets 10 points, while the "prevalence of worsening or serious bladder incontinence" QI gets 2 points. Based on the points assigned, the pressure sore QI is five times as important as the bladder incontinence QI.

Third, several of the QIs display a skewed distribution with facilities tightly grouped at the very top (ceiling) or bottom (floor) of the QI distribution. The current scoring approach is best suited for a facility QI distribution that is normal, i.e., bell-shaped curve. The best performing 20% of facilities statewide get full points on each QI, the worst performing 10% get no points, and the rest are sorted and given a prorated point value. If a QI is normally distributed with relatively large variation in rates, the scoring program discriminates well between facilities. Facilities that receive full points are exhibiting better quality relative to their peers, and facilities receiving no points are exhibiting poor quality.

In contrast, 8 QIs have a distribution that deviates from normality. They display minimal variation in QI rates, and rates are highly skewed with a floor effect (a large number of facilities have a QI rate at or near 0%). An additional 4 QIs have a wider distribution, yet they are subject to a floor or ceiling effect. The prevalence of physical restraints is an example of a QI with minimal variation and an extreme floor effect, nearly all facilities (94.4% in the fourth quarter of 2019) have completely eliminated restraint use. Facilities with no restrained residents receive full points as intended. However, the bottom 10% of facilities, which receive no points, have a very low level of restraint use, approximately 2 per 100 long-stay residents during 2017-2019. When a QI has a skewed distribution and when many facilities are able to achieve a perfect score, i.e., not a single resident failing on a QI, then it may be appropriate to set the top performance threshold at an absolute value of zero problem cases. For example, in order for a facility to achieve full points, it would have to have no residents with pressure sores or urinary tract infections. This viewpoint sets a target of a zero error rate, recognizing that every facility may not achieve the target every time, but all facilities should be striving to achieve it.

After integrating both qualitative and quantitative findings, we made the following recommendations.

Recommended Action: Adopt new domains for the long-stay QIs.

We recommend adopting a new domain structure for the 19 long-stay QIs. If long-stay QIs are added (recommendation below), they should be placed under the new domain structure. Our findings indicate it is reasonable to categorize these QIs into 4 rather than 10 domains currently used: *incontinence* (4 QIs: bladder incontinence, bowel incontinence, absence of a toileting plan for residents with bowel incontinence, and absence of a toileting plan for residents with bladder incontinence), *physical functioning* (5 QIs: improved walking, functional decline, mobility dependence, range of motion limitation, and falls), *restraints and behavioral symptoms* (4 QIs: physical restraints, behavioral problems, depressive symptoms, and use of antipsychotics without a supporting psychiatric diagnosis), and *care for specific conditions* (6 QIs: pain, pressure sores, unexplained weight loss, indwelling catheters, urinary tract infections, and infections). The new domain structure has two advantages. First, the new domains are more consistent with underlying patterns in the facility QI rates, indicating that they are more reliable and valid. Second, the new domain structure results in more balanced domains, with the number of QIs within each domain ranging from 4 to 6. The new domain structure makes the contributions of individual QIs to the domain and total QI scores similar (either 1.0, 1.2, or 1.5) and not as

exaggerated as the current domain structure (some QIs had a 5-time greater influence on the domain and total QI scores than other QIs). If we assume that individual QIs are equally important and contribute equally to the domain and total QI scores, we recommend creating facility domain points by averaging the QI points within each domain. The facility domain points are either summed or averaged to create an overall QI score for each facility.

Recommended Action: Discontinue the restraint QI.

Nearly all facilities have achieved zero physical restraints of their residents. As a consequence the QI does not discriminate well between facilities. Inappropriate use of physical restraints, occurring among only a handful of facilities, could be addressed adequately through the regulatory system of nursing home inspections.

Recommended Action: Reform the current scoring program for QIs with skewed distribution.

When QIs are highly skewed and many facilities are able to achieve the best QI rate (a QI rate of 0%, such as no pressure sores), then the poorer performing facilities (with even one resident with pressure sores) should not receive full points. Only facilities with a zero QI rate should receive full points, the worst performing 10% of facilities should receive no points, and facilities in between should receive points proportional to their rates. For the two QIs ("prevalence of antipsychotic medications without a diagnosis of psychosis" and "prevalence of depressive symptoms"), more than half facilities are able to achieve a better QI rate (use of antipsychotics QI: 6%; depressive symptoms QI: 3%). So the worst 50% of facilities, instead of the worst 10%, should receive no points. The best performing 20% of facilities should receive full points, and facilities in between should receive points proportional to their rates.

Recommended Action: Consider a substantial revision of the QIs involving toileting for incontinent residents.

We have mixed feelings about the two long-stay QIs: "prevalence of occasional to full bladder incontinence without a toileting plan" and "prevalence of occasional to full bowel incontinence without a toileting plan". The two toileting QI rates exhibit ceiling effects (a large number of facilities have a QI rate at or near 100%) and receive the lowest ratings from the provider survey in terms of importance and usability. During focus groups with nursing facility administrators and quality experts, concerns about the two QIs were raised; specifically, some felt that the two QIs were not a reflection of assistance provided with toileting.

An effective toileting plan may be difficult to implement because it is resource-intensive and requires considerable skill to implement. However, there is clinical evidence that a well designed and implemented toileting plan can effectively address incontinence. The overall poor performance on the toileting QIs could indicate inadequate effort by facilities, poorly defined and measured QIs, or both. Not only do most facilities perform poorly on these QIs, but the QIs have shown a disturbing upward trend in failure rates from 2012-2019.

For these reasons, we cannot recommend dropping the toileting QIs. Yet, given the very high failure rate and industry resistance to the QIs, they are not workable in its current form.

Recommended Action: Combine highly correlated QIs

We recommend combining the two incontinence QIs ("incidence of worsening or serious bowel incontinence" and "incidence of worsening or serious bladder incontinence") into one QI "incidence of worsening or serious bowel or bladder incontinence", because they are highly

correlated (if a facility has a high rate of bowel incontinence, the facility would have a corresponding high rate of bladder incontinence) and they both are representative of the incontinence construct. Although nursing facility administrators and quality experts expressed concerns that the two incontinence QIs were challenging to change, we recommend keeping them due to clinical significance and important correlations with resident and family satisfaction.

Regarding the two correlated QIs "incidence of worsening or serious functional dependence" and "incidence of worsening or serious mobility dependence", we recommend either combining them or clarifying their definitions if keeping both. Nursing facility administrators and quality experts felt that decline in function was inevitable given the resident population and did not reflect poor care. However, the functional decline QI is significantly related to other quality measures. Therefore, we recommend keeping it and clarifying that this QI focuses on late functional loss. Regarding the mobility QI, nursing facility administrators and quality experts felt it was highly responsive and was a good focus to engage therapy staff with nursing, but thought risk adjustment could be improved if residents with neurological conditions were excluded.

Recommended Action: Redefine the falls QI

Regarding the "prevalence of falls with injury" QI, nursing facility administrators and quality experts felt the amount of injury incurred was more an effect of resident frailty than staff supervision; overall number of falls was important to measure, as opposed to only falls with injury, because it was an example of an adverse event with potential impact, had a close connection with quality of care, and could impact quality of life. In addition, the "prevalence of falls with injury" QI rate is highly skewed with a floor effect and has too little variation. Therefore, we recommend replacing it with two new QIs: "prevalence of any fall" and "prevalence of two or more falls or fall with injury".

Recommended Action: Retain the current QIs covering pain and problem behaviors

Although nursing facility administrators and quality experts expressed concerns with the QIs including pain (difficult to achieve no pain despite nursing efforts) and behaviors (often occur despite staff intervention), we recommend keeping them due to clinical significance and important correlations with other quality measures. We also recommend exploring development of an opioid use QI given the current focus on addiction issues.

Recommended Action: Introduce new QIs with a quality improvement focus and new QIs for short-stay residents

The current QIs, with the exception of the improved walking QI, focus on avoiding poor care practices or outcomes. These negatively framed QIs convey a message of avoiding harm, essentially penalizing facilities for poor care. Positively framed QIs are intended to reward facilities for better care, with better care processes and outcomes. Earlier versions of the QIs, prior to 2016, had several positively focused QIs, emphasizing improvement in functioning and continence. We recommend re-introducing the following positively-framed QIs: "incidence of improved or maintained functional independence" and "incidence of improved or maintained bowel or bladder continence". We also recommend adding two new QIs for short-stay residents which have been used in the federal quality measures: "prevalence of antipsychotic medications without a diagnosis of psychosis" and "prevalence of any fall".

Relationships between Quality Measures

We conducted a correlational analyses to explore the relationships between four main quality components: clinical care quality (health inspection survey, clinical QIs, and hospitalization), staffing (hours per resident per day and retention), resident and family experience (quality of life, family satisfaction, and resident experience), and consumer choice (community discharge). Based on the correlational findings, we make the following recommendations.

Recommended Action: Continue to emphasize resident and family experiences as key indicators of facility care quality and performance.

One theme that emerged from the qualitative findings based on discussions with nursing home clinical leaders, quality experts, and administrators was a desire for person-centered and comprehensive measures. However, they expressed some frustration with the quality of life measure in particular. The survey may not represent the resident's true quality of life. For example, they were concerned that the survey was only a 'snap shot' of one point in time and it could be heavily influenced by immediate events. In addition, the sample includes residents with cognitive impairment who may not have been able to respond to questions in a valid manner.

Despite these concerns, we found evidence for the construct validity of the resident and family experience measures. Resident and family experience measures were correlated with several of the other quality measures. Residents and families tended to give higher satisfaction scores for facilities with better performance on multiple indicators: health inspections and clinical quality indicators, lower hospitalization rates, higher community discharge rates, more nurse staffing hours, higher retention rates, and higher proportion of single rooms. In addition, facilities with higher scores on these resident and family experience measures had higher occupancy rates. Better resident and family experience is likely a pivotal factor in attracting residents to the facility.

For these reasons, the state should continue to invest in resident and family surveys, and they should be essential components of the quality measurement system.

Recommended Action: Consider integrating selected CMS Nursing Home Compare measures into the VBR scoring system. The CMS staffing and inspection measures could replace comparable Minnesota VBR measures.

The CMS staffing and inspection measures offer more comprehensive and timely composite scores than comparable Minnesota measures. The CMS staffing measure is well designed and it relies on more timely data than the Minnesota measure, which is subject to an 18 month or more lag between data collection and reporting. The CMS ratings on the staffing domain are based on two measures: 1) registered nurse (RN) hours per resident per day; and 2) total nurse staffing (the sum of RN, licensed practical nurse (LPN), and nurse aide) hours per resident per day. The staffing measures are derived from data submitted each quarter through the Payroll-Based Journal (PBJ) System, along with daily resident census derived from Minimum Data Set assessments, and are case-mix adjusted based on the distribution of MDS assessments by Resource Utilization Groups, version IV (RUG-IV group). In addition to the overall staffing rating, a separate rating for RN staffing is also reported.

The CMS health inspections composite measure is also well designed. It provides a more comprehensive rating of inspection results than does the current Minnesota measure. The CMS composite is based on the number, scope, and severity of deficiencies identified during the three

most recent annual inspection surveys, as well as substantiated findings from the most recent 36 months of complaint investigations. All deficiency findings are weighted by scope and severity. This measure also takes into account the number of revisits required to ensure that deficiencies identified during the health inspection survey have been corrected.

Adopting the CMS measures offers an advantage to facilities that would have to track only one measure and to the state which could download the measure from the CASPER system rather than having to collect and process separate data.

Long-Stay Resident Quality of Life Survey

One theme that emerged from the qualitative findings based on discussions with nursing home clinical leaders, quality experts, and administrators was a desire for person-centered, comprehensive measures of resident quality of life. The Long-Stay Resident Quality of Life Survey could be a valuable tool for offering this person-centered, comprehensive perspective on resident quality of life. The survey was developed with input from residents, families, quality experts, and providers to ensure that the survey measures aspects of quality of life that are meaningful for residents. In addition, the survey measures multiple domains of quality of life to offer a more comprehensive picture of residents' lives. In order to complement findings from the qualitative arm of the study (Chapter 4), we utilized quantitative methods to identify strategies for improving the validity and reliability of the Long-Stay Resident Quality of Life Survey. In addition, we explore opportunities for reducing the length of the survey.

Recommended Action: Adopt the new structure of domains (i.e. meaningful activities, food enjoyment, dignified care, quality of service, autonomy, environment, communication with staff, mood, and resident global assessment).

This new domain structure has several advantages. First, the new domains are more consistent with underlying patterns in the data, suggesting that the domains are more valid and reliable. Second, the new domain structure results in more balanced domains, which makes it easier to compare variability in domain scores across domains. Third, the new domain structure results in a more normal distribution of facility domain scores, which makes it easier to distinguish among facilities in terms of quality of life.

Recommended Action: Move Q38 ("Would you recommend [name of facility] to someone who needs care?") and Q39 ("Overall, what grade would you give [Name of Facility], [pause] where A is the best it could be and F is the worst it could be?") to a separate domain of quality of life that measures resident global assessment.

This recommendation is made to improve the content validity of the domains, given that residents' responses to Q38 and Q39 may be influenced by multiple domains of quality of life. This new resident global assessment domain should be given equal weight to the other domains. Q38 should be scored as the percent positive responses (i.e., proportion of facility residents agreeing that they would recommend the facility). For Q39, a facility percent positive score should be calculated in the same manner as it is currently calculated. In particular, residents' responses should be assigned points as follows: "A" 4 points, "B" 3 points, "C" 2 points, "D" 1 point and "F" zero points. The points for all residents giving a valid response in a facility should be summed, and this total should then be divided by the maximum total points that the facility could have earned. The facility percent positive responses for Q38 and Q39 should then be averaged together to create a score for the domain.

Recommended Action: In the event the new domain structure is adopted, remove the following items from the Long-Stay Resident Quality of Life Survey:

- *Q10:* Is it easy for you to get around in your room?
- *Q18:* Do the people who work here treat you politely?
- *Q30:* Are you friends with anyone who lives here?
- *Q35:* Do the same people take care of your most of the time?

Omitting these items would improve the validity, reliability, and balance of domains. Refer to Table 25 for a more detailed description of the rationale for these recommendations. An additional advantage of removing the items from the survey is that it would reduce the length of the survey and, in turn, reduce the cognitive burden associated with taking the survey.

Recommended Action: In the event the current domain structure is maintained, remove the following items from the Long-Stay Resident Quality of Life Survey:

- *Q10:* Is it easy for you to get around in your room?
- *Q18:* Do the people who work here treat you politely?
- *Q35:* Do the same people take care of your most of the time?

Omitting these items would improve the validity, reliability, and balance of domains. Refer to Table 26 for a more detailed description of the rationale for these recommendations. An additional advantage of removing the items from the survey is that it would reduce the length of the survey and, in turn, reduce the cognitive burden associated with taking the survey.

VBR Quality Scoring

The value based reimbursement (VBR) quality score has three components: long-stay resident quality total score, short-stay resident quality score, and state inspection results score for short- and long-stay residents respectively. Based on the findings from the correlational analysis and survey of nursing facility administrators and quality experts (Chapter 4), we make the following recommendations.

Recommended Action: Expand the range of short-stay QIs in order to capture more dimensions of clinical care quality and to improve the reliability of the short-stay VBR score.

In Chapter 5 we recommended adding two short-stay quality indicators (falls and antipsychotics without a diagnosis of psychosis). Expanding the number and range of short-stay quality indicators would improve reliability.

Recommended Action: Make recommended changes to measures and quality score components (Chapters 5, 6, & 8) before constructing new VBR quality scores.

We recommended changes in the short- and long-stay QIs (described in Chapter 5) and quality of life measures (describe in Chapter 8), as well as the substitution of CMS staffing and inspection scores for MN measures (describe in Chapter 6). After deciding on these recommended changes and any other changes to the quality measurement system, the next step would be to construct corresponding new VBR quality scores for long- and short-stay residents.

Recommended Action: Work with stakeholders from the nursing home industry and consumer/advocacy groups to further evaluate the VBR quality components.

We recommend systematic and extensive input from key stakeholders in evaluating the VBR quality scoring and in determining the weights assigned to different components. Due to the COVID-19 pandemic, we obtained viewpoints about the quality measures from only a small proportion of the nursing home industry. We recommend that DHS conduct an extensive evaluation of quality measures by convening focus groups and conducting surveys on this topic in the coming months after the COVID-19 pandemic has subsided. Also, participation in this process should be expanded to include not only quality experts from the industry but also consumer/advocacy groups.

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Introduction

NF Reform

In 2015, the Minnesota legislature enacted major reforms to Medicaid nursing facility reimbursement. The system began affecting rates set on January 1 2016. This new system is commonly referred to as "Value-Based Reimbursement" (VBR). In brief, the goals of Nursing Facility Reform were to:

- Align Medicaid reimbursement rates more closely with the cost of caring for residents.

- Incentivize better care quality through the Medicaid rate setting process.

- Provide increased Medicaid reimbursement earmarked for direct care and care-related services.

- Improve efficiencies through other technical changes to Medicaid rate setting and payment.

Main features of the VBR system were the application of a quality incentive payment for care-related services and a fixed price for other operating expenses. Nursing facility services are bundled into a comprehensive package of room, board and nursing services. Payment for this package of services is a daily per diem rate. The daily per diem rate can be further broken down into rate components of a care-related payment rate, other operating payment rate, external fixed costs payment rate, and a property rate.

Under VBR, care-related costs such as nurse wages and supplies, activities and social services are reimbursed at actual cost subject to a quality-based limit. Other operating costs such as housekeeping, laundry and property insurance are reimbursed using a pricing model, meaning the rate for these costs will be the same for all NFs in the state. The external fixed rate component is also established based on actual costs but is not subject to a limit. The property rate is determined through a facility-specific formula.

The quality incentive is applied in setting the care-related component of the facility's reimbursement rate. The higher a facility's composite quality of care score, the more likely the facility will have its care-related costs fully covered in the Medicaid reimbursement rate. The composite score encompasses multiple dimensions of care quality. The score is derived from Minnesota-specific quality measures: clinical quality indicators from routine MDS resident assessments conducted by nursing facility staff (nursing home QIs), survey of resident quality of life and satisfaction with care for short and long-stay residents; survey of family satisfaction with care; findings from nursing facility regulatory inspections; and rates of hospitalizations and community discharges of nursing facility residents.

Evaluation Questions

Given the magnitude of the changes, the legislature is requiring the Minnesota Department of Human Services (DHS) to submit reports to the legislature addressing the impact of VBR. The

DHS contracted with an evaluation team from the Purdue University and University of Minnesota to conduct an external evaluation of VBR. The evaluation was to address a comprehensive set of questions.

- What were trends in nursing home utilization?
- How did VBR relate to trends in revenue and spending patterns?
- How did VBR relate to trends in nurse and other care-related staffing?
- How did VBR relate to trends in facility quality scores?
- Did revenue, spending, workforce effects, and care quality trends differ by nursing facility characteristics?

Evaluation Team

The team consists of Greg Arling, Kathleen Abrahamson, Dongjuan Xu, Zachary Hass, Karen Cai, and Marissa Rurka from Purdue University Schools of Nursing, Industrial Engineering, Department of Sociology, and Regenstrief Center for Healthcare Engineering and Mark Woodhouse, University of Minnesota School of Public Health.

Prior Reports

The evaluation team has been conducting an ongoing external evaluation of VBR since 2018. In January 2019 the evaluation team prepared a major report, Evaluation of the NF Payment Reform Legislation: Background for the 2019 Report to the Legislature [HYPERLINK]. The team prepared a subsequent report in June 2019, Evaluation of the Value-Based Reimbursement System (VBR) Report 2 [HYPERLINK] that identified major issues remaining to be addressed from the 2019 Legislative report. As a lead-up to the current report, the team prepared a July 2020 report, Nursing Facility Quality of Care and Costs: Literature Review and Findings from a Special Analysis [HYPERLINK].

Findings from the January 2019 Legislative Report

These were general findings from the evaluation carried out in 2018-2019 and presented in the 2019 Report to the Legislature.

Facility Characteristics
Several facility characteristics, such as ownership and urban-rural location, remained constant over the 5-year period of the evaluation. However, utilization indicators, such as resident case-mix, resident days and occupancy showed a steady decline. These declines seemed to reflect general industry trends of declining nursing home use rather than being a result of VBR.

Expenditures
A major goal of VBR was to increase care-related spending. That goal was largely met. The vast majority of facilities reported substantial increases in PRD costs between 2015 and 2016, with additional increases in 2017. There were similar increases in costs for direct care salaries and

benefits. In general, cost increases were significant for facilities of all ownership types, urban and rural location, and other subgroups.

Nursing Costs, Salaries and Hours per Resident Day
Mean facility hourly salaries for nursing staff increased substantially from 2015 to 2016; however, nursing hours per resident day did not increase significantly. Apparently, increased direct care expenditures were channeled primarily into direct care staff salaries and benefits and not into increased nursing hours per resident day.

Quality Scores
The average composite facility VBR quality score displayed an upward trend. However, VBR scores did not have an appreciable upswing from 2015 to 2016; the upward trend began in 2013 and continued over the 5-year period. The average VBR quality score remained flat or declined among for-profit facilities and facilities with low or declining occupancy rates. Among individual components of the VBR quality score, mean facility clinical quality indicator (QI) scores rose, while resident quality of life (QoL) scores declined.

Variation between Facilities in Revenue, Costs, and Quality

Underlying the averages reported in the tables and text is considerable variation between facilities in their revenue, costs, and quality scores. Even after considering major subgroup differences in ownership, size, acuity, location, and occupancy rate, considerable variation remained in individual facility revenue, costs, and quality scores.

Conclusions
The VBR system appeared to achieve one of its main goals – increased reimbursement and resulting facility expenditures for direct care and other care-related services. An improvement in care quality, the second major goal of VBR, did not appear to be achieved. The failure of care quality measures to improve significantly with VBR can be attributed to at least two factors. First, improving on care quality is arguably a more difficult and time-consuming process than changing expenditure patterns. The two year time period after VBR's introduction may not be sufficient to translate increased care resources into better care quality. Second, and perhaps more importantly, the design of VBR does not offer a strong incentive for quality improvement. The VBR quality score threshold is intended to place a more stringent limit on Medicaid payment rates for low quality facilities than for high quality facilities. However, the threshold was set in such a way that all but a handful of facilities have been affected. Moreover, with the current design, few facilities will be affected in the foreseeable future.

Aims of the Current Evaluation

The current evaluation follows up on the findings from the 2019 report. We examined trends in expenditures and care quality for an additional 2 cost reporting years (2018-2019); we conducted an in-depth analysis of the nursing home quality measures and scoring method; and, we gathered

opinions of nursing facility administrators, nurses, and quality experts. The current evaluation had these specific aims:

Aim 1. Conduct a thorough search of the research literature on nursing facility care quality measurement and the relationship between quality and costs in the context of nursing home value-based reimbursement.

Aim 2. Examine trends in nursing facility utilization, expenditures and quality in periods before and after the VBR and other initiatives were introduced.

1. Describe trends in nursing facility utilization
   - Resident days – Medicaid, Medicare, private pay, and other
   - Occupancy levels
   - Acuity (RUG case-mix score)
   - Payer mix
2. Describe trends in revenue and spending patterns
   - Facility revenue, particularly from Medicaid and private pay, the two revenue sources most affected by VBR
   - Spending on care-related and other operating costs
   - Salary and wages for nurses and other direct care workers
   - Benefits and other compensation
3. Describe trends in nurse and other care-related staffing
   - Nursing or direct care staff hours
   - Nurse staff mix among RN, LPN, and nursing assistants
4. Describe trends in facility quality measures
   - Clinical quality - MDS Quality Indicators
   - Health Department inspections
   - Resident quality of life and satisfaction with care
   - Nursing staff retention
   - Community discharge rates
   - Hospitalization rates

Aim 3. Examine the ways that different types of facilities responded to the VBR and other initiatives. Compare trends in expenditures and care quality according to:

1. Facility characteristics
   - Geographic location - Twin Cities, other MSA, or rural
   - Ownership type
   - Change in ownership
   - Size
   - Occupancy rates
   - Payer mix of Medicare, private pay, or Medicaid
   - Proportion of minority residents
   - Special populations – such as developmentally disabled or mentally ill
2. Cost and reimbursement patterns
   - Pre-VBR costs and reimbursement rate
   - Magnitude of rate increase after implementation of VBR

Aim 4. Conduct an in-depth analysis of quality measures and scoring method for the VBR quality score.

1. Evaluate the nursing home quality indicators, quality of life survey, and other measures according to multiple criteria.
   - Reliability and validity
   - Variability across facilities
   - Ceiling effects
   - Missingness
2. Obtain opinions from directors of nursing, other quality specialists, and administrators about the content, measurement, usefulness, and intervention potential of the nursing facility quality measures
   - Assess their understanding of the measures and how they factor into the VBR score
   - Identify dimensions of quality that are highly valued and achievable
   - Gauge opinions about the relative weight that should be assigned to the measures in calculating the VBR score
3. Explore the possibility of reducing the number of VBR quality score components, such as number of QIs or QOL items.
   - Apply variable reduction techniques, such as factor analysis.
   - Eliminate measures that do not discriminate very well between facilities -- too little variance, ceiling or floor effects, instability over time.
4. Explore alternative approaches to assigning weights to VBR score components in order to better reflect their importance and their potential for improvement

Organization of the Report

The current report contains 8 chapters addressing issues essential to the success of a value-based reimbursement system. Chapter 1 contains a review of the research literature into the most widely used set of clinical quality measures, Medicare's Nursing Home Compare Quality Measures, and research literature on the relationship between nursing facility expenditure and care quality. It examines evidence about the effectiveness of value-based reimbursement and other methods of incentivizing better care quality. Additional chapters cover the study methodology (Chapter 2), trends in expenditures and care quality (Chapter 3), provider views of care quality (Chapter 4), quantitative analyses of the quality measures (Chapters 5-7) and recommendations (Chapter 8). A list of in-depth technical reports are at the end of this report.

Chapter 1
Research Literature on Nursing Quality, Expenditures and VBR

The evaluation included a comprehensive review of the research literature addressing issues essential to the success of a value-based reimbursement system. A considerable body of research has accumulated about the measurement of nursing home quality and the relationships between the resources nursing home devote to the delivery of care and the quality of care they provide. This section of the report begins with a review of the research literature into the most widely used set of clinical quality measures, Medicare's Nursing Home Compare Quality Measures. It then address more generally the relationship between nursing facility expenditure and care quality. Finally it reviews evidence about the effectiveness of value-based reimbursement and other methods of incentivizing better care quality.

Nursing Home Quality Measures

A search of the academic literature from 2010 to 2019 was completed to capture recent evidence surrounding nursing home quality measures. A total of 34 primary research articles from peer reviewed journals contributed to this report. Evidence fell into 3 broad categories: correlations between CMS 5-star quality ratings and ratings from other resources, relationships between nursing home quality measures and outcomes including quality of life, satisfaction, patient safety, negligence litigation, depression, urinary tract infection, and hospitalization or potentially preventable hospitalizations, and psychometric performance of individual quality measures.

The search addressed the following questions:
1) What is correlation between different quality rating systems, and between different raters?
2) What is the relationship between NH quality and outcome variables such as quality of life, satisfaction, patient safety, negligence litigation, depression, urinary tract infection, and hospitalization?
3) What is psychometric performance of NH quality measures or quality indicators (QIs) such as relatability and validity?

Search Results
Identified studies ranged in publication date from 2010-2019, and came from a wide variety of high quality nursing, gerontology, medical, economics and health services journals. Studies were most commonly retrospective analyses of large government databases such as the MDS, OSCAR, Medicare Claims Data, and the Area Resource File, with the exception of 1 qualitative study and 1 systematic review. Two studies conducted outside the United States with one study in Canada and 1 study in England.

1. Correlations between CMS 5-star ratings, and ratings from other sources

- The CMS Nursing Home Compare (NHC) 5-star ratings did not necessarily correlate with social media or online ratings including Facebook, Yelp, and Google Consumer Reviews. Only one study found a moderate correlation.
- There was only minimal agreement on ranking of NHs between NHC 5-star ratings and resident/family ratings.
- There was a weak or no relationship between nursing home quality indicator performance and inspection deficiencies or complaints, although one study found 3 individual quality indicators (restraint use, worsened pressure ulcer, and experiencing worsened pain) predicted poor performance on inspections.

2. Relationships between NH quality measures and different outcomes
- The NHC 5-star ratings did not necessarily reflect nursing home residents' quality of life.
- The NHC 5-star ratings did not adequately reflect resident and family satisfaction.
- The relationships between NHC 5-star rating and resident safety measures were weak and inconsistent.
- There were significant associations between certain quality measures and negligence litigations; however, all the effects were small.
- The NHC 5-star ratings were not associated with new onset of depression; however, certain quality domain ratings were related to the severity of depressive symptoms.
- One study found that NHC 5-star ratings were significantly related to the occurrence of urinary tract infections.
- Available NH quality performance was not strongly or consistently associated with the risk of hospitalization or potentially preventable hospitalization. Only certain quality indicators appear to tap dimensions of clinical quality directly related to hospitalizations.
- Nursing homes with higher serious mental illness concentrations were related to poorer care quality.
- Nursing homes with special care unit for dementia were related to better care quality.
- Nursing homes with higher proportion of African American residents were related to worse care quality.

3. Psychometric performance of quality measures
- The agreements between falls recorded by facility staff in the MDS and falls recorded in the medical charts were fair or moderate.
- Depression QI was not a reliable and valid measure since it measured the ability of staff to detect depressive symptoms rather than the actual prevalence rate of depression.
- Incontinence QIs were not associated with clinically important differences in related care processes.
- Urinary tract infection QI overestimated the number of cases while adequately screening out residents without infections.

- Weight loss QI was able to discriminate differences in prevalence of weight loss between facilities.
- Restraint QI was not able to discriminate differences in the use of restraining devices.
- Pressure ulcer QI was not an effective measure of the quality of pressure ulcer care in facilities and the QI score could be misleading.
- There was potential systematic bias in reporting pain QI.
- Three short-stay quality measures (rehospitalizations, ED visits, and successful discharges to the community) were weakly correlated.

Nursing Home Cost, Quality and Value-Based Reimbursement

A search and review of academic literature that was completed to identify and summarize recent research regarding the relationships between value based purchasing (VBP) reimbursement policy, quality measurement, facility spending decisions, and care quality outcomes within nursing homes. The search addressed the following questions:

1) What factors influence quality measurement in nursing homes (NHs)?

2) What is the influence of VBP programs on care quality outcomes?

Search Results

Identified studies ranged in publication date from 1998-2019, and came from a wide variety of high quality nursing, gerontology, medical, economics and health services journals. Studies were most commonly retrospective analyses of large government databases such as the MDS, OSCAR, Medicare Claims Data, and the Area Resource File, with the exception of 4 surveys, 3 commentaries, 3 interview based studies, 1 systematic review and 1 mixed methods study combining secondary data analysis with observations of care.

Summary of Findings

1. NH quality, reimbursement, and costs
- Increased reimbursement does not necessarily correlate with improvements in quality.
- Financial constraints are not clearly predictive of the inability to deliver quality care, and processes unmeasured by quality indicators (QI) such as leadership stability and team approaches to care may play a larger role in quality than spending.
- The relationship between costs and quality is variable and often inverse. High cost were sometimes correlated with high quality, but often low costs were correlated with high quality. High costs were often correlated with low quality, highlighting the costs of managing the outcomes of poor quality care such as falls and pressure ulcers.
- The relationship between costs and quality varies by facility characteristics such as size and staffing, and the strategies which allow some facilities to provide quality care at a

low cost are understudied given the prevalence of secondary data analyses in this literature.

- RN staffing and nursing case mix that favors licensed nurses is expensive and increases costs, but may be essential to improve quality.
- The relationship between structure, processes and outcome measures is likely not as strong as the current quality measurement system assumes, and various QI's are impacted differently by reimbursement changes. Generally studies supported spending on staffing and process measures.

2. Influence of Value Based Purchasing programs on care quality outcomes
- Providers respond variably to VBP incentives, and transparency/clarity regarding quality measurement is necessary to improve provider decision making.
- Perverse incentives exist in the system that may de-incentivize top facilities from improving quality.
- A single VBP threshold and weighting system for a state is possibly less effective than a more individualized, consultant style system that rewards facilities for addressing particular areas of quality concern.
- Overall, VBP systems improve quality in a less dramatic fashion than was anticipated when the programs began.

3. NH report card and MDS quality measures
- Clarity, simplicity and transparency regarding quality measurement is needed to increase resident and family engagement with the report card for decision making.
- There is evidence that consumer driven weighting and individualized composite measures are feasible and valid approaches to measuring quality.
- Public reporting of quality may result in disparities of nursing home self-selection. Those with high resources tend to cluster in facilities with high quality.
- Despite some concerns about accuracy of self-report measures, current MDS measures are generally well correlated with outcomes, stable and sensitive. However, some measures are considerably better at differentiating between high and low quality facilities than others, and QIs can perhaps be grouped into composite measures for simplification.

Chapter 2
Evaluation Methods

Evaluation Design

Because VBR was implemented statewide at a single point in time, we have no control or comparison groups from which to draw inference about facilities not receiving the intervention. We will have to rely on a pre/post design where we examine trends in major indicators and outcomes, before and after implementation of VBR.

In order to respond to evaluation questions, considerable attention will be given to comparisons between different outcomes and subgroups in the facility and resident populations.

The evaluation is complicated by:

- The VBR having a differential effect on reimbursement rates depending on the cost history and spending patterns of facilities at baseline.
- The 18-month lag between the end of a facility's cost reporting year and when a new rate takes effect.
- High VBR cost limits that resulted in few facilities affected by their quality scores. Poor quality facilities were no more likely to be affected by the VBR cost limit than were good quality facilities.
- Many external events and trends, not associated directly with VBR, can have an impact on care quality, utilization, spending patterns and financial health of the industry.

Study Population and Sample: quantitative analyses

The total number of nursing facilities varied from year to year, ranging from 371 in 2013 to 356 in 2019. In order to conduct a trend analysis for all seven years we excluded any facility that had fewer than seven years of data. This left 344 facilities in the sample. We further reduced the sample by excluding 4 outlier facilities, which was defined as being predominately post-acute (> 50% Medicare days) or reported Per Resident Day (PRD) costs greater than 2.5 times the top quartile of the cost distribution: direct care cost PRD > $200, other care-related cost PRD > $75, or other operating cost PRD > $200. The final sample was 340 facilities present in all 7 years.

Table 1. Exclusion of Facilities for Analysis

	All facilities with data 2013-2019	*Facilities with 7 years of data*	*Outliers*	*Facilities with outliers removed*
2013	371	344	4	340
2014	366	344	4	340
2015	365	344	4	340
2016	363	344	4	340

	All facilities with data 2013-2019	Facilities with 7 years of data	Outliers	Facilities with outliers removed
2017	363	344	4	340
	360	344	4	340
	356	344	4	340
Total	2544	3408	28	2380

Major Variables and Data Sources

Key dates and time periods for rate setting and the periods for data used in rate setting. For example, rates set on January 1, 2016 were based on cost reports from October 2013-September 2014. The data periods for quality scoring vary, although in general they are based on the data period closest to September 1 of the year prior to the rate setting date.

Table 2. Key Rate Setting Dates and Data Periods

	Effective Date	Data Period for Rate Setting (Cost Year, referred to by ending year of each period)
VBR Passed by Legislature	June 2015	NA
CY 2016 reimbursement rates set	January 2016	Oct 2013 - Sep 2014
CY 2017 reimbursement rates set	January 2017	Oct 2014 - Sep 2015
CY 2018 reimbursement rates set	January 2018	Oct 2015 - Sep 2016
CY 2019 reimbursement rates set	January 2019	Oct 2016 - Sep 2017
CY 2020 reimbursement rates set	January 2020	Oct 2017 - Sep 2018
CY 2021 reimbursement rates set	January 2021	Oct 2018 - Sep 2019
Quality score applied to rate setting – QIs, QoL survey, and State Inspection score	January 1, 2016 and each subsequent January 1	QIs for 4 quarters ending the prior June 30 QOL scores from prior year's resident survey State Inspection score posted on the report card as of prior September 1

The major study variables are shown in Table 3. Most of the data are drawn from the cost reports. Table 4 shows the data periods associated with the analysis years in the report. For example, when the report refers to 2013, the data periods are October 2012 – September 2013 for cost report variables, composite quality score, QI score and retention score, and fall 2013 for the MDH inspection and quality of life score.

Annual revenue is the amount of revenue obtained from Medicaid during the cost report year. PRD Medicaid revenue is defined as total revenue from Medicaid during the year divided by

Medicaid resident days. Annual revenue can vary widely depending on a facility's number of Medicaid resident days. Similar measures were constructed for Medicare and other revenue sources. Three of the quality measures are components of a composite care quality score used in the new Medicaid reimbursement approach. These components are Quality Indicator (QI) score (range 0-50), Minnesota Department of Health Inspection score (range 0-10), and Resident Quality of Life (QoL) score (range 40). The scores of the components are summed to form a composite Total VBR Quality Score (range 0-100) for comparison against the New VBR Quality Score (current version which incorporates short stay mix and additional survey measures). In addition, we have included a Staff Retention measure of the proportion of nursing staff present at the first of the year who are still employed by the facility at the end of the year. We have also examined individual components of the QI and QOL metrics, as well as community discharge and hospitalization metrics. Details of the quality measures can be found on the Minnesota DHS web site Report Card Tech User Guide.

