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From: Kochanski, Alexis R (DHS) <Alexis.Kochanski@state.mn.us>
Sent: Monday, February 18, 2019 8:20 AM
To: Rep.Tina Liebling; Rep.Joe Schomacker; Rep.Rena Moran; Rep.Debra Kiel; Rep.Jennifer Schultz; Frans, Myron (MMB); Chris Steller; James Nobles; Rep.Glenn Gruenhagen; Rep.Todd Lippert; Rep.Alice Mann; Rep.Kelly Morrison
Cc: Pat McQuillan; Chris McCall; Randall Chun; Danyell Punelli; Elisabeth Klarqvist; Sarah Sunderman
Subject: DHS Legislative Report Submission: Nursing Facility Payment Reform Recommendations
Attachments: NF Payment Reform Eval Report Feb_14_2019 0423PM.PDF

Dear Legislators,

Please find the Department of Human Services legislative mandated report on Nursing Facility Payment Reform Recommendations attached.

Please feel free to contact me with any questions.

Best,

Alexis Russell Kochanski, MPH

Director of State Legislative Relations | External Relations

Minnesota Department of Human Services

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Chris Steller

From: Kochanski, Alexis R (DHS) <Alexis.Kochanski@state.mn.us>
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To: 'Sen. Michelle Benson'; 'sen.john.marty@senate.mn'; 'Sen. Jim Abeler'; 'sen.jeff.hayden@senate.mn'; Sen. Karin Housley; Sen. Kent Eken
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Legislative Report

Nursing Facility Payment Reform Recommendations

Nursing Facility Rates and Policy Division

January 2019

For more information contact:

Minnesota Department of Human Services
Nursing Facility Rates and Policy Division
P.O. Box 64973
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For accessible formats of this information or assistance with additional equal access to human services, write to DHS.LTCpolicycenter@state.mn.us, call (651) 431-2282, or use your preferred relay service. ADA1 (2-18)

Minnesota Statutes, Chapter 3.197, requires the disclosure of the cost to prepare this report. The estimated cost of preparing this report is \$157,000.

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I. Legislation

Minnesota Statutes 2018, section 256R.18. Beginning January 1, 2019, the commissioner shall provide to the house of representatives and senate committees with jurisdiction over nursing facility payment rates a biennial report on the effectiveness of the reimbursement system in improving quality, restraining costs, and any other features of the system as determined by the commissioner.

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 January 1, 2016. VBR calculates rates based on actual 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 care quality** through the Medicaid rate setting process.

A team from Purdue University and the University of Minnesota conducted an external evaluation of VBR through a contract from the Minnesota Department of Human Services (DHS). Their report presents 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 for the full report.

Key evaluation findings

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. There was wide variation between facilities, with some facilities having small increases and others very large increases. Facilities with the largest increases were governmental and non-profit, hospital affiliated, located in the Twin Cities, larger, and with higher occupancy rates and resident acuity. These facilities started out with higher payment rates and costs before VBR and, thus, were in a better position for increased spending and reimbursement under VBR.

At the same time, the evaluation found no evidence that VBR's quality incentives led to higher facility quality. As with rates and costs, facilities varied widely in their quality scores. About half of facilities increased their quality slightly after VBR, and the other half declined. The evaluators conclude the care-related spending limits as currently defined do not limit facility spending according to their quality. They predict that few facilities are likely to meet the spending limit in the future, regardless of their quality.

It is premature to draw final conclusions about the impact of VBR. The evaluators had one year of Medicaid cost data for analysis (2016). Data for 2017 was not fully audited at the time of the evaluation

and facilities had not reported data for 2018. Trends in spending, access and the workforce are developing. This supports the legislative requirement for continued, biennial evaluation.

Purpose of this report

The evaluators make two general recommendations to improve VBR. First, they recommend including an inflation index limiter when calculating non-care-related costs to better restrain Medicaid cost growth. Second, they recommend redefining the quality-based care-related spending limits to better reward high quality facilities and incent other facilities to improve their quality. DHS agrees with these recommendations. If the Governor of the Legislature request it, DHS can provide a budget change proposal which aligns with these initial recommendations to address the spending growth and strengthen the quality incentive.

This report provides detail on the recommendations to improve VBR's quality incentive function. For almost 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 on the [Minnesota Nursing Home Report Card](#), and funds provider quality improvement programs. VBR builds on these efforts. It is intended 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.

Each fall, as a part of VBR payment rate calculation, DHS calculates a summary quality score for all providers. It uses three measures from the [Nursing Home Report Card](#): clinical quality (50 points), long-stay resident quality of life interviews (40 points), and health department inspections (10 points). DHS uses this quality score in a formula that determines reimbursement limits for each facility's care-related costs. The formula raises the limit for facilities with higher quality scores and lowers it for those with lower scores.

The full evaluation report discusses the minimal impact of the current care-related cost limits on facility spending. Only three percent of facilities are affected. Affected facilities are as likely to have above average as below average quality. The full report recommends changes to the care-related cost limit formula (i.e. setting the statewide average limit at the statewide average quality score, and adjusting facility limits by their county's Medicare wage index to reflect local market conditions). See the Appendix for more information on the recommended changes to the cost limit formula.

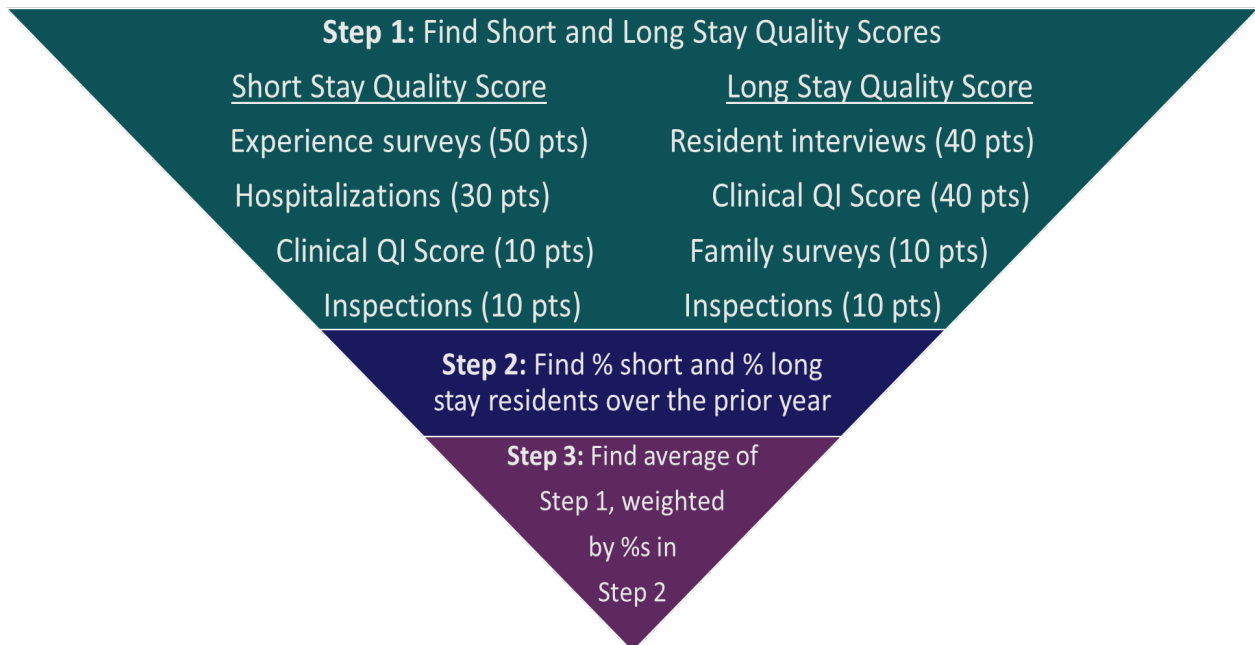
This report discusses recommended improvements to the facility quality score itself. The evaluators included these changes in their modeling analysis. DHS has existing authority to revise the quality score under Minnesota Statutes 2018, section 256R.16, subdivision. 1, paragraph (d): The commissioner, in cooperation with the commissioner of health, may adjust the formula in paragraph (c), or the methodology for computing the total quality score, effective July 1 of any year, with five months advance public notice. In changing the formula, the commissioner shall consider quality measure priorities registered by report card users, advice of stakeholders, and available research.

This report concludes with a discussion of other VBR improvements DHS may recommend in the future. DHS Nursing Facility Rates and Policy division staff completed this report.

III. Report recommendations

Short-term, rehabilitative stays play a key role in the operations and financial health of most Minnesota nursing facilities. Several facilities, particularly those opening in the last few years, provide only short-term care. In 2016, after VBR became law, Minnesota introduced an annual short-stay experience survey, a short-stay hospitalization quality measure, and other related information. Nursing facilities have had two years to become familiar with these new measures, gauge their initial performance trends, and use them as outcomes of quality improvement projects. DHS will share this performance information publicly on the [Nursing Home Report Card](#) in 2019.

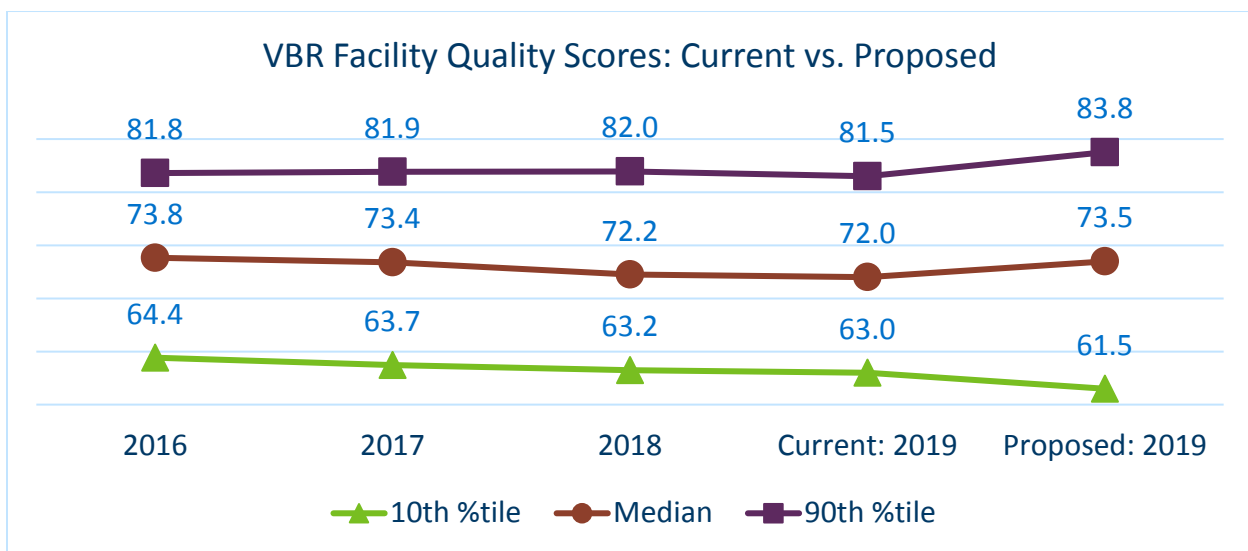
DHS proposes the changes to the VBR quality score calculation shown in the figure below. Step 1 incorporates three new quality measures into VBR. Two measures focus on the quality of short-stay care (an experience survey mailed to people discharged within 30 days and the rate of hospitalizations within 30 days of admission). One newly included measure, mailed family satisfaction surveys, focuses on the quality of long-term stays. The new quality score adds these to the measures already in use (long-stay resident quality of life interviews, clinical quality and state inspections). It changes the priority weighting as shown below to make the resident experience top priority, and to increase the weight of outcomes important to consumers, providers and the state. Finally, Steps 2 and 3 determine the percentage of each facility’s short- versus long-stay business, and use these as weights to create the final VBR quality score.



Impact of the new quality score

DHS analyzed the impact of the new quality score, shown in the figure and table below. Throughout four years of available quality score data calculated using the current method, the distribution of scores across facilities statewide has been stable. The year-to-year differences between the lowest (10th percentile), average (median) and highest (90th percentile) scoring facilities have remained below 10%, with a slight relative drop in scores for average facilities in 2018.

The proposed quality score method is much better at differentiating facilities by their quality. The lowest scoring facilities drop by 33% relative to average providers, while average and high performing facilities make gains. These results support VBR's purpose of rewarding high quality while motivating quality improvement.



VBR Quality Scores: Current vs. Proposed	10 th %tile vs. Median Point difference each year	10 th %tile vs. Median % change from prior year	Median vs 90 th %tile Point difference each year	Median vs 90 th %tile % change from prior year	10 th vs 90 th %tile Point difference each year	10 th vs 90 th %tile % change from prior year
2016	9.4		8.0		17.4	
2017	9.7	3%	8.5	7%	18.2	5%
2018	9.0	-7%	9.7	14%	18.7	3%
Current: 2019	9.0	0%	9.5	-2%	18.5	-1%
Proposed 2019	12.0	33%	10.3	6%	22.3	19%

Potential challenges

DHS' main challenge in implementing the new quality score approach is educating providers about the change. To maximize the effectiveness of Minnesota's pay for performance efforts, DHS has found that nursing facilities must be active partners who understand and buy into their role in the system. Many providers do not have knowledge of and familiarity with the newly introduced measures, particularly facilities with lower overall quality. In addition to public disclosure of these measures on the [Nursing Home Report Card](#), DHS plans to promote them as choices in its nursing facility pay for performance programs. DHS will also commit additional staff time to provider outreach (e.g. webinars, seminars, supplemental materials, etc.).

IV. Future recommendations

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. The design of VBR, with an increase in certain facility costs leading to an increase in Medicaid reimbursement rates in subsequent years contribute to an inflationary effect. Further study of these pass-through costs which are currently fully covered by the state will be a targeted area of evaluation. A second area requiring further study is to examine the variations between facilities. In addition to further evaluation of cost trends and quality performance, the following topic areas will be emphasized:

- Evaluate the nursing facility employee scholarship program to determine if the program is achieving the goal of enhancing the long-term care workforce by providing nursing facilities a tool to assist in the recruitment, retention, and education of long-term care workers.
- Evaluate employee health insurance to determine if VBR provided an incentive for providers to cover all their employees with affordable health insurance, while at the same time being prudent purchasers of reasonably priced insurance.
- Further study of variation between facilities in their revenue, costs, and quality scores to better understand why some facilities are more responsive to VBR than others. Knowing more about responsiveness may inform future VBR design changes to better reach policy goals.

V. Sample Implementation language

256R.16 QUALITY OF CARE.

Subdivision 1. Calculation of a quality score.

(a) The commissioner shall determine a quality score for each nursing facility using quality measures established in section [256B.439](#), according to methods determined by the commissioner in consultation with stakeholders and experts, and using the most recently available data as provided in the Minnesota

Nursing Home Report Card. These methods shall be exempt from the rulemaking requirements under chapter 14.

(b) For each quality measure, a score shall be determined with the number of points assigned as determined by the commissioner using the methodology established according to this subdivision. The determination of the quality measures to be used and the methods of calculating scores may be revised annually by the commissioner.

(c) The quality score shall include up to 50 points related to the Minnesota quality indicators score derived from the minimum data set, up to 40 points related to the resident quality of life score derived from the consumer survey conducted under section [256B.439](#), subdivision 3, and up to ten points related to the state inspection results score.

(d) The commissioner, in cooperation with the commissioner of health, may adjust the formula in paragraph (c), or the methodology for computing the total quality score ~~July 1 of any year~~, with five months advance public notice. In changing the formula, the commissioner shall consider quality measure priorities registered by report card users, advice of stakeholders, and available research.

Subd. 2. Monitoring quality of care.

If an annual cost report or field audit indicates that expenditures for direct resident care have been reduced in amounts large enough to indicate a possible detrimental effect on the quality of care, the commissioner shall notify the commissioner of health.

History:

[2016 c 99 art 1 s 14](#)

256R.23 TOTAL CARE-RELATED PAYMENT RATES.

Subdivision 1. Determination of total care-related cost per day.

Each facility's total care-related cost per day is the sum of its direct care cost per standardized day and its other care-related cost per resident day.

Subd. 2. Calculation of direct care cost per standardized day.

Each facility's direct care cost per standardized day is the facility's direct care costs divided by the sum of the facility's standardized days. A facility's direct care cost per standardized day is the facility's cost per day for direct care services associated with a case mix index of [1.00](#).

Subd. 3. Calculation of other care-related cost per resident day.

Each facility's other care-related cost per resident day is its other care-related costs, divided by the sum of the facility's resident days.

Subd. 4. Determination of the median total care-related cost per day.

The commissioner must determine the median total care-related cost per day using the cost reports from nursing facilities in Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington Counties.

Subd. 5. Determination of total care-related payment rate limits.

The commissioner must determine each facility's total care-related payment rate limit by:

(1) multiplying the facility's quality score, as determined under section [256R.16](#), subdivision 1(d), by ~~0.5625-2.0~~;

(2) ~~subtracting 40.0~~ ~~adding 89.375 to~~ ~~from~~ the amount determined in clause (1), and dividing the total by 100; and

(3) multiplying the amount determined in clause (2) by the median total care-related cost per day.

(4) multiplying the amount determined in clause (3) by the most-recent available Core-Based Statistical Area wage indices established by the Centers for Medicare and Medicaid Services for the Skilled Nursing Facility Prospective Payment System.

Subd. 6. Payment rate limit reduction.

No facility shall be subject in any rate year to a care-related payment rate limit reduction greater than five percent of the median determined in subdivision 4.

Subd. 7. Determination of direct care payment rates.

A facility's direct care payment rate equals the lesser of (1) the facility's direct care costs per standardized day, or (2) the facility's direct care costs per standardized day divided by its cost to limit ratio.

Subd. 8. Determination of other care-related payment rates.

A facility's other care-related payment rate equals the lesser of (1) the facility's other care-related cost per resident day, or (2) the facility's other care-related cost per resident day divided by its cost to limit ratio.

Subd. 9. Determination of total care-related payment rates.

A facility's total care-related payment rate is the sum of its direct care payment rate as determined in subdivision 7 and its other care-related payment rate as determined in subdivision 8.

History:

[2016 c 99 art 1 s 18](#)

256R.24 OTHER OPERATING PAYMENT RATE.

Subdivision 1. Determination of other operating cost per day.

Each facility's other operating cost per day is its other operating costs divided by the sum of the facility's resident days.

Subd. 2. Determination of the median other operating cost per day.

The commissioner must determine the median other operating cost per day using the cost reports from nursing facilities in Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington Counties.

Subd. 3. Determination of the other operating payment rate.

A facility's other operating payment rate equals the lesser of (1) 105 percent of the median other operating cost per day as determined by subdivisions 1 and 2, or (2) the prior year operating payment rate adjusted by a forecasting market basket and forecasting index. The adjustment factor shall come from the IHS Healthcare Cost Review, the Skilled Nursing Facility Total Market Basket Index, and the %MOVAVG line or a comparable index if this index ceases to be published. The commissioner shall use the fourth quarter index of the upcoming calendar year from the forecast published for the third quarter of the calendar year immediately prior to the rate year for which the rate is being determined.

VI. Appendix

Evaluation of the NF Payment Reform Legislation Background for the 2019 Report to the Legislature

15-Jan-2019

Prepared for: Minnesota Department of Human Services

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Executive Summary

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. Two main goals of VBR were to:

- Provide increased Medicaid reimbursement earmarked for direct care and care-related services.
- Incentivize better care quality through the Medicaid rate setting process.

An evaluation team from the University of Minnesota and Purdue University conducted an external evaluation of VBR through a contract from the Minnesota Department of Human Services. The purpose of this report is to summarize results from this evaluation. It also contains results from facility rate and cost modeling of different reimbursement approaches, comparing the current approach to new approaches that might better achieve care quality while restraining Medicaid cost growth.

Methods

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 (2013-2015) and after (2015-2016) 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 348 facilities with a full five 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 analysis involved cross-tabulations, bar and line graphs, difference of means or proportions, and multiple regression growth models with appropriate tests of statistical significance. For the VBR impact analysis, we attempted to isolate the effects of VBR on different outcomes and for different subgroups.

Evaluation Results

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-mix⁴, resident days and occupancy showed a steady decline. These trend lines did not change

⁴ “Case-mix is a system utilized by the state and nursing facilities (NF) to identify and measure acuity of NF residents. These measurements in turn, are associated with the resources required of a NF to provide care for individual residents.

significantly between 2015 and 2016, suggesting that utilization declines were not the result of changes in reimbursement approach. They likely reflect general industry trends of declining nursing home use.

Medicaid Revenue

The new reimbursement approach, implemented on January 1, 2016, was expected to increase Medicaid revenue substantially for facilities in 2016. Average Medicaid revenue per facility rose sharply between 2015 and 2016, with additional increases from 2016 to 2017. Facility mean Medicaid revenue PRD rose more sharply than annual Medicaid revenue, in part because increases in Medicaid reimbursement rates were offset by declines in Medicaid resident days each year. In general, revenue increases were significant for facilities of all ownership types, urban and rural location, and other subgroups.

Medicaid Costs

A major goal of VBR was to increase direct care spending. That goal was largely met. The vast majority of facilities reported substantial increases in PRD Medicaid 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.

Hourly Salaries for Direct Care Staff

Trends in hourly salaries for nursing staff were consistent with trends in PRD direct care expenditures. Mean facility hourly salaries for nursing staff increased substantially from 2015 to 2016: 12.2% for Certified Nursing Assistants, 11.2% for LPNs, 9.1% for RNs, and 10.1% for Trained Medication Aides (TMAs).

Nursing Hours Per Resident Day

Nursing hours per resident day did not increase significantly after the introduction of VBR, either overall or for facility subgroups. 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. Drawing firm conclusions about trends in QoL scores is difficult because of changes in the QoL instrument between years.

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. For example, although the vast majority of facilities experienced an increase in Medicaid PRD revenue and care-related costs between 2015 and 2016, the increase varied widely from just a few pennies to many dollars. In other cases, such as nursing hours PRD and quality score, about equal numbers of facilities saw increases and decreases. Even after considering major subgroup differences in ownership, size, acuity,

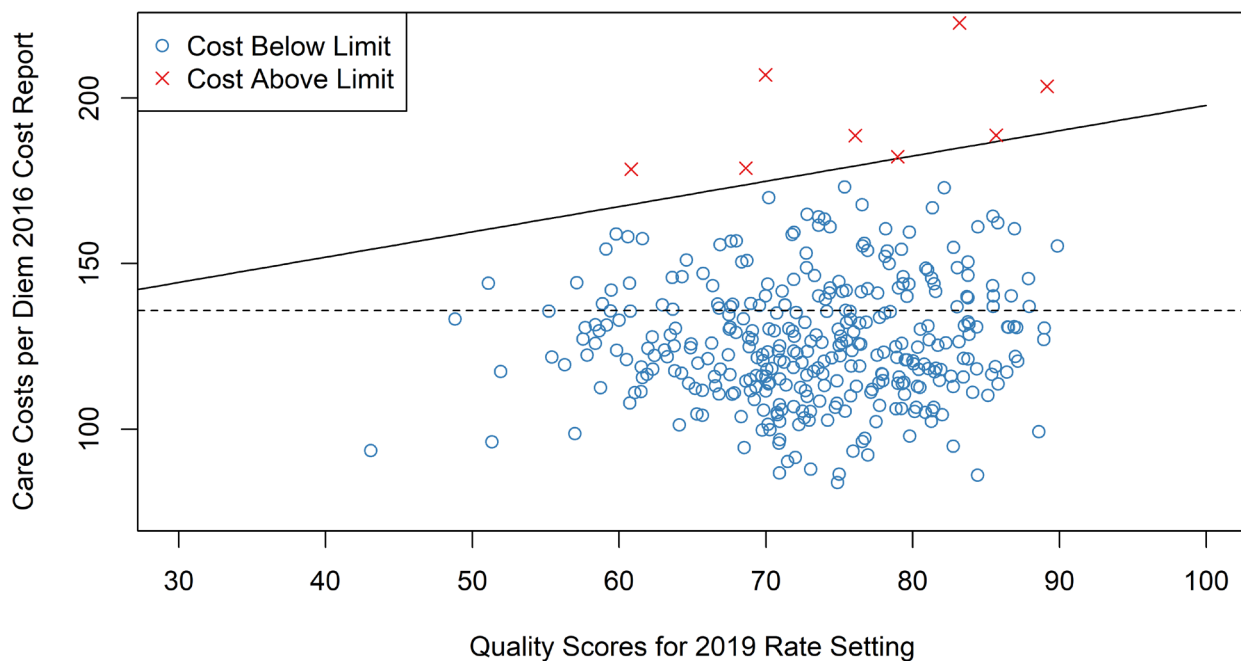
location, and occupancy rate, considerable variation remained in individual facility revenue, costs, and quality scores.

Modeling Alternative Reimbursement Approaches

Reimbursement Approaches

The primary goal of this analysis was to assess the impact on state expenditures of proposed changes to the Value Based Reimbursement system. At the request of DHS staff, two potential changes were examined. The first change was intended to strengthen the quality incentive for care-related cost reimbursement. The quality-related cost limit is set so high under the current VBR that only a handful of facilities reach the limit. Therefore, a facility has little financial incentive to increase care quality since its Medicaid payment rate is unlikely to be affected regardless of its quality score. Figure 1 displays the effect of the quality limit in setting 2019 rates under the current approach.⁵ Only a handful of facilities had costs above the limit and, thus, would have had their rates affected. Even facilities with low quality scores were unaffected by the limit.

Figure 1. Facilities with Care-Related Costs Affected by the Limit in 2019 under the Current Approach



A second problem with the current VBR is absence of an effective control over Medicaid rate growth due to rapidly rising operating costs. Rather than restricting growth in reimbursement as

⁵ Medicaid payment rates in 2019 are based on 2016 PRD costs and 2018 quality scores. Details of the rate setting process are contained in Modeling section of the report below.

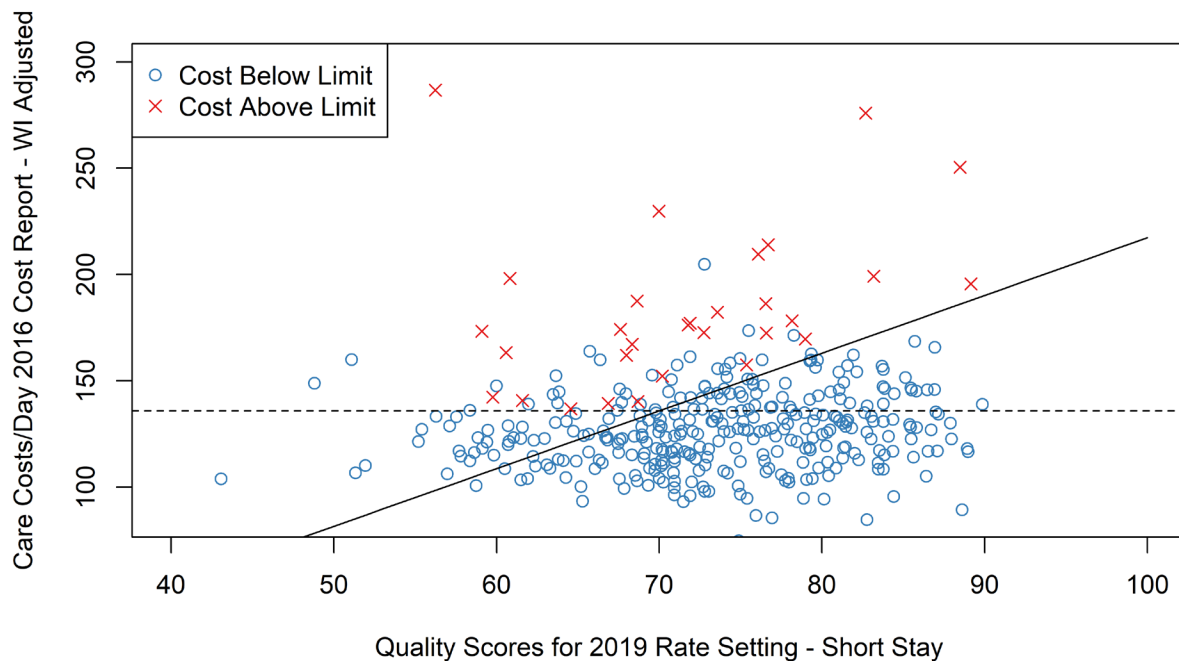
a whole, and potentially dis-incentivizing care-related expenditures, the alternative approach is to target the other operating rate. This change in reimbursement ties the annual rate of growth in the other operating rate to the Skilled Nursing Facility Market Basket Index.

Modeling

Two new reimbursement approaches were modeled: lowering of the quality-related limit on care-related costs, and capping growth in the other operating rate, i.e., the component of the rate covering costs other than care-related. Each new approach was compared to the current approach. The modeling scenarios start in 2018 with rate and cost projections for each approach from 2019-2023. The total Medicaid expenditure for care-related payments was projected at the facility level, using individual facility Medicaid days adjusted for acuity and the facility's rate.

Figure 2 shows the effect of the limit in 2019 had the new reimbursement approach been used.⁶ With the downward shift of the line, more facilities are affected by the limit. Also, the slope of the line is steeper than under the current approach, resulting in facilities with lower quality scores being more likely to fall above the limit and to have their rates affected. We should note that several facilities below the line were not subject to the limit, e.g., "o" rather than "x". This is due to a stop-loss provision and a wage index adjustment described in the Modeling section of the report.

Figure 2. Facilities with Care-Related Costs That Would Have Been Affected by the Limit in 2019 under the New Approach



Medicaid Rates

The mean facility quality scores were projected to rise from 73.2 in 2018 to 73.5 in 2023 under the current system, and from 73.1 to 74.0 under the proposed system over the same period. Under the current system, facilities were projected to reach a limit of \$231.63 per day for a score

⁶ Details of the new rate setting approach are presented in the Modeling section below.

of 60 and \$252.79 per day for a score of 80 by 2023. The proposed system projected a limit in 2023 of \$150.50 per day and \$225.75 per day for quality scores of 60 and 80, respectively.

Facilities fell into three mutually exclusive categories based on their care-related costs: having costs below the quality limit and receiving their full care-related costs in their rate, having costs above the limit but receiving rates higher than their limit due to a special stop-loss provision, and having costs above their limit and having their rate set at that limit. The stop-loss provision limits the amount of a facility's rate cut from one year to the next such that it cannot exceed 5% of the metro median rate.

Under the current system, between 2.5 – 3.1% of facilities are projected to receive their quality limit and no facilities invoke the stop loss. Under the proposed system, the percentage of facilities invoking the stop loss provision rises at first, peaking near 10% in years 2021 and 2022 before falling as those facilities move into the group receiving their quality limited rate. The final year of the projection, 2023, has the most impacted facilities with 23% either receiving their quality limited rate or invoking the stop loss provision.

Medicaid Savings

There were significant differences between scenarios in Medicaid expenditures for the care-related component of the reimbursement rate. Beginning in 2020 the projected Medicaid savings from the proposed approach is projected to be just under \$1 million; by 2023, savings are projected to rise to \$18 million. Rising savings are due primarily to increases in the number of facilities being limited in their care-related rates, and the effect this has on Medicaid expenditures.

A second change in reimbursement involved limiting the growth in other operating costs by the Skilled Nursing Facility Market Basket Index. Projected annual savings from this approach begin at under \$13 million in 2020 and grow to over \$56 million by 2023. Since the proposed cap is a growth cap, these savings have the potential to compound over time.

Conclusions and Recommendations

Medicaid Payment Rates and Costs

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 in 2016. The increases in Medicaid reimbursement rates and care-related costs continued between 2016 and 2017 but at a somewhat slower pace.

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. Facility subgroups with the largest increases in payment rates and care-related costs were governmental and non-profit, hospital affiliated, located in the Twin Cities, larger, and with higher occupancy rates and resident acuity. These subgroups started out with higher rates and costs in 2013-2015 and, thus, were better able to take advantage of the VBR changes.

The design of the VBR system, with an increase in facility costs leading to an increase in Medicaid reimbursement rates in subsequent years, can have a circular effect. Increased rates

contribute to rising costs, which in turn contribute to increases in future rates. This situation can have an inflationary effect if there are no controls on rate growth from year to year. In addition, facilities with more financial resources (e.g., Medicare or private pay revenue) economies of scale (e.g., larger size), increasing occupancy, and a history of higher reimbursement rates are in a better position to benefit from the circularity relationship between costs and rates. They can make the investments in current costs that will lead to future rate increases.

Care Quality

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.

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.

