CMS Comprehensive Care for Joint Replacement Model:

Performance Year 1 Evaluation Report

Prepared for:

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The Lewin Group

With our partners:

Abt Associates, GDIT, Telligen, and Optum

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Executive Summary

The Comprehensive Care for Joint Replacement (CJR) model tests episode-based bundled payment and quality measurement for an episode of care for lower extremity joint replacements (LEJR) to encourage hospitals, physicians, and post-acute care (PAC) providers to work together to improve the quality and coordination of care from the initial hospitalization through recovery.[1] The CJR model was implemented on April 1, 2016 by the Centers for Medicare & Medicaid Services (CMS) Innovation Center. The CJR model is an important component of CMS' strategy to use alternative payment models (APMs) to slow Medicare spending growth by rewarding value rather than volume.[2]

This first annual report presents findings from the early stages of CJR model implementation based on episodes included in the first performance year (episodes initiated on or after April 1, 2016 that ended by December 31, 2016). Despite its short tenure, the CJR model achieved a statistically significant reduction in total episode payments due to reductions in institutional PAC use. At the same time, quality of care, as measured by readmission rates, emergency department visits, and mortality, was maintained. Interviewees from CJR participant hospitals reported that they chose to respond to the model by beginning planning earlier, educating patients about discharge to less intensive PAC settings, and coordinating with PAC providers.

A. Structure of the CJR Model

The structure of the CJR model informed our approach to the evaluation. The CJR model requires mandatory participation for all hospitals paid under Medicare's inpatient prospective payment system (IPPS) in select markets; holds participant hospitals financially accountable for episodes of care; and uses a target pricing approach that incorporates historical hospital-specific and regional episode payments and a quality adjustment.

Under the CJR model, an LEJR episode of care begins with the hospitalization for the surgery and extends through the 90 days after hospital discharge. All Medicare-covered items and services provided during the episode, with some exclusions, are included in the episode bundle.[3]

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1 The term LEJR refers to all discharges under Medicare Severity-Diagnosis Related Groups 469: Major Joint Replacement or Reattachment of Lower Extremity with major complications and comorbidities and 470: Major Joint Replacement or Reattachment of Lower Extremity without major complications and comorbidities. Appendix A includes an acronym list and glossary for terms used through this report.

2 Press MJ, Rajkumar R, Conway PH. Medicare's new bundled payments: design, strategy, and evolution [published online December 17, 2015]. JAMA. doi:10.1001/jama.2015.18161.

3 Excluded items, services, and payments include: hemophilia clotting factors; new technology add-on payments; transitional pass-through payments for medical devices; items and services unrelated to the anchor hospitalization as determined by CMS, including (i) inpatient hospital admissions for MS–DRGs for oncology, trauma medical, chronic disease surgical, and acute disease surgical diagnoses, (ii) Medicare Part B services for acute disease and certain chronic disease diagnoses, (iii) certain per beneficiary per month payments; certain incentive programs and add on payments under existing Medicare payment systems; and payments for otherwise included items and services in excess of two standard deviations above the mean regional episode payment.

All providers involved in the episode continue to be paid under Medicare's existing fee-for-service (FFS) payment systems.

The CJR model was designed with the goal of evaluating the impact of an episode-based bundled payment model across a broad spectrum of hospitals with varying levels of infrastructure, care redesign experience, episode utilization patterns, and market positions. To achieve this goal, CMS implemented the CJR model in 67 geographic areas, defined by metropolitan statistical areas (MSAs).[4] Hospitals paid under the Medicare IPPS and located in the 67 MSAs, with few exceptions, were required to participate in the CJR model for the first two performance years. It is the mandatory participation within selected markets that is a major distinction between the CJR model and previous CMS Innovation Center episode-based payment models, such as Model 2 of the Bundled Payments for Care Improvement (BPCI) initiative. There are other differences as well, including that CJR qualifies as an Advanced Alternative Payment Model under the Quality Payment Program.

The CJR model holds participant hospitals financially accountable for the quality and cost of an episode of care. As such, hospitals have incentives to work collaboratively with physicians and PAC providers to improve quality and lower payments from the initial hospitalization through 90 days post-discharge. Through a reconciliation process after the end of each model performance year, CMS assesses whether participant hospitals have met financial and quality targets. At reconciliation, CMS compares each hospital's total episode payments for services provided during the clinical episode to its quality-adjusted target price. Hospitals with LEJR episode payments below the quality-adjusted target price plus a minimum composite quality score for the required quality measures will be eligible to earn a reconciliation payment from Medicare. The reconciliation payment will equal the difference between the quality-adjusted target price and actual episode spending, up to a stop-gain limit. Beginning in performance year 2, hospitals with LEJR episode spending that exceeds the quality-adjusted target price will be financially responsible for paying a portion of the difference to Medicare up to a stop-loss limit. This repayment responsibility will be fully implemented in year 4.

The CJR model uses a target pricing approach that incorporates historical hospital-specific and regional episode payments and a quality adjustment to incentivize certain behaviors in the participant hospitals. CMS provides CJR participant hospitals with prospective, quality-adjusted target prices prior to each performance year. The quality-adjusted target price is based on a discounted blend of a hospital's average historical episode payments and the historical regional average.[5] At the beginning of each performance year, a 3% discount is applied to the blended historical payment amount. The 3% discount will be lowered at reconciliation if the hospital's

[4] MSAs are counties associated with a core urban area that has a population of at least 50,000. Non-MSA counties (no urban core area or urban core area of less than 50,000 population) and MSAs with a volume of LEJR cases below 400 were not eligible for selection.

[5] For performance years 1 through 3, episode benchmark prices are a blend of the hospital's own historical payments and regional historical payments. Episode benchmark prices are based completely on regional amounts for performance years 4 and 5.

actual composite quality score is in the "good" or "excellent" range. This incentivizes quality performance through a higher target price for participants with better quality. To account for the variation in the complexity and resulting costs of LEJR episodes, the quality-adjusted target prices are risk-adjusted based on the presence or absence of major complications and comorbidities and presence of hip fracture, yielding four separate quality-adjusted target prices for each CJR participant hospital. The risk adjustment is intended to reduce any unintended incentive to avoid patients with greater needs.

This report presents findings from the first performance year of the CJR model, when all CJR hospitals in the 67 MSAs were required to participate. Beginning in 2018, performance year 3, the model was adjusted so that the 34 highest payment areas remained mandatory participation areas. CJR participant hospitals in the 33 other MSAs and those in all 67 areas identified as low-volume or rural, were given a one-time opportunity during January of 2018 to voluntarily opt-in to the CJR model for years 3 through 5.

B. Results

Analyses of Medicare claims and primary data collected from hospitals and other providers involved in an episode of care shed light on how CJR participant hospitals chose to respond to the financial pressure and incentives of the CJR model. Early evaluation results indicate that CJR participant hospitals responded to the CJR model by choosing actions that shifted patients to less intensive PAC settings, which lead to statistically significant reductions in total episode payments. Average total payments for LEJR episodes decreased by $910 more (or 3.3% from CJR baseline payments) for CJR episodes relative to control group episodes ($p<0.01$). The payment reductions persisted for different types of episodes.[6] We observed statistically significant relative decreases in average total payments for planned episodes and those due to fracture, as well as for episodes initiated in both MSAs with historically high and historically low episode payments.

Reductions in episode payments were largely driven by reductions in institutional PAC payments, which aligns with observed changes in utilization. Among elective episodes, CJR participant hospitals discharged a relatively smaller proportion of patients to an IRF, and patients spent fewer days in a skilled nursing facility (SNF). Among fracture episodes, changes in utilization suggest CJR participant hospitals substituted SNF for inpatient rehabilitation facility (IRF) care, and patients also spent fewer days in a SNF. Interviewees from CJR participant hospitals corroborated that their focus was on changing PAC use. In particular, they reported that in response to the CJR model, they encouraged the use of less expensive PAC settings. To do so, interviewees reported

[6] These results are based on the difference-in-differences statistical technique, which quantifies the impact of the CJR model by comparing changes in payment, utilization, and quality outcomes for CJR participant hospitals to changes for a control group from a baseline to the intervention period. To account for any differences between the CJR and control groups, we risk adjusted outcomes for hospital and patient characteristics, as well as geographic location. Payment outcomes are based on standardized Medicare allowed amounts. Standardizing payments removes wage adjustments and other Medicare payment adjustments and allowed amounts include beneficiary cost sharing.

expanding patient education efforts and beginning discharge planning earlier, for example, to better set patients' expectations about discharge destinations. Furthermore, interviewees reported increasing coordination with PAC providers and developing preferred provider networks. CJR participant hospitals were able to reduce payments through changes in utilization while maintaining quality of care. At the same time, we found no indication that CJR participant hospitals selected healthier patients to achieve these results.

These results indicate that participant hospitals in historically high episode payment areas and those in historically low episode payment areas were able to implement actions in response to the CJR model to lower episode spending. It is important to keep in mind, however, that these estimates do not account for reconciliation payments made to or received from CJR participant hospitals, so they do not represent total savings to the Medicare program.

Additional details about key findings are summarized under the three main research questions addressed in this report.

1. What are the impacts of the CJR model on Medicare payments, utilization, and quality of care?

- **Total episode payments decreased 3.3% more for CJR episodes than control group episodes.** On average across all LEJR episodes, total Medicare standardized allowed amounts (average payments that remove Medicare payment adjustments and include beneficiary cost sharing) for the LEJR anchor hospitalization and services furnished during the 90 days post-discharge went down by $910 (3.3%, $p<0.01$) more for CJR episodes between the baseline and the intervention periods than for control group episodes (Exhibit 1).[7]
- **Average total payment reductions for CJR episodes occurred in both MSAs with historically high and historically low episode payments.** Although there may be greater opportunities to reduce episode payments in MSAs with historically high payments, our estimates indicate that there were payment reductions in both groups of MSAs. Average total payments for CJR episodes decreased by $1,127 more (3.9%, $p<0.01$) and $577 more (2.3%, $p<0.05$) than control episodes in MSAs with historically high and low episode payments, respectively.
- **CJR participant hospitals reduced average total payments for both elective and fracture episodes, relative to the control group.** We completed separate analyses for elective LEJR and LEJR due to fracture because of their different care pathways and underlying costs. Average total payments for CJR elective episodes went down by $880 (3.6%, $p<0.01$) more than for control episodes, due to relative reductions in SNF, IRF, and Part B payments. Average total payments for CJR fracture episodes went down by

[7] The baseline includes episodes initiated in 2012 through 2014 that ended between Q2 2012 and Q1 2015 and the intervention period includes episodes initiated during or after Q2 2016 that ended by Q4 2016.

$1,345 (3.0%, p<0.01) more than for control episodes due to relative reductions in IRF and readmission payments.

- **Reductions in total episode payments were driven by reductions in the use of more intensive PAC settings.** Among CJR patients with elective episodes, there was a relative decrease in the proportion with IRF as the first PAC setting (-2.0 percentage points, p<0.01) and a relative increase in the proportion with home health agency (HHA) as the first PAC setting (4.4 percentage points, p<0.10). For fracture episodes, changes in discharge patterns suggest that SNF care was substituted for IRF care. Among CJR patients with fracture episodes, there was a relative increase in the proportion discharged to SNF (3.3 percentage points, p<0.01) and a similar decrease in the proportion discharged to IRF (-3.6 percentage points, p<0.01).
- **CJR patients with a SNF or IRF stay had statistically significantly greater reductions in PAC length of stay than control patients.** For CJR patients with elective or fracture episodes who had a SNF or IRF stay, there were statistically significant relative reductions in the average number of days spent in the institutional PAC setting. Among CJR episodes with a SNF stay, the average number of SNF days decreased for patients with elective episodes (-2.1 days, p<0.01) and fracture episodes (-1.6 days, p<0.01). Among CJR fracture episodes with an IRF stay, there was also a relative decrease in the average number of days spent in the IRF (-0.5 days, p<0.05).
- **Quality of care was maintained.** We observed no statistically significant changes in the quality of care, as measured by readmission rates, emergency department visits, and mortality, for elective or fracture CJR episodes relative to control group episodes.

Exhibit 1 presents the impact of the CJR model on key payment and utilization measures.

Exhibit 1: Payments for LEJR Episodes Declined under the CJR Model Due to Reduced Institutional PAC Use, Q2 2016 – Q4 2016

		Episode Type		
		All LEJR	Elective	Fracture
Number of intervention episodes	CJR	43,801	38,462	5,339
	Control group	58,960	52,640	6,320
Estimated relative change in standardized allowed amounts[a]	Total episode payments	-$910***	-$880***	-$1,345***
	SNF	-$455***	-$461***	-$73
	IRF	-$350***	-$273***	-$787***
	HHA	$86	$85	$43
	Part B	-$83*	-$86*	-$83
	Readmissions	-$109*	-$88	-$243**

		Episode Type		
		All LEJR	Elective	Fracture
Estimated relative change in utilization	First PAC discharge was to SNF (pp)	-0.5	-1.2	3.3***
	First PAC discharge was to IRF (pp)	-2.2***	-2.0***	-3.6***
	First PAC discharge was to HHA (pp)	3.9*	4.4*	0.5
	Number of SNF days, 90-day PDP[b]	-2.0***	-2.1***	-1.6***
	Number of IRF days, 90-day PDP[b]	-0.1	0.1	-0.5**

Source: Lewin's analysis of Medicare claims and enrollment data for episodes initiated in 2012 through 2014 that ended between Q2 2012 and Q1 2015 (baseline) and episodes initiated during or after Q2 2016 that ended by Q4 2016 (intervention).

Notes: HHA = home health agency, IRF = inpatient rehabilitation facility, LEJR = lower extremity joint replacement, PAC = post-acute care, PDP = post-discharge period, pp = percentage points, SNF = skilled nursing facility.

The estimated relative change in standardized allowed amounts and utilization are the results of a difference-in-differences (DiD) model (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$).

Definitions of outcome measures and their exclusion criteria are included in Appendix E. The denominators vary across the outcome measures because of different exclusions.

The change in separate provider payments do not sum to the change in total episode payments because separate models were estimated for total payments and each component payment.

[a] Payment measures are based on all episodes, including episodes with zero payments for that service.

[b] Beneficiaries must have spent a minimum of one day in the institutional setting during the 90-day PDP.

2. *Did the CJR model result in other impacts?*

- **There were no indications that the CJR patient population was healthier in the intervention period than in the baseline, relative to the control group population.**

  CJR participant hospitals have incentives to admit healthier patients or avoid higher risk patients to reduce average total episode payments. Indeed, some interviewees from CJR participant hospitals expressed concern about the possible impact of the CJR model on access to care for sicker or more resource intensive patients. Our analysis of claims data, however, provide no indications of changes in patient characteristics for CJR episodes relative to control group episodes.

3. *What actions did hospitals take in response to the CJR model and what are their perceptions of the model's potential impact?*

- **CJR participant hospitals chose to implement changes in response to the model.** In line with the financial incentives of the CJR model, interviewees reported taking actions with the goals of discharging patients to home health instead of institutional PAC settings and reducing institutional PAC lengths of stay. We also heard of efforts to expand patient education initiatives, initiate discharge planning earlier, standardize care protocols, improve coordination with orthopedic surgeons and PAC providers, and develop preferred PAC provider networks. While most interviewees reported their hospitals were implementing changes, as to be expected with a diverse group of participant hospitals, their reported actions varied. Some noted that their efforts were

already underway prior to the CJR model and they either did not need to make additional changes or enhanced them during the intervention period.

- **CJR participant hospitals that had participated in other bundled payment initiatives felt they were prepared for the CJR model.** Senior leaders from CJR participant hospitals understood the structure and purpose of the CJR model, although this understanding was not consistent across frontline staff. Participant hospital representatives that we interviewed with relevant prior experiences in other bundled payment initiatives felt they were prepared to identify areas for improvement and implement care redesign changes to succeed under the CJR model. Interviewees also recognized the value of the episode data that CMS provided in informing actions to take in response to the model, though many reported challenges using and analyzing these data.
- **Perceptions of the possible impact of the CJR model reflected the potential for improved coordination across providers as well as concerns about reduced utilization.** Most interviewees commented that the CJR model had the potential for both positive and negative effects on beneficiaries and providers through changes in care delivery, access, and quality. Interviewees noted possible improvements in continuity of care for patients, enhanced patient education, and increased coordination among providers. Some also expressed unease that shorter lengths of stay or use of lower intensity PAC settings could reduce quality and that access to care could be limited for higher risk patients or there could be undesirable outcomes for beneficiaries being discharged to substandard or unsafe home environments.

C. Discussion

Our results indicate that CJR participant hospitals successfully responded to the financial incentives of the CJR model during the first performance year. Average Medicare payments for LEJR episodes decreased by 3.3% more for CJR episodes than for control group episodes, primarily because of reduced use of institutional PAC. At the same time, quality of care was maintained, as indicated by claims-based quality measures. Further, some interviewees reported on efforts to improve care coordination with PAC providers.

These positive early results are particularly notable because hospitals were mandated to participate in the CJR model. This means that rather than making a business decision to join a voluntary model, CJR participant hospitals had to evaluate their available resources and market conditions to determine whether and how to act in response to the model's financial incentives. In aggregate, these responses achieved the model's goal of reducing episode payments across a range of hospitals that included participants that would not have joined a voluntary model.

CJR participant hospitals successfully reduced total episode payments largely by changing patterns of PAC. Payments for institutional PAC were reduced by lowering utilization and by substituting lower payment PAC settings for higher payment ones. Interviews with hospital representatives confirmed that they engaged in actions to change PAC use as a response to the

CJR model. Although many interviewees said that they were engaged in these activities prior to the implementation of the CJR model, they often indicated that they expanded these efforts because of the financial incentives of the CJR model. At the same time, hospital representatives noted in interviews that it was challenging to affect utilization to reduce payments and impact quality for services, such as SNF or home health care, that they did not directly control. Despite these challenges, participant hospitals achieved relative reductions in payments for PAC.

Possibly the most notable outcome during the first CJR model performance year was that statistically significant changes in utilization and payments occurred so quickly. With approximately nine months of implementation, the CJR model resulted in outcomes that are consistent with what has been achieved in other bundled payment initiatives. More time under the CJR model will help in determining if continued improvements can be achieved.

This annual report provides an early snapshot of the impact of the CJR model on Medicare episode payments; it does not include estimates of the change in Medicare program savings due to the CJR model because reconciliation data were not available in time to incorporate in our analyses. The mandatory, randomized nature of the model facilitated the creation of a control group to indicate what would have happened absent the model. The accuracy of our estimates, however, could still be affected by unobserved differences between the CJR and control group hospitals. We chose our site visit and telephone interview participants deliberately to target those with more incentive to act under the CJR model. Therefore, it is important to keep in mind that the qualitative data are not representative of all CJR participants and may not necessarily reflect the experiences of other participants.

Our mixed methods approach allows us to conclude, even with less than a full year under the CJR model that bundled payments for LEJR episodes results in reduced payments. Even when participants do not choose to participate in a bundled payment approach, they can respond to the financial incentives to shift patterns of care during the episode. More time under the model, as well as the opportunities created with the changes to reduce the number of mandatory MSAs, will expand the information about the impact of the CJR model. Future reports will contrast differential impacts across varying types of participants, markets, and patients to provide more nuanced information about the promise and possibilities of this alternative payment approach for the Medicare program.

I. Introduction

The CMS Innovation Center implemented the CJR model on April 1, 2016 to test episode-based bundled payment and quality measurement for an episode of care for LEJR.[8] CMS chose to focus this mandatory model on LEJR episodes because LEJR is one of the most common surgeries for Medicare beneficiaries and accounts for over $7 billion annually in hospital payments, with additional payments for physician, PAC, and other services.[9] There is wide regional variation in the cost and quality of LEJR and associated PAC, indicating opportunities for increased efficiency and improved value to the Medicare program. In addition, the BPCI initiative provided evidence that Medicare payments for LEJR episodes of care can be reduced while maintaining quality of care.[10]

The Lewin Group, with our partners, Abt Associates, Inc., GDIT, Telligen, and Optum, is under contract to CMS to evaluate the impact of the CJR model. This evaluation report details the impact of the CJR model on payment, utilization, and quality outcomes based on quantitative claims-based analyses during the first performance year, that is, for episodes initiated on or after April 1, 2016 that ended by December 31, 2016.[11] This report describes hospitals' actions to achieve the CJR model objectives and their perceptions of the CJR model in the early stages of implementation from site visits with nine hospitals and their associated providers in four MSAs and telephone interviews with 69 hospitals.

A. The CJR Model

The CJR model is a new CMS approach to APMs that tests episode-based bundled payment for LEJR in hospitals required to participate based on their geographic location. Under the CJR model, an LEJR episode of care begins with the hospitalization for LEJR and extends through the 90 days after hospital discharge. All Medicare-covered items and services provided during the episode, with some exclusions, are included in the episode bundle.[12] All providers involved

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8 Under the CJR model, the term LEJR refers to all discharges under Medicare Severity-Diagnosis Related Groups 469 and 470. Appendix A includes an acronym list and glossary for terms used through this report.

9 Centers for Medicare & Medicaid Services, Department of Health and Human Services, 2015. Medicare Program; Comprehensive Care for Joint Replacement Payment Model for Acute Care Hospitals Furnishing Lower Extremity Joint Replacement Services. Final Rule. *Federal Register* 80, no. 226 (November 24): 73273 -73554.

10 The Lewin Group. 2015. CMS Bundled Payments for Care Improvement (BPCI) Initiative Models 2-4: Year 1 Evaluation and Monitoring Annual Report. Report prepared by The Lewin Group for the Centers for Medicare & Medicaid Services. Contract no: HHSM-500-2011-00001I, task order HHSM-500-T0007, Baltimore, MD: CMS and Dummit LA, Kahvecioglu D, Marrufo G, Rajkumar R, Marshall J, Tan E, Press MJ, Flood S, Muldoon LD, Gu Q, Hassol A, Bott DM, Bassano A, Conway PH. Association Between Hospital Participation in a Medicare Bundled Payment Initiative and Payments and Quality Outcomes for Lower Extremity Joint Replacement Episodes. *JAMA*. 2016; 316(12):1267-1278. doi:10.1001/jama.2016.12717.

11 These results do not include reconciliation payments and thus are not representative of total savings to the Medicare program.

12 Excluded items, services, and payments include: hemophilia clotting factors; new technology add-on payments; transitional pass-through payments for medical devices; items and services unrelated to the anchor hospitalization as determined by CMS, including (i) inpatient hospital admissions for MS–DRGs for oncology, trauma medical, chronic disease surgical, and acute disease surgical diagnoses, (ii) Medicare Part B services for

in the episode continue to be paid under Medicare's existing FFS payment systems for episode services throughout the year. The CJR participant hospitals are financially accountable for the quality and cost of an episode, and thus, incentivized to collaborate with physicians and PAC providers to coordinate care throughout the episode.

The CJR model is an important component of CMS' strategy to use APMs to slow Medicare spending growth and improve quality.[13] Below we outline the key features of the CJR model that informed the conceptual framework and research questions for this evaluation: a mandatory, randomized design; financial accountability of participant hospitals for episodes of care; a target pricing approach that incorporates historical hospital-specific and regional episode payments and a quality adjustment; and a risk adjustment methodology that accounts for more complex episodes. See Exhibit 2 for definitions of select key model features.