Table 3. Major Variables and Data Sources

Domain	Major Indicators	Data Sources
Care Quality Scores	Clinical QIs	MDS
	MDH Inspection	Health Department Survey
	Resident QoL	Resident QoL Survey
	Retention Score	Cost Reports
	Hospitalization rate	
	Community discharge rate	
Workforce Effects	Direct care staff HPRD	Cost Reports
	Nursing staff mix	Cost Reports
Utilization	NH resident days	Cost Reports
	Occupancy Rates	Cost Reports
	Acuity (RUG Case Mix)	Cost Reports
Revenue	Medicaid	Cost Reports
	Medicare	Cost Reports
	Private pay	Cost Reports
	Other	Cost Reports
Costs	Direct care costs	Cost Reports
	Other care-related costs	Cost Reports
	Other operating costs	Cost Reports

Domain	Major Indicators	Data Sources
Facility Characteristics	Size Ownership type Chain affiliations Change in ownership Location Race/ethnicity Special populations	Cost and Administrative Data MDS data

Table 4. Major Cost and Quality Variables by Data Period for Analysis

Analysis Years	2013	2014	2015	2016	2017	2018	2019
All Cost Report (CR) Variables	10/12-9/13	0/13-9/14	10/14-9/15	10/15-9/16	10/16-9/17	10/17-9/18	10/18-9/19
QI Quality Score*	10/12-9/13	10/13-9/14	10/14-9/15	10/15-9/16	10/16-9/17	10/17-9/18	10/18-9/19
MDH Inspection Quality Score*	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017	Fall 2018	Fall 2019
Quality of Life Quality Score*	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017	Fall 2018	Fall 2019
Retention Quality Score	10/12-9/13	10/13-9/14	10/14-9/15	10/15-9/16	10/16-9/17	10/17-9/18	10/18-9/19

*Used in rate setting

Direct care and other care-related costs are reported in two forms. Standardized costs PRD have been case-mix adjusted in order to control for differences between facilities in cost-related acuity of their resident populations. Unstandardized PRD costs are costs as reported without case-mix adjustment. Standardized costs are noted as standardized, otherwise PRD indicates unstandardized per resident day.

We constructed a measure of urban – rural location using the rural-urban commuting area (RUCA) codes. The RUCA codes classify U.S. census tracts using measures of population density, urbanization, and daily commuting. The most recent RUCA codes are based on data from the 2010 decennial census and the 2006-10 American Community Survey. The RUCA classification delineates metropolitan, micropolitan, small town, and rural commuting areas based on the size and direction of the primary (largest) commuting flows. All facilities were assigned a RUCA code according to their physical address. The metropolitan facilities were subdivided into Twin Cities and other metropolitan areas. For more information on RUCA see: https://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes.aspx.

We constructed several change of ownership variables which are relevant to the trend analysis and to the change of ownership technical report. For trend analysis, change of ownership during the period indicates that a facility changed ownership between 2014 and 2019 (2013 ownership

change data was not available at the time of analysis). Alternative definitions are detailed where relevant in the findings and in the change of ownership technical report.

Analysis Approach: quantitative analyses

Trend analysis and Subgroup analysis

The unit of analysis for most of the trend and subgroup analyses was the nursing facility. Descriptive analysis involved cross-tabulations, bar and line graphs, difference of means or proportions, cross sectional regression models for most recent audited cost year data (2018), and linear growth model analysis with appropriate tests of statistical significance. Trend plots and models were made overall for cost and quality measures and by subgroups. Key cost measures are the care-related and other operating costs on a per resident day (PRD) basis. Key quality measures include aggregate scores for clinical quality, quality of life, Minnesota Department of Health inspection scores, staff retention rates, community discharge rates, and hospitalization rates.

Key subgroup measures include 2015 spending on care related costs (just prior to VBR implementation), location/hospital affiliation (using the RUCA codes as described above), ownership type (for-profit, non-profit, and government owned), change in ownership during the data period, facility bed size, annual admissions per bed, occupancy rates, percentage of total revenue from Medicaid, percentage of total revenue from Medicare, and percentage of minority race/ethnicity resident days. Continuous subgroup variables are split into groups based on quartiles to facilitate meaningful tables and plots. Typically the lowest quartile (bottom 25%), middle 50%, and highest quartile (top 25%) are compared. The exception being percentage of minority resident days, being right skewed, was split into bottom 50%, 3rd quartile (51-75%), and 4th quartile (76-100%).

Quality Measure Analysis

In evaluating the statistical properties of nursing home quality indicators (QI) and quality of life (QoL) measures, we conducted resident-level factor and correlational analyses. The analysis focused on risk-adjusted facility-level QIs including 19 long-stay QIs and 2 short-stay QIs over the 2012-2019 period (four quarters in each year) were used. The number of NHs in each quarter ranged from 369 to 382. Exploratory factor analysis (EFA), Cronbach's alpha, correlation, scatter plots, descriptive and trends analysis were conducted for this report.

Quality measures over the 2013-2019 period were used in the correlational analysis, except the VBR new score. The VBR new score including family satisfaction (long-stay residents) and short-stay resident survey was only available in 2019. Pearson or Spearman correlation, as appropriate, was used to evaluate the relationships between quality measures. Generally, correlation coefficient values less than 0.3 are consider to be weak; 0.3-0.7 are moderate, and 0.7 or greater are strong. High correlation (≥ 0.7) between two quality measures suggests that they may be measuring redundant aspects of nursing home quality.

Data are from the 2017-2019 Long-Stay Resident Quality of Life surveys. First, we examine whether patterns in residents' responses to the survey support the same dimensions, or domains, as the current Long-Stay Resident Quality of Life Survey. Second, based on the patterns in residents' responses, we develop and validate a new domain structure. Third, we compare the properties of the current and new domain structures. To evaluate the domains and items, exploratory factor analyses (EFA), confirmatory factor analyses (CFA), item-rest correlations, tetrachoric correlations, descriptive analyses, and histograms were conducted.

Methods, Sample and Analysis: qualitative component

The goal of the qualitative component of the VBR evaluation was to explore contextual influences on facility decision making and perceptions of VBR in order to illuminate the results of quantitative analyses and inform MN VBR policy decisions to optimally align reimbursement policies, facility costs, and expenditure decisions to increase care quality. Data collection tasks completed to address that goal included the following.

Targeted discussions with two state quality council groups

Discussions were held with the quality councils from Care Providers (9/9/20) and Leading Age (9/10/20). Each meeting lasted one hour, utilized a virtual platform, and was facilitated by Kathleen Abrahamson. Five quality council members participated in the Care Providers discussion, and approximately 15 persons participated in the Leading Age discussion. Meetings were recorded, and two VBR evaluation personnel (KA and KC) reviewed audio recordings and developed themes from participant responses. Representatives from the Minnesota Department of Human Services were present at both meetings.

Two focus group interviews comprised of quality specialists and facility administrators

Focus group interviews were convened with the objective of obtaining provider perspectives from a sample of MN administrators and quality experts beyond the sample of providers that participated in the Leading Age and Care Provider quality councils. The goal was to triangulate data from three sources: discussion groups, focus group interviews, and surveys in order to obtain a comprehensive portrait of provider perspectives. Sampling, respondent invitation procedures, and discussion topics were approved by the Purdue University Institutional Review Board (IRB) prior to contacting respondents. A list of potential participants was provided to the research team by MN DHS, and invitation letters to participate in the focus groups were sent to 31 individuals from across the state. Focus group participants were divided into two separate interviews, one comprised of quality managers (10/22/20), and one comprised of administrators (10/23/20). Both interviews were held on a virtual platform, recorded, and moderated by Kathleen Abrahamson. Interview questions mirrored those used in the quality council discussions noted above, and focused upon quality measurement, the relationship between costs and quality, perceptions of the MN VBR, and other topics as directed by participants. In total data was collected from 7 participants; 5 quality managers and 2 administrators. Both meetings lasted approximately 1 hour. Audio recordings of the interviews were reviewed by two members

of the research team (KA and KC), who individually took notes and identified pertinent themes within the data. Both analysts then reviewed the notes and discussed the themes until consensus was reached regarding the content of respondent statements.

Survey of nursing home clinical leaders from throughout the state

An online survey was distributed to MN nursing facility administrators and clinical leaders with the objective of obtaining a wider sample of provider perspectives to supplement and illuminate data obtain in the groups interviews. The goal was to triangulate data from three sources: discussion groups, focus group interviews, and surveys in order to obtain a comprehensive portrait of provider perspectives. Sampling and respondent invitation procedures were approved by the Purdue University IRB prior to contacting respondents. A list a potential participants was provided to the research team by MN DHS, and invitation letters were sent to 421 individuals from across the state. Survey distribution began on 10/13/ 20 and ended on 11/8/20, with reminders sent to potential respondents during weeks 1 and 3 of distribution.

The statewide survey included seven sections: 1) Quality Measures and the Quality Report Card, 2) Weighting of components in the VBR equation, 3) Challenges regarding quality measurement, use of quality data, and participation in the MN VBR program, 4) Approach to improving care quality and participation in the MN VBR program, 5) The relationship between costs and quality, 6) The impact of COVID-19, and 7) Other feedback. The final statewide survey included 42 Likert-style items and 4 open-ended questions to collect additional feedback. The surveys also collected respondents' demographic characteristics such as organization name and primary location, primary job title, job tenure, and the highest level of education.

Targeted survey of quality experts

An online survey was distributed to MN nursing facility administrators and clinical leaders with the objective of obtaining expert perspectives on specific quality measures. Sampling and respondent invitation procedure were approved by Purdue University Institutional Board (IRB) prior to contacting respondents. A list of potential expert panel participants was provided to the research team by MN DHS, and invitation letters were sent to 61 individuals in the expert panel. Survey distribution began on 10/26/20 and ended on 11/8/20, with reminders sent to potential respondents during week 1 of distribution.

The expert panel survey included two sections: 1) Rating specific quality measures and the VBR equation, and 2) Rating structural quality measures on the report card. The final expert panel survey included 32 items. The surveys also collected respondents' demographic characteristics such as organization name and primary location, primary job title, job tenure, and the highest level of education.

Chapter 3
Quality and Expenditure Trends Overall and by Subgroups

The objectives of the trend analysis was to determine if introduction of the new reimbursement system had the intended impacts of positive changes in major outcomes, such as facility costs, workforce characteristics, and quality measures; and, if these impacts were associated with facility operating or organizational characteristics, such as ownership, geographic location, size, and occupancy rate. The 2019 Legislative report addressed short-term response to VBR (through 2017). The current report, containing 2018 and partially audited 2019 data, takes a longer view of trends in utilization, expenditure, and care quality, overall and by subgroups. This report also expands the scope of the evaluation to include an in-depth examination of nursing home quality measures.

Trend Analysis

The first set of results describes annual trends for major variables for the years before (2013-2015) and after (2016-2019) introduction of the new reimbursement approach. This analysis approach is termed an interrupted time series. If the new reimbursement system had an impact on facility costs, workforce characteristics, or care quality, then we would expect to see a significant change (interruption) in the trends for these variables between 2013-2015 and 2016-2019. For example, there should be a significant positive increase in mean per diem direct cost and quality scores trends between 2013-2015 and 2016-2019.

Trends by Facility Subgroups

The next section of the report presents more detailed findings for facility subgroups that are of particular interest from a policy perspective. Trends are analyzed separately by facility ownership type, geographic location, pre-VBR spending on care-related costs, occupancy rate, number of beds, annual admissions per bed, source of revenue mix, and percentage minority race/ethnicity resident days. Finally, we tested a set of multiple regression analyses to determine the independent effects of these subgroupings on costs and quality metrics, using cross-sectional models to determine relative importance of the subgroup variables, and longitudinal growth models to test for changes associated with the VBR implementation.

Organization of Findings

The following section details general trends across all 340 facilities. The second section, examines trends in care-related and other operating costs across 10 sub-group variables. The third section repeats section two, but for eight quality metrics. Both sections two and sections three employ cross-sectional models to determine relative importance of the subgroup variables, and longitudinal growth models to test for changes associated with the VBR implementation. The final section summarizes notable observations. Additional detail can be found in the Trend Analysis Technical Report, available upon request.

General Trends

Nursing facility utilization

Table 5 displays annual means for various nursing home utilization measures including total resident days, percentage of resident days by payer source, occupancy rate, and acuity as measured by RUG case mix score. Over the period there is a general decline in resident days (12% drop) and occupancy rates (5% drop).

Table 5. Nursing Facility Utilization

Cost Year	2013	2014	2015	2016	2017	2018	2019
Number of Facilities	340	340	340	340	340	340	340
Total Resident Days	27,124	26,663	25,990	25,256	24,720	24,455	23,769
Medicaid RUG Days	56%	55%	52%	52%	51%	51%	50%
Medicare RUG Days	9%	9%	9%	9%	9%	9%	7%
Private Pay RUG Days	26%	26%	25%	23%	22%	21%	19%
Other RUG Days	9%	9%	9%	9%	9%	10%	11%
Occupancy	89%	89%	87%	86%	85%	85%	85%
Annual Occupancy Change	-0.7%	-0.2%	-1.4%	-1.7%	-0.8%	0.1%	-0.4%
Acuity (RUG Case-Mix Score)	1.020	1.017	1.014	1.012	1.010	1.010	1.003

Facility revenue

Table 6 displays annual means related to facility revenue including total revenue in thousands of dollars and percentage of revenue by payer source (Medicaid, Medicare, Private Pay/Other). Despite the decline in total resident days and occupancy rates, total revenue has risen by 23% over the period (not adjusted for inflation). With implementation of the Value Based Reimbursement policy in 2016, revenue from Medicaid increased by 4% of total revenue with a corresponding drop in Medicare revenue. Figure 1 indicates the annual change in median revenue per resident day by payer source. The large jump in Medicaid revenue associated with the VBR implementation has leveled off to steady, but lower median growth rates of around 6-7% annually.

Table 6. Revenue Sources

Cost Year	2013	2014	2015	2016	2017	2018	2019
Number of Facilities	340	340	340	340	340	340	340
Total Revenue (K)	5,614	5,732	5,684	6,247	6,436	6,749	6,900

Cost Year	2013	2014	2015	2016	2017	2018	2019
Medicare Revenue %	16%	16%	16%	14%	14%	14%	11%
Medicaid Revenue %	48%	48%	47%	50%	50%	51%	52%
Private Pay or Other Revenue %	36%	37%	37%	36%	36%	35%	37%

Figure 1. Median Revenue Change PRD
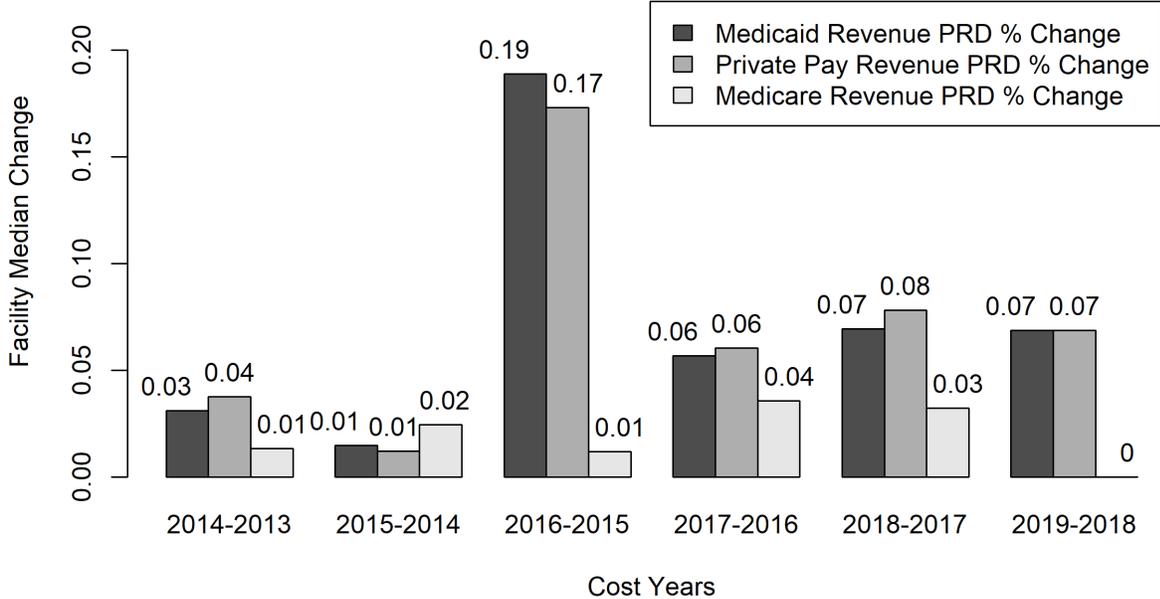
Care-related costs

Table 7 displays care-related costs for overall categories such as direct care and other care related costs, various salary and benefit line items from the cost report, some variables have been omitted for brevity, but may be found in the related technical report. Unless noted as standardized (adjusted for acuity), all measures are annual means on a per resident day basis. Care related costs have risen by 36% (unadjusted for acuity or inflation) over the period, which driven primarily by an increase in direct care spending (40% jump). Figure 2 displays the annual percent change in median care related spending. The figure highlights the large jump that occurred from 2015 to 2016, coinciding with the VBR policy implementation, and shows that growth in subsequent years, although lower than the initial jump, remains higher than cost growth prior to the policy change. A large portion of the increase in direct care spending was driven by increase spending on direct care salaries as most positions saw an increase of over 30% on a per resident day basis. Notably RNs and Nurse Administrators saw a 54% increase. Figure 3 displays the salary increase (salary per hour) for Nursing Administrators, RNs, LPNs, CNAs, and TMAs. Of note in Table 7, Medical Insurance (109%) and Scholarships (384%) saw the largest increases over the period of employee benefits.

Table 8 gives the annual mean costs per resident day for select non-salary care related costs, such as supplies, staffing through the pool, and raw food, additional variables may be found in the technical report. Notably, the amount of money spent on staffing through the pool has risen by a factor of 8-12 for all three nursing roles.

Table 7. Care Related Costs PRD by Cost Year

Cost Year	2013	2014	2015	2016	2017	2018	2019
Care-related Cost PRD Standardized	109.45	111.08	113.99	127.38	134.24	140.68	149.21
Direct Care Cost PRD Standardized	87.81	89.41	92.06	103.75	110.11	115.62	123.00
Other Care-Related Cost PRD Standardized	21.65	21.67	21.93	23.63	24.13	25.05	26.21
Total Care-related Cost PRD	111.10	112.65	115.46	128.71	135.33	141.53	149.57
Direct Care Cost PRD	89.28	90.82	93.40	104.96	111.14	116.48	123.44
Other Care-Related Cost PRD	21.83	21.83	22.07	23.75	24.19	25.05	26.13
Direct Care Salary	72.42	74.82	77.39	87.11	93.21	96.81	101.42
Nurse Admin Salary PRD	7.58	8.14	8.15	9.47	10.28	10.95	11.68
RN Salary PRD	14.69	15.56	16.50	17.69	19.30	20.63	22.64
LPN Salary PRD	15.61	15.78	16.11	17.79	18.16	18.16	18.40
CNA Salary PRD	30.93	31.71	32.57	36.89	39.63	40.87	42.23
Health Insurance PRD	6.90	8.87	9.21	10.76	11.95	12.88	14.40
Scholarship PRD	0.21	0.19	0.28	0.66	0.93	0.97	1.01

Table 8. Non-Salary Care Related Costs per Resident Day (PRD) by Cost Year

Cost Year	2013	2014	2015	2016	2017	2018	2019
Nursing Supplies and Non-Prescription Drugs PRD	4.85	4.86	4.58	4.38	4.02	4.17	4.72
RN Pool PRD	0.08	0.13	0.22	0.38	0.59	0.71	1.03
LPN Pool PRD	0.14	0.20	0.40	0.76	0.72	1.18	1.43
CNA Pool PRD	0.23	0.33	0.61	1.07	1.00	1.65	2.33
Raw Food Expense PRD	8.27	8.44	7.90	7.84	7.82	8.08	8.37

Figure 2. Care Related and Other Operating Cost Change per Resident Day
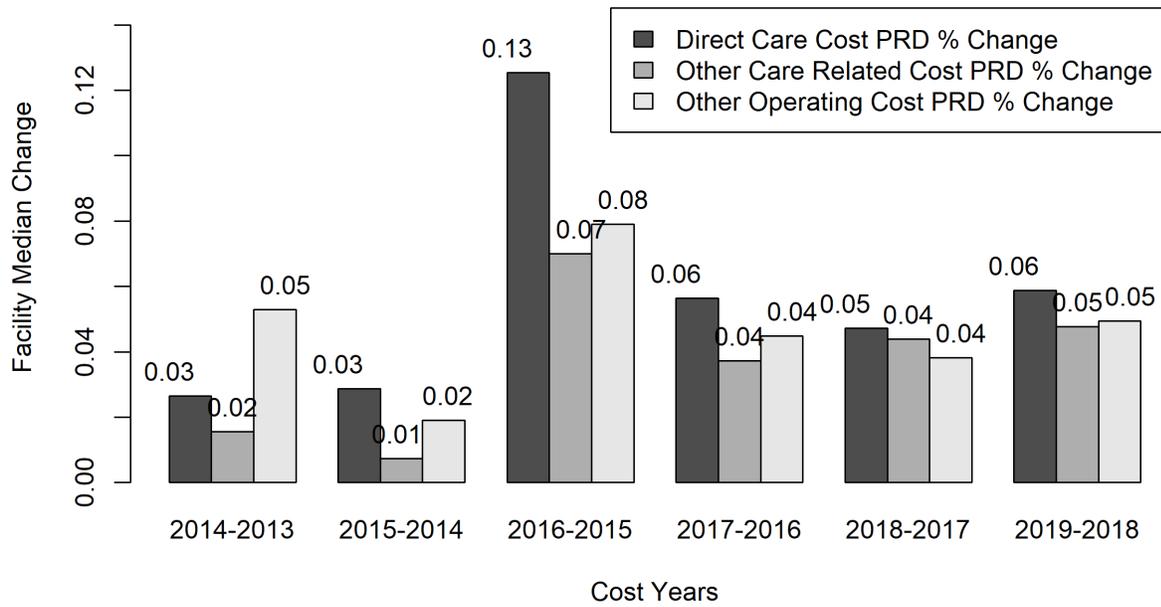
Figure 3. Direct Care Hourly Salaries
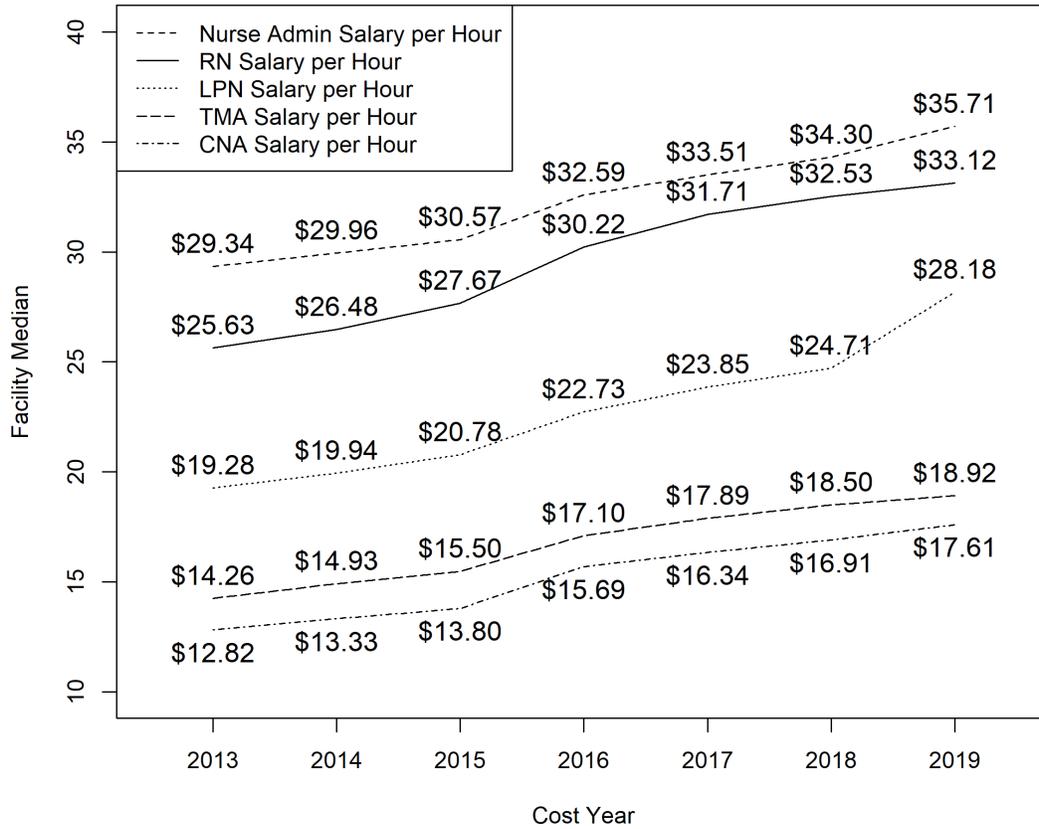
Other operating costs

Table 9 displays the annual mean costs per resident day for other operating costs as well as the major sub-categories of dietary, laundry, housekeeping, plant and maintenance, and administrative costs, along with the line item of administrative management fees. Other operating costs saw a 7% jump in 2016 and have risen fairly steadily with 4-5% annual increases since that time. Since 2015, the lowest increase in spending per resident day has come from laundry costs (10%) and the highest from administrative costs (29%). Administrative management fees have risen in line with the overall administrative costs at 30% since 2015.

Table 9. Other Operating Costs

Year	2013	2014	2015	2016	2017	2018	2019
Other Operating Cost PRD	67.16	70.64	72.13	77.39	81.13	84.65	89.22
Dietary Costs PRD	13.59	13.81	13.71	14.68	15.08	15.87	16.70
Laundry Costs PRD	3.36	3.41	3.54	3.74	3.80	3.82	3.90
Housekeeping Costs PRD	5.91	6.02	6.27	6.67	6.93	7.07	7.36
Plant & Maintenance Costs PRD	11.27	12.13	12.76	13.43	13.93	14.30	14.98

Year	2013	2014	2015	2016	2017	2018	2019
Administrative Costs PRD	26.84	28.85	28.98	31.60	33.70	35.07	37.37
Admin Management Fees PRD	6.19	6.42	6.86	7.28	7.68	8.52	8.92

Nurse and other care-related staffing

Table 10 displays staffing measures for nursing and other care related staff, including hours per resident day, staffing mix, and retention. RN hours per resident day saw a 15% increase since 2015 while LPN hours saw a corresponding 15% decrease. Overall licensed hours have decreased by 2% per resident day since 2015. The 3% increase in CNA hours PRD since 2015 was sufficient to raise total RN, LPN, and CNA hours by 1% since VBR implementation. Annual retention rates (an individual who began the year employed with a facility, ended the year employed with that facility) were declining prior to VBR implementation and generally made some, but not all of that ground back in the subsequent years. Notably, Nurse Administrator and CNA retention rates remain lower than in 2013. Figure 4 displays the relatively flat growth in hours per resident day by nursing position.

Table 10. Nurse and Other Care-Related Staffing

Cost Year	2013	2014	2015	2016	2017	2018	2019
RN Hours PRD	0.55	0.57	0.59	0.57	0.60	0.63	0.67
LPN Hours PRD	0.79	0.78	0.76	0.76	0.75	0.73	0.65
Licensed Hours PRD	1.35	1.35	1.35	1.33	1.35	1.35	1.32
Nursing Assistant Hours PRD	2.38	2.37	2.34	2.36	2.42	2.42	2.40
Total RN, LPN, and CNA Hours PRD	3.73	3.72	3.69	3.70	3.77	3.77	3.73
Total Direct Care Staff Hours PRD	4.65	4.64	4.64	4.74	4.85	4.88	4.93
% RN of total nursing Hours PRD	15%	12%	13%	12%	12%	13%	14%
% Licensed (RN & LPN) of Total Nursing HPRD	36%	36%	37%	36%	36%	36%	36%
Retention: Nursing Administrator	82%	79%	75%	74%	75%	77%	76%
Retention: RN	70%	67%	64%	67%	68%	71%	70%
Retention: LPN	74%	74%	72%	73%	73%	75%	73%
Retention: CNA	65%	63%	62%	64%	63%	64%	61%
Retention: TMA	49%	48%	50%	52%	54%	54%	52%
Retention: Social Worker	75%	77%	74%	75%	73%	74%	74%
Retention: Activities	79%	76%	79%	77%	77%	77%	75%
Retention: Mental Health Worker	0.3%	0.0%	0.0%	0.0%	0.3%	0.3%	0.3%

Figure 4. Nursing Hours PRD by Cost Year
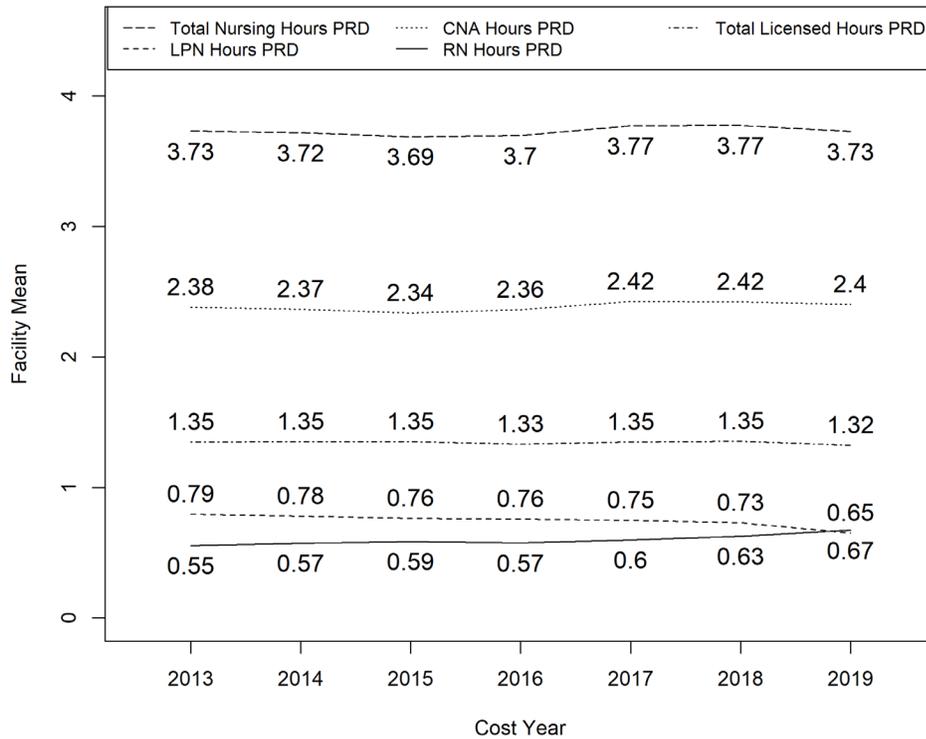
Quality measures

Table 11 displays the annual mean quality scores and measures, including quality indicator scores (out of 50 points), quality of life scores (out of 40 points), Minnesota Department of Heath scores (out of 10 points), overall direct care retention rates, acuity adjusted community discharge rates (3-30 and 31-90 day), acuity adjusted hospitalization rates (3-30 day), unadjusted hospitalization rates per 1000 resident days (31+ days). Additional variables from the CASPER (Certification and Survey Provider Enhanced Reports) data files can be found in the technical report. The notable dip inspection scores (17% drop since 2015) coincides with changes in the MDH inspection procedure, otherwise quality scores have remained fairly flat since 2015, with the exception of unadjusted hospitalization rates per 1000 residents (31+ days post admission) which saw a 10% increase in the annual mean.

Table 11. Quality Measures

Year	2013	2014	2015	2016	2017	2018	2019
Quality Indicator Quality Score	33.9	34.0	35.1	36.3	37.1	34.3	34.3
MDH Inspection Quality Score	8.4	8.9	8.3	8.3	8.1	7.6	6.9
Quality of Life Quality Score	33.1	33.1	33.1	32.7	32.3	32.6	32.4

Year	2013	2014	2015	2016	2017	2018	2019
Retention Rate	70%	69%	67%	69%	68%	70%	.
Community Discharge Rate (30 Day)	34.7%	34.2%	33.3%	35.1%	33.7%	34.7%	34.4%
Community Discharge Rate (30-90 Day)	32.5%	33.0%	33.2%	33.2%	33.9%	33.0%	32.7%
Hospitalization Rate (30 Day)	11.9%	12.1%	12.1%	12.0%	12.5%	12.4%	12.3%
Hospitalization Rate Low Risk Period per 1000 Resident Days	1.36	1.28	1.41	1.40	1.49	1.53	1.55

Subgroup Analysis Care-Related and Other Operating Costs

This section of the report gives highlights from the analysis that examined care related and other operating costs across ten sub-group variables to ascertain if relationships exist. Additional detail on how subgroups were formed is found the major variables and data sources and introduction to findings sections. The Trend Analysis Technical Report contains the full set of tables and line plots, cross sectional regression, and growth models that were fit to the full data set. Select results of note are highlighted here for brevity.

Trends in care-related cost by facility subgroups:

A table displaying annual cost year care related costs by subgroup variable and each corresponding plot can be found in the Trend Analysis Technical report. For brevity, the four subgroup variable plots that explained the most variability in care-related costs in the cross-sectional regression model are displayed and discussed here. There is strong separation between costs by 2015 Care Related Cost groups, this is to be expected given the nature of the reimbursement system. Since 2015, growth has occurred in the lower two groups (lowest 39% and middle quartiles 31%, Figure 5) faster than the facilities beginning with the highest costs (21% jump). Care related costs PRD were higher for facilities with more annual admissions per bed, but with slower cost growth since 2015 than the middle 50% subgroup (29% vs 33%, Figure 6). For location/hospital affiliation, costs are highest for hospital attached facilities and free standing Twin City Metro facilities, with growth in the mean ranging from 23% (hospital attached) to 33% (32-33% for free standing facilities outside the metro area, Figure 7). For-profit owned facilities have the lowest mean care related costs, but the same growth rate as non-profit facilities (31% vs 23%, Figure 8).