Recommendations

We have two general recommendations for changes in the VBR that could improve care quality and moderate Medicaid rate growth. Both recommendations have been implemented in the new VBR reimbursement design modeled in the last section of the report.

- Strengthen the financial incentive for facilities to provide better quality care. For example, changes could be made to VBR to reduce the level of the VBR quality score threshold and shift the slope of the line to place more stringent limits on the Medicaid rates paid to facilities providing poor quality of care, while retaining higher limits for rates paid to facilities providing better care.
- Moderate future Medicaid rate growth. For example, changes could be made to VBR to index the price for the other operating (not care-related) component of the Medicaid payment rate to the rate of general nursing home cost inflation, e.g., Skilled Nursing Facility Market Basket Index.

In addition, some findings from our evaluation could not be readily turned into recommendations because of their complexity. First, we need to gain a better understanding of why some facilities are more responsive than others to VBR. Is responsiveness, e.g., improved investments and better care quality, a matter of resources, organizational readiness, operating strategy, geographic location, or other factors? Knowing more about responsiveness can inform future VBR design changes to better reach policy goals.

Second, VBR is not occurring in isolation; its impact is influenced by other trends affecting the nursing home industry that have implications for a facility's ability or motivation to respond to VBR. For example, Medicare reimbursement will be undergoing a major revision that could affect operating strategies and resources. As another example, the use of nursing homes for long term supports and services has been declining for over a decade. This decline has resulted in reductions in nursing facility resident days and occupancy rates for both Medicaid and private pay residents.

Continuing the evaluation of VBR into future years will be an opportunity to gain a better understanding of the system and improve its design.

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Introduction

NF Reform

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). Given the magnitude of the changes, the legislature is requiring the DHS to submit a biennial report to the legislature addressing the impact of VBR beginning January 2019.

The evaluation addresses questions raised in the March 2017 report to the legislature prepared by the DHS staff. 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.

External Evaluation

An evaluation team from the University of Minnesota and Purdue University is conducting an external evaluation of VBR. The evaluation is being carried out through a contract from the Minnesota Department of Human Services. The team consists of Greg Arling and Zachary Hass, Purdue University School of Nursing and Mark Woodhouse, University of Minnesota School of Public Health.

Evaluation Questions

To provide the most useful information to DHS and stakeholders, the evaluation should address a comprehensive set of questions about the introduction of the new Value-Based Reimbursement (VBR) System and other policy initiatives of the Minnesota Nursing Facility Reform Legislation.

Changes in Care Processes and Outcomes

- 1) What were trends in nursing home utilization?

- a) Resident days – Medicaid, Medicare, private pay, and other
- b) Occupancy levels
- c) Acuity (RUG case-mix score)
- 2) How did VBR relate to trends in revenue and spending patterns?
 - a) Facility revenue, particularly from Medicaid and private pay, the two revenue sources most affected by VBR
 - b) Spending on direct care costs, as well as other cost areas
 - c) Salary and wages per resident day (PRD) for nurses and other direct care workers
 - d) Benefits and other compensation
- 3) How did VBR relate to trends in nurse and other care-related staffing?
 - a) Nursing or direct care staff hours per resident day (PRD)
 - b) Nurse staff mix among RN, LPN, and unlicensed nursing staff
- 4) How did VBR relate to trends in facility quality scores?
 - a) Clinical quality - MDS Quality Indicators
 - b) Health Department regulatory findings
 - c) Resident quality of life
 - d) Nursing staff retention

Differential Impact by Facility Characteristics

- 1) Did revenue, spending, workforce effects, and care quality trends differ by nursing facility characteristics?
 - a) Facility location - Twin Cities, other MSA, or rural
 - b) Facility ownership type
 - c) Size and occupancy rates
 - d) Facility proportion of business with – Medicare, private pay, Medicaid
 - e) Baseline costs, baseline reimbursement rate
 - f) Magnitude of rate increase after implementation of VBR

Content and Organization of the Report

The first section of the report addresses the Methods (28) for the evaluation. The second section presents results (32) from the evaluation in the form of an annual times series (2013-2017) for major variables. In the third section we present results from a set of future rate and cost projections based on changes to the current reimbursement system (67). These rate setting changes were determined by the DHS staff.

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.
- A limited time frame of 1-2 years post-VBR for assessing impact of the policy change.

In the initial period of the evaluation (Oct 2017-December 2018), we concentrated on:

- Building data sets and defining outcome measures of care quality, utilization, costs, and other outcomes.
- Producing descriptive statistics of outcome measures and trends in outcomes from 2013 to 2017.
- Examining relationships between key outcome measures.
- Determining patterns in outcome measures by subgroups of facilities and residents.
- Drawing preliminary conclusions about the impacts of VBR on outcomes overall and by subgroups of facilities and residents.

In addition, at the request of DHS we modeled Medicaid cost projections through FY 2023 in support of a fiscal note that was prepared by DHS in December 2018. The cost projections drew comparisons between the current reimbursement approach (baseline) and a new approach with changes in the way the Care-Related cost limit was applied.

Study Population and Sample

The total number of nursing facilities varied from year to year, ranging from 371 in 2013 to 363 in 2017. In order to conduct a trend analysis for all five years we excluded any facility that had fewer than five years of data. This left 352 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 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 348 facilities present in all 5 years.

Table 1. Exclusion of Facilities for Analysis

	<i>All facilities with data 2013-2017</i>	<i>Facilities with 5 years of data</i>	<i>Outliers</i>	<i>Facilities with outliers removed</i>
2013	371	352	4	348
2014	366	352	4	348
2015	365	352	4	348
2016	363	352	4	348
2017	363	352	4	348
Total	1828	1760	20	1740

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

	<i>Effective Date</i>	<i>Data Period for Rate Setting</i>
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
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.

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). 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. 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

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

Table 4. Major Variables by Data Period for Analysis

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

*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.

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>.

Statistical Approach

The unit of analysis for the entire report was the nursing facility. Descriptive analysis involved cross-tabulations, bar and line graphs, difference of means or proportions, and linear growth model analysis with appropriate tests of statistical significance. For the VBR impact analysis, we attempted to isolate the effects of VBR on different outcomes and for different subgroups.

Evaluation Results

The objectives of the evaluation were 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 first set of results describes annual trends for major variables for the years before (2013-2015) and after (2016-2017) 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 2016-2017. For example, there should be a significant positive increase in mean per diem direct cost and quality scores trends between 2013-2015 and 2016-2017.

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, occupancy rate, occupancy rate change, and size (resident days). Finally, we tested a set of multiple regression analyses to determine the independent effects of these subgroupings on changes in costs, workforce characteristics, and quality score.

All of the results have the facility as a unit of analysis. Resident level figures for quality scores have been aggregated up to the facility level. The tables, graphs and other analyses are presented as facility distributions and means. The most notable changes in trends are displayed visually through line graphs.

The Appendix contains graphs displaying facility distributions of changes in major variables between years. Facilities displayed considerable variation in the way they responded to reimbursement system changes.

Trend Analysis

Facility Characteristics by Year

For the most part, facility characteristics remained similar from 2013-2017 (Table 5). Slightly over half of the revenue for the average facility came from Medicaid with the next highest percentage from private pay residents over all 5 years. There was a similar pattern for resident days by pay source. About 60% of facilities were non-profit and 30% were for profit. The majority of facilities were located in the Twin Cities or other metropolitan areas while about one-fifth of facilities were in small towns or rural areas.

Table 5. Facility Characteristics by Year (Facility Means)

<i>Year</i>	<i>2013</i>	<i>2014</i>	<i>2015</i>	<i>2016</i>	<i>2017</i>
Mean Acuity (RUG Case-Mix)	1.020	1.016	1.013	1.011	1.010
MA Revenue %	53%	53%	52%	54%	55%
MC Revenue %	8%	8%	8%	8%	9%
PP Revenue %	27%	27%	28%	26%	25%
Other Revenue %	12%	12%	12%	11%	12%
Mean Annual Resident Days	26850	26386	25729	24996	24444
Mean Residents per Day	73.6	72.3	70.5	68.5	67.0
Mean Licensed Beds	81.7	80.6	79.7	79.0	77.9
Mean Occupancy %	88.8%	88.6%	87.2%	85.5%	84.5%
Mean Occupancy % Change	-0.6%	-0.3%	-1.4%	-1.8%	-0.9%
MA Res Day %	57%	56%	55%	56%	57%
MC Res Day %	9%	8%	9%	9%	9%
Private Pay Res Day %	27%	27%	27%	26%	25%
Other Res Day %	8%	8%	9%	9%	10%
Hospital Attached	13%	13%	13%	13%	13%
For Profit	29%	29%	29%	30%	32%
Government	10%	10%	10%	9%	9%
Non-Profit	61%	61%	61%	62%	60%
Urban Twin Cities	35%	35%	35%	35%	35%
Urban Other MSA	30%	30%	30%	30%	30%
RUCA* Micropolitan	14%	14%	14%	14%	14%
RUCA Small Town	13%	13%	13%	13%	13%
RUCA Rural	8%	8%	8%	8%	8%

*RUCA codes delineate geographic location of a facility based on population size and direction of commuting flows.

Utilization Trends

Important utilization variables displayed a steady downward trend from 2013 to 2016 (Table 5 and Figure 3 through Figure 5 and Figure A.1). Mean facility acuity (RUG case-mix score) dropped from 1.020 to 1.010; mean licensed beds dropped from 81.7 to 77.9; mean residents per day dropped from 73.6 to 67.0; and occupancy rates dropped from 88.8% to 84.5%. These trend lines did not change significantly between 2015 and 2016, suggesting that utilization declines were not the result of changes in reimbursement approach. They likely reflect general industry trends towards more post-acute admissions and shorter average stays.

Figure 3. Mean Facility Acuity by Year

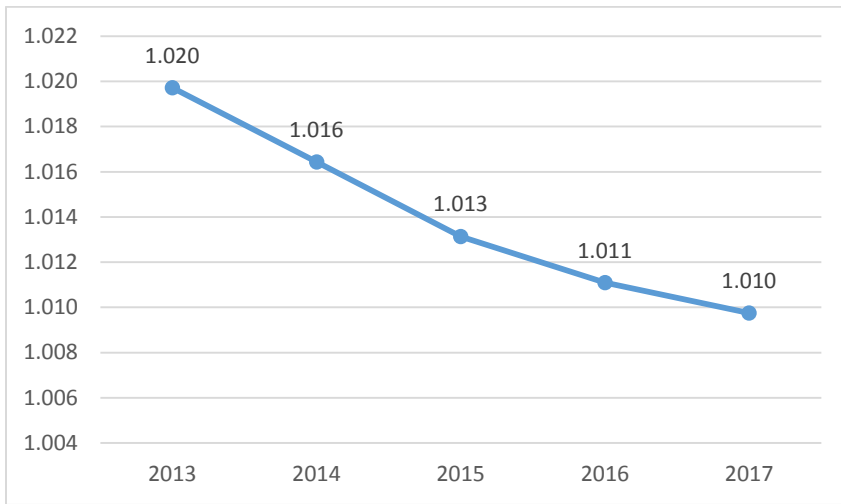


Figure 4. Mean Facility Beds and Residents per Day by Year

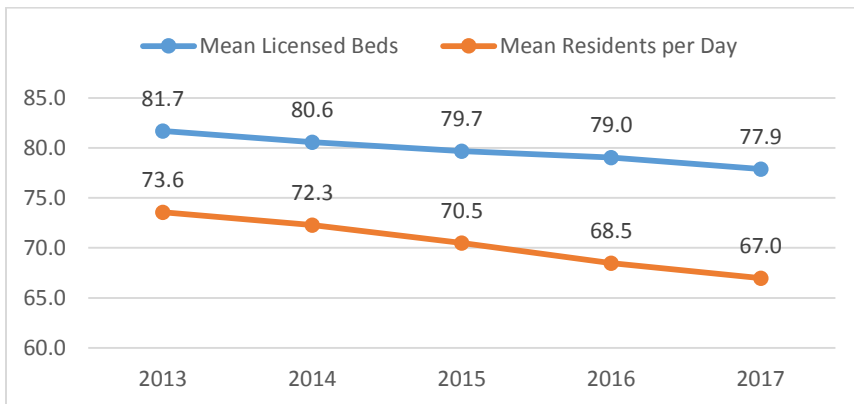
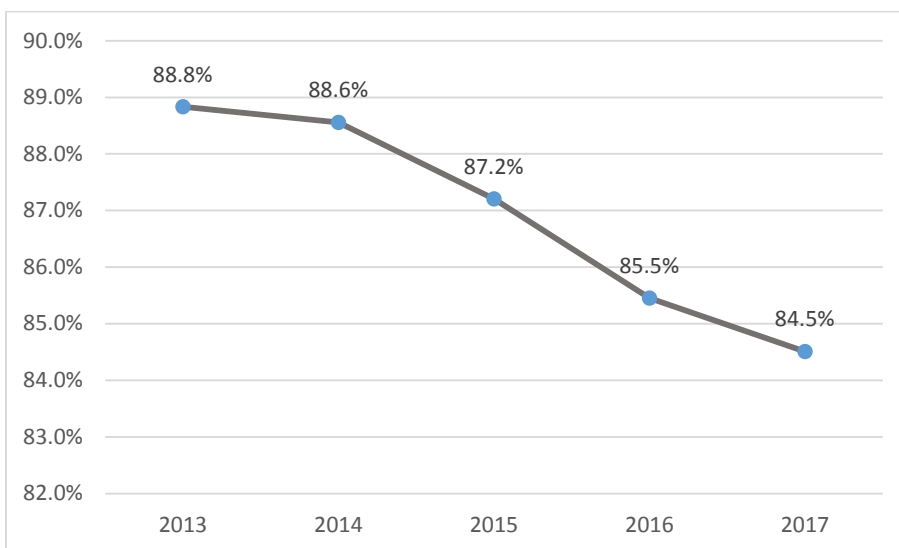


Figure 5. Mean Facility Occupancy Rates by Year



Although the rates of utilization declined on average across years, there was considerable variation between facilities in utilization changes from one year to the next. For example, Figure A.1 shows the annual facility change in occupancy percentage from 2013 to 2017. Although the majority of facilities experienced occupancy rate declines each year, a large minority experienced increase. In a later section of the report, we examine major outcome variables for subgroups of facilities by their average annual occupancy rate change.

Annual and PRD Revenue

The new reimbursement approach was expected to increase Medicaid revenue, and to some degree private pay revenue because private pay rates are tied to Medicaid rates. Annual Medicaid revenue is defined as all revenue received from Medicaid during the year.

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 is a function of revenue per day times number of Medicaid resident days. Both measures are important because they represent different perspectives. A facility with a small percentage of Medicaid residents might have a large increase in PRD Medicaid payment rate yet experience a relatively small absolute increase in revenue. Conversely, a facility with a very large percentage of Medicaid residents might have a relatively small increase in the Medicaid payment rate yet experience a relatively large increase in absolute revenue.

We found a large increase in both PRD and annual revenue between 2015 and 2016 and it continued to rise from 2016 to 2017 (Table 6 and Figure 6- Figure 8). Between 2015 and 2016 mean facility revenue PRD increased by 18% for Medicaid and 16% for private pay (Figure 7). Mean annual revenue increased by 17% for Medicaid and 8% for private pay between those same years (Figure 9).

Table 6. Facility Mean Annual and PPRD Revenue by Year

<i>Year</i>	<i>2013</i>	<i>2014</i>	<i>2015</i>	<i>2016</i>	<i>2017</i>
<i>Revenue PRD</i>					
Medicaid PRD	173.47	180.05	184.40	218.17	227.62
Medicare PRD	332.65	338.52	345.49	347.66	361.81
Private Pay PRD	185.05	193.80	197.27	228.35	239.55
Other Revenue PRD	293.35	301.47	281.56	300.37	312.64
Total PRD	184.94	192.46	195.50	226.85	237.84
<i>Annual Revenue</i>					
Medicaid Revenue Total	2,679,673	2,705,525	2,648,952	3,086,640	3,169,647
Medicare Revenue Total	450,172	463,111	485,825	537,231	560,537
Private Pay Revenue Total	1,309,996	1,364,092	1,356,456	1,459,648	1,416,751
Other Revenue Total	662,529	690,351	669,964	721,613	784,740
Total Revenue	5,102,369	5,223,079	5,161,196	5,805,131	5,931,675

Figure 6. Mean Facility Revenue PRD

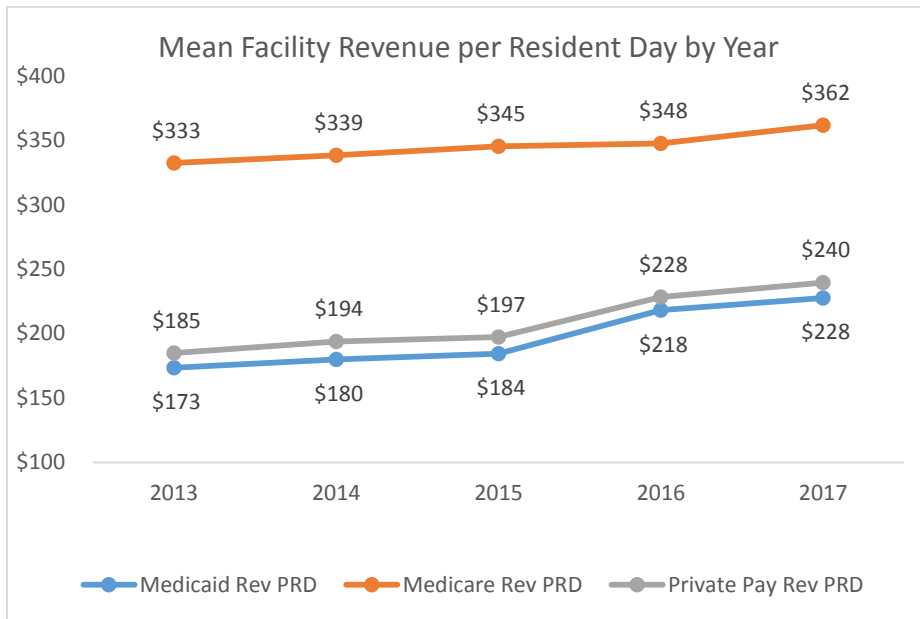


Figure 7. Percentage Changes in Mean Facility Revenue PRD

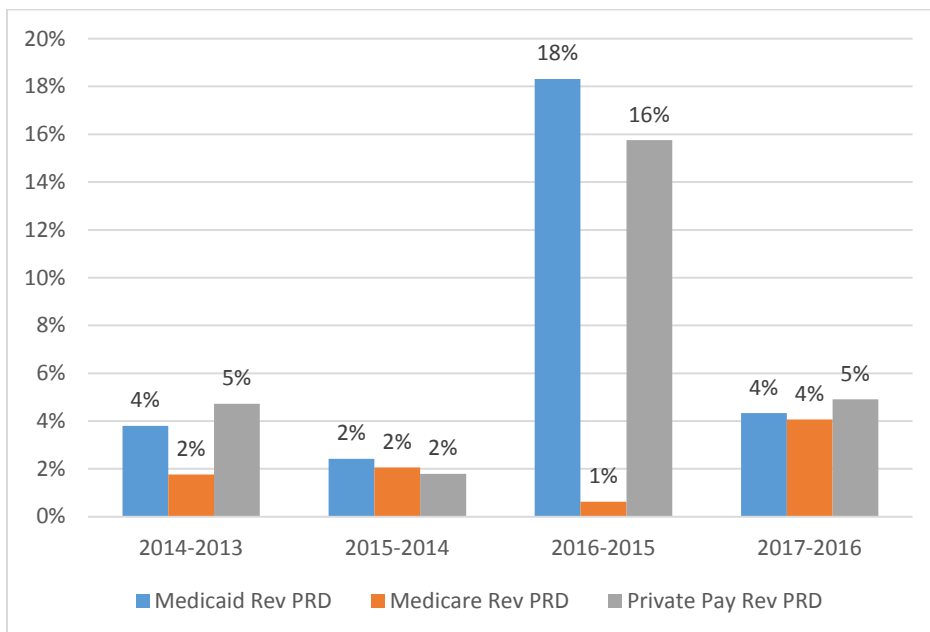


Figure 8. Mean Annual Revenue PRD

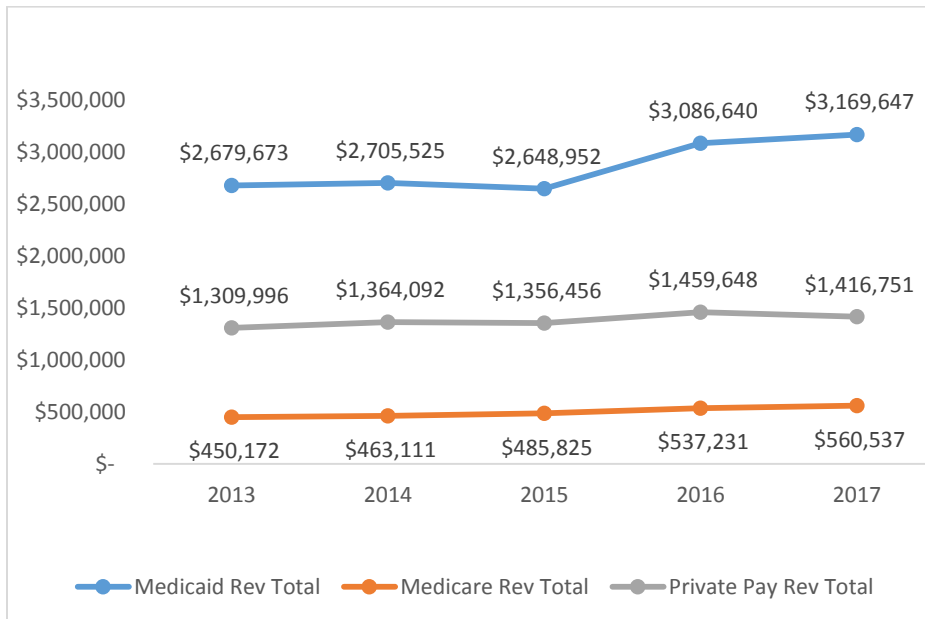
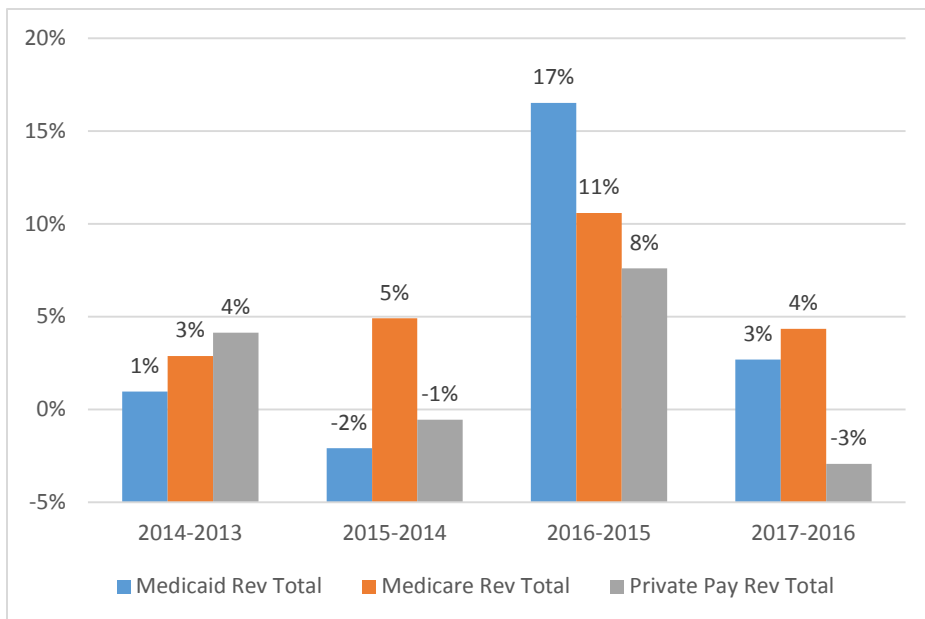


Figure 9. Percentage Change in Mean Annual Revenue PRD



Nearly all facilities saw an increase in their annual Medicaid and private pay PRD revenue (Figure A.2 and Figure A.3) between 2015 and 2016. Facilities were more evenly split between increases and decreases in their Medicaid and private pay annual revenue (Figure A.4 and Figure A.5 between the same years. Increases in private pay rates between 2015 and 2016 tended to be offset by a decline in private pay resident days, which resulted in lower overall revenue for a significant percentage of facilities.

Annual and PRD Costs

The next set of results shows trends in PRD and annual costs from 2013 to 2017. All major cost categories experienced a significant jump in PRD costs from 2015 to 2016, with additional increases between 2016 and 2017 (Table 7). Similar increases occurred for direct care salaries, other care-related salaries, and salaries in other operating areas, and staff benefits (Table 7). Note that part of the jump in scholarship costs per resident day is due to the reclassification of CNA training and testing costs as external fixed costs rather than operating costs (effective 7/1/15).

Table 7. Costs PRD (PRD) by Year

<i>Year</i>	<i>2013</i>	<i>2014</i>	<i>2015</i>	<i>2016</i>	<i>2017</i>
<i>Care-related Cost PRD</i>	<i>110.70</i>	<i>112.32</i>	<i>115.02</i>	<i>128.30</i>	<i>136.21</i>
Direct Care Cost PRD Standardized	87.52	89.16	91.82	103.49	110.72
Other Care-Related Cost PRD Case-mix Standardized	21.57	21.63	21.87	23.60	24.47
Direct Care Cost PRD Unstandardized	88.96	90.52	93.04	104.60	111.67
Other Care-Related Cost PRD Unstandardized	21.74	21.79	21.98	23.70	24.53
Other Operating Cost PRD	60.98	64.36	65.33	70.26	74.00
Total Operating Cost PRD	171.68	176.67	180.35	198.55	210.21
<i>Direct Care Salary</i>	<i>72.13</i>	<i>74.54</i>	<i>77.09</i>	<i>86.80</i>	<i>92.88</i>
Nurse Admin Salary PRD	7.56	8.11	8.15	9.45	10.26
RN Salary PRD	14.62	15.48	16.40	17.57	19.20
LPN Salary PRD	15.57	15.75	16.05	17.73	18.08
CNA Salary PRD	30.81	31.57	32.44	36.79	39.52
TMA Salary PRD	3.09	3.14	3.53	4.67	5.18
DC Staff Trainer Salary PRD	0.49	0.48	0.53	0.60	0.64
<i>Other Care-related Salary PRD</i>	<i>9.82</i>	<i>10.10</i>	<i>10.63</i>	<i>11.71</i>	<i>12.27</i>
Medical Record Salary PRD	2.66	2.74	2.84	3.18	3.34
Social Worker Salary PRD	2.55	2.64	2.85	3.13	3.32
Activities Staff Salary PRD	3.88	3.98	4.21	4.63	4.96
Other Direct Care Salary PRD	0.67	0.71	0.71	0.74	0.61
<i>Other Operating Cost PRD</i>	<i>60.98</i>	<i>64.36</i>	<i>65.33</i>	<i>70.26</i>	<i>74.00</i>
Dietary Costs PRD	13.57	13.80	13.73	14.70	15.20
Laundry Costs PRD	3.34	3.40	3.54	3.75	3.72
Housekeeping Costs PRD	5.90	6.04	6.29	6.70	7.06
Plant & Maintenance Costs PRD	11.34	12.24	12.82	13.49	14.13
Administrative Costs PRD	26.83	28.88	28.95	31.62	33.89
Admin Management Fees PRD	6.12	6.34	6.76	7.18	7.88
<i>Benefits PRD (All Staff)</i>	<i>8.40</i>	<i>10.39</i>	<i>10.88</i>	<i>13.02</i>	<i>15.03</i>
Health Insurance PRD	6.96	8.89	9.19	10.73	12.44
Dental Insurance PRD	0.17	0.19	0.25	0.27	0.25
Pension/Profit Share PRD	1.07	1.12	1.16	1.36	1.43

Year	2013	2014	2015	2016	2017
Scholarship PRD	0.20	0.19	0.28	0.66	0.91

Note: Standardized direct care and care-related 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.

Operating Cost Trends

Trends in selected PRD costs are highlighted in Figure 10 through Figure 13 and distributions for PRD costs are in Figure A.6 through Figure A.9. Cost categories are applied consistently across years according to the rules effective 1/1/16. Between 2015 and 2016 direct care PRD costs rose by 12%, and other care-related and other operating costs PRD rose by 8%, and total operating costs PRD by 10% (Figure 11 through Figure 13). Between 2016 and 2017 costs continued to rise but at a slower rate: direct care by 7%, other care-related by 4%, and other operating by 4%, and total operating by 6% (Figure 10 and Figure 11).

Figure 10. PRD Direct Care, Care-Related and Other Operating Costs

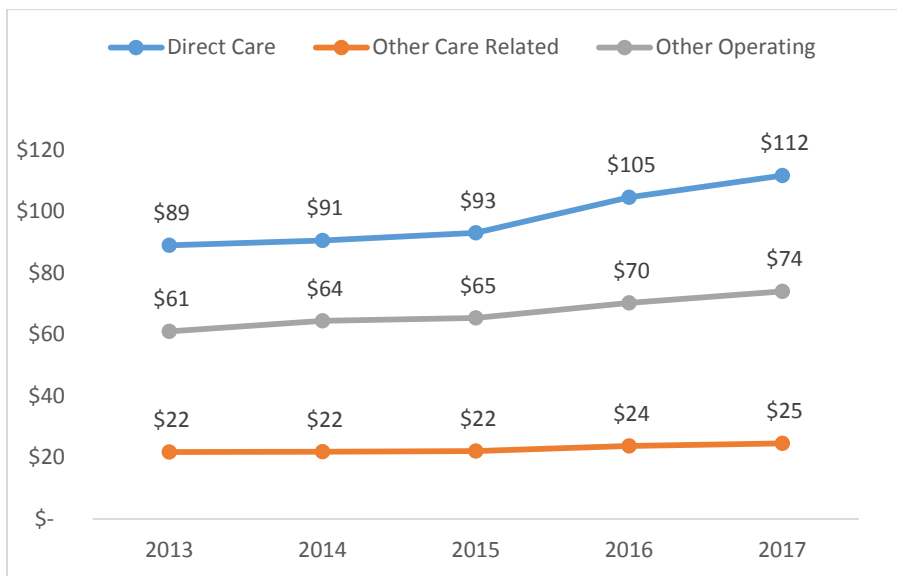


Figure 11. Percentage Change in PRD Direct Care, Care-Related and Other Operating Costs

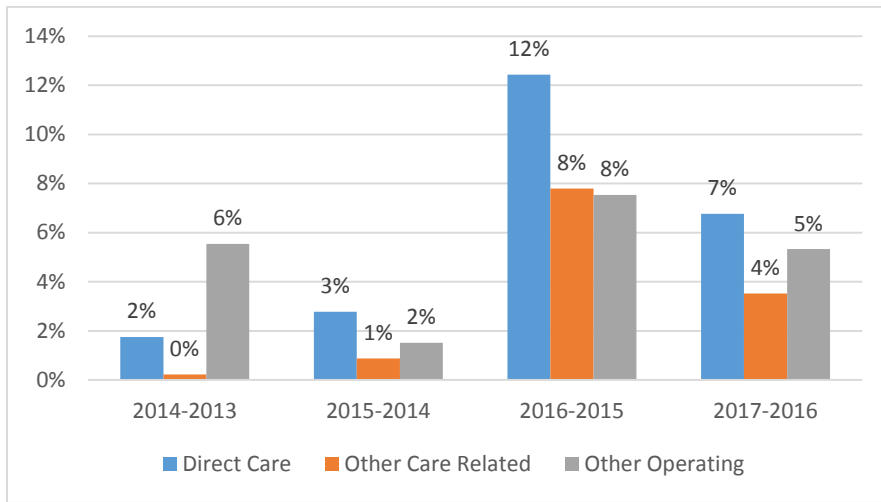


Figure 12. PRD Total Operating Costs

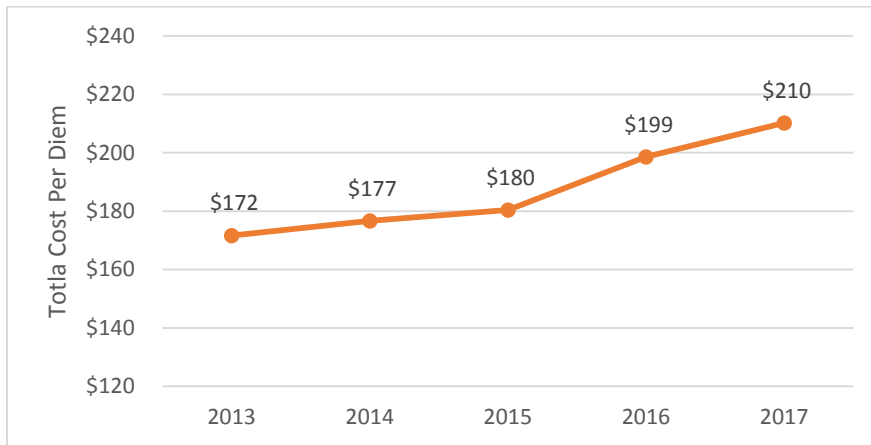
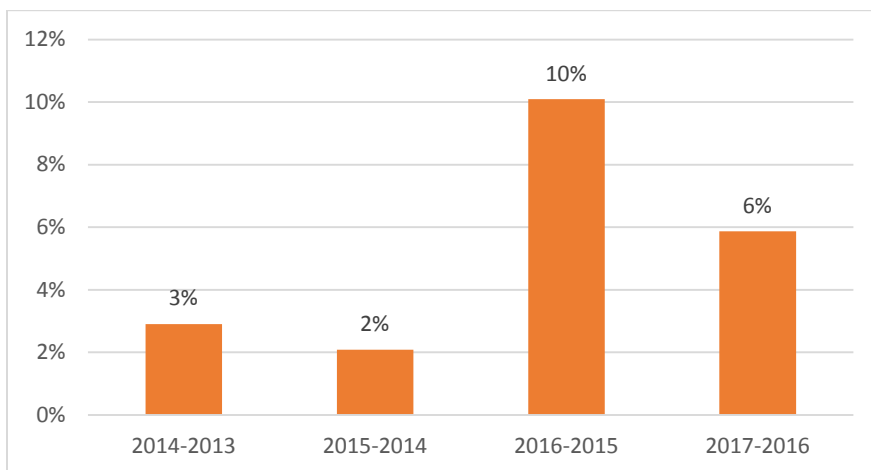


Figure 13. % Change in PRD Total Operating Costs



Direct care costs are comprised primarily of salaries and benefits for direct care staff (RN, LPN, CNA, etc.), wages for temporary direct care staff, and nursing supplies. Nearly all facilities increased their PRD direct care costs between 2015 and 2016 (Figure A.6). Other care-related costs are comprised primarily of salaries and benefits for other care-related staff (medical records, mental health, social worker, activities, therapy, etc.), consultants, and related supplies. A large proportion of facilities also increased PRD other operating and total operating costs between these years (Figure A.8 and Figure A.9). Changes in other care-related costs were relatively small and facilities were evenly split between increases and decreases (Figure A.7).