Mandatory, randomized design. A key feature of the CJR model is that participation was mandatory for hospitals located in designated geographic areas, defined by Metropolitan Statistical Areas (MSA).[14] For the first two performance years, CMS selected 67 MSAs (from 171 eligible MSAs)[15] for participation in the CJR model using a stratified random sampling methodology with eight MSA sampling strata based on quartiles of the average MSA historical episode payment and a median split of MSA population size. CMS oversampled MSAs in the top two quartiles of average historical episode payments because these MSAs would have a greater opportunity for reducing payments with participation in the CJR model. All acute care hospitals located in these MSAs paid under the Medicare IPPS were required to participate, with few exceptions. Market-level mandatory participation is unique to CJR.

The mandatory, randomized design will allow insights that would be difficult to obtain from voluntary models. For example, it ensures participation across a diverse group of hospitals and will provide information on how a bundled payment model works for participants that otherwise may not opt into such a model. It supports an examination of hospitals' decisions to act, how actions and outcomes may differ across a variety of hospitals, and how market dynamics may be impacted. Further, the results produced from the CJR model will be more broadly representative and generalizable than those achieved under a voluntary model. The characteristics of CJR participant hospitals will more closely resemble the overall characteristics of acute care hospitals in the United States, which is important when considering scalability.

Financial accountability of participant hospitals for episodes of care. The CJR model holds participant hospitals financially accountable for the quality and cost of an episode of care. As

acute disease and certain chronic disease diagnoses, (iii) certain per beneficiary per month payments; certain incentive programs and add on payments under existing Medicare payment systems; and payments for otherwise included items and services in excess of two standard deviations above the mean regional episode payment.

[13] Press MJ, Rajkumar R, Conway PH. Medicare's new bundled payments: design, strategy, and evolution [published online December 17, 2015]. JAMA. doi:10.1001/jama.2015.18161.

[14] MSAs are counties associated with a core urban area that has a population of at least 50,000.

[15] Non-MSA counties (no urban core area or urban core area of less than 50,000 population) and MSAs with non-BPCI LEJR volume less than 400 were not eligible for selection.

such, hospitals have incentives to work collaboratively with physicians and PAC providers to improve quality and lower payments from the initial hospitalization through 90-days post discharge. Through a reconciliation process after the end of each model performance year, CMS assesses whether participant hospitals have met financial and quality targets. At reconciliation, CMS compares each hospital's total episode payments for services provided during the clinical episode to its quality-adjusted target price. Depending on a hospital's quality and cost performance during the 90-day episode, hospitals may receive an additional payment from Medicare (i.e., reconciliation payment), or starting in performance year 2, may need to repay Medicare a portion of the episode payments.

The CJR model waives certain Medicare payment rules and fraud and abuse laws so participant hospitals have more flexibility to collaborate with clinicians and PAC providers. Participant hospitals can enter into arrangements to share gains (or repayments) with other providers or suppliers involved in the episode. Participant hospitals can also use CJR-specific waivers that extend Medicare coverage of post-discharge home visits, telehealth services in a broader range of circumstances, and SNF care following a less than 3-day hospital stay (Appendix B includes more information about the CJR model waivers). The goals of these waivers are to encourage collaboration and increase efficiency in the delivery of care during the episode.

Because the CJR model is mandatory, all participant hospitals in the 67 MSAs are subject to its financial incentives or pressure, and inaction can have financial consequences. Participant hospitals can receive reconciliation payments through all five performance years of the model, but downside risk is waived in performance year 1 to allow hospitals more time to implement changes. Beginning in performance year 2, repayment is required if the LEJR episode spending is above the quality-adjusted target price at reconciliation. Further, both opportunity and risk increase over time as stop loss and stop gain limits increase, with the stop gain limit increasing from 5% in performance year 1 to 20% in performance year 5 and the stop loss limit increasing from 0% to 20% over the same period.

Exhibit 2: Definitions of Key Model Components

Term	Definition
Effective discount percentage	The effective discount percentage serves as Medicare's portion of the savings. A 3% effective discount percentage is used to set the prospective quality-adjusted target price. The effective discount percentage used at reconciliation varies based on the hospital's actual quality performance in the year.
Episode benchmark price	The episode benchmark price represents the expected episode payments if treatment patterns and patient mix did not change from historical spending for LEJR episodes. In the first three years of the model, the episode benchmark price is based on a blend of hospital-specific and regional historical LEJR payments. In performance years 4 and 5, the episode benchmark price is based solely on regional amounts. The product of the episode benchmark price and the effective discount percentage equals the quality-adjusted target price.

Term	Definition
Quality-adjusted target price	The quality-adjusted target price is based on three years of historical data (2012-2014 for years 1 and 2, 2014-2016 for years 3 and 4, 2016-2018 for year 5) and is a blend of the hospital historical episode payments and the regional average historical payments in the first three years of CJR. By performance years 4 and 5, the target price is based completely on the regional historical episode payment. . The quality adjustment at the beginning of the performance year assumes that the hospital's composite quality score falls in the "acceptable" range. The quality adjustment reflects the hospital's actual composite quality score at reconciliation. There are separate quality-adjusted target prices to account for MS-DRG and hip fracture status.
Reconciliation payment	A retrospective payment that Medicare makes to a CJR participant hospital if total fee-for-service payments for its episodes during a performance year are less than the aggregate quality-adjusted target price. If total fee-for-service payments for a CJR participant hospital's episodes are more than its aggregate quality-adjusted target price, the hospital repays the difference to Medicare in performance years 2 through 5.

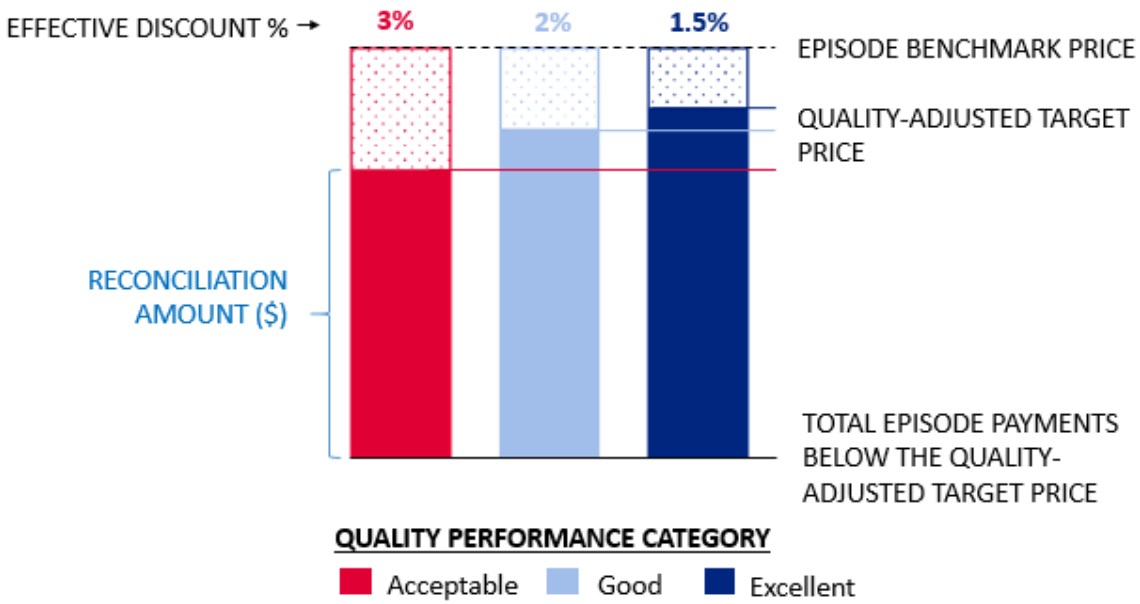
Notes: LEJR = lower extremity joint replacement, MS-DRG = Medicare severity-diagnosis related group.

A target pricing approach that links payment to quality. CMS provides CJR participant hospitals with their quality-adjusted target prices prior to each performance year. The quality-adjusted target price is based on a discounted blend of a CJR participant hospital's average historical episode payments and the historical regional average (i.e., episode benchmark price). At the beginning of each performance year, CMS applies a 3% discount to the episode benchmark price, which is the discount for hospitals with a composite quality score that falls in the "acceptable" range. The 3% discount may be lowered at reconciliation based on the hospital's actual composite quality score achieved in the performance year to incentivize quality.

The quality composite score is based on hospital performance on the total hip arthroplasty/total knee arthroplasty complications measure, a Hospital Consumer Assessment of Healthcare Providers and Systems survey measure, and successful submission of patient-reported outcome data. The quality composite score is then used to categorize hospitals as "below acceptable," "acceptable," "good," or "excellent" quality.

Hospitals with LEJR episode spending *below* the quality-adjusted target price as well as a minimum composite quality score will be eligible to earn a reconciliation payment from Medicare. The reconciliation payment will equal the difference between the quality-adjusted target price and actual episode spending, up to a stop-gain limit. As shown in Exhibit 3, hospitals with LEJR episode spending *below* their quality-adjusted target price at reconciliation will receive higher reconciliation payments by achieving higher quality scores. At reconciliation, CMS lowers the discount percentage applied for hospitals with higher quality composite scores. CJR participant hospitals in the "good" and "excellent" quality categories have 2% and 1.5% effective discount percentages applied, respectively. Hospitals in the "below acceptable" category are not eligible for reconciliation payments even if their spending is below the quality-adjusted target price because they did not meet the minimum quality standard.

Exhibit 3: Hospitals with Higher Quality Performance Receive Higher Reconciliation Amounts Due to a Lower Medicare Effective Discount

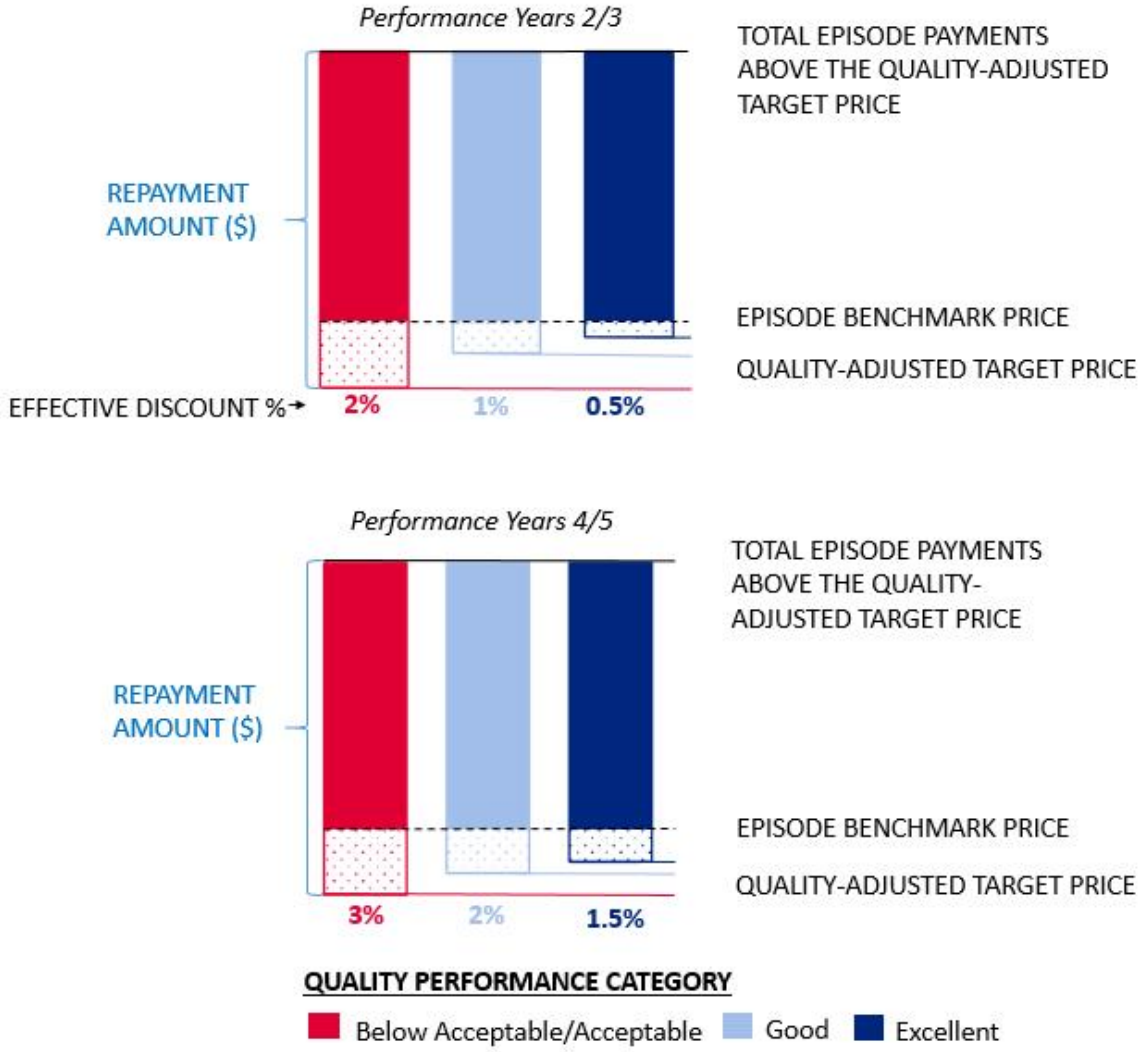


Source: Centers for Medicare & Medicaid Services, Department of Health and Human Services, 2015. Medicare Program; Comprehensive Care for Joint Replacement Payment Model for Acute Care Hospitals Furnishing Lower Extremity Joint Replacement Services. Final Rule. Federal Register 80, no. 226 (November 24): 73273 -73554.

Notes: The quality-adjusted target price is the product of the episode benchmark price and the effective discount percentage, based on a hospital's quality performance. Hospitals with "below acceptable" quality are ineligible for reconciliation payments. The effective discount percentage equals Medicare's portion of the savings from the CJR model.

Hospitals with LEJR episode spending that exceeds the quality-adjusted target price will be financially responsible for paying a portion of the difference to Medicare. The repayment responsibility will be phased in beginning in performance year 2 of the model and fully implemented in year 4 (Exhibit 4). Again, at reconciliation, CMS adjusts the discount percentage based on a CJR participant hospital's quality performance so that hospitals in the "good" and "excellent" categories have lower repayment responsibility than hospitals in the "below acceptable" and "acceptable" categories. Further, the effective discount percentage based on the quality category increases over the performance years for CJR participant hospitals with episode payments that exceed target spending.

Exhibit 4: Hospitals with Higher Quality Performance Have Reduced Repayment Responsibility Due to a Lower Medicare Effective Discount



Source: Centers for Medicare & Medicaid Services, Department of Health and Human Services, 2015. Medicare Program; Comprehensive Care for Joint Replacement Payment Model for Acute Care Hospitals Furnishing Lower Extremity Joint Replacement Services. Final Rule. Federal Register 80, no. 226 (November 24): 73273 -73554.

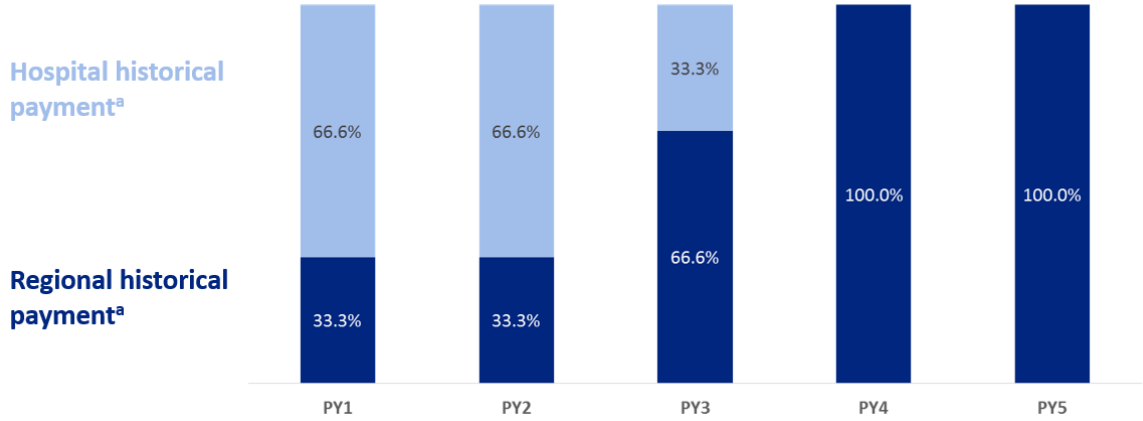
Notes: The quality-adjusted target price is the product of the episode benchmark price and the effective discount percentage, based on hospital's quality performance. Hospitals are not required to repay in performance year 1. The effective discount percentage equals Medicare's portion of the savings from the CJR model.

A target pricing approach that considers performance relative to a hospital's regional peers. The target pricing approach of the CJR model is different from the Innovation Center's other voluntary models and initiatives. It is designed to ultimately decrease variation in LEJR payments within a region by gradually shifting toward a quality-adjusted target price based on the regional average.[16] For performance years 1 through 3, episode benchmark prices (episode

[16] "Region" refers to a Census Division. The regional average is calculated based on all hospitals performing LEJR in the region, not just CJR participants.

price before the quality adjustment) are a blend of the hospital's own historical average payments and regional historical average payments (Exhibit 5). In performance years 4 and 5, episode benchmark prices are based completely on regional amounts, which means hospitals with average episode payments above the payments of their regional peers will have incentives to reduce payments.

Exhibit 5: By Performance Year 4, the Episode Benchmark Price will be Based on Regional Historical Episode Payments



Source: Centers for Medicare & Medicaid Services, Department of Health and Human Services, 2015. Medicare Program; Comprehensive Care for Joint Replacement Payment Model for Acute Care Hospitals Furnishing Lower Extremity Joint Replacement Services. Final Rule. Federal Register 80, no. 226 (November 24): 73273 -73554.

Note: PY= performance year.

The product of the episode benchmark price and the effective discount percentage equals the quality-adjusted target price.

[a] Based on three years of historical data. PY1 and PY2 historical data is from 2012-2014, PY3 and PY4 historical data is from 2014-2016, and PY5 historical data is from 2016-2018 (https://innovation.cms.gov/Files/x/cjr-faq.pdf).

In addition, quality-adjusted target prices are based on a rolling historical period so that by performance year 3, the historical period used to calculate quality-adjusted target prices will include episodes from the first performance year of the CJR model. This continues the downward pressure on episode payments so that participant hospitals maintain or expand activities aimed at reducing episode payments.

A risk adjustment methodology to set quality-adjusted target prices for more complex episodes. The CJR model does not exclude high risk cases. Rather, CJR participant hospitals will need to manage and coordinate care for all cases, regardless of patient complexity. To account for the inclusion of complex cases that require more costly care throughout the 90-day episode, CMS implemented a risk stratification methodology to set quality-adjusted target prices in addition to establishing stop loss limits for hospitals. Each CJR participating hospital is provided separate quality-adjusted target prices by Medicare severity-diagnosis related group (MS-DRG) (469 vs. 470) and hip fracture status (presence vs. absence of fracture) – four quality-adjusted target prices in total – that are used at annual reconciliation. This risk stratification methodology is used to reflect the higher spending and distinct clinical characteristics of patients discharged under MS-DRG 469 (LEJR with major complications and comorbidities) and LEJR due to fracture.

For more information about the CJR model, visit: https://innovation.cms.gov/initiatives/cjr

B. Evaluation Conceptual Framework

The conceptual framework for the evaluation of the CJR model reflects the fundamental features of the model described above and is informed by health services research literature, including evaluations of other bundled payment approaches.[17] The framework recognizes that hospitals where LEJR episodes initiate are the focal point for the intervention and as such are held responsible for controlling episode costs and quality. It also considers factors that facilitate or challenge the achievement of the CJR model's objectives – to reduce episode payments, increase care coordination, and maintain or improve quality of care across the episode.

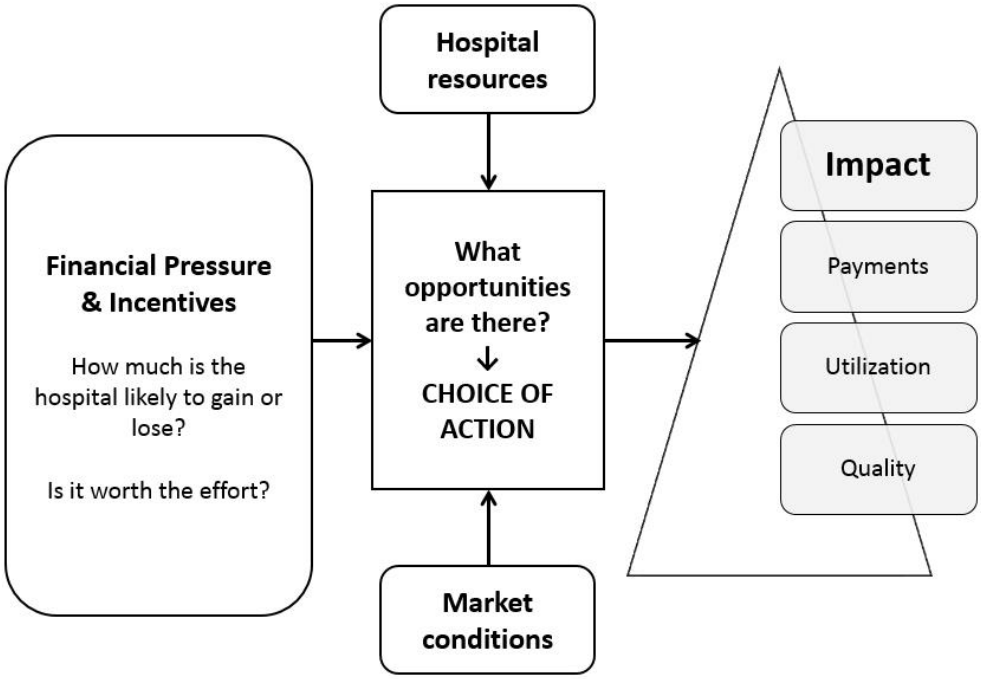
The framework also takes into account the mandatory nature of the model. The diverse group of hospitals required to participate in the CJR model will choose a variety of actions – or no action at all – in response to the financial pressure and incentives generated by the model. We incorporate, where possible, opportunities over the course of the evaluation to understand the drivers of hospital choice of actions in response to the CJR model.

We acknowledge that the framework represents the forces at play in a simplified, idealized world focused on a single service line. In reality, hospitals operate in a complex and ever-changing environment with multiple services lines, initiatives from other payers, state-specific policies, local labor markets, and other factors that are not fully incorporated.

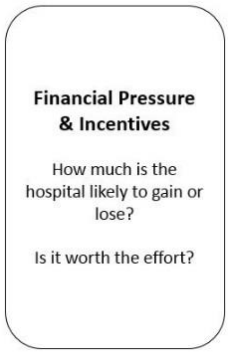
Exhibit 6 and the sections that follow detail the theoretical components of this conceptual framework: financial pressure and incentives generated by the CJR model, hospital resources, market conditions, hospital actions, and overall model impact.

[17] Maniya, O. Z., Mather, R. C., Attarian, D. E., Mistry, B., Chopra, A., Strickland, M., & Schulman, K. A. (2017). Modeling the Potential Economic Impact of the Medicare Comprehensive Care for Joint Replacement Episode-Based Payment Model. The Journal of Arthroplasty.

Exhibit 6: Evaluation Conceptual Framework



1. Financial pressure and incentives



The design of the CJR model is intended to motivate hospitals, through the use of financial incentives, to implement LEJR care redesign activities to reduce episode payments while maintaining or improving quality of care. Because the prospective quality-adjusted prices that hospitals receive are based on a rolling blend of hospital-specific historical payments and regional average payments, hospitals will vary in their perceptions of financial pressure. Each hospital will need to make a business case about whether and what actions to take in response to the model's financial incentives.