Figure 5. Care Related Costs by 2015 Care Related Spending Quartiles
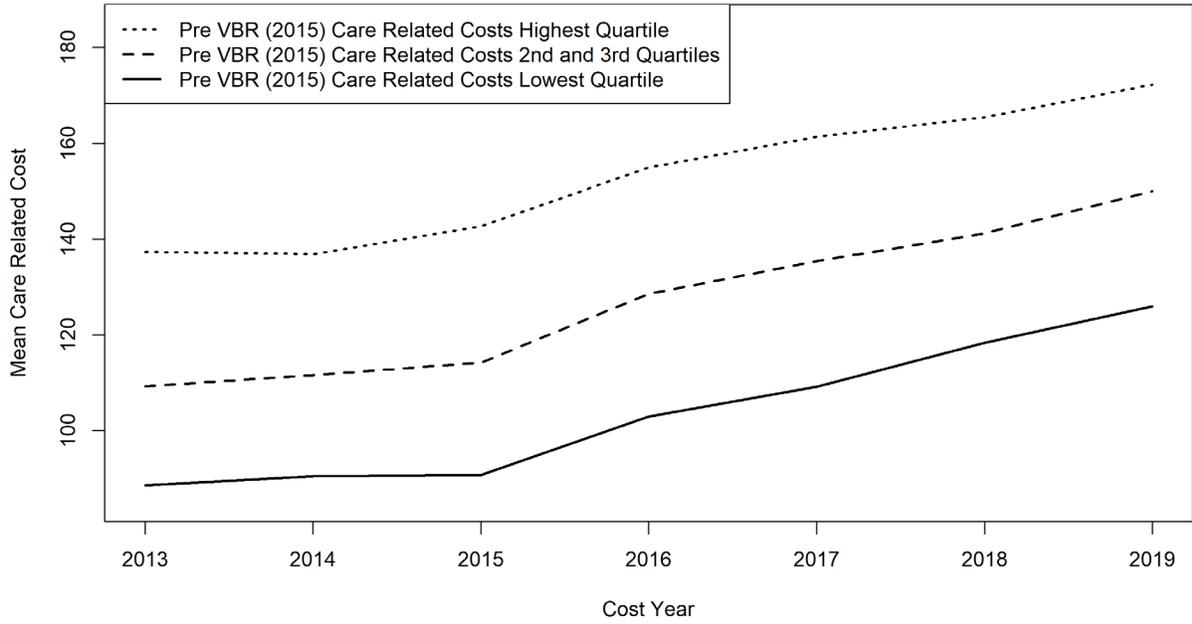
Figure 6. Care Related Costs by Annual Admits per Bed Quartile
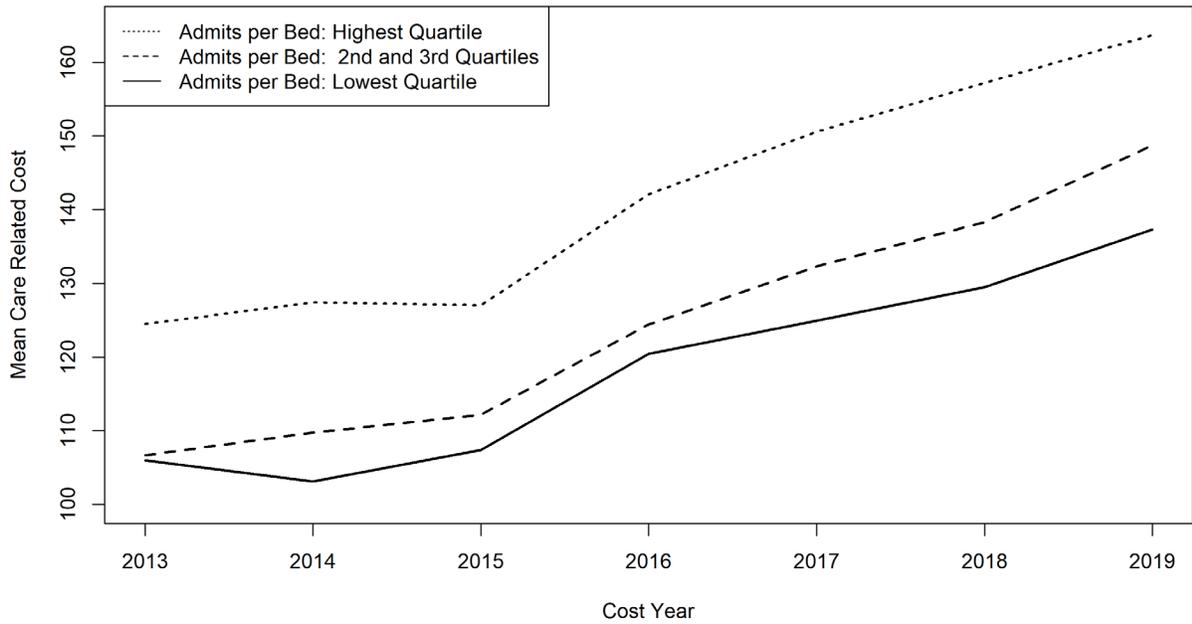
Figure 7. Care Related Costs by Location/Hospital Affiliation
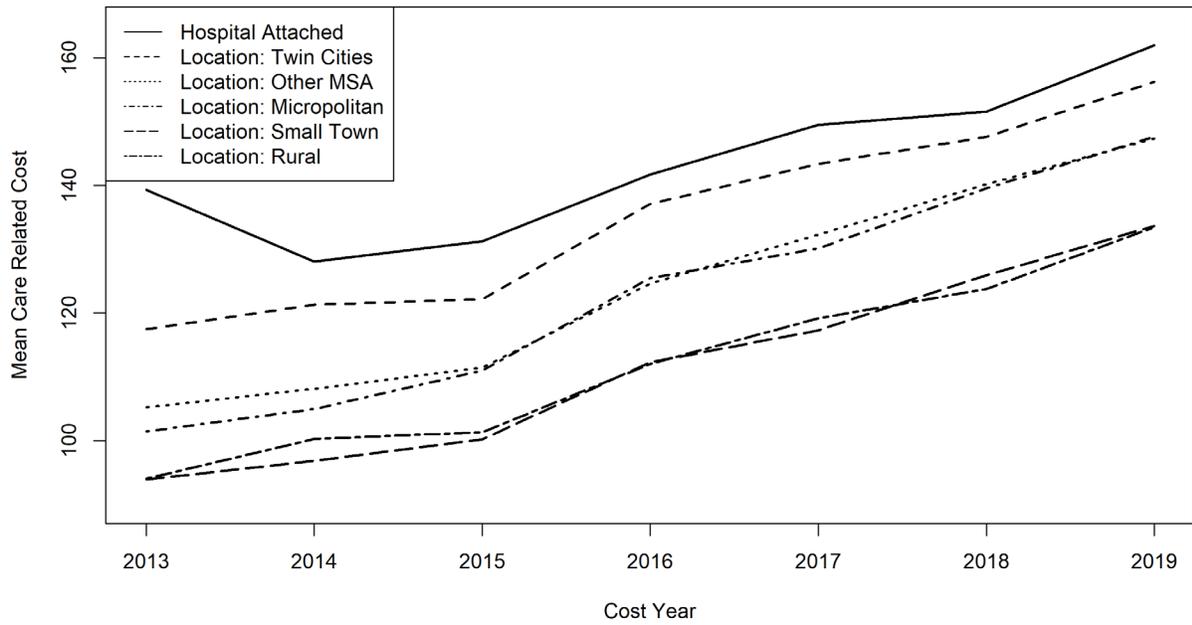
Figure 8. Care Related Costs by Ownership Type
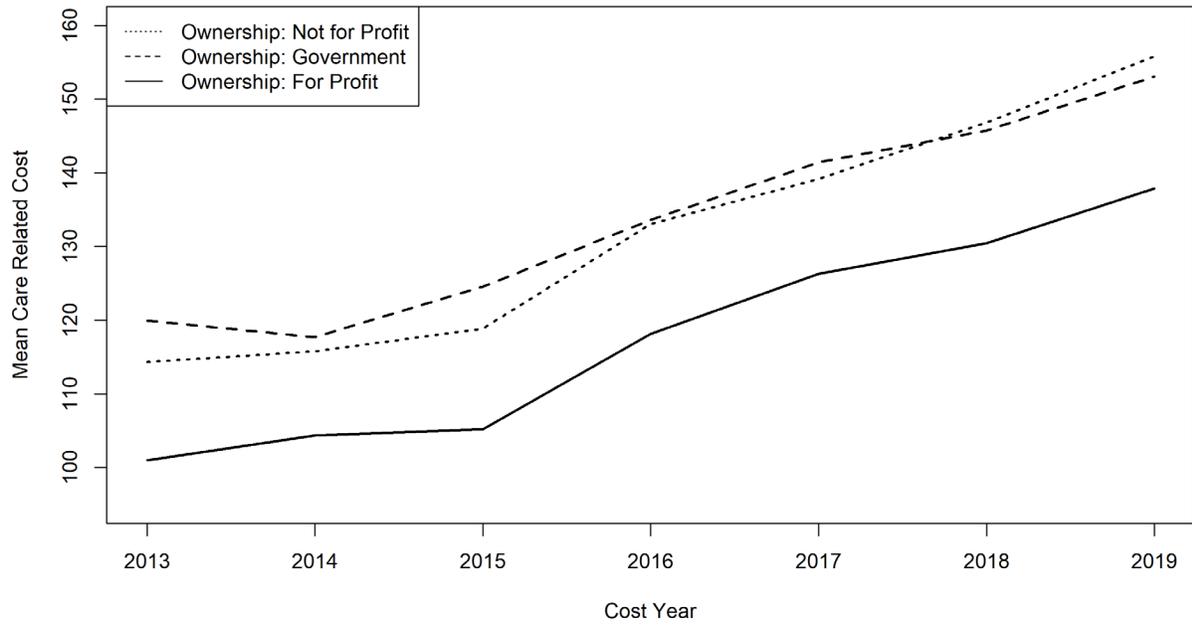
Trends in other operating cost by facility subgroups:

A table displaying annual cost year other operating costs by subgroup variable and each corresponding plot can be found in the Trend Analysis Technical report. For brevity, the three subgroup variable plots that explained the most variability in care-related costs in the cross-sectional regression model are displayed and discussed here. For location/hospital affiliation, costs are highest for hospital attached facilities, but growth in the median is fairly similar across location/hospital affiliation (20-26% since 2015, Figure 9). The Twin City Metro area has seen the slowest growth at a 20% increase since 2015. There is strong separation between costs by 2015 care-related cost groups. Since 2015, growth has occurred in the lower two groups (lowest and middle quartiles, Figure 10) at the same rate (26% jump) while growth has been slower in the facilities beginning with the highest costs (16% jump). Lowest occupancy rates saw the highest costs, but the highest occupancy rates saw the slowest growth (19% vs 20-22%, Figure 11).

Figure 9. Other Operating Costs PRD by Location/Hospital Affiliation
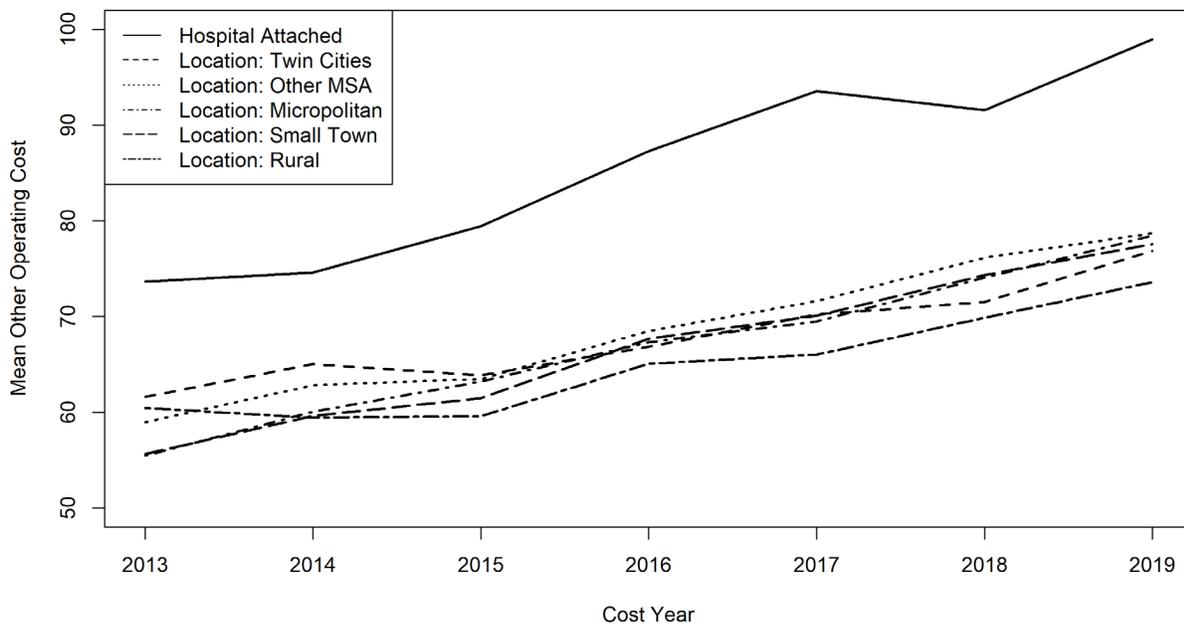
Figure 10. Other Operating Costs PRD by 2015 Care Related Cost Quartile
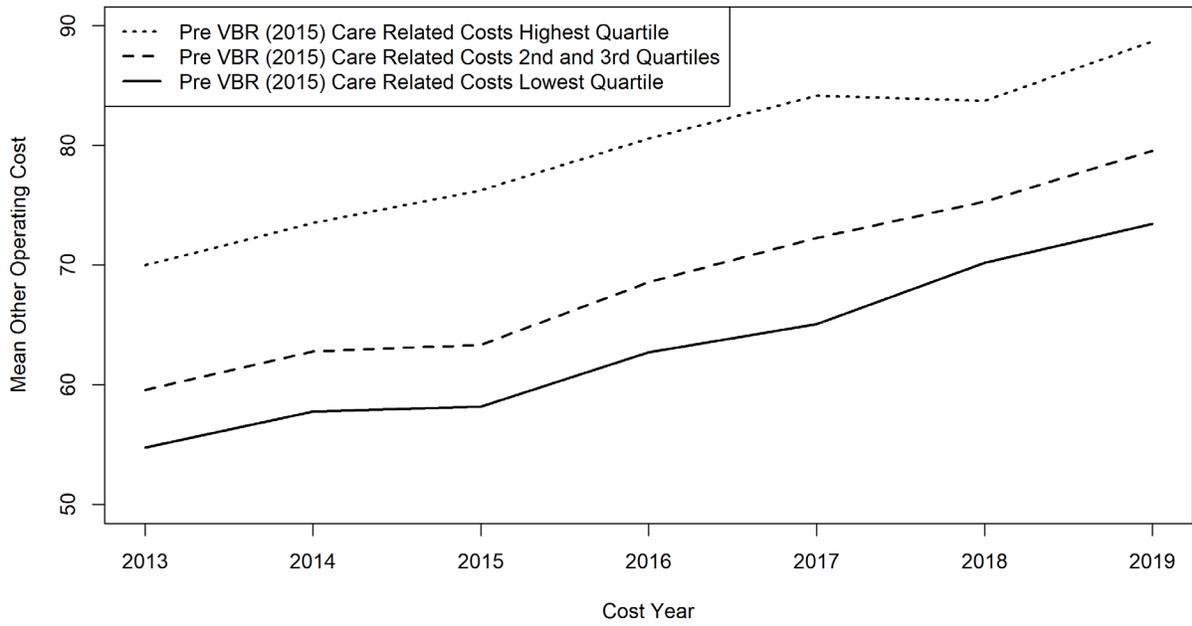
Figure 11. Other Operating Costs PRD by Occupancy Rate Quartile
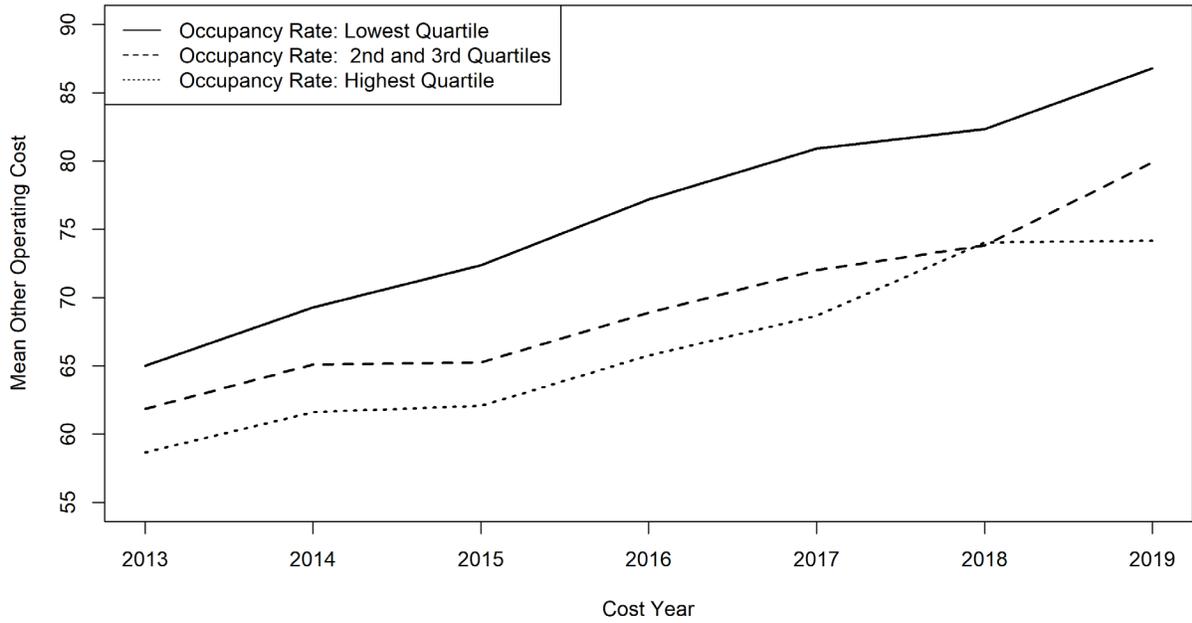
Cross Sectional Models for Care-Related and Other Operating Costs

The purpose of these models are to test for general relationships between the sub-groups and the cost measures and to illustrate relative levels of importance of the sub-group variables in explaining variability in costs. Both models use the 2018 audited data, the most recent available audited data at the time of the analysis. Although displayed by quartile in the tables and figures, in the modeling, continuous variables are treated as continuous independent variables. Table 12 displays the model with care related costs PRD as the outcome. Each row of the table gives the independent variable (with the top row being the intercept). The second column gives the estimated regression coefficient and the third column the P-Value (with a value < 0.05 indicating statistical significance). The fourth column multiplies the regression coefficient by one standard deviation of independent variable for continuous variables (see Table 11 in the Trend Analysis Technical Report) and gives a more comparable effect size among the continuous variables. Type 1 SS (Sum of Squares) and Type 3 SS help understand the relative importance of each independent variable in explaining the differences among facilities in terms of cost (variability in the dependent variable). Type 1 is the amount of variability explained by the independent variable alone, and Type 3 is the amount of variability explained by the independent variable after all other independent variables are taken into account (unique variability explained).

For the care-related costs model, the independent variables explain 72.9% of the variability in costs, most of which can be explained by the facilities costs prior to VBR (67%). Additionally, 29% of the total variability is unique to those pre-VBR care related costs. Location/hospital attachment, ownership type, annual admits per bed, number of beds, and revenue sources were also correlated with care-related costs (6-23% Type 1 SS), but much of this correlation overlapped with other factors (0-1.3% Type III SS).

After controlling for other effects only pre-VBR costs, ownership type, and occupancy were statistically significantly correlated with care-related costs in 2018. Pre-VBR costs had an estimated coefficient of 0.8 which indicates that for every additional 2015 care related cost dollar, the 2018 figure was estimated to have an additional $0.80 (above and beyond the $69.11 intercept). The standard deviation for 2015 care related costs was $21.15, which means that facilities one standard deviation above the median in costs in 2015 are estimated to have an additional $16.86 more in costs than the median in 2018. The strong relationship between 2015 care costs and 2018 care costs underpins the impact of initial spending on future spending in the current system. The fact that the estimate is under a 1.00 (less than a dollar) suggests that the gap between initial lower and higher spenders is decreasing, after other factors are considered. Notably, for-profit owned facilities are estimated to spend $7.92 less per resident on care-related costs in 2018 than non-profit owned facilities, after accounting for other factors. Occupancy rate also was significantly negatively correlated with care related costs, but like ownership type, did not account for much of the cost variability. Occupancy rate is on a percentage scale, for interpretation purposes, a one standard deviation change in occupancy rate (increase of 9%) is

estimated to correspond to a $2.63 per resident day decrease in care-related costs, likely a function of efficiency (spreading costs over more residents).

Table 13 displays the results for the 2018 cross sectional model with other operating costs as the response. The same set of independent variables are used for this model as in the care-related cost model. The total variability in other operating cost explained by the model is 38.3%, substantially less than the care-related model, but still enough to represent some substantive relationships. Care related costs in 2015 (a general measure of spending), location/hospital affiliation, and occupancy rate are the three most important independent variables in terms of amount of variability explained (Type 1/3 sums of squares). Facility size (number of beds) and resident volume (annual admissions per bed) are also statistically significantly related to other operating costs. In terms of practical impact, hospital attached facilities average much higher other operating costs than free standing facilities generally ($15.52 per resident day higher than rural free standing, more specifically), which is likely due to the way in which costs are allocated between the hospital and the attached skilled nursing facility. Those facilities which spent more on care-related costs in 2015 by one SD ($21.15) had an estimated increase in 2018 other operating costs PRD of $5.35 after controlling for other factors. This underscores the idea that facility spending in one area is correlated with spending amounts in other areas. For occupancy rates a one SD increase in occupancy (9%) leads to an estimated drop in other operating cost PRD of $6.05, likely due to diminishing increase in costs per additional resident. Larger facilities (number of beds) tend to have lower costs such that a one SD increase in number of beds (45.68 beds) is related to a $2.40 drop in other operating costs PRD. However, an increase in patient volume (annual admits per bed) had a positive relationship, such that a one SD increase in admits per bed (1.52) is related to a $2.15 increase in other operating costs PRD.

Table 12. 2018 Cross Sectional Model of Care Related Costs

	Coefficient	P-Value	STD Impact	Type 1 SS	Type 3 SS
Intercept	69.11	<.0001			
2015 Care Related Cost	0.80	<.0001	16.86	67%	29%
Free Standing: Twin City MSA	6.79	0.0781		12%	0.6%
Free Standing: Other Metro MSA	5.56	0.1132			
Free Standing: Micropolitan	5.02	0.1903			
Hospital Attached	1.86	0.6379			
Free Standing: Small Town	1.67	0.6628			
Baseline: Free Standing Rural	0.00	-			
Baseline: Non-Profit Ownership	0.00	-		11%	1.3%
Ownership: Government	-2.76	0.2928			

	Coefficient	P-Value	STD Impact	Type 1 SS	Type 3 SS
Ownership: For Profit	-7.92	0.0002			
Change of Ownership	0.35	0.8712		1.2%	0.0%
Number of Beds	0.01	0.4227	0.65	8%	0.1%
Annual Admits per Bed	1.17	0.045	1.77	23%	0.3%
Occupancy Rate	-28.20	0.0004	-2.63	0.1%	1.1%
% of Annual Revenue from Medicaid	-1.41	0.8272	-0.25	6%	0.0%
% of Annual Revenue from Medicare	3.22	0.5593	0.45	6%	0.0%
Occupancy Rate	-28.20	0.0004	-2.63	0.1%	1.1%

STD Impact is the estimated marginal impact on care related costs for a one standard deviation increase in the independent variable (given only for continuous variables). Type I SS is the amount of variability in Care Related Costs explained by the variation in the independent variable alone. Type III SS is the amount of variability in Care Related Costs additionally explained by the variation in the independent variable given all other variables were already in the model (variability not yet explained by all other variables). Total variation in Care Related Costs explained by the model (R^2) is 72.9%.

Table 13. 2018 Cross Sectional Model of Other Operating Costs

	Coefficient	P-Value	STD Impact	Type 1 SS	Type 3 SS
Intercept	95.34	<.0001			
2015 Care Related Cost	0.25	<.0001	5.35	12%	5%
Hospital Attached	15.52	0.0005		14%	6%
Free Standing: Small Town	4.04	0.3477			
Free Standing: Other Metro MSA	2.56	0.5154			
Free Standing: Micropolitan	0.79	0.8547			
Baseline: Free Standing Rural	0.00	-			
Free Standing: Twin City MSA	-1.02	0.8124			
Baseline: Non-Profit Ownership	0.00	-		1.6%	1.4%
Ownership: For Profit	-3.73	0.1097			
Ownership: Government	-6.85	0.0203			
Change of Ownership	-0.92	0.7		0.0%	0.0%
Number of Beds	-0.05	0.0085	-2.40	1.6%	1.3%
Annual Admits per Bed	1.41	0.0302	2.15	1.7%	0.9%
Occupancy Rate	-64.73	<.0001	-6.05	7.5%	10%
% of Annual Revenue from Medicaid	10.87	0.1345	1.92	0.7%	0.4%

	Coefficient	P-Value	STD Impact	Type 1 SS	Type 3 SS
% of Annual Revenue from Medicare	7.63	0.2173	1.08	0.6%	0.3%
% of Minority Race/Ethnicity Resident Days	-18.00	0.1341	-1.67	3.4%	0.4%

STD Impact is the estimated marginal impact on care related costs for a one standard deviation increase in the independent variable (given only for continuous variables). Type I SS is the amount of variability in Other Operating Costs explained by the variation in the independent variable alone. Type III SS is the amount of variability in Other Operating Costs additionally explained by the variation in the independent variable given all other variables were already in the model (variability not yet explained by all other variables). Total variation in Other Operating Costs explained by the model (R^2) is 38.3%.

Growth Models for Care-Related and Other Operating Costs

This section describes the results of growth models fitting the same independent and response variables (care-related and other operating costs) as in the cross sectional models. Growth models are fit across time (longitudinal) to test for changes in the relationship between variables. Both models were fit using the same methodology using data from 2013-2019. Full models were fit using an intercept for years when VBR was in effect (2016-2019) and interactions between each independent variable and that term to test for changes in relationship (change in slope) due to VBR. Interaction terms that were not statistically significant in the full model (p-value > 0.05) were removed to avoid over fitting.

Table 14 displays the results of both growth models. Columns 2 and 3 related to the model with care-related costs PRD as the outcome and columns 4 and 5 are for the model with other operating costs PRD as the outcome (dependent variable). The number given are the estimated regression coefficient which have the same interpretation as in linear regression, the marginal impact on the response for a unit change in the independent variable. Coefficients in parentheses are negative, and bolded terms are statistically significantly different than 0 (P-value < 0.05). The VBR Effect columns are of most interest. The row titled 'VBR Years (2016-2019)' is an intercept term which indicates the jump in the response related to the implementation of VBR. Remaining terms in the column are the modification (interaction terms) to the row effect associated with the implementation of VBR. For example, care-related costs PRD jumped by an estimated $19.43 and other operating costs PRD jumped by an estimated $11.16 when VBR was implemented, after controlling for the other factors. Spending on care related costs PRD increased for free-standing metro facilities by an estimated $4.81 PRD more than rural facilities during the, and by an estimated $7.96 more than hospital attached facilities. Non-Profit facilities spent significantly more than For-Profit or Government owned facilities during the VBR period ($3.23 and $3.32 respectively), which is in addition to the $3.22 gap between Non-Profit and For-Profit facilities that existed prior to VBR. The negative relationship between occupancy rate and minority race/ethnicity resident days increased during the VBR period ($1.26 less for a standard deviation (SD) increase in occupancy and $1.47 less for a SD increase in minority race/ethnicity resident day percentage).

For other operating costs PRD, only relationships with occupancy and minority resident days were estimated to have significantly changed during the VBR period. For occupancy, a one SD change in occupancy was estimated to add an additional drop in other operating costs PRD of $0.96 and for minority resident day percentage of $1.98, a threefold change from the period just before VBR implementation (2013-2015).

Table 14. Growth Model Results for Care Related and Other Operating Costs

	Care Related Cost		Other Operating Cost	
	Pre-VBR Effect[&]	VBR Effect*	Pre-VBR Effect[&]	VBR Effect*
Base Value[#]	42.35		67.91	
Year	**4.96**		**2.56**	
VBR Years (2016-2019)		**19.43**		**11.16**
2015 Care Related Cost	**0.81**		**0.31**	
Hospital Attached	**9.59**	(3.15)	**5.79**	
Free Standing: Twin City MSA	4.52	**4.81**	1.35	
Free Standing: Other Metro MSA	0.52	2.03	(0.44)	
Free Standing: Micropolitan	(0.81)	3.75	(1.64)	
Free Standing: Small Town	(0.74)	0.39	(0.14)	
Baseline: Free Standing Rural	0	-		
Ownership: For Profit	**(3.22)**	**(3.23)**	**(5.12)**	
Ownership: Government	0.40	**(3.32)**	(2.49)	
Baseline: Non-Profit Ownership	0	-		
Change of Ownership	(0.80)		1.97	
Number of Beds	**0.02**		**(0.08)**	
Annual Admits per Bed	**0.77**		**0.72**	
Occupancy Rate	**(43.46)**	**(14.01)**	**(49.20)**	**(10.69)**
% of Annual Revenue from Medicaid	3.79		5.20	
% of Annual Revenue from Medicare	3.73		3.18	
% of Minority Race/Ethnicity Resident Days	**(21.70)**	**(16.38)**	11.02	**(22.00)**

Bolded figures indicate statistical significance at the 5% level. [&]Regression coefficients. *Interaction term with VBR years indicator. [#]Regression intercept.

Subgroup Analysis – Quality of Care

This section of the report gives highlights from the analysis that examined eight quality metrics across ten sub-group variables to ascertain if relationships exist. Additional detail on how subgroups were formed is found the major variables and data sources and introduction to findings sections. The Trend Analysis Technical Report contains the full set of tables and line plots, cross sectional regression, and growth models that were fit to the full data set. Select results of note are highlighted here for brevity. Eight quality metrics were examined as response variables: quality indicator (QI) scores (out of 50 points, derived from MDS clinical measures), quality of life (QOL) scores (out of 40 points, derived from resident and family surveys), Minnesota Department of Heath (MDH) scores (out of 10 points, derived from MDS inspection data), overall direct care retention rates (referred to simply as retention rates), acuity adjusted community discharge rates (CD30: 3-30 day and CD90: 31-90 day), acuity adjusted hospitalization rates (HOSP30: 3-30 day), unadjusted hospitalization rates per 1000 resident days (HOSP LRP: 31+ days).

Trends in quality metrics by facility subgroups

For brevity, only subgroup variable plots that explained the most variability in the quality metric cross-sectional regression model are displayed and discussed here. Plots are organized by sub-group variable. Notably, no subgroup variable was significantly related to QI scores after controlling for other subgroup variables.

Pre-VBR care-related cost

Figure 12 and Figure 13 display the differentiability in CD30 and HOSP30 rates across 2015 care related spending groups over time. The significant relationship between initial care related spending and community discharge appears fairly stable, while the difference in hospitalization rates appears to be unique to 2018 (unstable result).

Figure 12. Adjusted Community Discharge Rate (3-30 Day) by 2015 Care Related Cost Quartiles
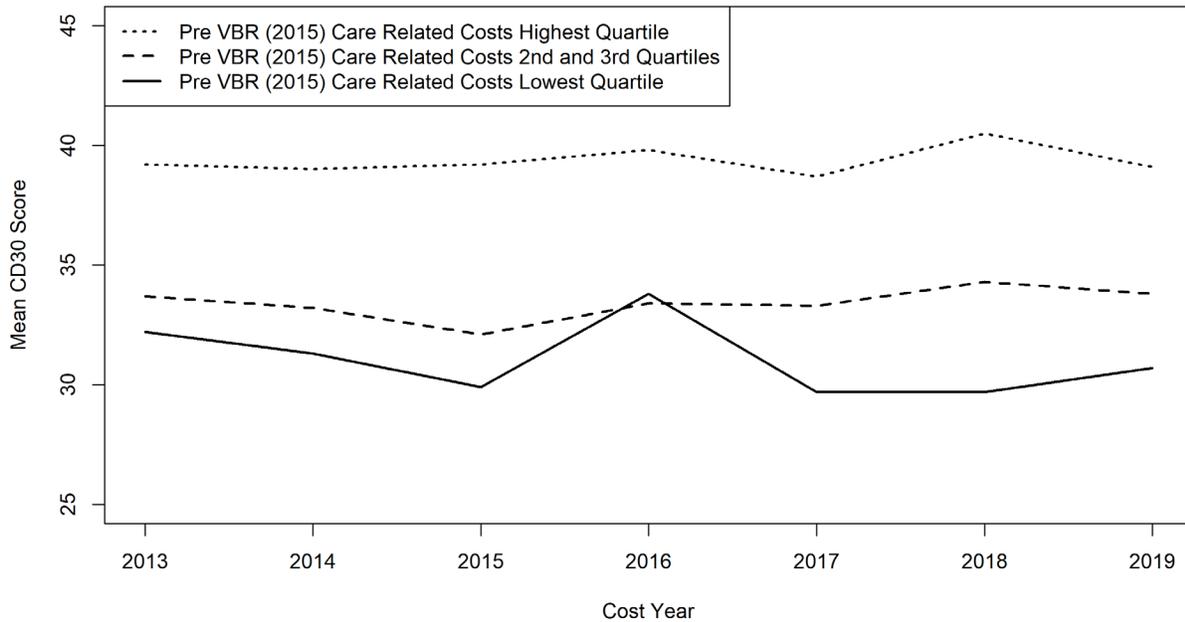
Figure 13. Adjusted Hospitalization Rates (3-30 Day) by 2015 Care Related Spending
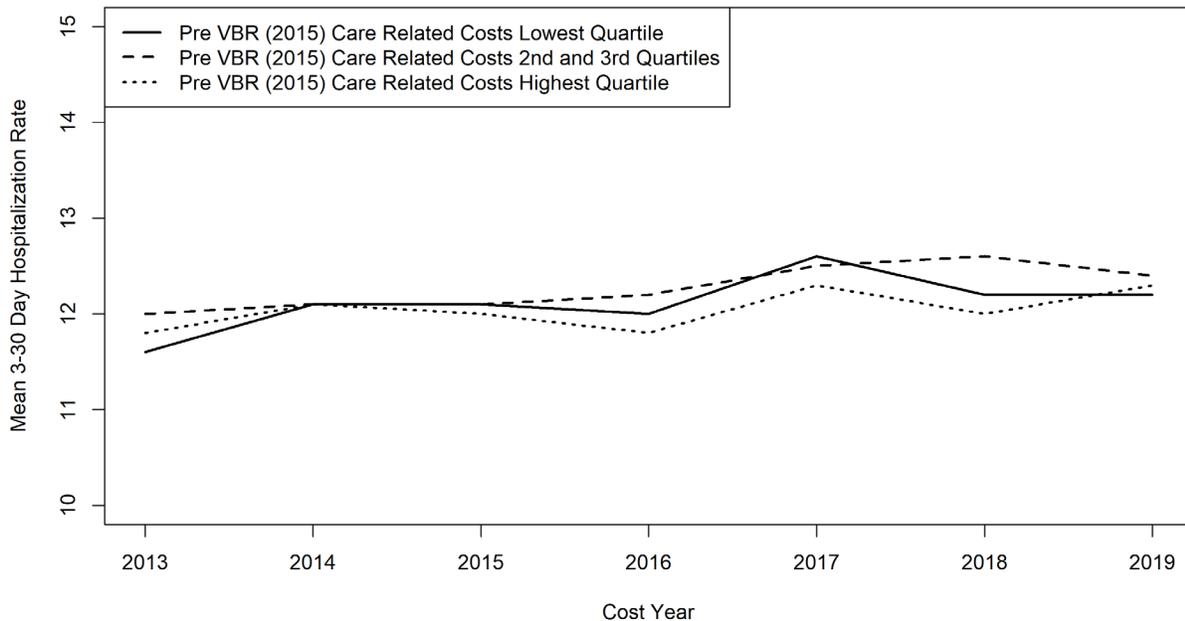
Geographic Location/Hospital Affiliation

Figure 14 indicates that retention rates of direct care staff is highest for hospital attached facilities and lowest for MSAs outside of the Twin City area. CD30 rates are consistently highest for hospital attached facilities (Figure 15). Figure 16 shows hospital attached facilities have the lowest HOSP LRP rate, while free standing metro facilities have been creeping up since 2016.