Salary and Benefit Cost Trends

Trends in selected PRD salary and benefit costs are displayed in

Figure 14 through Figure 16. Trends in nursing salary costs PRD were consistent with trends in direct care costs. Between 2015 and 2016 Certified Nursing Assistant salary costs PRD rose by 13%, LPN by 10%, and RN by 7% (Figure 16). Between 2016 and 2017 nursing salary costs continued to rise but at a slower rate. Total benefit costs for nursing and other staff displayed a different pattern. They jumped by 24% between 2013 and 2014, from \$8.40 to \$10.39 PRD (Figure 15 and Figure 16). After a modest 5% increase between 2014 and 2015, they rose by 20% between 2015 and 2016 (\$10.88 to \$13.02) and 15% between 2016 and 2017 (\$13.02 to \$15.03).

Figure 14. Nursing Salary Costs PRD

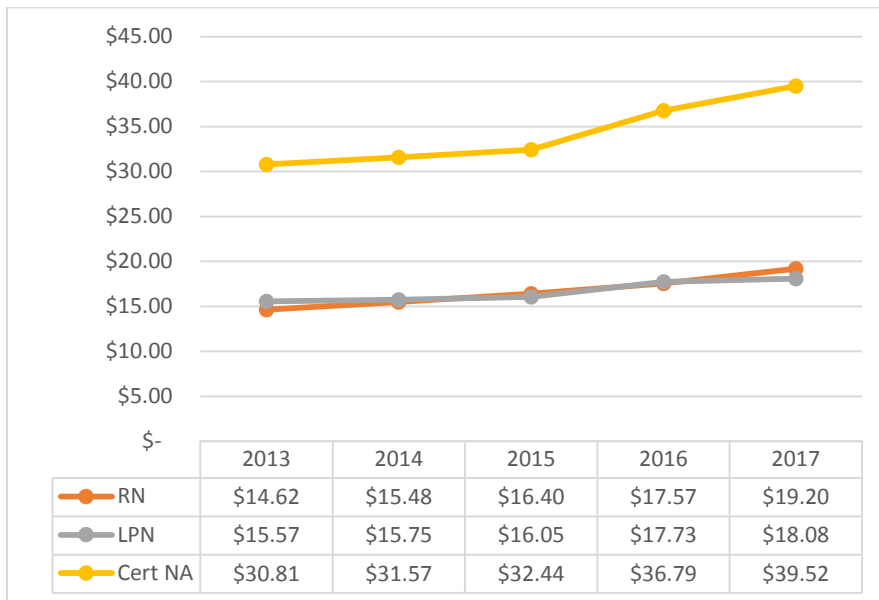


Figure 15. Total Benefit Costs PRD

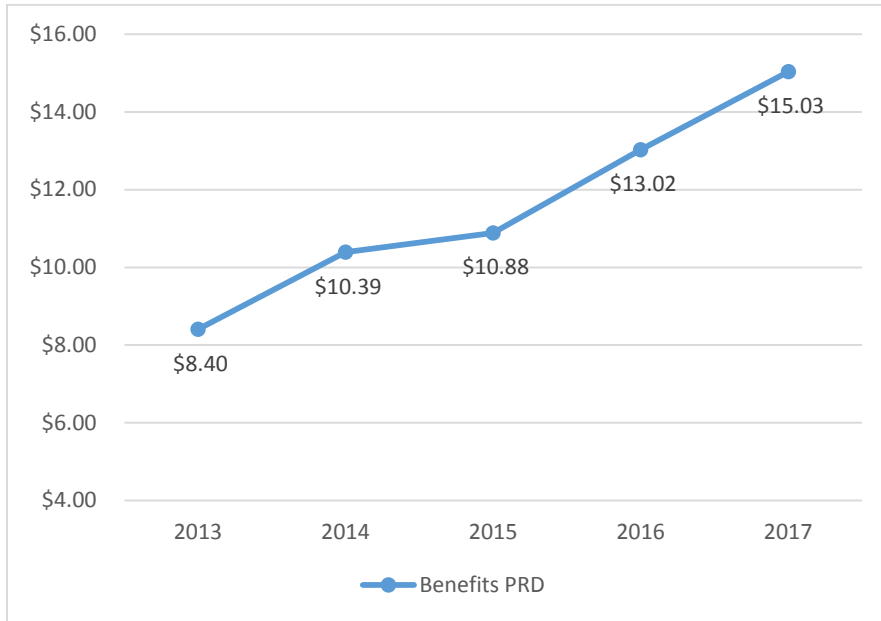
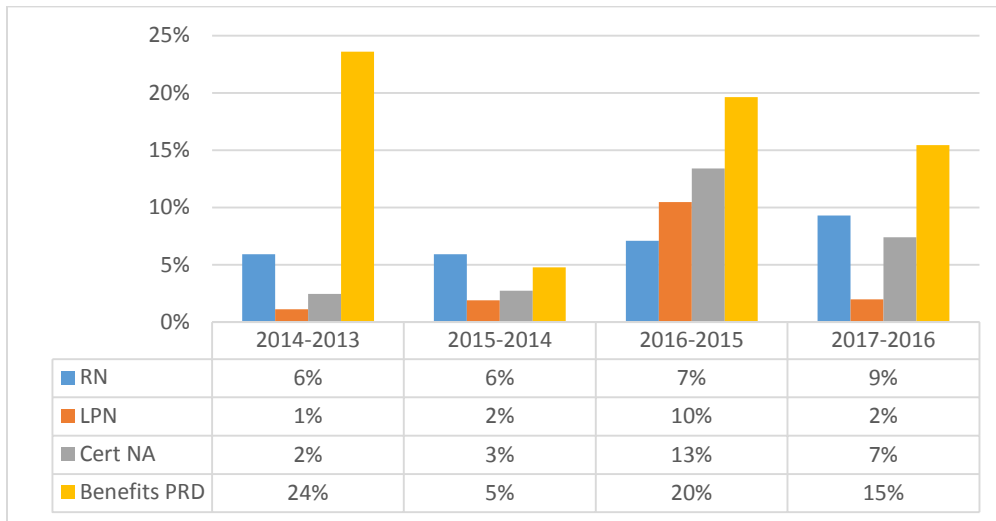


Figure 16. % Change in Nursing Salary and Total Benefit Costs PRD



The vast majority of facilities increased their PRD costs for Certified Nursing Assistant salaries between 2015 and 2016, and again between 2016 and 2017 (Figure A.12). Facilities were more evenly split in their cost between increases and decreases in RN and LPN salary costs between 2015 and 2016 (Figure A.10 and Figure A.11). Most facilities increased their costs for staff benefits PRD in 2014, 2016 and 2017 (Figure A.13).

Hourly Salaries for Direct Care and Other Care-Related Staff

Trends in hourly salaries for direct care and other care-related staff members were consistent with the above trends in PRD expenditures. Mean facility hourly salaries for direct care staff

increased substantially from 2015 to 2016 (Figure 17). They increased by 12.2% for Certified Nursing Assistants, 10.1% for Trained Medical Aides, 11.2% for LPNs, and 9.1% for RNs (Figure 18). The exception was Nursing Administration where hourly salaries rose by only 5.4%.

Figure 17. Hourly Salaries for Direct Care Staff

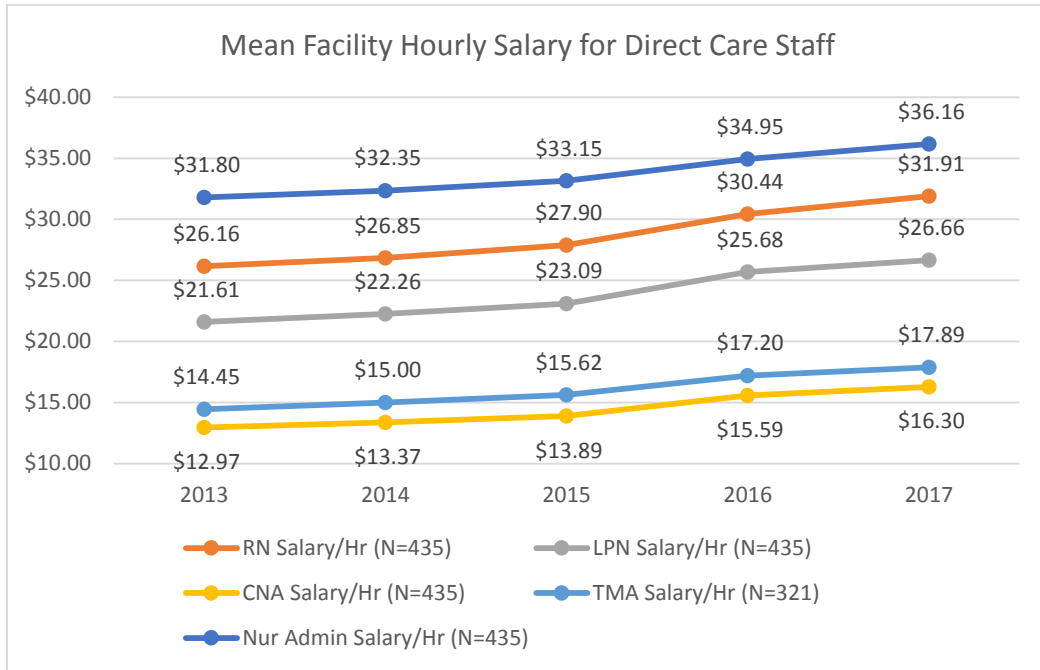
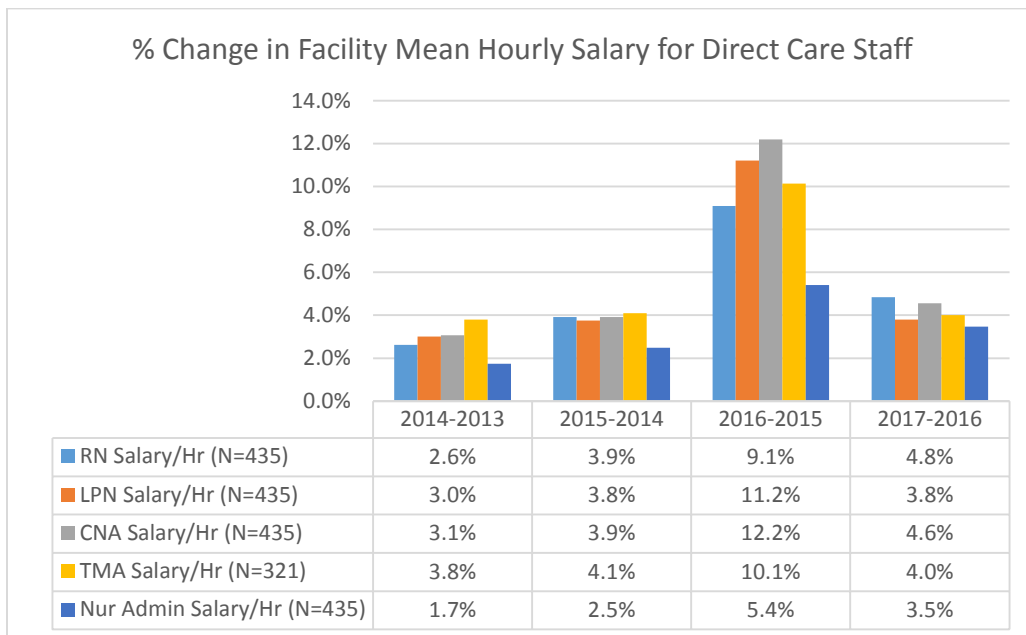


Figure 18. Change in Hourly Salaries for Direct Care Staff



Hourly salaries for other care-related staff also increased from 2015 to 2016, albeit at a slower rate (Figure 19). Activity staff hourly salaries increased 5.4% and social work staff increased by 4.2%.

Figure 19. Hourly Salaries for Other Care-Related Staff

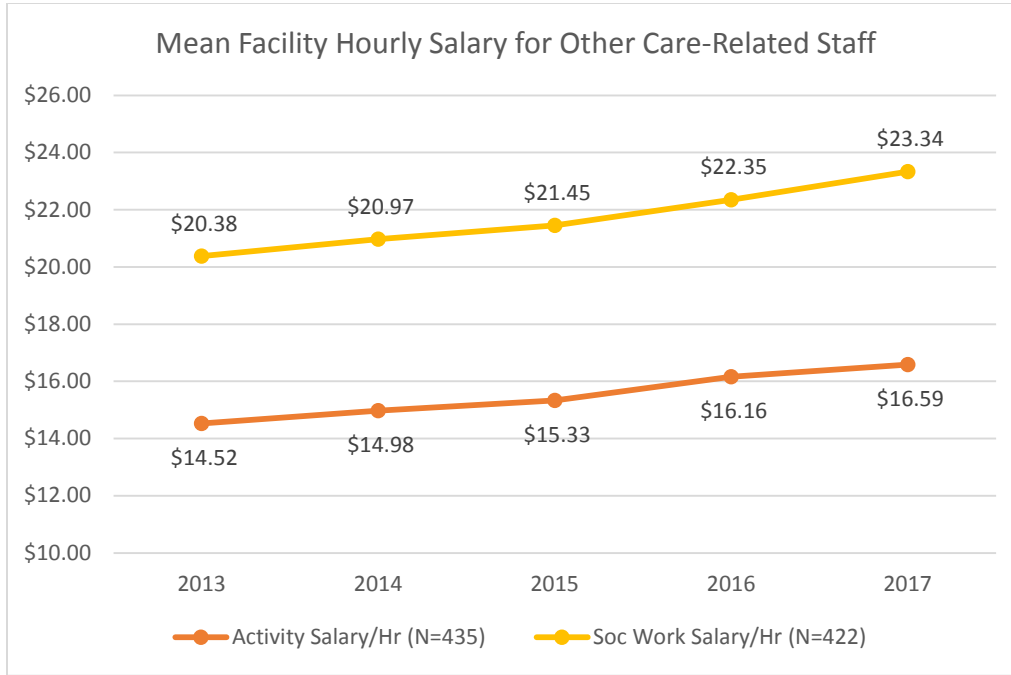
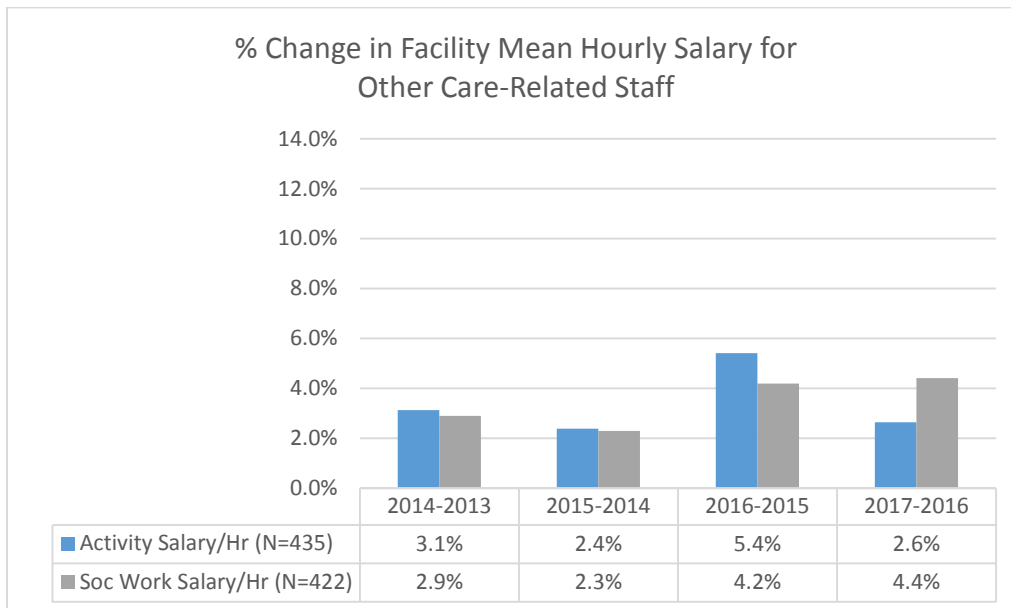


Figure 20. Change in Hourly Salaries for Other Care-Related Staff



Workforce Measures

Although nursing salary costs increased significantly between 2015 and 2016, neither nursing hours PRD nor percentage of registered or licensed (RN and LPN) nurse staffing experienced a similar increase (Table 8). In 2015 nursing hours PRD were .58 for RNs, .69 for LPNs, and 2.33 for Certified Nursing Assistants. In 2016 they were .57 for RNs, .68 for LPNs, and 2.36 for Certified Nursing Assistants. RN hours as a percentage of total nursing hours dropped from 13% to 12% and the licensed nurse percentage dropped from 28% to 27%. Mean total nursing hours PRD rose from 3.60 to 3.61. We should note that total direct care staff (nursing and other direct care staff) hours PRD went up from 4.63 to 4.73 between 2015 and 2016, and 4.73 to 4.85 between 2016 and 2017.

Apparently, the increase in nursing salary costs observed in the section above went into increases in nursing salaries and not additional staff hours per resident day, or an increase in RN or licensed hours as a percentage of total nursing hours. There was some increase in total direct care staffing PRD, apparently driven largely by other direct care staffing hours.

Table 8. Nursing Hours PRD and RN and Licensed Staff as a percentage of Nursing Staff Hours

<i>Year</i>	<i>2013</i>	<i>2014</i>	<i>2015</i>	<i>2016</i>	<i>2017</i>
RN hrs PRD	0.55	0.57	0.58	0.57	0.59
LPN hrs. PRD	0.72	0.71	0.69	0.68	0.68
Licensed hrs PRD	1.27	1.28	1.28	1.26	1.27
Nursing Assistant Hours PRD	2.38	2.36	2.33	2.36	2.42
Total RN, LPN, and CNA hrs PRD	3.65	3.64	3.60	3.61	3.69
Total Direct Care Staff hrs PRD	4.64	4.63	4.63	4.73	4.85
% RN of total nursing hrs PRD	12%	12%	13%	12%	12%
% Licensed (RN & LPN) of Total Nursing HPRD	28%	28%	28%	27%	26%

Figure 21. Mean Facility Hours PRD

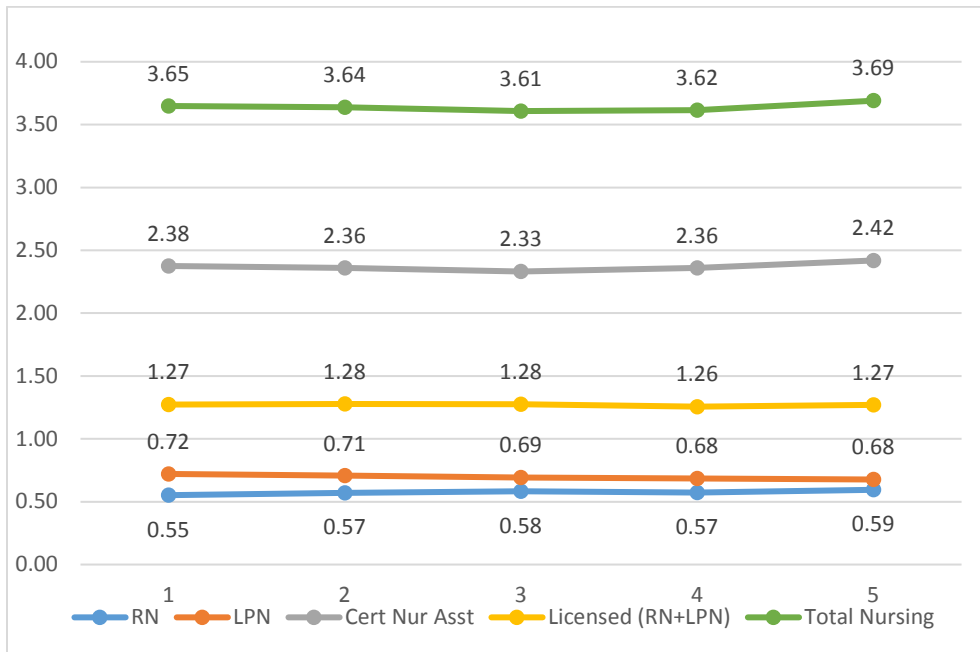


Figure A.14 through Figure A.17 display the facility distributions of nursing hours PRD, and Figure A.18 shows the facility distributions for percentage of licensed staff hours. In general, facilities are evenly split between increases and decreases in nursing hours and percentage of licensed in each year from 2013 to 2017.

Quality Scores

The component measures of care quality used in the new Medicaid reimbursement approach are a Quality Indicator (QI) score⁷ (range 0-50), Minnesota Department of Health Inspection score (range 0-10), and Resident Quality of Life (QoL) score (range 0-40). The scores of the components are summed to form a composite Total VBR Quality of Life Score (range 0-100). In addition, we have included a Staff Retention measure of the proportion of nursing staff present at the first of the reporting year who are still employed by the facility at the end of the reporting year.

The mean facility quality scores for each year are presented in Table 9 and Figure 22 to Figure 26. The VBR composite score showed a linear upward trend from 2013 through 2017, with no appreciable change in slope from 2015 to 2016. The QI Score displayed a similar upward trend from 2013 to 2017; the MDH Inspection score remained flat from 2013 to 2017; and the Resident QoL score displayed a downward trend from 2015 to 2017. Staff retention rates were relatively flat from 2013 to 2017. Figure A.19 to Figure A.23 show facility distributions of the

⁷ Here, we use a QI Improvement Score comparing facility performance to 2011 statewide QI thresholds.

mean quality score change between years. Facilities were evenly distributed between increases and decreases in scores.

These results suggest little if any relationship between introduction of the new reimbursement system and measures of care quality. Upward trends in the VBR Quality Measure and QI Score began before the new reimbursement approach was implemented and did not change between 2015 and 2016. The downward trend in the QoL score can probably be attributed to factors outside of the reimbursement system change. For example, the QOL survey was refreshed in 2016 which may have contributed to the downward trend. It is hard to derive a clear meaning from the trend when the instrument was changed.

Table 9. Quality Scores by Year

<i>Year</i>	<i>2013</i>	<i>2014</i>	<i>2015</i>	<i>2016</i>	<i>2017</i>
Total VBR Composite Score	75.3	76.0	76.5	77.1	77.4
Quality Indicator Quality Score	33.8	34.0	35.0	36.2	37.0
MDH Inspection Quality Score	8.4	8.9	8.3	8.2	8.1
Quality of Life Quality Score	33.1	33.1	33.1	32.7	32.3
Retention Quality Score (Retention Rate)	70%	68%	67%	68%	68%

Figure 22. Facility Mean Composite VBR Quality Score

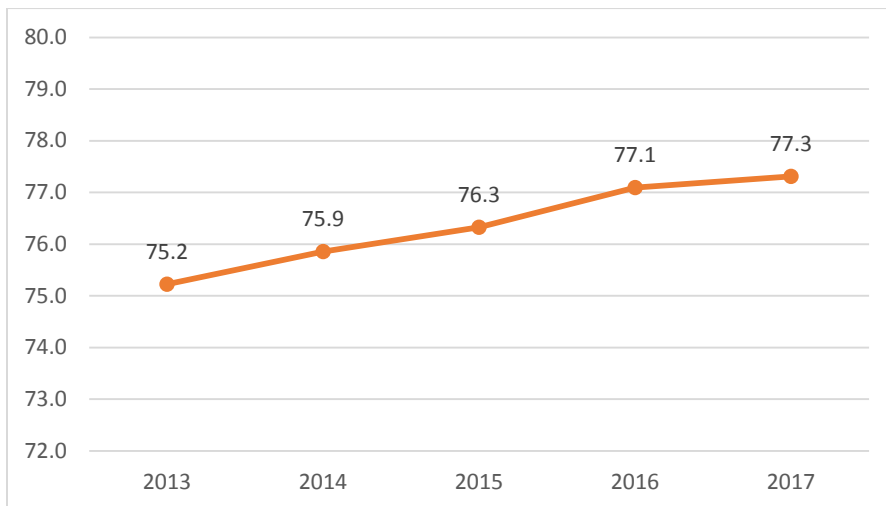


Figure 23. Facility Mean Quality Indicator (QI) Quality Score

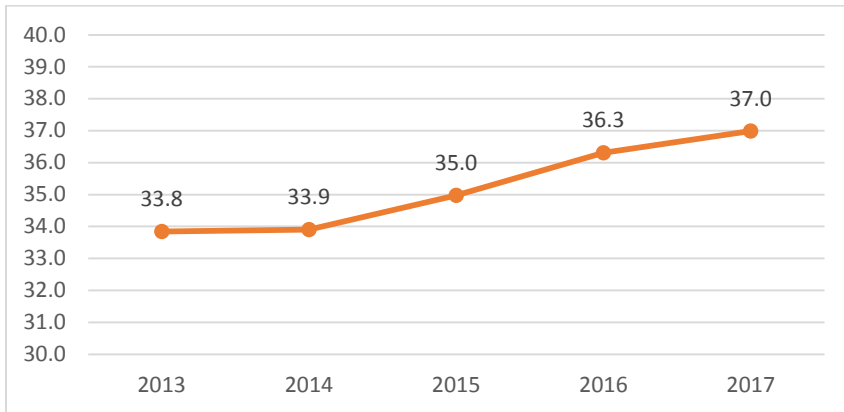


Figure 24. Facility Mean MDH Inspection Quality Score

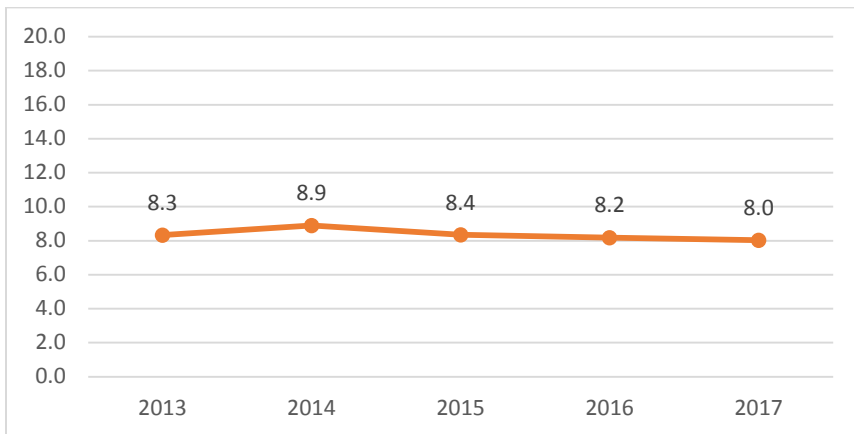


Figure 25. Facility Mean Quality of Life Score

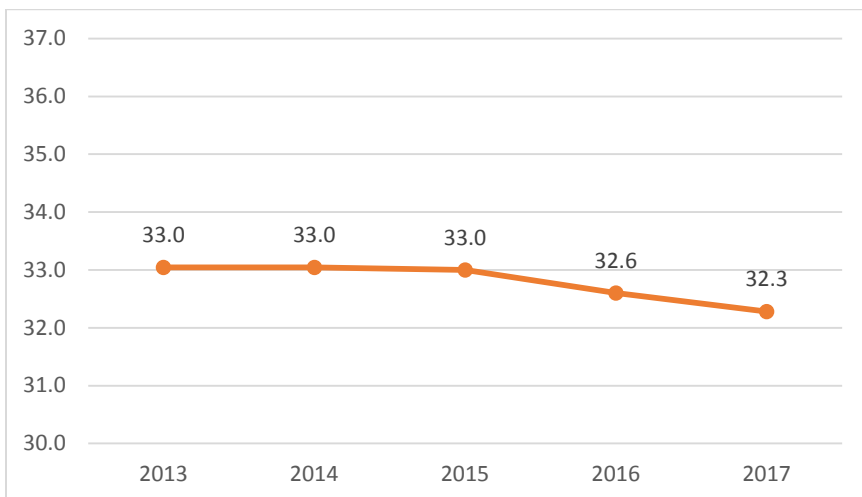
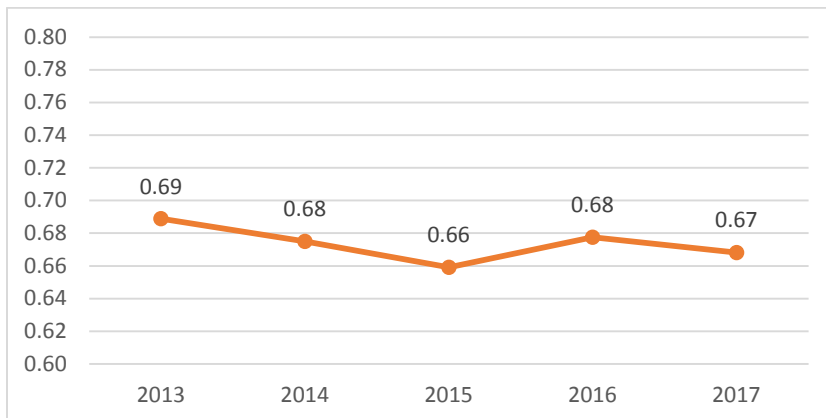


Figure 26. Facility Mean Nursing Staff Retention Score



Subgroup Trends

Underlying the patterns in overall trends are important subgroup differences. We chose major subgroups for more detailed analysis. These subgroups consisted of categorical variables of facility ownership, location, hospital affiliation, size (resident days), occupancy rate, change in occupancy rate, and acuity (RUG case-mix score). Because size, occupancy rate, and acuity are continuous variables, we categorized facilities based on percentile rank: bottom quartile (Q1), middle quartiles (Q2-Q3), and top quartile (Q4). Because hospital affiliated facilities have a distinct set of operating characteristics, we separated this category from the urban and rural locations. A relatively high proportion of rural facilities are hospital affiliated. They differ substantially in revenue, costs and outcomes from other rural facilities. Mixing hospital affiliated facilities in with other rural facilities tends to distort the facility trends.