We theorize that hospitals' choices of whether or not to take action and what actions to take will be influenced by their assessments of potential gains or losses associated with responding versus not responding to the model's incentives. These assessments will likely consider a variety of factors including the perceived difficulty of achieving episode payment reductions relative to the prospective quality-adjusted target price. Hospitals may use internal data as well as the claims-based episode data provided by CMS to explore areas where changes may yield reduced episode spending. Hospitals will also consider broader financial and organizational factors in their decisions about whether and how to respond to the CJR model.

Claims analyses, as well as site visit and structured interview data, will provide insights into how hospitals perceive financial pressure or incentives to implement changes, how hospitals are undertaking this decision-making process, which hospitals are choosing to take action to reduce

CJR episode payments and increase quality, and any links that can be made between these experiences and downstream outcomes.

We anticipate that hospitals will need to consider two primary questions described below: how much is the hospital likely to gain or lose? And is the response worth the effort?

a. How much is the hospital likely to gain or lose?

We anticipate that prospective quality-adjusted target prices (shared with participating hospitals at the start of the performance year), as well as the relative importance of LEJR surgeries to hospital revenues, will be key considerations as participant hospitals evaluate how much they are likely to gain or lose under the CJR model. Some hospitals may take advantage of the data provided by CMS to make financial projections that take into account their historical LEJR procedure volume and their episode payments relative to their prospective quality-adjusted target price.

Some CJR participant hospitals will be well-positioned to earn reconciliation payments under the CJR model. Hospitals with historical episode payments well below their quality-adjusted target price will anticipate financial gains under the CJR model and not experience financial pressure to make changes to avoid repayment. However, they do have an incentive to increase the reconciliation amounts they receive by taking action to further lower episode payments or to increase quality (hence lowering the Medicare effective discount). They may also consider maximizing financial gain by increasing their LEJR episode volume.

In contrast, CJR participant hospitals with historical episode payments above their quality-adjusted target price may be subject to future repayment responsibility (starting in performance year 2) if they do not take action to lower episode payments. Additionally, if LEJR surgeries contribute substantially to overall revenue, we anticipate that hospitals may have higher motivation to take action to avoid repayment responsibilities after the first performance year. Particularly for hospitals with a large volume of LEJR procedures whose historical episode payments fall above the prospective quality-adjusted target price, future repayment responsibility could be substantial. For hospitals with relatively high historical episode payments that are also situated in a lower payment region, the potential for financial losses would increase over the course of the model as the quality-adjusted target price becomes increasingly weighted by the regional average, increasing financial pressure to take action to lower episode payments. Hospitals with historical spending above their quality-adjusted target price that perform very few LEJR procedures annually may determine that the potential for financial loss is negligible and that financial investment in activities to respond to the CJR model would be greater than the potential for financial losses.

b. Is a response worth the effort?

The costs of actions intended to reduce episode payments or increase quality include direct internal hospital costs to support care redesign efforts, such as wages for additional staff or contracting for data analytics. The costs of actions may also include broader considerations such as relationships with area PAC providers or the impact of reduced referrals to hospital-owned

PAC providers. Hospitals will also vary in the extent to which they have, in response to other factors, already reduced payments or increased quality for LEJR surgeries and related post-acute care. Particularly for hospitals that do not fall into extremes of historical spending and volume, their choice of action in response to the CJR model may in large part be driven by these considerations as well as other contributing factors discussed below.

2. Factors moderating hospital actions in response to the CJR model

Hospital resources

Market conditions

While the CJR model is intended to motivate hospitals to reduce LEJR episode payments and improve quality, it does not dictate specific activities to achieve these outcomes, or that hospitals need to take action at all. If a hospital decides to take action in response to the CJR model, we expect that its actions will vary depending on its specific situation and circumstances, particularly its assessment of available internal resources and conditions of the market in which it operates.

Hospitals with greater financial capital and operational resources, such as dedicated care coordination staff or robust health information technology infrastructure, may be better situated to redesign care for LEJR episodes. Other hospital resources – such as leadership support, experience with bundled payments or similar payment models, or the nature of their relationships with PAC providers and surgeons – may also affect their choices. And while not typically thought of as a hospital resource, patient mix may also be a consideration in how to align to the CJR model incentives, particularly because organizational changes may impact or disrupt other hospital lines of business or workflows.

Market conditions, such as the supply and characteristics of other providers involved in the episode, will affect how and whether hospitals garner support for delivering care more efficiently during the episode. Hospitals in markets with an oversupply of PAC providers, for example, may have more leverage to influence changes in how PAC providers care for LEJR patients. If PAC providers in a market are at their capacity, however, hospitals may have less leverage to work with PAC providers to take actions that would reduce episode payments. Similarly, the supply and organization of orthopedic surgeons or surgery groups may affect hospital strategies to control LEJR episode payments and quality. For example, in markets with an oversupply of orthopedic surgeons, hospitals may have more leverage to get surgeons to cooperate with hospital efforts to engage in care redesign.

The site visits, in particular, will provide rich information about how market conditions and particular hospital resources affect responses to the model. Analyses of claims and other secondary data sources add to our ability to assess relative successes and challenges in bringing about expected change and variations in impact of the model, and allow insight into key characteristics of various markets.

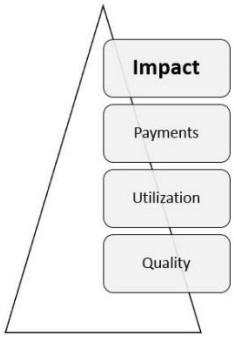
3. Hospital choice of actions in response to the CJR model

We anticipate that hospital perception of financial pressure, available resources, and market conditions will influence their choice of action. We expect a wide range of actions across the diverse group of participant hospitals intended to lower total episode payments and improve quality of care through care redesign and changes to post-discharge service use.

Participants in other bundled payment models have focused on educating patients, physicians, and other providers about accepting new patterns of care.[18] Other hospital strategies may include using data to inform clinical decision-making or working with surgeons and PAC provider partners to adopt more efficient practices. We expect such efforts to be undertaken with a goal of ultimately shifting post-acute care to less expensive settings and reducing lengths of stay in institutional PAC provider settings. The gainsharing option under the CJR model, in particular, may be an important tool for hospitals to enlist the cooperation of other providers to change service use.

Our qualitative and quantitative analyses are designed to provide insights into the relationships between the hospital's resources and market conditions and its choice of actions under the CJR model and, where possible, the impact of those actions on payment and quality outcomes. During interviews with hospitals, we will ask about how they perceive the impacts of the actions they have chosen to implement.

4. Measuring the impact of the CJR model



Our evaluation is designed to analyze the impact of the CJR model on payments, utilization, and quality outcomes. Over the course of the evaluation, we will measure this impact at the episode, hospital, and market levels. In the evaluation of the first performance year, we focus on the episode level impacts. As the model matures and more data are available, we will further investigate impacts at the hospital and market levels.

The primary analysis under this evaluation will be whether Medicare payments (and associated utilization patterns) and quality for LEJR episodes changed, relative to the control group, under the CJR model. These episode-level outcomes will provide the basic building blocks of the evaluation. They will ultimately be used to address questions about the types of hospitals that can achieve results, whether results differ across types of patients, and different ways to achieve changes in episode payments and quality. At a hospital level, we will report on the impact of the CJR model on LEJR volume and patient

[18] The Lewin Group. 2016. CMS Bundled Payments for Care Improvement (BPCI) Initiative models 2-4: Year 2 Evaluation and Monitoring Annual Report. Report prepared by The Lewin Group for the Centers for Medicare & Medicaid Services. Contract no: HHSM-500-2011-00001I, task order HHSM-500-T0007, Baltimore, MD: CMS and IMPAQ International, LLC. 2013. Evaluation of the Medicare Acute Care Episode (ACE) Demonstration. Report prepared by IMPAQ International for the Centers for Medicare & Medicaid Services. Contract no: HHSM-500-2006-00007I.

mix as well as the financial condition of hospitals. Because LEJR surgery is a common procedure, changes to how it is delivered can affect the entire hospital. Understanding how the hospital-level impacts vary will inform CMS decisions about potential expansion of the model.

One of the key features of the CJR model is that it is implemented in health care markets – defined by MSAs. This offers the unique opportunity to gain insights into complex health care market dynamics, including a better understanding of how shifting toward episode-based payments affects downstream providers and if variation in LEJR episode payment and utilization patterns is reduced within markets. We can also better assess whether the CJR model incentives have contributed to an absolute increase in LEJR episodes or shifting of episodes across providers within the MSA.

The central evaluation question is whether the CJR model will result in lower Medicare payments while maintaining or improving quality of care for beneficiaries. Whether the model ultimately results in net savings to the Medicare program depends not only on its impact on total payments, but also Medicare reconciliation payments and repayments under the model. Future evaluation reports will estimate the impact of the CJR model on net savings to the Medicare program.

C. Research Questions

The evaluation of the first performance year of the CJR model (April 1, 2016 through December 31, 2016) is guided by three primary research questions, which are detailed below. These research questions provide a structure for our analytical approach (please see Section IV for a discussion of our methods). As more data become available and hospitals have more exposure to the model, future annual reports will address additional research questions, such as the potential to scale the model and factors that explain variations in impact.

It is important to note that during the first performance year, participation in the CJR model was mandatory in all 67 MSAs. The design of the model changed in performance year 3. The 34 MSAs with the highest average historical episode payments remained mandatory participation areas, while the 33 MSAs with lowest average episode payments and rural and low volume hospitals in the 34 mandatory MSAs were removed from the model. Interested hospitals were given a one-time opportunity in January 2018 to continue participation or "opt-in" to the CJR model for the final three performance years. Future reports will also discuss the impact of these changes on the evaluation.

1. What are the impacts of the CJR model on Medicare payments, utilization, and quality of care?

The CJR model provides financial incentives to participating hospitals to reduce Medicare payments and maintain or improve quality for a 90-day episode of care initiated by a hospitalization for LEJR surgery. To understand whether the CJR model has impacted episode payments, utilization, and quality we examine the following questions:

- What is the impact of the CJR model on average total Medicare episode payments and payments by type of service?
- How has service use for LEJR episodes changed?
- How has the CJR model impacted quality of care?

2. Did the CJR model result in other impacts?

Unintended consequences associated with the CJR model are generally those effects – positive or negative – that are unexpected or that run counter to the stated objectives of lowering payments and improving quality of care. One concern with the CJR model is that participant hospitals may respond by selecting patients who are likely to have lower costs or better outcomes than average. Patient selection is of particular concern with LEJR because, aside from episodes involving fracture, it is predominantly a planned, scheduled procedure. To understand whether the CJR model resulted in any unintended consequences in patient selection we examine the following question:

- Are CJR participant hospitals selecting patients who are likely to have lower costs or better outcomes than average?

3. What actions did hospitals take in response to the CJR model and what are their perceptions of the model's potential impact?

The CJR model encourages CJR participant hospitals to work with physicians and PAC providers to improve the quality and coordination of care from the initial hospitalization through recovery. To understand how CJR participant hospitals perceive and are responding to the model we examine the following questions:

- Are CJR participant hospitals choosing to respond to the CJR model, and if so, how are they changing care processes?
- How are CJR participant hospitals engaging in care coordination efforts with physicians and PAC providers?
- How do CJR participant hospitals perceive the CJR model and its potential impact?

II. Results

This section presents results from the first performance year of the CJR model. We first present a comparison of CJR and control group MSAs, hospitals, and patients, which indicated that the randomized design worked well to achieve balance across the CJR and control groups. We then report the results of a difference-in-differences analysis that assessed the impact of the CJR model on Medicare payments, utilization, and quality of care. This is followed by results from a descriptive analysis that examined whether CJR participant hospitals selected patients who were likely to have lower costs or better outcomes than average. Finally, we describe qualitative findings about the actions hospitals took in response to the CJR model and their perceptions of the potential impact of the model, based on site visits to nine hospitals and interviews with 69 hospitals. Additional details about the methods used to generate these results can be found in Section IV or Appendix C.

A. CJR and Control Group MSAs, Hospitals, and Patients

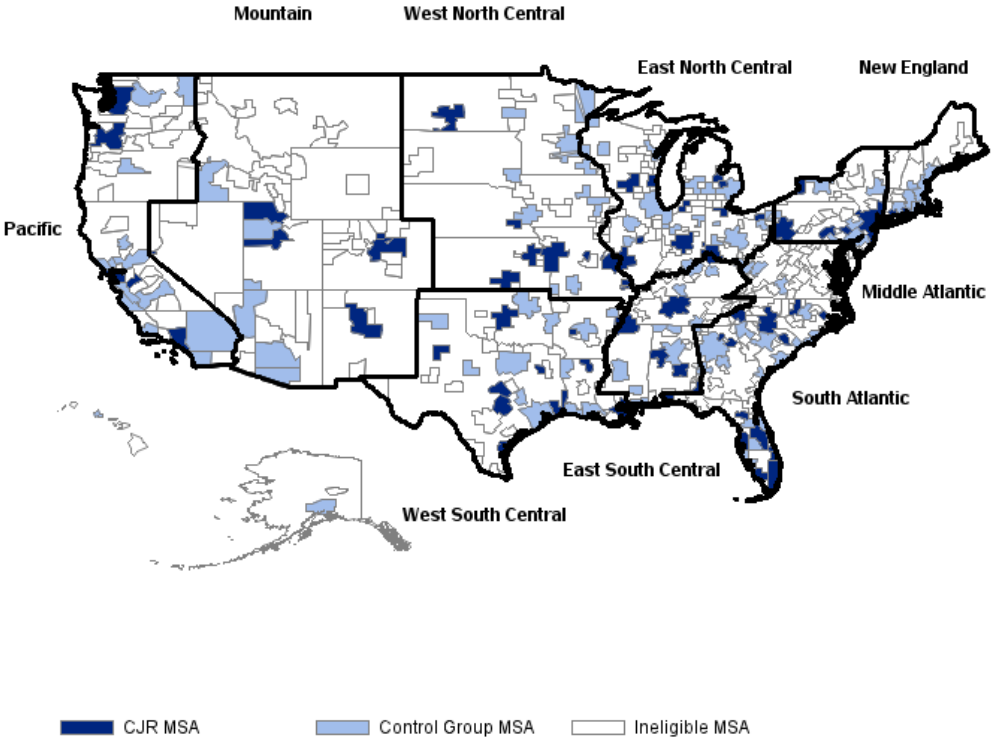
We evaluated the comparability of the CJR and control group MSAs, hospitals, and patients on a variety of characteristics. This was to ensure the appropriate choice of evaluation methodology as well as to provide context to the results of our evaluation. The CJR and the control groups were largely comparable across characteristics averaged at the MSA, hospital, and patient levels, and we conclude that the randomized design generally worked well to achieve balance between the two groups.

1. MSA characteristics

The CJR model was implemented in 67 randomly selected MSAs out of a total of 171 MSAs that were considered eligible for selection, leaving 104 control group MSAs (Exhibit 7). There were an additional 217 MSAs that were ineligible for CJR model selection because of low LEJR volume or high hospital participation in the BPCI initiative for LEJR episodes.[19]

[19] For a list of MSAs, the Final Rule cites OMB Bulletin No. 13-01, Revised Delineations of Metropolitan Statistical Areas, Micropolitan Statistical Areas, and Combined Statistical Areas, and Guidance on Uses of the Delineations of These Areas, for more information on the MSA definition (https://obamawhitehouse.archives.gov/sites/default/files/omb/bulletins/2013/b-13-01.pdf).

Exhibit 7: Randomly Sampled CJR MSAs and Control Group MSAs are located across Nine Regions, 2016



NOTE: Alaska and Hawaii are part of the Pacific Region. One Control Group MSA is located in Puerto Rico (not shown)

Note: MSA = metropolitan statistical area.

Overall, CJR MSAs and control group MSAs were similar on baseline characteristics (Exhibit 8). We also compared characteristics of CJR and control group MSAs for historically high episode payment MSAs and low episode payment MSAs. The CJR and control group MSAs remained comparable on most characteristics, even when stratified by historical payments; although, among historically high episode payment MSAs, CJR MSAs had a statistically significantly higher average number of specialists per 10,000 residents than did control group MSAs (10.6 vs. 8.7).

Exhibit 8: Characteristics of CJR and Control Group MSAs, Overall and by High versus Low Historical Episode Payment, 2014

MSA Characteristics	Overall[a]		High payment MSAs[b]		Low payment MSAs[b]	
	CJR MSAs (N=67) Mean	Control Group MSAs (N=104) Mean	CJR MSAs (N=38) Mean	Control Group MSAs (N=48) Mean	CJR MSAs (N=29) Mean	Control Group MSAs (N=57) Mean
Population	1,391,621	1,061,602	1,797,922	1,175,149	990,043	949,375
Median Household Income	$52,129	$51,705	$50,003	$49,073	$54,230	$54,307
% Age 65 years and older	14%	15%	15%	16%	13%	14%

MSA Characteristics	Overall[a]		High payment MSAs[b]		Low payment MSAs[b]	
	CJR MSAs (N=67) Mean	Control Group MSAs (N=104) Mean	CJR MSAs (N=38) Mean	Control Group MSAs (N=48) Mean	CJR MSAs (N=29) Mean	Control Group MSAs (N=57) Mean
Herfindahl-Hirschman Index[c]	3,680	3,523	3,535	3,428	3,823	3,617
Medicare Advantage penetration	28%	27%	29%	24%	27%	29%
Specialists Per 10,000 Residents**	10.5	9.7	10.6	8.7	10.5	10.7
SNF Beds Per 10,000 Residents	54.7	54.7	56.1	61.2	53.4	48.3
IRF Discharges Per 10,000 Residents	21.6	18.4	25.2	25.0	18.0	11.9

Source: Lewin's analysis of 2015-2016 Area Health Resource File, 2014 American Community Survey 5-Year Estimates, and Medicare claims and enrollment data for episodes initiated in 2012 through 2014 that ended between Q2 2012 and Q1 2015.

Notes: IRF = inpatient rehabilitation facility, MSA = metropolitan statistical area, SNF = skilled nursing facility.

Means of MSA characteristics calculated using MSA sampling strata weights.

[a] No statistically significant differences between CJR and control group MSAs overall at the $p<0.05$ and 0.10 levels.

[b] High versus low payment MSAs were defined based on the MSA sampling strata used by CMS to select the 67 CJR MSAs. MSAs in the 3rd, 4th, 7th, and 8th strata were grouped as high payment (top two quartiles of MSA historical payment measure), and MSAs in the 1st, 2nd, 5th, and 6th strata were grouped as low payment (bottom two quartiles of MSA historical payment measure).

[c] A measure of market concentration calculated based on lower extremity joint replacements (LEJR) at acute care hospitals. The Herfindahl-Hirschman index was not calculated for two control group MSAs that had no LEJR discharges.

** Significant at the $p<0.05$ level for high payment MSAs.

2. Hospital characteristics

The final study population comprised 731 CJR participant hospitals and 841 control group hospitals with any baseline or intervention LEJR episodes.[20] We evaluated the comparability of CJR and control group hospitals during the baseline period on a variety of hospital, market, and patient characteristics.[21]

CJR participant hospitals and control group hospitals were similar at baseline, with three exceptions. They had statistically significant differences for bed count, disproportionate share hospital patient percent, and geographic location (Exhibits 9a & b).[22] Compared with control group hospitals, a greater proportion of CJR participant hospitals had 250 or more beds (41% vs. 33%) and a smaller proportion of CJR participant hospitals had between one and 99 beds (18% vs. 28%). CJR participant hospitals also had a higher average disproportionate share hospital patient

[20] The number of CJR participant hospitals in our study is lower than the number of CJR participant hospitals listed on the CMS website (as of October 26, 2017) because we excluded hospitals in CJR and control group MSAs that did not perform LEJRs during the baseline and intervention periods.

[21] An additional seven CJR participant hospitals and 12 control group hospitals were excluded from the baseline characteristics table because they did not perform LEJRs in the baseline period.

[22] Definitions of hospital, market, and patient characteristics are in Appendix F.

percentage (31% vs. 26%). In terms of geographic location, a smaller proportion of CJR participant hospitals were located in the New England census division (1%) than control group hospitals (7%).

Exhibit 9a: CJR and Control Group Hospital Characteristics at Baseline (2012-2014)[a]

Characteristics		CJR participant hospitals (n=724)	Control Group Hospitals (n=829)
		%	%
Ownership	Not-for-Profit	63%	62%
	For Profit	21%	23%
	Government	16%	15%
Census Division	New England*	1%	7%
	Middle Atlantic	18%	8%
	South Atlantic	15%	12%
	East North Central	14%	21%
	West North Central	9%	6%
	East South Central	5%	6%
	West South Central	9%	21%
	Mountain	6%	5%
	Pacific	24%	11%
	Puerto Rico	0%	3%
Bed Count	1 – 99**	18%	28%
	100-249	41%	40%
	250+**	41%	33%
Type of Hospital	Part of a Chain	78%	80%
	Teaching Hospital	42%	36%
MSA Strata[b]	Stratum 1 (lowest quartile of payment, less than median population)	3%	5%
	Stratum 2 (2nd lowest quartile of payment, less than median population)	2%	4%
	Stratum 3 (2nd highest quartile of payment, less than median population)	3%	4%
	Stratum 4 (highest quartile of payment, less than median population)	3%	4%
	Stratum 5 (lowest quartile of payment, more than median population)	13%	10%
	Stratum 6 (2nd lowest quartile of payment, more than median population)	20%	24%
	Stratum 7 (2nd highest quartile of payment, more than median population)	25%	15%
	Stratum 8 (highest quartile of payment, more than median population)	31%	33%

Exhibit 9b: CJR and Control Group Hospital Characteristics at Baseline (2012-2014)[a]

Characteristics	CJR participant hospitals (n=724)	Control Group Hospitals (n=829)
	Mean	Mean
Medicare Proportion of Days	34%	35%
Medical Residents per 1,000 Beds	100	76
Occupancy Rate	54%	52%
DSH percentage*	31%	26%
Total Hospital LEJR Episodes	426	471
Hospital LEJR Discharges as a Percent of Total Discharges	9%	11%
Hospital LEJR Proportion in the Market	7%	8%

Source: Lewin's analysis of December 2016 POS, December 2014 PECOS, FY 2016 CMS Annual IPPS, and Medicare claims and enrollment data for episodes initiated in 2012 through 2014 that ended between Q2 2012 and Q1 2015 (baseline).

Notes: DSH = disproportionate share hospital, LEJR = lower extremity joint replacement, MSA = metropolitan statistical area.

[a] Percentages and means of hospital characteristics calculated using MSA sampling strata weights and accounting for clustering of hospitals within MSAs.

[b] Based on quartiles of MSA historical episode payment distribution and median population of MSA population distribution.

[c] The disproportionate share hospital patient percentage is calculated from a statutory formula and is the primary method for hospitals to qualify for the Medicare disproportionate share hospital adjustment. It is equal to the sum of the percentage of Medicare inpatient days attributable to patients eligible for both Medicare Part A and Supplemental Security Income (SSI), and the percentage of total inpatient days attributable to patients eligible for Medicaid but not Medicare Part A (https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/dsh.html).

* Significant difference at the p<0.10 level. ** Significant difference at the p<0.05 level. *** Significant difference at the p<0.01 level.

3. Patient characteristics

Patient characteristics were similar across the CJR and control group populations in terms of age, sex, race/ethnicity, Medicaid eligibility status, disability status, average hierarchical condition category (HCC) score, and prior health care utilization. There were small but statistically significant differences with respect to age, hip fracture status, and presence of major complications and comorbidities (Exhibits 10a & b). Compared with the control group, patients at CJR participant hospitals were more likely to be 80 years or older (26.7% vs. 25.2%), have had an LEJR due to fracture (13.6% vs. 12.3%), and have had major complications or comorbidities indicated by anchor MS-DRG 469 (4.8% vs. 4.2%).