Figure 14. Direct Care Staff Retention Percentage by Location/Hospital Affiliation
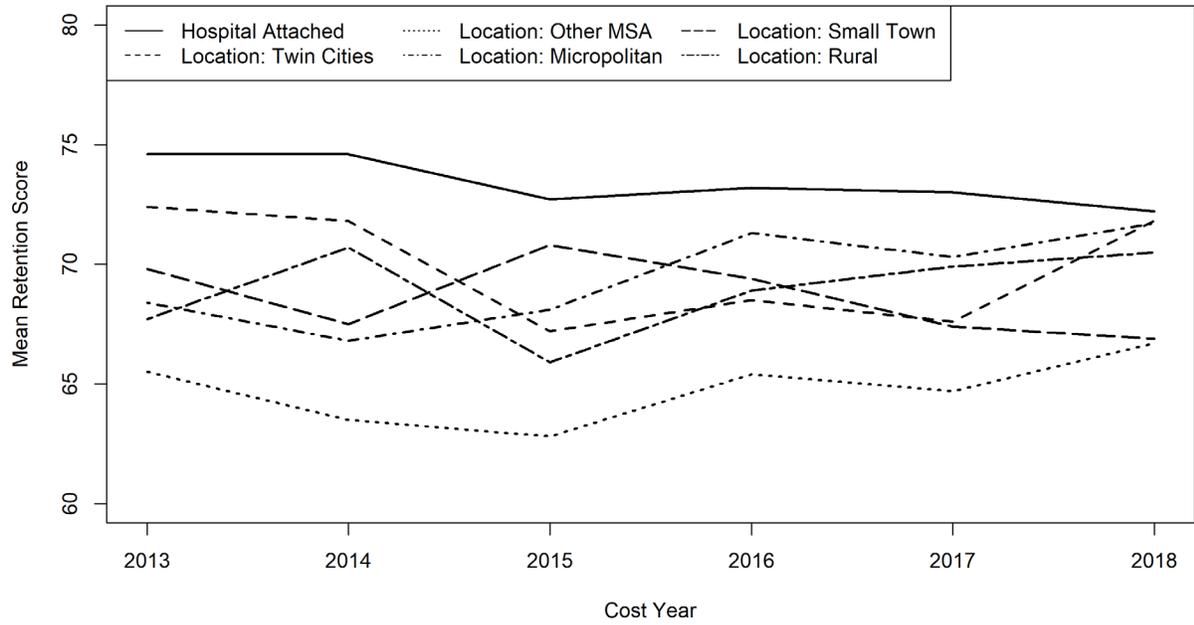
Figure 15. Adjusted Community Discharge Rate (3-30 Day) by Location/Hospital Affiliation
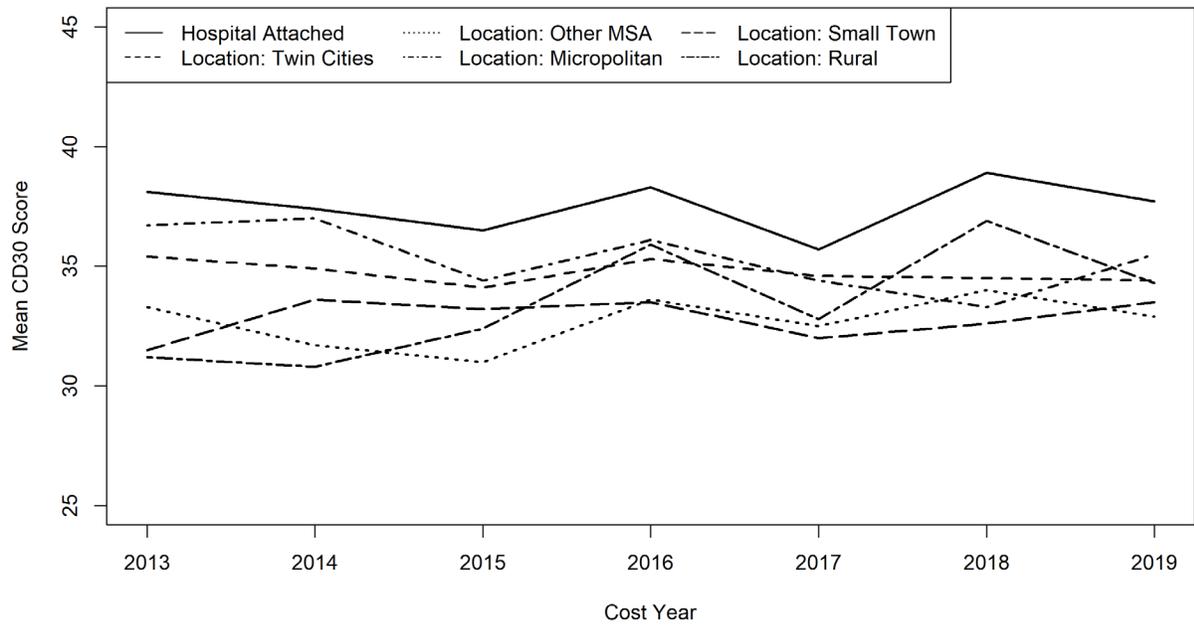
Figure 16. Hospitalizations per 1000 Resident Days (Low Risk Period) by Location/Hospital Affiliation
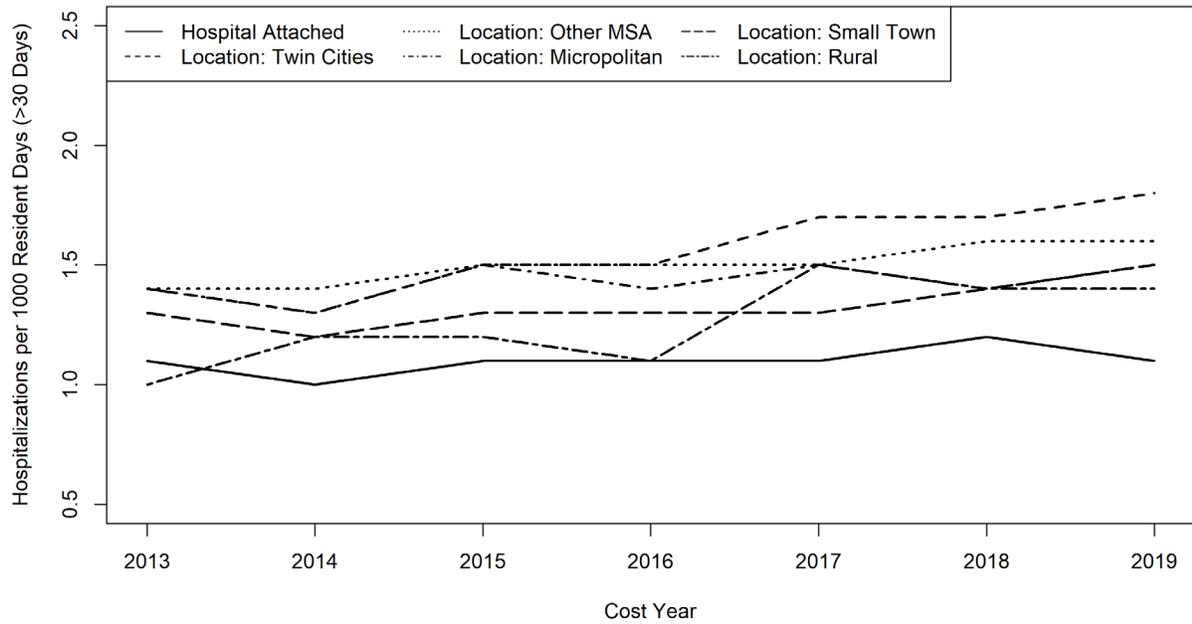
Ownership type

Figure 17 shows that quality of life scores are consistently lower in for-profit owned facilities. This was the only significant relationship between ownership type and quality metrics after controlling for other subgroup variables.

Figure 17. Quality of Life Score by Ownership Type
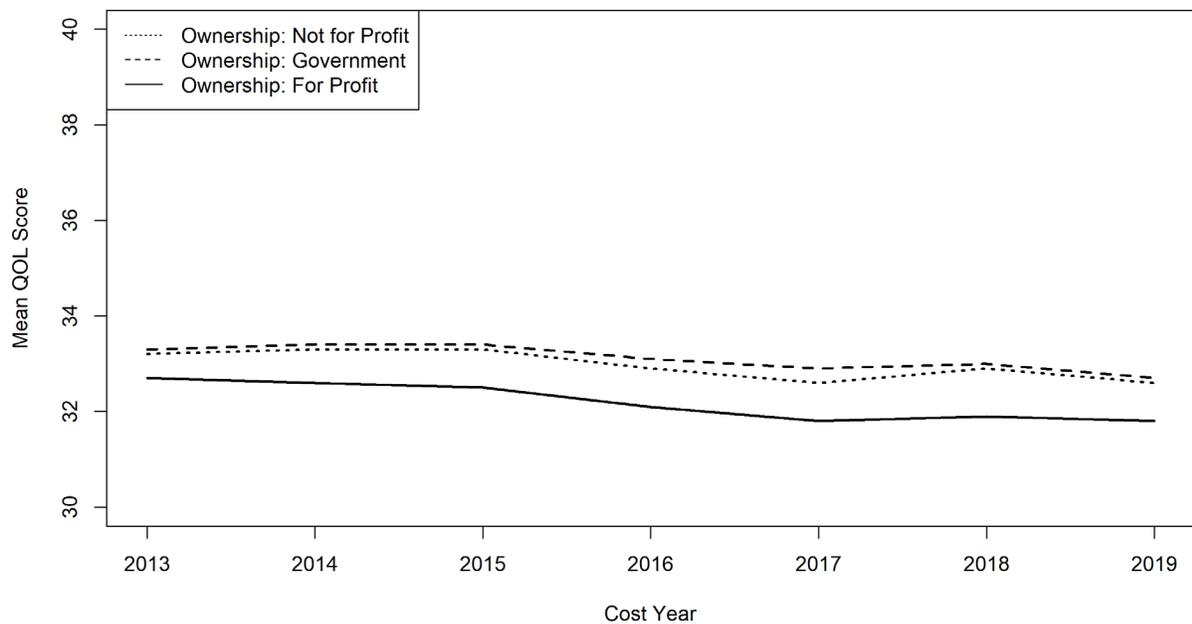
Change in ownership

Facilities that changed ownership during the period had notably worse MDH inspection scores, the gap which grew larger during the VBR period (when most ownership changes occurred), displayed in

Figure 18. These facilities also had much lower CD30 scores (Figure 19). Both of these differences remain significant after controlling for other subgroup effects. A separate technical report describes differences between facilities that changed ownership (CHOW) and those that had a single owner during the period. Notable highlights from that report are included here for convenience:

- CHOW facilities perform worse relative to facilities with constant ownership on every quality related metric (before controlling for any other subgroup effect).
- At least some of the gap between groups is due to a selection effect as future CHOWs tend to be performing worse on quality metrics in each year than current and past CHOWs.
- For those facilities that have accumulated data following the CHOW event, there is a visually discernable downwards trend in quality for a majority of facilities.
- CHOW facilities appear to have reduced spending on Laundry and dental benefits, while increasing spending more slowly on medical and scholarship benefits, and increasing administrative management fees at a higher rate.
- The gap in quality scores between CHOW and non-CHOW facilities increases after a CHOW event.

Figure 18. Minnesota Department of Health Inspection Score by Change in Ownership over Data Period
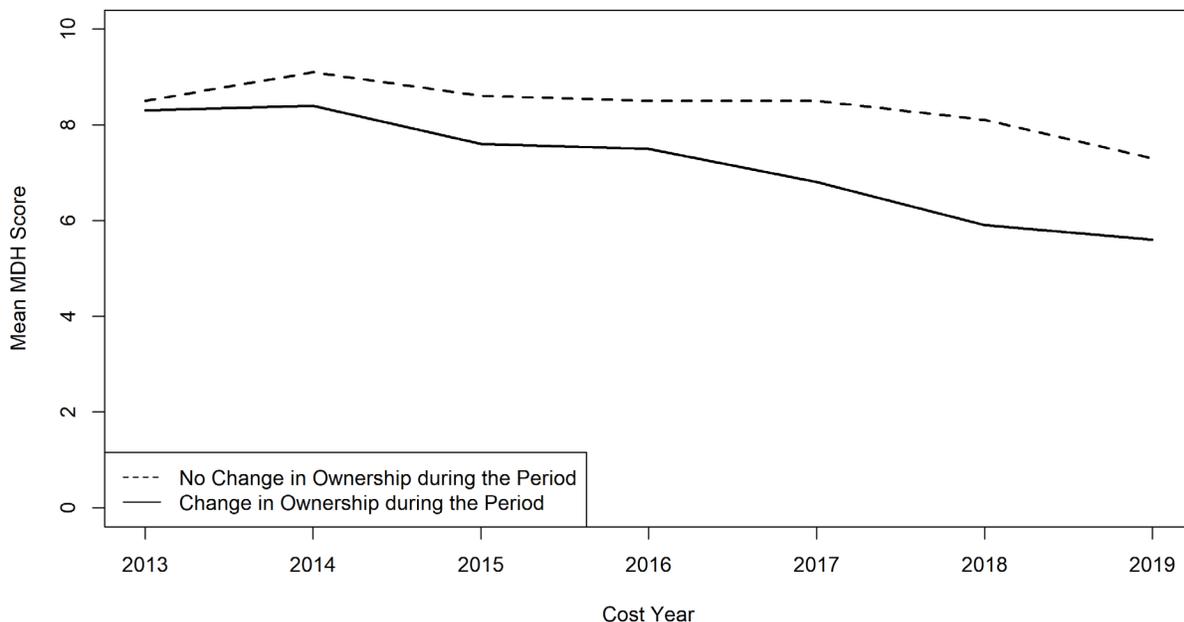
Figure 19. Adjusted Community Discharge Rate (3-30 Day) by Change in Ownership over Data Period
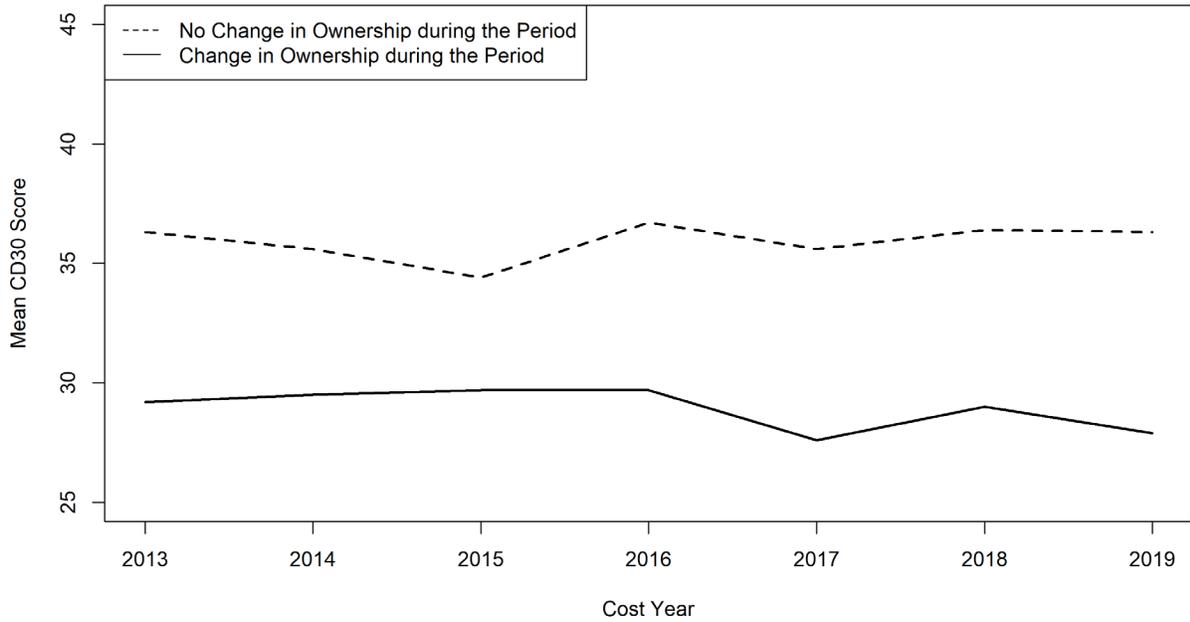
Number of Beds

Quality of life scores tended to be slightly higher for facilities with less beds (Figure 20). Retention and CD30 rates tended to be higher for larger facilities, however this effect was not significant after controlling for other factors.

Figure 20. Quality of Life Score by Number of Beds Quartile
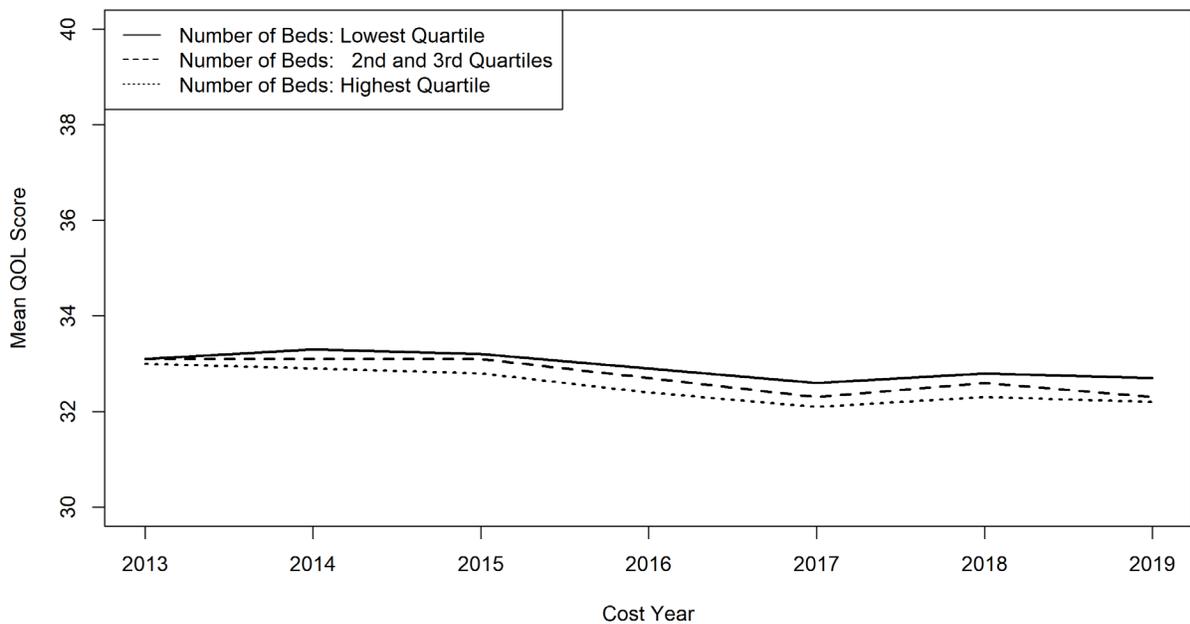
Number of Admissions per Bed

Direct care staff retention is highest for lower volume facilities (Figure 21) and as might be expected, CD30 rates are highest for high volume facilities (Figure 22).

Figure 21. Direct Care Staff Retention Percentage by Annual Admits per Bed Quartile
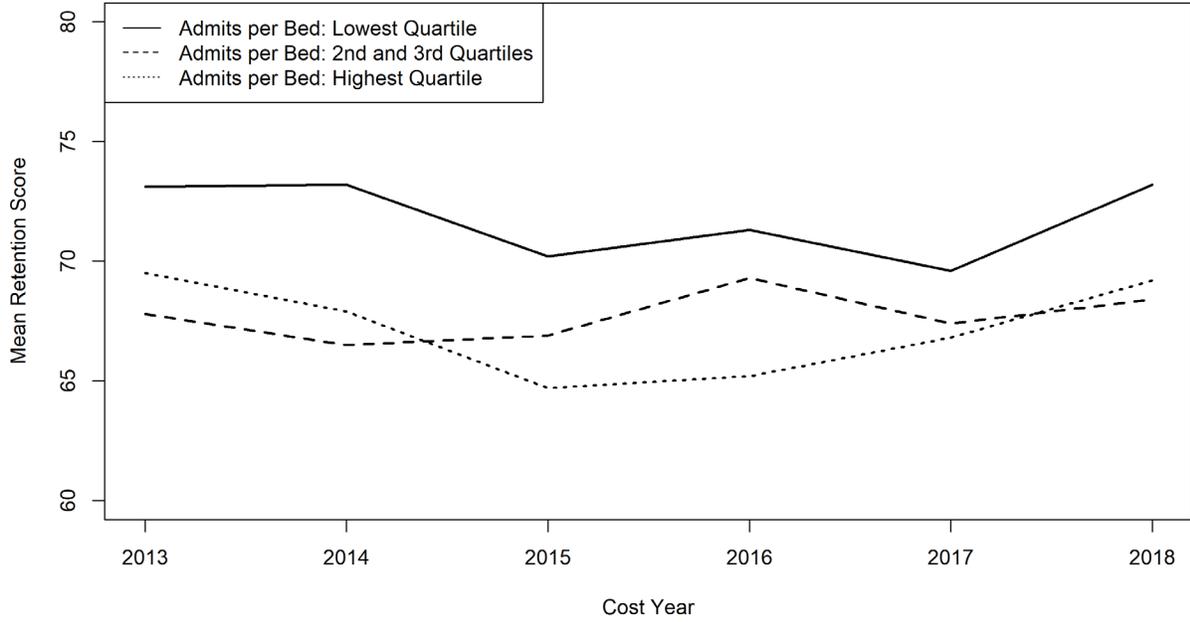
Figure 22. Adjusted Community Discharge Rate (3-30 Day) by Number of Beds Quartile
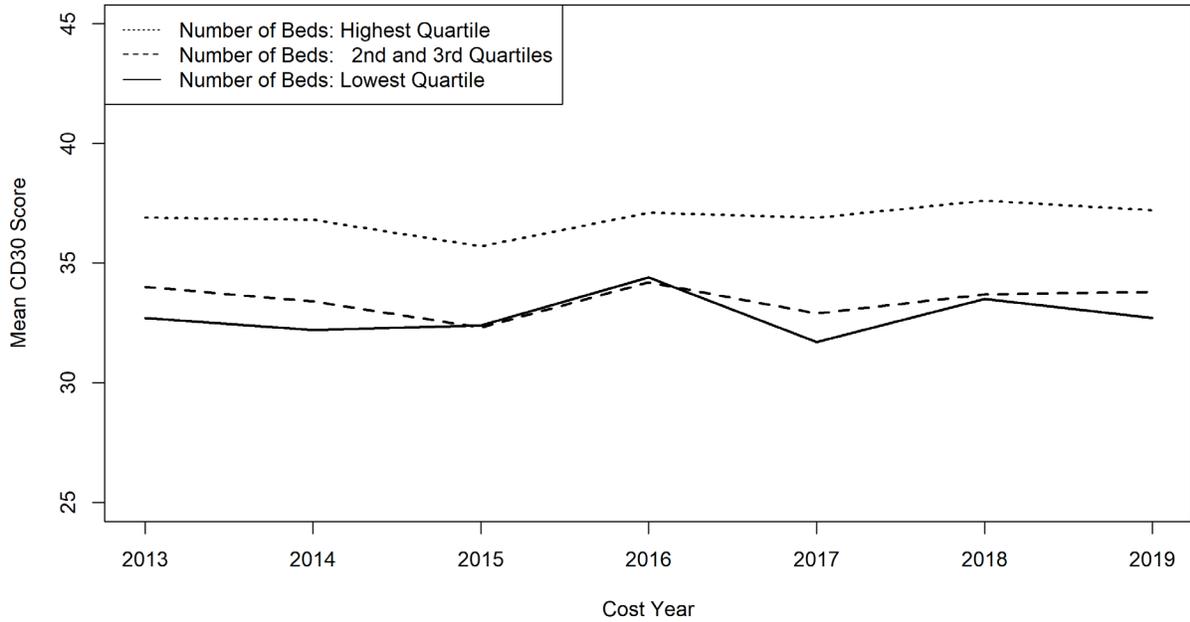
Occupancy Levels

Higher occupancy facilities tend to have higher quality of life scores (Figure 23), better retention rates (Figure 24), and lower hospitalization rates during the low risk period (Figure 25).

Figure 23. Quality of Life Score by Occupancy Rate Quartile
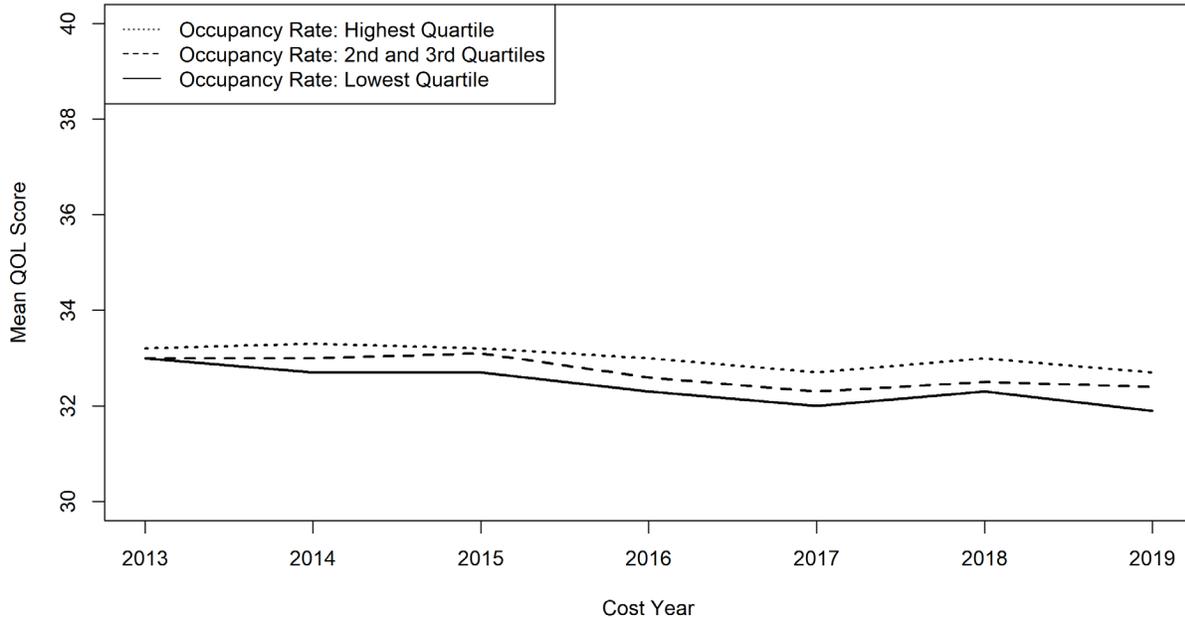
Figure 24. Direct Care Staff Retention Percentage by Occupancy Rate Quartile
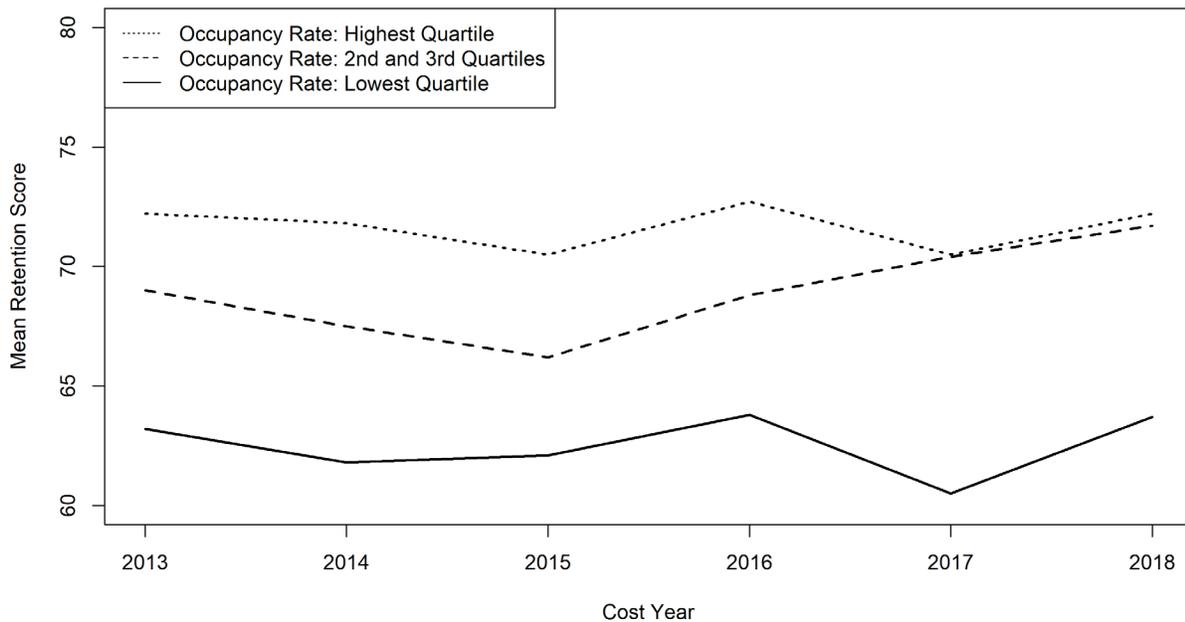
Figure 25. Hospitalizations per 1000 Resident Days (Low Risk Period) by Occupancy Rate Quartile
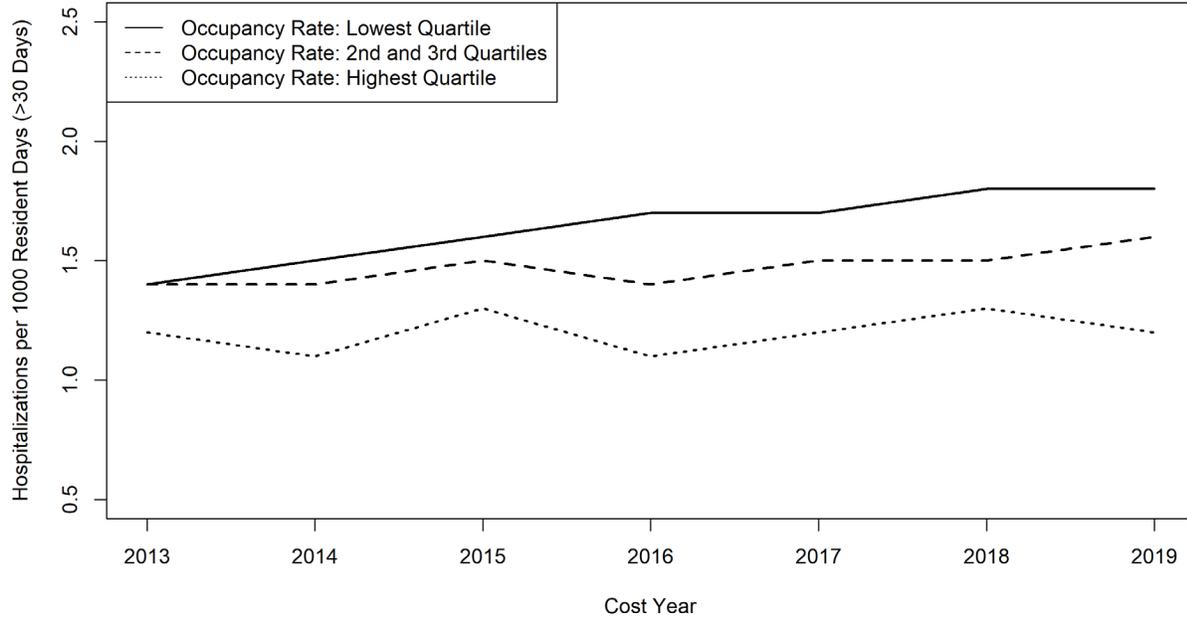
Percentage of Total Revenue from Medicaid

Facilities in the highest quartile for percentage of total revenue from Medicaid tended to have higher hospitalization rates during the low risk period (

Figure 26).

Figure 26. Hospitalizations per 1000 Resident Days (Low Risk Period) by Percentage of Revenue from Medicaid Quartile
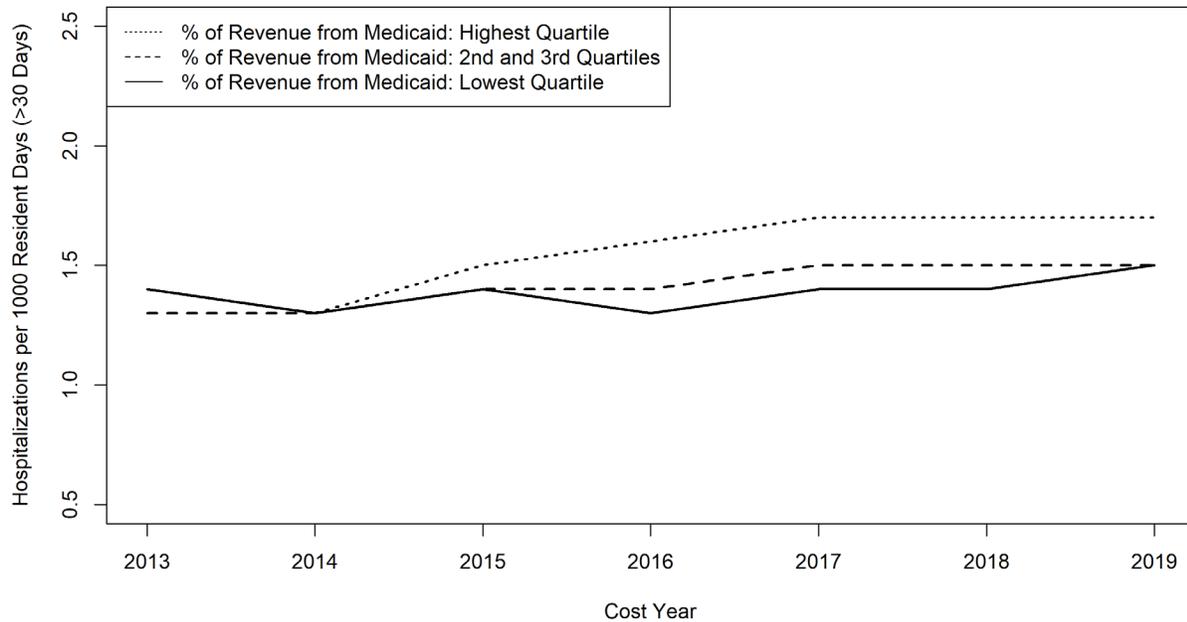
Percentage of Total Revenue from Medicare

Subgroups based on percentage of revenue from Medicare have decent separation in terms of hospitalization during the low risk period, higher revenue from Medicare is correlated with higher rates of hospitalization (
Figure 27). Taken together with the similar relationship for Medicaid revenue, facilities with higher proportions of Private Pay and Other Revenue sources tend to perform best on the low risk period hospitalization metric.

Figure 27. Hospitalizations per 1000 Resident Days (Low Risk Period) by Percentage of Revenue from Medicare Quartile
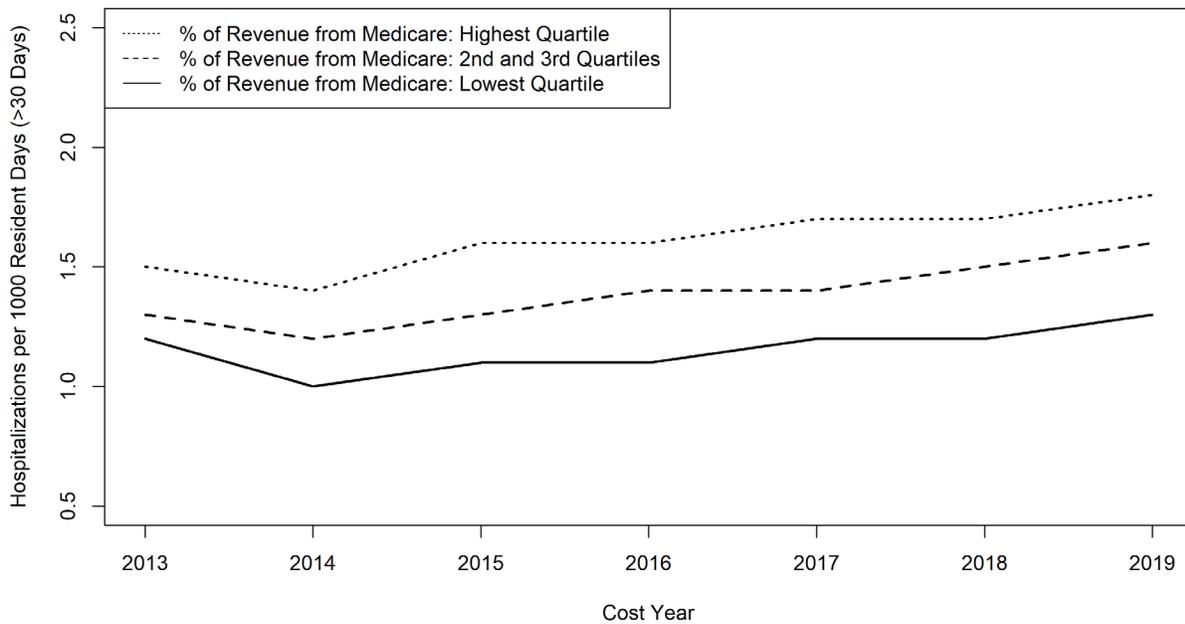
Proportion of Minority Race/Ethnicity Resident Days

Facilities with higher proportion of minority resident days tend to lower QOL and MDH scores, lower CD30 and CD90 rates, and higher HOSP LRP rates.