Subgroup Trends in Medicaid PRD and Annual Revenue

The first step in the analysis was to examine trends in Medicaid revenue. As a reminder, annual revenue is the amount of revenue obtained from Medicaid during the cost report year. PRD Medicaid revenue is the total revenue from Medicaid during the year divided by Medicaid resident days. Both measures are important because they represent different perspectives. A facility with a small percentage of Medicaid residents might have a large increase in PRD Medicaid payment rate yet experience a relatively small absolute increase in revenue. Conversely, a facility with a very large percentage of Medicaid residents might have a relatively small increase in the Medicaid payment rate yet experience a relatively large increase in absolute revenue.

Tables in the Appendix present detailed results for revenue by ownership type, resident days, location, occupancy rate, occupancy rate change, and acuity.

Ownership

On average, facilities in all three ownership groups had a substantial increase in Medicaid PRD revenue between 2015 and 2016. Government facilities had the highest PRD revenue, followed by nonprofit and for profit. Average annual Medicaid revenue also increased between these years for the governmental and nonprofit facilities; whereas mean annual revenue remained flat among for profit facilities.

Figure 27. Medicaid Revenue PRD by Ownership

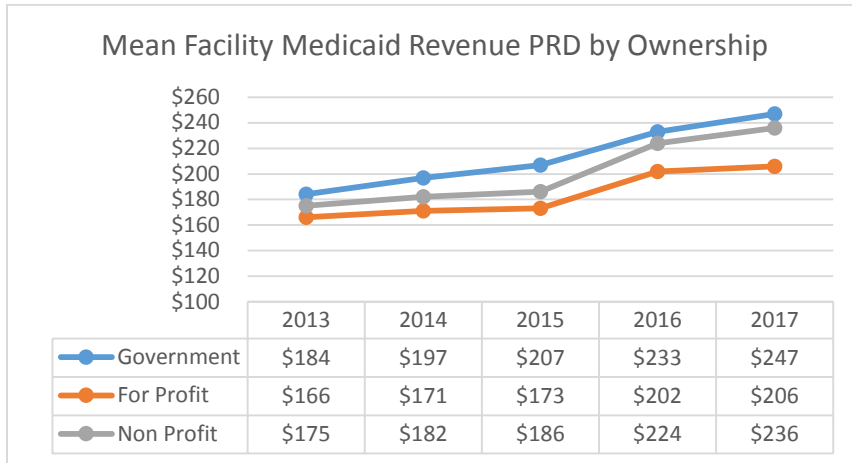
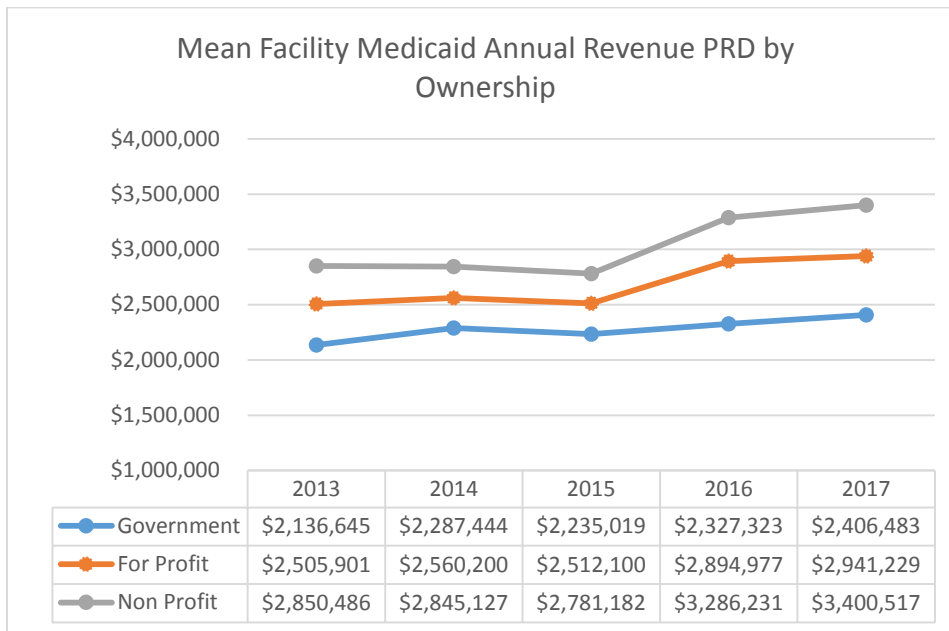


Figure 28. Annual Medicaid Revenue by Ownership



Location and Hospital Attached

Facilities in all locations experienced a substantial increase in mean Medicaid PRD revenue between 2015 and 2016. Hospital affiliated facilities had the largest increase, followed by other facilities in the Twin Cities, other metropolitan areas, micropolitan areas, and small towns and rural areas. Annual revenue increases were less substantial over the same period. Twin City facilities because of their larger number of Medicaid resident days had larger average Medicaid revenue. They also experienced the largest increase in Medicaid annual revenue between 2015 and 2016.

Figure 29. Medicaid Revenue PRD by Location and Hospital Affiliation

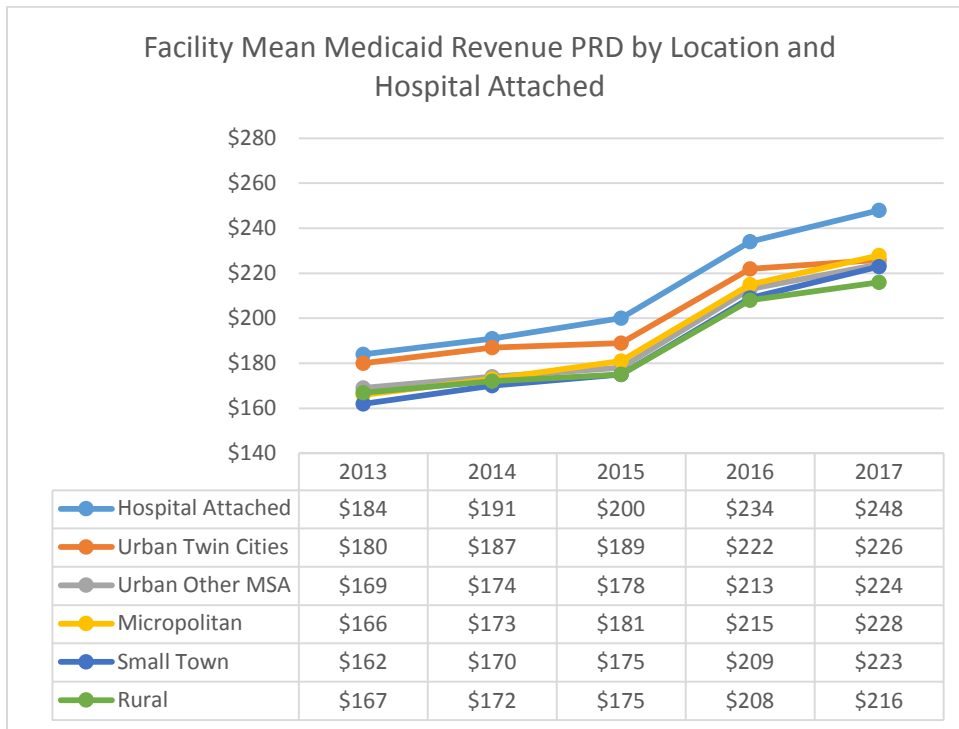
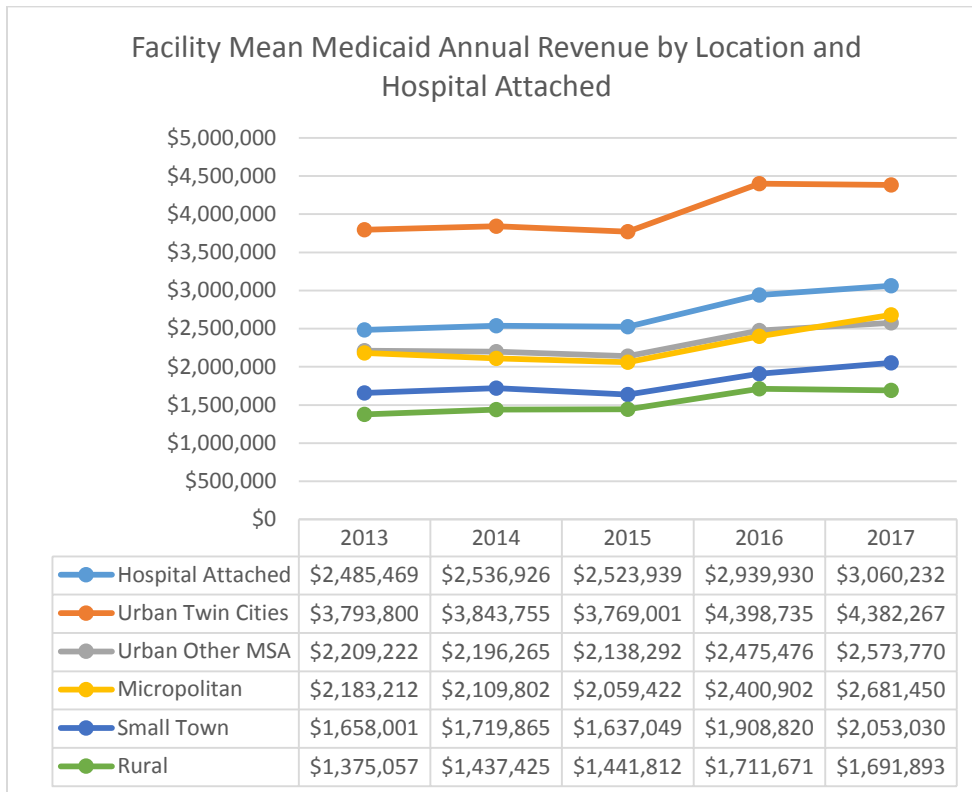


Figure 30. Medicaid Annual Revenue by Location and Hospital Affiliation



Occupancy Rate

Facilities with the lowest occupancy rates and the largest decline in occupancy over the 5-year period had the lowest Medicaid annual and PRD revenue. However, they were just as likely to experience an increase in Medicaid PRD revenue between 2015 and 2016 when compared to facilities with higher occupancy rates. Probably owing to their decline in occupancy over the years, they experienced little change in their annual Medicaid revenue. In contrast, facilities with higher occupancy rates (Q2-3 and Q4) experienced a relatively large increase in annual Medicaid revenue.

Figure 31. Medicaid Revenue PRD by Occupancy Rate

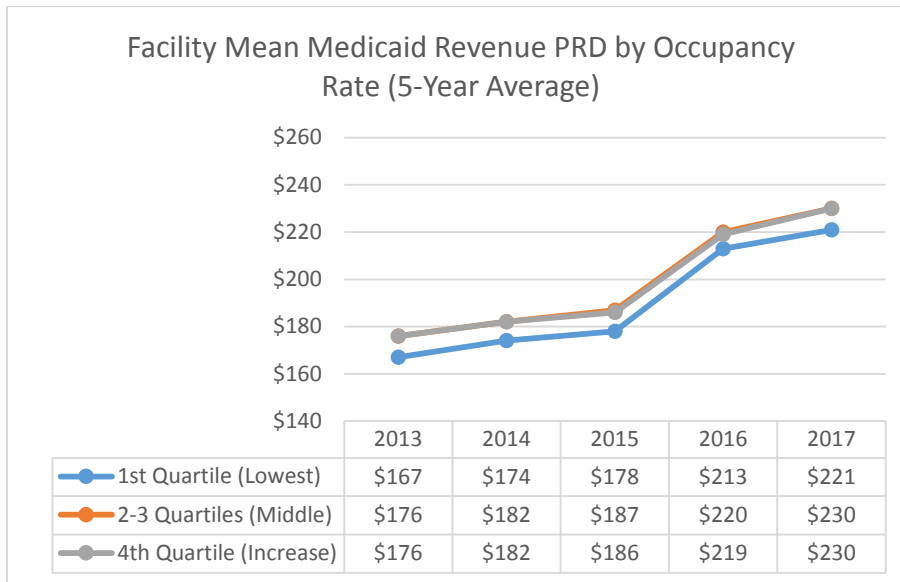


Figure 32. Medicaid Annual Revenue by Occupancy Rate

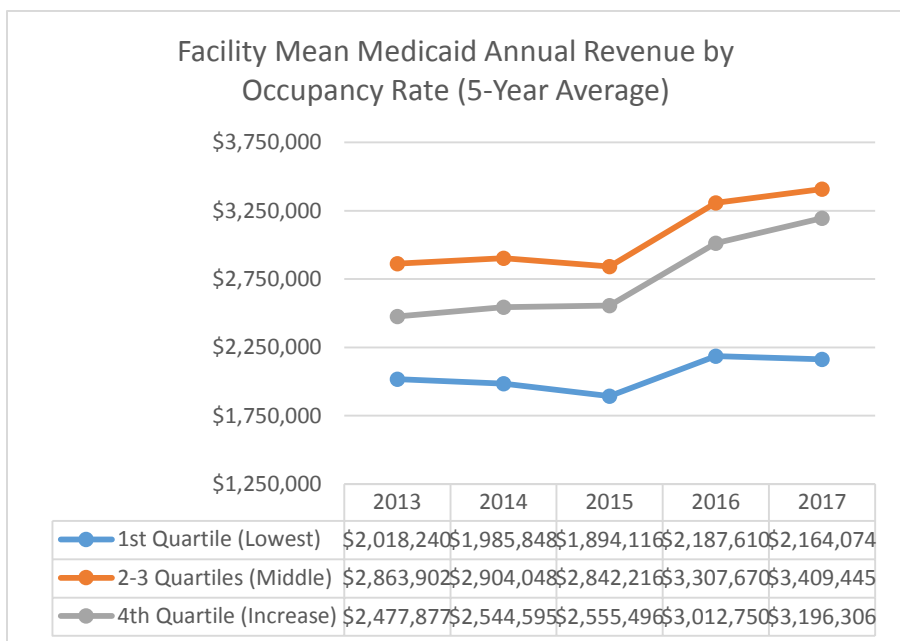


Figure 33. Medicaid Revenue PRD by Occupancy Rate Change

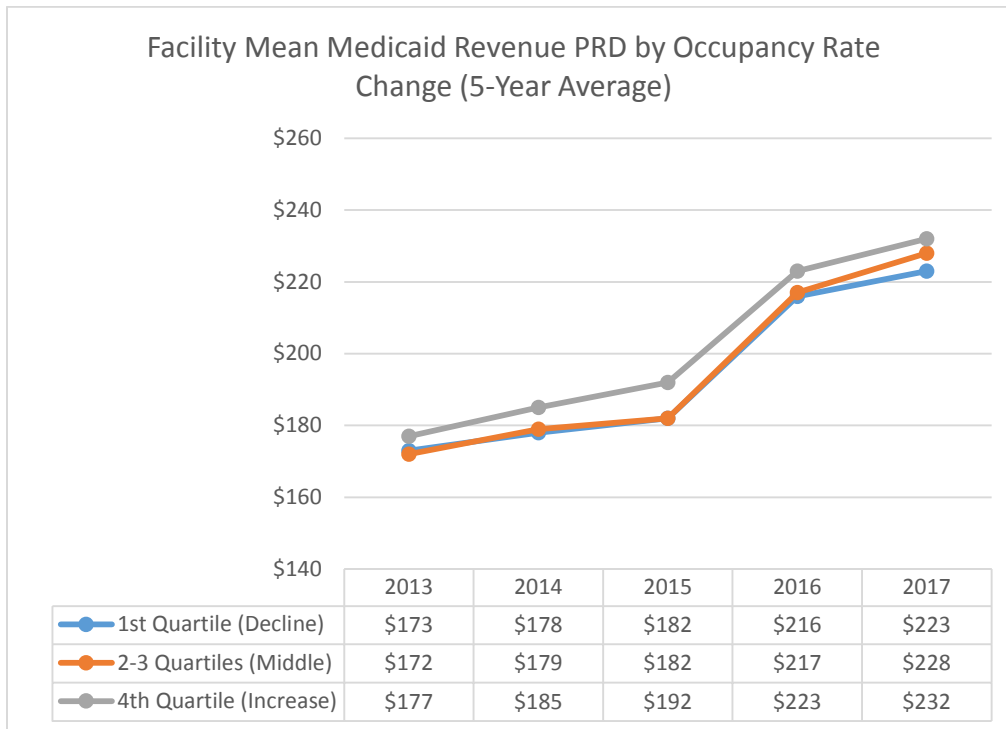
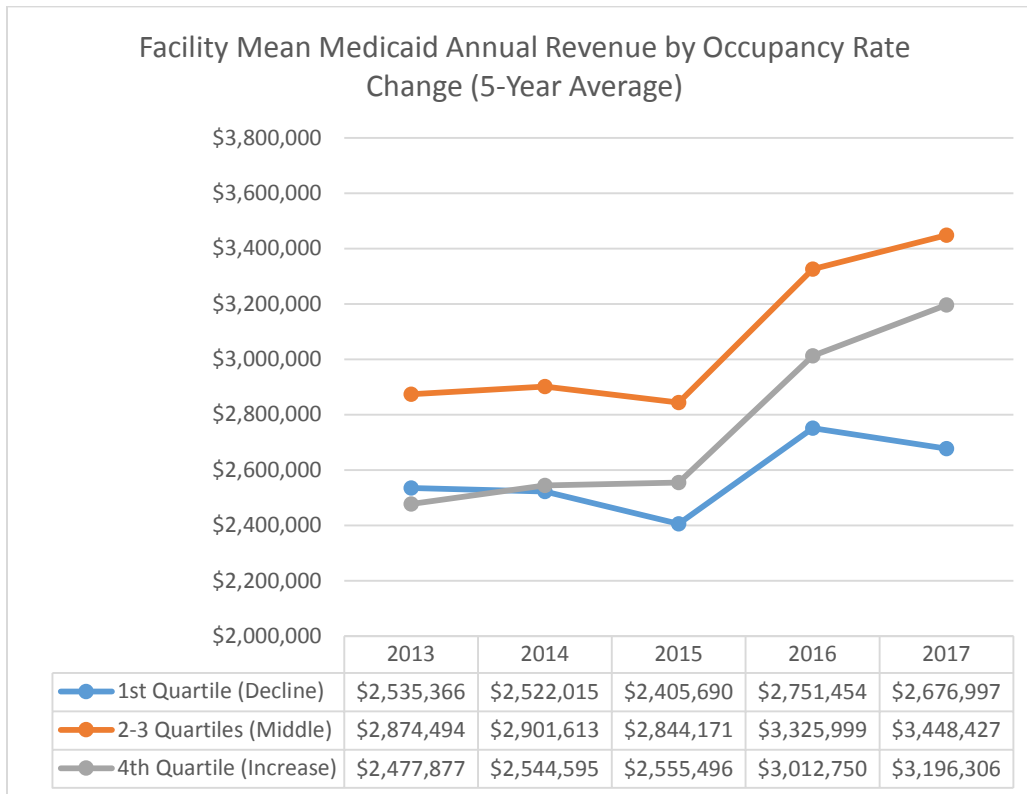


Figure 34. Medicaid Annual Revenue by Occupancy Rate Change



Acuity

Facilities with all three levels of acuity had increases in average Medicaid PRD and annual revenue between 2015 and 2016. However, the lowest acuity facilities (Q1) had lower Medicaid PRD revenue and much lower annual Medicaid revenue over the entire 5-year period.

Figure 35. Medicaid Revenue PRD by Acuity

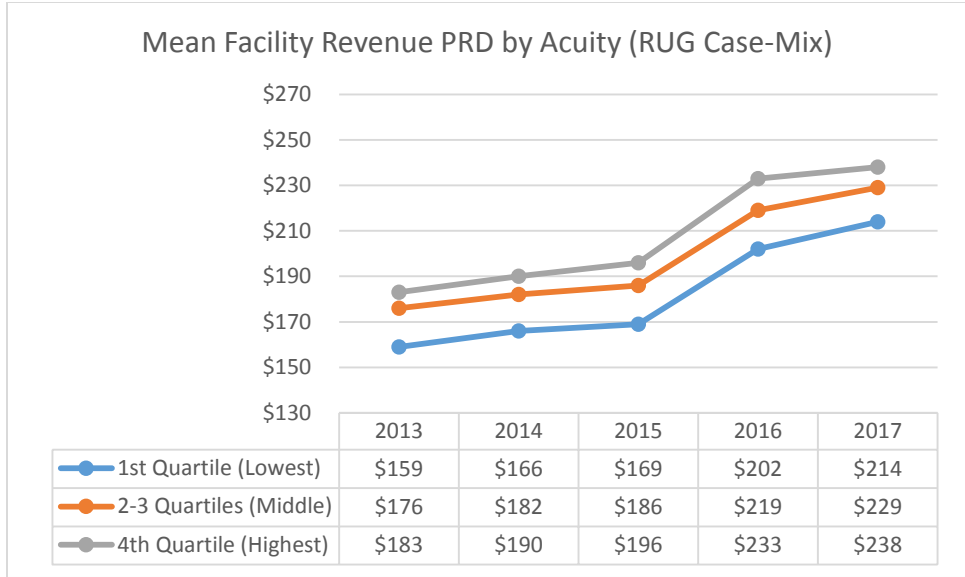
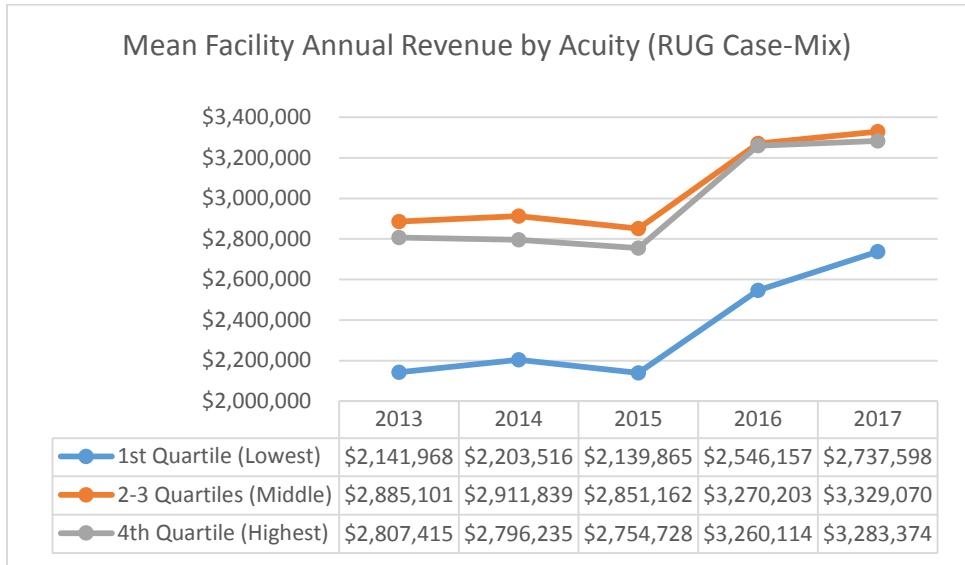


Figure 36. Medicaid Annual Revenue by Acuity



Subgroup Trends in Key Outcome Variables

In order to gain a better understanding of trends in quality outcomes, we conducted a subgroup analysis by policy-relevant facility characteristics. Tables in the Appendix present detailed results for major outcomes by ownership type, resident days, location, occupancy rate, occupancy rate change, and acuity. The following figures show trends for selected facility characteristics. We chose characteristics having significant effects on outcomes in the report section below -- Statistical Models Predicting Change in Key Outcome Variables.

Ownership

Facilities of all three ownership types increased their mean total direct care costs and salary costs PRD between 2015 and 2016. Non-profit and governmental facilities had higher direct care and salary costs PRD than for-profit facilities in each of the years. Non-profit and governmental facilities also had higher nursing hours PRD and higher VBR quality scores than for-profit facilities; however, none of the ownership types experienced a discernable increase in nursing hours PRD or quality score between 2015 and 2016.

Figure 37. Ownership and Direct Care Cost PRD

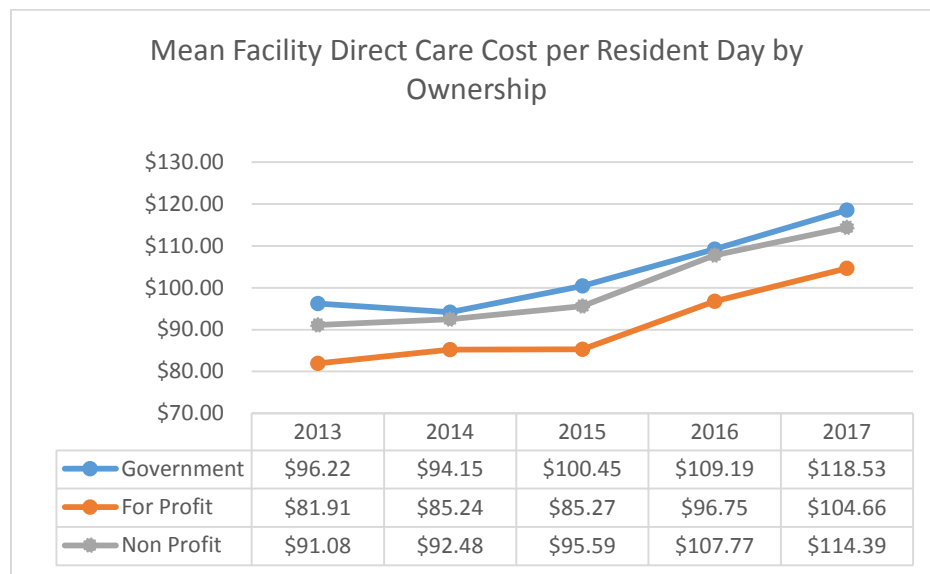


Figure 38. Ownership and Direct Care Salaries PD

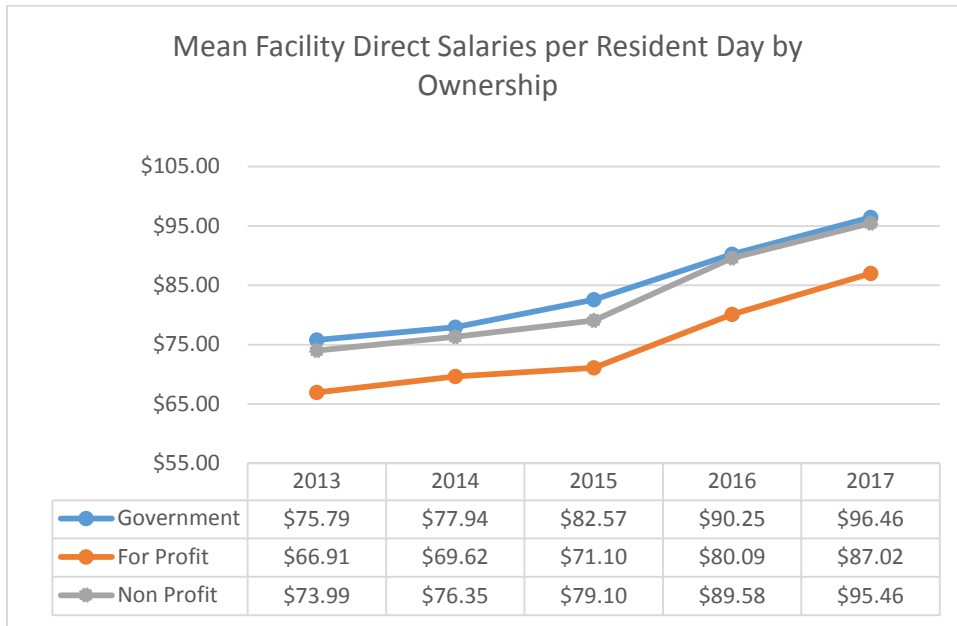


Figure 39. Ownership and Nursing Hours PRD

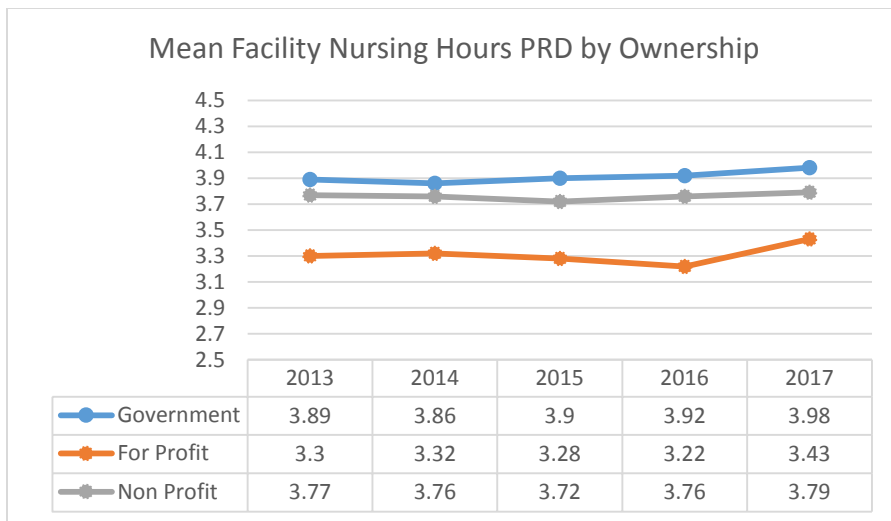
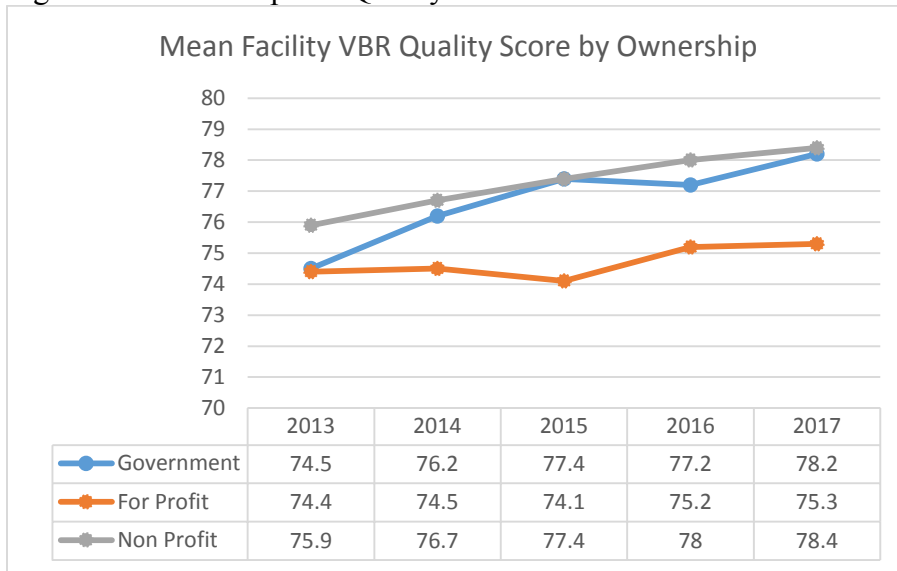


Figure 40. Ownership and Quality Score



Location and Hospital Affiliation

Hospital affiliated facilities were grouped together because of their similarities in costs and operations. The hospital affiliated led other facilities in total direct care and salary-related direct care cost PRD. Among the non-hospital affiliated, facilities in the Twin Cities had highest costs, while facilities in small towns and rural areas had the lowest costs. Facilities in all locations had increased costs between 2015 and 2016, with increases continuing into 2017.