Exhibit 10a: Patients at CJR and Control Group Hospitals have Similar Characteristics at Baseline (2012-2014)[a]

Characteristics		CJR Episodes (n=288,235) %	Control Group Episodes (n=371,867) %
Age, in years	20-64	8.1%	8.2%
	65-79*	65.2%	66.6%
	80 or more*	26.7%	25.2%
Sex	Female	65.1%	64.6%
Race/ethnicity	White	87.3%	88.9%
	Black	5.6%	5.8%
	Hispanic	4.2%	2.9%
	Other	2.5%	1.9%
	Unknown	0.5%	0.5%
Eligible for Medicaid		12.6%	11.1%
Disability, not due to ESRD		8.4%	8.5%
Hip fracture status**		13.6%	12.3%
Anchor MS-DRG: Joint replacement with complications (MS-DRG 469)***		4.8%	4.2%
Health care utilization in six months prior to LEJR	Inpatient acute care hospitalization	12.4%	12.3%
	HH use	10.5%	10.1%
	IRF stay	1.0%	1.0%
	SNF stay	4.6%	4.3%
	No institutional stay	71.9%	71.9%

Exhibit 10b: Patients at CJR and Control Group Hospitals have Similar Characteristics at Baseline (2012-2014)[a]

Characteristics	CJR Episodes (n=288,235) Mean	Control Group Episodes (n=371,867) Mean
HCC score in 12 months prior to LEJR	1.0	1.0

Source: Lewin's analysis of Medicare claims and enrollment data for episodes initiated in 2012 through 2014 that ended between Q2 2012 and Q1 2015 (baseline).

Notes: ESRD = end-stage renal disease, HCC = hierarchical condition category, HH = home health, IRF = inpatient rehabilitation facility, LEJR = lower extremity joint replacement, MS-DRG = Medicare severity-diagnosis related group, SNF = skilled nursing facility.

[a] Percentages and means of patient characteristics calculated using MSA sampling strata weights and accounting for clustering of patients within MSAs. Episodes include those meeting the eligibility criteria (valid age and sex information; fee-for-service enrollment history for the six months before the anchor hospitalization) required to risk-adjust outcome measures.

* Significant difference at the p<0.10 level.** Significant difference at the p<0.05 level. *** Significant difference at the p<0.01 level.

4. Variation in hospital historical episode payments in relation to performance year 1 quality-adjusted target prices

If a CJR participant hospital's actual episode spending for the year is below its quality-adjusted target price, then it will receive a reconciliation payment.[23] If its actual spending is above the quality-adjusted target price, then it may have a repayment responsibility to Medicare, starting in performance year 2. Our conceptual framework posits that CJR participant hospitals' assessments of potential gains or losses through the reconciliation process is one factor that will influence their choice of action under the model. Hospitals with historically higher episode payments may be motivated to reduce payments to avoid repayment, while historically lower payment hospitals may be incentivized to further reduce payments, increase quality, or increase volume to maximize reconciliation amounts.

The potential financial returns of implementing changes in response to the CJR model depend in part on the difference between a CJR participant hospital's average episode payment and its quality-adjusted target price, as well as its volume of Medicare LEJR discharges. In the first three years of the CJR model, the quality-adjusted target price is based on a blend of the hospital-specific historical average episode payment and the regional average payment. In the final two years of the model, the quality-adjusted target price is based solely on the regional average.

To understand how the model features may differentially impact the diverse group of hospitals required to participate in the CJR model, we examined:

1) The relationship between the hospital average historical episode payment amount and the quality-adjusted target price at the beginning of the first performance year (or prospective quality-adjusted target price in performance year (PY)1;[24] Exhibit 11);
2) The relationship between the hospital average episode payment and the historical regional average amount (Exhibit 12); and
3) The relationship between the difference in the hospital average historical payment amount and the prospective quality-adjusted target price in PY1 and the hospital's annual LEJR volume during the baseline period (Exhibit 13).

Hospitals that were participating in the CJR model as of December 31, 2016 and had 20 or more episodes during the baseline period used to generate the quality-adjusted target prices (episodes starting between January 1, 2012 and December 31, 2014) were included in this analysis (n=659). "Historical episode payments" refer to payments for episodes initiated in 2012 through 2014. "Low volume hospitals," which the CJR model defines as hospitals with fewer than 20

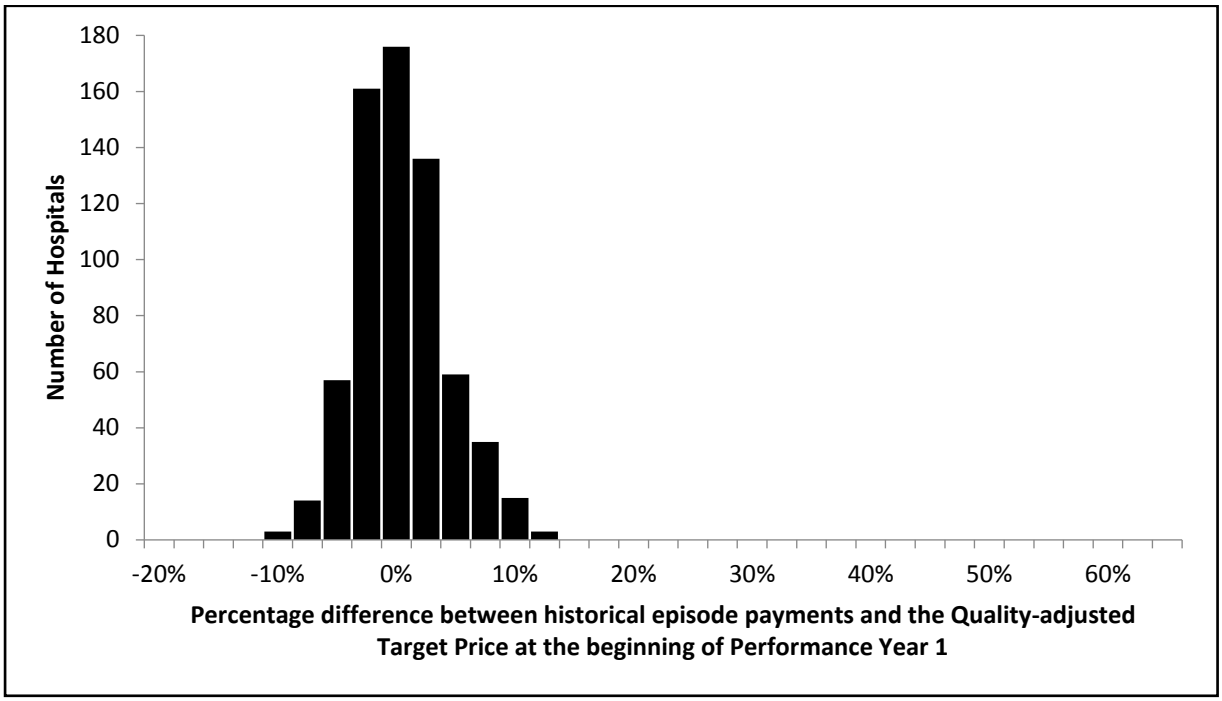
[23] The quality-adjusted target prices are re-adjusted at the end of the performance year during reconciliation based on the hospital's quality performance in the year. Lower effective discount percentages (<3%) are applied for those hospitals achieving higher quality.

[24] Hospital-specific quality-adjusted target prices are shared with CJR participating hospitals at the start of each performance year (i.e., prospective quality-adjusted target prices), calculated using three years of historical data and universally applying an effective discount percentage of 3%. See the Introduction for additional information on the calculation of the quality-adjusted target prices.

episodes from 2012 through 2014, were excluded from this analysis (n=129). Those hospitals are excluded because instead of using a blend of the hospital's historical average payment and the regional average amount, CMS based their quality-adjusted target price in performance year 1 on the regional average amount. The excluded hospitals, many of which had no LEJR episodes during the baseline (n=65), initiated less than 1% of all CJR episodes in performance year 1.

During the first performance year of the CJR model, most participant hospitals had average historical episode payments that were relatively close to the prospective quality-adjusted target price. This was CMS' intention with the design of the CJR model, by weighting the hospital's historical episode payments more heavily in the calculation of the PY1 quality-adjusted target prices. Nearly all hospitals had historical episode payments within 10% of their target (Exhibit 11). However, approximately 65% of hospitals had historical payments *above* their prospective quality-adjusted target price. Although there was no downside risk in the first performance year, hospitals with payments above the quality-adjusted target price may have been encouraged to take actions to reduce episode payments below this amount.

Exhibit 11: Two-thirds of Hospitals Had Historical Average Episode Payments Above their Performance Year 1 Quality-adjusted Target Prices



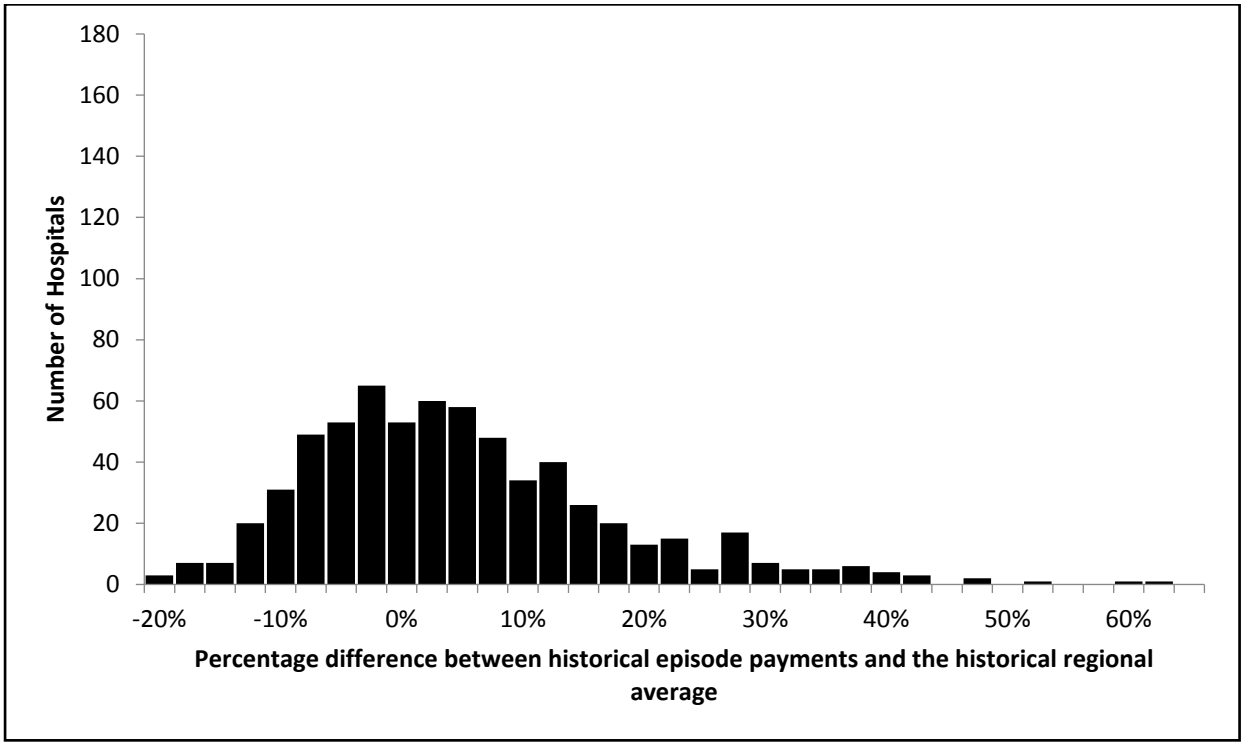
***Source*:** Lewin analysis of Mathematica Policy Research's CJR quality-adjusted target price data for episodes ending 04/01/2016 through 09/30/2016.

Notes: 129 hospitals (16.3%) were excluded because they had fewer than 20 LEJR episodes from 2012 through 2014. These hospitals contributed less than 1% of total CJR episodes in performance year 1.

By PY 4, the quality-adjusted target price will no longer incorporate hospital-specific historical payments and will be entirely based on the regional average. As shown in Exhibit 12, there is wider variation among hospitals when comparing historical average episode payments to the regional average, as compared to the blended PY 1 prospective quality-adjusted target price

(Exhibit 11). The right-skewed tail indicates that some CJR participant hospitals had historical episode payments far above the regional average. Twenty-nine percent of hospitals had historical payments greater than 10% above their regional averages and will likely need to make more substantial changes to meet their quality-adjusted target price in the later years of the model. The CJR model is designed to gradually reduce payment variation within a region by giving hospitals with historical episode payments above the regional average the incentive to lower them. It is important to note that the quality-adjusted target prices are based on a rolling historical period, which means the historical period used to set the quality-adjusted target prices for the final two years of the model will include episodes from the first performance year of the CJR model. As a result, if the CJR model results in hospitals reducing episode payments, the regional average may decrease. This would continue the downward pressure on episode payments.

Exhibit 12: Nearly One-Third of CJR Hospitals Have Historical Episode Payments Greater than 10% Above their Regional Averages by Performance Year 4



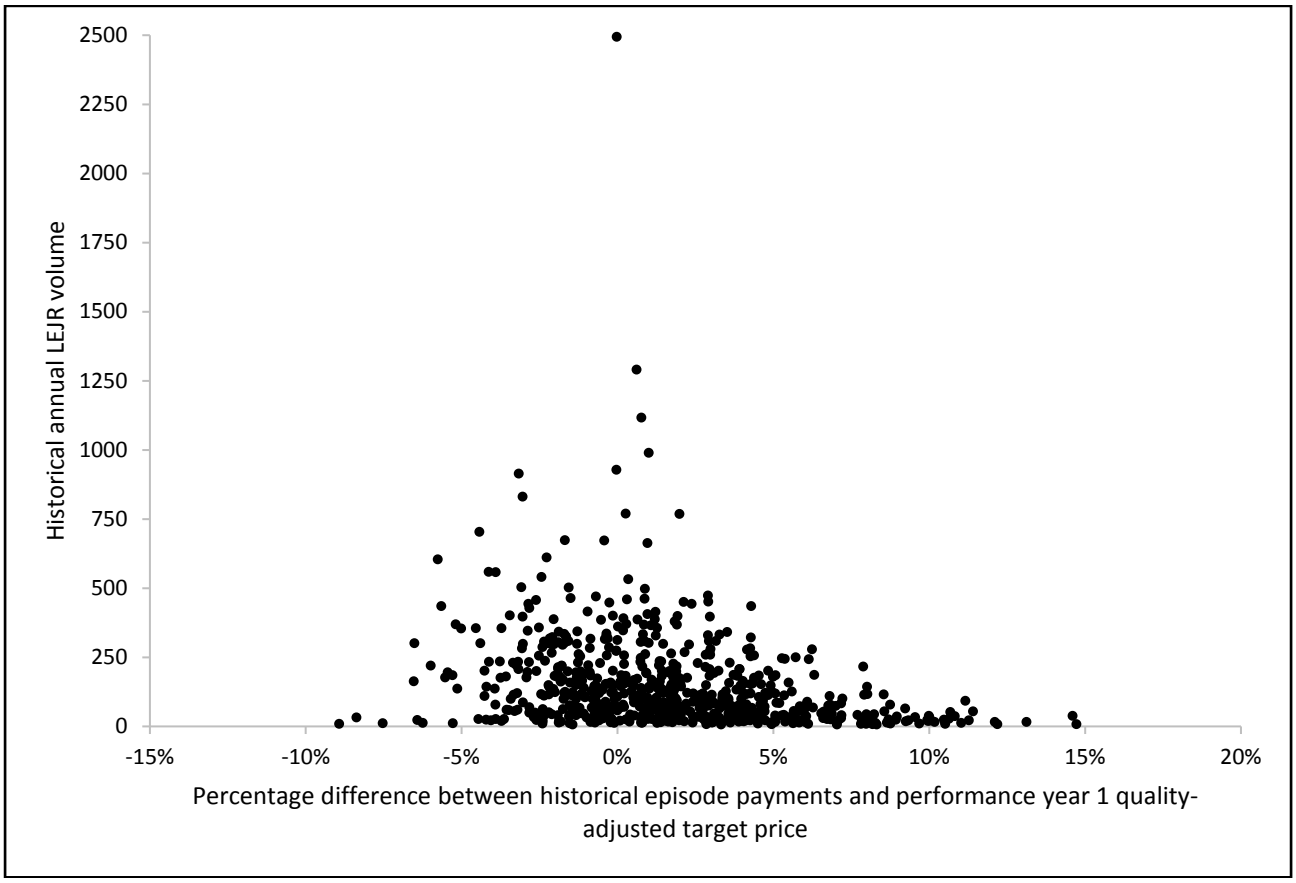
***Source*:** Lewin analysis of Mathematica Policy Research's CJR quality-adjusted target price data for episodes ending 04/01/2016 through 09/30/2016.

Notes: 129 hospitals (16.3%) were excluded because they had fewer than 20 LEJR episodes from 2012 through 2014. These hospitals contributed less than 1% of total CJR episodes in performance year 1.

Finally, the CJR model may affect hospitals differently based on their LEJR volume, as any reconciliation amount paid or received is a function of episode volume and the difference between episode payments and the quality-adjusted target price. Exhibit 13 shows the distribution of CJR participant hospitals' historical annual LEJR volume and the percent difference between their historical episode payments and PY 1 prospective quality-adjusted target price. The greatest variation in the percent difference is for lower volume hospitals, with

the variation decreasing as volume increases. Higher volume hospitals were more likely to have historical episode payments that were closer to their quality-adjusted target price than were lower volume hospitals. While nearly two-thirds of hospitals will need to lower their LEJR spending to come under the quality-adjusted target price in PY 1, one-third of hospitals were positioned to receive reconciliation payments in PY 1 because their historical episode payments were below their quality-adjusted target prices. Higher volume hospitals with historical average episode payments lower than their quality-adjusted target prices at reconciliation could receive substantial reconciliation payments without making changes, and they could also be incentivized to increase reconciliation amounts by further increasing episode volume or achieving additional reductions in episode payments.

Exhibit 13: CJR Participant Hospitals with Higher LEJR Volume are More Likely to Have Historical Payments Below the Quality-Adjusted Target Price



***Source*:** Lewin's analysis of Medicare claims data for LEJR discharges between 2012 and 2014 and Mathematica Policy Research's CJR quality-adjusted target price data.

Notes: LEJR = lower extremity joint replacement.
129 hospitals (16%) were excluded because they had fewer than 20 LEJR episodes beginning in 2012 through 2014. These hospitals contributed less than 1% of total CJR episodes in performance year 1.

B. Impact of the CJR Model

1. Key takeaways

Analyses of Medicare claims and primary data indicate that CJR participant hospitals responded to the model by choosing actions that shifted patients to less expensive PAC settings, which resulted in statistically significant reductions in total payments. Key findings are summarized below.

- The CJR model was associated with a statistically significant decrease in total payments for LEJR episodes (Exhibit 15). This was the case for both elective and fracture episodes (Exhibit 16) as well as episodes in both MSAs with historically high and historically low average episode payments (Exhibit 17).
- Lower average CJR episode payments were due to shifts to less expensive PAC settings (Exhibits 14 and 20).
- The average length of stay in an institutional PAC (SNF or IRF) setting decreased more for CJR patients than for control group patients (Exhibit 20).
- The CJR model did not impact quality of care as measured by readmission rates, emergency department visits, and mortality (Exhibit 26).
- There is no indication that CJR participant hospitals selected healthier patients (Exhibit 27).
- CJR participant hospitals reported that they chose to implement care redesign activities in response to the CJR model, including expanding patient education efforts, starting discharge planning earlier, developing preferred provider networks, and discharging patients to less expensive PAC settings as appropriate (Section II.B.4).

2. What are the impacts of the CJR model on Medicare payments, utilization, and quality of care?

This section discusses the impact of the CJR model on Medicare payments, utilization, and quality of care. Results were generated using the difference-in-differences statistical technique, which quantifies the impact of the CJR model by comparing changes in outcomes for the CJR participant hospital group to changes for a control group from a baseline to intervention period. We estimated the impact of the CJR model on payment, utilization, and quality outcomes separately for elective LEJR and LEJR due to fracture because of their different care pathways and typical costs.

a. What is the impact of the CJR model on average total Medicare episode payments and payments by type of service?

Key findings about the impact of the CJR model on episode payments include:

- **Total episode payments decreased 3.3% more for CJR episodes than control group episodes.** On average across all LEJR episodes, total Medicare standardized allowed amounts (average payments that remove Medicare payment adjustments and include beneficiary cost sharing) for the LEJR anchor hospitalization and services furnished

during the 90 days post-discharge went down by $910 (3.3%, p<0.01) more for CJR episodes between the baseline and the intervention periods than for control group episodes (Exhibit 14).[25]

- **Average total payment reductions for CJR episodes occurred in both MSAs with historically high and historically low episode payments.** Although there may be greater opportunities to reduce episode payments in MSAs with historically high payments, our estimates indicate that there were payment reductions in both groups of MSAs. Average total payments for CJR episodes decreased by $1,127 more (3.9%, p<0.01) and $577 more (2.3%, p<0.05) than control episodes in MSAs with historically high and low episode payments, respectively.
- **CJR participant hospitals reduced average total payments for both elective and fracture episodes, relative to the control group.** We completed separate analyses for elective LEJR and LEJR due to fracture because of their different care pathways and underlying costs. Average total payments for CJR elective episodes went down by $880 (3.6%, p<0.01) more than for control episodes, due to relative reductions in SNF, IRF, and Part B payments. Average total payments for CJR fracture episodes went down by $1,345 (3.0%, p<0.01) more than for control episodes due to relative reductions in IRF and readmission payments.

This section discusses the financial impact of the CJR model during the first performance year as measured by Medicare standardized allowed amounts (average payments).[26] We examined relative changes in risk-adjusted, average total payments for the episode, which include payments for the triggering inpatient hospital stay and payments for SNF, IRF, HHA, Part B services, and readmissions during the 90-day post-discharge period (PDP) (Exhibit 14). This analysis does not incorporate reconciliation payments made to CJR participant hospitals; therefore, the results are not representative of total savings to the Medicare program. We also estimated the impact of the CJR model on payments separately for episodes occurring in historically high payment MSAs and low payment MSAs.[27] Claims-based results are in Appendix H; additional details about the outcome measures are in Appendix E.

[25] The baseline includes episodes initiated in 2012 through 2014 that ended between Q2 2012 and Q1 2015 and the intervention period includes episodes initiated during or after Q2 2016 that ended by Q4 2016.

[26] Standardization removes wage adjustments and other Medicare payment adjustments. Allowed amounts include beneficiary cost sharing.

[27] High and low payment MSAs were defined based on the MSA sampling strata used by CMS to select the 67 CJR MSAs.

Exhibit 14: Average Total Episode Payments Decreased under the CJR Model Due to Reduced Payments for PAC, Q2 2016 – Q4 2016

		Episode Type		
		All LEJR	Elective	Fracture
Number of Intervention Episodes	CJR	43,801	38,462	5,339
	Control group	58,960	52,640	6,320
Estimated relative change in standardized allowed amounts[a]	Total episode payments	-$910***	-$880***	-$1,345***
	SNF	-$455***	-$461***	-$73
	IRF	-$350***	-$273***	-$787***
	HHA	$86	$85	$43
	Part B	-$83*	-$86*	-$83
	Readmissions	-$109*	-$88	-$243**

Source: Lewin's analysis of Medicare claims and enrollment data for episodes initiated in 2012 through 2014 that ended between Q2 2012 and Q1 2015 (baseline) and episodes initiated during or after Q2 2016 that ended by Q4 2016 (intervention).