Figure 28. Quality of Life Score by Percentage of Minority Race/Ethnicity Resident Day Quartile
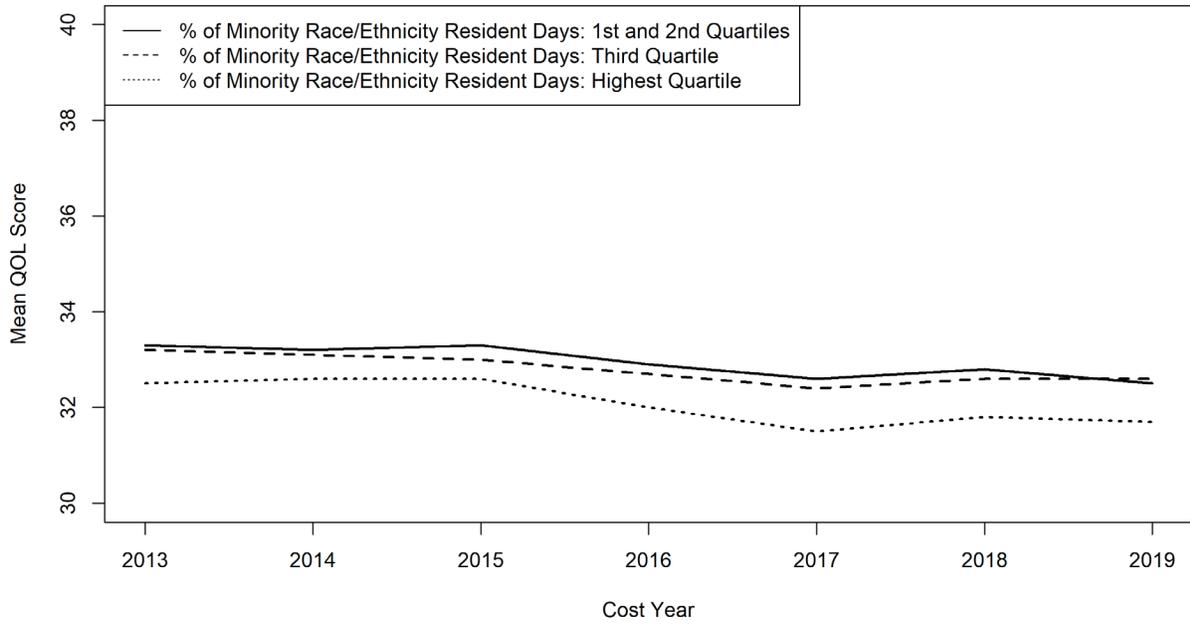
Figure 29. Minnesota Department of Health Inspection Score by Percentage of Minority Race/Ethnicity Resident Day Quartile
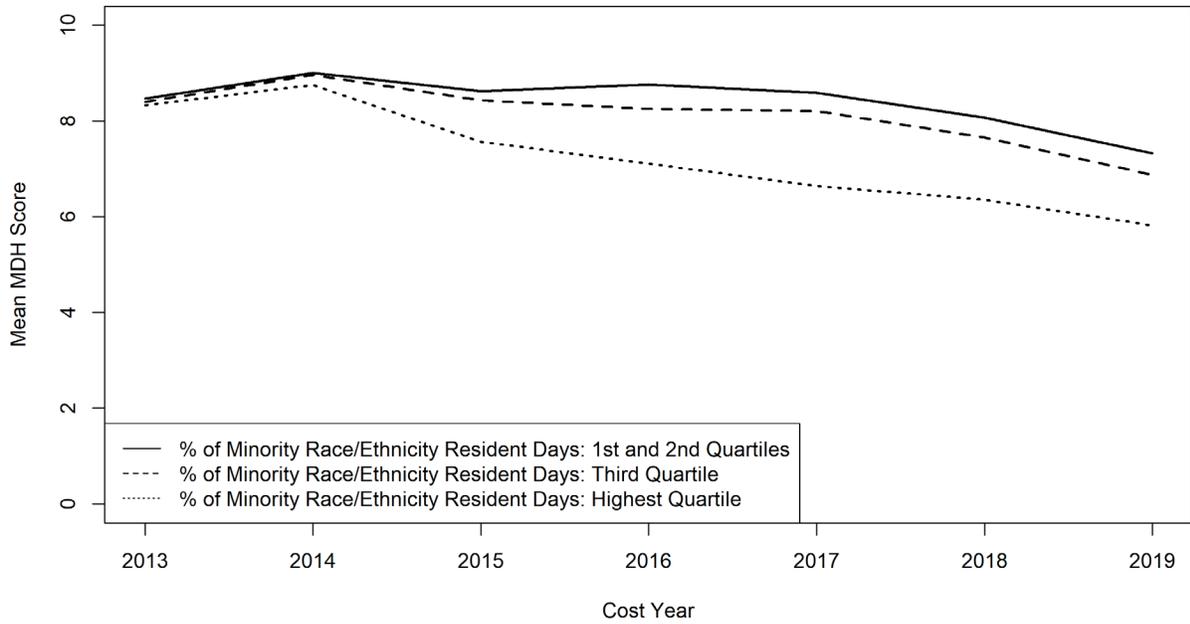
Figure 30. Adjusted Community Discharge Rate (3-30 Day) by Percentage of Minority Race/Ethnicity Resident Day Quartile
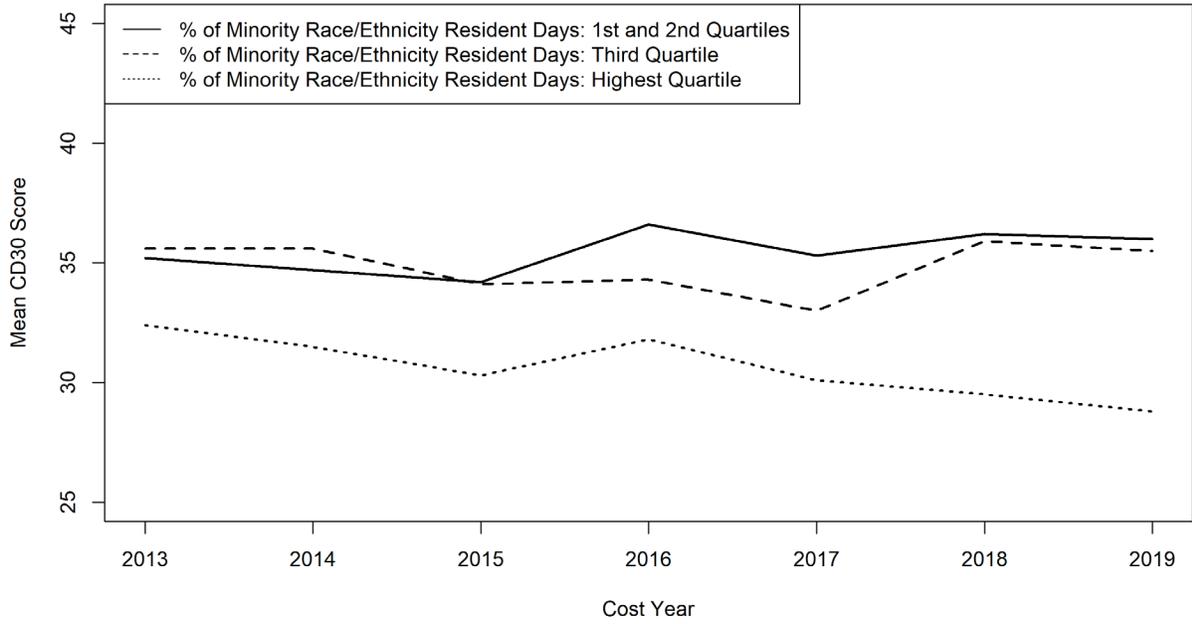
Figure 31. Adjusted Community Discharge Rate (31-90 Day) by Percentage of Minority Race/Ethnicity Resident Day Quartile
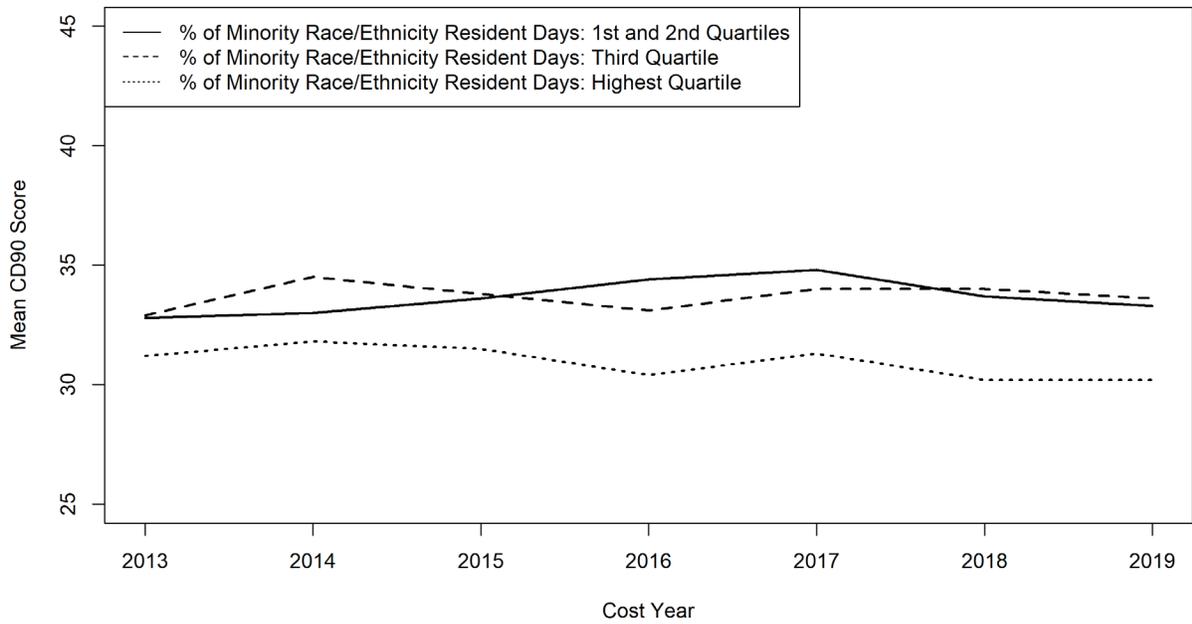
Figure 32. Hospitalizations per 1000 Resident Days (Low Risk Period) by Percentage of Minority Race/Ethnicity Resident Day Quartile
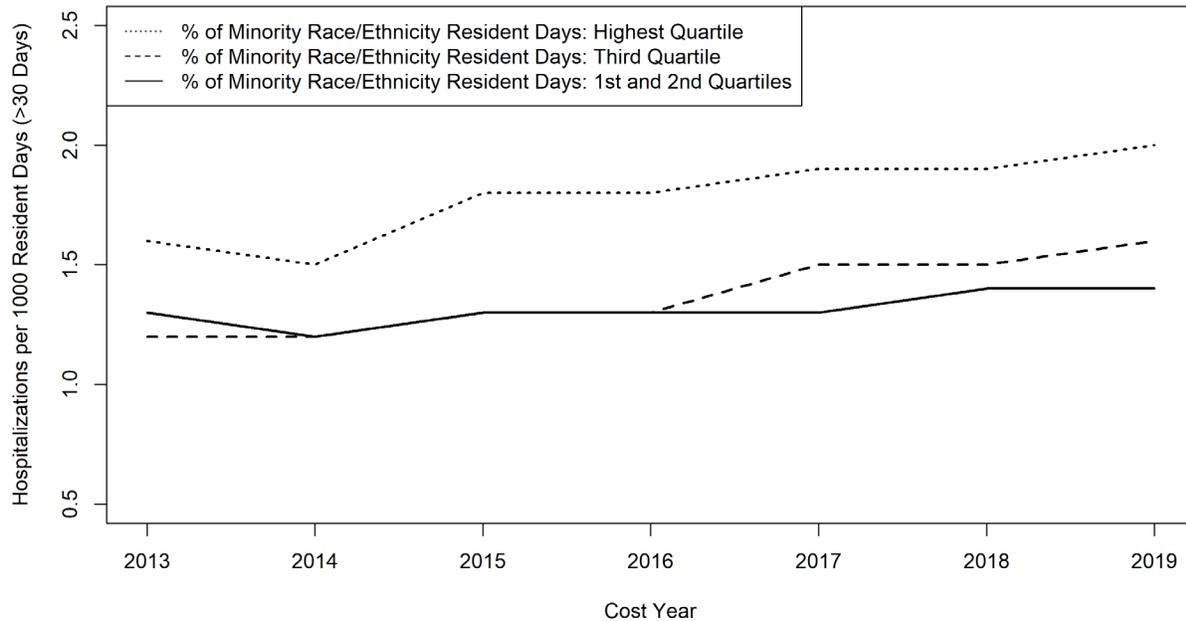
Cost and Quality Trajectory Clustering

An additional alternative approach was taken to understand patterns in care-related cost and quality metric trajectories. Latent Class Growth Models were used to cluster facilities by their care-related cost and quality scores (QI + QOL + MDH) and the ensuing clusters were summarized by their average characteristics. More detail and results can be found in the Cost and Quality Trajectory Clustering Technical Report, but some highlights are included here for convenience:

- Three clusters were identified: Cluster 3 maintains relatively higher costs, began with relatively high quality and ended in the middle of the clusters for mean quality score. Cluster 1 and Cluster 2 tracked fairly closely with relatively lower costs, but Cluster 1 began and ended with relatively higher quality scores while Cluster 2 began with low quality, improved in the middle of the period, and declined in quality scores at the end of the period.

- Cluster 2 (relatively lowest quality scores) is characterized by a higher rate of change in ownership, for-profit ownership, relatively higher administrative costs per resident day, relatively low revenue to long term lease ratios (for those facilities with long term leases), lower overall staff retention, scored relatively worse on all quality measures including those not used in clustering, and spent relatively less on group medical insurance per resident day.

- Cluster 1 (relatively low cost and highest quality) is notably similar to Cluster 2 in many facility and spending characteristics not otherwise noted, but has the best quality scores for hospitalization rate per 1000 resident days, quality indicator score, MDH inspection

score, and overall quality score. Cluster 1 has relatively much more favorable total revenue to long term lease costs (for those facilities with long term leases) and spends the most on group medical insurance per resident day.

- Cluster 3 (relatively highest cost, middle quality) has a much higher average number of admissions, made up of mostly non-profit and government facilities, higher acuity and occupancy, lowest percentage of Medicaid days, almost entirely located in the Metro area, highest care related costs, best staff retention, best adjusted community discharge and hospitalization rates, and highest quality of life scores (marginally).
- Cost trajectories are more stable (smooth) than quality score trajectories.

Cross Sectional Models for Quality Metrics

Cross sectional models for each of the quality metrics were run to test for relative importance of subgroup variables in accounting for variability in the metrics. Full results are found in the Trend Analysis Technical Report, tables are omitted for brevity, but significant relationships are discussed here in the text.

QI Scores

The first model used the Quality Indicators score as the outcome. Total variability in QI scores explained by the model is very low at 2.9%. Only change of ownership and occupancy rate accounted for more than 1% of the variability in QI scores and none of the variables were statistically significantly related to QI scores

QoL Scores

The second model used Quality of Life scores as the outcome. Total variability in quality of life scores explained by the variables is 25.2%. Ownership type, change of ownership, percent minority resident days, and occupancy rate all accounted for more than 5% of the variability when taken alone. Percent minority resident days accounted for the most unique variability at 5% (Type 3 SS). For profit ownership was associated with a 0.51 point drop in quality of life relative to non-profit status in 2018. A SD increase in the number of beds (45.68) was associated with a 0.26 point drop in quality of life. Similarly, a 9% increase in occupancy rate (one SD) was associated with an increase in quality of life scores of 0.14. An increase of 9% in the percentage of minority resident days was associated with a 0.42 drop in the quality of life scores.

Inspection Scores

The third cross sectional model used Minnesota Department of Health inspection scores as the outcome and the subgroup variables as independent variables. Total variability in MDH scores explained by these variables is 13.3%. Only change of ownership and percentage of minority resident days explained more than 5% of the variance in MDH scores (Type 1 SS) and most of this overlapped with other variables (Type 3 SS). Facilities with a change of ownership over the period had an estimated 1.73 points (0-10 scale) lower inspection score. A 9% increase in the

percentage of minority race/ethnicity resident days was associated with a 0.55 point drop in MDH inspection scores.

Staff Retention

The fourth model used direct care staff retention rates as the outcome. Total variability explained by the model is 17.4%. Ownership status, change of ownership, and occupancy rate all explained more than 5% of the variability by themselves (Type 1 SS), but of these only occupancy rate was statistically significant after accounting for the other variables. Free standing Twin City metro facilities were estimated as having the highest retention rates (7% higher than other metro MSA and small town facilities). Annual admits per bed and occupancy rates were also significantly related to direct care staff retention rates in 2018. An increase of 1.52 admits per bed (one SD) was associated with a 3% drop in retention and a 9% increase in occupancy with a 2% higher rate in retention.

Community Discharges 3-30 Days

The fifth model used adjusted community discharge 3-30 day rates (CD30) as the outcome and the subgroup variables as the independent variables. The model accounted for 38.7% of the variability in CD30 rates. 2015 care related spending, ownership status, change of ownership, annual admits per bed, and percentage of minority resident days all accounted for more than 5% of the variability in CD30 when considered alone (Type 1 SS). Minority resident days explained the most unique variability at 7.2% (Type 3 SS). Care related spending, location, change of ownership, annual admits per bed, and percent minority resident days were all significantly related to CD30 in the full model. An increase of $21.15 in 2015 per resident day care-related spending (one SD) was associated with a 2% higher CD30 rate in 2018. Free standing rural facilities were estimated to have the highest CD30 rates after accounting for the other variables. Facilities with a change in ownership over the period were estimated to have a 3% lower CD30 rate in 2018. An increase in 1.52 admits per bed was associated with a 2% increase in CD30 rates. A 9% increase in the percentage of minority race/ethnicity resident days was associated with a 4% drop in CD30 rates.

Community Discharges 31-90 Days

The sixth cross sectional model used adjusted community discharge 31-90 day rates (CD90) as the outcome and the subgroup variables as the independent variables. The model accounted for 19.5% of the variability in CD90 rates (about half as much as the model for CD30). Only ownership type and percentage of minority resident days explained more than 5% of the variability in CD90 when considered alone (Type 1 SS). Only percent of minority race/ethnicity resident days was a statistically significant predictor of CD90 when accounting for other variables. A 9% increase in the percent of minority resident days was associated with a 2% drop in the CD90 rate.

Hospitalizations 3-30 Days

The seventh cross sectional model used adjusted hospitalization 3-30 day rates (HOSP30) as the outcome and the subgroup variables as the independent variables. The model accounted for 11.9% of the variability in HOSP30 rates. Only 2015 care related spending was significantly related to HOSP30 rates. A $21.15 per resident day spending increase in care related spending in 2015 (one SD) was associated with a 0.4% drop in HOSP30 rates.

Hospitalizations for Resident Stays Greater than 30 days

The eighth cross sectional model used unadjusted hospitalizations per 1000 resident days (HOSP LRP) as the outcome and the subgroup variables as the independent variables. The model accounted for 32.6% of the variability in HOSP LRP. Location/hospital affiliation, ownership status, change of ownership, occupancy rate, and percent minority resident days all explained more than 5% of the variance when considered alone (Type 1 SS). When controlling for other variables, location/hospital affiliation, occupancy, percentage of revenue from Medicaid and from Medicare, and percent minority resident days were all significantly correlated with HOSP LRP. Hospital attached facilities were estimated to have the lowest HOSP LRP rates (0.31 lower than the highest group, free standing facilities in other metro MSAs). A 9% increase in occupancy rate (one SD) was associated with 0.12 less hospitalizations per 1000 resident days during the low risk period. An increase of 18% of total revenue from Medicaid (one SD) was associated with a 0.13 rise in HOSP LRP. Similarly, a 14% increase in the amount of total revenue from Medicare was associated with a 0.10 rise in HOSP LRP. Taken together, these two revenue findings suggest facilities with a greater portion of revenue from private pay and other sources have lower HOSP LRP rates. Lastly, an increase in 9% of minority race/ethnicity resident days was associated with a HOSP LRP rate of 0.16 points higher.

Growth Models for Quality Metrics

This section highlights the results from the growth models with the eight quality measures as outcomes, which were used to test for changes in the metrics or in relationships between the subgroup variables and the metrics associated with the VBR implementation. Tables are omitted here for brevity, but may be found in the Trend Analysis Technical Report.

The first growth model used Quality Indicator (QI) and the second Quality of Life (QOL) scores as the outcomes. The VBR period was associated with a 1.62 point increase to QI scores and a 0.37 point drop in QOL scores. No relationships between independent and dependent variables were altered by the VBR period (change of slope).

The third growth models used Minnesota Department of Health (MDH) inspection scores and the fourth direct care retention rates as outcomes. VBR was not associated with a significant change in MDH scores or with Retention rates. Facilities with a change in ownership suffered much lower retention rates during the VBR period (an additional 3% lower rate). This is likely due to

the fact that the majority of ownership changes over the data period happened after the implementation of VBR.

The fifth and sixth growth models used the two adjusted community discharge rates as the outcomes (CD30 and CD90). The effect of occupancy rate on CD30 appears to have been negated during the VBR period, but the lower rates for facilities with larger percentages of minority residents appears to have worsened (CD30). The VBR years are associated with a slight increase to CD90 rates (2%). The positive association for Medicare heavy facilities appears to have been dampened during the VBR period and rates have worsened for facilities with larger proportions of minority residents (CD90).

The seventh and eighth growth models used adjusted 30 day hospitalization rates (CD30) and unadjusted hospitalizations per 1000 resident days during the low risk period (HOSP LRP). The VBR implementation is not associated with a direct change to either metric. For HOSP30, there appears to be a rise in the rate for facilities with a larger proportion of minority residents. For HOSP LRP, larger facilities appear to have seen a slight rise while facilities with larger proportions of revenue from Medicare have seen a drop in the metric, after accounting for other factors.

Summary

All results presented in this report were for the 340 skilled nursing facility with data for all years from 2013-2019. Some observations of note are collected here for convenience:

- Overall the period saw a decline in nursing home use (resident days and occupancy rates). Acuity levels have also declined.

- Since 2016, Medicaid revenue has increased as a total share of facility revenue, replacing Medicare share of revenue, a shift of about 4% of total revenue.

- The jump in revenue for Medicaid and Private pay revenue was large in 2016. The annual growth in revenue from these sources is higher than pre-VBR, but lower than the initial jump.

- Annual care related spending increases, particularly direct care spending, have been larger during the VBR period.

- Medical and scholarship benefits have increased substantively during the VBR period.

- Other operating costs have grown steadily during the VBR period with annual increase between 4-5%. Laundry costs have increased the least since 2015 (10%), while administrative costs have increased the most (29%).

- There appears to be a substituting of RN hours for LPN hours over the period, as well as some CNA hours replacing licensed nursing hours. Overall, total hours across RN, LPN, and CNA PRD increased by 1% since 2015.

- Retention rates by nursing position do not show clear patterns over the period.

- The strongest predictor of care-related spending under VBR is care related spending just prior to VBR implementation. Previous spending accounts for 67% of the variability in current spending, just under half of which was not explainable by other factors in the cross sectional model. Additionally, 2015 care-related spending was significantly and positively correlated with the adjusted 30 day community discharge.

- Location/hospital affiliation was not correlated with care-related spending after other factors were accounted for, but hospital attached facilities report much higher other operating costs. Retention rates, CD30 rates, and low risk period hospitalizations varied by location/hospital affiliation. After accounting for other factors, retention rates were highest in free standing Twin City metro facilities, CD30 rates were highest in free standing rural facilities, and HOSP LRP rates were lowest in hospital attached facilities.

- Ownership status was significantly related to care-related and other operating spending, and QOL scores. After accounting for other factors, for-profit care-related spending was estimated to be $7.92 lower than non-profit facilities PRD, and quality of life scores about a half point lower. The spending gap between for-profit and non-profit facilities appears to have widened during the VBR period after accounting for other factors.

- Although for-profit facilities appear to be visually worse on most quality metrics, much of this variability overlaps with other factors including the change of ownership (CHOW) variable. After controlling for other factors, CHOW facilities had worse MDH inspection scores (-1.73) and CD30 rates (-3%).

- Number of beds was significantly correlated with other operating costs PRD and QOL scores (both lower for larger facilities).

- Annual resident admissions per bed was significantly correlated with care-related and other operating spending, direct care staff retention rates and CD30 rates. Costs were higher for greater volume as was the CD30 rate, while retention rates were lower.

- Occupancy rates were significantly related to care-related and other operating costs, QOL scores, retention rates, and hospitalizations during the low risk period. Costs PRD were lower for facilities with higher occupancy, an effect which was strengthened during the VBR period, quality of life scores and retention rates were higher, and HOSP LRP rates were better.

- Percentage of total revenue from Medicaid and from Medicare were only related to hospitalizations per 1000 resident days during the low risk period, after controlling for the other factors. A greater proportion of revenue from Medicaid or from Medicare

(lower proportion of revenue from private pay or other sources) were associated with worse rates of hospitalization.

- Proportion of minority race/ethnicity resident days was associated with QOL scores, MDH scores, CD30 rates, CD90 rates, and HOSP LRP rates, after accounting for other factors. A greater proportion of minority resident days was associated with lower QOL and MDH scores, worse CD30, CD90, and HOSP LRP rates. Spending on care-related and other operating costs appears to have grown more slowly for facilities with higher proportions of minority resident days and community discharge rates appear to have declined and 30 day hospitalization rates appear to have risen during the VBR period.

- After controlling for other factors, growth models indicate the implementation of VBR is associated with greater spending on care-related ($19.43 PRD) and other operating costs ($11.16 PRD), improved quality indicator scores (1.62), lower quality of life scores (-0.37), and improved community discharge rates in the 31-90 period (2%). This last result may have benefitted at least in part from the Return to Community Imitative which targets community discharge in that 60-90 day period.

Recommended Actions

There is a wealth of information summarized in the trend analysis section which sits atop three technical reports, each with additional details and results. In order to coalesce many of the details into a more digestible form, potential actions are presents here in the form of recommendations.

Recommended Action: Explore the possibility of reducing cost investment risk for facilities that are lagging in quality metrics and are constrained by initial pre-VBR spending.

The most substantial factor in predicting spending on care related costs during the VBR implementation is care related spending prior to VBR. As much as half of this relationship is a function of cost reimbursement with the rest explainable through other factors. Although the gap between higher and lower spending facilities has decreased over the period, some facilities likely still struggle to take on the cost risk associated with the lag between when costs are paid for and when they are realized in the reimbursement rate.

Recommended Action: Better understand motivation behind for-profit facility care related spending decisions under VBR.

The lag between for-profit facility care related spending and non-profit spending has increased during the VBR period and remains significant when accounting for other factors, as does a small gap in Quality of Life scores. It appears that for-profit facilities are acting sub-optimally within the VBR framework, whether this is a misunderstanding of the system, miss-alignment of incentives, or difficulty in transitioning due to lower pre-VBR spending is not clear.

Recommended Action: Implement strategies to hold new owners accountable for expenditures and care quality after a change of ownership.

The increased reimbursement rates appear to have made Minnesota Nursing Homes more attractive to buyers, some of whom are operators from other states. Facilities that change

ownership are generally lower performing facilities, particularly on inspection scores, and new ownership appears to be looking for cost cutting measures (e.g. laundry and benefits) while also increasing administrative costs. This group should be encouraged to make prudent financial decisions that improve nursing home quality through, for example, careful monitoring of expenditures and care quality.

Recommended Action: Utilize incentive and evaluation strategies that differentiate facilities in terms of role in the long term care system.

Annual resident admissions per bed was significantly correlated with higher care related and other operating spending, higher CD30, and lower staff retention rates. Taking care of the short stay population appears to cost more, but naturally boosts community discharge rates. Interestingly, direct care staff retention is lower in these facilities, possibly due to increased burden from transitioning through residents, as there is likely an effort cost to learning new care needs and resident preferences. Larger facilities tend to have lower PRD other operating costs (likely due to efficiencies of scale), but also lower of Quality of Life scores (perhaps due to perceptions of getting lost in the shuffle). The most recent version of the VBR Quality Score takes into account resident mix between short and long stay. This approach represents a strategy of trying to account for facility role and such approaches are more likely to yield a fairer measure of quality of care across the industry.

Recommended Action: Consider risk adjustment of the hospitalization measure for lower risk residents, or those with stays greater than 30 days.

Currently, hospitalization rates for residents within 30 days of admission to the nursing facility are adjusted for resident acuity, i.e., medical conditions and functional dependency. Hospitalization rates for residents who have stayed in the facility more than 30 days are considered low risk and their rates are not adjusted. However, we found evidence that that the measure for the longer stay residents is being influenced by differences in resident populations rather than differences in quality of care. Acuity adjustment of the rates may be in order.

Recommended Action: Explore in greater depth the relationship between percentage of minority group residents and care-related expenditures and care quality

Higher percentages minority resident days is correlated with lower QOL and MDH scores, worse community discharge rates and worse hospitalization rates during the first 30 days of a resident's stay. Care-related and other operating costs have also grown more slowly for these facilities, while community discharge and hospitalization rates have worsened during the period. This analysis was done at the facility level, and so this correlation does not imply that minority resident outcomes are better or worse than majority residents, but the generally lower quality metric for those facilities serving the minority residents is troubling and should be further investigated. Some of this relationship overlaps with other factors such as change of ownership, but a substantive amount is unique to serving the minority resident population. This issue should receive further study. The DHS should consider strategies targeted to minority-serving facilities to aid them in improving quality for a diverse resident population.

Chapter 4
Provider Views of Care Quality, Cost and VBR

Findings from each area of data collection and analysis are described below in terms of key identified themes, followed by evidence from the data to support that theme. Presentation of findings is organized by data collection activity (discussion group interviews, focus group interviews, statewide survey, and expert panel survey).

Quality Council Discussion Groups

Key Themes

Poor care is costly, and financial success is tied to quality

High functioning facilities are less likely to suffer costly outcomes such as poor inspection results, resident complaints, fines, and pressure ulcers. High quality facilities in general see financial success by providing a better product to the consumer.

Care cost related decisions are dependent upon leadership

Improving state average and rank is important, and the link between costs and quality is often top-down, initiated by leadership and aimed at focusing on the most responsive measures. Some outcomes are able to be changed just by improving documentation and have lesser impact.

Performance on quality indicators (QIs) impacts decisions on resource allocation, but the relationship is often indirect and unclear

It is common for staff committees to identify priority QIs at the facility level, which then are used to influence staffing and spending decisions. However, decisions of which QIs to target and how to allocate resources are frequently made independently from each other; staff suggest areas of quality improvement without consideration of costs or spending. It is often not a 'spend X to get Y' decision at the facility level.

The relationship between spending and care quality could be improved if facility staff had more information

Knowing how to allocate funding to improve quality outcomes is a struggle for facility providers. Good quality should be reimbursed, but difficult to determine how best to target efforts to get rewarded for improved quality. Targeting information about costs and quality performance to facility level QAPI committees could assist in tightening the link between QIs and resource allocation. Programs like PIPP encourage a team approach, which is good. It is usually leadership who makes spending decisions based upon reimbursement, but a team approach that involves staff committees in that decision has a stronger impact on quality and should be encouraged.

QIs and VBR are complex and often not fully understood by those making decisions in facilities

Requirements are difficult to explain to busy providers with other pressing priorities. The multitude of systems and programs (federal, state, multiple measures) contributes to the challenge of using the information to guide decisions at the facility level. A clearer understanding of the quality add-on would also help decision making. Particularly, lessening the number of QIs would be helpful. Too many areas to address with few resources, particularly in comparison to how hospitals are evaluated. The addition of more processes measures, which tend to be more easily understood by staff, as well as increased education and engagement with the program for nursing home staff would also be helpful.

Accuracy is key to quality measurement; measures do not always reflect the actual quality culture within a facility

There is interest in creating more robust and broad measures that reflect overall quality, as opposed to many individual measures that each reflect only a small part of care. Examples included staff engagement, organizational culture, and organizational effectiveness. Defining quality more broadly would more accurately reflect quality, and be more understandable to staff who get frustrated when their efforts are reduced to a number and ranking.

Person-centered quality and resident choice

Calculating QI scores using the MDS is rigid and does not reflect variation in resident choices. This is particularly true of the incontinence QI, when some residents refuse active toileting plans in exchange for sleep or activities if incontinence management products are working well. Complete continence is a challenge and often not the resident's goal. Overall there was a tone of wanting more comprehensive measurement and less dependence on the MDS for measures.

Punitive programs less motivating

The system as a whole is too punitive, and positive programs such as PIPP are appreciated. More incentive type programs are needed. PIPP and QIIP are simple, understandable, and narrow in focus, with clear timelines. Those programs are motiving. They also encourage much needed innovation, whereas avoiding punishment for not meeting a threshold does not. These programs were viewed as financially lucrative as well.

VBR reimbursement threshold

A stronger threshold is needed for the VBR reimbursement system that would have more impact on facilities. As it is now, the impact is very minimal on most facilities. The VBR score should be simpler and more understandable. It is not always clear how to improve the score, and QI efforts can feel like 'throwing spaghetti to the wall to see what sticks'. Difficult to be strategic.

QIs that are clearly measured and responsive to QI effort are the most effective

Infections, UTIs, antipsychotics (when prescribers are on board), and weight loss were described as well-measured and responsive QIs. Weight loss was helpful in that it creates a warning sign

that can be acted upon to avoid clinical decline. QIs that are measured most objectively are the easiest to manage, and adjusters/ exclusions can have a large effect on some scores (particularly weight loss and anti-psychotics). Adjusters and exclusions are not always well-understood at the facility level, furthering confusion.

Feedback on specific QIs

- Incontinence is challenging to change and frustrates staff; measured too rigidly and staff unlikely to choose as a QI focus due to difficulty moving the score; inconsistent case mix reviews have exacerbated the problems with the QI, as have differences between federal and state measures.
- Incontinence, pain and behavior were the most commonly noted measures of difficulty. Weight loss, mobility and infections were the most commonly noted measures of clarity.
- Behavior score is very dependent upon your population, and is determined by your population more than your overall quality. A resident's behavior may be dealt with appropriately and still continue daily depending on the resident's diagnosis. Not always changeable or a measure of care quality.
- Pain is subjective, it is difficult to obtain the goal of no pain, and the differences between federal and state QIs in this area are confusing. Pain measure could be improved by bringing in assessments other than the MDS.
- Short stay pain is very dependent upon your population and unstable over time as the population changes.
- Restraints are so infrequently used that it is an easy success, but not reflective of overall quality.
- Mobility measures are highly responsive and are a good focus to engage therapy staff with nursing. Walking and range of motion are particularly hard to move in the long stay population, which depresses scores, but progress can be made with effort and the measures reflect that effort.
- Overall number of falls is important to measure, as opposed to only falls with injury, because it is an example of an adverse event with potential impact, has a close connection with quality of care, and can impact QOL. One time big falls with injury are often related to other comorbidities, and frequent falls without injury allows for examination of the root cause of a quality problem. Frequent falls are important to families and also insurance companies.
- Weight loss makes an excellent PIPP outcome; it is clearly measured, responsive to efforts, and pairs well with other important aspects of quality such as skin care. QOL is a challenging PIPP outcome for reasons of measurement and subjectivity.

The COVID-19 Pandemic

The pandemic has tightened resources, created immediate needs that take time away from strategic planning, and caused worries about possible systems changes as a result of pandemic related changes to care delivery and reimbursement. It was also noted that the pandemic is forcing some innovation, which could have a positive effect in the long term.

Nursing Home Administrator and Quality Expert Focus Group Interviews

Key Themes

Achieving excellent quality scores is rewarding

Respondents in both groups noted the value of achieving high quality scores in regards to facility pride, community relations, recruitment of residents and staff, communication to boards of directors/ trustees, and motivation to continue hard work when times are challenging. In addition, despite the concerns surrounding quality measurement addressed in this report, it was noted multiple times in both interviews that QIs, in general, reflect care quality.

It takes investment to achieve high quality

Investment in staffing is important, and VBR has assisted with wage increases. Spending decisions often revolve around the wants and needs of the staff more than any single quality indicator or quality score focus. That is particularly true of capital investments for equipment that may improve the efficiency or effectiveness of staff time. The VBR appeared to influence spending in that it increased revenue, but had little impact on resource allocation. There was agreement that the QIs were not "real time" and "not my go to" for spending decisions. Appreciation was noted for the PIPP program which creates tangible revenue through rate increases, removing the 'lag' of VBR.

VBR has little risk or impact on high performing facilities

Respondents felt that most facilities, particularly those that are high performers, do not see the VBR threshold as a financial risk. The threshold may matter more for low performing facilities who struggle to achieve their goals. It was noted that because of rate equalization it can be difficult to increase revenue to invest in quality, and that for most facilities VBR provides a rare opportunity to see a revenue increase. However, respondents perceived a "performance punishment" for high performing facilities on some measures; they cannot improve given they have reached the top level of performance.

The lag in reporting is a significant barrier to the use of quality indicators (QIs) for decision making

A dominant theme throughout was frustration over the time gap between data submission for QIs and data reporting. Respondents noted they were often addressing different challenges, and perhaps a different set of residents, by the time QIs were reported for their previous efforts. Statements included, "We are on to something else by the time our scores are received" and "By the time we see the scores it is hard to remember what we were doing right". They found this particularly frustrating for direct care staff, who see a low QI score that may be related to a past resident, event, or challenge as not reflective of their current care efforts. "The delay in reporting makes it hard to celebrate our successes." Respondents noted that negative events and poor performance on QIs "hangs with facilities for a long time", which is frustrating to staff who feel they have made improvements.

Documentation plays a key role in performance on some QIs

Respondents noted that Minimum Data Set (MDS) coding plays a significant role in performance on some QIs. A challenge to the validity of the measures is the variation in interpretation between facilities on some MDS items such as pressure ulcers, incontinence, and functional independence. "Everyone needs to play at the same level" for scores to be ranked or compared. Risk adjustment is necessary but confusing to staff, and targeting efforts becomes difficult when they are unsure "who is counted".

Risk adjustment is necessary but confusing

Respondents felt their staff did not always understand risk adjustments, "exclusions", and "what triggers something and what does not". It was noted that the exclusions should remove individuals for which the facility cannot influence the outcome, but this is not always the case. Examples provided included declines in mobility and incontinence. Respondents noted that often the staff feel they are helping the resident and providing good care, but then a decline happens because the resident is "not going to get better" and they are not given credit for their efforts. Examples of areas where risk adjustment could be improved included mobility exclusions for residents with neurological conditions, excluding some multi-use drugs such as Abilify from the anti-psychotic QI when used for depression, and excluding schizophrenia or related conditions from the QOL mood domain.

A more comprehensive view of quality is needed

Federal and state measures differ, and there are many of them, and risk adjustment varies, which creates a system that one respondent described as "so complex it turns into a crap shoot". Overall quality, aiming for a culture of quality and caring, and retaining good people were noted multiple times as more important indicators for decision making than tracking individual QIs. "What is the overall quality of our residents' lives" was noted as more important than data. "The human component is missing from the data", with family and staff relationships, and a lack of family complaints given as examples of indicators of quality. Respondents particularly noted feeling powerless to improve performance on individual questions or domains in the quality of life (QOL) assessment. One respondent noted in regards to the challenge of addressing the QOL scores, "If you can improve the overall culture your scores will improve."

Frustrations with the QOL measure

Another significant theme in both groups was frustration regarding the QOL measure. Concerns included the annual survey which provided a 'snap shot' of one point in time that providers felt did not reflect the overall resident experience and was highly influenced by the events of the few days prior to the survey. Relatedly, respondents expressed concern that residents who are able to converse and answer questions may not have the ability to look-back over a week to respond to questions in a valid manner, such as residents with memory issues. There was concern that the results are lagging, and that staff feel disheartened when scores are low in QOL. Staff complain that results are not "real time" and do not reflect the true quality of life for residents.

Appreciation of assistance from DHS

Respondents appreciated the technical assistance from DHS, particularly in the interpretation of data and assistance to develop QI programming. It was acknowledged that DHS allows them to "have a voice" in the process, which was appreciated.

Reflections on individual quality measures

- Pain is difficult to improve, and staff feel powerless to make change in that area. It is very dependent upon your population, particularly for short stay residents. Addiction issues are important to address, and reports of pain often vary depending upon who is asking and in what context. The 7-day 'look back' on the MDS exacerbates the problem of pain measurement. Some pain may be inevitable with some conditions, such as arthritis, so it is challenging to achieve the goal. Also, having pain or not may not be a good measure of quality of care as long as the pain does not affect ones' physical activities.

- Falls with major injury was recommended to be removed from the report card. The reasoning was that the outcome of injury was more related to the co-morbidities and condition of the resident than to the care provided. Two residents could fall and have different outcomes regardless of staff actions, and a resident may fall despite high quality care.

- Decline in function is frustrating to staff given some decline may be inevitable and not a reflection of poor care.

- Toileting without a plan is an easy measure to 'fix' given all that is needed is the addition of a plan. In that sense it does not capture quality of care, but is easy to move the needle. Case mix reviewers provide challenges to this measure, which can be frustrating.