Figure 41. Location and Direct Care Cost PRD

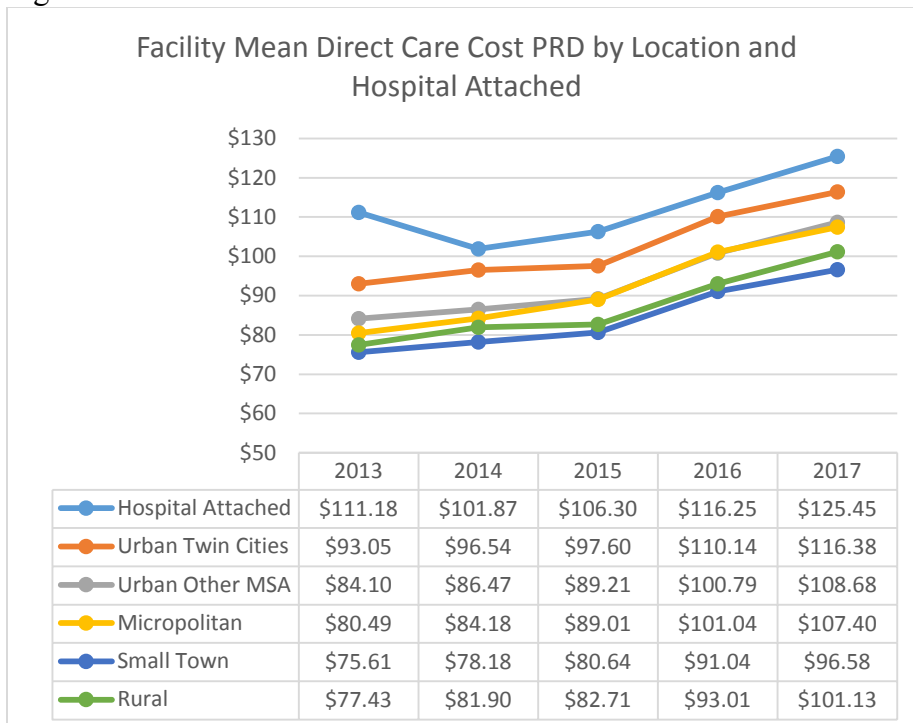
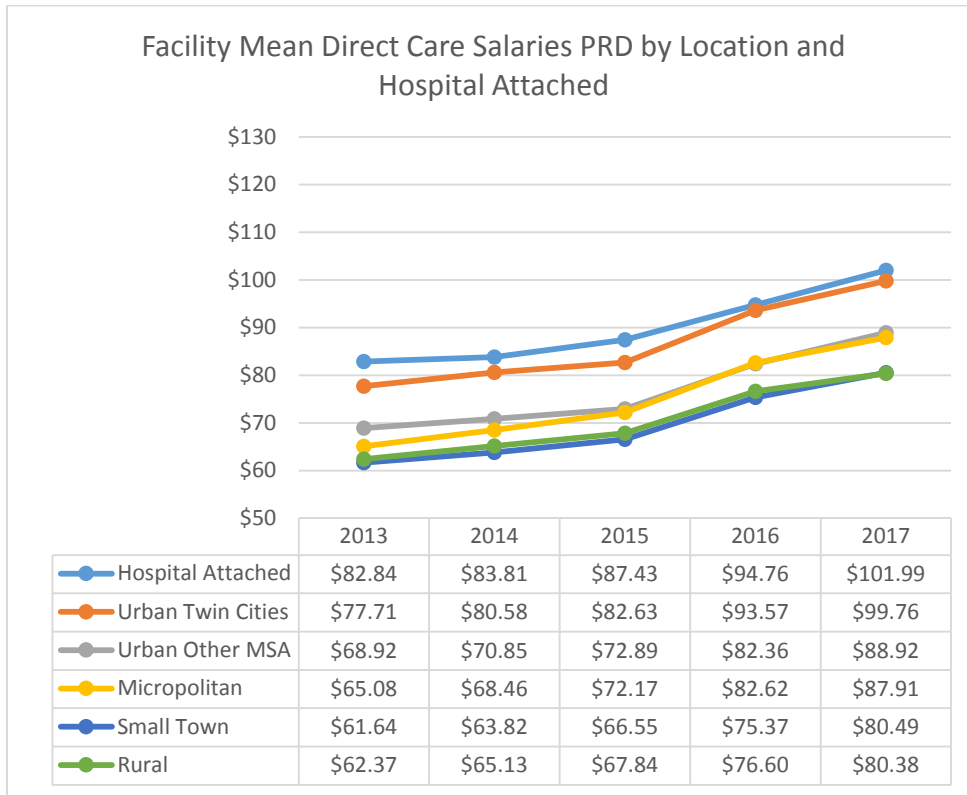


Figure 42. Location and Direct Care Salaries PRD



Occupancy

Facilities of varying occupancy levels all had significant increases in total direct care PRD and direct care salaries PRD between 2015 and 2016 (Figure 43 and Figure 44). Although their direct care costs were similar, the occupancy rate groupings differed significantly in care quality. Facilities with higher occupancy rates tended to have higher mean VBR quality scores. Facilities with declines in occupancy rates over the 5-year period had an increase in direct care costs that was similar to facilities with less of a decline or an increase in occupancy. However, facilities with declines in occupancy tended to have lower VBR quality scores in all five years.

Figure 43. Occupancy Rate by Direct Care cost PRD

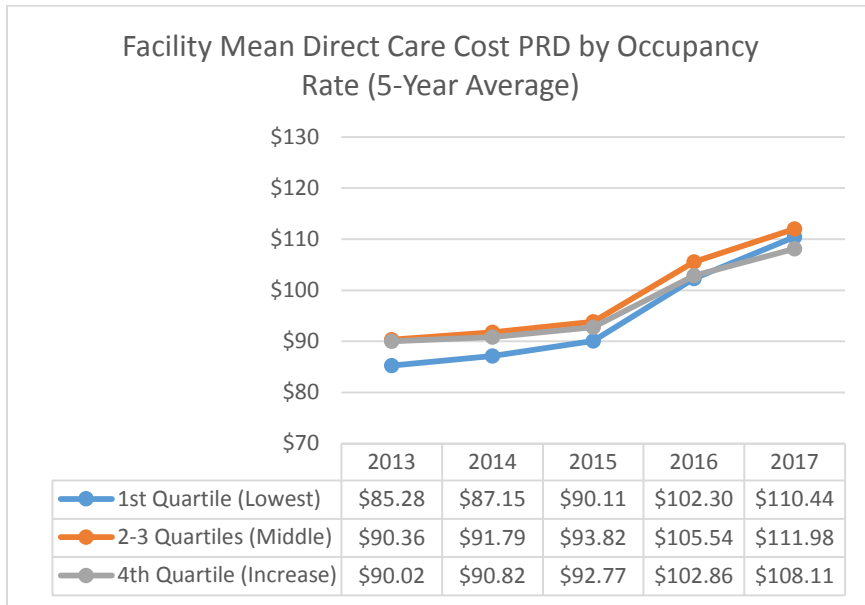


Figure 44. Occupancy and Direct Care Salaries PRD

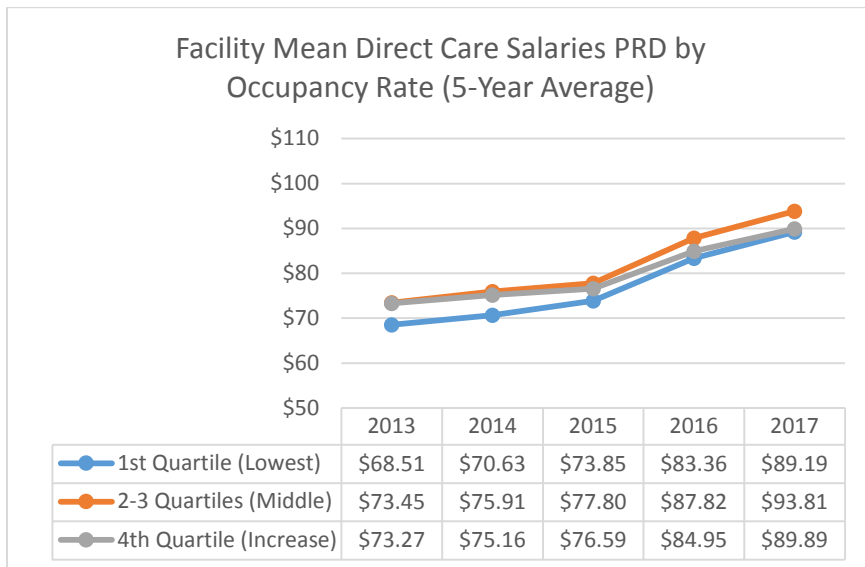


Figure 45. Occupancy Rate by VBR Quality Score

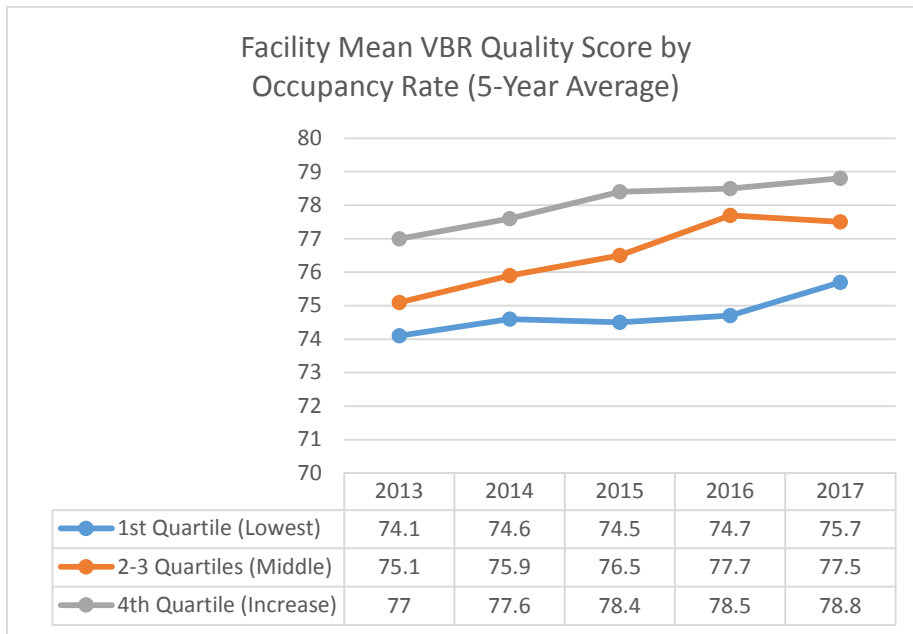


Figure 46. Occupancy Rate Change by Direct Care Cost PRD

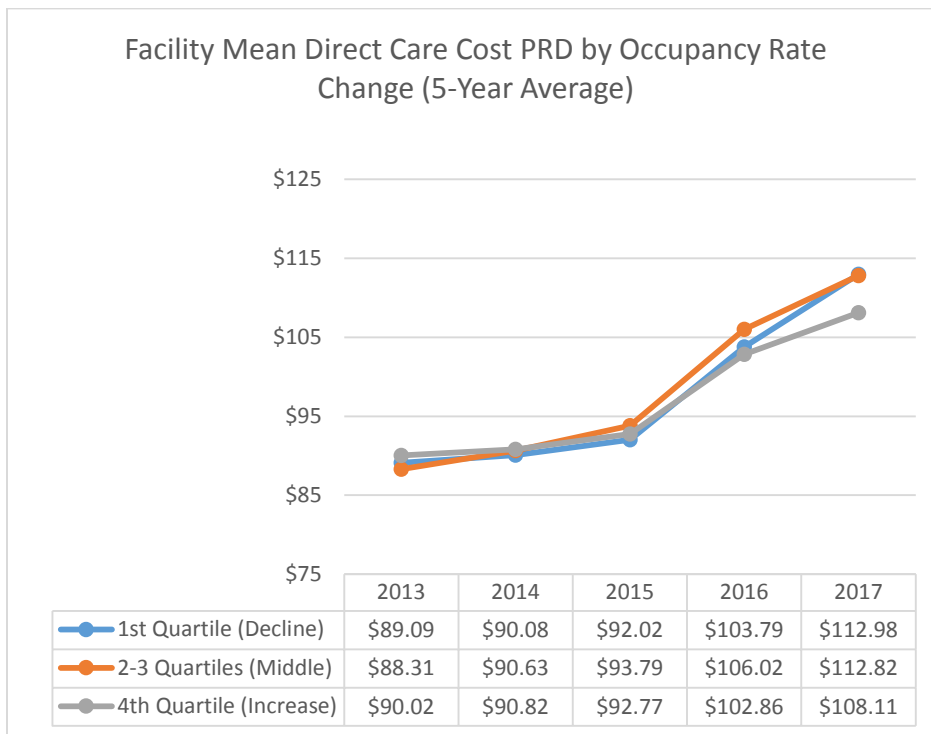


Figure 47. Occupancy Rate Change by Direct Care Salary PRD

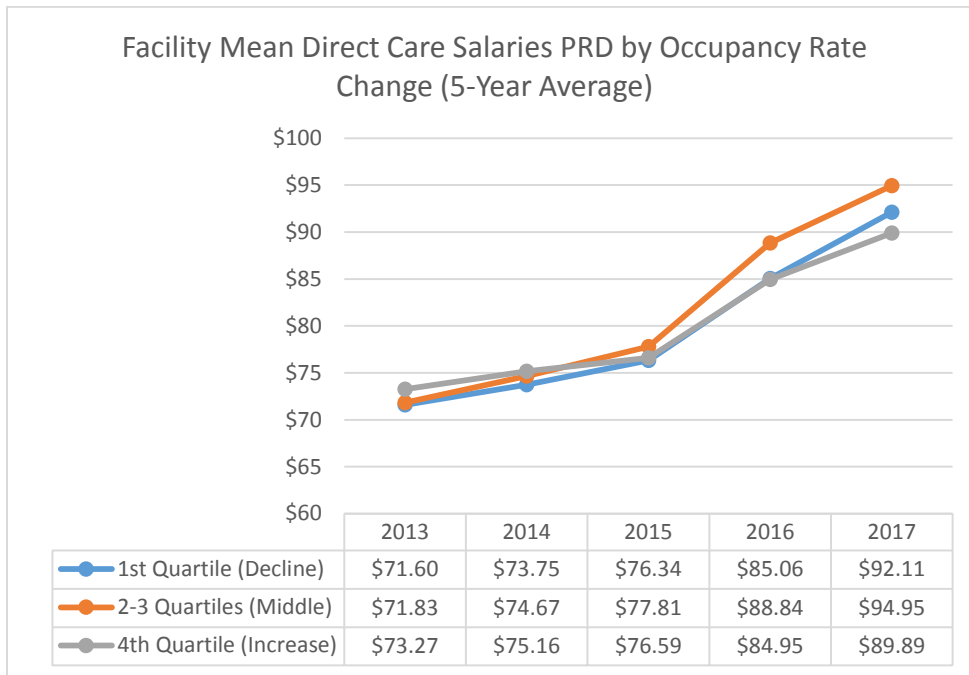
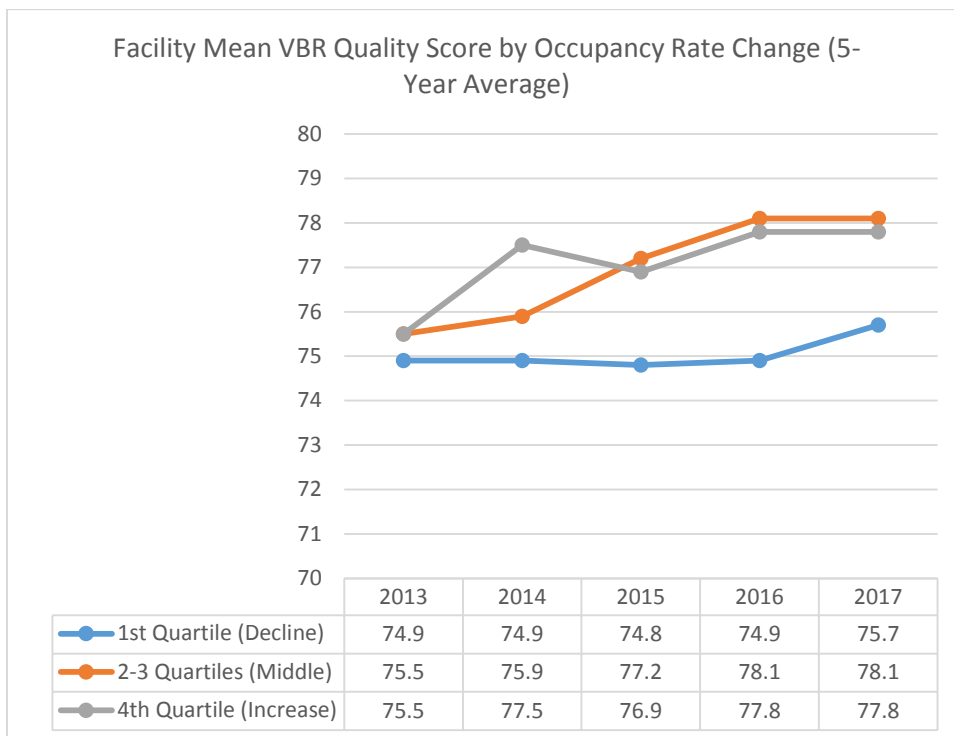


Figure 48. Occupancy Rate Change by Quality



Acuity

Finally, we examined outcomes by acuity groupings. Higher acuity facilities spent significantly more on total direct care PRD and direct care salaries PRD over the 5-year period. They also had higher nursing hours PRD. All three acuity groups had significant increases in total direct care PRD and direct care salaries PRD from 2015 to 2016; although their nursing hours PRD did not increase.

Figure 49. Acuity by Direct Care Cost PRD

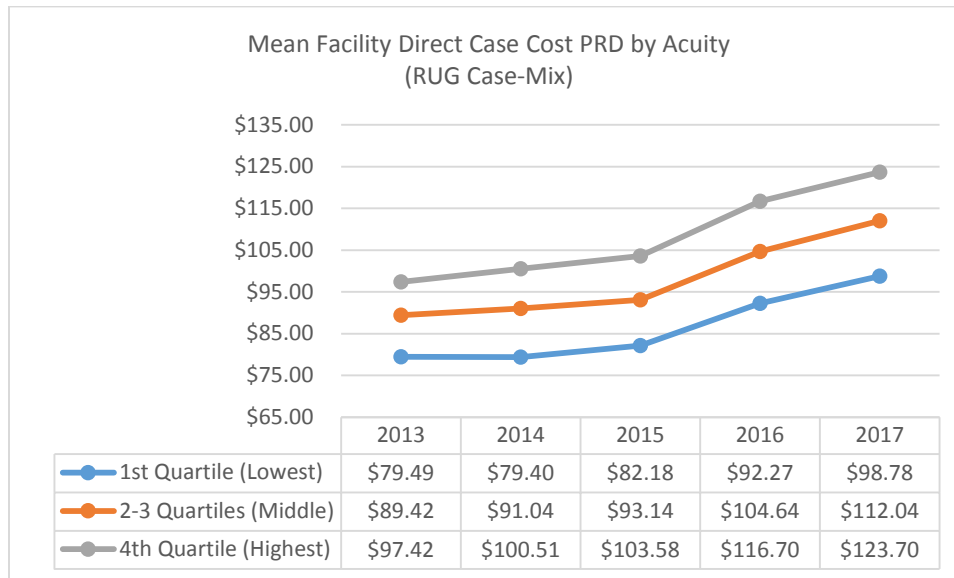


Figure 50. Acuity and Direct Care Salaries PRD

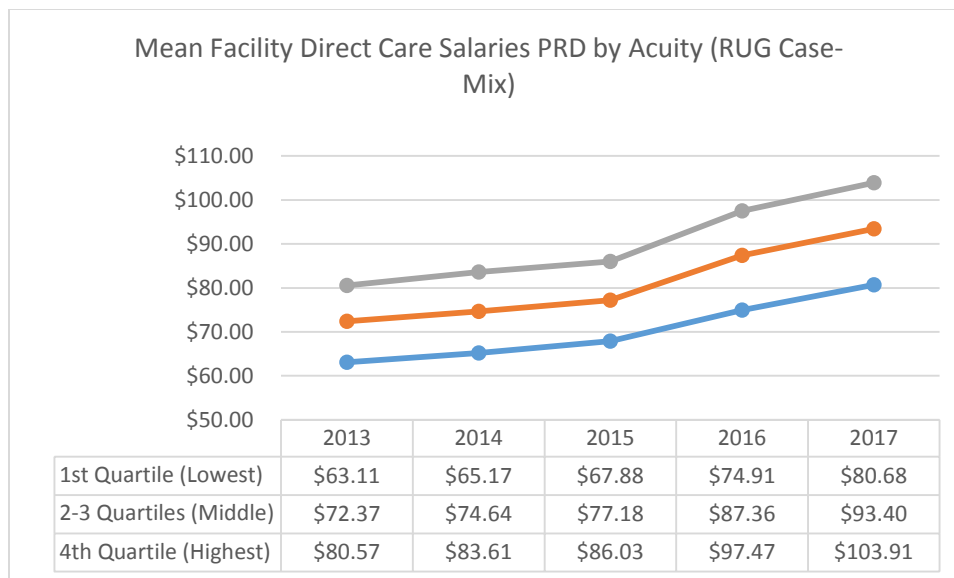
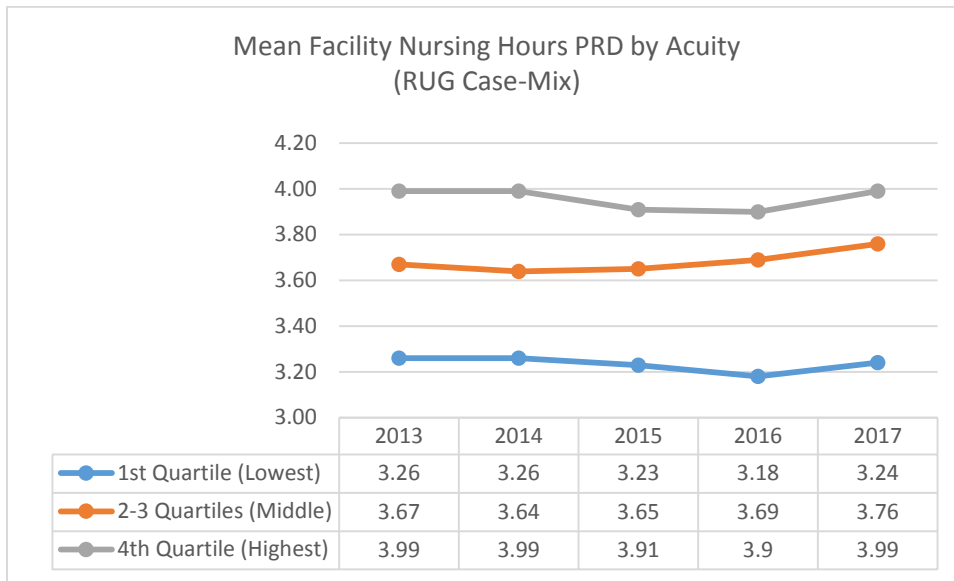


Figure 51. Acuity and Nursing Hours PRD



Statistical Models Predicting Change in Key Outcome Variables

Because subgroup characteristics tend to be correlated with each other, e.g., facilities in the Twin Cities tend to be larger than facilities in other locations, we developed a set of statistical models to isolate the independent relationships between subgroup characteristics and costs and quality outcomes.

Methods

A linear growth model was fit to measure change over time in each of the outcomes. Correlation in outcomes within facilities was modeled using an unstructured covariance matrix. All models were fit using SAS version 9.4 Proc Mixed. In all models, the year variable estimates the annual change in the outcome over the five-year period across facilities. The VBR Years indicator estimates the additional change in the outcome specific to the two years of data following the enactment of the VBR program. Additional variables were used to control for facility specific characteristics. Ownership is split into three categories, for profit, government owned, and the baseline or comparison group of nonprofit. Facilities are also split by their RUCA code (Rural Urban Commuter Area) and whether or not the facility is attached to a hospital. All facilities with a hospital attached are in the first group, facilities without a hospital attached are further split by RUCA code into urban Twin Cities, urban other Metropolitan Statistical Area (MSA), Micropolitan, Small Town, and Rural. Several continuous variables were split into three categories by quartile according to their five-year average. The three groups are the 1st quartile, the middle two quartiles or middle 50% of facilities, and the 4th quartile. These variables are the annual number of resident days, occupancy rate (resident days over capacity days), change in occupancy rate, and acuity. Additional control variables treated as continuous include per diem Medicaid revenue, percentage of revenue from Medicaid, and percentage of revenue from Medicare. All of the categorical control variables were interacted with the VBR Years indicator to assess for differential impact of the program on each outcome during this time. Discussion for

the outcomes of per diem direct care and other care-related costs refer to Table A.7 salaries and benefits to Table A.8, and nursing hours or facility quality to Table A.9.

Results

General Trends

Over the five-year period, it is estimated that direct care costs grew at an annual rate of \$2.67 PRD (per diem). It is also estimated that the VBR program contributed an additional annual growth of \$7.79 per diem. Annual other care-related cost growth was not statistically significant until the VBR period which contributed annual growth of \$2.43 per diem. Direct care salary, other care salary, and benefits grew at annual rate of \$2.99, \$0.39, and \$1.30 per diem, respectively. The VBR period saw a significant increase in annual growth in both direct care salary (\$7.33 per diem) and other care salary (\$0.79 per diem). Overall there was no significant annual growth in the number of nursing hours per diem indicating that additional funds are likely being invested in existing staff positions rather than in adding direct care hours. This holds for the VBR period. Quality scores grew at an annual rate of 0.51 points, but the additional increase during the VBR period was not statistically significant.

Ownership

The baseline or comparison group for ownership type is nonprofit. Relative to nonprofits and controlling for other facility characteristics, for profit facilities tend to have lower direct care (-\$2.70 per diem) and other care-related costs (-\$3.20 per diem). Government owned facilities had higher direct care costs (\$4.50 per diem), but not significantly different other care-related costs. The VBR period did significantly impact this pattern. This difference appears to be driven by estimated higher direct care salaries in government facilities (\$4.20 per diem). For profit facilities had lower other care salaries (-\$1.55 per diem) and benefits (-\$3.90 per diem) than nonprofits. Average costs during the VBR period on other care salaries appears to have been smaller in government facilities than nonprofits. For profit facilities tended to have less nursing hours (-0.16 per diem) and lower quality scores (-2.09), while government facilities had more nursing hours (0.23 per diem).

Hospital attached and Rural Urban Commuter Areas

The baseline group for the characteristics of hospital attached facilities and rural urban commuter areas are facilities in the Urban Twin Cities commuter area without a hospital attached. Relative to this group and controlling for other variables, facilities with a hospital attached had much higher direct care costs (\$17.63 per diem) and higher other care-related costs (\$2.49 per diem). Hospital attached facilities appear to have fallen behind the Twin City non-hospital group during the VBR period (-\$2.73 per diem). The other commuter areas had lower direct care and other care-related costs over the five-year period than the Twin Cities. Facilities with hospitals attached averaged much higher direct care salaries (\$10.80 per diem), this gap was closed slightly during the VBR period (-\$1.22 per diem). Hospital attached facilities spent more on benefits (\$2.71 per diem) and widened the gap during the VBR period (\$2.58 per diem). Other commuter areas have lower salaries for both direct care and other care, but there was not a statistical difference in benefits. Hospital attached and facilities in small town commuter areas averaged more nursing hours than those in the Twin Cities with no hospital attached (0.67 and 0.24 hours per diem respectively). For quality, only facilities in other Urban MSAs without a

hospital attached lagged behind the baseline group (-2.49 points). Facilities in the small town commuter areas saw a jump relative to the Twin Cities during the VBR period (2.29 points).

Resident Days

The total number of resident days is one way to measure the size of a facility. The reference group for this variable is the middle 50% of facilities. The largest quartile of facilities based on resident days had significantly higher direct care costs per diem (\$5.98) than the middle 50%. The largest quartile also had higher direct care salaries (\$5.00 per diem). When controlling for other factors, the smallest quartile of facilities averaged fewer nursing hours per diem (-0.15) while the largest quartile averaged more (0.18). The largest facilities also averaged lower quality scores than the middle 50% (-1.42 points).

Occupancy

Occupancy was used for two different variables; the five year occupancy rate and the average annual change in occupancy rate. Both were split into three categories based on quartiles, with the middle 50% serving as the comparison group. The lowest quartile for occupancy rate saw a jump in direct care costs per diem (\$2.24) relative to the middle 50% during the VBR period. Low occupancy facilities also averaged higher other care-related costs over the five year period (\$1.21 per diem). During the VBR period, facilities that averaged the lowest (often decreasing) occupancy saw an increase in per diem other care-related costs (\$1.26) while facilities with the highest increases in occupancy saw a decrease in direct care costs (-\$2.09 per diem). Lowest occupancy facilities averaged less benefits (-\$1.53) during the VBR period than the middle 50% of facilities. During the VBR period, facilities with the least occupancy change saw the greatest increases in direct care salaries. For other care, those with declining occupancy averaged higher salaries (\$0.55 per diem). Stable occupancy facilities averaged the most nursing hours with lowest occupancy lagging by -0.16 hours per diem and higher occupancy facilities lagging by -0.21 hours per diem. The highest occupancy group averaged higher quality scores (1.62 points) than the middle 50% of facilities. The declining occupancy group averaged lower quality scores in the VBR period (-1.46 points).

Acuity

Facilities were split into three groups based on average resident acuity with the middle 50% serving as the baseline group. After controlling for other variables, the lowest acuity facilities averaged lower direct care costs (-\$10.67 per diem) while the highest acuity facilities averaged the highest (\$5.65 per diem). Highest acuity facilities also averaged higher other care-related costs (\$1.59 per diem). The lowest acuity facilities averaged lower direct care salaries (-\$9.06 per diem) while the highest acuity facilities had higher direct care salaries (\$5.20 per diem), other care salaries (\$1.02 per diem), but lower benefits during the VBR period (-\$1.17 per diem). Highest acuity facilities averaged more nursing hours per diem (0.23) while lower acuity facilities averaged less (-0.44). Quality was not significantly related to acuity group.

Revenue Sources

Three continuous variables were utilized to control for sources of revenue. Medicaid Revenue per diem captures the average realized Medicaid rate for the facilities. Percent of revenue from Medicaid and percent of revenue from Medicare describe the average payer sources. These variables were not interacted with the VBR period. Higher per diem Medicaid revenue is associated with higher direct care and other care-related costs. Similarly, with higher percentage

of revenue coming from Medicare. Each additional dollar of Medicaid revenue per diem is associated with an additional \$0.07 of direct care salary, \$0.01 of other care salary, and \$0.02 of benefits per diem. Each additional percentage of revenue that comes from Medicare is associated with an additional \$0.48 of direct care salary, \$0.05 of other care salary, and \$0.12 of benefits per diem. Additional per diem Medicaid revenue and a greater percentage of revenue coming from Medicare are both associated with greater per diem nursing hours. A higher percentage of revenue coming from Medicaid is associated with slightly lower quality scores.

Modeling – Future Medicaid Rate and Cost Projections for Alternative Reimbursement Approaches

Analysis Background

The primary goal of this analysis was to assess the impact on state expenditures of proposed changes to the Value Based Reimbursement system. There are two potential changes examined in this section. The first is strengthening the quality incentive for care-related cost reimbursement. The second is capping growth in the other operating rate by tying the annual growth rate to the Skilled Nursing Facility Market Basket Index.

Under the current system, the quality incentive line is set such that a given facility's quality score will affect the facilities cap on reimbursable care-related costs. This is done by setting an intercept and slope value for the quality incentive line. The relationship between the quality score and the cap can be understood as a particular quality score earning a percentage of the median care-related costs of facilities in the metro area (metro median cost). For example, the current intercept of 89.375 implies that a quality score of 0 would earn 89.375% of the metro median cost as a care-related cost cap. The current slope of 0.56 implies each additional quality point increases the cap by 0.56% of the metro median cost. The majority of facilities have quality scores between 60 and 80. These quality scores result in a cap of approximately 123% and 134% of the metro median cost, respectively. Under this structure very few facilities (3%) are impacted by the limit resulting in a very weak quality incentive (Figure 52).

The proposed change is to reduce the intercept and increase the slope, thereby strengthening the incentive for quality. This causes more facilities with lower scores to be impacted by the limit as well as providing greater gain in the cost reimbursement cap for each additional quality point. For this work, the intercept and slope were set such that a quality score of 60 would receive 80% of the metro median cost and a quality score of 80 would receive 120% of the metro median cost. A metro median cost cap is achieved at quality score of 70. The impact is shown in Figure 53.

A major component of care-related costs are worker salaries. It is common for salary levels to differ substantively between rural and urban settings. Failure to adjust for this fact has three possible outcomes. First, that only facilities in higher wage areas (urban) are impacted by a relatively high limit, leaving rural facilities without a strong financial incentive to improve quality. Lowering the limit to incentivize rural facilities would cause the second outcome in which urban facilities would be forced to choose between losing workers and suffering financial loss regardless of quality scores. The third outcome is a compromise between the two and represents an acceptance of both issues to a lesser degree. The current system falls into the first category. In order to address this, this analysis adjusts the limit for each facility according to the Medicare county wage index. This approach incentivizes quality improvement for facilities in rural areas without creating a competitive disadvantage in hiring and recruiting workers for facilities in urban areas.

Given the more aggressive approach in tying quality scores to reimbursement, it is worth noting that this analysis retains the stop loss provision of the current system. This provision dictates that no facility rate can drop by more than 5% of the metro median rate. This protects facilities from sudden drops in rates from year to year in order to avoid financial catastrophe. Additionally, this

provision helps to ease facilities into the change, allowing them more time for their strategic measure to take effect.