Notes: HHA = home health agency, IRF = inpatient rehabilitation facility, LEJR = lower extremity joint replacement, PAC = post-acute care, SNF = skilled nursing facility.

The estimated relative change in standardized allowed amounts is the result of a DiD model (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$).

The denominators vary across the outcome measures because of different exclusions.

The change in separate provider payments do not sum to the change in total episode payments because separate models were estimated for total payments and each component payment, and results that are not statistically significant are not shown.

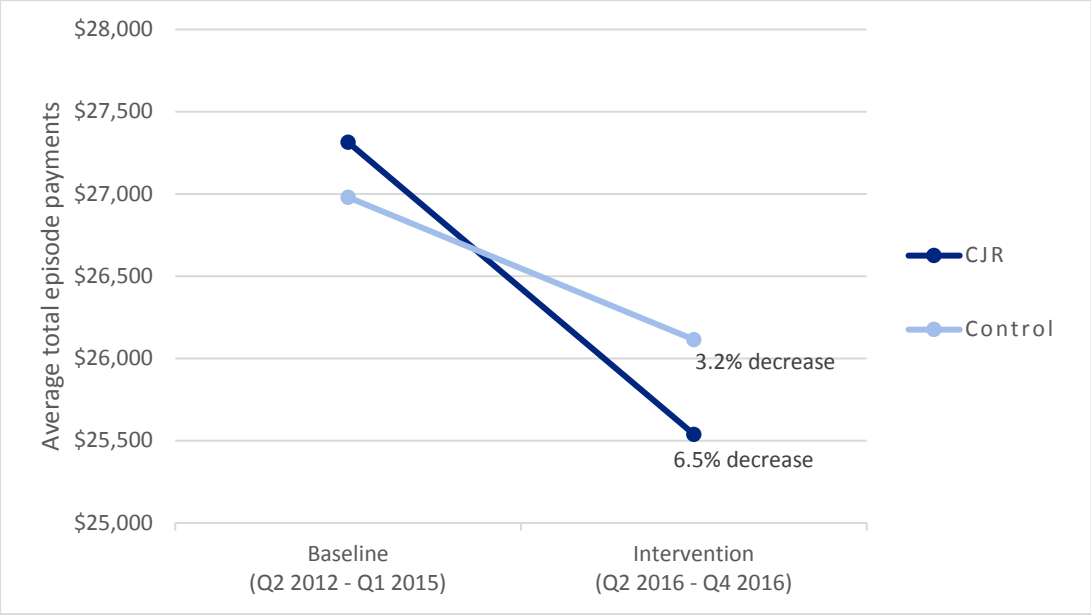
[a] Payment measures are based on all episodes, including episodes with zero payments for that service.

The CJR model resulted in relative reductions in total episode payments

There was a statistically significant reduction in average CJR episode payments from the baseline to the intervention period compared to the change in payments for control group episodes (Exhibit 15). Average total payments for CJR episodes decreased by $1,775, from $27,314 in the baseline to $25,539 in the intervention period. In the control group, average total episode payments decreased by $865, from $26,980 to $26,115 over the same period. Average total payments decreased by $910 more for CJR episodes than control group episodes ($p<0.01$). This relative reduction in episode payments equates to a 3.3% decrease in average payments for CJR episodes from the baseline.[28]

[28] This value represents the percent change from the CJR baseline that is due to CJR. It is calculated by dividing the DiD estimate by the baseline average from CJR participant hospitals.

Exhibit 15: Average Total Episode Payments Decreased More for CJR than Control LEJR Episodes, Q2 2016 – Q4 2016



Source: Lewin's analysis of Medicare claims and enrollment data for episodes initiated in 2012 through 2014 that ended between Q2 2012 and Q1 2015 (baseline) and episodes initiated during or after Q2 2016 that ended by Q4 2016 (intervention).

Notes: LEJR = lower extremity joint replacement.

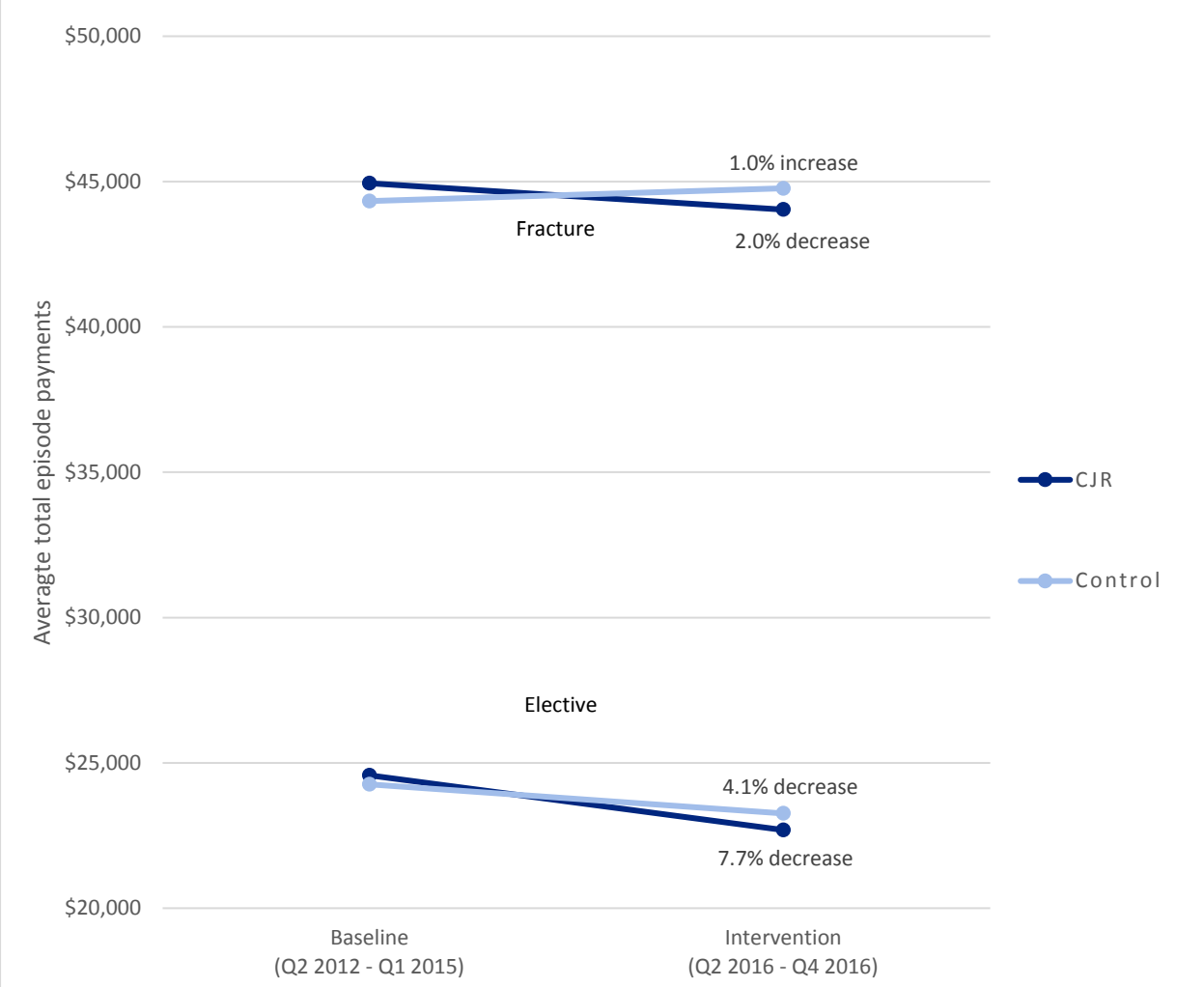
There were relative decreases in total payments for both elective and fracture episodes

We analyzed elective and fracture episodes separately because they differ with respect to underlying reasons for the surgery, patient needs, and payments, which may affect CJR participant hospitals' ability to change episode payments. Elective LEJR surgery is typically planned and performed on relatively healthier beneficiaries. LEJR surgery due to hip fracture is often an emergent event with a frailer population, as reflected in the higher average episode payments for fracture episodes. For CJR episodes during the intervention period, total payments averaged $22,689 for elective episodes and $44,035 for fracture episodes (Exhibit 16).

We observed statistically significant reductions in total payments for both elective and fracture episodes initiated by CJR participant hospitals, relative to control group episodes. From the baseline to the intervention period, total episode payments for elective episodes decreased by $880 more for CJR than control group episodes, or 3.6% more from baseline average payments for episodes initiated at CJR participant hospitals ($p<0.01$). Total average payments for CJR elective episodes decreased by $1,881, from $24,570 in the baseline period to $22,689 in the intervention period. In comparison, total payments decreased by $1,001 for control group episodes, from $24,261 to $23,260 (Exhibit 16).

For fracture episodes, total episode payments decreased by $1,345 (or 3.0%) more for episodes from CJR participant hospitals than episodes from control group hospitals ($p<0.01$). Total payments for CJR fracture episodes decreased from $44,942 to $44,035. Total payments for control group episodes increased from $44,329 to $44,768 (Exhibit 16).

Exhibit 16: Average Total Episode Payments Decreased More for CJR than Control Elective LEJR Episodes and Decreased for CJR Fracture Episodes as Control Fracture Episode Payments Rose, Q2 2016 – Q4 2016



Source: Lewin's analysis of Medicare claims and enrollment data for episodes initiated in 2012 through 2014 that ended between Q2 2012 and Q1 2015 (baseline) and episodes initiated during or after Q2 2016 that ended by Q4 2016 (intervention).

Notes: LEJR = lower extremity joint replacement.

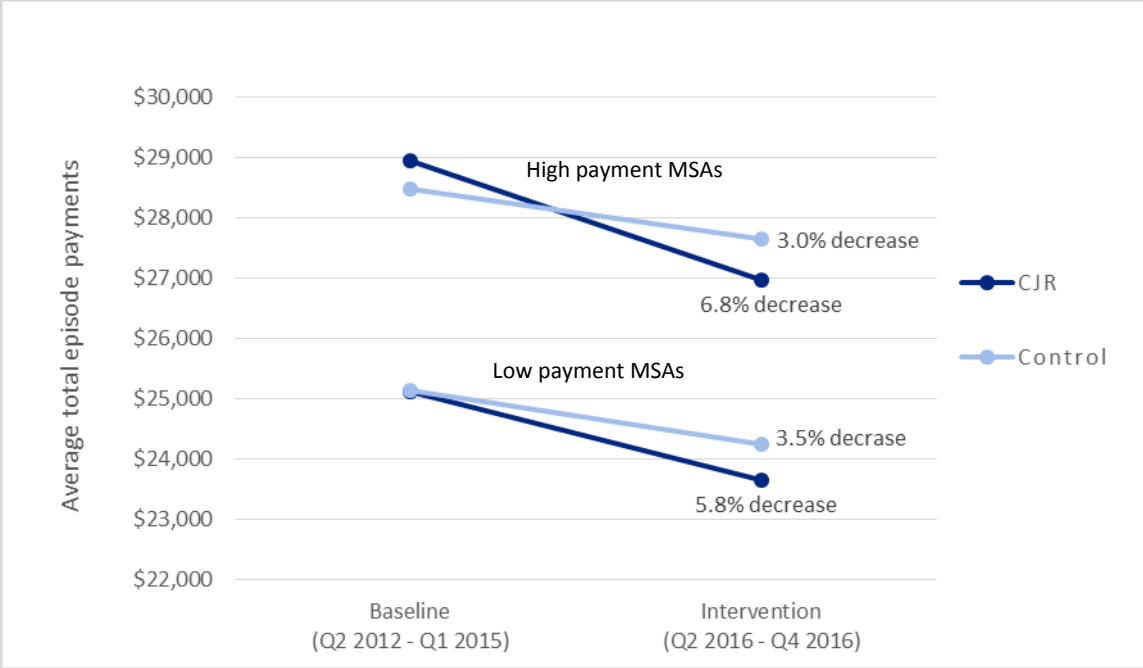
Statistically significant relative decreases in total payments were achieved for episodes initiated in both MSAs with historically high and low payments

We also estimated the impact of the CJR model on total payments separately for episodes occurring in historically high payment MSAs and low payment MSAs because there may be greater opportunities to reduce episode payments in MSAs with historically high payments (Methods described in Section IV). We observed a statistically significant relative decrease in average total episode payments from baseline to intervention for CJR episodes in high payment MSAs compared to control group episodes in high payment MSAs. The same statistically significant pattern was observed in low payment MSAs, although the relative decrease was smaller.

More specifically, for historically high payment MSAs, the average total episode payment for CJR episodes decreased by $1,967, from $28,929 in the baseline to $26,961 in the intervention period (Exhibit 17). In the control group, average total episode payments decreased by $840, from $28,482 to $27,642 over the same period. Average total payments decreased by $1,127 more for CJR than control group episodes ($p<0.01$), which equates to a 3.9% decrease in payments from the CJR baseline average payment.

For historically low payment MSAs, the average total episode payment decreased by $1,465, from $25,127 in the baseline to $23,663 in the intervention period. Over this same period, the average total episode payments for the control group decreased by $887, from $25,130 to $24,243. The average total episode payment decreased by $577 more for CJR episodes in low payment MSAs than control group episodes in low payment MSAs ($p<0.05$), which equates to a 2.3% decrease in payments from the CJR baseline average payment.

Exhibit 17: Average Total Episode Payments Decreased More for CJR than Control LEJR Episodes in Both High Payment and Low Payment MSAs, Q2 2016 – Q4 2016



Source: Lewin's analysis of Medicare claims and enrollment data for episodes initiated in 2012 through 2014 that ended between Q2 2012 and Q1 2015 (baseline) and episodes initiated during or after Q2 2016 that ended by Q4 2016 (intervention), and Lewin's analysis of MSAs by population and episode payments, which was used to select the 67 MSAs in the 2015 final rule (available at: https://innovation.cms.gov/Files/worksheets/ccjr-populationpayment.xlsx).

Notes: LEJR = lower extremity joint replacement, MSA = metropolitan statistical area.

The drivers of the relative total payment reductions differed for elective and fracture episodes

Overall, for all LEJR episodes, the relative reduction in total payments was driven by relative decreases in SNF, IRF, readmission, and Part B payments (Exhibit 14). The largest relative reductions in payments were for institutional PAC payments. SNF and IRF payments decreased by $455 and $350 more, respectively, for CJR episodes than control episodes ($p<0.01$).

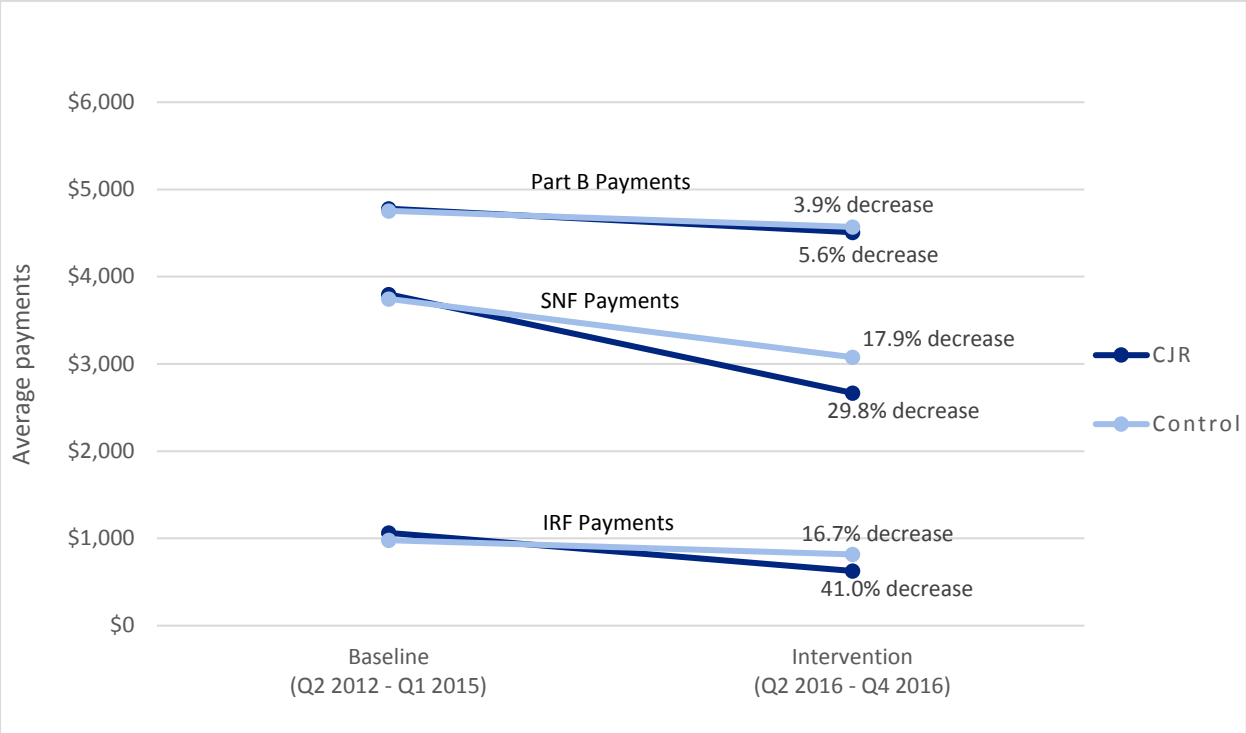
Readmission payments decreased by $109 more for CJR episodes than control episodes ($p<0.10$). There was also a relative decrease of $83 in payments for Part B services for CJR episodes compared to control episodes ($p<0.10$).

For elective episodes, relative reductions in average CJR total episode payments were driven by relative decreases in SNF, IRF and Part B payments. In contrast, for fracture episodes, reductions were due to relative decreases in IRF and readmission payments (Appendix H: Claims-Based Results).

Relative decreases in total payments for elective episodes were due to reduced SNF, IRF, and Part B payments

About half of the relative reduction in average total episode payments for CJR elective episodes was due to lower SNF payments (Exhibit 14). Average SNF payments went down $461 more for CJR elective episodes than for elective episodes in the control group, or 12.1% more from average payments among CJR participant hospitals at baseline ($p<0.01$, Exhibit 18). Average SNF payments for elective episodes initiated by CJR participant hospitals decreased by $1,130; they averaged $3,798 during the baseline period and decreased to $2,668 during the intervention period. SNF payments for elective episodes in the control group went down less, by $669, from an average of $3,746 to $3,077.

Exhibit 18: SNF, IRF, and Part B Payments Decreased More for CJR Elective Episodes than for Control Episodes, Q2 2016 – Q4 2016



Source: Lewin's analysis of Medicare claims and enrollment data for episodes initiated in 2012 through 2014 that ended between Q2 2012 and Q1 2015 (baseline) and episodes initiated during or after Q2 2016 that ended by Q4 2016 (intervention).

***Note*:** IRF = inpatient rehabilitation facility, SNF = skilled nursing facility.

Reductions in IRF payments accounted for 29% of the relative decrease in average total episode payments for elective episodes (Exhibit 14). Average IRF payments decreased by $273 (25.7%) more for CJR episodes than for control group episodes ($p<0.01$). In the baseline period, IRF payments across all elective episodes initiated by CJR participant hospitals averaged $1,063, and they decreased to $627 during the intervention period. IRF payments for elective episodes decreased less among control group episodes, from an average of $980 to $817 (Exhibit 18). (See Section II.B.2.b for a description of changes in PAC utilization; see Section II.B.4 for a discussion of how CJR participant interviewees responded to the CJR model by changing hospital discharge patterns and coordinating with PAC providers.)

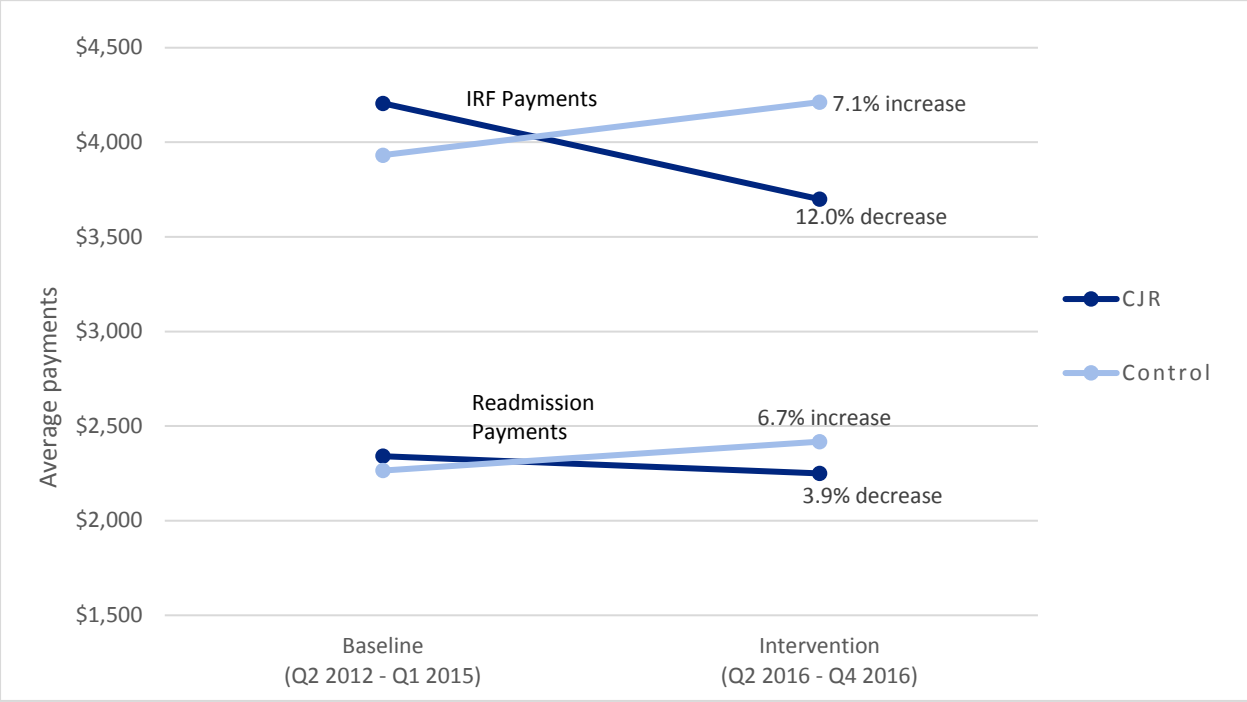
Lower Part B payments contributed about 10% of the reduction in average total elective episode payments (Exhibit 14). Part B payments decreased $86 (1.8%) more from the baseline to the intervention period for elective CJR episodes than for control group episodes ($p<0.10$). During the baseline, Part B payments for elective episodes initiated by CJR participant hospitals averaged $4,779 and decreased to $4,509 during the intervention period. Part B payments among control group episodes went from an average of $4,755 to $4,571 (Exhibit 18).

Relative decreases in total payments for fracture episodes were due to lower IRF and readmission payments

Lower IRF payments contributed about 50% of the decrease in average total fracture episode payments (Exhibit 14). IRF payments decreased $787 (18.7%) more from the baseline to the intervention period for CJR fracture episodes than for control group episodes ($p<0.01$). As displayed in Exhibit 19, during the baseline, IRF payments for fracture episodes initiated by CJR participant hospitals averaged $4,206 and decreased to $3,699. IRF payments for fracture episodes increased for control group episodes, from an average of $3,932 to $4,213.