- The way incontinence is measured does not reflect the quality of care provided. Someone can have small leakage and it is not reflective of staff efforts to assist the resident to the toilet. One respondent felt the measure 'shamed' residents who have minor incontinence by describing something normal as a poor outcome, and others agreed. Overall, there was frustration over measures where staff felt they had little impact on outcomes despite providing quality care.

- The short stay measures include residents who enter with a goal for an extended stay, which 'muddies the water' in trying to interpret short stay measures.

Statewide Survey of Providers

Twenty-nine of the 421 potential respondents completed the survey, a response rate of approximately 7%. It is likely that the low response rate is related to the COVID-19 pandemic response efforts being expended by facility leaders throughout the state, although that cannot be determined definitively. Results, while informative, should be viewed in light of the small and likely non-representative sample size.

The 29 respondents reported the following job titles: administrators (52%), director of nursing (28%), quality coordinator (7%), assistant administrators (7%), or other quality leaders (10%). Respondents had been in their role for an average of 9 years (range 0.2-32), in their organization for an average of 12 years, (range 1-42), and in the nursing home industry for an average of 22 years (range 4-50). Eighty-nine percent of respondents had a bachelor's degree or higher, with 21% reporting a graduate degree.

Respondents were asked to report their level of understanding of the MN quality measures, the MN quality report card, and the MN VBR program. The majority (93%) reported at least of basic understanding of the quality measures, at least a basic understanding of the report card (96%), and the VBR program (86%).

Key Themes

Quality Measures and the Quality Report Card

Sixty-two percent of respondents agreed or strongly agreed that it was clear how the quality measures are calculated. Responses were almost evenly divided between agree/strongly agree and disagree/ strongly disagree in regards to whether the measures reflect actual quality and whether there was clarity surrounding selection of measures for the report card. More respondents felt positively than negatively about measures reflecting clinical priorities, and more felt negatively than positively about selection of measures for the report card, but the differences were minimal reflecting a varied view of the quality measures and report card among respondents.

Quality measures and decision making

There was variation in the responses to questions addressing the influence of quality measures on decision making, reflecting varying perceptions in the area among respondents. For example, an even number of respondents strongly agreed/ agreed and disagreed that quality measures impact spending decisions overall. Almost half of the respondents strongly agreed/ agreed that quality measures are person-centered (43%) and are important to public reporting (47%), but the number of respondents selecting the neutral or strongly disagree/disagree categories was notable for each of these items.

VBR policy and decision making

Over half of the respondents strongly agreed or agreed that VBR policy impacts spending overall (55%) and spending on staffing (52%), though the selection of the neutral category was sizable and the difference between those percentages and the percentage that selected strongly disagree/ disagree was not sizable. Forty-five percent of the respondents noted that VBR policy promotes decisions that improve care while 31% disagreed. Thirty percent of the respondents noted that VBR accurately reflect what is needed to provide care while 35% disagreed. Most respondents (66%) strongly agreed/ agreed that VBR promotes data-based decision making.

Weighting of components in the VBR equation

Respondents were provided with the current VBR equation and asked to create what they perceived to be an ideal weighting of components for the VBR equation based upon their experiences. Average responses somewhat mirrored the actual VBR equation for the long-stay residents with a lesser emphasis on QOL measures and increased emphasis on family satisfaction and state inspections than is currently used. It should be noted that the standard deviation for these averages is wide, indicating variability or lack of consensus among responses, and that averages are impacted by scores at the outside of the range such as zero, which was provided by respondents for the QOL and family satisfaction measures.

Responses addressing the short-stay quality equation differed from the current equation with respondents placing less emphasis on hospitalization and more emphasis on pressure ulcers and pain. Similar to the long-stay measures, the wide standard deviations and tendencies for means to be influenced by responses on the end of the range such as zero should be noted.

Challenges regarding quality measurement, use of quality data, and participation in the MN VBR program

Respondents were asked to report on the level of challenges posed by various aspects of implementing QI and participating in the VBR program. All respondents noted that staff turnover and time to plan quality efforts was at least somewhat challenging, and collecting data was the category that respondents felt posed the least challenge.

The relationship between costs and quality

Respondents were asked to provide their opinions on the relationship between costs and quality. Most respondents strongly agreed or agreed that providing high quality care costs more than providing lower quality care (59%) and is cost effective (69%). However, the number of respondents selecting the neutral or strongly disagree/disagree categories on the impact of VBR program on quality care provision was notable (55%). Similarly, most respondents did not agree that residents and families look at facility quality scores when selecting the facility (62%).

Expert Panel Survey

Seven of the 61 potential respondents completed the survey, a response rate of approximately 11%. Similar to the statewide survey, it is likely that the low response rate is related to the COVID-19 pandemic response efforts being expended by facility leaders throughout the state, although that cannot be determined definitively. Results should be interpreted in light of the small sample size.

The 7 respondents reported the following job titles: administrators (n=2), director of nursing (n=1), quality coordinator (n=1), other quality leaders (n=2). Respondents had been in their role for an average of 7 years (range 2-12), in their organization for an average of 8 years, (range 2-17), and in the nursing home industry for an average of 27 years (range 4-50). Six respondents had a bachelor's degree or higher, with two reporting a graduate degree.

Understanding of the QIs

Respondents were asked to report their level of understanding of the MN quality measures, the MN quality report card, and the MN VBR program. All reported at least of basic understanding of the quality measures and at least a basic understanding of the report card. The majority (71%) reported at least of basic understanding of the VBR program.

Criteria Ratings

Respondents were asked to rate each long-stay, short-stay and structural quality measures based on four criteria:

Importance: This measure addresses an important area of clinical quality. The measure addresses a key aspect of care quality.

Validity: This measure reflects actual care quality. This is a good measure of the quality of care that we provide in this area.

*Responsiveness***:** It is easy to achieve improvements in this measure with appropriate efforts and actions. The efforts we make in this area are reflected by changes in this measure.

Usability: This measure is useful in our QI decision making. Tracking our data in this area help us to improve our care.

Rating Results

Overall, the responsiveness (i.e., being easy to achieve improvements) of long-stay quality measures concerns the respondents more than other criteria. Quality indicators having a relatively lower responsiveness includes the "Worsening or Serious Resident Behavior Problems", "Worsening or Serious Bladder Incontinence", "Prevalence of Falls with Major Injury", and "State Inspection Results". Most respondents agreed that all the long-stay measures address an important area of clinical quality. The validity of the measures "Worsening or Serious Resident Behavior Problems", "Worsening or Serious Bladder Incontinence", "Prevalence of Falls with Major Injury", and "State Inspection Results" also caught some attentions. All long-

stay quality indicators were considered as useful in QI decision making, except for "Prevalence of Physical Restraints". Similar to the long stay measures, responsiveness was rated as the weakest component of the short stay measures. This was particularly true for pain, community discharge, and resident experience. On average, respondents agreed that the short stay measures reflected important areas of clinical quality. The "Proportion of Beds in Single Rooms" was flagged across four criteria as the least rated structural quality measure. The responsiveness of "Direct Care Staff Retention" and "Temporary Staff Agency Use" had relatively low rates. It should be noted that the small size is very small and the standard deviations for some quality indicators are fairly wide.

Recommended Actions

A number of themes are intertwined throughout the four data sources for this report, and the provided recommended actions are based upon commonalities within the integrated findings from the qualitative component of the VBR evaluation. Findings from the quantitative portion of the evaluation are considered within these recommendations as well. It must be acknowledged that the small sample size, likely to do the COVID-19 pandemic response efforts, significantly limits the generalizability of these findings. Similarly, it is likely that those who volunteered to participate in the study, given the low response rate, do not fully represent the population of MN nursing home providers in regards to knowledge and expertise. The survey findings indicate that respondents perceived a very high level of knowledge regarding QI measurement, the MN quality report card, and VBR, and quality council discussions as well as the expert panel survey were specifically aimed at those with a high level of understanding. However, despite these limitations the reported findings are informative given the expertise of the respondents, and can be viewed as the perspectives of experts with in the population of MN nursing home providers.

Recommended Action: Reduce the number of QI's that included in the VBR quality measurement.

Participants in the quality council discussion groups and focus group interviews described QI's that they felt were not useful, unnecessary and/or did not reflect care quality. This is consistent with the findings of the quantitative component of the VBR evaluation, which noted ceiling effects (inability to achieve improvements in score due to current high performance), lack of variability between some measures such that the measures do not discriminate between facilities in regards to quality, and groups of measures that may be measuring the same underlying construct and therefore could be eliminated to reduce complexity. The findings from the qualitative component indicate a need to examine the recommendations from the quantitative analyses and reduce the number of QI's where possible.

Recommended Action: Focus on QI's that are responsive to improvements in the care provided.

Respondents from both interviews and surveys reported that QI's may accurately measure a reported outcome, but the outcome measured may not be reflective of care provided and/or may not be able to be influenced by caregiving staff. They voiced frustration and concern that their care efforts were not acknowledged by some outcomes, and that risk adjustment helped with the process but was often unclear or inadequate. Specific QI's noted as likely unresponsive include: incontinence (some incontinence is normal with aging and not a reflection of assistance provided with toileting); falls with injury (the amount of injury incurred is more an effect of resident frailty than staff supervision); pain (difficult to achieve no pain despite nursing efforts); behaviors (often occur despite staff intervention); and functional decline (may be unavoidable given the resident population). It is recommended that the QI's which providers perceive as unresponsive to their efforts be re-evaluated in light of the findings from the quantitative portion of the evaluation.

Recommended Action: Work toward a more comprehensive measure of quality.

Providers described a vision of quality within their facilities that went beyond individual QI's, and discussed feeling frustrated that the areas they used to guide their view of how well their facility is performing were not included in the quality measures. Providers described relationships within the facility and with family members, lack of complaints, staff who appear happy at work, efficient daily operations, and general demeanor of residents as examples. There was a perception voiced in interviews that the reliance upon MDS measures and thresholds did not reflect the current focus of those in the industry who are forward thinking, and were based on the old, punitive way of thinking. Concerns regarding the QOL measure reflected some of the desire to measure quality of resident care more comprehensively. Additionally, the state-wide survey noted wide variance among respondents on whether QI's were person-centered, and interview findings noted a perception that the resident voice may be missing in some of the QI measures such as incontinence and mobility, contributing to the perception that a more comprehensive view of quality is needed. Although challenging, it is recommended to work toward a measurement process that captures a more global view of quality.

Recommended Action: Nursing facility staff would benefit from more knowledge and information regarding the inter-relationship between quality, spending, and VBR.

Respondents noted that there was a relationship between costs, quality and spending decisions within their facilities. However, consistent with the quantitative findings of this evaluation, survey findings and focus group respondents described this relationship as indirect and variable. Respondents noted that decisions surrounding resource allocation were often leadership-driven, but with strong influence from clinical staff within quality committees without consideration of costs, and perhaps without a clear understanding of the implications of those decisions on reimbursement. It was recommended by respondents that quality committees be provided with additional information regarding the use of purpose of QI data, the revenue implications of

quality measurement and VBR, and particularly reasons for the time lags in reporting state data. Providing clinical care staff with information to better understand VBR program data and quality measurement encourages resource allocation decisions that incorporate the full universe of factors, including costs. **Recommended Action: The VBR threshold must be tightened to be meaningful to high functioning facilities.**

Consistent with the findings from the quantitative component of the evaluation, the current VBR threshold does not appear to provide meaningful direction to facilities who are currently meeting the quality standard. Interview respondents reported feeling positively about the VBR program in terms of revenue, but not in terms of using VBR performance to guide decisions. This finding is supported by the state-wide survey, where respondents were almost evenly divided in their view of the usefulness of VBR for decision making.

Chapter 5
Quantitative Analysis of Quality Measures

Nursing Home Quality Indicators

The Minnesota Nursing Home Report Card provides two clinical quality indictor (QI) ratings: one focused on the quality of care during long-term stays (LS) with 19 indicators, and one focused on the quality of care during short-term stays (SS) with 2 indicators. These QIs are risk adjusted to account for differences between the types of residents served in nursing homes (NHs). Examples of the adjustors used are, but are not limited to: age, gender, cognitive performance (mental functioning), Alzheimer's disease, stroke, and ADL ability (Minnesota Nursing Home Report Card Technical User Guide). Table 15 shows the current 19 long-stay QIs grouped into 10 domains and the points associated with each QI. The composite QI score for a facility is the sum of the points it achieves in each domain.

Table 15. Domains of long-stay quality indicators in Report Card

Domain	19 Long-stay Quality Indicators	Points
Psychosocial	Incidence of Worsening or Serious Resident Behavior Problems	5
	Prevalence of Depressive Symptoms	5
Quality of Life	Prevalence of Physical Restraints	10
Continence	Incidence of Worsening or Serious Bowel Incontinence	2
	Incidence of Worsening or Serious Bladder Incontinence	2
	Prevalence of Occasional to Full Bladder Incontinence Without a Toileting Plan	2
	Prevalence of Occasional to Full Bowel Incontinence Without a Toileting Plan	2
	Prevalence of Indwelling Catheters	2
Infections	Prevalence of Urinary Tract Infections	5
	Prevalence of Infections	5
Accidents	Prevalence of Falls with Major Injury	10
Nutrition	Prevalence of Unexplained Weight Loss	10
Skin Care	Prevalence of Pressure Sores in High-Risk Residents	10
Psychotropic Drugs	Prevalence of Antipsychotics Without a Diagnosis of Psychosis	10
Physical Functioning	Incidence of Walking as Well or Better than Previous Assessment	2.5
	Incidence of Worsening or Serious Functional Dependence	2.5
	Incidence of Worsening or Serious Mobility Dependence	2.5
	Incidence of Worsening or Serious Range of Motion Limitation	2.5
Pain	Prevalence of Residents who Report Moderate to Severe Pain	10

Objective

The main objective was to explore the dimensionality of the clinical QIs and the possibility of reducing the number of QIs. We also examined the distribution of the current QIs and offered recommendations for reforming the scoring program. We were working with the current QIs as defined. We were not evaluating the need for new QIs or proposing a major re-defining of the current QIs.

Data and Methods

Risk-adjusted facility-level QIs including 19 long-stay QIs and 2 short-stay QIs over the 2012-2019 period (four quarters in each year) were used. The number of NHs in each quarter ranged from 369 to 382. Exploratory factor analysis (EFA), correlation, descriptive and trends analysis were conducted for this report.

Results

New domains for long-stay QIs

The EFA results indicate it is reasonable to categorize the 19 long-stay QIs into 4 underlying dimensions or domains rather than the 10 domains currently used: incontinence (4 QIs), physical functioning (5 QIs), restraints and behavioral symptoms (4 QIs), and care for specific conditions (6 QIs). The new domain structure has two advantages. First, the new domains are more consistent with underlying patterns in the data, indicating that the domains are more valid and reliable. Second, the new domain structure increases the balance across the domains. The number of QIs within each domain ranges from 4 to 6, which makes the contributions of individual QIs to the domain and total QI scores similar (either 1.0, 1.2, or 1.5), not as exaggerated as previously assigned. Previously some QIs had a 5-time greater influence on the domain and total QI scores than other QIs.

- **Factor/Domain 1**: incontinence, including 4 QIs:
    - Incidence of worsening or serious bowel incontinence
    - Incidence of worsening or serious bladder incontinence
    - Prevalence of occasional to full bowel incontinence without a toileting plan
    - Prevalence of occasional to full bladder incontinence without a toileting plan

- **Factor/Domain 2**: physical functioning, including 5 QIs:
    - Incidence of walking as well or better than previous assessment
    - Incidence of worsening or serious functional dependence
    - Incidence of worsening or serious mobility dependence
    - Incidence of worsening or serious range of motion limitation
    - Prevalence of falls with major injury

- **Factor/Domain 3**: restraints and behavioral symptoms, including 4 QIs:
  - Prevalence of physical restraints
  - Incidence of worsening or serious resident behavior problems
  - Prevalence of depressive symptoms
  - Prevalence of antipsychotic medications without a diagnosis of psychosis
- **Factor/Domain 4**: care for specific conditions, including 6 QIs:
  - Prevalence of moderate to severe pain
  - Prevalence of pressure sores in high risk residents
  - Prevalence of unexplained weight loss
  - Prevalence of indwelling catheters
  - Prevalence of urinary tract infections
  - Prevalence of infections

Highly correlated QIs

The two long-stay QIs "incidence of worsening or serious bladder incontinence" and "incidence of worsening or serious bowel incontinence" have a correlation coefficient of 0.657. The two long-stay QIs "prevalence of occasional to full bladder incontinence without a toileting plan" and "prevalence of occasional to full bowel incontinence without a toileting plan" have a correlation coefficient of 0.683. The two long-stay physical functioning QIs "incidence of worsening or serious functional dependence" and "incidence of worsening or serious mobility dependence" have a correlation coefficient of 0.508. Given two highly correlated QIs, if a facility had a high rate of one QI, the facility would have a corresponding high rate of the other QI. Two highly correlated QIs suggest they may be measuring some redundant aspects of quality of care. It may be reasonable to combine them into one QI.

Distributions of QIs with floor or ceiling effect

Nine of the 21 QIs have an approximately normal distribution with relatively large variation in QI rates. The current scoring approach discriminates well between facilities. The best performing 20% of facilities statewide get full points on each QI, the worst performing 10% get no points, and the rest are sorted and given a prorated point value. Facilities that receive full points are exhibiting better quality relative to their peers, and facilities receiving no points are exhibiting worse quality relative to their peers.

However, 8 QIs have a distribution that deviates from normality. They display minimal variation in QI rates, and rates are highly skewed with a floor effect (a large number of facilities have a QI rate at or near 0%). An additional 4 QIs have a wider distribution, yet they are subject to a ceiling (a large number of facilities have a QI rate at or near 100%) or floor effect. The prevalence of physical restraints is an example of a QI with minimal variation and an extreme

floor effect (Figure 33Figure 34). Nearly all facilities (94.4%, n = 337) have completely eliminated restraint use. The remaining 5.6% of facilities (n = 20) have a very low level of restraint use, approximately 2 per 100 long-stay residents in 2019. We recommend discontinuing this QI because of the near-total elimination of restraint use. This problem could be addressed adequately through the regulatory system of nursing home inspections. If keep it, we recommend facilities with a QI rate of 0% or no restrained residents receive full points and the rest facilities (with even one restrained resident) receive no points.

Figure 33. The distribution of quality indicator: Adjusted Prevalence of Physical Restraints (Long-Stay)
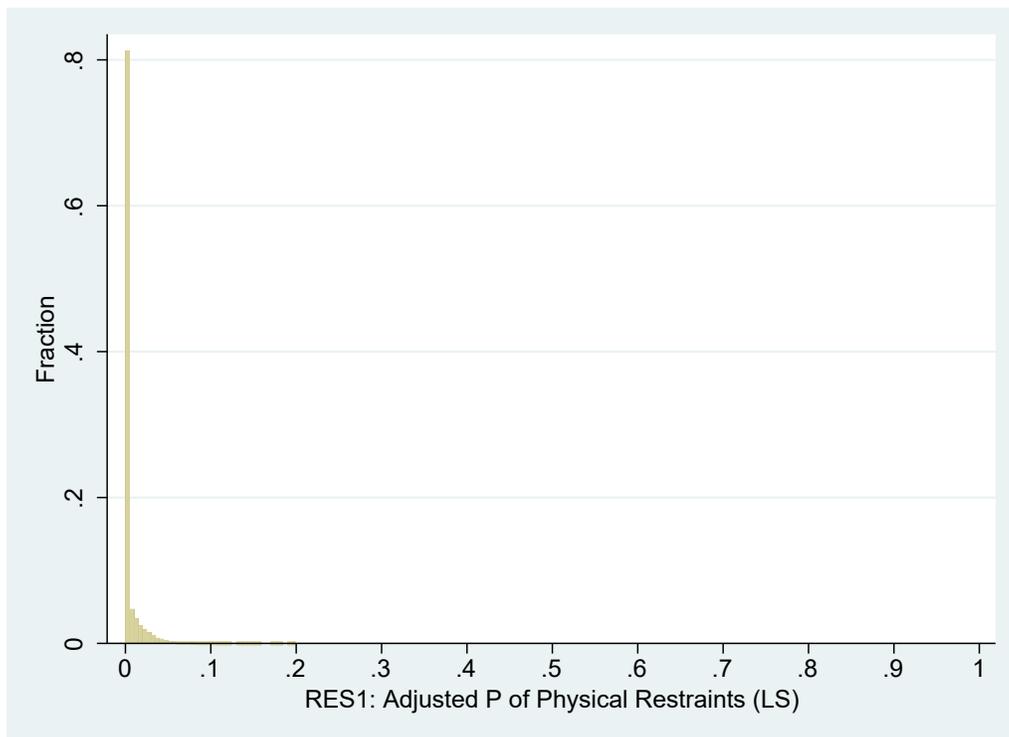
Figure 34.The trends of quality indicator: Adjusted Prevalence of Physical Restraints (Long-Stay)
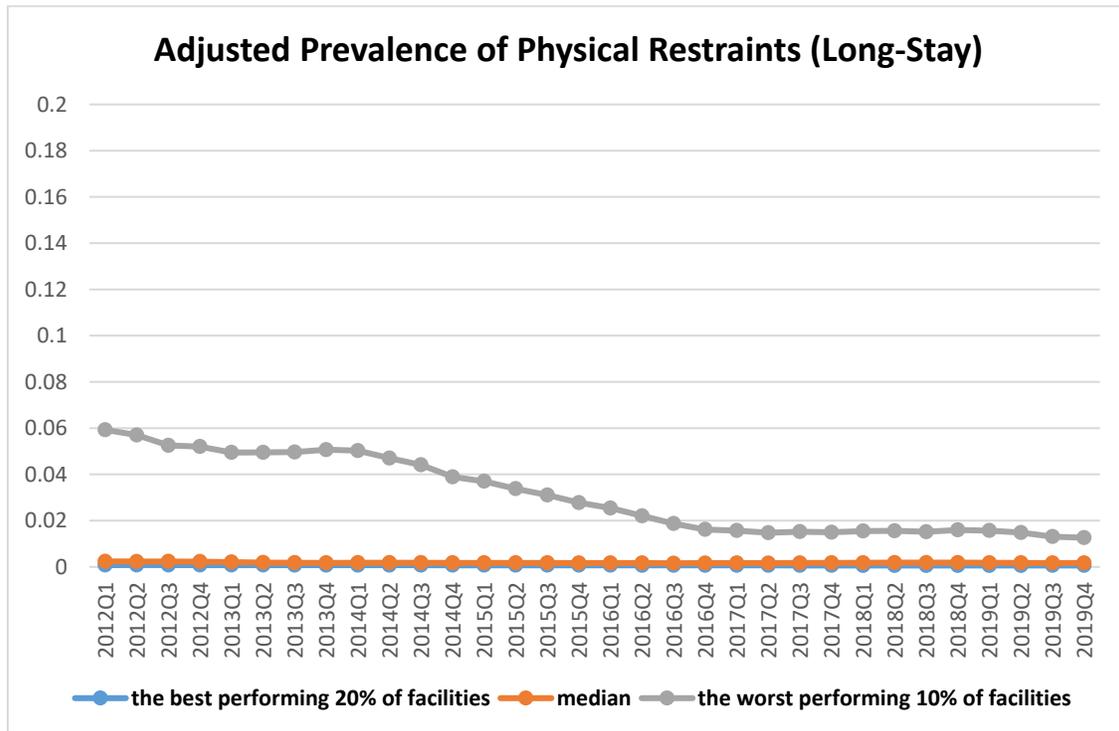
A less extreme case is the QI for use of antipsychotics without a supporting psychiatric diagnosis which also displays a skewed distribution and a floor effect (Figure 35). In the fourth quarter of 2019, the best 20% of facilities with QI rates below 2.4% received full points (10 points), and 21 facilities (approximately 6% of all facilities) had no residents with occasional to full bladder incontinence who did not have a toileting plan. The bottom 10% of facilities with QI rates ranging from 15.5% to 48.6% received no points, and facilities in between would receive points proportional to their rates (between 0 and 10 points). However, more than 50% of facilities achieved a QI rate below 6%. The current scoring approach may distort or exaggerate the differences in QI rates, assigning widely varying points to facilities that vary little in their QI rates (Figure 36). When more than half facilities are able to achieve a better QI rate (below 6%), then the poorer performing facilities should be held to a more stringent standard. For example, a facility with 6% or more residents with inappropriate antipsychotic use (the bottom 50% of facilities) should receive no points. A threshold for facilities receiving no points may be set at the worst 50%, rather than the worst 10% of facilities currently used.

Figure 35. The distribution of quality indicator: Adjusted Prevalence of Antipsychotic Medications without a Diagnosis of Psychosis (Long-Stay)
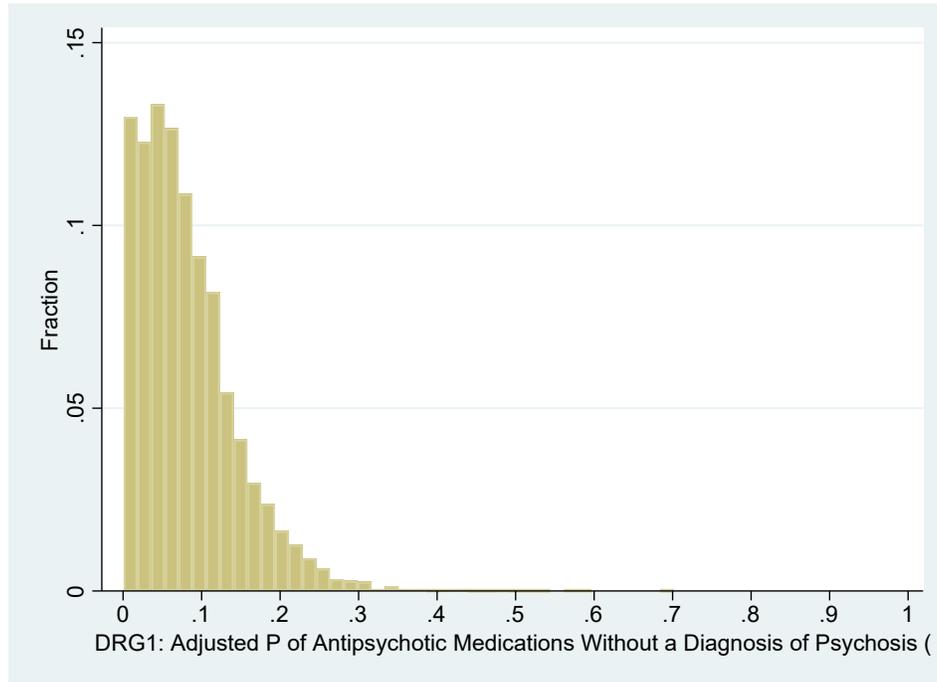
Figure 36. The trends of quality indicator: Adjusted Prevalence of Antipsychotic Medications without a Diagnosis of Psychosis (Long-Stay)
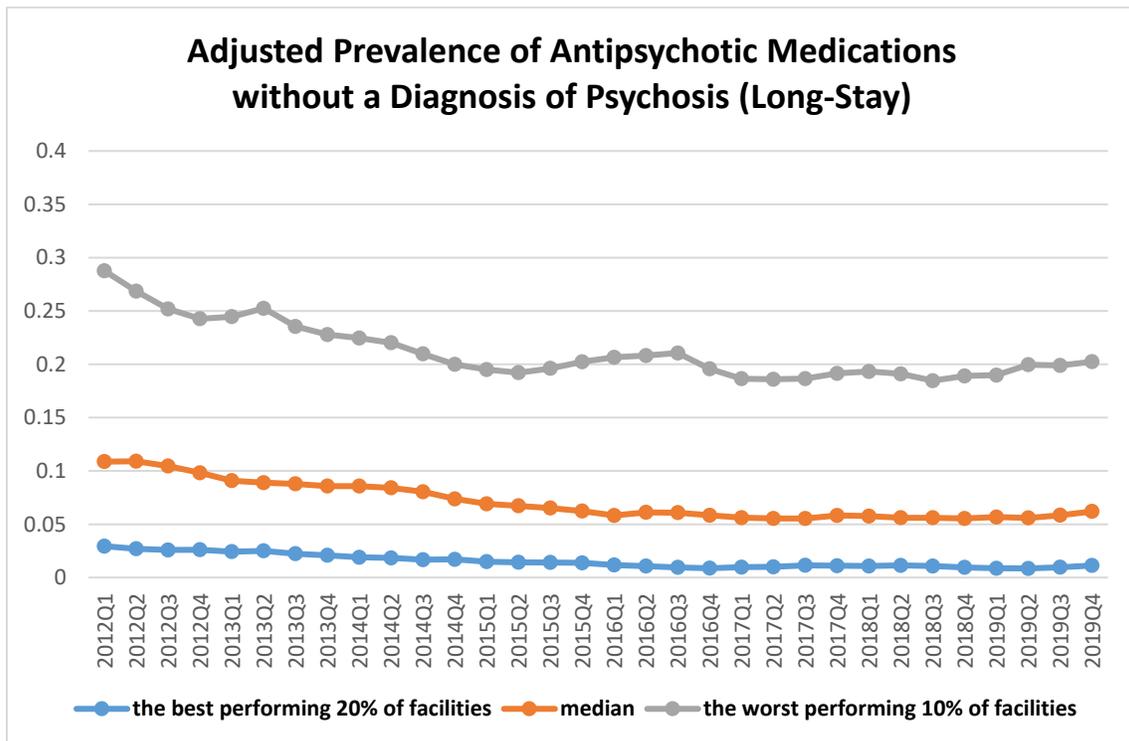
There are two QIs ("prevalence of occasional to full bladder incontinence without a toileting plan" and "prevalence of occasional to full bowel incontinence without a toileting plan") that exhibit a ceiling effect (a large number of facilities have a QI rate at or near 100%), although they have relatively large variance (Figure 37). Under the current scoring approach, the best 20% of facilities, which receive full points, have a very wide QI rate. For example, the percentage of long-stay residents with bladder incontinence without a toileting plan ranged from 6% to 77% among facilities receiving full points in the fourth quarter of 2019. Only facilities with a percentage as high as 96% or above received no points (the worst 10% facilities in the fourth quarter of 2019). Moreover, the absence of a toileting plan QI is trending upward during the 2012-2019 period (Figure 38). Even the performance of the best 20% facilities is getting worse over time.

Figure 37. The distribution of quality indicator: Adjusted Prevalence of Occasional to Full Bladder Incontinence without a Toileting Plan (Long-Stay)
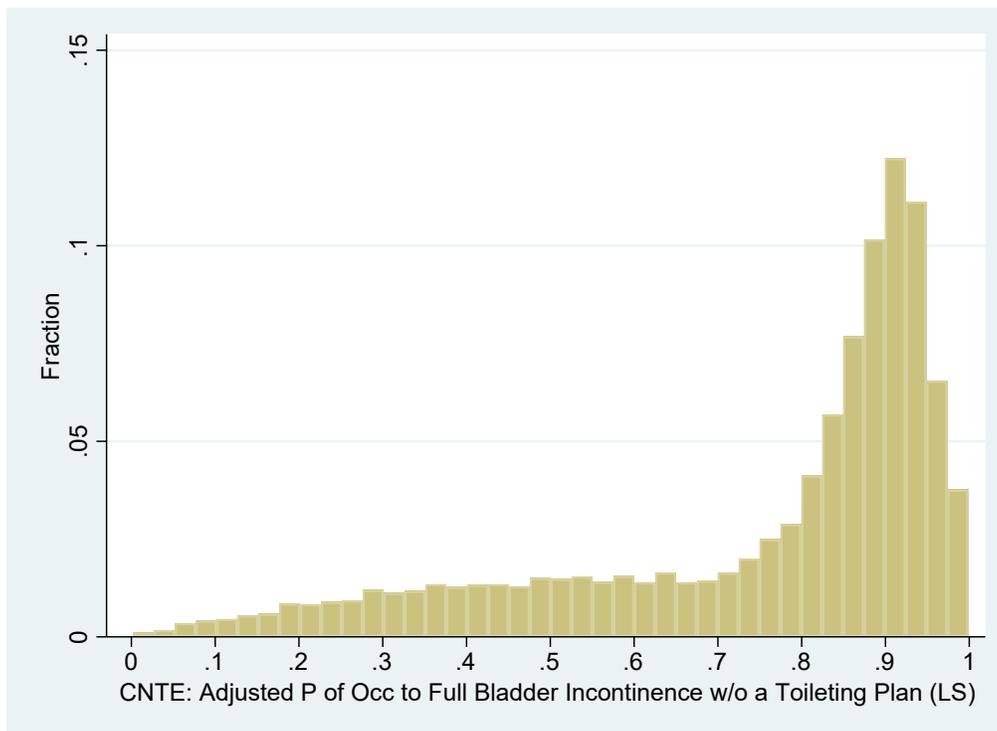
Figure 38. The trends of quality indicator: Adjusted Prevalence of Occasional to Full Bladder
Incontinence without a Toileting Plan (Long-Stay)

**Adjusted Prevalence of Occasioanal to Full Bladder
Incontinence without a Toileting Plan (Long-Stay)**
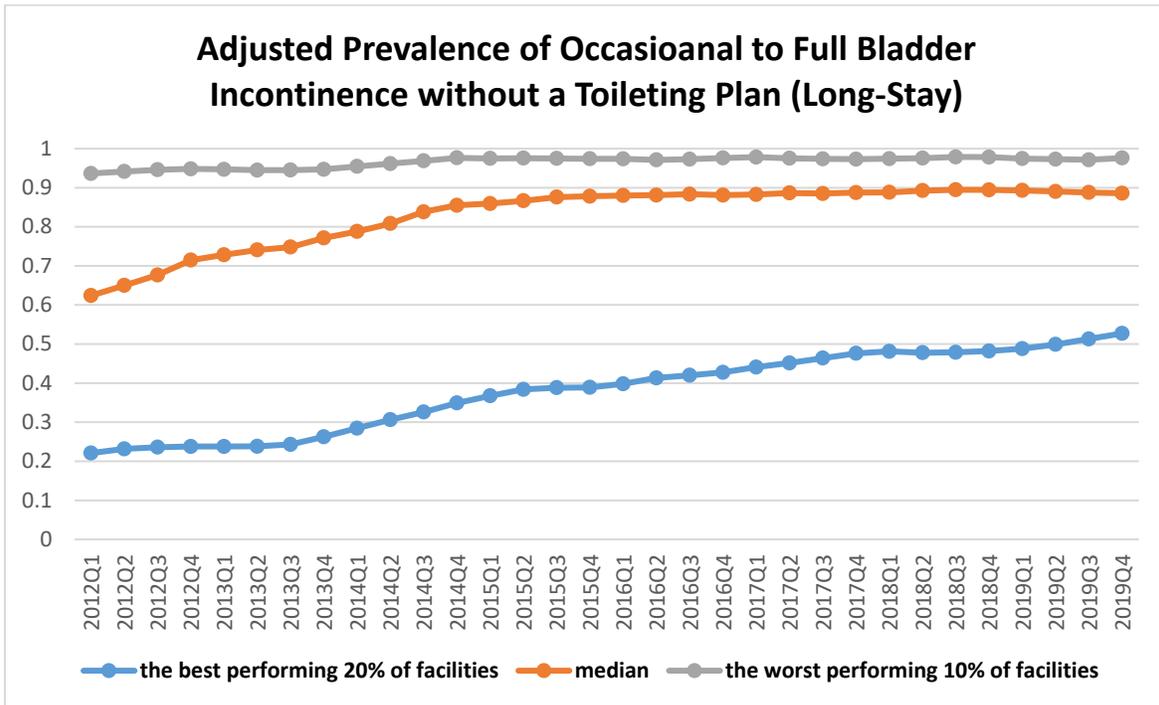
Summary

The underlying patterns in the data support four domains for the 19 long-stay QIs: incontinence
(4 QIs), physical functioning (5 QIs), restraints and behavioral symptoms (4 QIs), and care for
specific conditions (6 QIs). The new domain structure has more balanced domains.

Nine of the 21 QIs display an approximately normal distribution and 12 QIs display a skewed
distribution with facilities tightly grouped at the very bottom (floor) or top (ceiling) of the QI
distribution. Eight QIs also display minimal variation in QI rates. Our findings suggest that the
current scoring approach may distort or exaggerate the differences in the QI rates with skewed
distributions, assigning widely varying points to facilities that vary little in their QI rates. Table
16 presents the proposed thresholds and points for the current QIs based on the observed QI rates
in the fourth quarter of 2019. Regarding the normally distributed QIs, we recommend using the
current scoring approach. For the extreme case of the physical restraint QI, we recommend
discontinuing it because of the near-total elimination of restraint use and coverage of this
problem by state inspections. When QIs are highly skewed and many facilities are able to
achieve the best QI rate (a QI rate of 0%), we recommend using zero deficit for facilities to
receive full points. That is, facilities with a QI rate of 0% receive full points, the worst
performing 10% of facilities receive no points, and facilities in between receive points
proportional to their rates. For the two QIs ("prevalence of antipsychotic medications without a
diagnosis of psychosis" and "prevalence of depressive symptoms"), more than half of facilities

are able to achieve a better QI rate (use of antipsychotics QI: 6%; depressive symptoms QI: 3%). So the worst 50% of facilities, instead of the worst 10%, should receive no points. The best performing 20% of facilities receive full points, and facilities in between receive points proportional to their rates.