Figure 52. Facilities Limited by Quality Incentive under Current Rate Calculation

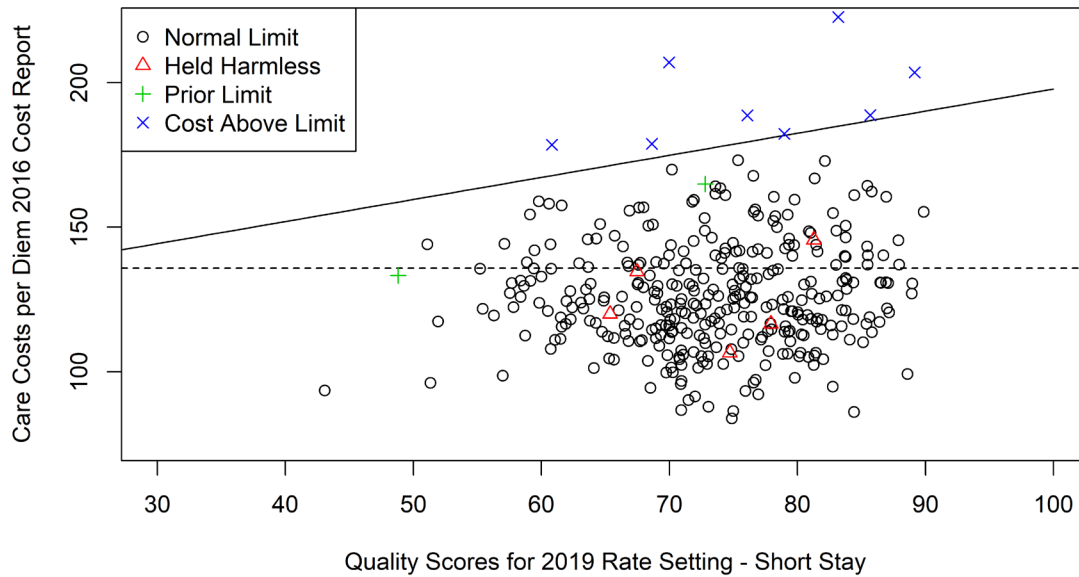
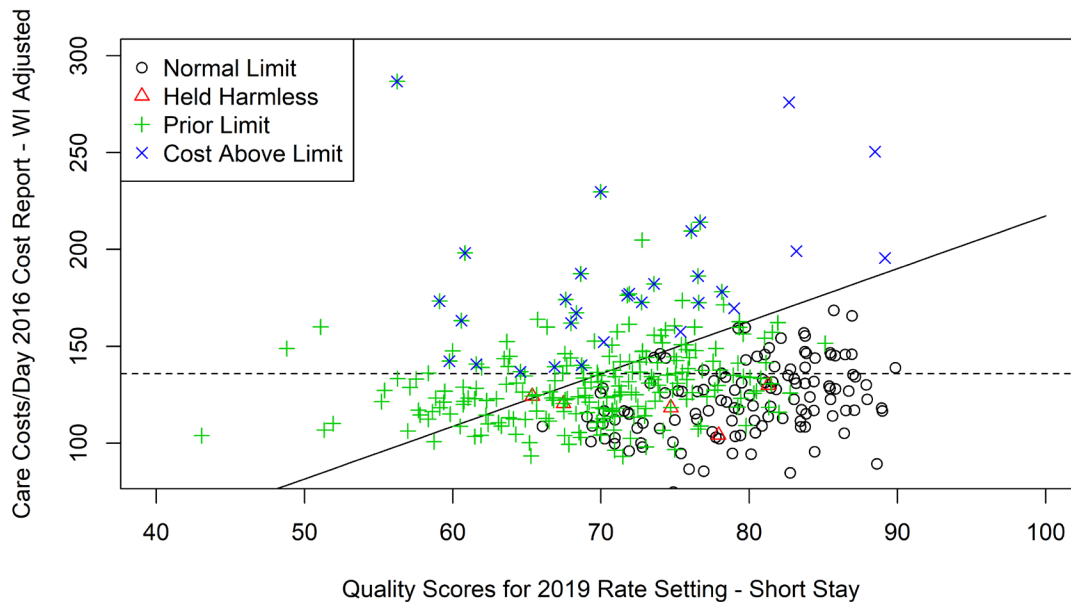


Figure 53. Facilities Limited by Quality Incentive under Proposed Rate Calculation



In both of the above figures, the solid line indicates the quality limit and the horizontal dashed line indicates the metro median per diem cost. Each symbol on the plot indicates a facilities quality score (under the proposed scoring that encapsulates short stay measures), per diem care costs, and their relation to the quality limit. A blue x indicates that a facility is above the limit, a green plus indicates the facilities limit is higher than the solid line due to the stop loss provision, a red triangle indicates the hold harmless provision is in effect, and a black circle indicates the facilities is receiving their costs as their rate. In Figure 52 costs are not wage index adjusted, but such adjustment is made in Figure 53.

The second major proposed change is to limit the annual growth rate of other operating costs. Currently these costs are allowed to grow unchecked. All facilities receive the same price of 105% of the median other operating cost of facilities in the metro area. The proposed change would cap annual growth at the rate of increase in the Skilled Nursing Facility Market Basket Index, currently around 2.8%.

Model/Assumptions

Calculation of potential impact of these changes is assessed using simulation. This requires a set of assumptions in order to project future costs under both the current and the proposed reimbursement system. The majority of the discussion of these assumptions centers on the simulation related to the changes in the quality incentive as that is where most of the complexity lies.

Data for this analysis was taken from the 2016 Cost Report (October 2015 - September 2016). The more recent 2017 Cost Report data was not yet audited at the time of the analysis. Annual growth in costs at the aggregate and facility level were made according to the rate schedule given in Table 10 and Table 11, note that they are equivalent across the two scenarios. For both scenarios, it is additionally assumed that the number of Medicaid care-related payment days remains flat at the 2016 level. Quality scores are also held at their 2018 levels, with the exception of those facilities whose care-related costs exceed their quality based limit. For these facilities an increase of 3% in quality score is assumed. The quality scores were calculated using the proposed method (effective date 1/1/2020) which incorporates a more robust accounting for the differences between short and long stay residents. The simulation also assumes a start date of 1/1/2020 for the new quality limit, implying that the 2019 numbers will be the same in both scenarios. The held harmless provision is not used for this simulation. Very few facilities had a quality limit low enough to evoke the hold harmless provision at onset of the simulation.

In order to assess the impact on state expenditures of capping the growth rate of other operating costs three primary assumptions were made. The first is that the metro area facility median other operating costs would grow at a rate of 6.5% to 7% over the next 4 years. The second assumption is that the number of Medicaid care-related payment days follows the current forecasted decline given in the results table. Lastly, the Skilled Nursing Facility Market Basket Index is assumed to continue at the projected rate of 3.05%.

Results

Primary results are given in Table 10 for the current quality limit and in Table 11 under the increased incentive for quality. The first six lines of both tables show the assumed growth in costs by cost report year and are identical across the two tables. The cost growth percentage is assumed based on the most current state projections available at the time of analysis. Aggregate care-related costs are at the state level and reflect those costs subject to the quality based limit. Standardized days are total resident days adjusted for resident acuity. Mean per diem costs are averaged across facilities and are on a standardized day basis. The metro median is the median per diem cost of facilities in the metro area and is also on a standardized basis.

The remainder of the table is on the rate year basis and shows actual (2018) or projected figures (2019-2023) reflecting the impact of using the current or new quality based limits. The mean quality score is across facilities and is projected to rise from 73.2 – 73.5 under the current system

and to 74.0 under the proposed system. Quality based limits for scores of 60 and 80 are given under both scenarios. Under the current system, they are projected to reach a limit of \$231.63 per day for a score of 60 and \$252.79 per day for a score of 80 by 2023. The proposed system projects a limit of \$150.50 per day and \$225.75 per day for quality scores of 60 and 80 respectively.

Percentages for facilities falling into three mutually exclusive categories is also given: facilities below the quality limit and receiving their full care-related costs in their rate, facilities whose costs are above the limit but receive rates higher than their limit due to the stop loss provision, and those facilities with costs above the limit and receiving their limit as their rate. Under the current system, between 2.5 – 3.1% of facilities receive their quality limit and no facilities invoke the stop loss. Under the proposed system, the percentage of facilities invoking the stop loss provision rises first, peaking near 10% in years 2021 and 2022 before falling as those facilities move into the group receiving their quality limited rate. The final year of the projection, 2023, has the most impacted facilities with 23% either receiving their quality limited rate or invoking the stop loss provision. The total state cost for care-related payments is projected at the facility level, using individual facility Medicaid days adjusted for acuity and the facility's rate. The figure is in this way weighted by individual facility amount of business, costs, and quality.

Differences between the two scenarios in terms of dollars are given in Table 12 and impact on cost growth is given in Table 13. It is assumed that 2019 will continue under the current system, so no savings are noted in that year. Beginning in 2020 the projected savings are just under \$1 million rising to \$19 million in 2023. Rising savings are due primarily to increases in the number of facilities being limited and the subsequent limiting effect this has on cost growth to the state. The differences between projected cost growth in the mean facility rate under both scenarios and the forecasted cost growth are small (Table 13).

The projected impact on limiting the growth in other operating costs by the Skilled Nursing Facility Market Basket is given in Table 14. The projected metro area median other operating cost, Medicaid days unadjusted for acuity, and state expenditures under both the current and capped system are given in the table. The difference between the two totals, or savings, are given in the last line of the table and assumed to begin in 2020. Projected annual savings begin at under \$13 million and grow to over \$56 million by 2023. Since the proposed cap is a growth cap, these savings have the potential to compound over time.

Table 10. Base Case – Current System Carried Forward

Cost Year	2016	2017	2018	2019	2020	2021
Cost Growth Percentage	NA Cost Report Used	6.95%	6.75%	7.01%	6.40%	6.53%
Aggregate Care-Related Costs	\$1,191,315K	\$1,274,112K	\$1,360,114K	\$1,455,458K	\$1,548,607K	\$1,649,732K
Standardized Days	9,137,008	9,137,008	9,137,008	9,137,008	9,137,008	9,137,008
Mean Per Diem Cost	\$129.56	\$138.56	\$147.81	\$158.17	\$168.29	\$179.28
Metro Median	\$135.81	\$145.17	\$155.09	\$165.97	\$176.59	\$188.12
Rate Year	2018	2019	2020	2021	2022	2023
Mean Quality Score		73.2	73.3	73.4	73.4	73.5
Cost Limit at Quality Score 60	\$167.22	\$178.74	\$190.96	\$204.35	\$217.43	\$231.63
Cost Limit at Quality Score 80	\$182.50	\$195.07	\$208.41	\$223.02	\$237.29	\$252.79
% of facilities below limit		97.5%	96.9%	97.2%	97.5%	97.5%
% of facilities above limit with 5% stop loss		0%	0%	0%	0%	0%
% of facilities above limit with NO 5% stop loss		2.5%	3.1%	2.8%	2.5%	2.5%
Mean Care-related Per Diem Rate		\$137.22	\$146.25	\$156.57	\$166.65	\$177.60
Medicaid days x MA Acuity	4,710,073	4,710,073	4,710,073	4,710,073	4,710,073	4,710,073
Aggregate Medicaid Care-related Payments (PD X Days) ^{&}		\$646,495K	\$690,040K	\$738,496K	\$785,817K	\$837,194K

[&]Multiplication occurs at the facility level (e.g. facility rate x facility Medicaid days).

Table 11. New Reimbursement Approach Beginning in rate year 2020

Cost Year	2016	2017	2018	2019	2020	2021
Cost Growth Percentage	NA Cost Report Used	6.95%	6.75%	7.01%	6.40%	6.53%
Aggregate Care-Related Costs	\$1,191,315K	\$1,274,112K	\$1,360,114K	\$1,455,458K	\$1,548,607K	\$1,649,732K
Standardized Days	9,137,008	9,137,008	9,137,008	9,137,008	9,137,008	9,137,008
Mean Per Diem Cost	\$129.56	\$138.56	\$147.81	\$158.17	\$168.29	\$179.28
Metro Median	\$135.81	\$145.17	\$155.09	\$165.97	\$176.59	\$188.12
Rate Year	2018	2019	2020	2021	2022	2023
Mean Quality Score		73.2	73.3	73.4	73.6	74.0
Cost Limit at Quality Score 60	\$167.22	\$178.74	\$124.08	\$132.78	\$141.27	\$150.50
Cost Limit at Quality Score 80	\$182.50	\$195.07	\$186.12	\$199.16	\$211.91	\$225.75
% of facilities below limit		97.5%	94.4%	88.0%	78.3%	76.9%
% of facilities above limit with 5% stop loss		0%	3.6%	9.5%	10.6%	4.2%
% of facilities above limit with NO 5% stop loss		2.5%	1.9%	2.5%	11.1%	18.9%
Mean Care-related Per Diem Rate		\$137.22	\$146.08	\$155.01	\$163.19	\$173.55
Medicaid days x MA Acuity	4,710,073	4,710,073	4,710,073	4,710,073	4,710,073	4,710,073
Aggregate Medicaid Care-related Payments (PD X Days)		\$646,495K	\$689,042K	\$731,453K	\$768,025K	\$817,929K

&Multiplication occurs at the facility level (e.g. facility rate x facility Medicaid days).

Table 12. Projected Care-related Costs under Current and Proposed Quality Limits

	<i>2019</i>	<i>2020</i>	<i>2021</i>	<i>2022</i>	<i>2023</i>
<i>Current Quality Limit</i>	646.495 m	690.040 m	738.496 m	785.817 m	837.194 m
<i>New Quality Limit</i>	646.495 m	689.042 m	731.453 m	768.025 m	817.929 m
<i>Projected Savings</i>	-	<i>0.998 m</i>	<i>7.043 m</i>	<i>17.792 m</i>	<i>19.265 m</i>

*m = million.

Table 13. Projected Mean Annual Rate Growth (Care-related Rate)

	2020	2021	2022	2023
Current Quality Limit	6.66%	7.06%	6.44%	6.57%
New Quality Limit	6.46%	6.11%	5.28%	6.35%
Forecast	6.75%	7.01%	6.40%	6.53%

Table 14. Projected Other Operating Costs under Current and Proposed Systems

	2019	2020	2021	2022	2023
Median Rate	71.85	76.70	82.08	87.33	93.03
Price (1.05 * Median Rate)	75.44	80.53	86.18	91.70	97.68
Medicaid Days	4,885,529	4,596,039	4,545,563	4,514,674	4,502,314
Current Total	368.577 m	370.141 m	391.738 m	413.977 m	439.802 m
Price (1.028*Previous Year's Price)	75.44	77.74	80.11	82.56	85.07
Medicaid Days	4,885,529	4,596,039	4,545,563	4,514,674	4,502,314
Proposed Total	368.577 m	357.312 m	364.166 m	372.723 m	383.039 m
Projected Savings	-	12.829 m	27.572 m	41.254 m	56.763 m

Discussion

The nursing home industry is a complex system with a diverse set of actors. These projections rely on several assumptions of how this complex system will play out and how these actors will respond to change. Understanding these assumptions will help assess what may cause them to deviate from the actual realized future. It is assumed that facilities will raise their quality in small increments and only if impacted by the quality limit. If, however, facilities are able to respond more strongly to the incentives this will reduce potential savings to the state, albeit while improving quality. A second major assumption is that facilities will not react by cutting their own costs. Cost cutting would increase savings to the state. The number of Medicaid days is assumed to be flat, it is not expected that changing the quality incentive will impact the number of Medicaid days realized. However, if the trend in Medicaid days is downward, actual savings realized will be lower, and if the number of Medicaid days increases, actual savings will be higher. This is due to the fact that savings are calculated on a per diem basis. In so much as possible, all assumptions made in this analysis were based on data or state projections.

APPENDIX

Subgroup Results for Major Outcome Variables

Table A.1 Annual Impact Measures by Ownership Type

Ownership	Year	Medicaid Revenue PRD	Annual Medicaid Revenue	Direct Care Cost PRD Unadjusted	Other Care-Related Cost PRD Unadjusted	Direct Care Salaries PRD	Other Care Salaries PRD	Benefits PRD	Nursing (RN, LPN, and NA) Hours PRD	VBR Composite Score
For Profit	2013	\$166	\$ 2,505,901	\$ 81.91	\$18.63	\$66.91	\$ 8.09	\$ 6.33	3.30	74.4
	2014	\$171	\$ 2,560,200	\$ 85.24	\$18.88	\$69.62	\$ 8.39	\$ 6.01	3.32	74.5
	2015	\$173	\$ 2,512,100	\$ 85.27	\$19.34	\$71.10	\$ 8.78	\$ 6.46	3.28	74.1
	2016	\$202	\$ 2,894,977	\$ 96.75	\$20.84	\$80.09	\$ 9.67	\$ 7.50	3.22	75.2
	2017	\$206	\$ 2,941,229	\$ 104.66	\$22.42	\$87.02	\$ 10.84	\$10.23	3.43	75.3
Government	2013	\$184	\$ 2,136,645	\$ 96.22	\$23.20	\$75.79	\$ 10.47	\$ 5.95	3.89	74.5
	2014	\$197	\$ 2,287,444	\$ 94.15	\$23.00	\$77.94	\$ 10.11	\$13.41	3.86	76.2
	2015	\$207	\$ 2,235,019	\$ 100.45	\$23.40	\$82.57	\$ 10.84	\$14.02	3.90	77.4
	2016	\$233	\$ 2,327,323	\$ 109.19	\$24.05	\$90.25	\$ 11.43	\$17.49	3.92	77.2
	2017	\$247	\$ 2,406,483	\$ 118.53	\$25.84	\$96.46	\$ 11.98	\$19.51	3.98	78.2
Non Profit	2013	\$175	\$ 2,850,486	\$ 91.08	\$22.96	\$73.99	\$ 10.53	\$ 9.78	3.77	75.9
	2014	\$182	\$ 2,845,127	\$ 92.48	\$23.00	\$76.35	\$ 10.92	\$12.00	3.76	76.7
	2015	\$186	\$ 2,781,182	\$ 95.59	\$23.03	\$79.10	\$ 11.48	\$12.51	3.72	77.4
	2016	\$224	\$ 3,286,231	\$ 107.77	\$25.04	\$89.58	\$ 12.74	\$15.08	3.76	78.0
	2017	\$236	\$ 3,400,517	\$ 114.39	\$25.46	\$95.46	\$ 13.06	\$16.93	3.79	78.4

Table A.2 Annual Impact Measures by Five Year Resident Day Quartile

Resident Days	Year	Medicaid Revenue PRD	Annual Medicaid Revenue	Direct Care Cost PRD Unadjusted	Other Care-Related Cost PRD Unadjusted	Direct Care Salaries PRD	Other Care Salaries PRD	Benefits PRD	Nursing (RN, LPN, and NA) Hours PRD	VBR Composite Score
1st Quartile (Lowest)	2013	\$166	\$ 1,307,649	\$ 83.11	\$ 20.48	\$66.29	\$ 8.62	\$ 6.16	3.44	73.8
	2014	\$172	\$ 1,280,303	\$ 84.55	\$ 20.44	\$68.64	\$ 8.85	\$ 8.98	3.42	75.6
	2015	\$178	\$ 1,237,660	\$ 88.13	\$ 21.21	\$71.90	\$ 9.56	\$ 9.42	3.40	75.7
	2016	\$212	\$ 1,433,855	\$ 98.56	\$ 22.90	\$80.34	\$ 10.56	\$11.60	3.41	76.0
	2017	\$223	\$ 1,469,084	\$106.47	\$ 23.88	\$85.45	\$ 11.04	\$13.64	3.45	76.8
2-3 Quartiles (Middle)	2013	\$172	\$ 2,236,601	\$ 87.31	\$ 21.28	\$70.73	\$ 9.67	\$ 8.29	3.65	76.0
	2014	\$179	\$ 2,272,290	\$ 88.93	\$ 21.58	\$73.26	\$ 9.95	\$10.45	3.65	76.1
	2015	\$183	\$ 2,201,896	\$ 90.88	\$ 21.49	\$75.24	\$ 10.39	\$10.98	3.59	77.0
	2016	\$217	\$ 2,590,632	\$102.55	\$ 23.08	\$84.82	\$ 11.52	\$13.28	3.58	77.8
	2017	\$226	\$ 2,669,222	\$109.23	\$ 24.10	\$91.01	\$ 12.14	\$15.19	3.66	78.1
4th Quartile (Highest)	2013	\$183	\$ 4,937,840	\$ 98.10	\$ 23.93	\$80.78	\$ 11.31	\$10.88	3.85	75.5
	2014	\$191	\$ 4,997,217	\$ 99.68	\$ 23.57	\$82.99	\$ 11.64	\$11.66	3.83	76.2
	2015	\$194	\$ 4,954,357	\$102.27	\$ 23.75	\$86.00	\$ 12.18	\$12.15	3.85	76.2
	2016	\$227	\$ 5,731,443	\$114.74	\$ 25.74	\$97.24	\$ 13.24	\$13.93	3.90	76.9
	2017	\$237	\$ 5,871,060	\$121.76	\$ 26.05	\$ 104.06	\$ 13.75	\$16.11	3.99	76.5

Table A.3 Annual Impact Measures by Five Year Occupancy Rate Quartile

Occupancy Rate	Year	Medicaid Revenue PRD	Annual Medicaid Revenue	Direct Care Cost PRD Unadjusted	Other Care-Related Cost PRD Unadjusted	Direct Care Salaries PRD	Other Care Salaries PRD	Benefits PRD	Nursing (RN, LPN, and NA) Hours PRD	VBR Composite Score
1st Quartile (Lowest)	2013	\$167	\$ 2,018,240	\$ 85.28	\$20.79	\$ 68.51	\$ 9.11	\$ 7.65	3.50	74.1
	2014	\$174	\$ 1,985,848	\$ 87.15	\$21.27	\$ 70.63	\$ 9.21	\$ 8.71	3.48	74.6
	2015	\$178	\$ 1,894,116	\$ 90.11	\$21.83	\$ 73.85	\$ 9.99	\$ 8.98	3.47	74.5
	2016	\$213	\$ 2,187,610	\$102.30	\$23.27	\$ 83.36	\$ 10.79	\$10.03	3.43	74.7
	2017	\$221	\$ 2,164,074	\$110.44	\$24.27	\$ 89.19	\$ 11.62	\$11.90	3.55	75.7
2-3 Quartiles (Middle)	2013	\$176	\$ 2,863,902	\$ 90.36	\$21.57	\$ 73.45	\$ 9.87	\$ 8.56	3.76	75.1
	2014	\$182	\$ 2,904,048	\$ 91.79	\$21.63	\$ 75.91	\$ 10.22	\$10.28	3.75	75.9
	2015	\$187	\$ 2,842,216	\$ 93.82	\$21.94	\$ 77.80	\$ 10.75	\$11.08	3.70	76.5
	2016	\$220	\$ 3,307,670	\$105.54	\$23.89	\$ 87.82	\$ 12.04	\$13.31	3.70	77.7
	2017	\$230	\$ 3,409,445	\$111.98	\$24.64	\$ 93.81	\$ 12.43	\$15.59	3.77	77.5
4th Quartile (Highest)	2013	\$176	\$ 2,985,156	\$ 89.88	\$23.09	\$ 73.17	\$ 10.45	\$ 8.87	3.57	77.0
	2014	\$182	\$ 3,041,879	\$ 91.40	\$22.67	\$ 75.77	\$ 10.77	\$12.34	3.56	77.6
	2015	\$186	\$ 3,032,533	\$ 94.45	\$22.23	\$ 79.00	\$ 11.04	\$12.46	3.56	78.4
	2016	\$219	\$ 3,562,340	\$105.03	\$23.73	\$ 88.27	\$ 11.98	\$15.52	3.63	78.5
	2017	\$230	\$ 3,717,009	\$112.31	\$24.59	\$ 94.78	\$ 12.60	\$17.13	3.67	78.8

Table A.4 Annual Impact Measures by RUCA Code and Hospital Attached

RUCA/ Hospital Attached	Year	Medicaid Revenue PRD	Annual Medicaid Revenue	Direct Care Cost PRD Unadjusted	Other Care- Related Cost PRD Unadjusted	Direct Care Salaries PRD	Other Care Salaries PRD	Benefits PRD	Nursing (RN, LPN, and NA) Hours PRD	VBR Composite Score
Hospital Attached	2013	\$184	\$ 2,485,469	\$ 111.18	\$ 28.09	\$82.84	\$11.38	\$ 2.04	4.04	75.9
	2014	\$191	\$ 2,536,926	\$ 101.87	\$ 26.17	\$83.81	\$11.24	\$ 17.32	4.03	77.1
	2015	\$200	\$ 2,523,939	\$ 106.30	\$ 24.91	\$87.43	\$11.53	\$ 19.25	3.97	77.3
	2016	\$234	\$ 2,939,930	\$ 116.25	\$ 25.44	\$94.76	\$12.56	\$ 20.56	3.95	77.3
	2017	\$248	\$ 3,060,232	\$ 125.45	\$ 26.58	\$ 101.99	\$13.06	\$ 22.52	4.02	77.8
Urban Twin Cities	2013	\$180	\$ 3,793,800	\$ 93.05	\$ 22.73	\$77.71	\$10.96	\$ 9.87	3.56	76.0
	2014	\$187	\$ 3,843,755	\$ 96.54	\$ 23.15	\$80.58	\$11.24	\$ 9.62	3.59	76.6
	2015	\$189	\$ 3,769,001	\$ 97.60	\$ 23.55	\$82.63	\$11.96	\$ 9.69	3.61	76.8
	2016	\$222	\$ 4,398,735	\$ 110.14	\$ 25.97	\$93.57	\$13.12	\$ 11.36	3.60	77.3
	2017	\$226	\$ 4,382,267	\$ 116.38	\$ 26.05	\$99.76	\$13.37	\$ 13.17	3.70	77.1
Urban Other MSA	2013	\$169	\$ 2,209,222	\$ 84.10	\$ 20.29	\$68.92	\$ 9.14	\$ 8.95	3.68	74.3
	2014	\$174	\$ 2,196,265	\$ 86.47	\$ 20.53	\$70.85	\$ 9.50	\$ 8.94	3.63	74.9
	2015	\$178	\$ 2,138,292	\$ 89.21	\$ 20.82	\$72.89	\$ 9.93	\$ 8.82	3.54	75.0
	2016	\$213	\$ 2,475,476	\$ 100.79	\$ 21.98	\$82.36	\$10.92	\$ 11.35	3.52	75.7
	2017	\$224	\$ 2,573,770	\$ 108.68	\$ 23.72	\$88.92	\$11.67	\$ 13.51	3.58	76.4
Micropolitan	2013	\$166	\$ 2,183,212	\$ 80.49	\$ 20.33	\$65.08	\$ 9.25	\$ 9.45	3.63	74.8
	2014	\$173	\$ 2,109,802	\$ 84.18	\$ 20.37	\$68.46	\$ 9.50	\$ 9.80	3.62	75.2
	2015	\$181	\$ 2,059,422	\$ 89.01	\$ 20.90	\$72.17	\$10.12	\$ 10.32	3.62	76.7
	2016	\$215	\$ 2,400,902	\$ 101.04	\$ 23.36	\$82.62	\$11.22	\$ 13.00	3.74	77.0
	2017	\$228	\$ 2,681,450	\$ 107.40	\$ 24.14	\$87.91	\$11.89	\$ 15.57	3.80	77.9
Small Town	2013	\$162	\$ 1,658,001	\$ 75.61	\$ 18.28	\$61.64	\$ 7.98	\$ 9.15	3.54	74.5
	2014	\$170	\$ 1,719,865	\$ 78.18	\$ 18.62	\$63.82	\$ 8.40	\$ 9.59	3.49	75.9

RUCA/ Hospital Attached	Year	Medicaid Revenue PRD	Annual Medicaid Revenue	Direct Care Cost PRD Unadjusted	Other Care- Related Cost PRD Unadjusted	Direct Care Salaries PRD	Other Care Salaries PRD	Benefits PRD	Nursing (RN, LPN, and NA) Hours PRD	VBR Composite Score
	2015	\$175	\$ 1,637,049	\$ 80.64	\$ 19.60	\$66.55	\$ 8.89	\$ 10.69	3.50	77.4
	2016	\$209	\$ 1,908,820	\$ 91.04	\$ 21.26	\$75.37	\$10.17	\$ 13.79	3.50	79.1
	2017	\$223	\$ 2,053,030	\$ 96.58	\$ 21.55	\$80.49	\$10.82	\$ 15.70	3.51	79.1
Rural	2013	\$167	\$ 1,375,057	\$ 77.43	\$ 16.72	\$62.37	\$ 6.77	\$ 7.96	3.34	76.6
	2014	\$172	\$ 1,437,425	\$ 81.90	\$ 17.65	\$65.13	\$ 7.34	\$ 8.08	3.30	77.1
	2015	\$175	\$ 1,441,812	\$ 82.71	\$ 17.21	\$67.84	\$ 7.62	\$ 9.66	3.19	76.9
	2016	\$208	\$ 1,711,671	\$ 93.01	\$ 18.23	\$76.60	\$ 8.23	\$ 11.78	3.31	78.3
	2017	\$216	\$ 1,691,893	\$ 101.13	\$ 20.16	\$80.38	\$ 9.59	\$ 13.40	3.42	77.7

Table A.5 Annual Impact Measures by Five Year Occupancy Rate Change Quartile

Occupancy Rate Change	Year	Medicaid Revenue PRD	Annual Medicaid Revenue	Direct Care Cost PRD Unadjusted	Other Care-Related Cost PRD Unadjusted	Direct Care Salaries PRD	Other Care Salaries PRD	Benefits PRD	Nursing (RN, LPN, and NA) Hours PRD	VBR Composite Score
1st Quartile (Decline)	2013	\$173	\$ 2,535,366	\$89.09	\$21.39	\$71.60	\$ 9.45	\$ 7.75	3.64	74.9
	2014	\$178	\$ 2,522,015	\$90.08	\$21.81	\$73.75	\$ 9.85	\$10.23	3.62	74.9
	2015	\$182	\$ 2,405,690	\$92.02	\$21.50	\$76.34	\$10.09	\$10.58	3.62	74.8
	2016	\$216	\$ 2,751,454	\$ 103.79	\$24.08	\$85.06	\$11.35	\$11.89	3.56	74.9
	2017	\$223	\$ 2,676,997	\$ 112.98	\$25.01	\$92.11	\$12.12	\$13.82	3.66	75.7
2-3 Quartiles (Middle)	2013	\$172	\$ 2,874,494	\$88.31	\$21.50	\$71.83	\$ 9.85	\$ 9.10	3.62	75.5
	2014	\$179	\$ 2,901,613	\$90.63	\$21.68	\$74.67	\$10.18	\$10.97	3.63	75.9
	2015	\$182	\$ 2,844,171	\$93.79	\$22.14	\$77.81	\$10.86	\$11.31	3.62	77.2
	2016	\$217	\$ 3,325,999	\$ 106.02	\$23.45	\$88.84	\$11.88	\$13.78	3.67	78.1
	2017	\$228	\$ 3,448,427	\$ 112.82	\$24.50	\$94.95	\$12.43	\$15.90	3.74	78.1
4th Quartile (Increase)	2013	\$177	\$ 2,477,877	\$90.02	\$22.59	\$73.27	\$10.17	\$ 7.84	3.71	75.5
	2014	\$185	\$ 2,544,595	\$90.82	\$21.98	\$75.16	\$10.22	\$ 9.49	3.66	77.5
	2015	\$192	\$ 2,555,496	\$92.77	\$22.23	\$76.59	\$10.79	\$10.44	3.58	76.9
	2016	\$223	\$ 3,012,750	\$ 102.86	\$23.73	\$84.95	\$11.80	\$12.86	3.57	77.8
	2017	\$232	\$ 3,196,306	\$ 108.11	\$24.08	\$89.89	\$12.11	\$14.75	3.64	77.8