Lower readmission payments account for 17% of the reduction in average total fracture episode payments (Exhibit 14). Readmission payments decreased $243 (10.4%) more from the baseline to the intervention period for CJR fracture episodes than for control group episodes ($p<0.05$). In the baseline, readmission payments for fracture episodes initiated by CJR participant hospitals averaged $2,341 and decreased to $2,250 during the intervention period. Readmission payments for fracture episodes increased among control group episodes, from $2,265 to $2,418 (Exhibit 19). (See Section II.B.4.c for interviewee concerns regarding readmissions, see Section II.B.2.c for a description of changes in readmission rates.)

Exhibit 19: Average IRF and Readmission Payments Decreased for CJR Fracture Episodes and Increased for Control Episodes, Q2 2016 – Q4 2016



Source: Lewin's analysis of Medicare claims and enrollment data for episodes initiated in 2012 through 2014 that ended between Q2 2012 and Q1 2015 (baseline) and episodes initiated during or after Q2 2016 that ended by Q4 2016 (intervention).

***Note*:** IRF = inpatient rehabilitation facility.

b. How has service use for LEJR episodes changed?

Key findings about the impact of the CJR model on utilization include:

- **Reductions in total episode payments were driven by reductions in the use of more intensive PAC settings.** Among CJR patients with elective episodes, there was a relative decrease in the proportion with IRF as the first PAC setting (-2.0 percentage points, $p<0.01$) and a relative increase in the proportion with home health agency (HHA) as the first PAC setting (4.4 percentage points, $p<0.10$). For fracture episodes, changes in discharge patterns suggest that SNF care was substituted for IRF care. Among CJR patients with fracture episodes, there was a relative increase in the proportion discharged to SNF (3.3 percentage points, $p<0.01$) and a similar decrease in the proportion discharged to IRF (-3.6 percentage points, $p<0.01$).
- **CJR patients with a SNF or IRF stay had statistically significantly greater reductions in PAC length of stay than control patients.** For CJR patients with elective or fracture episodes who had a SNF or IRF stay, there were statistically significant relative reductions in the average number of days spent in the institutional PAC setting. Among CJR episodes with a SNF stay, the average number of SNF days decreased for patients with elective episodes (-2.1 days, $p<0.01$) and fracture episodes

(-1.6 days, p<0.01). Among CJR fracture episodes with an IRF stay, there was also a relative decrease in the average number of days spent in the IRF (-0.5 days, p<0.05).

Changes in service use during LEJR episodes generally mirror the changes in payments discussed above. This section presents the impact estimates, generated using difference-in-differences analysis, of the CJR model on utilization during the first CJR performance year. Additional details about the utilization outcome measures and exclusion criteria are in Appendix E.

As illustrated in Exhibit 20, there were statistically significant differences in the changes in PAC use between CJR and control episodes. There were differences in the change in initial PAC setting as well as duration of PAC.

Exhibit 20: Institutional PAC Use Decreased and HHA Use Increased Due to the CJR Model Q2 2016 – Q4 2016

		All LEJR	Elective	Fracture
Number of intervention episodes	CJR	43,857	38,516	5,341
	Control group	59,571	53,217	6,354
Estimated relative change in utilization	Anchor inpatient LOS (days)	0.0	0.0	0.0
	First PAC discharge was to SNF (pp)	-0.5	-1.2	3.3 ***
	First PAC discharge was to IRF (pp)	-2.2 ***	-2.0 ***	-3.6 ***
	First PAC discharge was to HHA (pp)	3.9 *	4.4 *	0.5
	Number of SNF days, 90-day PDP[a]	-2.0***	-2.1***	-1.6***
	Number of IRF days, 90-day PDP[a]	-0.1	0.1	-0.5**
	Number of HHA visits, 90-day PDP[b]	-0.5**	-0.6**	-0.1

Source: Lewin's analysis of Medicare claims and enrollment data for episodes initiated in 2012 through 2014 that ended between Q2 2012 and Q1 2015 (baseline) and episodes initiated during or after Q2 2016 that ended by Q4 2016 (intervention).

Notes: HHA = home health agency, IRF = inpatient rehabilitation facility, LEJR = lower extremity joint replacement, LOS = length of stay, PAC = post-acute care, PDP = post-discharge period, pp = percentage points, SNF = skilled nursing facility.

The estimated relative change in utilization is the result of a DiD model (* p < 0.10, ** p < 0.05, *** p < 0.01).

The denominators vary across the outcome measures because of different exclusions.

[a] Beneficiaries must have spent a minimum of one day in the institutional setting during the 90-day PDP.

[b] Beneficiaries must have had at least one HHA visit during the 90-day PDP.

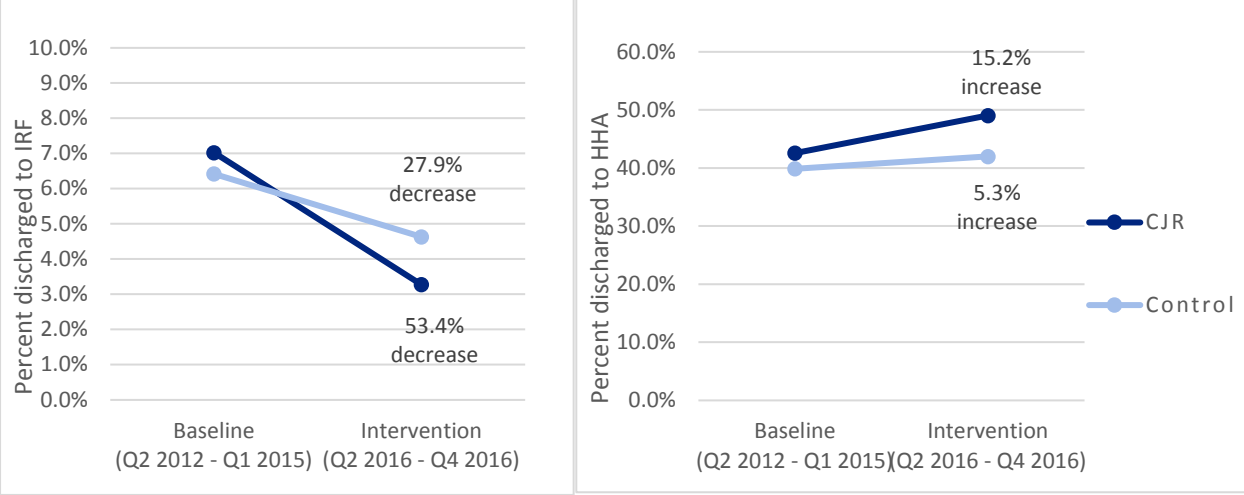
Among CJR elective episodes, there was a relative decrease in the proportion discharged to an IRF and a relative increase in the proportion discharged to a HHA

Under the CJR model, there was a shift from more intensive to less intensive PAC settings for patients with elective episodes. There was a 2.0 percentage point relative decrease in the proportion of patients with an IRF as the first PAC setting (p<0.01). The proportion of patients with an IRF as the first PAC setting decreased by 3.8 percentage points for CJR episodes, from 7.0% during the baseline to 3.3% in the intervention period. For control episodes, the proportion of patients with an IRF as the first PAC setting decreased by 1.8 percentage points from 6.4% to 4.6% (Exhibit 21).

At the same time, there was a relative increase of 4.4 percentage points in the proportion of patients with CJR elective episodes initially discharged to a HHA ($p<0.10$). The proportion of patients with elective LEJR whose first PAC setting was a HHA increased from 42.6% to 49.1% for CJR episodes, compared with the change from 39.9% to 42.0% for control episodes (Exhibit 21).

While there was a relative decrease in the proportion of patients with elective episodes discharged to an IRF and a relative increase in the proportion discharged to a HHA, there was no statistically significant relative change in the proportion initially discharged to a SNF ($p>0.10$).

Exhibit 21: The Proportion of Elective Episodes with IRF as the First PAC Setting Decreased More for CJR than for Control Episodes and the Proportion of Elective Episodes with HHA as the First PAC Setting Increased More for CJR than for Control Episodes, Q2 2016 – Q4 2016



Source: Lewin's analysis of Medicare claims and enrollment data for episodes initiated in 2012 through 2014 that ended between Q2 2012 and Q1 2015 (baseline) and episodes initiated during or after Q2 2016 that ended by Q4 2016 (intervention).

Note: HHA = home health agency, IRF = inpatient rehabilitation facility, PAC = post-acute care.

Among CJR fracture episodes, there was a relative increase in the proportion of patients discharged to a SNF and a relative decrease in the proportion discharged to an IRF

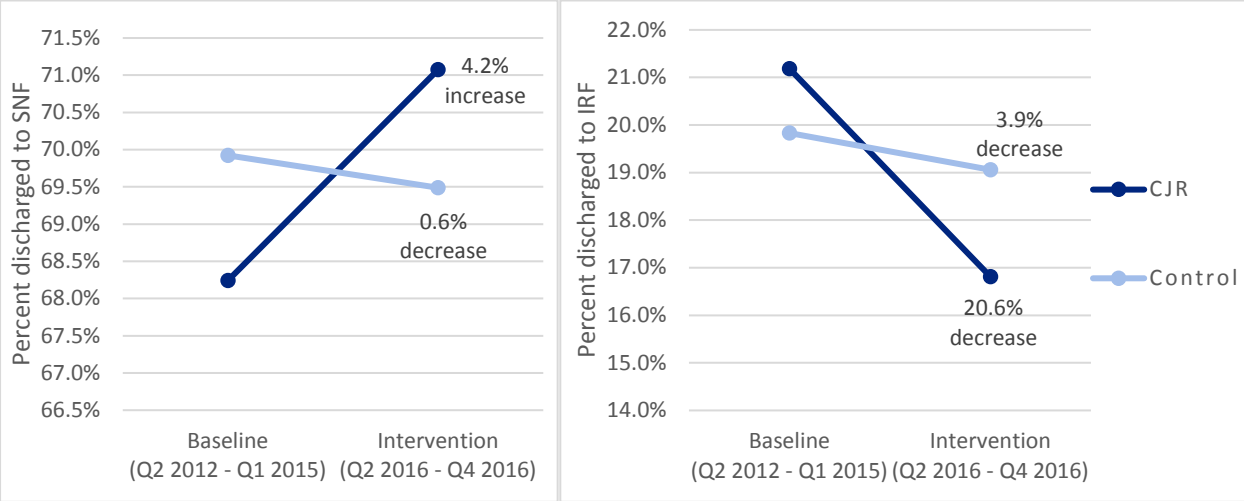
For fracture episodes, changes in the proportion of patients across first PAC settings suggest that SNF care was substituted for IRF care for CJR patients. There was a relative increase of 3.3 percentage points in the proportion of CJR patients first discharged to a SNF ($p<0.01$). The proportion of patients first discharged to a SNF increased from 68.2% to 71.1% for CJR episodes, while the proportion remained virtually the same, at 69.9% and 69.5%, for control episodes (Exhibit 22).

The relative increase in the proportion of CJR fracture patients first discharged to a SNF was similar in magnitude to the relative decrease in the proportion of CJR fracture patients first discharged to an IRF. There was a relative decrease of 3.6 percentage points in the proportion of fracture patients first discharged to an IRF for CJR episodes relative to control episodes ($p<0.01$).

The proportion of fracture patients first discharged to an IRF decreased from 21.2% to 16.8% for CJR episodes and decreased less, from 19.8% to 19.1%, for control episodes (Exhibit 22).

There was no statistically significant relative change in the proportion of patients with CJR fracture episodes initially discharged to a HHA (p>0.10).

Exhibit 22: The Proportion of Fracture Episodes with SNF as the First PAC Setting Increased for CJR and Decreased for Control Episodes and The Proportion of Fracture Episodes with IRF as the First PAC Setting Decreased More for CJR than for Control Episodes, Q2 2016 – Q4 2016



Source: Lewin's analysis of Medicare claims and enrollment data for episodes initiated in 2012 through 2014 that ended between Q2 2012 and Q1 2015 (baseline) and episodes initiated during or after Q2 2016 that ended by Q4 2016 (intervention).

Note: IRF = inpatient rehabilitation facility, PAC = post-acute care, SNF = skilled nursing facility.

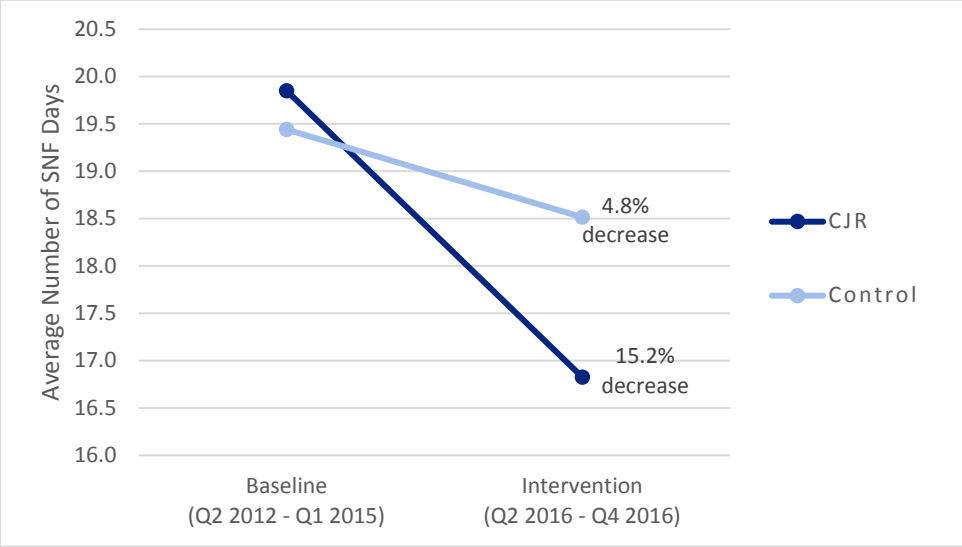
Institutional PAC stays for CJR episodes decreased

Among patients with an institutional PAC stay, there were statistically significant relative reductions in the average days in the PAC setting for CJR elective and fracture episodes.

Among patients with a SNF stay, the average number of SNF days of care decreased from 19.8 to 16.8 for CJR elective episodes and went down less, from 19.4 to 18.5, for control episodes, for a relative decrease of 2.1 days (p<0.01, Exhibit 23).[29]

[29] Medicare SNF payments are made on a per diem basis so shorter stays translates into reduced SNF payments.

Exhibit 23: Among SNF Users, the Number of SNF Days Decreased More for CJR than Control, Elective Episodes, Q2 2016 – Q4 2016



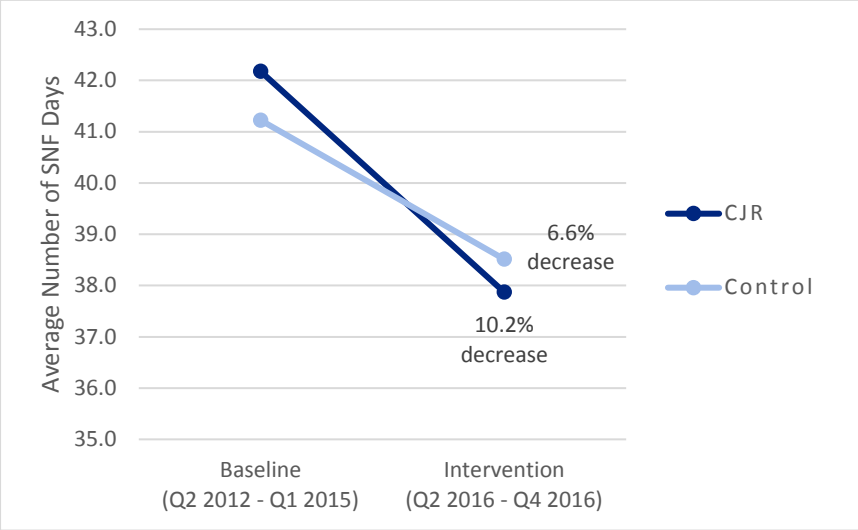
Source: Lewin's analysis of Medicare claims and enrollment data for episodes initiated in 2012 through 2014 that ended between Q2 2012 and Q1 2015 (baseline) and episodes initiated during or after Q2 2016 that ended by Q4 2016 (intervention).

Note: SNF = skilled nursing facility.

There was also a relative decrease in the average number of SNF days for CJR fracture patients with a SNF stay. The number of SNF days decreased from 42.2 to 37.9 for CJR fracture episodes and decreased less, from 41.2 to 38.5, for control episodes, resulting in a relative reduction of 1.6 days ($p<0.01$, Exhibit 24). Among fracture patients with an IRF stay, there was also a relative decrease of 0.5 days in the IRF for CJR episodes ($p<0.05$). The number of IRF days of care decreased from 13.8 to 13.2 for CJR episodes and remained nearly flat for control episodes (Exhibit 25).[30]

[30] Medicare pays IRF on a per discharge basis, so shorter stays do not directly translate into reduced IRF payments.

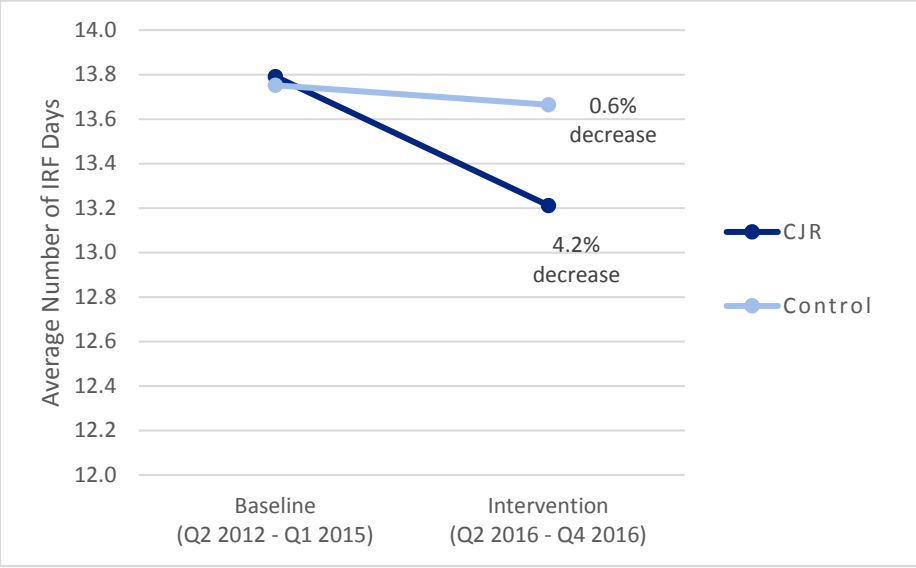
Exhibit 24: Among SNF Users, the Number of SNF Days Decreased More for CJR than Control Fracture Episodes, Q2 2016 – Q4 2016



Source: Lewin's analysis of Medicare claims and enrollment data for episodes initiated in 2012 through 2014 that ended between Q2 2012 and Q1 2015 (baseline) and episodes initiated during or after Q2 2016 that ended by Q4 2016 (intervention).

Note: SNF = skilled nursing facility.

Exhibit 25: Among IRF Users, the Reduction in IRF Days Was Greater for CJR than Control Fracture Episodes, Q2 2016 – Q4 2016



Source: Lewin's analysis of Medicare claims and enrollment data for episodes initiated in 2012 through 2014 that ended between Q2 2012 and Q1 2015 (baseline) and episodes initiated during or after Q2 2016 that ended by Q4 2016 (intervention).

Note: IRF = inpatient rehabilitation facility.

HHA visits for elective episodes that received HH decreased

Among patients with elective episodes who received HHA services, there was a relative decrease in the average number of home health visits for CJR episodes relative to control episodes (-0.6 visits, $p<0.05$).[31]

c. How has the CJR model impacted quality of care?

Key findings about the impact of the CJR model on quality of care include:

- **Quality of care was maintained.** We observed no statistically significant changes in the quality of care, as measured by readmission rates, emergency department visits, and mortality, for elective or fracture CJR episodes relative to control group episodes.

To evaluate the impact of the CJR model on the quality of care delivered to Medicare beneficiaries undergoing LEJR, we compared the change in claims-based quality outcomes for CJR and control group episodes. Specifically, we looked at unplanned readmissions, emergency department (ED) use, and complications in the 90 days post-discharge, as well as mortality during the anchor hospitalization or in the 90-day PDP. More details about these outcome measures are available in Appendix E.

Quality of care was maintained

We found no association between the CJR model and claims-based quality of care outcomes for elective or fracture episodes (See Section II.B.4.c for interviewee discussion of quality of care) (Exhibit 26).

Exhibit 26: The CJR Model had No Impact on Claims-Based Quality Outcomes, Q2 2016 – Q4 2016

		Episode Type		
		All LEJR	Elective	Fracture
Number of intervention episodes	CJR	43,851	38,511	5,340
	Control group	59,561	53,209	6,352
Estimated relative change in quality of care	Unplanned readmission rate (pp)	0.0	0.0	-0.6
	ED use (pp)	0.0	0.0	-0.3
	All-cause mortality rate (pp)	0.1	0.1	0.4
	Incidence of any complications (pp)	--	0.0	--

Source: Lewin's analysis of Medicare claims and enrollment data for episodes initiated in 2012 through 2014 that ended between Q2 2012 and Q1 2015 (baseline) and episodes initiated during or after Q2 2016 that ended by Q4 2016 (intervention).

Notes: ED = emergency department, LEJR = lower extremity joint replacement, pp = percentage points.
The estimated relative change in quality of care is the result of a DiD model (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$).
A blank cell indicates that the outcome is not available for the specified group.
The denominators vary across the outcome measures because of different exclusions.

[31] Generally, Medicare pays HHA for a 60-day episode of care, so the reduction in visits would not necessarily affect Medicare payments.

3. Did the CJR model result in other impacts?

a. Are CJR participant hospitals selecting patients who are likely to have lower costs or better outcomes than average?

One potential unintended consequence of the CJR model would be if CJR participant hospitals selected healthier patients for LEJR to lower episode payments or improve their quality outcomes. This unintended response to the model could have a negative impact on access to care for patients who have greater needs or who would be expected to need more services. Although the ability to avoid sicker or costlier patients is more limited under the CJR model than other models because all providers within the MSA are under the same incentives, CJR participant hospitals still have an incentive to prefer healthier LEJR patients because they incur lower costs. If a CJR participant hospital can change its mix of patients to include a higher proportion of lower cost patients, its average episode payments would be lower without the hospital engaging in any care redesign. This would make it easier for the hospital to come under its target price. In addition to potential access concerns about this possible unintended consequence, a shift to a healthier mix of patients without corresponding changes to the target prices could increase Medicare spending under the CJR model by increasing reconciliation payments to CJR participant hospitals that maintain their patterns of care for a less complex mix of patients.

We evaluated patient characteristics to determine if CJR patients were on average healthier during the intervention period than historically. Specifically, we examined changes in age, gender, race, Medicaid eligibility, disability status, health status, and prior health care utilization of LEJR patients from the baseline to the intervention period relative to changes for the control group patients. Although we controlled for these patient characteristics in the difference-in-differences results discussed above, in this analysis of changes in patient mix, we analyzed these characteristics separately.

There were no indications that the CJR patient population was healthier in the intervention period than in the baseline, relative to the control group population. There was only one significant relative difference in patient characteristics. Among patients with fracture episodes, there was a 1.3 percentage point increase in the proportion of black patients in CJR participant hospitals relative to patients in control group hospitals ($p<0.01$, Exhibit 27).