Table 17 summarizes the findings about the current 21 facility-level QIs from the qualitative and quantitative studies. Besides discontinuing the "prevalence of physical restraints" QI, we recommend discontinuing 2 QIs: "prevalence of occasional to full bladder incontinence without a toileting plan" and "prevalence of occasional to full bowel incontinence without a toileting plan". We recommend combining two highly correlated QIs (incidence of worsening or serious bowel incontinence" and "incidence of worsening or serious bladder incontinence") into one QI "incidence of worsening or serious bowel or bladder incontinence". We also recommend replacing the "prevalence of falls with injury" QI with two new QIs "prevalence of any fall" and "prevalence of two or more falls or fall with injury". See Table 17 for detail about the rationale for these recommendations.

The current QIs, with the exception of the improved walking QI, focus on avoiding poor care practices or outcomes. These negatively framed QIs convey a message of avoiding harm, essentially penalizing facilities for poor care. Positively framed QIs are intended to reward facilities for better care, with better care processes and outcomes. Earlier versions of the QIs, prior to 2016, had several positively focused QIs, emphasizing improvement in functioning and continence. We recommend re-introducing the following positively-framed QIs: "incidence of improved or maintained functional independence" and "incidence of improved or maintained bowel or bladder continence". We also recommend adding two new QIs for short-stay residents which have been used in the federal quality measures: "prevalence of any fall" and "prevalence of antipsychotic medications without a diagnosis of psychosis". Table 18 summarizes the recommended changes made to current QIs and new QIs.

Besides the summary, there are two additional points worth discussing. First, the line graphs also paint a picture of change in the QIs over time. Some of the change may be due to a change in the Minimum Data Set (MDS) or the way the QIs are defined. Some of the trends in the QIs may indicate changes in true care quality. For example, the physical restraints QI tends to be trending downward, while absence of a toileting plan QI is trending upward. Second, since the thresholds are based on percentiles, they will move with overall QI trends. A specific QI rate (10% incidence or prevalence) could move up or down in the point system over time depending on how the distribution changes. Conversely, a facility may be improving in its QI rate, but since others are improving as well, that facility will not get any higher points. Should the thresholds possibly be fixed, such that they are based on the same QI rates over time? This is a potential area for future analysis.

Table 16. Proposed thresholds and points based on observed QI rates in the fourth quarter of 2019

QI	Full Points			Points In Between	No Points		Comments
Keep QIs in Present Form	**Threshold**	**% facility**	**QI Rate (%)**		**Threshold**	**QI Rate (%)**	
Prevalence of New or Worsening Pressure Sores (Short-Stay)	Zero Deficit	37.5%	0	Linear Interpolation	Worst 10 %tile	2.4	Skewed distribution with floor effect
Prevalence of Pressure Sores in High Risk Residents (Long-Stay)	Zero Deficit	10.2%	0	Linear Interpolation	Worst 10 %tile	8.7	Skewed distribution with floor effect
Prevalence of Indwelling Catheters (Long-Stay)	Zero Deficit	24.2%	0	Linear Interpolation	Worst 10 %tile	5.2	Skewed distribution with floor effect
Prevalence of Infections (Long-Stay)	Zero Deficit	14.9%	0	Linear Interpolation	Worst 10 %tile	4.6	Skewed distribution with floor effect
Prevalence of Falls with Injury (Long-Stay)	Zero Deficit	21.1%	0	Linear Interpolation	Worst 10 %tile	6.6	Skewed distribution with floor effect
Prevalence of Urinary Tract Infections (LS)	Zero Deficit	8.4%	0	Linear Interpolation	Worst 10 %tile	5.6	Skewed distribution with floor effect
Prevalence of Unexplained Weight Loss (Long-Stay)	Best 20 %tile		2.4	Linear Interpolation	Worst 10 %tile	8.2	floor effect, relative performance
Prevalence of antipsychotic medications without a diagnosis of psychosis (Long-Stay)	Best 20 %tile		2.4	Linear Interpolation	Worst 50 %tile	6.0	floor effect
Prevalence of depressive symptoms (Long-Stay)	Best 20 %tile		0.8	Linear Interpolation	Worst 50 %tile	3.0	floor effect
Incidence of worsening or serious bowel incontinence (long-stay)	Best 20 %tile		22.1	Linear Interpolation	Worst 10 %tile	41.9	Normally distributed, relative performance
Incidence of worsening or serious bladder incontinence (long-stay)	Best 20 %tile		17.9	Linear Interpolation	Worst 10 %tile	45.0	Normally distributed, relative performance
Prevalence of moderate to serious pain (short-stay)	Best 20 %tile		12.7	Linear Interpolation	Worst 10 %tile	35.0	Normally distributed, relative performance

QI	Full Points			Points In Between	No Points		Comments
Prevalence of moderate to serious pain (long-stay)	Best 20 %tile		5.8	Linear Interpolation	Worst 10 %tile	23.1	Normally distributed, relative performance
Incidence of worsening or serious mobility dependence (long-stay)	Best 20 %tile		16.3	Linear Interpolation	Worst 10 %tile	31.5	Normally distributed, relative performance
Incidence of worsening or serious functional dependence (long-stay)	Best 20 %tile		10.6	Linear Interpolation	Worst 10 %tile	20.3	Normally distributed, relative performance
Incidence of worsening or serious range of motion limitation (long-stay)	Best 20 %tile		4.7	Linear Interpolation	Worst 10 %tile	21.0	Normally distributed, relative performance
Incidence of walking as well or better than previous assessment (long-stay)	Best 20 %tile		72.7	Linear Interpolation	Worst 10 %tile	48.9	Normally distributed, relative performance
Incidence of worsening or serious resident behavior problems (long-stay)	Best 20 %tile		4.9	Linear Interpolation	Worst 10 %tile	19.2	Normally distributed, relative performance
Drop/Significantly Revise these QIs							
Prevalence of Physical Restraints (Long-Stay)							Skewed distribution with floor effect, target: no resident fails the QI
Prevalence of occasional to full bladder incontinence without a toileting plan (Long-Stay)							Skewed distribution, systemic problem with vast majority of facilities doing poorly on this QI
Prevalence of occasional to full bowel incontinence without a toileting plan (Long-Stay)							Skewed distribution, systemic problem with vast majority of facilities doing poorly on this QI

Notes: The second column is the threshold for facilities to receive full points: either the facilities have a QI rate of zero or the best performing 20% of facilities. The third column is the percentage of facilities that receive full points. If we use the "Best 20 %tile" threshold, the percentage of facilities is 20%, which is blank. The fourth column is the actual QI rate (%). If a facility QI rate is equal or lower than this QI rate, the facility receives full points. The only exception is the positive walking QI rate. If a facility walking QI rate is equal or greater than 72.7%, the facility receives full points.

Table 17. Summary of 21 facility-level QIs from the qualitative and quantitative studies

21 Quality Indicators	Care domain (Factor)	Problems identified in quantitative studies	Findings from qualitative studies	Correlation with other quality measures	Recommendations
Incidence of Worsening or Serious Bowel Incontinence (LS)	Incontinence	moderate correlation	Incontinence is challenging to change and frustrates staff; measured too rigidly and staff unlikely to choose as a QI focus due to difficulty moving the score; inconsistent case mix reviews have exacerbated the problems with the QI, as have differences between federal and state measures. Regarding *responsiveness*, both QIs had a mean score lower than 3. Regarding *importance and usability*, both QIs had the lowest or second lowest scores. Regarding *validity*, bladder incontinence QI had a mean score of 2.4.	Bowel incontinence QI is significantly correlated with QOL (-0.31), family satisfaction (-0.35), long-stay total quality score (-0.31), short-stay resident survey (-0.36), and VBR score (-0.32).	Keep QI due to significant correlations with other quality measures. Combine with bladder continence
Incidence of Worsening or Serious Bladder Incontinence (LS)		moderate correlation			Combine with bowel continence

21 Quality Indicators	Care domain (Factor)	Problems identified in quantitative studies	Findings from qualitative studies	Correlation with other quality measures	Recommendations
Prevalence of Occasional to Full Bladder Incontinence without a Toileting Plan (LS)	Incontinence without a toileting plan	ceiling effect, moderate correlation	Some residents refuse active toileting plans in exchange for sleep or activities if incontinence management products are working well. Complete continence is a challenge and often not the resident's goal. Some incontinence is normal with aging and not a reflection of assistance provided with toileting. Regarding *responsiveness*, both QIs had a mean score lower than 3. Regarding *importance* and *usability*, both QIs had the lowest or second lowest scores.	Bladder incontinence QI is significantly correlated with total QI score (-0.31), long-stay total quality score (-0.32), and VBR score (-0.30).	Discontinue QI due to the identified problems and concerns with how QI data is collected.
Prevalence of Occasional to Full Bowel Incontinence without a Toileting Plan (LS)		ceiling effect, moderate correlation			Discontinue QI due to the identified problems and concerns with how QI data is collected.

21 Quality Indicators	Care domain (Factor)	Problems identified in quantitative studies	Findings from qualitative studies	Correlation with other quality measures	Recommendations
Prevalence of Moderate to Severe Pain (LS)	Pain		Pain is subjective, it is difficult to obtain the goal of no pain, and the differences between federal and state QIs in this area are confusing. Addiction issues are important to address, and reports of pain often vary depending upon who is asking and in what context. The 7-day 'look back' on the MDS exacerbates the problem of pain measurement. Some pain may be inevitable with some conditions, such as arthritis. Regarding *responsiveness*, it had a mean score of 2.7.	It is significantly correlated with total QI score (-0.52), long-stay total quality score (-0.43), and VBR score (-0.33).	Keep QI due to clinical significance. Might create an opioid use QI
Prevalence of Moderate to Severe Pain (SS)			Short stay pain is very dependent upon your population and unstable over time as the population changes. Regarding *responsiveness*, it had a mean score of 2.9.	It is significantly correlated with total QI score (-0.35).	Keep QI due to clinical significance. Might create an opioid use QI

21 Quality Indicators	Care domain (Factor)	Problems identified in quantitative studies	Findings from qualitative studies	Correlation with other quality measures	Recommendations
Incidence of Walking as Well or Better than on Previous Assessment (LS)	Physical Functioning	the only positive QI	Walking and range of motion are particularly hard to move in the long stay population, which depresses scores, but progress can be made with effort and the measures reflect that effort.		It might be redefined negatively as worsening walking
Incidence of Worsening or Serious Functional Dependence (LS)		correlation	Decline in function is frustrating to staff given some decline may be inevitable and not a reflection of poor care. Nursing staff tend to document the highest level of function and may underestimate the amount of care or supervision they are providing. Regarding *responsiveness*, it had a mean score of 2.6.	It is significantly correlated with total QI score (-0.32), long-stay total quality score (-0.36), and VBR score (-0.36).	Keep QI due to significant correlations with other quality measures. Combine with mobility dependence. If keeping both, clarify that this QI focuses on "late loss" functional loss vs. mobility (rename QI?).

21 Quality Indicators	Care domain (Factor)	Problems identified in quantitative studies	Findings from qualitative studies	Correlation with other quality measures	Recommendations
Incidence of Worsening or Serious Mobility Dependence (LS)		correlation	Mobility measures are highly responsive and are a good focus to engage therapy staff with nursing. Mobility was one of the most commonly noted measures of clarity. Risk adjustment could be improved if excluding residents with neurological conditions. Regarding *validity*, it had a mean score of 2.9.		Combine with functional dependence. If keeping both, clarify them. Consider risk-adjustment by excluding residents with neurological conditions.

21 Quality Indicators	Care domain (Factor)	Problems identified in quantitative studies	Findings from qualitative studies	Correlation with other quality measures	Recommendations
Prevalence of Falls with Injury (LS)		too little variance, floor effect	Overall number of falls is important to measure, as opposed to only falls with injury, because it is an example of an adverse event with potential impact, has a close connection with quality of care, and can impact QOL. One time big falls with injury are often related to other comorbidities, and frequent falls without injury allows for examination of the root cause of a quality problem. Frequent falls are important to families and also insurance companies. The amount of injury incurred is more an effect of resident frailty than staff supervision. Regarding *responsiveness* and *validity*, it had the lowest mean scores.		Keep due to clinical significance and consider scoring changes. Consider replacing with new "all falls" QI.

21 Quality Indicators	Care domain (Factor)	Problems identified in quantitative studies	Findings from qualitative studies	Correlation with other quality measures	Recommendations
Incidence of Worsening or Serious Range of Motion Limitation (LS)			Walking and range of motion are particularly hard to move in the long stay population, which depresses scores, but progress can be made with effort and the measures reflect that effort. Regarding *responsiveness*, it had a mean score of 2.7.		Keep QI
Incidence of Worsening or Serious Resident Behavior Problems (LS)	Restraints and Behavioral Symptoms		Behavior score is very dependent upon your population, and is determined by your population more than your overall quality. A resident's behavior may be dealt with appropriately and still continue daily depending on the resident's diagnosis. Not always changeable or a measure of care quality. Behaviors often occur despite staff intervention. Regarding *validity*, it had a mean score of 2.7. Regarding *responsiveness*, it had the lowest mean score.	It is significantly correlated with total QI score (-0.37), and long-stay total quality score (-0.33).	Keep QI due to significant correlations with other quality measures.

21 Quality Indicators	Care domain (Factor)	Problems identified in quantitative studies	Findings from qualitative studies	Correlation with other quality measures	Recommendations
Prevalence of Depressive Symptoms (LS)		floor effect	Regarding *responsiveness*, it had a mean score of 2.7. Regarding *importance*, it has the highest mean score.	It is significantly correlated with total QI score (-0.41), long-stay total quality score (-0.41), and VBR score (-0.35).	Consider scoring changes.
Prevalence of Physical Restraints (LS)		too little variance, floor effect	Restraints are so infrequently used that it is an easy success, but not reflective of overall quality. Regarding *responsiveness*, it had a mean score of 2.7. Regarding *usability*, it had the lowest mean score.		Discontinue QI due to near-total elimination of restraint use and coverage of this topic by state inspections.

21 Quality Indicators	Care domain (Factor)	Problems identified in quantitative studies	Findings from qualitative studies	Correlation with other quality measures	Recommendations
Prevalence of Antipsychotic Medications without a Diagnosis of Psychosis (LS)		floor effect	Antipsychotics (when prescribers are on board) were described as well-measured and responsive QI. Adjusters/exclusions can have a large effect on some scores (particularly weight loss and anti-psychotics). Excluding some multi-use drugs such as Abilify from the anti-psychotic QI when used for depression Antipsychotic domain should be adjusted for behavioral health facilities.	It is significantly correlated with total QI score (-0.42), long-stay total quality score (-0.41), and VBR score (-0.36).	Consider scoring changes. Consider risk-adjustment
Prevalence of Infections (LS)		too little variance, floor effect	Infections were described as well-measured and responsive QI. Infections were one of the most commonly noted measures of clarity. It has the highest mean score in terms of *importance*, *validity*, and *usability*, and the second highest mean score of *responsiveness*.		Consider scoring changes

21 Quality Indicators	Care domain (Factor)	Problems identified in quantitative studies	Findings from qualitative studies	Correlation with other quality measures	Recommendations
Prevalence of New or Worsening Pressure Sores (SS)	Care for Specific Conditions	too little variance, floor effect	A challenge to the validity of the measures is the variation in interpretation between facilities on some MDS items such as pressure ulcers, incontinence, and functional independence. It has the highest mean score in terms of *importance*, *validity*, *responsiveness* and *usability* among short-stay measures.		Keep QI due to clinical significance and consider scoring changes
Prevalence of Pressure Sores in High Risk Residents (LS)		too little variance, floor effect	A challenge to the validity of the measures is the variation in interpretation between facilities on some MDS items such as pressure ulcers, incontinence, and functional independence.	It is significantly correlated with total QI score (-0.49), long-stay total quality score (-0.47), and VBR score (-0.44).	Keep QI due to clinical significance and consider scoring changes

21 Quality Indicators	Care domain (Factor)	Problems identified in quantitative studies	Findings from qualitative studies	Correlation with other quality measures	Recommendations
Prevalence of Unexplained Weight Loss (LS)		too little variance, floor effect	Weight loss was described as well-measured and responsive QI. Weight loss was helpful in that it creates a warning sign that can be acted upon to avoid clinical decline. Weight loss, mobility and infections were the most commonly noted measures of clarity. Adjusters/ exclusions can have a large effect on some scores (particularly weight loss and anti-psychotics). Weight loss makes an excellent PIPP outcome; it is clearly measured, responsive to efforts, and pairs well with other important aspects of quality such as skin care.	It is significantly correlated with total QI score (-0.45), long-stay total quality score (-0.48), and VBR score (-0.41).	Keep QI due to clinical significance and consider scoring changes
Prevalence of Indwelling Catheters (LS)		too little variance, floor effect	Regarding *responsiveness*, it had the highest mean score.		Keep QI due to clinical significance and consider scoring changes

21 Quality Indicators	Care domain (Factor)	Problems identified in quantitative studies	Findings from qualitative studies	Correlation with other quality measures	Recommendations
Prevalence of Urinary Tract Infections (LS)		too little variance, floor effect	UTIs were described as well-measured and responsive QI. It has the highest mean score in terms of *validity,* and the second highest mean score of *usability*.		Keep QI due to clinical significance and consider scoring changes

Notes: Correlation: 2 or more QIs are similar enough to question the need to include both/all of them

Ceiling effect: a large number of providers have a QI rate at or near 100%

Floor effect: a large number of providers have a QI rate at or near 0%

Positive QI: QI that is coded to trigger when a resident has a positive or good outcome

Too little variance: nursing home providers are performing very similarly statewide

Importance: This measure addresses an important area of clinical quality. The measure addresses a key aspect of care quality. (1=Strongly Disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly Agree)

Validity: This measure reflects actual care quality. (1=Strongly Disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly Agree)

Responsiveness: It is easy to achieve improvements in this measure with appropriate efforts and actions. (1=Strongly Disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly Agree)

Usability: This measure is useful in decision making. Tracking our data in this area help to improve care. (1=Strongly Disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly Agree)

Table 18. Summary of recommended changes in the current QIs and new QIs

	Domain [a]	Current or New	Negatively or Positively Framed
Long-Stay Quality Indicators			
Incidence of Worsening or Serious Bowel or Bladder Incontinence	Incontinence	New	Negatively
Incidence of Improved or Maintained Bowel or Bladder Incontinence		New	Positively
Prevalence of Occasional to Full Bowel or Bladder Incontinence without a Toileting Plan [b]		New	Negatively
Incidence of Walking as Well or Better than on Previous Assessment	Physical functioning	Current	Positively
Incidence of Worsening or Serious Functional Dependence		Current	Negatively
Incidence of Worsening or Serious Mobility Dependence		Current	Negatively
Incidence of Worsening or Serious Range of Motion Limitation		Current	Negatively
Prevalence of Any Falls		New	Negatively
Prevalence of Two or More Falls or Fall with Injury		New	Negatively
Incidence of Worsening Walking		New	Negatively
Incidence of Improved or Maintained Functional Independence		New	Positively
Incidence of Worsening or Serious Resident Behavior Problems	Restraints and	Current	Negatively
Prevalence of Depressive Symptoms	behavioral	Current	Negatively
Prevalence of Antipsychotic Medications without a Diagnosis of Psychosis	symptoms	Current	Negatively
Prevalence of Moderate to Severe Pain	Care for	Current	Negatively
Prevalence of Pressure Sores in High Risk Residents	specific	Current	Negatively
Prevalence of Unexplained Weight Loss	conditions	Current	Negatively
Prevalence of Indwelling Catheters		Current	Negatively
Prevalence of Urinary Tract Infections		Current	Negatively
Prevalence of Infections		Current	Negatively

	Domain [a]	Current or New	Negatively or Positively Framed
Short-Stay Quality Indicators			
Prevalence of Moderate to Severe Pain		Current	Negatively
Prevalence of New or Worsening Pressure Sores		Current	Negatively
Prevalence of Antipsychotic Medications without a Diagnosis of Psychosis		New	Negatively
Prevalence of Any Falls		New	Negatively

Notes:

a. The domains of long-stay QIs is based on analysis of the current 19 long-stay QIs. With new long-stay QIs, the domains may change.
b. b. For the QI "Prevalence of Occasional to Full Bowel or Bladder Incontinence without a Toileting Plan", we hesitate to recommend dropping it. Yet, given the very high failure rate on the QI and resistance to it from the industry, it is not workable in its current form. See the detailed information in the section of Recommend Actions.

Recommended Actions

The Minnesota Nursing Home Report Card provides two clinical quality indictor (QI) ratings: one focused on the quality of care during long-term stays (LS) with 19 indicators, and one focused on the quality of care during short-term stays (SS) with 2 indicators.

There are three problems identified in our quantitative analysis. First, the current domain structure was not supported by our analysis. Expert opinions were employed to group the 19 long-stay QIs into 10 different domains or aspects of care. However, the underlying patterns of facility QI rates, as determined by empirical factor analysis, support a different structure of domains. The structure from our analysis is described below.

Second, individual QIs vary widely in their contributions to the domain and total QI scores. When multiple QIs are grouped under a single domain, their contribution is diminished. Each of the 10 domains is assigned 10 points and within each domain the points are distributed equally. However, the number of QIs within each domain varies considerably, ranging from 1 to 5. Consequently different weights are assigned to the individual QIs. For example, the "prevalence of pressure sores in high-risk residents" QI gets 10 points, while the "prevalence of worsening or serious bladder incontinence" QI gets 2 points. Based on the points assigned, the pressure sore QI is five times as important as the bladder incontinence QI.

Third, several of the QIs display a skewed distribution with facilities tightly grouped at the very top (ceiling) or bottom (floor) of the QI distribution. The current scoring approach is best suited for a facility QI distribution that is normal, i.e., bell-shaped curve. The best performing 20% of facilities statewide get full points on each QI, the worst performing 10% get no points, and the rest are sorted and given a prorated point value. If a QI is normally distributed with relatively large variation in rates, the scoring program discriminates well between facilities. Facilities that receive full points are exhibiting better quality relative to their peers, and facilities receiving no points are exhibiting poor quality.

In contrast, 8 QIs have a distribution that deviates from normality. They display minimal variation in QI rates, and rates are highly skewed with a floor effect (a large number of facilities have a QI rate at or near 0%). An additional 4 QIs have a wider distribution, yet they are subject to a floor or ceiling effect. The prevalence of physical restraints is an example of a QI with minimal variation and an extreme floor effect, nearly all facilities (94.4% in the fourth quarter of 2019) have completely eliminated restraint use. Facilities with no restrained residents receive full points as intended. However, the bottom 10% of facilities, which receive no points, have a very low level of restraint use, approximately 2 per 100 long-stay residents during 2017-2019. When a QI has a skewed distribution and when many facilities are able to achieve a perfect score, i.e., not a single resident failing on a QI, then it may be appropriate to set the top performance threshold at an absolute value of zero problem cases. For example, in order for a facility to achieve full points, it would have to have no residents with pressure sores or urinary tract

infections. This viewpoint sets a target of a zero error rate, recognizing that every facility may not achieve the target every time, but all facilities should be striving to achieve it.

After integrating both qualitative and quantitative findings, we made the following recommendations.

Recommended Action: Adopt new domains for the long-stay QIs.

We recommend adopting a new domain structure for the 19 long-stay QIs. If long-stay QIs are added (recommendation below), they should be placed under the new domain structure. Our findings indicate it is reasonable to categorize these QIs into 4 rather than 10 domains currently used: *incontinence* (4 QIs: bladder incontinence, bowel incontinence, absence of a toileting plan for residents with bowel incontinence, and absence of a toileting plan for residents with bladder incontinence), *physical functioning* (5 QIs: improved walking, functional decline, mobility dependence, range of motion limitation, and falls), *restraints and behavioral symptoms* (4 QIs: physical restraints, behavioral problems, depressive symptoms, and use of antipsychotics without a supporting psychiatric diagnosis), and *care for specific conditions* (6 QIs: pain, pressure sores, unexplained weight loss, indwelling catheters, urinary tract infections, and infections). The new domain structure has two advantages. First, the new domains are more consistent with underlying patterns in the facility QI rates, indicating that they are more reliable and valid. Second, the new domain structure results in more balanced domains, with the number of QIs within each domain ranging from 4 to 6. The new domain structure makes the contributions of individual QIs to the domain and total QI scores similar (either 1.0, 1.2, or 1.5) and not as exaggerated as the current domain structure (some QIs had a 5-time greater influence on the domain and total QI scores than other QIs). If we assume that individual QIs are equally important and contribute equally to the domain and total QI scores, we recommend creating facility domain points by averaging the QI points within each domain. The facility domain points are either summed or averaged to create an overall QI score for each facility.

Recommended Action: Discontinue the restraint QI.

Nearly all facilities have achieved zero physical restraints of their residents. As a consequence the QI does not discriminate well between facilities. Inappropriate use of physical restraints, occurring among only a handful of facilities, could be addressed adequately through the regulatory system of nursing home inspections.

Recommended Action: Reform the current scoring program for QIs with skewed distribution.

When QIs are highly skewed and many facilities are able to achieve the best QI rate (a QI rate of 0%, such as no pressure sores), then the poorer performing facilities (with even one resident with pressure sores) should not receive full points. Only facilities with a zero QI rate should receive full points, the worst performing 10% of facilities should receive no points, and facilities in between should receive points proportional to their rates. For the two QIs ("prevalence of antipsychotic medications without a diagnosis of psychosis" and "prevalence of depressive

symptoms"), more than half facilities are able to achieve a better QI rate (use of antipsychotics QI: 6%; depressive symptoms QI: 3%). So the worst 50% of facilities, instead of the worst 10%, should receive no points. The best performing 20% of facilities should receive full points, and facilities in between should receive points proportional to their rates.

Recommended Action: Consider a substantial revision of the QIs involving toileting for incontinent residents.

We have mixed feelings about the two long-stay QIs: "prevalence of occasional to full bladder incontinence without a toileting plan" and "prevalence of occasional to full bowel incontinence without a toileting plan". The two toileting QI rates exhibit ceiling effects (a large number of facilities have a QI rate at or near 100%) and receive the lowest ratings from the provider survey in terms of importance and usability. During focus groups with nursing facility administrators and quality experts, concerns about the two QIs were raised; specifically, some felt that the two QIs were not a reflection of assistance provided with toileting.

An effective toileting plan may be difficult to implement because it is resource-intensive and requires considerable skill to implement. However, there is clinical evidence that a well designed and implemented toileting plan can effectively address incontinence. The overall poor performance on the toileting QIs could indicate inadequate effort by facilities, poorly defined and measured QIs, or both. Not only do most facilities perform poorly on these QIs, but the QIs have shown a disturbing upward trend in failure rates from 2012-2019.

For these reasons, we cannot recommend dropping the toileting QIs. Yet, given the very high failure rate and industry resistance to the QIs, they are not workable in its current form.

Recommended Action: Combine highly correlated QIs

We recommend combining the two incontinence QIs ("incidence of worsening or serious bowel incontinence" and "incidence of worsening or serious bladder incontinence") into one QI "incidence of worsening or serious bowel or bladder incontinence", because they are highly correlated (if a facility has a high rate of bowel incontinence, the facility would have a corresponding high rate of bladder incontinence) and they both are representative of the incontinence construct. Although nursing facility administrators and quality experts expressed concerns that the two incontinence QIs were challenging to change, we recommend keeping them due to clinical significance and important correlations with resident and family satisfaction.

Regarding the two correlated QIs "incidence of worsening or serious functional dependence" and "incidence of worsening or serious mobility dependence", we recommend either combining them or clarifying their definitions if keeping both. Nursing facility administrators and quality experts felt that decline in function was inevitable given the resident population and did not reflect poor care. However, the functional decline QI is significantly related to other quality measures. Therefore, we recommend keeping it and clarifying that this QI focuses on late functional loss. Regarding the mobility QI, nursing facility administrators and quality experts felt it was highly

responsive and was a good focus to engage therapy staff with nursing, but thought risk adjustment could be improved if residents with neurological conditions were excluded.

Recommended Action: Redefine the falls QI

Regarding the "prevalence of falls with injury" QI, nursing facility administrators and quality experts felt the amount of injury incurred was more an effect of resident frailty than staff supervision; overall number of falls was important to measure, as opposed to only falls with injury, because it was an example of an adverse event with potential impact, had a close connection with quality of care, and could impact quality of life. In addition, the "prevalence of falls with injury" QI rate is highly skewed with a floor effect and has too little variation. Therefore, we recommend replacing it with two new QIs: "prevalence of any fall" and "prevalence of two or more falls or fall with injury".

Recommended Action: Retain the current QIs covering pain and problem behaviors

Although nursing facility administrators and quality experts expressed concerns with the QIs including pain (difficult to achieve no pain despite nursing efforts) and behaviors (often occur despite staff intervention), we recommend keeping them due to clinical significance and important correlations with other quality measures. We also recommend exploring development of an opioid use QI given the current focus on addiction issues.

Recommended Action: Introduce new QIs with a quality improvement focus and new QIs for short-stay residents

The current QIs, with the exception of the improved walking QI, focus on avoiding poor care practices or outcomes. These negatively framed QIs convey a message of avoiding harm, essentially penalizing facilities for poor care. Positively framed QIs are intended to reward facilities for better care, with better care processes and outcomes. Earlier versions of the QIs, prior to 2016, had several positively focused QIs, emphasizing improvement in functioning and continence. We recommend re-introducing the following positively-framed QIs: "incidence of improved or maintained functional independence" and "incidence of improved or maintained bowel or bladder continence". We also recommend adding two new QIs for short-stay residents which have been used in the federal quality measures: "prevalence of antipsychotic medications without a diagnosis of psychosis" and "prevalence of any fall".

Chapter 6
Relationships Between Quality Measures

The measures of nursing home quality of care can be grouped into four main components: clinical care quality, staffing, resident and family experience, and consumer choice (Table 19). The clinical care quality component includes the health inspection survey, clinical quality indicators (QIs), and hospitalization.

We assume that quality measures are to a degree independent of each other; they each represent a different dimension of care quality. Further, we assume that quality measures may be correlated with each other without one being the cause of another. Rather, they may each fall under a common global construct of care quality. Better overall "care quality" contributes to a positive score on each of the measures, as well as accounting for the correlation between the measures. For example, we found correlations between performance on health inspections (deficiency), differences in certain aspects of clinical care quality, and variation in resident and family experience. Facilities with better overall quality of care probably do well on all three measures. These facilities likely will have better performance on health inspections, better clinical care quality, more satisfied residents and a more positive family experience. Moreover, their better care quality probably results, at least in part, from characteristics not currently measured, such as leadership, organizational structure, and organizational culture; adherence to protocols (procedures, standards, and rules); knowledge, skills, and experience of staff; and staff workload, teamwork, and effective communication. Although these organizational factors are very important in achieving better quality, they are difficult to measure objectively. Future iterations of the Minnesota nursing home quality measurement system might incorporate these types of organizational measures.

Objective

The main objective of this analysis was to explore the correlations between quality measures.

Data and Methods

Table 19 describes the major VBR quality measures. Most measures over the 2013-2019 period were used in the correlational analysis. However, the new VBR score, with additional measures from the family satisfaction (long-stay residents) and short-stay resident surveys, was available only in 2019. Pearson or Spearman correlation, as appropriate, was used to evaluate the correlations between quality measures. Generally, correlation coefficient values less than 0.3 are considered to be weak; 0.3-0.7 are moderate, and 0.7 or greater are strong. High correlation (≥ 0.7) between two quality measures suggests that they may be duplicative, or measuring redundant aspects of nursing home quality.

Table 19. Four main components of nursing home quality of care

Quality of Care		Sources	Quality Measures
Clinical care quality	health inspection survey	CMS NHC	• five-star rating: health inspection survey • total health inspection score • number of facility-reported incidents • number of substantiated complaints • number of fines • total amount of fines in dollars
		MN	• MDH five-star rating: health inspection survey
	clinical quality indicators	CMS NHC	• five-star rating: clinical quality indicator
		MN	• clinical quality indicator summary score • twenty-one quality indicators (19 long-stay and 2 short-stay)
	hospital-ization	MN	• adjusted 30-day hospitalization rate • hospitalization rate for 30+ days per 1000 resident days
Staffing		CMS NHC	• five-star rating: overall staffing and RN • hours per resident per day: RN, LPN, CNA, total nurse, and physical therapy staffing
		MN	• overall staffing score • hours per resident per day: nurse administrators, RN, LPN, CNA, trained medication aides, total nurse, activities staff, mental health workers, social workers, other direct care staff, and total direct care staff • retention: overall, nurse administrators, RN, LPN, CNA, trained medication aides, activities staff, mental health workers, social workers, and other direct care staff • percentage of temporal/pool nursing staff hours
Resident and family experience		MN	• long-stay resident quality of life survey • family satisfaction survey (long-stay residents; 2019) • short-stay residents survey (2019)
Consumer choice	community discharge	MN	• adjusted 3-30 day community discharge rate • adjusted 30-90 day community discharge rate

Quality of Care		Sources	Quality Measures
Overall quality		CMS NHC	• five-star rating: overall
		MN	• VBR score • VBR new score (2019)

Notes: Five-star rating with one star representing the lowest possible rating and five stars representing the highest possible rating. CMS NHC measures come from Center for Medicare and Medicaid Services, Nursing Home Compare; MN measures come from the Minnesota Nursing Home Report Card or VBR measures.

Results

Although we tested a large number of correlations, many of them were well below the moderate level (< 0.3) or not statistically significant. The following tables mainly display moderate to strong correlations

1.1 Resident and family experience

As shown in Table 20, residents and families tend to give higher satisfaction scores for facilities with better performance on health inspections and clinical quality indicators. Quality indicator scores tend to relate more strongly to satisfaction as measured by short-stay resident surveys compared to long-stay resident surveys.

Resident and family experience scores are negatively associated with hospitalization rates and positively associated with community discharge rates.

More nurse staffing hours including certified nursing assistant, total nurse, activity staff, and total direct care staff are positively correlated with better resident and family experience. Similarly, higher retention rates of RN, social worker, and overall staff are positively correlated with better resident and family experience. The strongest correlation is between total nursing/direct care staffing hours and short-stay resident survey results.

Residents and families tend to give higher satisfaction scores for facilities with higher proportion of single rooms. There are positive correlations between occupancy and resident and family experience, which indicate that achieving high satisfaction scores is rewarding by attracting more residents.

Table 20. Correlations between resident and family experience and other quality measures

			long-stay resident quality of life survey	**family satisfaction survey (long-stay)**	**short-stay residents survey**
Overall quality		overall quality (five-star rating, CMS NHC)	**0.36**	**0.51**	**0.55**
		VBR score	**0.37**	**0.34**	**0.40**

			long-stay resident quality of life survey	family satisfaction survey (long-stay)	short-stay residents survey
		VBR new score	**0.47**	**0.46**	**0.43**
Clinical care quality	health inspect-ion survey	health inspection survey (five-star rating, CMS NHC)	**0.36**	**0.49**	**0.44**
		total health inspection score (CMS NHC)	**-0.39**	**-0.51**	**-0.46**
		number of substantiated complaints (CMS NHC)	**-0.40**	**-0.47**	**-0.52**
		MDH health inspection survey (five-star rating)	0.27	**0.31**	0.26
	clinical quality indicators	clinical quality indicator (five-star rating, CMS NHC)	0.25	**0.36**	**0.56**
	Hospital-ization	adjusted 30-day hospitalization rate	-0.17	-0.26	**-0.30**
		hospitalization rate for 30+ days per 1000 resident days	**-0.39**	**-0.46**	**-0.39**
Cons-umer choice	Comm-unity discharge	adjusted 3-30 day community discharge rate	**0.33**	**0.31**	**0.47**
		adjusted 30-90 day community discharge rate	0.22	0.18	**0.30**
Staffing	hours per resident per day	overall staffing (five-star rating, CMS NHC)	0.16	**0.31**	**0.39**
		certified nursing assistant (CMS NHC)	0.19	**0.33**	**0.32**
		certified nursing assistant	0.14	0.24	**0.39**
		activity staff	0.25	**0.30**	**0.34**
		other direct care staff	0.14	0.15	**0.39**
		total direct care staff	0.26	**0.33**	**0.54**
		total nurse (CMS NHC)	**0.33**	**0.38**	**0.56**

			long-stay resident quality of life survey	family satisfaction survey (long-stay)	short-stay residents survey
	retention	overall staff	0.20	**0.32**	**0.34**
		RN	0.17	0.18	**0.30**
		social worker	0.22	**0.35**	**0.31**
		other direct care staff	0.18	0.20	**0.31**
Private room		MN proportion of beds in single rooms	0.19	0.21	**0.34**
Occupancy			**0.30**	**0.36**	**0.40**

Notes: Five-star rating with one star representing the lowest possible rating and five stars representing the highest possible rating. CMS NHC measures come from Center for Medicare and Medicaid Services, Nursing Home Compare.

1.2 Hospitalization and community discharge

As expected, hospitalization rates are negatively associated with community discharge rates, particularly among short-stay residents (Table 21). These hospitalization and community discharge measures are calculated on the same pool of residents and they are not independent. If residents are being hospitalized in the first 30 days, they are unlikely to also be discharging to the community.