Table A.6 Annual Impact Measures by Five Year Acuity Quartile

Acuity	Year	Medicaid Revenue PRD	Annual Medicaid Revenue	Direct Care Cost PRD Unadjusted	Other Care-Related Cost PRD Unadjusted	Direct Care Salaries PRD	Other Care Salaries PRD	Benefits PRD	Nursing (RN, LPN, and NA) Hours PRD	VBR Composite Score
1st Quartile (Lowest)	2013	\$159	\$ 2,141,968	\$79.49	\$ 20.59	\$63.11	\$8.67	\$ 6.22	3.26	74.4
	2014	\$166	\$ 2,203,516	\$79.40	\$ 20.20	\$65.17	\$8.80	\$10.01	3.26	76.7
	2015	\$169	\$ 2,139,865	\$82.18	\$ 20.83	\$67.88	\$9.28	\$10.78	3.23	76.6
	2016	\$202	\$ 2,546,157	\$92.27	\$ 21.79	\$74.91	\$ 10.29	\$13.10	3.18	76.7
	2017	\$214	\$ 2,737,598	\$98.78	\$ 22.02	\$80.68	\$ 10.67	\$15.17	3.24	77.0
2-3 Quartiles (Middle)	2013	\$176	\$ 2,885,101	\$89.42	\$ 21.47	\$72.37	\$9.68	\$ 8.40	3.67	75.7
	2014	\$182	\$ 2,911,839	\$91.04	\$ 21.54	\$74.64	\$ 10.02	\$10.23	3.64	76.0
	2015	\$186	\$ 2,851,162	\$93.14	\$ 21.47	\$77.18	\$ 10.47	\$10.95	3.65	76.5
	2016	\$219	\$ 3,270,203	\$ 104.64	\$ 23.57	\$87.36	\$ 11.61	\$13.31	3.69	77.5
	2017	\$229	\$ 3,329,070	\$ 112.04	\$ 24.72	\$93.40	\$ 12.44	\$15.39	3.76	77.6
4th Quartile (Highest)	2013	\$183	\$ 2,807,415	\$97.42	\$ 23.42	\$80.57	\$ 11.22	\$10.57	3.99	75.5
	2014	\$190	\$ 2,796,235	\$ 100.51	\$ 23.87	\$83.61	\$ 11.55	\$11.08	3.99	75.5
	2015	\$196	\$ 2,754,728	\$ 103.58	\$ 24.14	\$86.03	\$ 12.27	\$10.86	3.91	76.2
	2016	\$233	\$ 3,260,114	\$ 116.70	\$ 25.84	\$97.47	\$ 13.31	\$12.37	3.90	76.9
	2017	\$238	\$ 3,283,374	\$ 123.70	\$ 26.66	\$ 103.91	\$ 13.49	\$14.18	3.99	77.3