Exhibit 27: Changes in Patient Characteristics between CJR and Control Episodes were Similar, Q2 2016 – Q4 2016

Characteristics		Net Difference in Average Values		
		All LEJR	Elective	Fracture
CJR Episodes (Q2 2016 – Q4 2016)		43,853	38,512	5,341
Age	20-64 (pp)	-0.0	-0.1	0.5
	65-79 (pp)	0.0	0.0	-0.7
	80+ (pp)	0.0	0.1	0.2
Gender	Female (pp)	-0.0	0.2	-1.4
Race	White (pp)	-0.3	-0.2	-1.0
	Black (pp)	0.1	-0.1	1.3*
	Hispanic (pp)	0.3	0.4	-0.2
	Other (pp)	-0.1	-0.1	-0.0
	Unknown (pp)	0.0	0.1	-0.1
Medicaid & Disability	Eligible for Medicaid (pp)	0.2	0.1	1.4
	Disability, no ESRD (pp)	0.0	-0.1	0.5
Episode Type	Fracture (pp)	-0.1	N/A	N/A
Anchor MS-DRG	Joint replacement with complications (MS-DRG 469) (pp)	-0.2	-0.1	-0.9
Health Status	HCC Score	0.1	-0.2	2.8
Utilization in the Six Months Prior to the Anchor Hospitalization	Percent with Inpatient Acute Care Hospitalization (pp)	-0.2	-0.4	0.9
	Percent with HHA Use (pp)	-0.3	-0.2	-0.7
	Percent with IRF Stay (pp)	-0.1	-0.1	-0.3
	Percent with SNF Stay (pp)	-0.2	-0.1	-0.5
	Percent with No Institutional Stay	0.6	0.6	0.9

Source: Lewin's analysis of Medicare claims and enrollment data for episodes initiated in 2012 through 2014 that ended between Q2 2012 and Q1 2015 (baseline) and episodes initiated during or after Q2 2016 that ended by Q4 2016 (intervention).

***Notes*:** ESRD = end-stage renal disease, HCC = hierarchical condition category, HHA = home health agency, IRF = inpatient rehabilitation facility, LEJR = lower extremity joint replacement, MS-DRG = Medicare severity-diagnosis related group, N/A = not applicable, pp = percentage points, SNF = skilled nursing facility. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4. What actions did hospitals take in response to the CJR model and what are their perceptions of the model's potential impact?

This section of the report describes qualitative findings from primary data collected during two rounds of telephone interviews with 69 providers and site visits to nine hospitals and their related providers in four MSAs. The first round of provider telephone interviews focused on CJR hospitals' early responses to the model. The second round focused on CJR hospitals' relationships with PAC providers. During the site visits we had focused discussions with staff from hospitals, orthopedic surgery practices, HHAs, and SNFs about CJR model implementation experiences, characteristics of local markets affecting CJR response strategies, factors that could explain variation in key outcomes, and early successes under the model. Contextual examples from site visits are included below, and full case studies for each hospital participating in a site visit are included in Appendix G.

The key themes presented in this section are based on a systematic review of the data and describe hospitals' actions and perceptions of the CJR model.

a. Are CJR participant hospitals choosing to respond to the CJR model, and if so, how are they changing care processes?

Preparation and early response to the CJR model

The case study focusing on Hospital F examines one hospital's use of Lean methodology as a process improvement strategy prior to the beginning of the CJR model, as well as Lean initiatives that were implemented in response to the CJR model.

Through our interviews with hospital and PAC representatives across a variety of positions, we found that individuals in leadership roles were aware of the CJR model, its aims, and its implications for their organization(s); however, the level of understanding of the CJR model among direct care staff varied. Several direct care staff interviewees noted that their hospital's response to the model was not as transparent or as smooth as they would have liked, and many cited unclear instructions concerning model details, such as the beneficiary notification requirement and how to address the overlap between the CJR model and other Medicare payment models.

Several interviewees described prior hospital initiatives or other payment and delivery models that helped them prepare for the CJR model. Some hospitals leveraged LEJR care pathways developed for other bundled payment approaches, such as the BPCI initiative or commercial payer bundles. A few interviewees explained that some of the policies and procedures to respond to the CJR model were in place because of previous hospital activities, such as pursuit of Joint Commission Certification, focus on readmission reduction or achievement of other quality metrics, pursuing Center of Excellence status, or investment in Six Sigma training for hospital staff. One hospital representative described how the presence of managed care plans in the market helped prepare for the CJR model by providing a blueprint for utilization management. This interviewee stated that one large plan, in particular, emphasized the importance of a standardized pre- and post-operative care continuum, which informed the hospital's response to the model. Overall, staff at hospitals with relevant prior experiences indicated more capacity than interviewees from hospitals with no noted relevant experience to identify areas for improvement and implement care redesign changes to succeed under the CJR model.

"Commercial bundles helped us prepare for CJR because of the alignment needed between physicians and hospital administration. Those bundles also helped us develop the care pathways a little more stringently to better manage risk."

– Care Redesign Leadership, Hospital Interview

Care delivery and redesign

Standardizing practices and protocols

> *"Recently we had a lot of standardization. CJR allowed us to take a bundle and actually actualize it. I'm in utilization management, and from that perspective CJR makes a lot of sense. Until people are on the hook financially, they won't be as responsible as they need to be."*
>
> – Direct Care Staff and Case Management, Hospital Interview

Interviewees commonly identified standardizing care protocols, or enhancing the protocols already in place, as a key part of their hospital's attempt to lower cost and improve quality under the CJR model. While some hospitals had previously worked on standardizing care for joint replacement surgeries and felt they did not have a lot of room to improve under the CJR model, others were motivated to implement new protocols as a result of the model. One interviewee spoke at length about how the hospital's health system leveraged the knowledge and skills gained through participation in the BPCI initiative to create an outpatient rehabilitation program and define best practices for outpatient care provided to CJR patients. One hospital completely redesigned its care pathway from the initial surgical scheduling through the rehabilitation period. This hospital's service line leadership developed a "passport" to guide patients through the new care pathway and educate them on the activities and other goals for each day of the hospitalization.

> *"In the hospitals, they're more protocol driven and can be that way. The boundaries are a little more flexible when you're in the home dealing with family, and the house layout, and pain control. It's harder for us to deal with protocols that the hospitals want."*
>
> – Clinical Leadership, HHA Interview

With regard to patient care protocols following hospital discharge, several interviewees reported that hospitals are setting expectations for how PAC providers should care for CJR patients. For example, some hospitals suggested guidelines to PAC providers for the length of stay and therapy schedule and intensity. However, staff at some HHAs noted that the variable nature of their work in patients' homes made it difficult to standardize treatment as much as hospitals could. In most cases, hospitals developed care protocols for PAC providers; however, protocols were also created by the PAC providers. For example, interviewees at one SNF explained that after the CJR model announcement, they decided to proactively work with a HHA to design clinical pathways for a hospital with which they hoped to develop a stronger relationship. The SNF then presented these pathways to the hospital and became one of its CJR preferred providers as a result.

Several interviewees discussed hospital supply chain management, but noted that they had standardized device selection and narrowed the number of implant vendors well before the CJR model began. A few interviewees mentioned increased focus on supply chain management as a result of the CJR model, including one that explained that setting up gainsharing helped to engage surgeons who originally pushed back on efforts to standardize devices. Another described how they were looking for opportunities to standardize other surgical materials (e.g., cements), which could reduce internal costs, after successfully standardizing implants. Alternatively, one interviewee indicated that the hospital would not try to narrow the number of vendors in response to the model because past attempts resulted in surgeons threatening to leave the hospital. A couple of interviewees said that their hospitals were motivated by the CJR model to review evidence-based guidelines and standardize the use (or disuse) of certain devices, such as drains and continuous passive motion machines, across surgeons practicing at the hospital.

Case Study VII provides an in-depth look into one hospital's experience transforming its surgical supply chain.

In 2013, the hospital's parent system implemented a new program which aims to take a holistic view of surgical procedures through the entire care continuum, including the supply chain. The program incorporates multidisciplinary workgroups to understand how the hospital can bring greater value to its patients, physicians, staff, and vendors, which would translate into improved outcomes and reduced costs while reducing utilized resources and waste.

Patient pre-surgery optimization

Some interviewees outlined how their hospitals used risk stratification to identify higher risk patients so that they could work with them before their surgery to optimize their outcomes. They mentioned using existing programs and supports to, for example, help patients lose weight, control their diabetes, or stop smoking. A few interviewees indicated that since participating in the CJR model, surgeons might be encouraged to delay surgery if a patient was not in optimal condition. One interviewee's hospital had explored setting up a pre-operative clinic that would be a "one-stop shop" to focus on pre-surgical optimization of high-risk patients, but they could not figure out a funding strategy for the initiative. As part of its response to the CJR model, one hospital is launching a new pilot "prehab boot camp" to help overweight patients lose weight.

Patient education

Many hospitals provided pre-surgical classes, or "joint camps," for their LEJR patients. The content of the classes typically focused on setting expectations, discharge planning, identifying and mitigating risks to successful recovery, and caregiver engagement.

Most hospital interviewees indicated that the class was an opportunity to set patient expectations about the surgery and recovery. Interviewees frequently reported that the class educated patients to expect discharge home rather than to a SNF. A few interviewees noted that they also used the classes to prepare some patients to discharge to SNFs or other locations. One interviewee stated

that "[Patients] receiving a list of SNFs has been an important part of the pre-op education class. Recently, the star ratings from Medicare have been added to the SNF list and this has started conversations. Many patients also do their own research."

> *"The pre-op joint camp is a brand new series of classes (the hospital just started their second cohort) where patients work on diet, nutrition, exercise, and socialization of patients—talking to other patients who are going through similar things. Patients come in for 3 months, twice a week at one of the hospital system's outpatient facilities. Then there is the pre-op class that prepares patients for the inpatient stay. The joint camp works physically to get patients into shape."*
>
> – Direct Care Staff and Case Management, Hospital Interview

Several interviewees also noted that in addition to shaping patients' expectations for PAC, the pre-surgical classes provided an opportunity to identify and resolve both environmental and medical risks. One hospital direct care staff interviewee stated "when a patient is scheduled for their surgery, they are also scheduled for a pre-op class at the same time. The time interval before surgery is about 4 to 6 weeks so patients can start on their exercises, remove obstructions such as throw rugs, adapt bathrooms, and make sure they have someone at home to help them and encourage them." Another interviewee described a more in-depth joint camp, noting that it was used to mitigate multiple risk factors that could cause patients to have problems with recovery after LEJR surgery resulting in readmission. A couple of interviewees also mentioned that the CJR model has led to more focus on identifying whether patients have proper support at home, and if not, making sure they are discharged to a SNF instead of home.

Other common topics of pre-surgical education classes included engaging caregivers and introducing patients to physical therapy. One physical therapist said that he used the class to set "patients' expectations about what therapy is going to be like, so they feel no anxiety when they start physical therapy." Another interviewee said that in the classes, direct care staff "explain the exercises [used for physical therapy] and show them [the patients] what they should be doing pre-surgery."

> *"CJR did change our joint class slightly. Initially it was mostly about rehab and skilled nursing, with a minor focus on going home. It's been changed to focus more on going home. That was one of the biggest changes."*
>
> – Clinical Leadership, Hospital Interview

Interviewees indicated that the pre-surgical classes were an important part of hospitals' response to the CJR model. A few noted that they developed the classes as a direct response to the model. Others said that they already had joint classes, but enhanced their content or encouraged attendance more strongly since the CJR model. One interviewee noted "The pre-operative class was already in place. We have been able to achieve roughly 80% participation now, after a big push." Regardless of when classes were implemented, many of those interviewed said that they changed their pre-surgical education to encourage more patients to be discharged directly home and focused on information to make the home discharge successful. A few interviewees noted that they had not made any changes to their pre-surgical patient education in response to the model. These individuals noted either that

they already had robust patient education in place before the CJR model began or that they did not have sufficient resources to implement a class.

The majority of interviewees said that classes were not mandatory, although several indicated that there was increased emphasis on attendance. Several interviewees stated that some surgeons required their patients to attend and some hospitals expressed interest in making the class mandatory, however, some hospitals were reluctant to mandate attendance because of challenges like travel time and cost of transportation. To overcome barriers to class attendance, some hospitals offered alternatives like telephone calls to review the covered material or online videos or DVDs.

Discharge planning

When asked about discharge planning, many interviewees indicated that they had made changes in response to the CJR model, while other interviewees said that their existing discharge planning policies were sufficient to maximize patient outcomes.

There was variance in discharge planning start times, ranging from the initial office visit to discuss the surgery to the inpatient stay for the surgery. Even so, the most common theme was earlier initiation of discharge planning due to the CJR model. Several interviewees said they were starting discussions with patients about discharge planning during pre-surgical education. In fact, interviewees often discussed discharge planning and pre-surgical classes together because many noted that they used the classes to educate patients on strategies for a successful post-discharge recovery. One interviewee stated that "during pre-op teaching the patient completes a plan of where they want to go [after surgery]."

SNFs also noted that they were starting discharge planning earlier. Among interviewees, it was common to start discharge planning after the initial physical therapy (PT) assessment. One SNF employee stated that, "we discharge plan on day one of a patient's stay. Residents think they might be able to stay here forever. That's the part we're still working on."

Patient follow-up after discharge

> *"We've been following CJR patients with phone calls but the next evolution is to do home visits."*
>
> – Quality Improvement/Care Redesign Leadership, Hospital Interview

Many hospital interviewees discussed methods for LEJR patient follow-up, including the related challenges. Most of the interviewees who said they had formal patient follow-up strategies noted that they primarily relied on telephone calls to check on patients' progress post hospital discharge. A few mentioned having care coordinators systematically following up with SNFs on patient status or investing in data tracking and analysis software that allowed the hospital to track patients. Of the interviewees who mentioned calling patients, the majority indicated that they did so within the first three days of hospital discharge with many following up at the 30, 60, and 90 day post-discharge marks as well. While not as common, a few said that they called patients weekly during the 90-day episode.

Several interviewees noted that they would like to enhance their patient follow-up processes. Interviewees noted barriers to process improvement, including lack of dedicated care coordinators for patient follow-up and difficulties in tracking patients once they were "back in their communities." A few interviewees noted that they were planning to invest in telehealth infrastructure to help with patient follow-up after discharge.

Others reported developing concrete plans for future initiatives to improve patient follow-up in response to the CJR model. For example, a couple of interviewees noted that they had made investments in technology to help them further their patient monitoring after discharge. "They [outside contractors] have developed a two-way communication tool to allow us to interact with patients post discharge. This tool works either through text or email and it helps us collect PROs [patient reported outcomes]."

Using CMS data

Many interviewees discussed both the value of the episode data that CMS provided to participant hospitals as well as several challenges they encountered when trying to use the files.

> *"The data from outside of the hospital is stuff that we have never had. We never had any idea how much post-acute care costs. This data motivated us to go and tighten things up, although we can only control so much."*
>
> – Data Management, Hospital Interview

Interviewees indicated that the Medicare data they received because of their participation in the CJR model provided new information for designing and evaluating their response to the model. Many of the hospital interviewees previously did not have data on patients post-discharge and most had no data about their patients' PAC use. Staff at one hospital indicated that when the CJR model was announced, they felt prepared to meet the model's quality goals, but because they had not looked at costs for the entire LEJR episode, they felt less confident in their ability to meet the financial targets. Staff from another hospital explained that they previously did not know which patients were readmitted and had to rely on the surgeons to inform them of any readmission. Interviewees at several hospitals noted the value of the CMS episode data in understanding total episode costs, including the contribution of PAC use and readmissions.

Most interviewees noted difficulties using and analyzing the episode data from CMS. The most commonly cited reason was a lack of in-house capability to work with and draw insights from the CJR data files. Interviewees commonly reported that the hospital or health system invested in outside consulting services to manage and analyze the data, although some hospitals were not able or willing to make this investment. Many also indicated that they needed data closer to real-time, rather than with a six-month lag, to intervene in high-cost episodes or to evaluate the

> *"Because they need the 90-day runout for the episode and there is another 3 months for the claim lag, the hospital doesn't see what is going on for six months. It is difficult to develop initiatives if you don't understand what is going on with your patient population. We would like more real-time data."*
>
> – Data Management, Hospital Interview

impact of care redesign and other initiatives. However, an inherent limitation of claims data, particularly for episode analyses, is that there is a lag before claims are submitted to Medicare, and because the episode includes almost all services provided within the 90-day period following hospital discharge, there is an additional gap until the data are available. Other challenges mentioned included the changing format of the data, the complexity of the data dictionary, and issues with the data download and file conversion process.

b. How are CJR participant hospitals engaging in care coordination efforts with physicians and PAC providers?

Coordination and relationships: PAC partners

> *"I think things have changed slightly with skilled nursing facilities. It's just more of a partnership. […] We ask them more regularly if there are things we can help with."*
>
> – Direct Care Staff and Case Management, Hospital Interview

Many hospital interviewees described efforts to increase coordination with PAC providers to improve care under the CJR model. Coordination efforts often included educating PAC providers on the CJR model and bundled payments or a general increase in communication and collaboration between hospital and PAC staff. Some interviewees discussed regular meetings between hospital and PAC staff and introducing PAC providers to the quality or financial metrics hospitals were monitoring (e.g., readmissions, PAC length of stay (LOS) and progress measures developed by hospitals. One group of PAC provider interviewees said the hospital sends them a list of CJR patients that includes their Risk Assessment Prediction Tool (RAPT) scores to help them prepare for potential admissions. This group also discussed conducting additional needs assessments with CJR patients while they were in the hospital, if the patients were flagged by the care coordinator. They noted that these additional assessments helped identify patients who were at a higher risk of readmission due to issues such as stairs in the home, use of opioids, or unavailability of a caregiver. Hospitals often used care coordination staff to work with PAC providers during the inpatient stay or after discharge; however, many interviewees noted that such practices were in place prior to the CJR model.

> *"Figuring out the post-acute care situation is the next bit we need to work on. CMS has the double-edged sword, allowing us to identify high performing providers, but preventing us from steering patients there. By giving patients the 'choice' we see some patients still getting home health 3 months after the surgery."*
>
> – Orthopedic Surgeon, Physician Group Practice Interview

The vast majority of hospital interviewees discussed developing networks or lists of preferred PAC providers. Some hospitals developed preferred PAC provider networks based on historical relationships with the provider; physician, care coordination staff, or patient preferences; or general impressions of the provider. Others used data-driven approaches and based their decisions on information such as star quality ratings, the frequency and intensity of PAC therapy schedules, readmission rates, or typical PAC LOS. Some interviewees used a combination of methods. For example, one hospital representative discussed narrowing their list of preferred SNFs based on existing relationships, location (to

ensure coverage of their catchment area), a minimum 3-star quality rating, SNF willingness to communicate and be collaborative, and locations where their hospitalists could visit patients. Despite identifying preferred providers, some hospital interviewees reported that honoring patient choice made it difficult to steer patients to preferred providers. Interviewees mentioned that patients commonly selected PAC providers that were close to their home or that had been used by other patients, their family members, or friends. Interviewees discussed the challenges in coordinating care with other providers. Some hospital interviewees indicated that SNFs were not motivated to decrease the LOS for LEJR patients or change care delivery practices without financial incentives or increased volume. In turn, some SNFs noted that while some hospitals led them to expect an increase in volume with a shorter LOS, they did not actually see an increase in volume. In some cases, SNFs noted that volume had actually decreased, which resulted in backfilling SNF beds with non-CJR patients.

Coordination and relationships: Orthopedic surgeons

In discussing changes to their relationships with orthopedic surgeons, hospital interviewees described fewer specific actions in response to CJR than they had with PAC providers. Increased physician engagement, especially through the identification of a champion, was mentioned often. Collaborative efforts commonly included surgeons working more closely with the pre-surgical education team, engaging in conversations with PAC providers, and participating in regular meetings (e.g., steering committees) with hospital administration.

Coordination and relationships: Gainsharing relationships

None of the hospitals interviewed were gainsharing with PAC providers, and the majority of hospital interviewees were not gainsharing with orthopedic surgeons during the first year of the model. Interviewees provided a variety of reasons for not having initiated gainsharing agreements (Exhibit 28). For PAC providers, hospital interviewees discussed challenges in having sufficient savings to share while also trying to balance steering patients toward less PAC utilization. Hospital representatives mentioned that it was often more effective to provide other incentives to PAC providers, such as inclusion on a preferred provider list or increased volume when possible. Only a few hospital interviewees indicated that they would be open to developing gainsharing agreements with PAC providers in the future.

Approximately one-third of the hospital interviewees, however, did report establishing gainsharing agreements with orthopedic surgeons. A few of these interviewees said the decision to gainshare was due to surgeon interest or the hospital's interest in modifying provider behaviors, such as increasing engagement in care redesign strategies, or encouraging visiting patients in SNFs.

Exhibit 28: Common Reasons for not Gainsharing with PAC Providers and Orthopedic Surgeons

Provider Type	Comments
Common reasons for not gainsharing with PAC providers	• Focusing on gainsharing with surgeons instead of PAC providers • Focusing on shifting patients toward less PAC utilization • The provision of other incentives in lieu of gainsharing • Low volume of LEJR patients does not justify gainsharing • No established relationships with PAC providers • Hospital ownership of PAC providers
Common reasons for not gainsharing with orthopedic surgeons	• Low LEJR patient volume • Direct employment of surgeons • Administrative burden of implementing a gainsharing program

Source: Lewin's analysis of site visit and provider interview data.

Note: LEJR = lower extremity joint replacement, PAC = post-acute care.

The most commonly reported outcome from gainsharing with surgeons was increased buy-in to care redesign activities, such as shifting PAC use from SNF to home, referring patients to preferred PAC providers, and standardizing implants. A few hospital interviewees felt that gainsharing amounts were not sufficient to incentivize behavior changes among orthopedic surgeons. Some hospital interviewees discussed specific challenges with the 50% cap on gainsharing, noting that such restrictions may limit additional physician engagement and thus hinder changes in practice patterns.

c. *How do CJR participant hospitals perceive the CJR model and its potential impact?*

Hospital perceptions of the impact of CJR

> *"Patient families are happier – they are empowered and informed about what they are going through with the surgery – they are educated. It starts at the doctor's office as early as consult. The mindset has a lot to do with the outcomes."*
>
> – Medical Director/Hospitalist, Hospital Interview

Nearly all interviewees felt that the CJR model either has or would significantly impact beneficiaries, providers, and hospitals through changes in care delivery, access, and quality. A majority of interviewees discussed the potential for positive effects of the CJR model on quality. Interviewees most often pointed to efforts to improve continuity of care across the episode as the primary positive impact of the CJR model. They also had positive impressions of initiatives to enhance patient education, engagement, care coordination and cooperation among providers. Interviewees noted that these efforts were largely responsible for recent improvements in patient care experiences and satisfaction. Many interviewees also mentioned that the CJR model had motivated efforts to discharge patients to their homes with home health or outpatient rehabilitation, instead of institutional PAC. These interviewees felt that less institutional PAC reduced adverse patient outcomes as well as lowered average episode costs. Interviewees were careful to note, however, that these successes could not be entirely or directly attributed to the CJR model alone; efforts to optimize patient discharge often began prior to the CJR model,

though some interviewees noted that the model encouraged enhancements to existing efforts. (Section II.B.2.b discusses claims analyses that document reduced use of institutional PAC.)

Despite the perceived benefits of the CJR model, many interviewees also noted potential concerns about quality and patient outcomes. Several interviewees mentioned that they felt the model could result in limited choices for patients and their doctors by encouraging shorter lengths of stay and lower intensity PAC settings. These interviewees felt that providers were often under pressure to balance the needs of the patient with hospital clinical care pathways that were often stricter as a result of the CJR model. Others indicated that they thought that the model's financial incentives and pressures were ineffective and inappropriate methods of improving patient care. A large number of these interviewees speculated that patient risk stratification by hospitals and surgeons could have undesirable consequences on higher risk patients, indicating that while pre-surgical patient optimization may appropriately delay care for some less healthy patients, it could also result in some patients who were viewed as too risky not receiving surgery at all. Most of these interviewees added that they believed the traditionally underserved populations (e.g., those with low socioeconomic status or who were dually eligible for Medicare and Medicaid) would likely be disproportionately impacted by this practice due to their higher rates of comorbid conditions. (Section II.B.3.a discusses claims analyses of patient characteristics, which indicate no changes in characteristics of CJR patients relative to control patients.)