Table 21. Correlations between hospitalization and community discharge rate

		Hospitalization		Community Discharge	
Measures		adjusted 30-day hospital-ization rate	Hospital-ization rate for 30+ days per 1000 resident days	adjusted 3-30 day community discharge rate	adjusted 30-90 day community discharge rate
Hospital-ization	adjusted 30-day hospital-ization rate	1			
	Hospital-ization rate for 30+ days per 1000 resident days	**0.36**	1		
Community Discharge	adjusted 3-30 day community discharge rate	**-0.33**	-0.15	1	

Measures		Hospitalization		Community Discharge	
		adjusted 30-day hospital-ization rate	Hospital-ization rate for 30+ days per 1000 resident days	adjusted 3-30 day community discharge rate	adjusted 30-90 day community discharge rate
	adjusted 30-90 day community discharge rate	-0.18	-0.01	**0.43**	1

As shown in Table 22, facilities with better overall quality scores are negatively associated with hospitalization rates and positively associated with community discharge rates.

More nurse staffing hours is positively correlated with higher adjusted community discharge rates. The strongest relationship is between total nursing/direct care staffing hours and adjusted community discharge rates within 30 days.

In contrast, more licensed nursing hours as well as social worker hours is positively correlated with higher unadjusted hospitalization rates during the low risk period (after 30 days). There are at least two possible reasons for this unexpected correlation. First, the positive correlation between staffing hours and unadjusted hospitalization rates may be explained by case mix. Facilities taking care of higher acuity residents would be expected to have more licensed nurse staffing and relatively higher hospitalization rates. Our analysis tended to support this explanation. A facility's case mix score was not only positively correlated with staffing hours (RN: correlation coefficient 0.46; RN+LPN: correlation coefficient 0.50; social worker: correlation coefficient 0.30), but it was also positively correlated with unadjusted hospitalization rates (correlation coefficient 0.29). The best way of addressing this problem is to adjust the >30 day hospitalization rate for case-mix (recommended below).

Table 22. Correlations between hospitalization, community discharge rate, and staffing

		Hospitalization		Community Discharge	
		adjusted 30-day hospital-ization rate	hospitalization rate for 30+ days per 1000 resident days	adjusted 3-30 day community discharge rate	adjusted 30-90 day community discharge rate
Overall quality	overall quality (five-star rating, CMS NHC)	-0.15	-0.28	0.23	0.16
	VBR score	-0.11	-0.25	0.14	0.13
	VBR new score	-0.27	**-0.33**	0.28	0.20

		Hospitalization		Community Discharge	
		adjusted 30-day hospital-ization rate	hospitalization rate for 30+ days per 1000 resident days	adjusted 3-30 day community discharge rate	adjusted 30-90 day community discharge rate
Staffing (hours per resident per day)	RN	-0.03	**0.38**	0.24	0.26
	RN+LPN	-0.04	**0.33**	0.27	0.24
	social worker	0.03	**0.32**	0.10	0.17
	total direct care staff	-0.10	0.16	**0.36**	**0.30**
	total nurse (CMS NHC)	-0.08	-0.08	**0.31**	0.21

Notes: Five-star rating with one star representing the lowest possible rating and five stars representing the highest possible rating.

1.3 Weak correlations between measures of clinical care quality

The correlations between health inspection survey, clinical quality indicators, and hospitalization rates are weak. The findings indicate that health inspection, quality indicators, and hospitalization rates may tap different aspects of quality in nursing homes. Health inspections cover a wide range of care-related regulations, some of which may be directly related to hospitalization risk and others not. Similarly, the QIs tap multiple types of quality. In an earlier study, we found an association between selected QIs and hospitalizations in nursing homes (Xu et. al., 2019). Future research should involve a careful examination of regulatory deficiency types and hospitalizations, as well as individual QIs and hospitalization.

Recommended Actions

We conducted a correlational analyses to explore the relationships between four main quality components: clinical care quality (health inspection survey, clinical QIs, and hospitalization), staffing (hours per resident per day and retention), resident and family experience (quality of life, family satisfaction, and resident experience), and consumer choice (community discharge). Based on the correlational findings, we make the following recommendations.

Recommended Action: Continue to emphasize resident and family experiences as key indicators of facility care quality and performance.

One theme that emerged from the qualitative findings based on discussions with nursing home clinical leaders, quality experts, and administrators was a desire for person-centered and comprehensive measures. However, they expressed some frustration with the quality of life measure in particular. The survey may not represent the resident's true quality of life. For example, they were concerned that the survey was only a 'snap shot' of one point in time and it

could be heavily influenced by immediate events. In addition, the sample includes residents with cognitive impairment who may not have been able to respond to questions in a valid manner.

Despite these concerns, we found evidence for the construct validity of the resident and family experience measures. Resident and family experience measures were correlated with several of the other quality measures. Residents and families tended to give higher satisfaction scores for facilities with better performance on multiple indicators: health inspections and clinical quality indicators, lower hospitalization rates, higher community discharge rates, more nurse staffing hours, higher retention rates, and higher proportion of single rooms. In addition, facilities with higher scores on these resident and family experience measures had higher occupancy rates. Better resident and family experience is likely a pivotal factor in attracting residents to the facility.

For these reasons, the state should continue to invest in resident and family surveys, and they should be essential components of the quality measurement system.

Recommended Action: Consider risk-adjustment of the hospitalization rate for 30+ days per 1000 resident days.

Correlational findings suggest that more licensed nurse and social worker hours is positively correlated with higher hospitalization rate for 30+ days per 1000 resident days. One possible reason for this unexpected relationship is that the hospitalization rate does not adjust for the acuity of residents in the facility. Facilities with higher resident acuity may have more licensed nurses and more residents at risk of entering the hospital. We recommend to adjust the 30 days or more hospitalization rate by case mix acuity in the same manner as the acuity adjustment is applied to rates of hospitalization for short-stay residents (less than 30 days).

Recommended Action: Consider integrating selected CMS Nursing Home Compare measures into the VBR scoring system. The CMS staffing and inspection measures could replace comparable Minnesota VBR measures.

The CMS staffing and inspection measures offer more comprehensive and timely composite scores than comparable Minnesota measures. The CMS staffing measure is well designed and it relies on more timely data than the Minnesota measure, which is subject to an 18 month or more lag between data collection and reporting. The CMS ratings on the staffing domain are based on two measures: 1) registered nurse (RN) hours per resident per day; and 2) total nurse staffing (the sum of RN, licensed practical nurse (LPN), and nurse aide) hours per resident per day. The staffing measures are derived from data submitted each quarter through the Payroll-Based Journal (PBJ) System, along with daily resident census derived from Minimum Data Set assessments, and are case-mix adjusted based on the distribution of MDS assessments by Resource Utilization Groups, version IV (RUG-IV group). In addition to the overall staffing rating, a separate rating for RN staffing is also reported.

The CMS health inspections composite measure is also well designed. It provides a more comprehensive rating of inspection results than does the current Minnesota measure. The CMS

composite is based on the number, scope, and severity of deficiencies identified during the three most recent annual inspection surveys, as well as substantiated findings from the most recent 36 months of complaint investigations. All deficiency findings are weighted by scope and severity. This measure also takes into account the number of revisits required to ensure that deficiencies identified during the health inspection survey have been corrected.

Adopting the CMS measures offers an advantage to facilities that would have to track only one measure and to the state which could download the measure from the CASPER system rather than having to collect and process separate data.

Chapter 7
Value Based Reimbursement (VBR) Quality Score

As shown in Figure 39, the value based reimbursement (VBR) quality score has three components: long-stay resident quality score (quality of life score, clinical quality indicator score, and family satisfaction score), short-stay resident quality score (resident survey score, 30-day hospitalization, two clinical quality indicators including pain and pressure ulcers), and state inspection results score.

Figure 39. VBR new score

Objective

The main objective of our analysis was to examine the relationships between VBR quality score components. The scoring system should best reflect the relative clinical importance and potential for quality improvement of each VBR score component.

Data and Methods

For this analysis, we used the VBR quality total score and its component scores from 2019, the only year for which complete data were available on all components. Pearson or Spearman correlation, as appropriate, was used to evaluate the relationships between VBR quality score components. We also took into account the survey of providers (described in Chapter 4 Provider Views of Care Quality, Cost and VBR). A total of 29 respondents completed the survey regarding the weights of VBR score components. Descriptive statistics was used to summarize the survey results.

Scoring System for the VBR Composite Score

As shown in Figure 39, there are three steps to create the VBR quality total score (max 100 points). In Step 1, long-stay and short-stay resident quality scores (max 90 points) are calculated separately. The long-stay resident quality score has three components: quality of life score (max 40 points), clinical quality indicator score (max 40 points; 19 long-stay quality indicators), and family satisfaction score (max 10 points). The short-stay resident quality score also has three components: resident survey score (max 50 points), 30-day hospitalization (max 30 points), and two short-stay quality indicators "prevalence of moderate to serious pain" (max 5 points) and "prevalence of new or worsening pressure ulcers" (max 5 points). Two quality total scores (actual vs. rescaled) are calculated, reflecting how many facilities have data on all the components of this quality score and how many are missing 1+ components. Using the short-stay quality score as an example, some facilities do not participate in the short-stay resident survey and some facilities do not have rates on one or both of the quality indicators. A facility's actual quality score is calculated based on how many quality components the facility has. This actual quality score is then rescaled to 90 total for those facilities with 1+ missing components to compare them fairly to facilities that have all the components.

In Step 2, the percentages of long- and short-stay resident days, rather than residents, are counted and used as weights for long- and short-stay resident quality scores respectively. In Step 3, the Minnesota Department of Health (MDH) inspection score (max 10 points) is added to the total weighted long- and short-stay quality score. As a result, the highest possible total score of VBR quality is 100.

Results

1.1 Short-stay quality measures and total score

Number of short-stay quality indicators
We presented a detailed critique of the QIs in Chapter 5 of this report. Having only two short-stay QIs presents a problem in attempting to represent the clinical care quality for this population. We recommended 2 additional short-stay resident QIs: Prevalence of Antipsychotic Medications without a Diagnosis of Psychosis and Prevalence of Any Falls, which are used in the CMS Nursing Home Compare (NHC) system and, thus, should be familiar to providers.

Missing data and its effect on rescaled quality total scores
Significant missing data for components of the short-stay quality score presents a problem in calculating both the short-stay and total VBR quality scores. A facility's actual quality score is calculated based on the number of non-missing quality components. For facilities with one or more missing components, the quality score is then rescaled to 90 total, in order to have a fair comparison with facilities that have all the components. If the number of facilities with missing quality components were small, there would be no major concerns about the rescale method. As

a result, the correlation coefficient between actual score and their "rescaled to 90" score (rescaled score) should be 1 or close to 1. There is not a problem of missing quality components for long-stay facilities. Almost all facilities have all the components for the long-stay total quality score, so their rescaled score equals their actual score in almost all cases. This situation is confirmed in our analysis; the correlation coefficient between actual and rescaled scores is as high as 0.99.

In contrast, the short-stay quality score has many facilities with missing quality components. Only 47% of facilities (n = 166) have all the components for the short-stay total quality score and more than half of facilities (53%, n = 190) are missing 1+ short-stay quality components. For facilities having missing information on one or more components, their total score does not offer a complete picture; instead it reflects quality for only those measures where data are present. The short stay resident satisfaction survey is measure most likely to have missing data. In those facilities with a missing survey, resident satisfaction plays no role in the final score; it is dependent on the other measures that are present.

On the positive side, the method of blending short and long stay quality scores minimizes the bias that can be introduced by missing data on the short stay measure. The contributions of the short and along stay measures are weighted by the number of short stay resident days as a proportion of long-stay resident days. Facilities with missing data on their short stay residents typically have few short stay resident days. If so, their total VBR score will be largely dependent on the long stay score; the problem of missing data in the short stay score will be minimized.

1.2 Correlations between VBR and CMS NHC quality measures

We examined the correlations between the VBR quality score components and comparable measures from the CMS Nursing Home Compare system. Because of the concerns described above with the short-stay total quality score, we did not expect the short-stay quality score to be highly correlated with any of the other measures.

Regarding the health inspection survey, the correlation between the two data sources (MDH VBR and CMS NHC) is 0.37 (Table 23). This correlation is surprisingly low given that both the MDH and CMS measures are attempting to measure the same construct. Based on our findings in in Chapter 6, the CMS inspection measure appears to better represent the dimension of care quality. With regard to other scores, we found as expected that the CMS NHC five-star overall quality rating and clinical quality indicator rating were positively correlated with the VBR long-stay total quality score (0.44 and 0.51, respectively).

Surprisingly, we found weak correlations between the CMS staffing measures and the VBR total score. This weak correlation could be because the CMS staffing measure is only moderately related to the VBR staffing measure. Also, the VBR total score includes multiple measures, some of which may be related to staffing and others not. Staffing receives only limited weight in calculating the total VBR score. As a result, other unrelated measures will have a greater

influence on the VBR score, which will lower the correlation between the CMS NHC staffing score and the total VBR score.

Table 23. Correlations between VBR quality components and CMS NHC quality measures

CMS NHC quality measures	Long-Stay Total Quality Score		Short-Stay Total Quality Score		MDH Inspection	VBR Total Score
	Total90 (rescaled)	Total (actual)	Total90 (rescaled)	Total (actual)		
Overall quality (five-star rating)	**0.43**	**0.44**	0.27	0.17	**0.37**	**0.50**
Clinical quality indicators (five-star rating)	**0.51**	**0.51**	**0.30**	0.17	0.24	**0.52**
Health inspection						
Health inspection survey (five-star rating)	**0.38**	**0.39**	0.24	0.12	**0.37**	**0.44**
Total health inspection score (the lower score, the better facility performance)	**-0.30**	**-0.32**	-0.29	-0.14	**-0.38**	**-0.40**
Number of substantiated complaints	-0.23	-0.24	-0.18	0.03	**-0.30**	**-0.32**
Number of facility-reported incidents	-0.18	-0.18	-0.13	0.10	-0.26	-0.26
Number of fines	-0.20	-0.19	-0.21	-0.02	-0.16	-0.24
Total amount of fines in dollars	-0.19	-0.19	-0.24	-0.07	-0.22	-0.26
Staffing						
Overall staffing (five-star rating)	0.19	0.22	0.10	0.20	0.11	0.20
RN (five-star rating)	0.16	0.18	0.06	0.17	0.13	0.18
Hours per resident per day						
RN	0.08	0.09	0.04	0.28	0.10	0.07
Adjusted RN	0.15	0.17	0.11	0.22	0.17	0.18
LPN	-0.01	0.00	0.02	0.16	-0.08	-0.03
Adjusted LPN	0.00	0.01	0.04	0.07	-0.06	-0.01
CNA	0.21	0.24	0.11	0.11	0.06	0.19
Adjusted CNA	0.20	0.23	0.08	0.00	0.04	0.17
RN+LPN	0.05	0.07	0.05	**0.33**	0.04	0.04
Total nurse	0.18	0.21	0.11	0.27	0.06	0.15
Adjusted total nurse	0.21	0.22	0.12	0.13	0.14	0.20
Physical therapy	0.08	0.09	0.10	**0.37**	0.04	0.15

Notes: Total: the actual total quality score; Total90: the rescaled total quality score. Bolded values indicate correlation coefficients ≥ 0.3.

1.3 Weights assigned to VBR quality components

Quality experts and administrators responding to the survey (Chapter 4) were provided with the current VBR equation and asked to create what they perceived to be an ideal weighting of components for the VBR equation based upon their experiences (Table 24). Average responses somewhat mirrored the actual VBR equation for the long-stay residents. However, they placed somewhat less emphasis on quality of life measures and somewhat increased emphasis on family

satisfaction. Responses addressing the short-stay quality equation differed more from the current equation. Respondents placed less emphasis on hospitalization and more emphasis on pressure ulcers and pain. It should be noted that the standard deviation for these averages is wide, indicating variability or lack of consensus among responses, and that averages are impacted by scores at the outside of the range such as zero.

Table 24. Weights assigned to VBR quality components (n=29)

	DHS Score	Weights Assigned by Respondents		
		Mean	Standard Deviation	Range
VBR Long-Stay Quality Components				
Resident Quality of Life Ratings	40	34.1	13.8	0-55
Clinical Quality Indicator Score	40	40.7	16.9	10-90
Family Satisfaction Ratings	10	13.8	8.3	0-30
State Inspection Results	10	11.4	5.2	5-30
VBR Short-Stay Quality Components				
Resident Experience Ratings	50	49.7	12.7	20-80
Percent of Hospitalizations	30	22.2	7.5	0-30
Prevalence of Residents who Report Moderate to Severe Pain	5	7.8	5.6	0-20
Prevalence of New or Worsening Pressure Ulcers	5	10.2	6.3	0-25
State Inspection Results	10	10.4	5.0	0-25

Recommended Actions

The value based reimbursement (VBR) quality score has three components: long-stay resident quality total score, short-stay resident quality score, and state inspection results score for short- and long-stay residents respectively. Based on the findings from the correlational analysis and survey of nursing facility administrators and quality experts, we make the following recommendations.

Recommended Action: Make recommended changes to measures and quality score components (Chapters 5, 6, & 8) before constructing new VBR quality scores.

We recommended changes in the short- and long-stay QIs (described in Chapter 5) and quality of life measures (describe in Chapter 8), as well as the substitution of CMS staffing and inspection scores for MN measures (describe in Chapter 6). After deciding on these recommended changes and any other changes to the quality measurement system, the next step would be to construct corresponding new VBR quality scores for long- and short-stay residents.

Recommended Action: Expand the range of short-stay QIs in order to capture more dimensions of clinical care quality and to improve the reliability of the short-stay VBR score.

In Chapter 5 we recommended adding two short-stay quality indicators (falls and antipsychotics without a diagnosis of psychosis). Expanding the number and range of short-stay quality indicators would improve reliability.

Recommended Action: Work with stakeholders from the nursing home industry and consumer/advocacy groups to further evaluate the VBR quality components.

We recommend systematic and extensive input from key stakeholders in evaluating the VBR quality scoring and in determining the weights assigned to different components. Due to the COVID-19 pandemic, we obtained viewpoints about the quality measures from only a small proportion of the nursing home industry. We recommend that DHS conduct an extensive evaluation of quality measures by convening focus groups and conducting surveys on this topic in the coming months after the COVID-19 pandemic has subsided. Also, participation in this process should be expanded to include not only quality experts from the industry but also consumer/advocacy groups.

Chapter 8
Long-Stay Resident Quality of Life Survey

Background

Since 2005, the Minnesota Department of Human Services (DHS) and the survey research firm Vital Research have annually interviewed long-stay residents in Minnesota nursing facilities regarding their quality of life. Results from the survey are shared with nursing facilities, allowing them to better understand residents' perspectives on their services. The results are also incorporated into the Minnesota Nursing Home Report Card and utilized to calculate an overall quality score for the Value-Based Reimbursement payment system. This incentivizes facilities to consider aspects of quality of life that are meaningful to residents.

In 2016, the original survey was revised based on input from survey experts, quality of life experts, residents, families and providers to ensure the survey reflected contemporary expectations and practices. In its current form, the survey measures long-stay residents' quality of life over the following eight topics or domains: meaningful activities, food enjoyment, environment, dignity, autonomy, relationships, caregiving, and mood. The questions within each domain are averaged to create facility domain scores, and facility domain scores are averaged to create an overall resident quality of life score for each facility. These composite scores are then adjusted to account for characteristics of the facility and their resident populations. These adjusted scores are utilized to compare facilities' performances.

Purpose

One theme that emerged from the qualitative findings based on discussions with nursing home clinical leaders, quality experts, and administrators was a desire for person-centered, comprehensive measures of resident quality of life. The Long-Stay Resident Quality of Life Survey could be a valuable tool for offering this person-centered, comprehensive perspective on resident quality of life. The survey was developed with input from residents, families, quality experts, and providers to ensure that the survey measures aspects of quality of life that are meaningful for residents. In addition, the survey measures multiple domains of quality of life to offer a more comprehensive picture of residents' lives. However, some nursing home clinical leaders, quality experts, and administrators expressed frustrations regarding the validity of the survey (the extent to which the measures actually reflect resident quality of life), as well as the responsiveness of the survey (the extent to which it is possible to achieve improvements in the measures with appropriate efforts and actions). In this report, we utilize quantitative methods to identify strategies for improving the validity and reliability of the Long-Stay Resident Quality of Life Survey. In addition, we explore opportunities for reducing the length of the survey. We do not propose major changes to the content or delivery of the survey, as that is beyond the scope of these analyses.

Data and Methods

Data are from the 2017-2019 Long-Stay Resident Quality of Life surveys. First, we examine whether patterns in residents' responses to the survey support the same dimensions, or domains, as the current Long-Stay Resident Quality of Life Survey. Second, based on the patterns in residents' responses, we develop and validate a new domain structure. Third, we compare the properties of the current and new domain structures. When evaluating domains and items, the following criteria were considered:

a. ***Construct validity***: Do the items relate to each other in a manner consistent with the current set of domains? According to patterns in residents' responses, which items are the best indicators of each domain?

b. ***Correlation with other items***: To what extent is each item correlated with other items in the survey and within its domain? Are there any weak correlations suggesting that an item is not a reliable measure of a domain? Are there any items that are so highly correlated that they are measuring redundant aspects of quality of life?

c. ***Frequency of endorsement***: Are there any items that are so frequently or infrequently endorsed that they are not useful in distinguishing among residents in terms of quality of life?

d. ***Percentage missing***: Are there any items at risk of bias because a high percentage of residents did not respond to the question?

e. ***Balance***: Are a similar number of items used to measure each domain of resident quality of life?

f. ***Content validity***: Do the items used to measure a domain seem to be reasonable measures of that aspect of resident quality of life?

To evaluate the domains and items, exploratory factor analyses (EFA), confirmatory factor analyses (CFA), item-rest correlations, tetrachoric correlations, descriptive analyses, and histograms were conducted.

Summary of Findings

Based on EFA results, a new model for categorizing items into domains is proposed. The new domain structure includes the following domains of long-stay resident quality of life: meaningful activities, food enjoyment, dignified care, quality of service, autonomy, environment, communication with staff, and mood. CFA revealed that the new domain structure fits better with the underlying pattern of residents' responses than the current domain structure, although the difference in fit is modest.

Upon evaluating domains and items based on the aforementioned criteria, we recommend items for removal from the survey both in the event the current domain structure is maintained and in the event the new domain structure is adopted. We propose that omitting the following items would enhance the validity, improve the reliability, and reduce the length of both the current and new models of the survey. We recommend that Q10 ("Is it easy for you to get around in your

room?") is removed because its high correlation with Q11 ("Can you get to the things you need in your room?") suggests it is measuring a redundant aspect of quality of life. We recommend that Q18 ("Do the people who work here treat you politely?") is removed because it is highly correlated with 5 other items in the survey, indicating that the question adds little unique information regarding residents' quality of life. In addition, Q18 has a high level of endorsement (95% agreement), suggesting that the item is not very useful in differentiating among residents in terms of quality of life. We recommend that Q35 ("Do the same people take care of your most of the time?") is removed because CFA results suggest the item has low construct validity, and item-rest correlations suggest the item is weakly related to the other items in its domain. In addition, removal of Q35 would result in increased balance across the domains.

In the event that the new domain structure is adopted, we also propose that Q30 ("Are you friends with anyone who lives here?") is removed from the survey. CFA results suggest that Q30 has low construct validity, and item correlations suggest Q30 is weakly related to the other items in its domain. During focus groups with nursing facility administrators and quality experts, concerns about the measure were raised; specifically, some felt that the measure did not reflect overall relationship quality in the facility, but rather residents' varying definitions of what it means to be a friend. In addition, given the organization of the new domain structure, removing Q30 from the survey would not disrupt the balance of items among domains.

For both the current and new domain structures, we recommend that Q38 ("Would you recommend [name of facility] to someone who needs care?") and Q39 ("Overall, what grade would you give [Name of Facility], [pause] where A is the best it could be and F is the worst it could be?") are moved to a separate domain termed "resident global assessment". This recommendation is made to improve the content validity of the domains, given that residents' responses to Q38 and Q39 may be influenced by multiple domains of quality of life. This new resident global assessment domain should be given equal weight to the other domains. Q38 should be scored as the percent positive responses (i.e., proportion of facility residents agreeing that they would recommend the facility). For Q39, a facility percent positive score should be calculated in the same manner as it is currently calculated. In particular, residents' responses should be assigned points as follows: "A" 4 points, "B" 3 points, "C" 2 points, "D" 1 point and "F" zero points. The points for all residents giving a valid response in a facility should be summed, and this total should then be divided by the maximum total points that the facility could have earned. The facility percent positive responses for Q38 and Q39 should then be averaged together to create a score for the domain.

CFA analyses suggest that removing the recommended items from the survey and creating a new resident global assessment domain leads to a slight improvement in model fit for both the current and the new domain structures. When comparing the distributions of facility domain scores across models, none of the domain score distributions for the new model of domains exhibit as extreme of a ceiling effect as the dignity domain score distributions in the current models. This is notable given that ceiling effects make it more challenging to distinguish among facilities in

terms of quality of life. Overall, the new structure of domains with the recommended items removed is the best fitting model; it also is the shortest survey, and thus imposes the least burden on respondents.

Tables Summarizing Current and New Domain Structures and Items

The following tables summarize the item-by-item recommendations for the quality of life survey in the event the new domain structure is adopted or the current domain structure is retained.

Table 25. Item Recommendations for New Structure of Domains

Domains	Item Recommendations
Meaningful Activities • Q1: Are there enough scheduled activities here? • Q2: Do you like the activities that are scheduled here? • Q3: Do you have something to look forward to most days? • Q4: Are there things you do on the weekends that you enjoy? • Q5: Are you given the chance to do things that are meaningful to you? • Q30: Are you friends with anyone who lives here?	Remove from survey: • Q30 *Criteria:* Small CFA factor loading suggests lacks construct validity; Weak correlations suggest weak relationship with other domain items; Qualitative data suggests this item lacks validity
Food Enjoyment • Q6: Do you like the food here? • Q7: Do you get your favorite foods here? • Q8: Does the menu change enough? • Q9: Do you enjoy the mealtimes here?	None
Environment • Q12: Does noise keep you awake at night? • Q14: Can you find a place to be alone when you want to be alone? • Q15: Do you feel you have enough privacy? • Q16: Are your personal items safe here? • Q17: Do you feel safe here?	None
Dignified Care • Q18: Do the people who work here treat you politely? • Q19: Do the people who work here listen to you? • Q21: Are the people who work here gentle with your care? • Q22: Do the people who work here respect your modesty? • Q24: Do the people who work here do things the way you want them done? • Q36: Do the people who work here ever get angry at you?	Remove from survey: • Q18 *Criteria:* Strongly correlated with other items, suggesting adds little unique information; Exhibits a high frequency of endorsement (ceiling effect)

Domains	Item Recommendations
Autonomy • Q10: Is it easy for you to get around in your room? • Q11: Can you get to the things you need in your room? • Q13: Can you enjoy the outdoors when you want to? • Q20: Do the people who work here let you do the things you can do for yourself? • Q23: Can you get up in the morning at the time you want?	Remove from survey: • Q10 *Criteria:* Strongly correlated with another item, suggesting adds little unique information; Removal would increase balance across domains
Quality of Service • Q26: Are your concerns taken care of in a timely manner? • Q29: Do the people who work here seem happy to work here? • Q31: Do you get help when you need it in a timely manner? • Q33: Do the people who work here check often enough to see if you need anything? • Q35: Do the same people take care of your most of the time? • Q37: Do the people who work here go above and beyond to give you a good life? • Q38: Would you recommend [name of facility] to someone who needs care? • Q39: Overall, what grade would you give [Name of Facility], [pause] where A is the best it could be and F is the worst it could be?	Remove from survey: • Q35 *Criteria:* Small CFA factor loading suggests lacks construct validity; Weak correlations suggest weak relationship with other domain items; Removal would increase balance across domains Remove from quality of service domain score calculation, move to a new domain that captures resident global assessment: • Q38 & Q39 *Criteria:* Lack content validity because not specific to the quality of service domain
Communication with Staff • Q25: Are you encouraged to speak up about things you don't like here? • Q27: Do the people who work here stop by just to talk? • Q28: Do the people who work here talk with you about things that are important to you? • Q32: Do the people who work here tell you what they are doing when they care for you? • Q34: Do the people who work here ask to come in before entering your room?	None

Domains	Item Recommendations

Mood
• In the past two weeks, how often have you felt:
    ○ Q40: bored?
    ○ Q41: angry?
    ○ Q42: relaxed?
    ○ Q43: worried?
    ○ Q44: interested in things?
    ○ Q45: sad or unhappy?
    ○ Q46: afraid?
    ○ Q47: lonely?
    ○ Q48: happy?
	None

Table 26. Item Recommendations for Current Structure of Domains

Domains	Item Recommendations
Meaningful Activities • Q1: Are there enough scheduled activities here? • Q2: Do you like the activities that are scheduled here? • Q3: Do you have something to look forward to most days? • Q4: Are there things you do on the weekends that you enjoy? • Q5: Are you given the chance to do things that are meaningful to you?	None
Food Enjoyment • Q6: Do you like the food here? • Q7: Do you get your favorite foods here? • Q8: Does the menu change enough? • Q9: Do you enjoy the mealtimes here?	None

Environment
• Q10: Is it easy for you to get around in your room?
• Q11: Can you get to the things you need in your room?
• Q12: Does noise keep you awake at night?
• Q13: Can you enjoy the outdoors when you want to?
• Q14: Can you find a place to be alone when you want to be alone?
• Q15: Do you feel you have enough privacy?
• Q16: Are your personal items safe here?
• Q17: Do you feel safe here?
	Remove from survey:
	• Q10
	   Criteria:
	   Strongly correlated with another item, suggesting adds little unique information; Removal would increase balance across domains

Domains	Item Recommendations
Dignity • Q18: Do the people who work here treat you politely? • Q19: Do the people who work here listen to you? • Q20: Do the people who work here let you do the things you can do for yourself? • Q21: Are the people who work here gentle with your care? • Q22: Do the people who work here respect your modesty?	Remove from survey: • Q18 **_Criteria:_** Strongly correlated with other items, suggesting adds little unique information; Exhibits a high frequency of endorsement (ceiling effect)
Autonomy • Q23: Can you get up in the morning at the time you want? • Q24: Do the people who work here do things the way you want them done? • Q25: Are you encouraged to speak up about things you don't like here? • Q26: Are your concerns taken care of in a timely manner?	None
Relationships • Q27: Do the people who work here stop by just to talk? • Q28: Do the people who work here talk with you about things that are important to you? • Q29: Do the people who work here seem happy to work here? • Q30: Are you friends with anyone who lives here?	None

Domains	Item Recommendations

Caregiving
 	
• Q31: Do you get help when you need it in a timely manner?
• Q32: Do the people who work here tell you what they are doing when they care for you?
• Q33: Do the people who work here check often enough to see if you need anything?
• Q34: Do the people who work here ask to come in before entering your room?
• Q35: Do the same people take care of your most of the time?
• Q36: Do the people who work here ever get angry at you?
• Q37: Do the people who work here go above and beyond to give you a good life?
• Q38: Would you recommend [name of facility] to someone who needs care?
• Q39: Overall, what grade would you give [Name of Facility], [pause] where A is the best it could be and F is the worst it could be?
	Remove from survey:
	• Q35
	  Criteria:
	  Small CFA factor loading suggests lacks construct validity;
	  Weak correlations suggest weak relationship with other domain items;
	  Removal would increase balance across domains
	
	Remove from caregiving domain score calculation, move to a new domain that captures resident global assessment:
	• Q38 & Q39
	  Criteria:
	  Lack content validity because not specific to the caregiving domain

Mood
 	
• In the past two weeks, how often have you felt:
  ○ Q40: bored?
  ○ Q41: angry?
  ○ Q42: relaxed?
  ○ Q43: worried?
  ○ Q44: interested in things?
  ○ Q45: sad or unhappy?
  ○ Q46: afraid?
  ○ Q47: lonely?
  ○ Q48: happy?
	None

Recommendations

Recommended Action: Adopt the new structure of domains (i.e. meaningful activities, food enjoyment, dignified care, quality of service, autonomy, environment, communication with staff, mood, and resident global assessment).

This new domain structure has several advantages. First, the new domains are more consistent with underlying patterns in the data, suggesting that the domains are more valid and reliable. Second, the new domain structure results in more balanced domains, which makes it easier to compare variability in domain scores across domains. Third, the new domain structure results in

a more normal distribution of facility domain scores, which makes it easier to distinguish among facilities in terms of quality of life.

Recommended Action: Move Q38 ("Would you recommend [name of facility] to someone who needs care?") and Q39 ("Overall, what grade would you give [Name of Facility], [pause] where A is the best it could be and F is the worst it could be?") to a separate domain of quality of life that measures resident global assessment.

This recommendation is made to improve the content validity of the domains, given that residents' responses to Q38 and Q39 may be influenced by multiple domains of quality of life. This new resident global assessment domain should be given equal weight to the other domains. Q38 should be scored as the percent positive responses (i.e., proportion of facility residents agreeing that they would recommend the facility). For Q39, a facility percent positive score should be calculated in the same manner as it is currently calculated. In particular, residents' responses should be assigned points as follows: "A" 4 points, "B" 3 points, "C" 2 points, "D" 1 point and "F" zero points. The points for all residents giving a valid response in a facility should be summed, and this total should then be divided by the maximum total points that the facility could have earned. The facility percent positive responses for Q38 and Q39 should then be averaged together to create a score for the domain.

Recommended Action: In the event the new domain structure is adopted, remove the following items from the Long-Stay Resident Quality of Life Survey:

- *Q10:* Is it easy for you to get around in your room?
- *Q18:* Do the people who work here treat you politely?
- *Q30:* Are you friends with anyone who lives here?
- *Q35:* Do the same people take care of your most of the time?

Omitting these items would improve the validity, reliability, and balance of domains. Refer to Table 25 for a more detailed description of the rationale for these recommendations. An additional advantage of removing the items from the survey is that it would reduce the length of the survey and, in turn, reduce the cognitive burden associated with taking the survey.

Recommended Action: In the event the current domain structure is maintained, remove the following items from the Long-Stay Resident Quality of Life Survey:

- *Q10:* Is it easy for you to get around in your room?
- *Q18:* Do the people who work here treat you politely?
- *Q35:* Do the same people take care of your most of the time?

Omitting these items would improve the validity, reliability, and balance of domains. Refer to Table 26 for a more detailed description of the rationale for these recommendations. An additional advantage of removing the items from the survey is that it would reduce the length of the survey and, in turn, reduce the cognitive burden associated with taking the survey.

TECHNICAL REPORTS

See the technical reports under the Nursing Facility Payment Reform dropdown on the [Reports – Nursing Facility Related Issues webpage](#) on the DHS website.

Qualitative Component Report

The objective of this report is to describe the activities and findings from the qualitative component of the Minnesota Value Based Reimbursement evaluation. The report describes four data collection activities: discussion with provider quality councils, focus group interviews with providers, a state-wide survey of providers, and a focused survey of quality experts from throughout the Minnesota nursing home industry. Findings are described for each set of data, and recommendations for action are noted at the conclusion of the report.

Clinical Quality Indicators Report

The main objectives were to explore the dimensionality of the clinical QIs and the possibility of reducing the number of QIs. We also examine the distribution of the current QIs and offer recommendations for reforming the scoring program. We are working with the current QIs as defined. We are not evaluating the need for new QIs or proposing a major re-defining of the current QIs.

Long Stay Resident of Life Survey Report

The purpose of this report is to explore opportunities for enhancing the validity and reliability and reducing the length of the Long-Stay Resident Quality of Life Survey.

Correlational Analysis Report

The main objective was to explore the relationships between VBR quality score components and the possibility of alternative approaches to assigning weights to VBR score components, in order to better reflect their importance and their potential for improvement.

QI/QM Literature Review

The purpose of this report is to present findings from a literature review on the current scientific findings regarding clinical quality measures in nursing facilities.

Cost and Quality Literature Review

The purpose of this report is to present findings from a literature review on the current scientific findings regarding the relationship between nursing facility expenditure and care quality and what is known on the effectiveness of value-based reimbursement and other methods of incentivizing better care quality.

Trend Analysis Report

The purpose of this report is to present relevant trends in nursing facility utilization, cost, and quality trends in the years just prior to and after the Value Based Reimbursement legislation (VBR) took effect (January 1, 2016). This is done both to provide references for general trends and through statistical models to test for differences across subgroups and for changes in cost and quality trends associated with the VBR implementation.

Change in Ownership Report

The Value Based Reimbursement (VBR) legislation, effective January 1st 2016, coincided with a substantial uptick in change of ownership (CHOW) of nursing facilities in the state, often times from out of state buyers and/or buyers with convoluted ownership structures. It appears that VBR has made Minnesota facilities appear more attractive to profit seeking organizations and it is desirable to understand whether or not these purchasing organizations are committed to upholding and/or improving quality of care for Minnesota's nursing facility residents. The purpose of this section is to investigate whether the CHOW event is correlated with substantive changes in facility quality and/or costs.

Cost and Quality Trajectory Report

The purpose of this report was to examine nursing facilities for subgroups in their care related cost and quality score trajectories (as measured by the 50 point Quality Indicator Score + 40 point Quality of Life Score + 10 point MDH Inspection Score). Latent Class Growth Analysis was used to cluster all facilities into one of three groups (relatively high cost group, and two similar cost groups with relatively different levels in quality scores). Mean characteristics of these facilities were then compared to better understand the groups.