Distribution Plots Referenced in Report

Figure A.1 Annual Facility Change in Occupancy Percentage

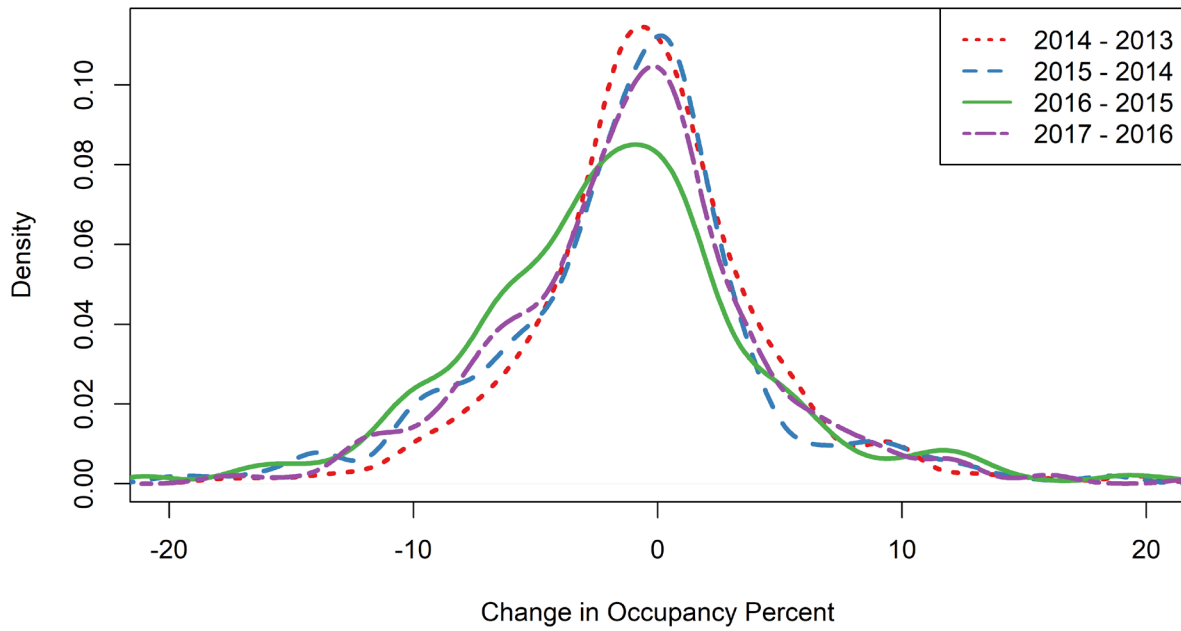


Figure A.2 Annual Facility Change in Medicaid Revenue PRD

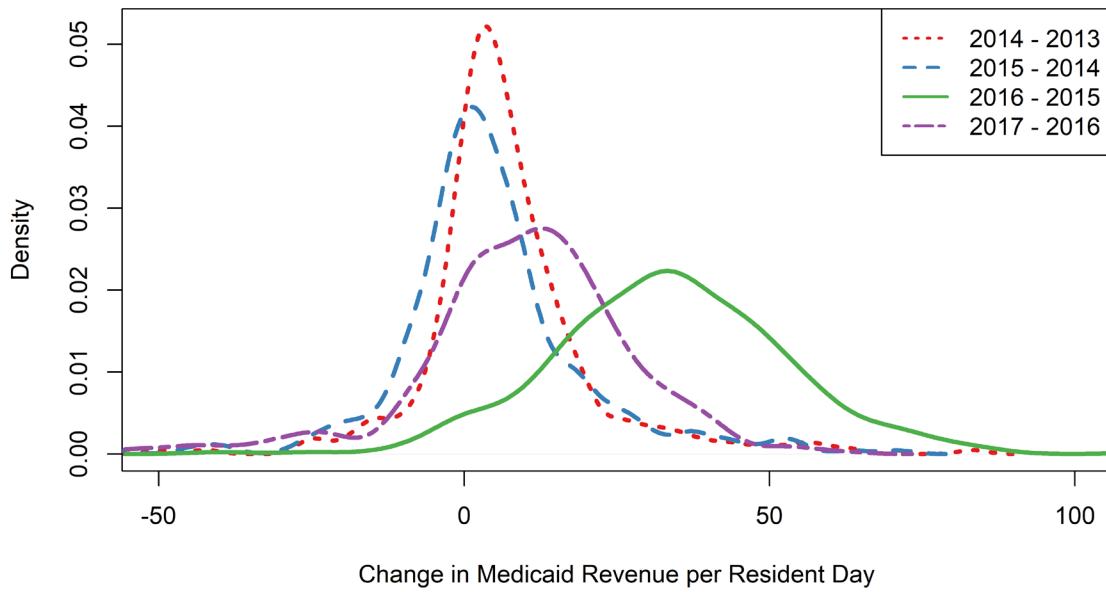


Figure A.3 Annual Facility Change in Private Pay Revenue PRD

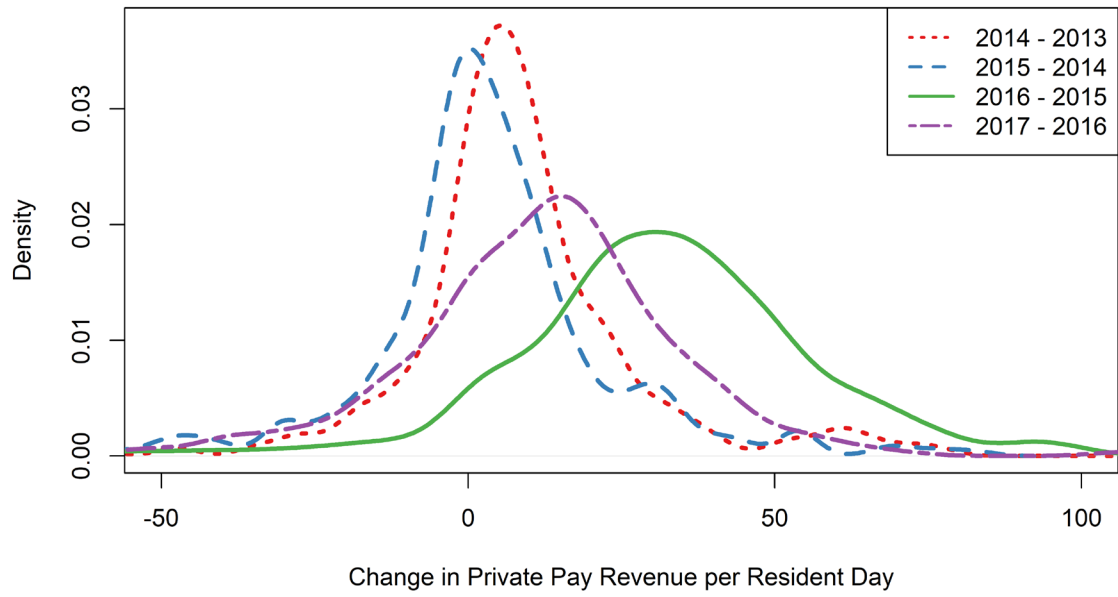


Figure A.4 Annual Facility Change in Total Medicaid Revenue

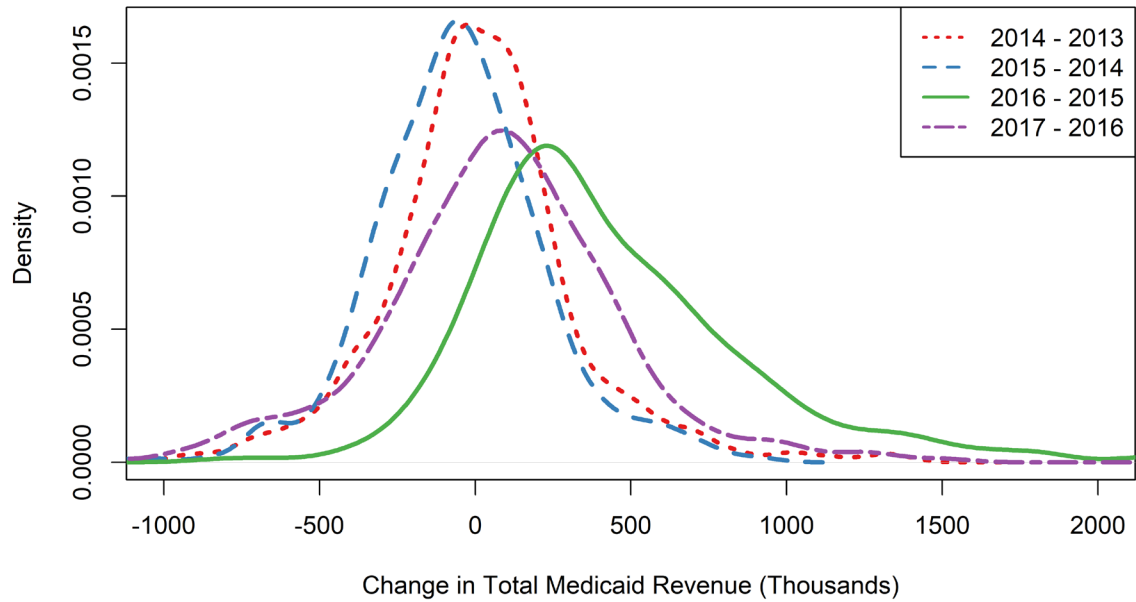


Figure A.5 Annual Facility Change in Total Private Pay Revenue

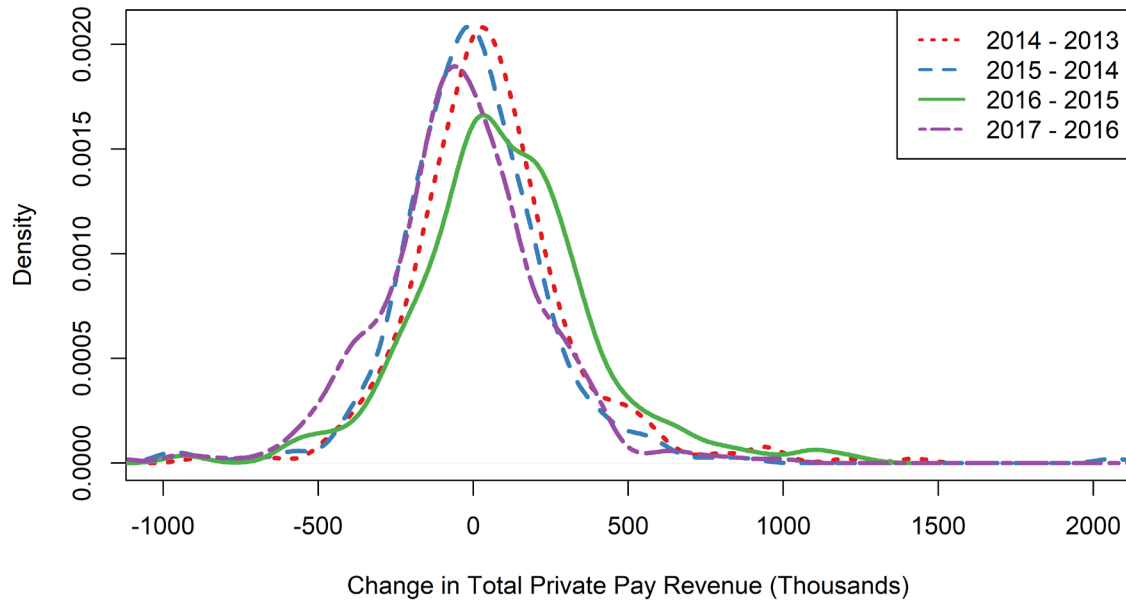


Figure A.6 Annual Facility Change in Direct Care Costs PRD

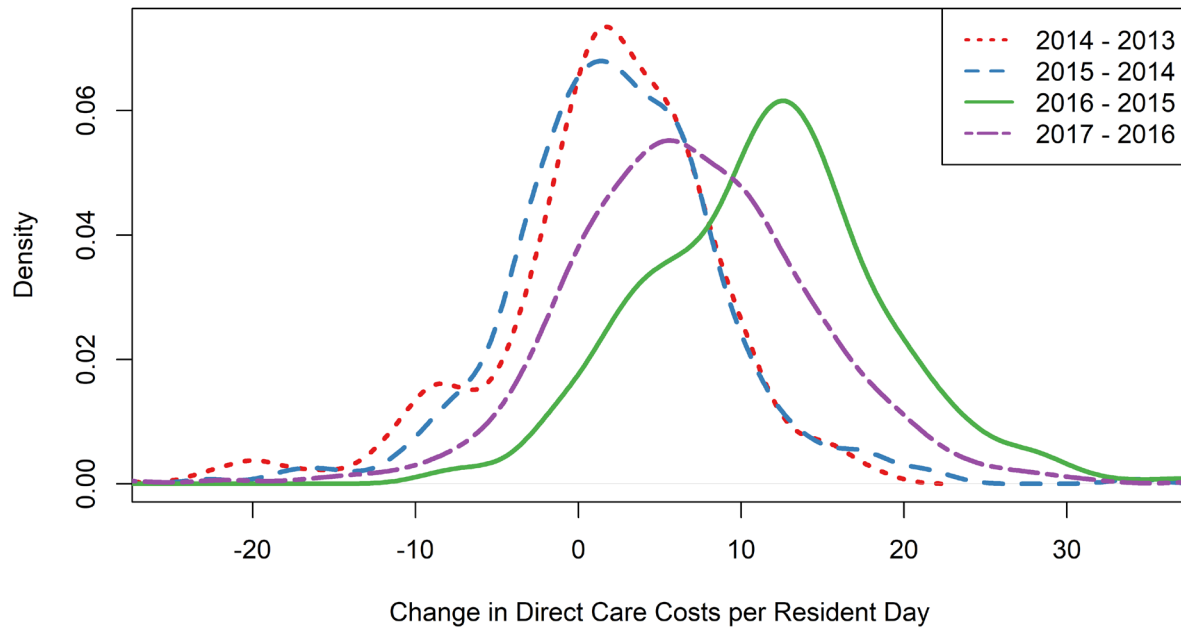


Figure A.7 Annual Facility Change in Other care-related costs PRD

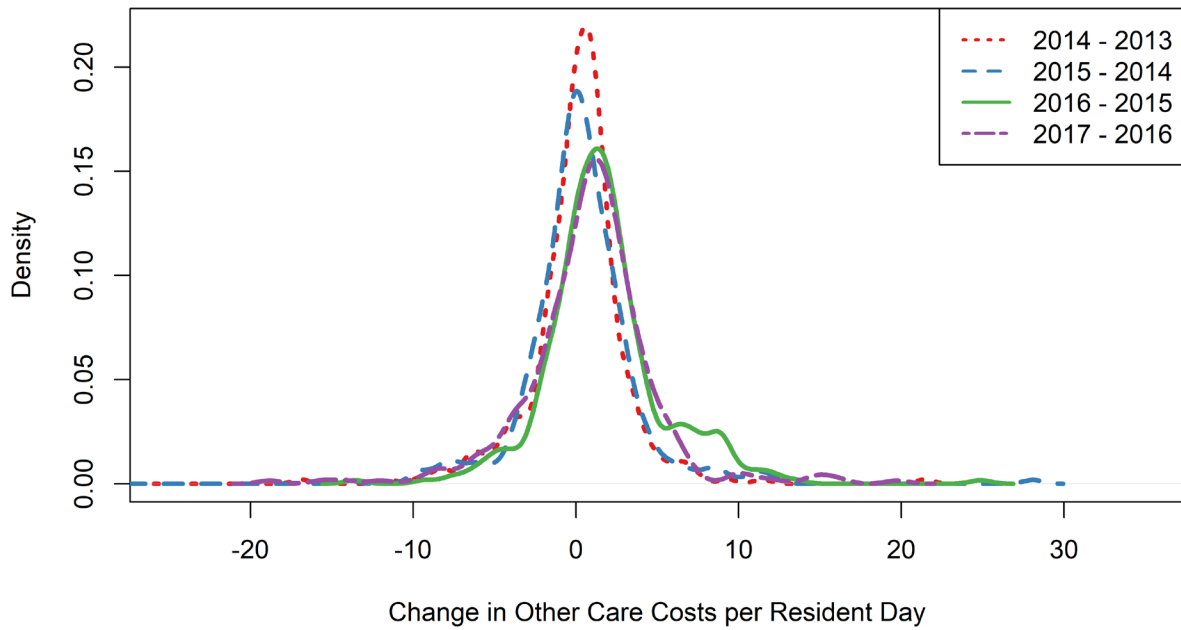


Figure A.8 Annual Facility Change in Other Operating Costs PRD

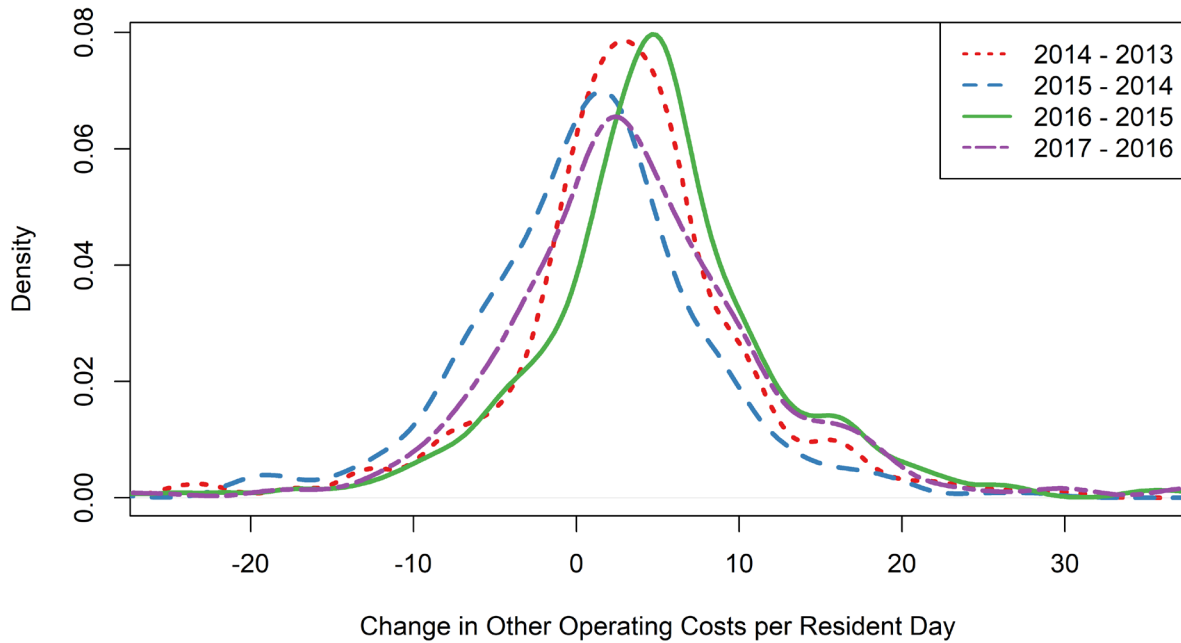


Figure A.9 Annual Facility Change in Total Operating Costs PRD

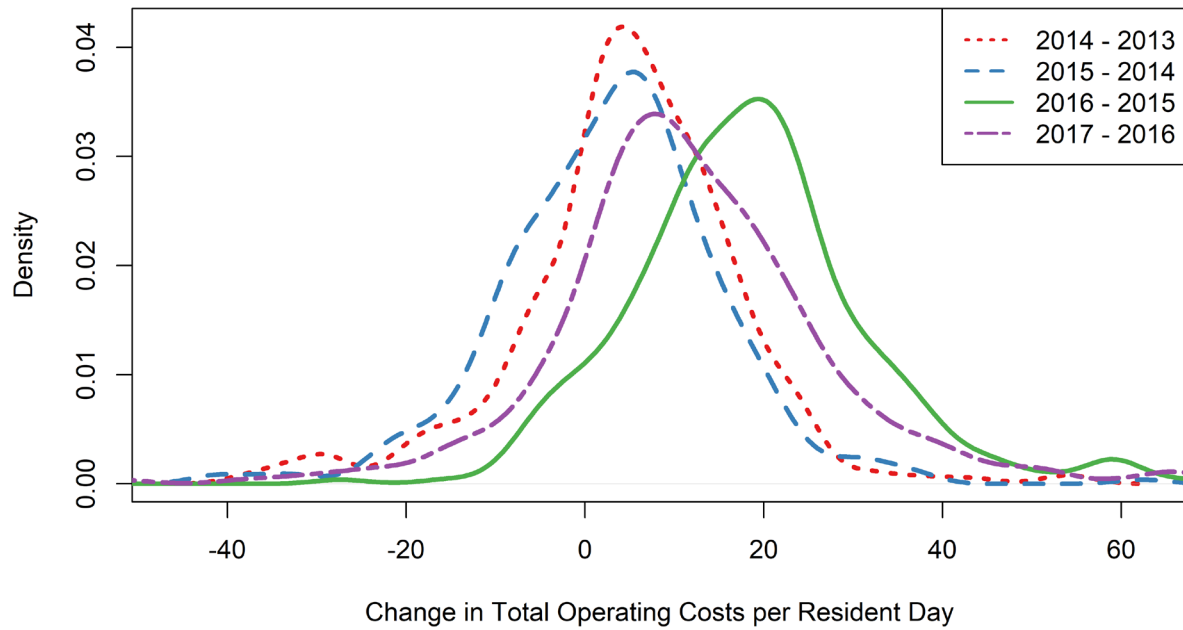


Figure A.10 Annual Facility Change in RN Salary PRD

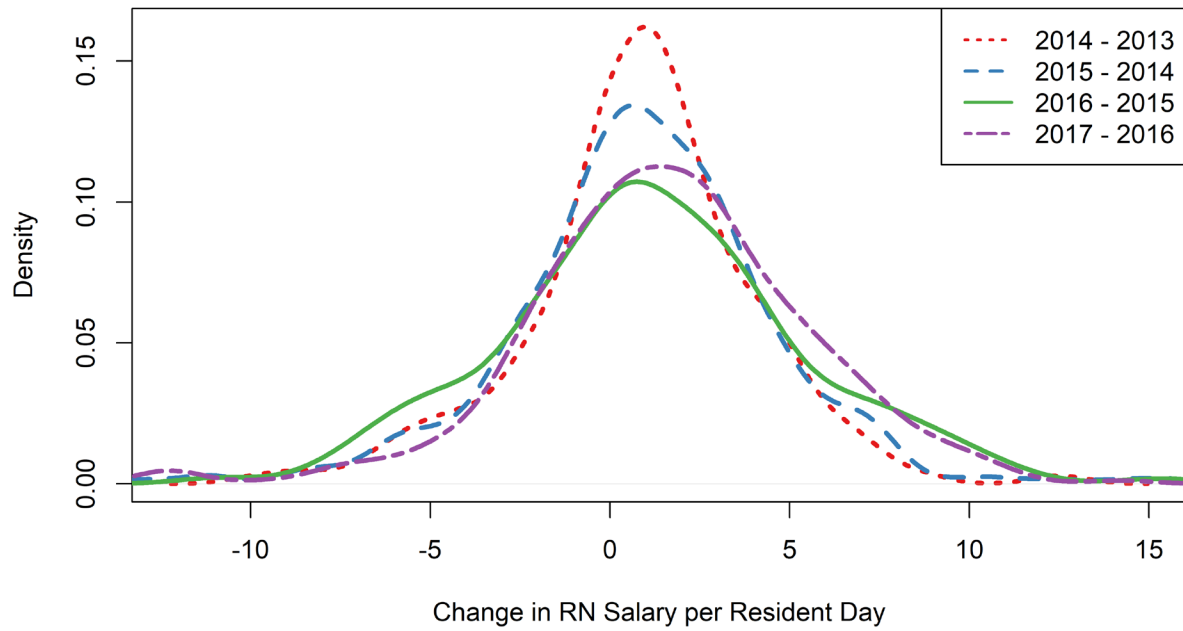


Figure A.11 Annual Facility Change in LPN Salary PRD

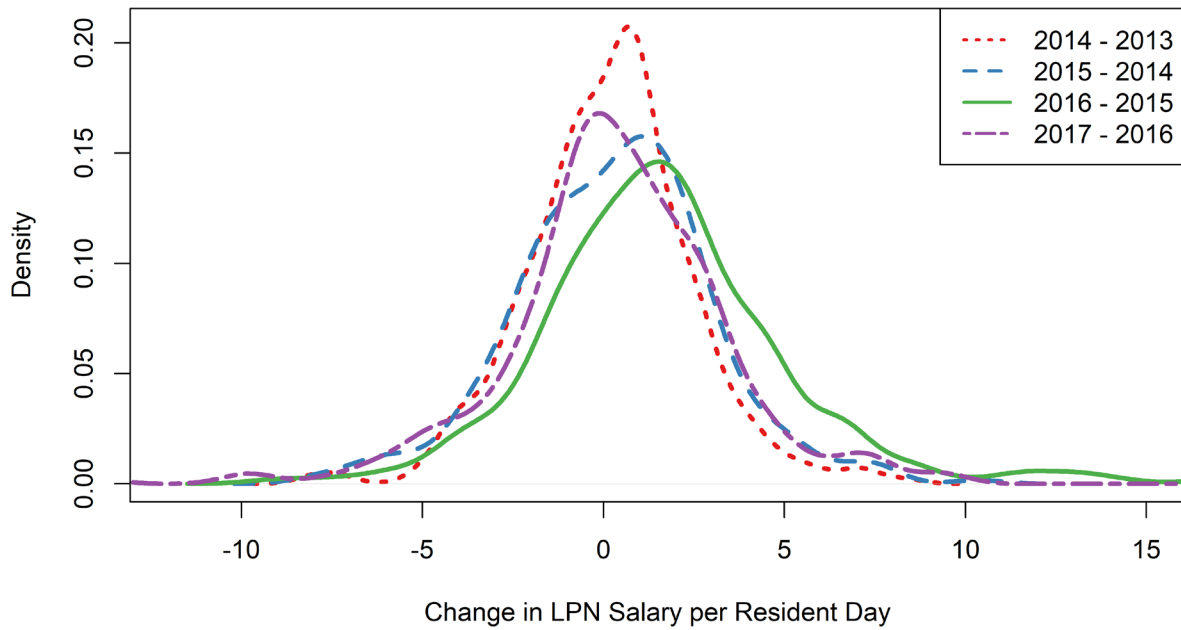


Figure A.12 Annual Facility Change in CNA Salary PRD

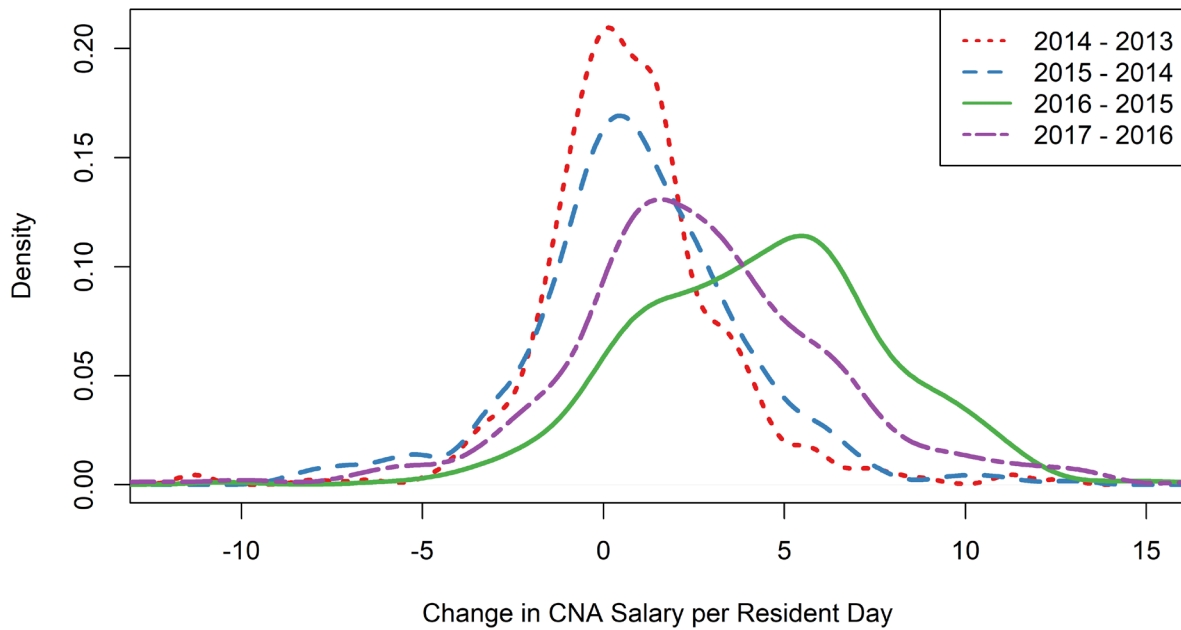


Figure A.13 Annual Facility Change in Benefits PRD

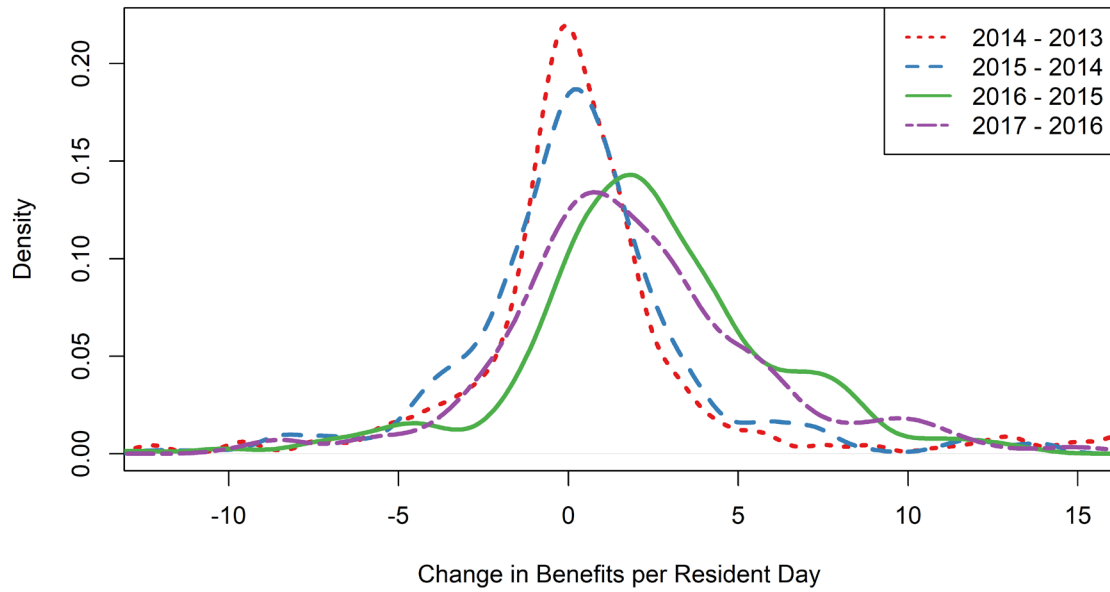


Figure A.14 Annual Facility Change in RN Hours PRD

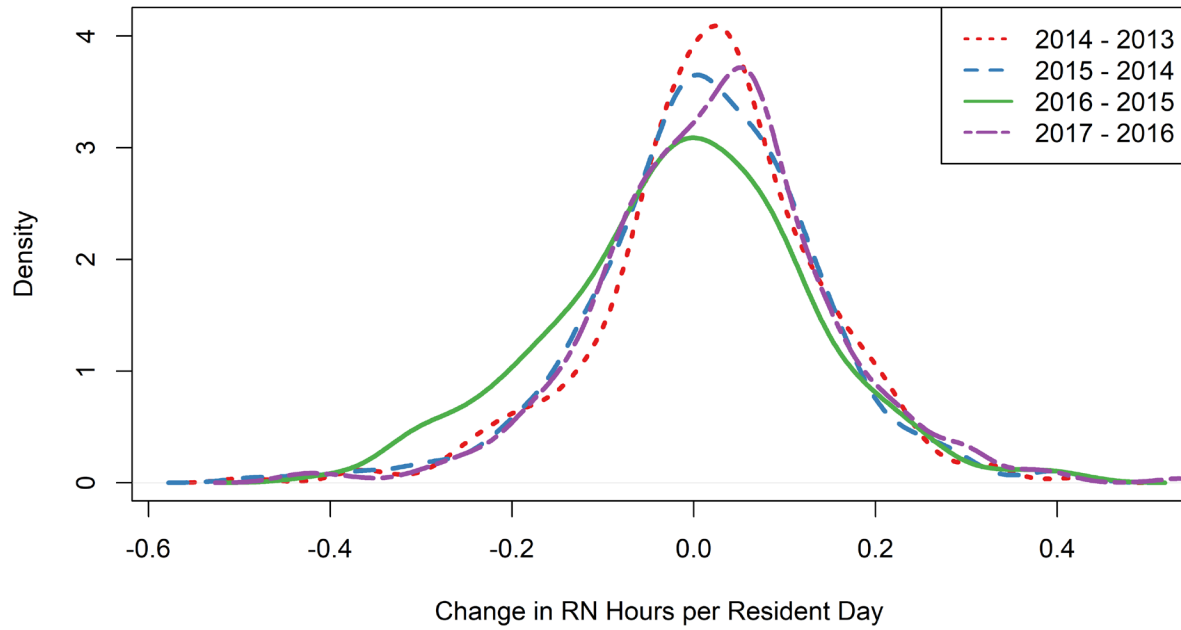


Figure A.15 Annual Facility Change in LPN Hours PRD

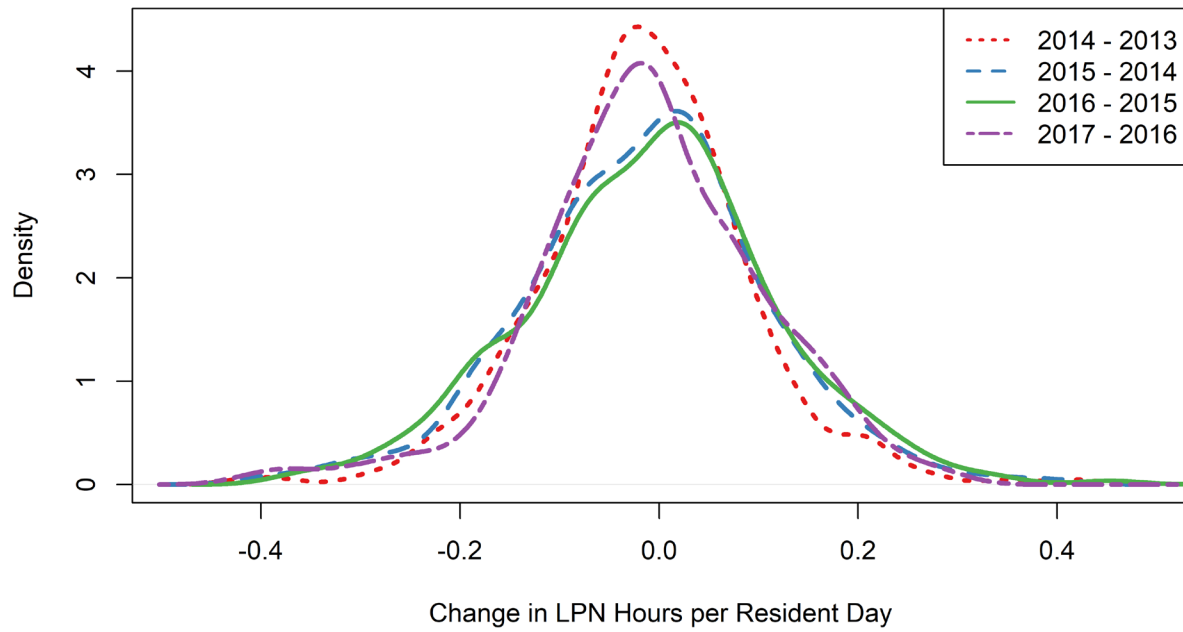


Figure A.16 Annual Facility Change in CNA Hours PRD

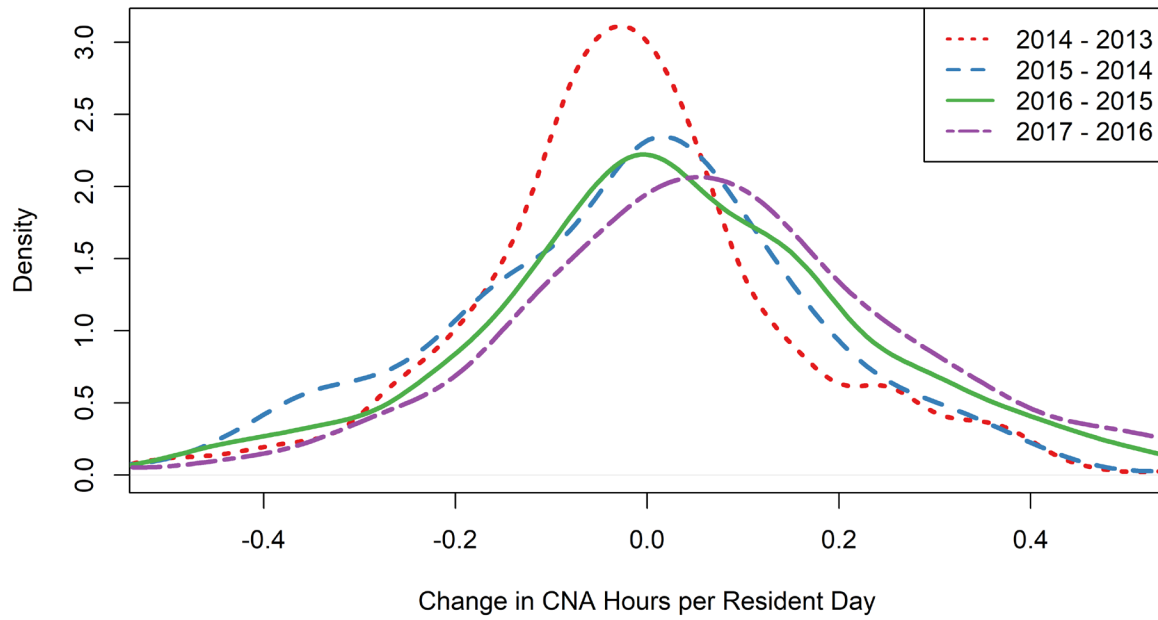


Figure A.17 Annual Facility Change in Total Nursing Hours PRD

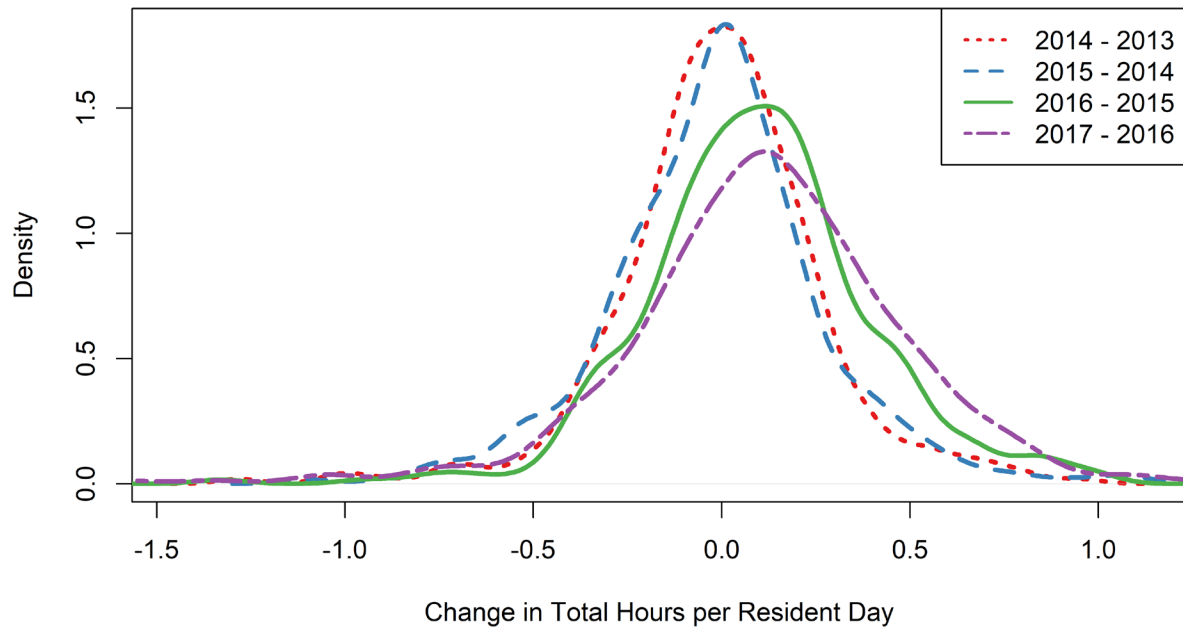


Figure A.18 Annual Facility Change in Licensed Hours Percentage

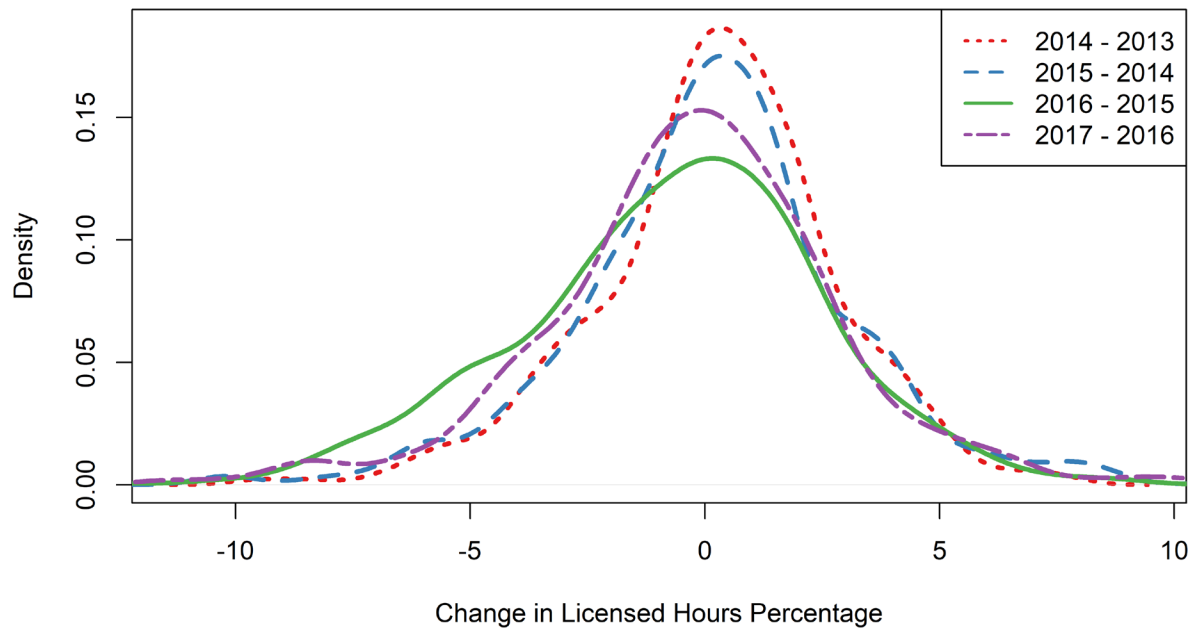


Figure A.19 Annual Facility Change in Composite VBR Quality Scores

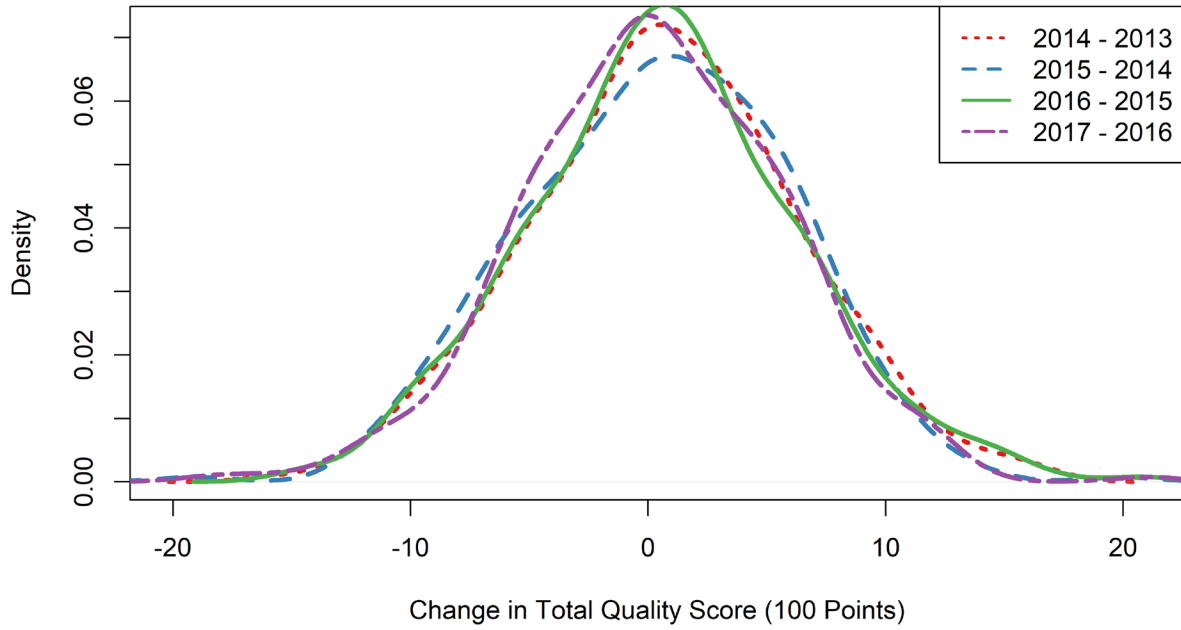


Figure A.20 Annual Facility Change in Quality Indicator Scores

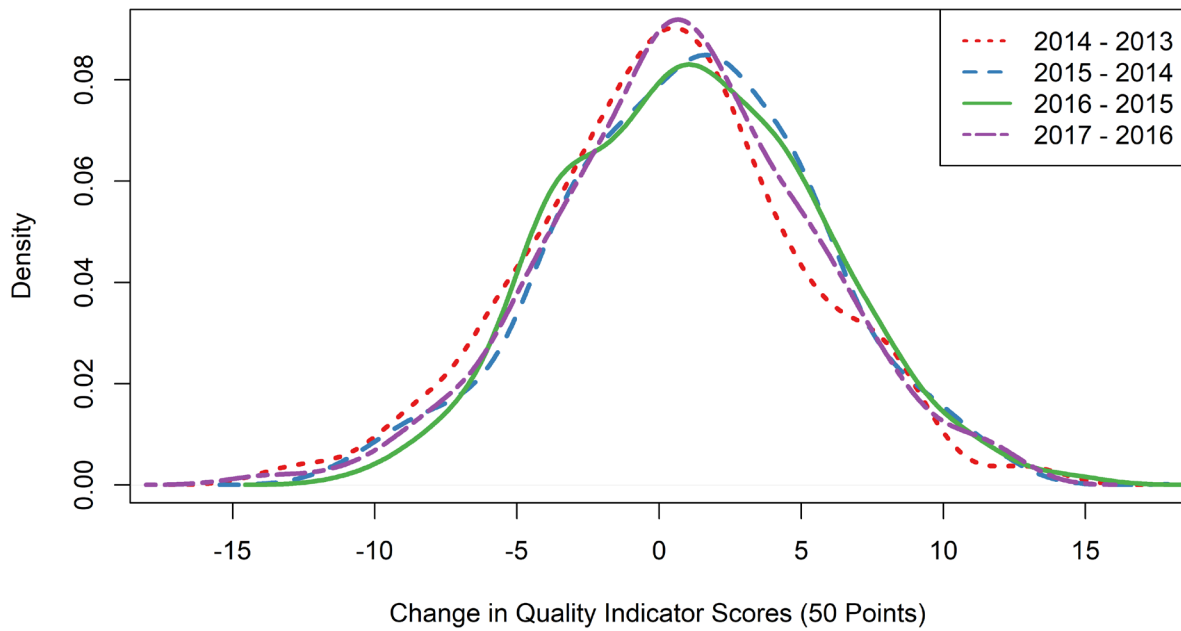


Figure A.21 Annual Facility Change in Minnesota Department of Health Inspection Scores

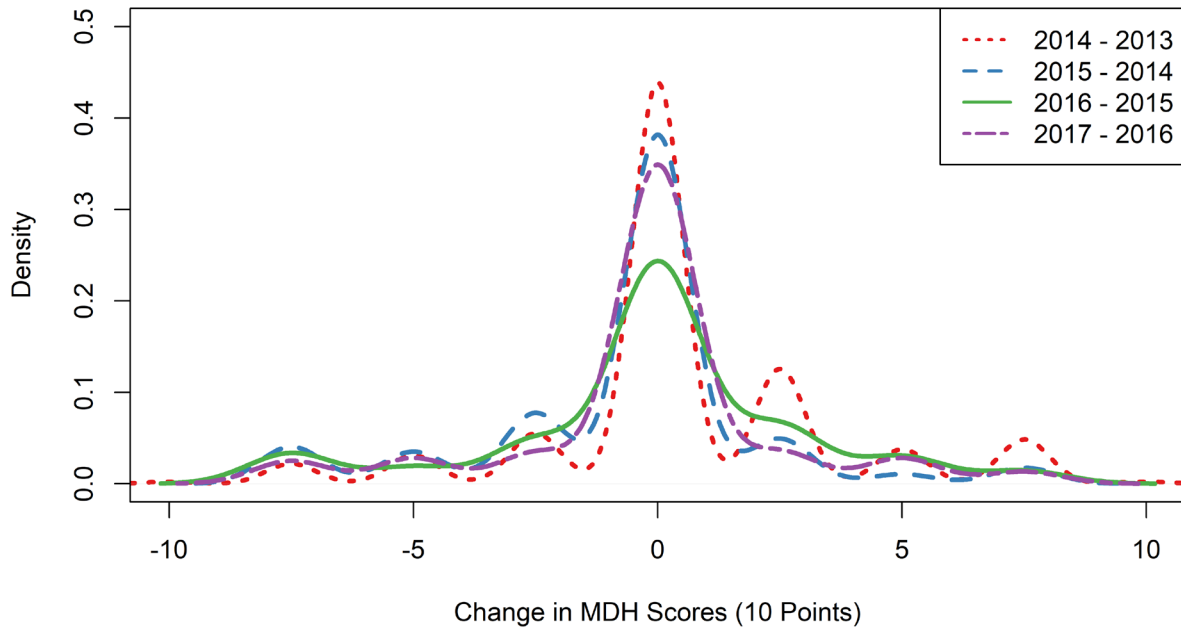


Figure A.22 Annual Facility Change in Quality of Life Scores

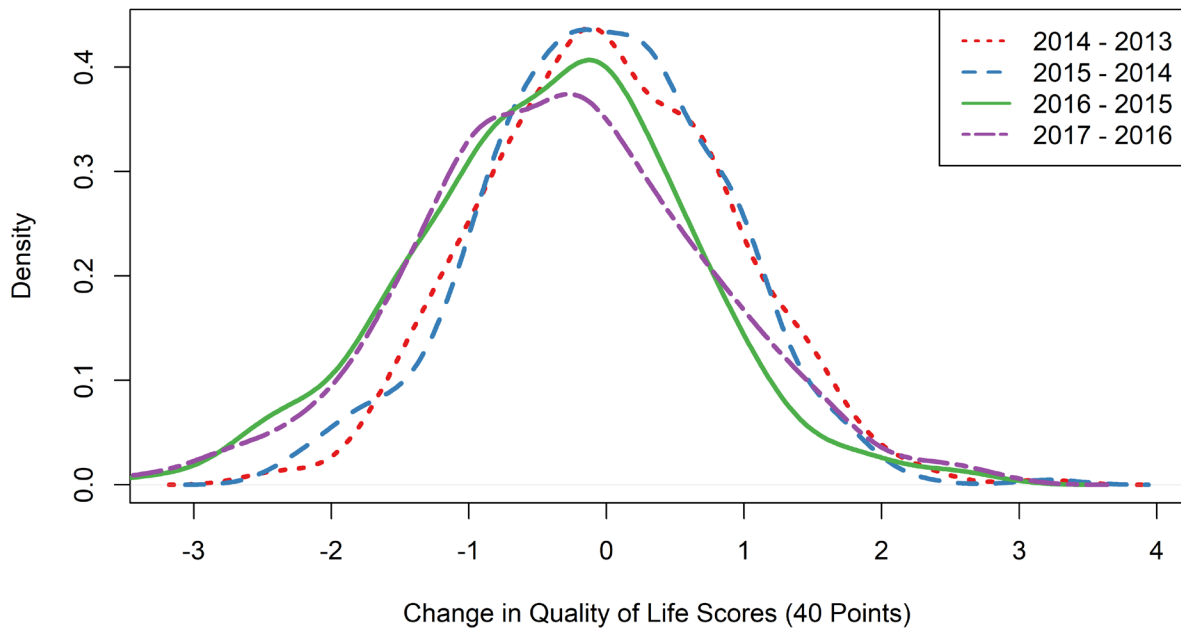
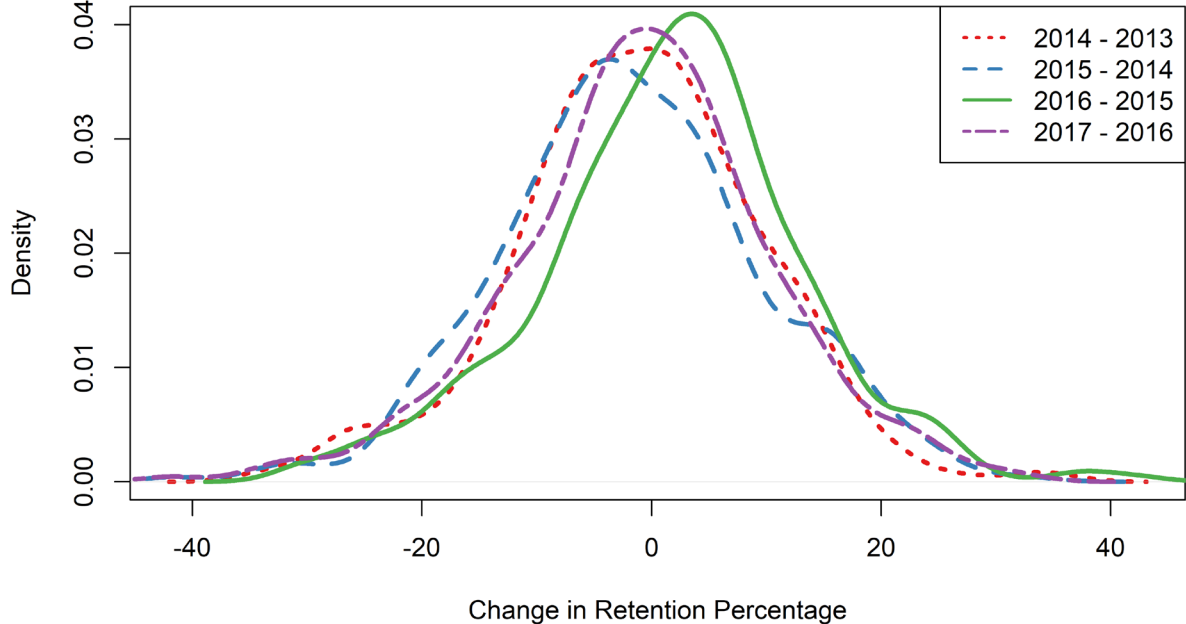


Figure A.23 Annual Facility Change in Retention Percentage



Tables for Growth Models Assessing Impact of VBR

Table A.7 Growth Model Results for per Diem Direct Care and Other Care-Related Costs

Outcome	Direct Care Cost per Day	Direct Care Cost per Day	Other care-related cost per Day	Other care-related cost per Day
Variable	Pre-VBR Effect ^{&}	VBR Effect [*]	Pre-VBR Effect ^{&}	VBR Effect [*]
Base Cost [#]	\$64.24		\$19.26	
Year (2013-2015)	\$2.67		\$0.18	
VBR Years (2016-17)		\$7.79		\$2.43
Ownership: For Profit	-\$2.70	-\$0.63	-\$3.20	-\$0.29
Ownership: Government	\$4.50	-\$0.14	\$0.11	-\$0.44
Ownership: Non Profit				
Hospital Attached	\$17.63	-\$0.59	\$2.49	-\$2.73
Urban Twin Cities				
Urban Other MSA	-\$5.89	-\$0.89	-\$2.59	-\$1.13
Micropolitan	-\$7.86	-\$1.22	-\$2.29	-\$0.40
Small Town	-\$7.66	-\$1.78	-\$3.39	-\$0.95
Rural	-\$4.01	-\$1.81	-\$4.64	-\$1.46
Resident Days (Smallest)	-\$0.66	-\$0.97	\$0.32	\$0.61
Resident Days (Mid 50%)				
Resident Days (Largest)	\$5.98	\$0.02	\$0.59	-\$0.56
Occupancy Rate (Lowest)	-\$1.12	\$2.24	\$1.21	-\$0.71
Occupancy Rate (Mid 50%)				
Occupancy Rate (Highest)	-\$1.96	-\$1.26	\$0.12	-\$0.33
Occupancy Change (Decline)	\$0.97	-\$0.60	\$0.06	\$1.26
Occupancy Change (Mid 50%)				
Occupancy Change (Increase)	\$0.15	-\$2.09	\$0.14	-\$0.20
Acuity (Lowest)	-\$10.67	-\$0.28	-\$0.49	-\$0.82
Acuity (Mid 50%)				
Acuity (Highest)	\$5.65	\$1.40	\$1.59	-\$0.51
Medicaid Revenue per Day	\$0.10		\$0.02	
Revenue % Medicaid	\$0.00		-\$0.01	
Revenue % Medicare	\$0.61		\$0.12	

Bolded figures indicate statistical significance at the 5% level. [&]Regression coefficients.

^{*}Interaction term with VBR years. [#]Regression intercept.

Table A.8 Growth Model Results for per Diem Salary and Benefits

Outcome	Direct Care Salary per Day	Direct Care Salary per Day	Other Care Salary per Day	Other Care Salary per Day	Benefits per Day	Benefits per Day
Variable	Pre-VBR Effect ^{&}	VBR Effect [*]	Pre-VBR Effect ^{&}	VBR Effect [*]	Pre-VBR Effect ^{&}	VBR Effect [*]
Base Cost [#]	\$53.90		\$9.08		\$2.60	
Year (2013-2015)	\$2.99		\$0.39		\$1.30	
VBR Years (2016-17)		\$7.33		\$0.79		-\$0.01
Ownership: For Profit	-\$1.19	-\$0.56	-\$1.55	\$0.08	-\$3.90	-\$0.71
Ownership: Government	\$4.20	\$0.13	-\$0.03	-\$1.08	-\$1.01	\$0.88
Ownership: Non Profit						
Hospital Attached	\$10.80	-\$1.22	\$0.14	\$0.22	\$2.71	\$2.58
Urban Twin Cities						
Urban Other MSA	-\$6.74	-\$1.70	-\$1.78	-\$0.14	-\$0.25	\$0.68
Micropolitan	-\$9.43	-\$1.43	-\$1.56	-\$0.14	\$0.22	\$1.04
Small Town	-\$7.62	-\$1.02	-\$2.19	\$0.07	\$1.46	\$1.39
Rural	-\$6.10	-\$1.82	-\$3.13	-\$0.50	\$0.88	\$0.54
Resident Days (Smallest)	-\$1.30	-\$0.50	-\$0.24	\$0.02	-\$1.13	\$0.39
Resident Days (Mid 50%)						
Resident Days (Largest)	\$5.00	\$0.79	\$0.43	-\$0.35	\$0.89	-\$0.40
Occupancy Rate (Lowest)	-\$2.05	\$1.57	\$0.14	-\$0.28	\$0.05	-\$1.53
Occupancy Rate (Mid 50%)						
Occupancy Rate (Highest)	-\$1.38	-\$0.92	\$0.19	-\$0.30	\$0.56	\$0.64
Occup. Change (Decline)	\$0.50	-\$2.19	-\$0.02	\$0.55	\$0.30	-\$0.20
Occup. Change (Mid 50%)						
Occup. Change (Increase)	\$0.39	-\$2.67	\$0.05	-\$0.08	-\$1.34	\$0.14
Acuity (Lowest)	-\$9.06	-\$2.38	-\$0.73	-\$0.19	-\$0.32	-\$0.37
Acuity (Mid 50%)						
Acuity (Highest)	\$5.20	\$1.07	\$1.02	-\$0.29	\$0.73	-\$1.17
Medicaid Rev per Day	\$0.07		\$0.01		\$0.02	
Revenue % Medicaid	\$0.01		-\$0.01		\$0.01	
Revenue % Medicare	\$0.48		\$0.05		\$0.12	

Bolded figures indicate statistical significance at the 5% level. [&]Regression coefficients.

^{*}Interaction term with VBR years. [#]Regression intercept.

Table A.9 Growth Model Results for Nursing Hours per Day and Overall Quality Score

Outcome	Nursing Hours per Day	Nursing Hours per Day	Quality Score	Quality Score
Variable	Pre-VBR Effect ^{&}	VBR Effect [*]	Pre-VBR Effect ^{&}	VBR Effect [*]
Base Value [#]	3.14		80.78	
Year (2013-2015)	(0.01)		0.51	
VBR Years (2016-17)		0.00		1.34
Ownership: For Profit	(0.16)	(0.02)	-2.09	0.12
Ownership: Government	0.23	0.11	0.29	-0.69
Ownership: Non Profit				
Hospital Attached	0.67	(0.04)	-1.17	0.32
Urban Twin Cities				
Urban Other MSA	0.10	(0.05)	-2.49	0.39
Micropolitan	0.08	0.06	-1.34	0.55
Small Town	0.24	(0.04)	-1.57	2.29
Rural	0.09	0.11	-0.43	0.27
Resident Days (Smallest)	(0.15)	0.00	-0.51	0.01
Resident Days (Mid 50%)				
Resident Days (Largest)	0.18	0.06	-1.42	-0.55
Occupancy Rate (Lowest)	(0.16)	0.07	-0.75	-0.68
Occupancy Rate (Mid 50%)				
Occupancy Rate (Highest)	(0.21)	0.05	1.62	-1.14
Occupancy Change (Decline)	0.06	(0.07)	-0.08	-1.46
Occupancy Change (Mid 50%)				
Occupancy Change (Increase)	0.04	(0.03)	0.28	-0.51
Acuity (Lowest)	(0.44)	(0.05)	-0.33	-0.96
Acuity (Mid 50%)				
Acuity (Highest)	0.23	(0.04)	0.01	-0.21
Medicaid Rev per Day	0.002		-0.01	
Revenue % Medicaid	0.00		-0.05	
Revenue % Medicare	0.019		-0.04	

Bolded figures indicate statistical significance at the 5% level. [&]Regression coefficients.

^{*}Interaction term with VBR years. [#]Regression intercept.