Example case study at Hospital C:

"Several interviewed staff members expressed concern about whether the proportion of patient discharges to home with HH or outpatient care can be increased, given the socioeconomic climate in the area. Many hospital staff noted that while they believe the best patient outcomes occur at home, they are hesitant to discharge patients to home who may be medically complex or reside in substandard living conditions. Given these socioeconomic realities, it remains to be seen whether further reductions in SNF admissions or length of stay are possible for Hospital C."

"If patients need to go to a SNF, they need to go, but now you'll feel the pressure about a high cost on you and the hospital."

– Clinical Leadership, Hospital Interview

> *"Our biggest concerns [with CJR] were the social barriers for our patients. It's easier when people you're sending home have a family member who can take a week off of work to be a caretaker, or even just have running water. Having to look at it from the perspective of our patients who don't necessarily have those things makes everything look different. For these reasons, it's unfortunate that people are comparing us to other hospitals, even nearby ones. Social determinants of health need to be recognized in these models."*
>
> – Executive Leadership, Hospital Interview

Moreover, a handful of interviewees indicated concern that the CJR model could have potential unintended effects for individuals who have substantial non-medical needs or substandard housing. Their concern centered on patients who would be clinically ready for a discharge home but who lacked housing conducive to their recovery (e.g., ground floor access, bathroom grab bars) or a suitable caregiver to assist with functional needs. Interviewees indicated that the CJR model encouraged earlier discharges home, which could result in increasing risk for readmissions or additional medical costs for these patients. (Section II.B.2.c on readmission rates indicates no increase under CJR.)

Hospitals also discussed the impact to their operations and financial conditions. While some CJR participant hospitals acknowledged the potential to receive reconciliation payments as a result of the actions they took in response to the CJR model, they also indicated that any potential savings or positive reconciliation amounts might be offset by increased costs from investments in care delivery and redesign, such as changes in staffing or working with external consultants. This is illustrated by an interviewee who noted, "Any potential savings or positive reconciliation amounts will be offset by increased costs from investments."

III. Discussion and Conclusion

A. Discussion

During the first performance year for the CJR model, average Medicare payments for LEJR episodes decreased by 3.3% more for CJR episodes than for control group episodes, primarily because of reduced use of institutional PAC. At the same time, quality of care was maintained, as indicated by claims-based quality measures. The CJR model resulted in lower payments for both elective LEJR episodes and LEJR episodes due to fracture. There was a 3.6%, or $880, relative reduction in total payments for elective LEJR episodes, which accounted for 88% of total LEJR episode volume. There was a 3.0%, or $1,345, relative reduction in payments for LEJR episodes due to fracture. Further, we observed a statistically significant relative decrease in average total episode payments in both MSAs with historically high episode payments and MSAs with historically low episode payments. The relative payment reduction in historically high payment MSAs was 3.9% or $1,127, compared with 2.3% or $577, in historically low payment MSAs.

These positive early results are particularly notable because hospitals were mandated to participate in the CJR model. This means that rather than making a business decision to join a voluntary model, CJR participant hospitals had to evaluate their available resources and market conditions to determine whether and how to act in response to the model's incentives. In addition, CJR participant hospitals are likely more representative of all acute care hospitals than those that would have opted into a voluntary model. These findings suggest that a mandatory model may impel action across a broad range of hospitals that may not otherwise have acted to reduce episode payments. As the evaluation of the CJR model progresses, we will be able to more fully explore the factors that affect hospitals' actions and outcomes under the model, as well as broaden our analyses of variation in impact across MSAs, hospitals, and patients.

CJR participant hospitals successfully reduced total episode payments largely by changing patterns of PAC. Payments for institutional PAC were reduced by lowering utilization and by substituting lower payment PAC for higher payment PAC settings. Interviews with hospital representatives confirmed that they engaged in actions to change PAC use as a response to the CJR model. Interviewees described focusing on patient education prior to admission, discharge planning earlier in the episode, setting patient expectations about discharge home, and initiating therapy earlier in the hospital stay. These actions were all intended to lower discharges to institutional PAC. In addition, interviewees said that they stepped up care coordination with PAC providers and developed networks of preferred PAC providers to reduce PAC lengths of stay. Although many interviewees said that they were engaged in these activities prior to the implementation of the CJR model, they often indicated that they expanded these efforts because of the incentives of the CJR model.

At the same time, hospital representatives noted in interviews that it was challenging to affect utilization to reduce payments and impact quality for services they did not directly control. They pointed out, for example, that they were trying to reduce the number of LEJR patients discharged to a SNF while also trying to shorten the SNF length of stay for their patients who received SNF

care. These actions would reduce SNF revenues, making it harder to enlist the cooperation of the SNFs to work together to redesign care across the entire episode. In performance year 1, none of the hospitals interviewed reported gainsharing with PAC providers; we will continue to ask about gainsharing and whether and how its use changes during the course of the model. With more time and experience under the CJR model, we can explore the use of gainsharing and whether it contributes to aligning financial interests to help achieve common goals.

Even as CJR participant hospitals engaged in actions to reduce PAC use, we heard of PAC providers taking the initiative to work with hospitals to streamline and strengthen care protocols in return for preferred referral status with the hospital. Market conditions, such as the dominance of a CJR hospital in the area and PAC provider capacity, are likely to affect how hospitals and PAC providers align and how care coordination evolves.

Orthopedic surgeons and surgery groups are also likely to be key in affecting change over the entire LEJR episode. Few hospitals, however, indicated in interviews that they entered into gainsharing agreements with surgeons; some said that the savings would be too small to share and subsequently affect physician behavior. Others suggested that they had entered into gainsharing agreements with surgeons to enlist their support in achieving internal cost savings. Although reducing the internal costs of the anchor hospitalization would not affect the LEJR episode payments under the CJR model, this action could affect how CJR participant hospitals view the model. We will continue to explore whether and how participant hospitals use gainsharing to engage physicians and whether the CJR model affects internal hospital costs.

Another strategy hospital representatives indicated that they used to respond to the CJR model was risk stratification to target additional resources to LEJR patients who needed higher intensity PAC or would be at a higher risk of readmission. Risk stratification identified individuals with common risk factors, such as obesity, diabetes, or smoking, associated with poorer outcomes after surgery. Hospitals used this information to encourage patients identified as high risk to attend additional education or counseling. In some instances, interviewees indicated that the LEJR surgery was postponed until the patient addressed their risk. Surgeons and others involved in the episode noted that these changes successfully lowered the risk of the surgery and optimized patient outcomes. Other hospital interviewees expressed concerns that these strategies could reduce access to LEJR for a subset of individuals who could benefit from the surgery. We found no evidence to date, however, of access problems due to the CJR model, but we will continue to monitor this as a potential unintended consequence.

There was no change in claims-based quality measures for patients with LEJR episodes, relative to the control group. This was reassuring, given the statistically significant changes in Medicare payments and PAC utilization. The model is designed to incentivize improvements in quality. As the data become available, we will evaluate whether hospitals are improving on the quality measures that affect their quality-adjusted target prices and any variations across providers in achieving improvements. We will also be able to incorporate patient survey data on self-reported

functional status and care experience, as well as changes in functional status for patients who were discharged to a SNF, IRF, or HHA.

B. Future Analyses

Future reports will include additional measures from patient surveys, reconciliation data, and patient assessments, which were not available in time to include in this report. We will also have data from hospital surveys, a clinical review panel, and additional site visits and telephone interviews. With more time under the CJR model, the added claims data will support additional stratified analyses to better understand the variations in impact across markets, hospitals, and patients. We will be able to address additional questions including any impacts on referral patterns or the health care market, the potential to expand or scale the model, and additional unintended consequences. Finally, we will continue to triangulate information across the various quantitative and qualitative data sources to support more robust conclusions to incorporate into future reports.

This annual report covers results for the first performance year when participation in the CJR model was mandatory in all 67 MSAs. The design of the model changed in performance year 3 with hospitals in the 34 MSAs with the highest average historical episode payments remaining mandatory. Beginning in performance year 3, hospitals in the other 33 MSAs and rural and low volume hospitals were no longer required to participate, although they could choose to opt in to the CJR model for the final three performance years. Future evaluation reports will reflect on the changing nature of the model and what we have learned as we continue this evaluation.

C. Limitations

This annual report provides an early snapshot of the impact of the CJR model during its first performance year on average episode payments relative to a control group. We have not estimated the impact of the CJR model on Medicare program savings because NPRA data were not available and we have not yet estimated whether the volume of episodes changed due to CJR. Although the mandatory, randomized design of the CJR model resulted in a control group that closely matched the treatment group on characteristics thought to influence episode payment and quality, there could be unobserved differences that affect the accuracy of our estimates of the differential change in outcome measures between CJR and control episodes. Our evaluation includes numerous outcomes, which increases the risk of rejecting the null hypothesis of no effect when in reality the null hypothesis is true. We believe that the majority of our results are unaffected by this problem but we plan to implement adjustments to account for this potential statistical problem.

The analysis of the site visit and provider telephone interview data provide descriptions of themes, patterns, or taxonomies in response to our protocols, which may not represent all CJR participants. For both site visits and interviews, we intentionally oversampled hospitals that had historically high average episode payments relative to their quality-adjusted target price. This

was to ensure that we heard about the widest range of strategies implemented in response to the model from hospitals with the most need to respond.

D. Conclusion

Results from the first performance year of the CJR model are promising and indicate that a mandatory bundled payment approach for LEJR episodes can achieve per episode payment reductions while maintaining quality for both planned LEJR episodes and those due to fracture. In response to the CJR model, participant hospitals said they continued with care redesign efforts and engaged in strategies to change PAC use after hospital discharge.

Possibly the most notable outcome during the first CJR model performance year was that statistically significant changes in utilization and payments occurred so quickly. With approximately nine months of implementation, the CJR model resulted in outcomes that are consistent with what has been achieved in other bundled payment initiatives. More time under the initiative will help determine if continued improvements can be achieved.

Our mixed methods approach allows us to conclude, even with less than a full year under the CJR model that bundled payments for LEJR episodes results in reduced payments. Even when participants do not choose to participate in a bundled payment model, they can respond to the financial incentives to shift to more efficient patterns of care during the episode. More time under the model, as well as the opportunities created with the changes to reduce the number of mandatory MSAs, will expand the information about the impact of the CJR model. Future reports will contrast differential impacts across different types of participants, markets, and patients to provide more nuanced information about the promise and possibilities of this alternative payment approach for the Medicare program.

IV. Methods

This report used a variety of data sources and methods to evaluate the impact of the CJR model during the first performance year. Secondary data sources, such as claims and enrollment data, were used to construct key outcome measures to examine changes in payments, utilization, quality, and patient mix. The primary analytic method for these quantitative data was DiD with risk adjustment to control for any remaining differences between the CJR and control group. We also collected primary data from site visits and telephone interviews with providers. We used qualitative methods, including thematic analysis and case studies, to examine primary data. The sections that follow provide additional methodological information; readers can also reference Appendix C for detailed specifications of data sources, measures, study population, and analytic methods.

A. Data Sources

Secondary data sources. Secondary data sources were used to calculate outcomes for payment, utilization, and quality; characterize patients, episodes, hospitals, and markets; and sample CJR participant hospitals for participation in site visits and provider telephone interviews (Exhibit 29).

Exhibit 29: Key Secondary Data Sources and their Use

Use	Key Secondary Data Sources
Payment, utilization, and quality Outcomes	Medicare fee-for-service claims[a]
	Medicare standardized payments
Patient and episode characteristics	Medicare fee-for-service beneficiary enrollment data
	Master Data Management (MDM) to identify ACO participation
Hospital characteristics	Provider of Services (POS) file
	Acute Inpatient Prospective Payment System (IPPS) data files
	Medicare Provider Enrollment, Chain, and Ownership System (PECOS)
Market characteristics	Area Health Resource File (AHRF)
	US Census Bureau's American Community Survey
Sampling CJR participant hospitals for site visits and provider telephone interviews	CJR programmatic data from CMS (NPRA, quality-adjusted target price, quality, participant lists)
	American Hospital Association (AHA) Survey

Notes: ACO = accountable care organization, NPRA = net payment reconciliation amount.

[a] A minimum three month claims run out was used for episodes included in this report.

Primary data sources. We collected and analyzed primary data to inform questions that are not readily answered by secondary data. In the first year of the evaluation, we completed site visits to nine hospitals and related providers in four MSAs and telephone interviews with 69 providers. The site visits allowed for in-depth discussions with staff from hospitals, orthopedic surgical practices, HHAs, and SNFs about CJR model implementation experiences, characteristics of local markets that affected CJR model response strategies, factors that could explain variation in

key outcomes, and early successes under the model.[32] The provider telephone interviews allowed for efficient collection of targeted information from CJR participant hospitals, including hospitals' perspectives on the impact of the CJR model on Medicare beneficiaries, the hospital itself, providers, and local market dynamics and hospitals' relationships with PAC providers.[33]

B. Measures

Exhibit 30 shows claims-based measures for Medicare payment, utilization, and quality outcomes and patient characteristics.

Exhibit 30: Claims-Based Outcome Measures

Measure Category	Measure Name/Description
Medicare Payments[a]	Total Medicare standardized allowed amounts included in the episode, inpatient anchor hospitalization through the 90-day PDP
	Medicare standardized allowed amounts per episode, by service, 90-day PDP[b]
Utilization	First post-acute discharge was to IRF
	First post-acute discharge was to SNF
	First post-acute discharge was to HHA
	Number of IRF days, 90-day PDP[c]
	Number of SNF days, 90-day PDP[c]
	Number of HHA visits, 90-day PDP[c]
	Acute inpatient care length of stay
Quality	Unplanned readmission, 90-day PDP
	Emergency department visit, 90-day PDP
	All-cause mortality, inpatient stay and 90-day PDP[d]
	Incidence of any complications, 90-day PDP[e]
Patient Characteristics	Age
	Sex
	Race/ethnicity
	Medicaid eligibility
	Disability, no ESRD
	Hip fracture status
	HCC score
	Utilization in the six months prior to the anchor hospitalization[f]

Notes: ESRD = end-stage renal disease, HCC = hierarchical condition category, HHA = home health agency, IRF = inpatient rehabilitation facility, PDP = post-discharge period, SNF = skilled nursing facility.

Definitions of specific outcome measures (including any exclusion criteria) are included in Appendix E.

[a] Payments are the standardized Medicare allowed amounts. Standardization removes wage adjustments and other Medicare payment adjustments. Allowed amounts include beneficiary cost sharing.

[b] Services include inpatient readmissions, IRF, SNF, HHA, and services covered under Medicare Part B.

[32] Site visit interview protocols are in Appendix D.

[33] Provider telephone interview protocols are in Appendix D.

[c] The eligible sample for these measures is based on the first PAC setting (IRF, SNF, or HHA) to which a patient was discharged after the anchor hospitalization.

[d] Under the CJR model, death during the anchor hospitalization or 90-day PDP cancels the episode. Therefore, to estimate the all-cause mortality rate, this analysis includes CJR and control group episodes as well as beneficiary admissions at CJR and control group hospitals that would have been identified as episodes if the beneficiaries had not died during the anchor hospitalization or 90-day PDP.

[e] This quality measure is the THA/TKA Complications measure (NQF #1550) used in the CJR model to determine quality performance for elective LEJR procedures.

[f] Prior utilization includes acute care inpatient, SNF, IRF, HHA, hospice, other Part A inpatient, long-term care hospital, and custodial nursing facility service utilization in the six months prior to the anchor hospitalization.

C. Study Population

Hospital participation for the CJR model was based on the MSA in which the hospital was physically located. MSAs were selected for CJR participation using a stratified random sampling methodology. MSAs were stratified into eight strata based on historical wage-adjusted episode payments and population size. Within each stratum, MSAs were randomly selected to participate in the CJR model. CMS over-sampled MSAs with higher average episode payments with the rationale that they were most likely to have opportunities to lower episode payments. The control group of hospitals was selected from the MSAs that were eligible for the CJR model but not selected to participate. The final study population comprised 731 CJR participant hospitals in 67 MSAs and 841 control group hospitals from 104 MSAs.[34]

D. Quantitative Analysis of Secondary Data

To control for both observed and unobserved differences in patient characteristics and other factors that could affect the CJR model outcomes we used a DiD approach. The DiD approach estimates the change in outcomes for beneficiaries with episodes initiated at CJR participating hospitals between the baseline and the intervention periods relative to that same change for beneficiaries with episodes initiated at control group hospitals. One critical assumption of the DiD estimate is that the outcomes for the CJR and control groups exhibit parallel trends during the baseline period. All outcome measures passed the parallel trends test.

To account for any remaining differences after randomization between the CJR and control group populations, outcomes were risk-adjusted for major complications or comorbidities as indicated by the anchor MS-DRG, hip fracture status, procedure type (hip or knee), patient characteristics (age, sex, and race/ethnicity), Medicaid eligibility status, and disability status.

To control for prior health conditions, we used HCC indicators calculated for the 12 months prior to the anchor hospitalization. We also included measures of prior care use in the following settings: acute care IPPS hospital, long-term care hospital (LTCH), SNF, IRF, hospice, other Part A inpatient, HHA, and custodial nursing facility. To account for participation in other Medicare

[34] The number of CJR participant hospitals in our study is lower than the number of CJR participant hospitals listed on the CMS website (n=799, as of October 26, 2017) because we excluded hospitals that entered CJR after December 31, 2016 and hospitals in CJR and control group MSAs that did not perform LEJRs during the baseline and intervention periods.

initiatives, we used an indicator variable to identify whether the beneficiary was in the Medicare Shared Savings Program, Pioneer ACO Model, or Next Generation ACO Model during the episode. For provider characteristics, we adjusted for hospital bed count, for-profit status, previous BPCI LEJR experience, and previous BPCI experience in a clinical episode other than LEJR. Finally, to account for regional differences, we included state dummies in all regression models (Exhibit 31).

Exhibit 31: Predictive Risk Factors Used to Risk-Adjust Claims-based Outcomes

Domain	Variables
Service mix	• With or without major complications or comorbidities as indicated by anchor MS-DRG • Hip fracture status[a] • Procedure type (hip or knee)
Patient demographics and enrollment	• Age (under 65, 65-79, 80+) • Sex • Race/ethnicity • Medicaid status • Disability status • Attribution to Medicare Shared Savings Program, Pioneer ACO Model, or Next Generation ACO Models during CJR episode
Prior health conditions	• CMS-HCC version 21 indicators from qualifying services and diagnoses (those meeting a threshold of at least 1%) from claims and data for 12 months preceding the anchor hospitalization
Utilization measures preceding the start of the qualifying anchor hospitalization	• Prior use variables used in risk adjustment varied by model[b] ▪ Binary indicators for acute care inpatient, SNF, IRF, HHA, hospice, other Part A inpatient, LTCH, and custodial nursing facility service utilization in the six months preceding the start of the episode ▪ Number of days of acute care inpatient, SNF, IRF, HHA, hospice, and Part A inpatient service use in the one month preceding the start of the episode ▪ Number of days of acute care inpatient, SNF, IRF, HHA, hospice, other Part A inpatient, and LTCH service use in the six months preceding the start of the episode
Geography	• State indicators
Hospital provider characteristics	• Bed count • For-profit status • BPCI LEJR experience[c] • BPCI experience in a clinical episode other than LEJR

Notes: ACO = accountable care organization, BPCI = bundled payments for care improvement, HCC = hierarchical condition category, HHA = home health agency, IRF = inpatient rehabilitation facility, LEJR = lower extremity joint replacement, LTCH = long-term care hospital, MS-DRG = Medicare severity-diagnosis related group, SNF = skilled nursing facility.

[a] Models were also estimated separately for fracture episodes and elective episodes in addition to risk adjusting for fracture in models that combined fracture and elective episodes.

[b] The optimal specification for each prior use variable was chosen using the goodness of fit criteria for each outcome.

[c] CJR participant hospitals that previously participated in the risk-bearing phase of BPCI for LEJR were included in the analysis. However, to be included in the control group, hospitals could not have participated in the risk-bearing phase of BPCI for LEJR.

We used a variety of regression model specifications (logistic, Poisson, OLS, and two-part models) to appropriately model outcome measures of various types and accounted for clustering at the MSA level given the design of the CJR model. We conducted sensitivity analyses with

respect to model specification, which confirmed the robustness of our results. We report overall model results, as well as the impact on outcomes separately for elective LEJR and LEJR due to fracture because of their different underlying costs and patient complexity. Further, we estimated the impact of the CJR model on outcomes separately for episodes occurring in historically high payment MSAs and low payment MSAs,[35] as CMS posited with their sampling that a greater reduction in payments would be observed in historically high payment MSAs.

E. Qualitative and Mixed Methods Analysis

We developed protocols for site visit and provider telephone interviews. During the interviews, we took notes and, if the interviewee agreed, recorded the interviews. Recordings were used to enhance interviewer notes. Notes from both site visits and provider telephone interviews were organized and entered into Atlas.ti software (version 7.5.18; Scientific Software Development GmbH, Berlin, Germany) for coding and analysis.

We developed an initial analytic codebook based on the site visit and provider telephone interview protocols. The codebook contained categories used with the Atlas.ti software to characterize interview notes and identify key themes across hospitals and markets. The codebook was refined during our analysis to better capture patterns related to the CJR model as they were identified.

To ensure that staff were consistently applying codes to notes, we calculated Cohen's kappa, a measure of inter-coder agreement, on a 5% sample of interview files across provider telephone interviews and site visit summaries. Assessing inter-coder agreement in this way is important for ensuring that themes are reliably captured across coders. Cohen's kappa results ranged from 0.5 (moderate agreement) to 0.72 (good agreement) between coders.

We used a case study approach to describe start-up and implementation experiences for the hospitals that participated in site visits. After each site visit, we reviewed the data and identified an interesting or illustrative topic to explore in greater detail and prepared a case study to highlight the hospital's experience with the topic. Most topics involved a strategy that had been initiated by the hospital as a response to the CJR model, such as the development of a preferred PAC provider list. As appropriate, additional research, such as interviews, examination of MSA-level socioeconomic characteristics, or review of relevant literature, was used to supplement the site visit data for the case studies.

In addition to completing a case study for each hospital (Exhibit 32 and Appendix G), we incorporated the case study findings into the annual report to provide contextual examples when appropriate. The inclusion of case studies in this way allows a more comprehensive understanding

[35] High versus low payment MSAs were defined based on the MSA sampling strata used by CMS to select the 67 CJR MSAs. MSAs were grouped as high payment if in the top two quartiles of historical LEJR payments, and MSAs were grouped as low payment if in the bottom two quartiles of historical LEJR payments. All outcome measures passed the parallel trends test when stratified by high versus low payment MSAs.

of the effects of the CJR model on hospitals and their associated PAC providers and orthopedic surgery groups.

Exhibit 32: Case Study Topics

Case Study	Topic
I	Gainsharing between hospital and orthopedic surgeons
II	Challenges faced during the first year of CJR
III	Developing preferred provider lists and use of patient score cards
IV	Changing discharge patterns through pre-operative education
V	Prior experience with bundled payment models
VI	Lean methodology as a process improvement strategy
VII	Improving trust and collaboration between orthopedic surgeons and hospital administrators
VIII	Discharge planning strategies
IX	Transforming the surgical supply chain